Curia New Mexico, LLC
4401 Alexander Blvd. NE
Albuquerque, NM 87107

Air Permit Modification Application – Update to Reflect Final Selections for New Diesel-Fired Emergency Generator and Natural Gas-Fired Boiler

Construction Permit No. 1097-M5-1AR

22 December 2023

Project No.: 0654619

ERM

Table of Contents

Attachment 1

Permit Application Checklist

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Application Checklist

This checklist must be returned with the application

Any person seeking a new air quality permit, a permit modification, or an emergency permit under 20.11.41 NMAC (Construction Permits) shall do so by filing a written application with the Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

The Department will rule an application administratively incomplete if it is missing or has incorrect information. The Department may require additional information that is necessary to make a thorough review of an application, including but not limited to technical clarifications, emission calculations, emission factor usage, additional application review fees if any are required by 20.11.2 NMAC, and new or additional air dispersion modeling.

If the Department has ruled an application administratively incomplete three (3) times, the Department will deny the permit application. Any fees submitted for processing an application that has been denied will not be refunded. If the Department denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

The following are the minimum elements that shall be included in the permit application before the Department can determine whether an application is administratively complete and ready for technical review. It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.

At all times before the Department has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Department. The applicant's duty to supplement and correct the application includes but is not limited to relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Department's review and decision. While the Department is processing an application, regardless of whether the Department has determined the application is administratively complete, if the Department determines that additional information is necessary to evaluate or make a final decision regarding the application, the Department may request additional information and the applicant shall provide the requested additional information.

NOTICE REGARDING PERMIT APPEALS: A person who has applied for or has been issued an air quality permit by the Department shall be an obligatory party to a permit appeal filed pursuant to 20.11.81 NMAC.

NOTICE REGARDING SCOPE OF A PERMIT: The Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City Planning Department or County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City Planning Department website at https://www.cabq.gov/planning and the County Department of Planning and Development Services website at https://www.bernco.gov/planning.

The Applicant shall:

20.11.41.13(A) NMAC – Pre-Application Requirements:

Item	Completed	N/A[1]	Waived[2]
(1) Request a pre-application meeting with the Department using the pre-application meeting request form. Include a copy of the request form submitted to the Department.	☒	☐	☐
(2) Attend the pre-application meeting. Date of pre-application meeting: **11/30/23**	☒	☐	☐
Pre-application meeting agenda and public notice sign checklists included with application?	☒	☐	☐

1. *Not Applicable*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*

20.11.41.13(B) NMAC – Applicant's Public Notice Requirements:

Item	Included in Application	N/A[1]	Waived[2]
(1) Provide public notice in accordance with the regulation, including by certified mail or electronic copy to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.	☒	☐	☐
• Contact list of representative(s) of recognized neighborhood associations and recognized coalitions cannot be more than three months old from the application submittal date. • Include contact list provided by Department in application submittal.	☒	☐	☐
• Provide notice using the Notice of Intent to Construct form and Applicant Notice Cover Letter.	☒	☐	☐
(2) In accordance with the regulation, post and maintain in a visible location a weather proof sign provided by the Department. Include pictures in application.	☒	☐	☐
Documentary proof of all public notice requirements listed above and required by 20.11.41.13(E)(15) included with application?	☒	☐	☐

1. *Not Applicable; For emergency permits, the public notice requirements in 20.11.41.24 NMAC shall apply instead.*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*

20.11.41.13(D) NMAC

Item	Included in Application
A person who is seeking a construction permit pursuant to 20.11.41 NMAC shall complete a permit application and file one complete original and one duplicate copy with the Department.	☒
• A high-quality electronic duplicate copy is required by the Department to speed up review and allow for the Department public notice to be posted online. The electronic copy must be an exact duplicate of the hardcopy original, including pages with signatures such as the application certification page. Note: Do not include financial information, such as a copy of a check, in the electronic PDF.	☒
The electronic submittal on thumb drive, unless alternate method is allowed by the Department, must also include modeling files, if applicable, and emission calculations file(s) in Microsoft Excel-compatible format.	☒

The Permit Application shall include:

20.11.41.13(E) NMAC – Application Contents

Item	Included in Application	N/A[1]	Waived[2]
(1) A complete permit application on the most recent form provided by the Department.	☒	☐	☐
(2) The application form includes:			
a. The applicant's name, street and post office address, and contact information;	☒	☐	☐
b. The facility owner/ operator's name, street address and mailing address, if different from the applicant;	☒	☐	☐
c. The consultant's name and contact information, if applicable;	☒	☐	☐
d. All information requested on the application form is included (*i.e.*, the form is complete).	☒	☐	☐
(3) The date the application was submitted to the Department.	☒	☐	☐
(4) Sufficient attachments for the following:			
a. Ambient impact analysis using an atmospheric dispersion model approved by the U.S. Environmental Protection Agency, and the Department to demonstrate compliance with the applicable National Ambient Air Quality Standards (NAAQS). *See* 20.11.1 NMAC. If you are modifying an existing source, the modeling must include the emissions of the entire source to demonstrate the impact the new or modified source(s) will have on existing plant emissions.	☐	☒	☐
b. The air dispersion model has been executed pursuant to a protocol that was approved in advance by the Department.	☐	☒	☐
c. Air dispersion modeling approved (or 2nd denied) protocol date:	☐	☒	☐
d. Basis or source for each emission rate (including manufacturer's specification sheets, AP-42 section sheets, test data, or corresponding supporting documentation for any other source used).	☒	☐	☐
e. All calculations used to estimate potential emission rates and controlled/proposed emissions.	☒	☐	☐
f. Basis for the estimated control efficiencies and sufficient engineering data for verification of the control equipment operation, including if necessary, design, drawing, test report and factors which affect the normal operation.	☒	☐	☐
g. Fuel data for each existing and/or proposed piece of fuel burning equipment.	☒	☐	☐
h. Anticipated maximum production capacity of the entire facility and the requested production capacity after construction and/or modification.	☒	☐	☐
i. Stack and exhaust gas parameters for all existing and proposed emission stacks.	☒	☐	☐
(5) An operational and maintenance strategy detailing:	☒	☐	☐
a. the steps the applicant will take if a malfunction occurs that may cause emission of a regulated air contaminant to exceed a limit that is included in the permit;	☒	☐	☐
b. the nature of emissions during routine startup or shutdown of the source and the source's air pollution control equipment; and	☒	☐	☐
c. the steps the applicant will take to minimize emissions during routine startup or shutdown.	☒	☐	☐
(6) A map, such as a 7.5'-topographic quadrangle map published by the U.S. Geological Survey or a map of equivalent or greater scale, detail, and precision, including a City or County zone atlas map that shows the proposed location of each process equipment unit involved in the proposed construction, modification, or operation of the source, as applicable.	☒	☐	☐

Item	Included in Application	N/A[1]	Waived[2]
(7) An aerial photograph showing the proposed location of each process equipment unit involved in the proposed construction, modification, relocation or technical revision of the source except for federal agencies or departments involved in national defense or national security as confirmed and agreed to by the Department in writing.	☒	☐	☐
(8) A complete description of all sources of regulated air contaminants and a process flow diagram depicting the process equipment unit or units at the facility, both existing and proposed, that are proposed to be involved in routine operations and from which regulated air contaminant emissions are expected to be emitted.	☒	☐	☐
(9) A full description of air pollution control equipment, including all calculations and the basis for all control efficiencies presented, manufacturer's specifications sheets, and site layout and assembly drawings; UTM (universal transverse mercator) coordinates shall be used to identify the location of each emission unit.	☒	☐	☐
(10) A description of the equipment or methods proposed by the applicant to be used for emission measurement.	☒	☐	☐
(11) The maximum and normal operating time schedules of the source after completion of construction or modification, as applicable.	☒	☐	☐
(12) Any other relevant information as the Department may reasonably require, including without limitation:	☒	☐	☐
a. Provide an applicability determination for all potentially applicable federal regulations.	☒	☐	☐
b. Applicants shall provide documentary proof that the proposed air quality permitted use of the facility's subject property is allowed by the zoning designation of the City or County zoning laws, as applicable. Sufficient documentation includes: (i) a zoning certification from the City Planning Department or County Department of Planning and Development Services, as applicable, if the property is subject to City or County zoning jurisdiction; or (ii) a zoning verification from both planning departments if the property is not subject to City or County zoning jurisdiction.[3] A zone atlas map shall not be sufficient.	☒	☐	☐
c. Compliance History Disclosure Form[4]	☒	☐	☐
(13) The signature of the applicant, operator, owner or an authorized representative, certifying to the accuracy of all information as represented in the application and attachments, if any.	☒	☐	☐
(14) A check or money order for the appropriate application fee or fees required by 20.11.2 NMAC, *Fees*. (Online fee payments are now accepted as well. Application must be submitted first, then Department will provide invoice for online payment.)	☒	☐	☐

1. *Not Applicable*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*
3. *Applicants are not required to submit documentation for the subject property's zoning designation when applying for a relocation of a portable stationary source, or a technical or administrative revision to an existing permit.*
4. *Required for applications filed pursuant to the following regulations: Construction Permits (20.11.41 NMAC); Operating Permits (20.11.42 NMAC); Nonattainment Areas (20.11.60 NMAC); Prevention of Significant Deterioration (20.11.61 NMAC); and Acid Rain (20.11.62 NMAC); except this Form shall not be required for asbestos notifications under 20.11.20.22 NMAC, and this Form shall only be required for administrative permit revision (20.11.41.28(A) NMAC) and administrative permit amendments (20.11.42.12(E)(1) NMAC) when the action requested is a transfer of ownership. Air Quality Program staff can answer basic questions about the Compliance History Disclosure Form but will not provide specific advice about which boxes to check or whether information must be disclosed. The decision about how to answer a question and whether there is information to disclose is the responsibility of applicants/permittees.*

Attachment 2

Final Pre-Permit Application Meeting Request Form

City of Albuquerque
Environmental Health Department
Air Quality Program

Pre-Permit Application Meeting Request Form

Please complete appropriate boxes and email to aqd@cabq.gov or mail to:

Environmental Health Department
Air Quality Program
Permitting Division
P.O. Box 1293
Albuquerque, NM 87103

A copy of this form must be included as part of the application package.

Company/Organization: Current Permit #:	**Curia New Mexico, LLC** **1097-M5**
Point of Contact: (phone number and email): Preferred form of contact (check one): ☐Phone ☒E-mail	Name: **Tawnya Chott** Phone: **720-200-7137** Email: **Tawnya.Chott@erm.com**
Preferred meeting date/times: Preferred meeting type (Zoom/In Person):	**11/27/2023 (09:00 -11:00)** **11/29/2023 (11:00 -15:00)** **11/30/2023 (8:00 - 9:00 or 11:00-1500)** **Zoom**
Description of Project:	Curia New Mexico, LLC (Curia), located at 4401 Alexander Blvd, previously submitted a permit modification for the addition of one 1750-kW diesel-fired standby/emergency generator (Unit 6) and one 16,700 MBTU/hr natural gas fired boiler (Unit 7). The emissions were estimated based on design specifications for units that had not been purchased for installation at the time of the application. Curia did specify that these were the proposed suppliers at the time of the modification application and may be subject to change. Curia has made final selections for emergency generator and boiler units. The unit specifications are: - 1780-kW Kohler Emergency Generator (emissions were previously calculated using a 1750-kW Cummins Emergency Generator) - 16,329 MBTU/hr Cleaver Brooks Boiler (emissions were previously calculated using a 16,700 MBTU/hr Johnston Boiler) Based on the selected units, the estimated PTE is approximately 1.0 tpy higher for NOx and 0.6 tpy higher for

	CO as compared to the permit limits for the emergency generator currently set forth in Permit #1097-M5. The estimated PTE for the criteria and total HAPs for the selected boiler unit are below the established permit limits established in Permit #1097-M5 for the boiler. This meeting is to discuss the steps for permit modification and/or technical amendment of the permit for the final boiler and emergency generator selections.

Attachment 3

Final Pre-Permit Application Meeting Agenda & Public Notice Sign Guidelines Checklist

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Pre-Permit Application Meeting Agenda Checklist & Public Notice Sign Guidelines Checklist

This entire document, including both completed checklists, must be included as part of the application package.

Any person seeking a new permit, a permit modification, or an emergency permit under 20.11.41 NMAC (Construction Permits) shall do so by filing a written application with the Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

Prior to submitting an application, per 20.11.41.13(A) NMAC, the applicant (or their consultant) shall contact the Department in writing and submit a Pre-Permit Application Meeting Request Form to request a pre-application meeting. The Pre-Permit Application Meeting Request Form is available at https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms. The purpose of the pre-application meeting is for the Department to provide the applicant with information regarding the contents of the application and the application process.

This pre-application meeting agenda checklist is provided to aid the Department and applicant in ensuring that in the pre-permit application meeting all information regarding the contents of the application and the application process are communicated to the applicant. This is because applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

Also included in this document is the Public Notice Sign Guidelines Checklist, which contains requirements for how the applicant must display the required weather-proof sign.

The applicant should fill out and have this agenda checklist available at the pre-application meeting to be sure all items are covered. Check the boxes to acknowledge that each item from the agenda was discussed and that requirements for the weather-proof sign were followed.

Pre-Permit Application Meeting Agenda Checklist

Applicant Company Name: **Curia New Mexico, LLC**
Facility Name: **Curia New Mexico**

☒ Fill out and submit a Pre-Permit Application Meeting Request form
Available online at https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms/air-quality-application-forms

I. ☒ Discuss Project:
   a. Facility Location
   b. Facility Description
   c. Main Processes
   d. Equipment
   e. Proposed Schedule

II. ☒ Discuss the requirement for a zoning certification or verifications for new permits and permit modifications. The Zoning Requirement Cover Page form is a required component of this part of the submittal:
   a. For projects on property subject to City or County zoning laws (*i.e.*, **not** located on federal land, **not** located on State of New Mexico land, **not** located on Tribal land), a zoning certification from the appropriate planning department is required.
      i. City Planning Form: https://www.cabq.gov/planning/code-enforcement-zoning
      ii. County Planning Form: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/
   b. If the project's property is not subject to City or County zoning jurisdiction, a zoning verification from both planning departments is required.
      i. City Planning Form: https://www.cabq.gov/planning/code-enforcement-zoning
      ii. County Planning Form: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/
   c. The zoning certification or verifications **must** be obtained from the appropriate Planning Department, either City of Albuquerque or Bernalillo County. For more information, please visit the City's Planning Department website at https://www.cabq.gov/planning or Bernalillo County's Planning Department website at the https://www.bernco.gov/planning/.

III. ☒ Discuss the requirement for a Compliance History Disclosure Form as of Nov. 6, 2023 for permit application submittals except for Administrative Revisions that are not transfers of ownership.

IV. ☒ If permit modification or revision, review current permit:
   a. Review Process Equipment Table and Emissions Table and discuss changes
   b. Request information about the replacement or new equipment (for example, if it is an engine, we need to know if it is new, what year, fuel type, etc…) to give them an idea of the changes that will be needed
   c. Discuss possible changes in permit conditions

V. ☒ Air Dispersion modeling process, procedures and options:
   a. When modeling is required and possibility of waivers
   b. Protocol process, purpose, and time frame
   c. Preliminary review, purpose, and time frame
   d. Full review and time frame
   e. Peer reviews
   f. Assumptions in the modeling become permit conditions
   g. NED data should be used instead of DEM data for assigning elevations to receptors, sources, buildings, etc.

VI. ☒ Applicant's public notice requirements

a. During the same month application package will be submitted, ask Department for memo of neighborhood associations/coalitions within ½ mile of facility
b. Fill out and send Notice of Intent to Construct form as attachment, with Applicant Notice Cover Letter as email body, to neighborhood associations/coalitions listed in memo: https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms
c. Post and maintain a weather-proof sign. Signs are available in the downtown Program office. The Public Notice Sign Guidelines Checklist can be found on the next page of this document.

VII. ☒ Regulatory timelines

a. 30 days to rule application complete
b. 90 days after ruled complete for permitting decision
c. 30-day public comment period after application deemed complete
d. If public interest in application:
    i. 30-day review of technical analysis
    ii. 90-day extension for permitting decision
e. Request for Public Information Hearing - 90-day extension for permitting decision
f. Complex technical issues in application - 90-day extension for permitting decision
g. If application ruled incomplete it stops timeline and restarts at beginning with updated submittal

VIII. ☒ Department Policies

a. One original hard copy must be submitted along with a duplicate copy. The duplicate copy should be a high-quality electronic duplicate submitted on thumb drive as one complete PDF with all application contents found in the hardcopy, including pages with signatures. However, do not include financial information, such as a copy of a check, in the electronic PDF. The electronic submittal should also include emission calculations Excel-compatible file(s) and modeling files, if applicable.
b. Applications will be ruled incomplete if any parts from Permit Application Checklist are missing
c. Review fees paid in full are part of the application package (Except as noted above)
d. Discuss payment format (by check, credit card or online)
e. Use the most recent Permit Application Checklist, found under Part 41 Implementation on this page: https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms
f. After three tries, permit application denied and application must start over including repayment of fees

IX. ☒ Additional Questions?

The department indicated their policy for emissions is to report 2 significant figures after the decimal. If a number is not a true zero but would be reported as "0.00" using 2 significant figures after the decimal (example "0.004"), use scientific notation and report as "4.0E-03").

City of Albuquerque
Environmental Health Department
Air Quality Program

Public Notice Sign Guidelines

Any person seeking a permit under 20.11.41 NMAC, Construction Permits, shall do so by filing a written application with the Department. *Prior to submitting an application, the applicant shall post and maintain a weather-proof sign provided by the department. The applicant shall keep the sign posted until the department takes final action on the permit application; if an applicant can establish to the department's satisfaction that the applicant is prohibited by law from posting, at either location required, the department may waive the posting requirement and may impose different notification requirements.* **A copy of this form must be submitted with your application.**

Applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

Applicant Company Name: **Curia New Mexico, LLC**
Facility Name: **Curia New Mexico**

☒ The sign must be posted at the more visible of either the proposed or existing facility entrance (or, if approved in advance and in writing by the department, at another location on the property that is accessible to the public)

- ☒ The sign shall be installed and maintained in a condition such that members of the public can easily view, access, and read the sign at all times.
- ☒ The lower edge of the sign board should be mounted a minimum of 2 feet above the existing ground surface to facilitate ease of viewing

☒ Include at least two pictures of the completed, properly posted sign in the application package immediately following this document. One picture should show the location of the posted sign and the other should be close enough to the sign for the posted information to be legible in the picture.

☐ **Check here if the department has waived the sign posting requirement.**
Alternative public notice details:

Attachment 4

Air Quality Permit Application Form

City of Albuquerque – Environmental Health Department
Air Quality Program

Please mail this application to **P.O. Box 1293, Albuquerque, NM 87103**
or hand deliver between 8:00 am – 5:00 pm Monday – Friday to:
3rd Floor, Suite 3023 – One Civic Plaza NW, Albuquerque, NM 87102
(505) 768-1972 aqd@cabq.gov

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

Submittal Date: December 22, 2023

Owner/Corporate Information ☒ **Check here and leave this section blank if information is exactly the same as Facility Information below.**

Company Name:			
Mailing Address:	City:	State:	Zip:
Company Phone:	Company Contact:		
Company Contact Title:	Phone:	E-mail:	

Stationary Source (Facility) Information: **Provide a plot plan (legal description/drawing of the facility property) with overlay sketch of facility processes, location of emission points, pollutant type, and distances to property boundaries.**

Facility Name: **Curia New Mexico, LLC**			
Facility Physical Address: **4401 Alexander Boulevard NE**	City: **Albuquerque**	State: **NM**	Zip: **87107**
Facility Mailing Address (if different):	City:	State:	Zip:
Facility Contact: **John Gerback, Jr.**	Title: **Sr. Manager EH&S**		
Phone: **505-340-5989**	E-mail: **John.GerbackJr@curiaglobal.com**		
Authorized Representative Name[1]: **John Gerback, Jr.**	Authorized Representative Title: **Sr. Manager EH&S**		

Billing Information ☐ **Check here if same contact and mailing address as corporate** ☒ **Check here if same as facility**

Billing Company Name:			
Mailing Address:	City:	State:	Zip:
Billing Contact:	Title:		
Phone:	E-mail:		

Preparer/Consultant(s) Information ☐ **Check here and leave section blank if no Consultant used or Preparer is same as Facility Contact.**

Name: **Tawnya Chott**	Title: **ERM - Principal Consultant**		
Mailing Address: **1200 17th Street, Floor 10**	City: **Denver**	State: **CO**	Zip: **80202**
Phone: **720-200-7137**	Email: **tawnya.chott@erm.com**		

1. See 20.11.41.13(E)(13) NMAC.

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

General Operation Information (if any question does not pertain to your facility, type N/A on the line or in the box)

Permitting action being requested (please refer to the definitions in 20.11.40 NMAC or 20.11.41 NMAC):			
☐ New Permit	☒ Permit Modification Current Permit #: **1097-M5-1AR**	☐ Technical Permit Revision Current Permit #:	☐ Administrative Permit Revision Current Permit #:
☐ New Registration Certificate	☐ Modification Current Reg. #:	☐ Technical Revision Current Reg. #:	☐ Administrative Revision Current Reg. #:
UTM coordinates of facility (Zone 13, NAD 83): **13S 352446.57E 3888958.32N**			
Facility type (*i.e.*, a description of your facility operations): **Curia New Mexico, LLC is a contract manufacturing organization (CMO) that specializes in delivering injectable sterile liquid, suspension, and lyophilized biologic and pharmaceutical products.**			
Standard Industrial Classification (SIC Code #): **2834**		North American Industry Classification System (NAICS Code #): **325412**	
Is this facility currently operating in Bernalillo County? **Yes**		If **YES**, list date of original construction: **1984** If **NO**, list date of planned startup:	
Is the facility permanent? **Yes**		If **NO**, list dates for requested temporary operation: From Through	
Is the facility a portable stationary source? **No**		If **YES**, is the facility address listed above the main permitted location for this source?	
Is the application for a physical or operational change, expansion, or reconstruction (*e.g.*, altering process, or adding, or replacing process or control equipment, etc.) to an existing facility? **Yes**			
Provide a description of the requested changes: **Final units selected and updates/corrections for the added Units #6 and 7; one 1780-kW diesel-fired standby/emergency generator and one 16,329 MBtu natural gas-fired boiler.**			
What is the facility's operation? ☒ Continuous ☐ Intermittent ☐ Batch			

Estimated percent of production/operation:	Jan-Mar: **25**	Apr-Jun: **25**	Jul-Sep: **25**	Oct-Dec: **25**
Requested operating times of facility:	**24** hours/day	**7** days/week	**4** weeks/month	**12** months/year

Will there be special or seasonal operating times other than shown above? This includes monthly- or seasonally-varying hours. **Yes**
If **YES**, please explain: **Operating hours for standby/emergency generator will be 500 hours per year**
List raw materials processed: **Emergency Generator: Diesel; Boiler: Natural gas**
List saleable item(s) produced: **N/A**

USE INSTRUCTIONS: For the forms on the following pages, please do not alter or delete the existing footnotes or page breaks. If additional footnotes are needed then add them to the end of the existing footnote list for a given table. Only update the rows and cells within tables as necessary for your project. Unused rows can be deleted from tables. If multiple scenarios will be represented then the Uncontrolled and Controlled Emission Tables, and other tables as needed, can be duplicated and adjusted to indicate the different scenarios.

Regulated Emission Sources Table

(*E.g.*, Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator-Haul Road-Storage Pile, etc.) Match the Units listed on this Table to the same numbered line if also listed on Emissions Tables & Stack Table.

Unit Number and Description[1]		Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[2]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[3]	Fuel Type
1	Emergency Generator	Engine: Cummins	6CT 8 3G	45068185	Unknown	Unknown	N/A	180 hp	Diesel
		Generator: Onan Generator Set	125QSEA-714108	1940555595	Unknown	Unknown		125 kW	
2	Emergency Generator	Removed from Permit in 2022	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	Emergency Generator	Engine: Cummins	QSL9-G	73472926	2012(1)	2012(1)	N/A	464 hp	Diesel
		Generator: Onan	DQDAB-1216217	L120426818				225 kW	
4	Emergency Generator	Engine: Cummins	QSK19-G8	37274123	2018	2018	N/A	967 hp	Diesel
		Generator: Cummins	DQPAA-1755965	B180322832					
5	Boiler	Superior	6-X-500	18659	2018	2018	N/A	4.2 MMBtu/hr	Natural Gas
6	Emergency Generator	Engine: Mitsubish	S16R-Y2PTAW2-1	To Be Determined	To Be Determined	2024	N/A	2923 bhp	Diesel
		Generator: Kohler	1750REOZ MD					1780 kW	
7	Boiler	Cleaver Brooks	CBEX-3W	To Be Determined	To Be Determined	2024	N/A	400 HP/ 16.329 MBTU/hr	Natural Gas
CHEM	Site Wide Chemical and Solvent Usage	N/A	N/A	N/A	N/A	N/A	N/A	/	N/A
								/	
								/	
								/	
								/	

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.
2. To determine whether a unit has been modified, evaluate if changes have been made to the unit that impact emissions or that trigger modification as defined in 20.11.41.7(U) NMAC. If not, put N/A.
3. Basis for Equipment Process Rate or Capacity (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.) **Specified in Attachment 8**
   Submit information for each unit as an attachment.

(1) Year in the permit is stated as 2008, engine and generator nameplate have date of manufacture as 2012. Photos of nameplates referenced in Attachment 8: Basis of Emission Rates.

Emissions Control Equipment Table

Control Equipment Units listed on this Table should either match up to the same Unit number as listed on the Regulated Emission Sources, Controlled Emissions and Stack Parameters Tables (if the control equipment is integrated with the emission unit) or should have a distinct Control Equipment Unit Number and that number should then also be listed on the Stack Parameters Table.

Control Equipment Unit Number and Description		Controlling Emissions for Unit Number(s)	Manufacturer	Model # | Serial #	Date Installed	Controlled Pollutant(s)	% Control Efficiency[1]	Method Used to Estimate Efficiency	Rated Process Rate or Capacity or Flow
	N/A								

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Control Equipment % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). _____
   Submit information for each unit as an attachment.

Exempted Sources and Exempted Activities Table

See 20.11.41 NMAC for exemptions.

Unit Number and Description		Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[1]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[2]	Fuel Type
	N/A							/	
								/	
								/	
								/	
								/	
								/	
								/	
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NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. To determine whether a unit has been modified, evaluate if changes have been made to the unit that impact emissions or that trigger modification as defined in 20.11.41.7(U) NMAC. Also, consider if any changes that were made alter the status from exempt to non-exempt. If not, put N/A.
2. Basis for Equipment Process Rate or Capacity (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.) _____
   Submit information for each unit as an attachment.

Uncontrolled Emissions Table

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8760 hrs)

Regulated Emission Units listed on this Table should match up to the same numbered line and Unit as listed on the Regulated Emissions and Controlled Tables. List total HAP values per Emission Unit if overall HAP total for the facility is ≥ 1 ton/yr.

Unit Number*	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Method(s) used for Determination of Emissions (AP-42, Material Balance, Field Tests, etc.)
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	
1. Emergency Generator	**7.25**	**1.81**	**1.56**	**0.39**	**0.58**	**0.14**	**0.48**	**0.12**	**0.51**	**0.13**	**0.51**	**0.13**	**0.01**	**1.4E-3**	**Criteria Pollutants are from existing permit; HAPs: AP-42 Tables 3.3-1,2, and 1.3-10**
3. Emergency Generator	**2.90**	**0.72**	**2.67**	**0.67**	**0.15**	**0.04**	**0.11**	**0.03**	**0.15**	**0.04**	**0.15**	**0.04**	**0.02**	**0.01**	**EPA Tier 3 Standards for 130<kW>560; HAPs: AP-42 Tables 3.3-2 and 1.3-10; SO2: Manufacturer Specs**
4. Emergency Generator	**9.67**	**2.42**	**5.57**	**1.39**	**0.51**	**0.13**	**0.01**	**3.0E-03**	**0.32**	**0.08**	**0.32**	**0.08**	**0.03**	**0.01**	**EPA Tier 2 Standards for kW>560; AP-42 Tables 3.4-1,3,4, and Table 1.3-10**
5. Boiler	**0.13**	**0.57**	**0.16**	**0.70**	**0.03**	**0.15**	**4.0E-03**	**0.02**	**0.02**	**0.09**	**0.02**	**0.09**	**0.05**	**0.20**	**Criteria Pollutants are from existing permit; AP-42 Tables 1.4-2,3, and 4**
6. Emergency Generator	**29.22**	**7.30**	**16.82**	**4.20**	**1.54**	**0.38**	**0.04**	**0.01**	**0.96**	**0.24**	**0.96**	**0.24**	**0.03**	**0.01**	**EPA Tier 2 Standards for kW>560; AP-42 Tables 3.4-1,3,4 and Table 1.3-10**
7. Boiler	**0.51**	**2.24**	**1.34**	**5.89**	**0.09**	**0.39**	**0.01**	**0.04**	**0.12**	**0.53**	**0.12**	**0.53**	**0.18**	**0.79**	**AP-42 Tables 1.4-1,2,3, and 4: Manf. Spec. of < 9 ppm NOx**
CHEM	-	-	-	-	**1.28**	**4.00**	-	-	-	-	-	-	-	-	**Mass Balance/previous permit limit**
Totals of Uncontrolled Emissions	**49.68**	**15.07**	**28.12**	**13.24**	**4.18**	**5.23**	**0.65**	**0.22**	**2.08**	**1.11**	**2.08**	**1.11**	**0.31**	**1.02**	

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

*A permit is required and this application along with the additional checklist information requested on the Permit Application checklist must be provided if:
(1) any one of these process units or combination of units, has an uncontrolled emission rate greater than or equal to (≥) 10 lbs/hr or 25 tons/yr for any of the above pollutants, excluding HAPs, based on 8,760 hours of operation; or
(2) any one of these process units or combination of units, has an uncontrolled emission rate ≥ 2 tons/yr for any single HAP or ≥ 5 tons/yr for any combination of HAPs based on 8,760 hours of operation; or
(3) any one of these process units or combination of units, has an uncontrolled emission rate ≥ 5 tons/yr for lead (Pb) or any combination of lead and its compounds based on 8,760 hours of operation; or
(4) any one of the process units or combination of units is subject to an Air Board or federal emission limit or standard.

* If all of these process units, individually and in combination, have an uncontrolled emission rate less than (<) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8,760 hours of operation), but > 1 ton/yr for any of the above pollutants, then a source registration is required. A Registration is required, at minimum, for any amount of HAP emissions. Please complete the remainder of this form.

Controlled Emissions Table

(Based on current operations with emission controls OR requested operations with emission controls)

Regulated Emission Units listed on this Table should match up to the same numbered line and Unit as listed on the Regulated Emissions and Uncontrolled Tables. List total HAP values per Emission Unit if overall HAP total for the facility is ≥ 1 ton/yr.

Unit Number	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Control Method	% Efficiency[1]
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr		
1. Emergency Generator	**7.25**	**1.81**	**1.56**	**0.39**	**0.58**	**0.14**	**0.48**	**0.12**	**0.51**	**0.13**	**0.51**	**0.13**	**0.01**	**1.4E-3**	**N/A**	**N/A**
3. Emergency Generator	**2.90**	**0.72**	**2.67**	**0.67**	**0.15**	**0.04**	**0.11**	**0.03**	**0.15**	**0.04**	**0.15**	**0.04**	**0.02**	**0.01**	**N/A**	**N/A**
4. Emergency Generator	**9.67**	**2.42**	**5.57**	**1.39**	**0.51**	**0.13**	**0.01**	**3.0E-03**	**0.32**	**0.08**	**0.32**	**0.08**	**0.03**	**0.01**	**N/A**	**N/A**
5. Boiler	**0.13**	**0.57**	**0.16**	**0.70**	**0.03**	**0.15**	**4.0E-03**	**0.02**	**0.02**	**0.09**	**0.02**	**0.09**	**0.05**	**0.20**	**N/A**	**N/A**
6. Emergency Generator	**29.22**	**7.30**	**16.82**	**4.20**	**1.54**	**0.38**	**0.04**	**0.01**	**0.96**	**0.24**	**0.96**	**0.24**	**0.03**	**0.01**	**N/A**	**N/A**
7. Boiler	**0.51**	**2.24**	**1.34**	**5.89**	**0.09**	**0.39**	**0.01**	**0.04**	**0.12**	**0.53**	**0.12**	**0.53**	**0.18**	**0.79**	**N/A**	**N/A**
CHEM	**-**	**-**	**-**	**-**	**1.28**	**4.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**N/A**	**N/A**
Totals of Controlled Emissions	**49.68**	**15.07**	**28.12**	**13.24**	**4.18**	**5.23**	**0.65**	**0.22**	**2.08**	**1.11**	**2.08**	**1.11**	**0.31**	**1.02**		

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Control Method % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). _____
   Submit information for each unit as an attachment.
2. #2 Emergency generator removed from the permit in 2022.

Hazardous Air Pollutants (HAPs) Emissions Table

Report the Potential Emission Rate for each HAP from each source on the Regulated Emission Sources Table that emits a given HAP. Report individual HAPs with ≥ 1 ton/yr total emissions for the facility on this table. Otherwise, report total HAP emissions for each source that emits HAPs and report individual HAPs in the accompanying application package in association with emission calculations. If this application is for a Registration solely due to HAP emissions, report the largest HAP emissions on this table and the rest, if any, in the accompanying application package.

Unit Number	Total HAPs															
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
1. Emergency Generator	**0.01**	**1.4E-03**														
3. Emergency Generator	**0.02**	**0.01**														
4. Emergency Generator	**0.03**	**0.01**														
5. Boiler	**0.05**	**0.20**														
6. Emergency Generator	**0.03**	**0.01**														
7. Boiler	**0.18**	**0.79**														
Totals of HAPs for all units:	**0.31**	**1.02**														

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

Use Instructions: Copy and paste the HAPs table here if need to list more individual HAPs.

Purchased Hazardous Air Pollutant Table*

Product Categories (Coatings, Solvents, Thinners, etc.)	Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service (CAS) Number of HAP or VHAP from Representative As Purchased Product	HAP or VHAP Concentration of Representative As Purchased Product (pounds/gallon, or %)	Concentration Determination (CPDS, SDS, etc.)[1]	Total Product Purchases For Category	(-)	Quantity of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
1. N/A – Only non-HAP VOCs used at this facility					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
2.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
3.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
4.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
5.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
6.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
7.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
8.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
9.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
.					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr
TOTALS					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

NOTE: Product purchases, recovery/disposal and usage should be converted to the units listed in this table. If units cannot be converted please contact the Air Quality Program prior to making changes to this table.

1. Submit, as an attachment, information on one (1) product from each Category listed above which best represents the average of all the products purchased in that Category. CPDS = Certified Product Data Sheet; SDS = Safety Data Sheet

*** A Registration is required, at minimum, for any amount of HAP or VHAP emission.**
Emissions from purchased HAP usage should be accounted for on previous tables as appropriate.
A permit may be required for these emissions if the source meets the requirements of 20.11.41 NMAC.

Material and Fuel Storage Table

(*E.g.*, Tanks, barrels, silos, stockpiles, etc.)

Storage Equipment		Product Stored	Capacity (bbls, tons, gals, acres, etc.)	Above or Below Ground	Construction (Welded, riveted) & Color	Installation Date	Loading Rate[1]	Offloading Rate[1]	True Vapor Pressure	Control Method	Seal Type	% Eff.[2]
6	**Tank**	**Diesel Fuel**	**2260 gal**	**Above Ground**	**To Be Determined**	**To Be Determined**	**To Be Determined**	**To Be Determined**	**To Be Determined**	**N/A**	**N/A**	**N/A**

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Loading/Offloading Rate (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.). _____
   Submit information for each unit as an attachment.
2. Basis for Control Method % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). _____
   Submit information for each unit as an attachment.

Stack Parameters Table

If any equipment from the Regulated Emission Sources Table is also listed in this Stack Table, use the same numbered line for the emission unit on both tables to show the association between the Process Equipment and its stack.

Unit Number and Description		Pollutant (CO, NOx, PM_{10}, etc.)	UTM Easting (m)	UTM Northing (m)	Stack Height (ft)	Stack Exit Temp. (°F)	Stack Velocity (fps)	Stack Flow Rate (acfm)	Stack Inside Diameter (ft)	Stack Type
5	**Existing Boiler**	**CO, NOx, PM10, PM2.5, SO2, VOC, HAP**	**352468.5**	**3888870.3**	**35.007**	**494**	**18.668**	**1560.848**	**1.332**	**Vertical with Rain Cap**
6	**Emergency Generator**	**CO, NOx, PM10, PM2.5, SO2, VOC, HAP**	**352389.3**	**3889015.4**	**To Be Determined**	**979**	**To Be Determined**	**17,302**	**To Be Determined**	**Horizontal**
7	**Boiler**	**CO, NOx, PM10, PM2.5, SO2, VOC, HAP**	**352388.9**	**3888987.6**	**43.996**	**502**	**44.14**	**8,320**	**2.0**	**Vertical**
										Select
										Select
										Select
										Select

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

Certification

NOTICE REGARDING SCOPE OF A PERMIT: The Environmental Health Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City of Albuquerque Planning Department or Bernalillo County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City of Albuquerque Planning Department website at https://www.cabq.gov/planning and the Bernalillo County Department of Planning and Development Services website at https://www.bernco.gov/planning.

NOTICE REGARDING ACCURACY OF INFORMATION AND DATA SUBMITTED: Any misrepresentation of a material fact in this application and its attachments is cause for denial of a permit or revocation of part or all of the resulting registration or permit, and revocation of a permit for cause may limit the permitee's ability to obtain any subsequent air quality permit for ten (10) years. Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained under the Air Quality Control Act, NMSA 1978 §§ 74-2-1 to 74-2-17, is guilty of a misdemeanor and shall, upon conviction, be punished by a fine of not more than ten thousand dollars ($10,000) per day per violation or by imprisonment for not more than twelve months, or by both.

I, the undersigned, hereby certify that I have knowledge of the information and data represented and submitted in this application and that the same is true and accurate, including the information and date in any and all attachments, including without limitation associated forms, materials, drawings, specifications, and other data. I also certify that the information represented gives a true and complete portrayal of the existing, modified existing, or planned new stationary source with respect to air pollution sources and control equipment. I understand that there may be significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. I also understand that the person who has applied for or has been issued an air quality permit by the Department is an obligatory party to a permit appeal filed pursuant to 20.11.81 NMAC. Further, I certify that I am qualified and authorized to file this application, to certify the truth and accuracy of the information herein, and bind the source. Moreover, I covenant and agree to comply with any requests by the Department for additional information necessary for the Department to evaluate or make a final decision regarding the application.

Signed this 21st day of December, 2023

John Gerback
Print Name

Sr. Manager of EHS
Print Title

Signature

Role: ☐ Owner ☐ Operator ☒ Other Authorized Representative

Attachment 5

Notice of Intent Form, List of Neighborhood Associations and Neighborhood Coalitions, and Proof of Public Notices

Fill out the required highlighted information below. Then use the Subject as the Subject line of the required public notice email(s) sent to nearby neighborhood associations/neighborhood coalitions. Copy and paste the rest of the completed information on this page into the body of the email(s) and attach the completed NOI form. If providing notice by certified mail, use this page as the cover letter and attach the NOI form.

SUBJECT: Public Notice of Proposed Air Quality Construction Permit Application Curia New Mexico, LLC-Curia New Mexico

Dear Neighborhood Association/Coalition Representative(s),

Why did I receive this public notice?
You are receiving this notice in accordance with New Mexico Administrative Code (NMAC) 20.11.41.13.B(1) which requires any applicant seeking an Air Quality Construction Permit pursuant to 20.11.41 NMAC to provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.

What is the Air Quality Permit application review process?
The City of Albuquerque, Environmental Health Department, Air Quality Program (Program) is responsible for the review and issuance of Air Quality Permits for any stationary source of air contaminants within Bernalillo County. Once the application is received, the Program reviews each application and rules it either complete or incomplete. Complete applications will then go through a 30-day public comment period. Within 90 days after the Program has ruled the application complete, the Program shall issue the permit, issue the permit subject to conditions, or deny the requested permit or permit modification. The Program shall hold a Public Information Hearing pursuant to 20.11.41.15 NMAC if the Director determines there is significant public interest and a significant air quality issue is involved.

What do I need to know about this proposed application?

Applicant Name	Curia New Mexico, LLC
Site or Facility Name	Curia New Mexico
Site or Facility Address	4401 Alexander Blvd, Albuquerque, NM 87107
New or Existing Source	EXISTING
Anticipated Date of Application Submittal	December 22, 2023
Summary of Proposed Source to Be Permitted	The application is to modify Construction Permit #1097-M5-1AR. The modification includes updates to equipment specifications and revised potential to emit calculations for the planned emergency generator and boiler units recently permitted with the issuance of Permit#1097-M5 issued August 14, 2023. Updates are based on final equipment selections for the facility expansion project.

What emission limits and operating schedule are being requested?
See attached Notice of Intent to Construct form for this information.

How do I get additional information regarding this proposed application?
For inquiries regarding the proposed source, contact:
- John Gerback, Jr.
- John.GerbackJr@curiaglobal.com
- (505) 340-5989

For inquiries regarding the air quality permitting process, contact:
- City of Albuquerque Environmental Health Department Air Quality Program
- aqd@cabq.gov
- (505) 768-1972

NOTICE FROM THE APPLICANT

Notice of Intent to Apply for Air Quality Construction Permit

You are receiving this notice because the New Mexico Air Quality Control Act (20.11.41.13B NMAC) requires any owner/operator proposing to construct or modify a facility subject to air quality regulations to provide public notice by certified mail or electronic mail to designated representatives of recognized neighborhood associations and coalitions within 0.5-mile of the property on which the source is or is proposed to be located.

This notice indicates that the owner/operator intends to apply for an Air Quality Construction Permit from the Albuquerque – Bernalillo County Joint Air Quality Program. Currently, no application for this proposed project has been submitted to the Air Quality Program. Applicants are required to include a copy of this form and documentation of mailed notices with their Air Quality Construction Permit Application.

Proposed Project Information

Applicant's name and address:
Nombre y domicilio del solicitante: Curia New Mexico, LLC; 4401 Alexander Blvd. NE, Albuquerque, NM 87107

Owner / operator's name and address:
Nombre y domicilio del propietario u operador: Curia New Mexico, LLC; 4401 Alexander Blvd. NE, Albuquerque, NM 87107

Contact for comments and inquires:
Datos actuales para comentarios y preguntas:

Name *(Nombre)*: John Gerback, Jr.
Address *(Domicilio)*: 4401 Alexander Blvd. NE, Albuquerque, NM 87107
Phone Number *(Número Telefónico)*: (505) 340-5989
E-mail Address *(Correo Electrónico)*: John.GerbackJr@curiaglobal.com

Actual or estimated date the application will be submitted to the department:
Fecha actual o estimada en que se entregará la solicitud al departamento: December 22, 2023

Description of the source:
Descripción de la fuente: Permitted emission sources include emergency generators, boilers, and solvent and chemical usage.

Exact location of the source or proposed source:
Ubicación exacta de la fuente o fuente propuesta: 4401 Alexander Blvd. NE, Albuquerque, New Mexico 87107

Nature of business:
Tipo de negocio: Curia New Mexico, LLC is a contract manufacturing organization (CMO) that specializes in delivering injectable sterile liquid, suspension, and lyophilized biologic and pharmaceutical products.

Process or change for which the permit is requested:
Proceso o cambio para el cuál de solicita el permiso: Updates to equipment specifications and emissions estimates for the recently permitted sources: Units #6 - 1780 kW emergency generator and Unit #7 - 400 HP natural gas-fired boiler to reflect final equipment selections.

Maximum operating schedule:
Horario máximo de operaciones: Emergency Generator: 500 hrs/yr; Boiler: 8760 hrs/yr

Normal operating schedule:
Horario normal de operaciones: Emergency Generator: Readiness Testing/Non-emergency Use: 100 hrs/yr; Boiler: 8760 hrs/yr

Preliminary estimate of the maximum quantities of each regulated air contaminant the source will emit:
Estimación preliminar de las cantidades máximas de cada contaminante de aire regulado que la fuente va a emitir:

Air Contaminant *Contaminante de aire*	**Proposed Construction Permit** *Permiso de Construcción Propuesto*		**Net Changes (for permit modification or technical revision)** *Cambio Neto de Emisiones (para modificación de permiso o revisión técnica)*	
	pounds per hour *libras por hora*	tons per year *toneladas por año*	pounds per hour *libras por hora*	tons per year *toneladas por año*
CO	28.12	13.24	+2.32	+0.44
NOx	49.68	15.07	+4.08	+0.97
VOC	4.18	5.23	+0.18	+0.03
SO2	0.65	0.22	+1.1E-03	+3.9E-03
PM10	2.08	1.11	+0.08	+0.01
PM2.5	2.08	1.11	+0.08	+0.01
HAP	0.31	1.02	+1.9E-03	+0.02

Questions or comments regarding this Notice of Intent should be directed to the Applicant. Contact information is provided with the Proposed Project Information on the first page of this notice. To check the status of an Air Quality Construction Permit application, call 311 and provide the Applicant's information, or visit www.cabq.gov/airquality/air-quality-permits.

The Air Quality Program will issue a Public Notice announcing a 30-day public comment period on the permit application for the proposed project when the application is deemed complete. The Air Quality Program does not process or issue notices on applications that are deemed incomplete. More information about the air quality permitting process is attached to this notice.

Air Quality Construction Permitting Overview

This is the typical process to obtain an Air Quality Construction Permit for Synthetic Minor and Minor sources of air pollution from the Albuquerque – Bernalillo County Joint Air Quality Program.

Step 1: Pre-application Meeting: The Applicant and their consultant must request a meeting with the Air Quality Program to discuss the proposed action. If air dispersion modeling is required, Air Quality Program staff discuss the modeling protocol with the Applicant to ensure that all proposed emissions are considered.

> **Notice of Intent from the Applicant:** Before submitting their application, the Applicant is required to notify all nearby neighborhood associations and interested parties that they intend to apply for an air quality permit or modify an existing permit. The Applicant is also required to post a notice sign at the facility location.

Step 2: Administrative Completeness Review and Preliminary Technical Review: The Air Quality Program has 30 days from the day the permit is received to review the permit application to be sure that it is administratively complete. This means that all application forms must be signed and filled out properly, and that all relevant technical information needed to evaluate any proposed impacts is included. If the application is not complete, the permit reviewer will return the application and request more information from the Applicant. Applicants have three opportunities to submit an administratively complete application with all relevant technical information.

> **Public Notice from the Department:** When the application is deemed complete, the Department will issue a Public Notice announcing a 30-day public comment period on the permit application. This notice is distributed to the same nearby neighborhood associations and interested parties that the Applicant sent notices to, and published on the Air Quality Program's website.
>
> During this 30-day comment period, individuals have the opportunity to submit written comments expressing their concerns or support for the proposed project, and/or to request a Public Information Hearing. If approved by the Environmental Health Department Director, Public Information Hearings are held after the technical analysis is complete and the permit has been drafted.

Step 3: Technical Analysis and Draft Permit: Air Quality Program staff review all elements of the proposed operation related to air quality, and review outputs from advanced air dispersion modeling software that considers existing emission levels in the area surrounding the proposed project, emission levels from the proposed project, and meteorological data. The total calculated level of emissions is compared to state and federal air quality standards and informs the decision on whether to approve or deny the Applicant's permit.

Draft Permit: The permit will establish emission limits, standards, monitoring, recordkeeping, and reporting requirements. The draft permit undergoes an internal peer review process to determine if the emissions were properly evaluated, permit limits are appropriate and enforceable, and the permit is clear, concise, and consistent.

> **Public Notice from the Department:** When the technical analysis is complete and the permit has been drafted, the Department will issue a second Public Notice announcing a 30-day public comment period on the technical analysis and draft permit. This second Public Notice, along with the technical analysis documentation and draft permit, will be published on the Air Quality Program's website, and the public notice for availability of the technical analysis and draft permit will only be directly sent to those who requested further information during the first comment period.

During this second 30-day comment period, residents have another opportunity to submit written comments expressing their concerns or support for the proposed project, and/or to request a Public Information Hearing.

Possible Public Information Hearing: The Environmental Health Department Director may decide to hold a Public Information Hearing for a permit application if there is significant public interest and a significant air quality issue. If a Public Information Hearing is held, it will occur after the technical analysis is complete and the permit has been drafted.

Step 4: Public Comment Evaluation and Response: The Air Quality Program evaluates all public comments received during the two 30-day public comment periods and Public Information Hearing, if held, and updates the technical analysis and draft permit as appropriate. The Air Quality Program prepares a response document to address the public comments received, and when a final decision is made on the permit application, the comment response document is published on the Air Quality Program's website and distributed to the individuals who participated in the permit process. If no comments are received, a response document is not prepared.

Step 5: Final Decision on the Application: After public comments are addressed and the final technical review is completed, the Environmental Health Department makes a final decision on the application. If the permit application meets all applicable requirements set forth by the New Mexico Air Quality Control Act and the federal Clean Air Act, the permit is approved. If the permit application does not meet all applicable requirements, it is denied.

Notifications of the final decision on the permit application and the availability of the comment response document is published on the Air Quality Program's website and distributed to the individuals who participated in the permit process.

The Department must approve a permit application if the proposed action will meet all applicable requirements and if it demonstrates that it will not result in an exceedance of ambient air quality standards. Permit writers are very careful to ensure that estimated emissions have been appropriately identified or quantified and that the emission data used are acceptable.

The Department must deny a permit application if it is deemed incomplete three times, if the proposed action will not meet applicable requirements, if estimated emissions have not been appropriately identified or quantified, or if the emission data are not acceptable for technical reasons.

For more information about air quality permitting, visit www.cabq.gov/airquality/air-quality-permits

Proposed Air Quality Construction Permit

Permiso de Construcción de Calidad del Aire Propuesto

1. **Applicant's Name:**
   Nombre del solicitante: Curia New Mexico, LLC
   Owner or Operator's Name:
   Nombre del Propietario u Operador: Curia New Mexico, LLC
2. **Actual or Estimated Date the Application will be Submitted to the Department:**
   Fecha Actual o Estimada en que se Entragará la Solicitud al Departamento: December 22, 2023
3. **Exact Location of the Source or Proposed Source:**
   Ubicación Excata de la Fuente o Fuente Propuesta: 4401 Alexander Blvd NE Albuquerque, NM 87107
4. **Description of the Source:**
   Descripción de la Fuente: Permitted emission sources include emergency generators, boilers, and solvent and chemical usage.
   Nature of Business: Curia New Mexico, LLC is a contract manufacturing organization (CMO) that specializes in delivering
   Tipo de Negocio: injectable sterile liquid, suspension, and lyophilized biologic and pharmaceutical products.
   Process or change for which a permit is requested: updates to equipment specifications + emissions estimates for the recently
   Proceso o cambio para el cuál se solicita el permiso: permitted sources: Units #6-1780 kW emergency generator and Unit # 7-16.3 MMBTU/1400 HP natural gas-fired boiler to reflect final equipment selections.

Preliminary estimate of the maximum quantities of each regulated air contaminant the source will emit:
Estimación preliminar de las cantidades máximas de cada contaminante de aire regulado que la fuente va a emitir:

Air Contaminant *Contaminante de Aire*	Proposed Construction Permit *Permiso de Construcción Propuesto*		Net Change Emissions (for permit modification or technical revision) *Cambio Neto de Emisiones (para modificación de permiso o revisión técnica)*	
	Pounds per hour *libras por hora*	Tons per year *toneladas por año*	Pounds per hour *libras por hora*	Tons per year *toneladas por año*
NO_x	49.68	15.07	+4.08	+0.97
CO	28.12	13.24	+2.32	+0.44
VOC	4.18	5.23	+0.18	+0.03
SO_2	0.65	0.22	+1.1E-03	+3.9E-03
PM_{10}	2.08	1.11	+0.08	+0.01
$PM_{2.5}$	2.08	1.11	+0.08	+0.01
HAP	0.31	1.02	+1.9E-03	+0.02

5. **Maximum Operating Schedule:**
   Horario Máximo de Operaciones: Emergency Generator: 500 hrs/yr; Boiler: 8760 hrs/yr.
   Normal Operation Schedule:
   Horario Normal de Operaciones: Emergency Generator: Readiness Testing/Non-emergency use: 100 hrs/yr; Boiler: 8760 hrs/yr.
6. **Current Contact Information for Comments and Inquiries**
   Datos actuales para Comentarios y Preguntas
   Name *(Nombre):* John Gerback, Jr.
   Address *(Domicilio):* 4401 Alexander Blvd. NE Albuquerque, NM 87107
   Phone Number *(Número Telefónico):* (505) 340-5989
   Email Address *(Correo Electrónico):* John.Gerback@curiaglobal.com

Call 311 for additional information concerning this project, the Air Quality Program, or to file a complaint.
Llame al 311 para obtener información adicional sobre este proyecto, del Programa de Calidad del Aire, o para presenter una queja.
Gọi 311 để biết thêm thông tin hoặc để khiếu nại về dự án này, Chương Trình Chất Lượng Không Khí

City of Albuquerque, Environmental Health Department, Air Quality Program – Stationary Source Permitting
Ciudad de Albuquerque, Departamento de Salud Ambiental, Programa de Calidad del Aire - Permisos para Fuentes Inmóviles
(505) 768-1972, aqd@cabq.gov

THIS SIGN SHALL REMAIN POSTED UNTIL THE DEPARTMENT TAKES FINAL ACTION ON THE PERMIT APPLICATION
ESTE AVISO DEBERÁ DE MANTENERSE PUESTO HASTA QUE EL DEPARTAMENTO TOME UNA DECISIÓN SOBRE LA SOLICITUD DE PERMISO

Proposed Air Quality Construction Permit
Permiso de Construcción de Calidad del Aire Propuesto

1. **Applicant's Name:** *Nombre del solicitante:* Curia New Mexico, LLC
   Owner or Operator's Name: *Nombre del Propietario u Operador:* Curia New Mexico, LLC
2. **Actual or Estimated Date the Application will be Submitted to the Department:** *Fecha Actual o Estimada en que se Entragará la Solicitud al Departamento:* December 22, 2023
3. **Exact Location of the Source or Proposed Source:** *Ubicación Exacta de la Fuente o Fuente Propuesta:* 4401 Alexander Blvd NE Albuquerque, NM 87107
4. **Description of the Source:** *Descripción de la Fuente:* Permitted emission sources include emergency generators, boilers, and solvent and chemical usage.
   Nature of Business: *Tipo de Negocio:* Curia New Mexico, LLC is a contract manufacturing organization (CMO) that specializes in delivering injectable sterile liquid, suspension, and lyophilized biologic and pharmaceutical products.
   Process or change for which a permit is requested: *Proceso o cambio para el cuál se solicita el permiso:* Updates to component specifications + emissions estimates for the recently permitted sources: Units [illegible] emergency generator and [illegible] natural gas-fired boiler to reflect final equipment selections.

Preliminary estimate of the maximum quantities of each regulated air contaminant the source will emit:
Estimación preliminar de las cantidades máximas de cada contaminante de aire regulado que la fuente va a emitir:

Air Contaminant *Contaminante de Aire*	Proposed Construction Permit *Permiso de Construcción Propuesto*		Net Change Emissions (for permit modification or technical revision) *Cambio Neto de Emisiones (para modificación de permiso o revisión técnica)*	
	Pounds per hour *libras por hora*	Tons per year *toneladas por año*	Pounds per hour *libras por hora*	Tons per year *toneladas por año*
NO_x	49.68	15.07	+4.08	+0.97
CO	28.12	13.24	+2.32	+0.44
VOC	4.18	5.23	+0.18	+0.03
SO_2	0.65	0.22	+1.1E-03	+3.9E-03
PM_{10}	2.08	1.11	+0.08	+0.01
$PM_{2.5}$	2.08	1.11	+0.08	+0.01
HAP	0.31	1.02	+1.9E-03	+0.02

5. **Maximum Operating Schedule:** *Horario Máximo de Operaciones:* Emergency Generator: 500 hrs/yr; Boiler: 8760 hrs/yr
   Normal Operation Schedule: *Horario Normal de Operaciones:* Emergency Generator: Readiness Testing (non-emergency use): 100 hrs/yr; Boiler: 8760 hrs/yr
6. **Current Contact Information for Comments and Inquiries**
   Datos actuales para Comentarios y Preguntas
   Name *(Nombre)*: John Gerback, Jr.
   Address *(Domicilio)*: 4401 Alexander Blvd. NE Albuquerque, NM 87107
   Phone Number *(Número Telefónico)*: (505) 340-5989
   Email Address *(Correo Electrónico)*: John.Gerback@curiaglobal.com

Call 311 for additional information concerning this project, the Air Quality Program, or to file a complaint.
Llame al 311 para obtener información adicional sobre este proyecto, del Programa de Calidad del Aire, o para presentar una queja
Gọi 311 để biết thêm thông tin hoặc để khiếu nại về dự án này, Chương Trình Chất Lượng Không Khí

City of Albuquerque, Environmental Health Department, Air Quality Program – Stationary Source Permitting
Ciudad de Albuquerque, Departamento de Salud Ambiental, Programa de Calidad del Aire - Permisos para Fuentes Inmóviles
(505) 768-1972, aqd@cabq.gov

THIS SIGN SHALL REMAIN POSTED UNTIL THE DEPARTMENT TAKES FINAL ACTION ON THE PERMIT APPLICATION
ESTE AVISO DEBERÁ DE MANTENERSE PUESTO HASTA QUE EL DEPARTAMENTO TOME UNA DECISIÓN SOBRE LA SOLICITUD DE PERMISO

Timothy M. Keller,
Mayor

Public Participation

List of Neighborhood Associations and Neighborhood Coalitions
MEMORANDUM

To: Curia of New Mexico
From: Angela Lopez, Environmental Health-Air Quality Permitting Manager
Subject: Determination of Neighborhood Associations and Coalitions within 0.5 mile of 4401 Alexander Blvd. NE in Bernalillo County, NM.
Date: December 1, 2022-Updated February 23, 2023 and again November 30, 2023

DETERMINATION:

On November 30, 2023, I used the City of Albuquerque Zoning Advanced Map Viewer (http://coagisweb.cabq.gov/) to verify which City of Albuquerque Neighborhood Associations (NA), Homeowner Associations (HOA) and Neighborhood Coalitions (NC) are located within 0.5 mile of 4401 Alexander Blvd. NE in Bernalillo County, NM.

I then used the City of Albuquerque Office (COA) of Neighborhood Coordination's Monthly Master NA List dated November 2023 and the Bernalillo County (BC) Monthly Neighborhood Association November 2023 Excel file to determine the contact information for each NA and NC located within 0.5 mile of 4401 Alexander Blvd. NE.

The table below contains the contact information, which will be used in the City of Albuquerque Environmental Health Department's public notice. Duplicates have been deleted.

COA/BC Association or Coalition	Name	Email or Mailing Address*
Neighborhood Coalition D4C	Ellen Dueweke Mildred Griffee	edueweke@juno.com mgriffee@noreste.org
Neighborhood Coalition D7C	Janice Arnold-Jones Michael Kious	jearnoldjones70@gmail.com mikekious@aol.com
North Edith Commercial Corridor	Michael Haederle Evelyn Harris	haederle@yahoo.com grumpyeh46@comcast.net
North Edith Corridor Association	Christine Benavidez Evelyn Harris	christine61benavidez@gmail.com grumpyeh46@comcast.net
North Valley Coalition	Peggy Norton James Salazar	peggynorton@yahoo.com jasalazarmm@gmail.com nvcabq@gmail.com

If email address is not listed, provide public notice via certified mail and include a copy of each mail receipt with the application submittal.

From:	Alaina Juhl
To:	edueweke@juno.com; mgriffee@noreste.org; jearnoldjones70@gmail.com; mikekious@aol.com; haederle@yahoo.com; grumpyeh46@comcast.net; christine61benavidez@gmail.com; peggynorton@yahoo.com; jasalazarnm@gmail.com; nvcabq@gmail.com
Cc:	Sokolowski, Paul; John.GerbackJr@curiaglobal.com; Tawnya Chott; Anthony Griego; angelalopez@cabq.gov; mmckinstry@cabq.gov; Tumpane, Kyle
Subject:	Public Notice of Proposed Air Quality Construction Permit Application Curia New Mexico, LLC-Curia New Mexico
Date:	Thursday, December 21, 2023 10:15:00 AM
Attachments:	image001.png Notice of Intent Form.pdf

Dear Neighborhood Association/Coalition Representative(s),

Why did I receive this public notice?
You are receiving this notice in accordance with New Mexico Administrative Code (NMAC) 20.11.41.13.B(1) which requires any applicant seeking an Air Quality Construction Permit pursuant to 20.11.41 NMAC to provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.

What is the Air Quality Permit application review process?
The City of Albuquerque, Environmental Health Department, Air Quality Program (Program) is responsible for the review and issuance of Air Quality Permits for any stationary source of air contaminants within Bernalillo County. Once the application is received, the Program reviews each application and rules it either complete or incomplete. Complete applications will then go through a 30-day public comment period. Within 90 days after the Program has ruled the application complete, the Program shall issue the permit, issue the permit subject to conditions, or deny the requested permit or permit modification. The Program shall hold a Public Information Hearing pursuant to 20.11.41.15 NMAC if the Director determines there is significant public interest and a significant air quality issue is involved.

What do I need to know about this proposed application?

Applicant Name	Curia New Mexico, LLC
Site or Facility Name	Curia New Mexico
Site or Facility Address	4401 Alexander Blvd, Albuquerque, NM 87107
New or Existing Source	EXISTING
Anticipated Date of Application Submittal	December 22, 2023
Summary of Proposed Source to Be Permitted	The application is to modify Construction Permit #1097-M5-1AR. The modification includes updates to equipment specifications and revised potential to emit calculations for the planned emergency generator and boiler units recently permitted with the issuance of Permit#1097-M5 issued August 14, 2023. Updates are based on final equipment selections for the facility expansion project.

What emission limits and operating schedule are being requested?
See attached Notice of Intent to Construct form for this information.

How do I get additional information regarding this proposed application?
For inquiries regarding the proposed source, contact:

- John Gerback, Jr.
- John.GerbackJr@curiaglobal.com
- (505) 340-5989

For inquiries regarding the air quality permitting process, contact:

- City of Albuquerque Environmental Health Department Air Quality Program

- aqd@cabq.gov
- (505) 768-1972

Regards,

Sustainability is our business

Alaina Juhl
Consulting Associate, Engineering
She/Her/Hers

Tampa
+1 835-522-5017
+1 303-886-5532

erm.com

Attachment 6

Air Quality Zoning Requirement

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Zoning Requirement Cover Letter

This Cover Letter Must Be Returned With The Application Along With All Required Attachments

The Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

Any person seeking a new air quality permit or a permit modification under 20.11.41 NMAC (Construction Permits) shall provide documentary proof that the proposed air quality permitted use of the facility's subject property is allowed by the zoning designation of the City or County zoning laws, as applicable. Sufficient documentation may include (i) a zoning certification from the City Planning Department or County Department of Planning and Development Services, as applicable, if the applicant is subject to City or County zoning jurisdiction; or (ii) a zoning verification from both planning departments if the applicant is not subject to City or County zoning jurisdiction. A zone atlas map shall not be sufficient. At this time, applicants are not required to submit documentation for the subject property's zoning designation when applying for a relocation of a portable stationary source, or a technical or administrative revision to an existing permit.

The Department will rule an application administratively incomplete if it is missing or has incorrect information. If the Department has ruled an application administratively incomplete three (3) times, the Department will deny the permit application. Any fees submitted for processing an application that has been denied will not be refunded. If the Department denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

The Department may require additional information that is necessary to make a thorough review of an application. At all times before the Department has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Department. The applicant's duty to supplement and correct the application includes, but is not limited to, relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Department's review and decision. While the Department is processing an application, regardless of whether the Department has determined the application is administratively complete, if the Department determines that additional information is necessary to evaluate or make a final decision regarding the application, the Department may request additional information and the applicant shall provide the requested additional information.

NOTICE REGARDING SCOPE OF A PERMIT: The Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City Planning Department or County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City Planning Department website at https://www.cabq.gov/planning and the County Department of Planning and Development Services website at https://www.bernco.gov/planning.

Corporate and Facility Information: This information shall match the information in the permit application**.**

Air Quality Permit Applicant Company Name: **Curia New Mexico, LLC**			
Facility Name: **Curia New Mexico**			
Facility Physical Address: **4401 Alexander Boulevard NE**	City: **Albuquerque**	State: **NM**	Zip: **87107**
Facility Legal Description:			

General Operation Information: This information shall match the information in the permit application.

Permitting action being requested (please refer to the definitions in 20.11.41 NMAC):
☐ New Permit ☒ Permit Modification, Current Permit #: **1097-M5-1AR**

Attachment Information: The location information provided to the City Planning Department or County Department of Planning and Development Services, as applicable, and reflected in the zoning certification or verifications, as applicable, shall be the same as the Facility location information provided to the Department in the air quality construction permit application.

☐ Zoning Certification Provided by: Choose an item. *This is a use-specific certification.* **City Planning Form**: https://www.cabq.gov/planning/code-enforcement-zoning **County Planning Form**: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/	☒ City Zoning Verification ☐ County Zoning Verification **City Planning Form**: https://www.cabq.gov/planning/code-enforcement-zoning **County Planning Form**: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/

CITY OF ALBUQUERQUE

CODE ENFORCEMENT
Plaza Del Sol Building, Suite 500
600 2nd Street NW
Albuquerque, NM 87102
Tel: (505) 924-3850 Fax: (505) 924-3847

Date: November 29, 2022

VIA Email, John.gerbackjr@curia.com
John Gerback, Jr
4401 Alexander Boulevard NE
Albuquerque, NM 87107

RE: 4401 ALEXANDER BLVD NE – the "property".
UPC: 101606106405930310

To Whom It May Concern:

This letter will certify that according to the map on file in this office on November 29, 2022, the property located at: **4401 ALEXANDER BLVD NE**, legally described as: **TR B BLK 5 PLAT OF TRACTS A & B BLK 5 SUNDT'S INDUSTRIALCENTER CONT 11.8662 AC**, Albuquerque, Bernalillo County, New Mexico, is Zoned: NR-GM Non-residential - General Manufacturing Zone District.

If you have any questions regarding this matter please feel free to contact code enforcement by email at codeenforcement@cabq.gov

Sincerely:

Angelo Metzgar
Code Compliance Manager

CITY OF ALBUQUERQUE – PLANNING DEPARTMENT
CODE ENFORCEMENT DIVISION

ZONING VERIFICATION REQUEST

HELPFUL HINTS

- Make sure the property is located within the Albuquerque city limits prior to requesting a verification statement.
- Provide the legal description of the property and/or the Uniform Property Code (UPC) number. This information helps staff to identify the property and expedite your request.
- Verification statements are processed in the order that they are received. Depending upon division workload and service demands, verification statements may take up to seven (7) days to complete.

For more information, contact:

City of Albuquerque
Planning Department

Phone: (505) 924-3450
(505) 924-3860

www.cabq.gov/planning

Code Compliance Manager:
Andrew Garcia

Revised April 2017

OVERVIEW

What is a zoning verification statement?

A zoning verification statement is written confirmation provided by the city to confirm the current zoning designation of a particular piece of property.

What type of information is provided in a zoning verification statement?

Verification statements contain the following information:

- The assigned address of the subject site
- The legal description of the property
- The zoning designation of the property
- The overlay district or sector plan affecting the property, if applicable

Zoning verification statements DO NOT include the following:

- Confirmation of the existing development's compliance with current zoning code requirements*, conformance/non-conformance of existing uses or structures, or reference to building or fire codes
- Copies of site plans, special exceptions, certificates or other approvals
- The zoning designations of abutting or nearby properties
- Reference to existing zoning code violations

**Written confirmation of a property's compliance with current zoning standards, reference to nonconformance/rebuild allowances, and/or types of permitted development on a property are provided through our ZONAL CERTIFICATION process.*

How do I obtain a zoning verification statement?

Complete the form on the reverse side of this brochure and return it to:

City of Albuquerque – Code Enforcement Division
600 2nd St. NW, Suite 500
Albuquerque, New Mexico 87102
(505) 924-3847

THERE IS NO FEE FOR A ZONING VERIFICATION STATEMENT

SELF-HELP RESOURCES

- **Zoning Code**. If you would like to view and/or obtain copies of the Comprehensive City Zoning Code, please visit the following website:
  - http://www.amlegal.com/albuquerque_nm/
- **Recorded Documents**. If you would like copies of official recorded documents such as site plans, special exceptions or certificates of occupancy, please make a Freedom of Information Act (FOIA) request to:
  - cityclerk@cabq.gov
- **GIS Data**. If you would like mapping or geographic information, please visit the following website:
  - www.cabq.gov/gis/advanced-map-viewer
- **Related City Agencies**. If you would like information on City of Albuquerque building codes, fire codes or other development standards, please visit the following website:
  - www.cabq.gov

CITY OF ALBUQUERQUE – PLANNING DEPARTMENT
CODE ENFORCEMENT DIVISION

ZONING VERIFICATION REQUEST

DID YOU REMEMBER TO...

- Verify that the property is located within the city limits?
- Provide the legal description of the property and/or the Uniform Property Code (UPC) number?
- Submit your request at least seven (7) days before the verification statement is needed?

City of Albuquerque
PO Box 1293
Albuquerque, New Mexico 87103
www.cabq.gov

FOR STAFF USE ONLY

DATE RECEIVED: _____

RECEIVED BY: _____

ZONE: _____

ZAP: _____

SUBJECT PROPERTY

le ander l d

ADDRESS

D D

LOT BLOCK SUBDIVISION

UPC #

uria e e ico

OWNER OF RECORD

APPLICANT INFORMATION

ohn er ac r

NAME

uria e e ico

COMPANY / ORGANIZATION

le ander oule ard l u uer ue e e ico

ADDRESS

ohn ger ac r curia com

PHONE EMAIL

STATEMENT DETAILS

ADDRESS THE STATEMENT TO: ☐ *SAME AS APPLICANT*

NAME

COMPANY / ORGANIZATION

ADDRESS

PHONE FAX EMAIL

Attachment 7

Basis of Emission Rates

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2021 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **ENER-G Rudox LLC**
(U.S. Manufacturer or Importer)

Certificate Number: MRDXL65.4AAA-001

Effective Date: 04/29/2021

Expiration Date: 12/31/2021

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 04/29/2021

Revision Date: N/A

Model Year: 2021
Manufacturer Type: Original Engine Manufacturer
Engine Family: MRDXL65.4AAA

Mobile/Stationary Indicator: Both
Emissions Power Category: kW>900
Fuel Type: Diesel
After Treatment Devices: CTOX-DPF-Passive, Diesel Oxidation Catalyst, Selective Catalytic Reduction
Non-after Treatment Devices: No Non-After Treatment Devices Installed

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Parts 60 and 1039, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Parts 60 and 1039 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Parts 60 and 1039 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Parts 60 and 1039.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Parts 60 and 1039. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Parts 60 and 1039.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

KOHLER

Model: 1750REOZMD

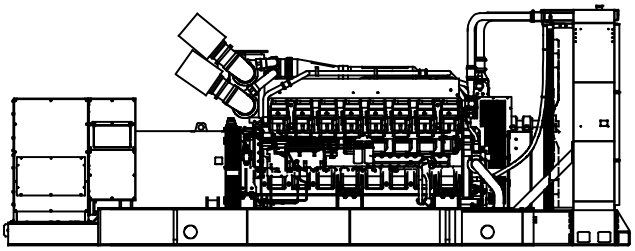
380- 4160 V **Diesel**

ISO 9001 KOHLER NATIONALLY REGISTERED

Tier 2 EPA-Certified for Stationary Emergency Applications

Ratings Range

		60 Hz
Standby:	**kW**	1480- 1780
	kVA	1850- 2225
Prime:	**kW**	1350- 1650
	kVA	1688- 2063



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940 / ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A standard one-year limited warranty covers all generator set systems and components. Two-, five-, and ten-year extended limited warranties are also available.
- Alternator features:
  - The pilot-excited, permanent magnet (PM) alternator provides superior short-circuit capability.
  - Additional alternator voltages are available including 12.47 kV, 13.2 kV, and 13.8 kV medium voltages. Contact your local distributor for more detailed information.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Kohler designed controllers for one-source system integration and remote communication. See Controllers on page 3.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).
  - An electronic, isochronous governor delivers precise frequency regulation.
  - Multiple circuit breaker configurations.

Generator Set Ratings

				150°C Rise Standby Rating		130°C Rise Standby Rating		125°C Rise Prime Rating		105°C Rise Prime Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
	220/380	3	60	1480/1850	2811	1480/1850	2811	1350/1688	2564	1350/1688	2564
7M4052	240/416	3	60	1620/2025	2810	1610/2013	2793	1470/1838	2550	1460/1825	2533
	277/480	3	60	1750/2188	2631	1750/2188	2631	1650/2063	2481	1600/2000	2406
	220/380	3	60	1590/1988	3020	1590/1988	3020	1450/1813	2754	1450/1813	2754
7M4054	240/416	3	60	1780/2225	3088	1780/2225	3088	1620/2025	2810	1620/2025	2810
	277/480	3	60	1780/2225	2676	1780/2225	2676	1620/2025	2436	1620/2025	2436
	220/380	3	60	1780/2225	3381	1780/2225	3381	1620/2025	3077	1620/2025	3077
7M4056	240/416	3	60	1780/2225	3088	1780/2225	3088	1620/2025	2810	1620/2025	2810
	277/480	3	60	1780/2225	2676	1780/2225	2676	1620/2025	2436	1620/2025	2436
7M4176	220/380	3	60	1780/2225	3381	1780/2225	3381	1620/2025	3077	1620/2025	3077
7M4292	347/600	3	60	1780/2225	2141	1780/2225	2141	1620/2025	1949	1620/2025	1949
7M4370	2400/4160	3	60	1780/2225	309	1780/2225	309	1620/2025	281	1620/2025	281
7M4374	2400/4160	3	60	1780/2225	309	1780/2225	309	1620/2025	281	1620/2025	281

RATINGS: All three-phase units are rated at 0.8 power factor. *Standby Ratings:* The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. *Prime Power Ratings:* At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Alternator Specifications

Specifications		Alternator
Type		4-Pole, Rotating-Field
Exciter type		Brushless, Permanent-Magnet Pilot Exciter
Voltage regulator		Solid State, Volts/Hz
Insulation:		NEMA MG1
Material		Class H, Synthetic, Nonhygroscopic
Temperature rise		130°C, 150°C Standby
Bearing: quantity, type		1, Sealed
Coupling		Flexible Disc
Amortisseur windings		Full
Rotor balancing		125%
Voltage regulation, no-load to full-load		Controller Dependent
One-step load acceptance		100% of Rating
Unbalanced load capability		100% of Rated Standby Current
Peak motor starting kVA:		(35% dip for voltages below)
480 V	7M4052 (4 bus bar)	5500
480 V	7M4054 (4 bus bar)	7000
480 V	7M4056 (4 bus bar)	7200
380 V	7M4176 (4 bus bar)	5400
600 V	7M4292 (4 bus bar)	4250
4160 V	7M4370 (6 lead)	5500
4160 V	7M4374 (6 lead)	6200

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Superior voltage waveform from two-thirds pitch windings and skewed stator.
- Digital solid-state, volts-per-hertz voltage regulator with ±0.25% no-load to full-load regulation.
- Brushless alternator with brushless pilot exciter for excellent load response.

Application Data

Engine

Engine Specifications	
Manufacturer	Mitsubishi
Engine model	S16R-Y2PTAW2-1
Engine type	4-Cycle, Turbocharged
Cylinder arrangement	16 V
Displacement, L (cu. in.)	65.4 (3989)
Bore and stroke, mm (in.)	170 x 180 (6.69 x 7.09)
Compression ratio	14.0:1
Piston speed, m/min. (ft./min.)	648 (2126)
Main bearings: quantity, type	9, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	2180 (2923)
Cylinder head material	Cast Iron
Crankshaft material	Forged Steel
Governor type	Electronic
Frequency regulation, no-load to full-load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust flow at rated kW, m^3/min. (cfm)	490 (17302)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	526 (979)
Maximum allowable back pressure, kPa (in. Hg)	5.9 (1.7)
Exhaust outlet size at engine hookup, mm (in.)	See ADV drawing

Engine Electrical

Engine Electrical System	
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	24
Ampere rating	30
Starter motor rated voltage (DC)	Dual, 24
Battery, recommended cold cranking amps (CCA):	
Quantity, CCA rating each	Four, 1150
Battery voltage (DC)	12

Fuel

Fuel System	
Fuel supply line, min. ID, mm (in.)	19 (0.75)
Fuel return line, min. ID, mm (in.)	19 (0.75)
Max. lift, engine-driven fuel pump, m (ft.)	1.0 (3.0)
Max. fuel flow, Lph (gph)	720 (190)
Max. fuel pump restriction, kPa (in. Hg)	10 (3.0)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel filter: quantity, type	4, Secondary
Recommended fuel	#2 Diesel / HVO / RD

Lubrication

Lubricating System	
Type	Full Pressure
Oil pan capacity, L (qt.) §	200 (211)
Oil pan capacity with filter, L (qt.) §	230 (243)
Oil filter: quantity, type §	4, Cartridge
Oil cooler	Water-Cooled

§ Kohler recommends the use of Kohler Genuine oil and filters.

Application Data

Cooling

Radiator System	
Ambient temperature, °C (°F)	40 (104)
Engine jacket water capacity, L (gal.)	170 (44.9)
Radiator system capacity, including engine, L (gal.)	367 (96.9)
Engine jacket water flow, Lpm (gpm)	1850 (489)
Charge cooler water flow, Lpm (gpm)	920 (243)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	702 (39937)
Heat rejected to charge cooler water at rated kW, dry exhaust, kW (Btu/min.)	702 (39937)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	2057 (81)
Fan kWm (HP)	81 (109)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)

High Ambient Radiator System	
Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	170 (44.9)
Radiator system capacity, including engine, L (gal.)	386 (102)
Engine jacket water flow, Lpm (gpm)	1850 (489)
Charge cooler water flow, Lpm (gpm)	920 (243)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	702 (39937)
Heat rejected to charge cooler water at rated kW, dry exhaust, kW (Btu/min.)	702 (39937)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	2362 (93)
Fan kWm (HP)	63 (84)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)

Remote Radiator System†	
Exhaust manifold type	Dry
Connection sizes:	
Jacket water engine inlet, mm (in.)	95 (3.75)
Jacket water engine outlet, mm (in.)	95 (3.75)
Intercooler water engine inlet, mm (in.)	83 (3.25)
Intercooler water engine outlet, mm (in.)	83 (3.25)
Static head allowable above engine, kPa (ft. H_2O)	98 (32.8)

† Contact your local distributor for cooling system options and specifications based on your specific requirements.

Operation Requirements

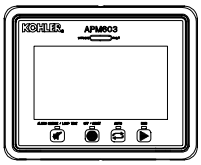
Air Requirements	
Radiator-cooled cooling air, m^3/min. (scfm)‡	2209 (78000)
High ambient radiator-cooled cooling air, m^3/min. (scfm)‡	2718 (96000)
Cooling air required for generator set when equipped with city water cooling or remote radiator, based on 14°C (25°F) rise, m^3/min. (scfm)‡	898 (31700)
Combustion air, m^3/min. (cfm)	206 (7274)
Heat rejected to ambient air:	
Engine, kW (Btu/min.)	162 (9216)
Alternator, kW (Btu/min.)	88 (5004)

‡ Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

Fuel Consumption**	
Diesel, Lph (gph) at % load	**Standby Rating**
100%	536 (141.6)
75%	403 (106.6)
50%	271 (71.6)
25%	154 (40.6)
Diesel, Lph (gph) at % load	**Prime Rating**
100%	487 (128.7)
75%	366 (96.7)
50%	251 (66.3)
25%	142 (37.6)

** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD.

Controllers

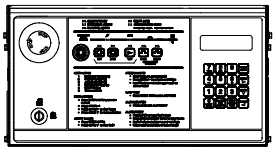


APM603 Controller

Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- 7-inch graphic display with touch screen and menu control provides easy local data access
- Measurements are selectable in metric or English units
- Paralleling capability to control up to 8 generators on an isolated bus with first-on logic, synchronizer, kW and kVAR load sharing, and protective relays
  Note: Parallel with other APM603 controllers only
- Generator management to turn paralleled generators off and on as required by load demand
- Load management to connect and disconnect loads as required
- Controller supports Modbus® RTU, Modbus® TCP, SNMP and BACnet®
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- UL-listed overcurrent protective device
- NFPA 110 Level 1 capability

Refer to G6-162 for additional controller features and accessories.



Decision-Maker® 6000 Paralleling Controller

Provides advanced control, system monitoring, and system diagnostics with remote monitoring capabilities for paralleling multiple generator sets.

- Paralleling capability to control up to 8 generators on an isolated bus with first-on logic, synchronizer, kW and kVAR load sharing, and protective relays
  Note: Parallel with other Decision-Maker® 6000 controllers only
- Digital display and keypad provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or modem configuration
- Controller supports Modbus® protocol
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-107 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.
BACnet® is a registered trademark of ASHRAE.

KOHLER.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Standard Features

- Alternator Protection
- Alternator Strip Heater (standard on 3300 volt and above)
- Customer Connection (Decision-Maker® 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature
- Radiator Core Guard

Available Options

Circuit Breakers

Type

- ❑ Magnetic Trip
- ❑ Thermal Magnetic Trip
- ❑ Electronic Trip (LI)
- ❑ Electronic Trip with Short Time (LSI)

Rating

- ❑ 80%
- ❑ 100%

Operation

- ❑ Manual
- ❑ Electrically Operated (for paralleling)

Circuit Breaker Mounting

- ❑ Generator Mounted
- ❑ Remote Mounted
- ❑ Bus Bar (for remote mounted breakers)

Approvals and Listings

- ❑ California OSHPD Pre- Approval
- ❑ CSA Certified
- ❑ HCAI Pre- Approval
- ❑ IBC Seismic Certification
- ❑ UL 2200 Listing

Enclosed Unit

- ❑ Sound Enclosure/Fuel Tank Package
- ❑ Weather Enclosure/Fuel Tank Package

Open Unit

- ❑ Exhaust Silencer, Hospital (kit: PA-361627)
- ❑ Exhaust Silencer, Critical (kit: PA-361625)
- ❑ Flexible Exhaust Connector, Stainless Steel

Fuel System

- ❑ Flexible Fuel Lines
- ❑ Fuel Pressure Gauge
- ❑ Fuel/Water Separator

Controller

- ❑ Common Failure Relay
- ❑ Communication Products and PC Software
- ❑ Dry Contact (isolated alarm) (Decision- Maker® 6000 controllers only)
- ❑ Input/Output, Digital (APM603 controller only; included with paralleling kit)
- ❑ Lockable Emergency Stop Switch
- ❑ Manual Key Switch (APM603 controller only)
- ❑ Prime Power Switch (Decision- Maker® 6000 controllers only)
- ❑ Remote Emergency Stop Switch
- ❑ Remote Mounting Cable
- ❑ Remote Serial Annunciator Panel
- ❑ Run Relay (Standard with APM603 controller)

Cooling System

- ❑ Block Heater; 9000 W, 208 V, 1 Ph
- ❑ Block Heater; 9000 W, 240 V, (Select 1 Ph or 3 Ph)
- ❑ Block Heater; 9000 W, 380 V, 3 Ph
- ❑ Block Heater; 9000 W, 480 V, (Select 1 Ph or 3 Ph) Required for Ambient Temperatures Below 0°C (32°F)
- ❑ High Ambient Radiator
- ❑ Remote Radiator Cooling Setup

Electrical System

- ❑ Alternator Strip Heater (available up to 600 volt)
- ❑ Battery
- ❑ Battery Charger, Equalize/Float Type
- ❑ Battery Heater
- ❑ Battery Rack and Cables

Paralleling System

- ❑ Voltage Sensing (Decision-Maker® 6000 controller only)

Miscellaneous

- ❑ Air Cleaner, Heavy Duty
- ❑ Air Cleaner Restriction Indicator
- ❑ Crankcase Emission Canister
- ❑ Engine Fluids (oil and coolant) Added
- ❑ Oil Temperature Gauge
- ❑ Rated Power Factor Testing
- ❑ Spring Isolators

Literature

- ❑ General Maintenance
- ❑ NFPA 110
- ❑ Overhaul
- ❑ Production

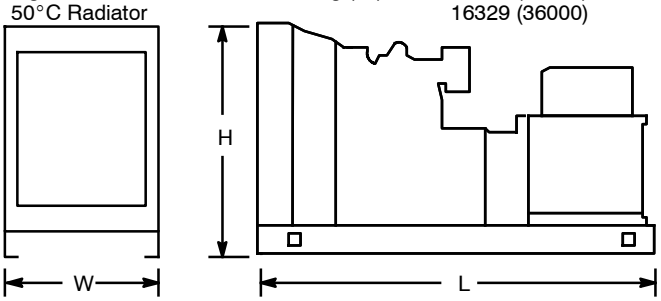
Warranty

- ❑ 2-Year Basic Limited Warranty
- ❑ 2-Year Prime Limited Warranty
- ❑ 5-Year Basic Limited Warranty
- ❑ 5-Year Comprehensive Limited Warranty
- ❑ 10-Year Major Components Limited Warranty

Dimensions and Weights

Overall Size, L x W x H, max., mm (in.):

40°C Radiator	6724 x 2430 x 2606 (264.7 x 95.7 x 102.6)
50°C Radiator	6774 x 2766 x 3089 (266.7 x 108.9 x 121.6)
Weight 40°C Radiator, wet, max., kg (lb.):	15422 (34000)
50°C Radiator	16329 (36000)



Note: This drawing is provided for reference only and should not be used for planning the installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

Nonroad Compression-Ignition Engines: Exhaust Emission Standards

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr)	NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	kW < 8	1	2000-2004	-	10.5	-	1.0	8.0	20/15/50	3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	8.0			
		4	2008+	-	7.5	-	0.40 [c]	8.0			
	8 ≤ kW < 19	1	2000-2004	-	9.5	-	0.80	6.6		3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	6.6			
		4	2008+	-	7.5	-	0.40	6.6			
	19 ≤ kW < 37	1	1999-2003	-	9.5	-	0.80	5.5		5,000/7 [d]	3,000/5 [e]
		2	2004-2007	-	7.5	-	0.60	5.5			
		4	2008-2012	-	7.5	-	0.30	5.5			
			2013+	-	4.7	-	0.03	5.5			
	37 ≤ kW < 56	1	1998-2003	-	-	9.2	-	-		8,000/10	3,000/5
		2	2004-2007	-	7.5	-	0.40	5.0			
		3 [f]	2008-2011	-	4.7	-	0.40	5.0			
		4 (Option 1) [g]	2008-2012	-	4.7	-	0.30	5.0			
		4 (Option 2) [g]	2012	-	4.7	-	0.03	5.0			
		4	2013+	-	4.7	-	0.03	5.0			
	56 ≤ kW < 75	1	1998-2003	-	-	9.2	-	-			
		2	2004-2007	-	7.5	-	0.40	5.0			
		3	2008-2011	-	4.7	-	0.40	5.0			
		4	2012-2013 [h]	-	4.7	-	0.02	5.0			
			2014+ [i]	0.19	-	0.40	0.02	5.0			
	75 ≤ kW < 130	1	1997-2002	-	-	9.2	-	-			
		2	2003-2006	-	6.6	-	0.30	5.0			
		3	2007-2011	-	4.0	-	0.30	5.0			
		4	2012-2013 [h]	-	4.0	-	0.02	5.0			
			2014+	0.19	-	0.40	0.02	5.0			

Continued

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr	NOx (g/kW-hr	PM (g/kW-hr	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	130 ≤ kW < 225	1	1996-2002	1.3 [j]	-	9.2	0.54	11.4	20/15/50	8,000/10	3,000/5
		2	2003-2005	-	6.6	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	225 ≤ kW < 450	1	1996-2000	1.3 [j]	-	9.2	0.54	11.4			
		2	2001-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	450 ≤ kW < 560	1	1996-2001	1.3 [j]	-	9.2	0.54	11.4			
		2	2002-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	560 ≤ kW < 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			
	kW > 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5 [k]	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			

Notes on following page.

Notes:

- For Tier 1, 2, and 3 standards, exhaust emissions of nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and non-methane hydrocarbons (NMHC) are measured using the procedures in 40 Code of Federal Regulations (CFR) Part 89 Subpart E. For Tier 1, 2, and 3 standards, particulate matter (PM) exhaust emissions are measured using the California Regulations for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines.
- For Tier 4 standards, engines are tested for transient and steady-state exhaust emissions using the procedures in 40 CFR Part 1039 Subpart F. Transient standards do not apply to engines below 37 kilowatts (kW) before the 2013 model year, constant-speed engines, engines certified to Option 1, and engines above 560 kW.
- Tier 2 and later model naturally aspirated nonroad engines shall not discharge crankcase emissions into the atmosphere unless these emissions are permanently routed into the exhaust. This prohibition does not apply to engines using turbochargers, pumps, blowers, or superchargers.
- In lieu of the Tier 1, 2, and 3 standards for NOX, NMHC + NOX, and PM, manufacturers may elect to participate in the averaging, banking, and trading (ABT) program described in 40 CFR Part 89 Subpart C.

a Smoke emissions may not exceed 20 percent during the acceleration mode, 15 percent during the lugging mode, and 50 percent during the peaks in either mode. Smoke emission standards do not apply to single-cylinder engines, constant-speed engines, or engines certified to a PM emission standard of 0.07 grams per kilowatt-hour (g/kW-hr) or lower. Smoke emissions are measured using procedures in 40 CFR Part 86 Subpart I.

b Useful life and warranty period are expressed hours and years, whichever comes first.

c Hand-startable air-cooled direct injection engines may optionally meet a PM standard of 0.60 g/kW-hr. These engines may optionally meet Tier 2 standards through the 2009 model years. In 2010 these engines are required to meet a PM standard of 0.60 g/kW-hr.

d Useful life for constant speed engines with rated speed 3,000 revolutions per minute (rpm) or higher is 5 years or 3,000 hours, whichever comes first.

e Warranty period for constant speed engines with rated speed 3,000 rpm or higher is 2 years or 1,500 hours, whichever comes first.

f These Tier 3 standards apply only to manufacturers selecting Tier 4 Option 2. Manufacturers selecting Tier 4 Option 1 will be meeting those standards in lieu of Tier 3 standards.

g A manufacturer may certify all their engines to either Option 1 or Option 2 sets of standards starting in the indicated model year. Manufacturers selecting Option 2 must meet Tier 3 standards in the 2008-2011 model years.

h These standards are phase-out standards. Not more than 50 percent of a manufacturer's engine production is allowed to meet these standards in each model year of the phase out period. Engines not meeting these standards must meet the final Tier 4 standards.

i These standards are phased in during the indicated years. At least 50 percent of a manufacturer's engine production must meet these standards during each year of the phase in. Engines not meeting these standards must meet the applicable phase-out standards.

j For Tier 1 engines the standard is for total hydrocarbons.

k The NOx standard for generator sets is 0.67 g/kW-hr.

l The PM standard for generator sets is 0.03 g/kW-hr.

Citations: Code of Federal Regulations (CFR) citations:

- 40 CFR 89.112 = Exhaust emission standards
- 40 CFR 1039.101 = Exhaust emission standards for after 2014 model year
- 40 CFR 1039.102 = Exhaust emission standards for model year 2014 and earlier
- 40 CFR 1039 Subpart F = Exhaust emissions transient and steady state test procedures
- 40 CFR 86 Subpart I = Smoke emission test procedures
- 40 CFR 1065 = Test equipment and emissions measurement procedures

3.4 Large Stationary Diesel And All Stationary Dual-fuel Engines

3.4.1 General

The primary domestic use of large stationary diesel engines (greater than 600 horsepower [hp]) is in oil and gas exploration and production. These engines, in groups of 3 to 5, supply mechanical power to operate drilling (rotary table), mud pumping, and hoisting equipment, and may also operate pumps or auxiliary power generators. Another frequent application of large stationary diesels is electricity generation for both base and standby service. Smaller uses include irrigation, hoisting, and nuclear power plant emergency cooling water pump operation.

Dual-fuel engines were developed to obtain compression ignition performance and the economy of natural gas, using a minimum of 5 to 6 percent diesel fuel to ignite the natural gas. Large dual-fuel engines have been used almost exclusively for prime electric power generation. This section includes all dual-fuel engines.

3.4.2 Process Description

All reciprocating internal combustion (IC) engines operate by the same basic process. A combustible mixture is first compressed in a small volume between the head of a piston and its surrounding cylinder. The mixture is then ignited, and the resulting high-pressure products of combustion push the piston through the cylinder. This movement is converted from linear to rotary motion by a crankshaft. The piston returns, pushing out exhaust gases, and the cycle is repeated.

There are 2 ignition methods used in stationary reciprocating IC engines, compression ignition (CI) and spark ignition (SI). In CI engines, combustion air is first compression heated in the cylinder, and diesel fuel oil is then injected into the hot air. Ignition is spontaneous because the air temperature is above the autoignition temperature of the fuel. SI engines initiate combustion by the spark of an electrical discharge. Usually the fuel is mixed with the air in a carburetor (for gasoline) or at the intake valve (for natural gas), but occasionally the fuel is injected into the compressed air in the cylinder. Although all diesel- fueled engines are compression ignited and all gasoline- and gas-fueled engines are spark ignited, gas can be used in a CI engine if a small amount of diesel fuel is injected into the compressed gas/air mixture to burn any mixture ratio of gas and diesel oil (hence the name dual fuel), from 6 to 100 percent diesel oil.

CI engines usually operate at a higher compression ratio (ratio of cylinder volume when the piston is at the bottom of its stroke to the volume when it is at the top) than SI engines because fuel is not present during compression; hence there is no danger of premature autoignition. Since engine thermal efficiency rises with increasing pressure ratio (and pressure ratio varies directly with compression ratio), CI engines are more efficient than SI engines. This increased efficiency is gained at the expense of poorer response to load changes and a heavier structure to withstand the higher pressures.[1]

3.4.3 Emissions And Controls

Most of the pollutants from IC engines are emitted through the exhaust. However, some total organic compounds (TOC) escape from the crankcase as a result of blowby (gases that are vented from the oil pan after they have escaped from the cylinder past the piston rings) and from the fuel tank

and carburetor because of evaporation. Nearly all of the TOCs from diesel CI engines enter the atmosphere from the exhaust. Crankcase blowby is minor because TOCs are not present during compression of the charge. Evaporative losses are insignificant in diesel engines due to the low volatility of diesel fuels. In general, evaporative losses are also negligible in engines using gaseous fuels because these engines receive their fuel continuously from a pipe rather than via a fuel storage tank and fuel pump.

The primary pollutants from internal combustion engines are oxides of nitrogen (NO_x), hydrocarbons and other organic compounds, carbon monoxide (CO), and particulates, which include both visible (smoke) and nonvisible emissions. Nitrogen oxide formation is directly related to high pressures and temperatures during the combustion process and to the nitrogen content, if any, of the fuel. The other pollutants, HC, CO, and smoke, are primarily the result of incomplete combustion. Ash and metallic additives in the fuel also contribute to the particulate content of the exhaust. Sulfur oxides also appear in the exhaust from IC engines. The sulfur compounds, mainly sulfur dioxide (SO_2), are directly related to the sulfur content of the fuel.[2]

3.4.3.1 Nitrogen Oxides -

Nitrogen oxide formation occurs by two fundamentally different mechanisms. The predominant mechanism with internal combustion engines is thermal NO_x which arises from the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most thermal NO_x is formed in the high-temperature region of the flame from dissociated molecular nitrogen in the combustion air. Some NO_x, called prompt NO_x, is formed in the early part of the flame from reaction of nitrogen intermediary species, and HC radicals in the flame. The second mechanism, fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Gasoline, and most distillate oils, have no chemically-bound fuel N_2 and essentially all NO_x formed is thermal NO_x.

3.4.3.2 Total Organic Compounds -

The pollutants commonly classified as hydrocarbons are composed of a wide variety of organic compounds and are discharged into the atmosphere when some of the fuel remains unburned or is only partially burned during the combustion process. Most unburned hydrocarbon emissions result from fuel droplets that were transported or injected into the quench layer during combustion. This is the region immediately adjacent to the combustion chamber surfaces, where heat transfer outward through the cylinder walls causes the mixture temperatures to be too low to support combustion.

Partially burned hydrocarbons can occur because of poor air and fuel homogeneity due to incomplete mixing, before or during combustion; incorrect air/fuel ratios in the cylinder during combustion due to maladjustment of the engine fuel system; excessively large fuel droplets (diesel engines); and low cylinder temperature due to excessive cooling (quenching) through the walls or early cooling of the gases by expansion of the combustion volume caused by piston motion before combustion is completed.[2]

3.4.3.3 Carbon Monoxide -

Carbon monoxide is a colorless, odorless, relatively inert gas formed as an intermediate combustion product that appears in the exhaust when the reaction of CO to CO_2 cannot proceed to completion. This situation occurs if there is a lack of available oxygen near the hydrocarbon (fuel) molecule during combustion, if the gas temperature is too low, or if the residence time in the cylinder is too short. The oxidation rate of CO is limited by reaction kinetics and, as a consequence, can be accelerated only to a certain extent by improvements in air and fuel mixing during the combustion process.[2-3]

3.4.3.4 Smoke, Particulate Matter, and PM-10 -

White, blue, and black smoke may be emitted from IC engines. Liquid particulates appear as white smoke in the exhaust during an engine cold start, idling, or low load operation. These are formed in the quench layer adjacent to the cylinder walls, where the temperature is not high enough to ignite the fuel. Blue smoke is emitted when lubricating oil leaks, often past worn piston rings, into the combustion chamber and is partially burned. Proper maintenance is the most effective method of preventing blue smoke emissions from all types of IC engines. The primary constituent of black smoke is agglomerated carbon particles (soot).[2]

3.4.3.5 Sulfur Oxides -

Sulfur oxide emissions are a function of only the sulfur content in the fuel rather than any combustion variables. In fact, during the combustion process, essentially all the sulfur in the fuel is oxidized to SO_2. The oxidation of SO_2 gives sulfur trioxide (SO_3), which reacts with water to give sulfuric acid (H_2SO_4), a contributor to acid precipitation. Sulfuric acid reacts with basic substances to give sulfates, which are fine particulates that contribute to PM-10 and visibility reduction. Sulfur oxide emissions also contribute to corrosion of the engine parts.[2,3]

Table 3.4-1 contains gaseous emission factors for the pollutants discussed above, expressed in units of pounds per horsepower-hour (lb/hp-hr), and pounds per million British thermal unit (lb/MMBtu). Table 3.4-2 shows the particulate and particle-sizing emission factors. Table 3.4-3 shows the speciated organic compound emission factors and Table 3.4-4 shows the emission factors for polycyclic aromatic hydrocarbons (PAH). These tables do not provide a complete speciated organic compound and PAH listing because they are based only on a single engine test; they are to be used only for rough order of magnitude comparisons.

Table 3.4-5 shows the NO_x reduction and fuel consumption penalties for diesel and dual-fueled engines based on some of the available control techniques. The emission reductions shown are those that have been demonstrated. The effectiveness of controls on a particular engine will depend on the specific design of each engine, and the effectiveness of each technique could vary considerably. Other NO_x control techniques exist but are not included in Table 3.4-5. These techniques include internal/external exhaust gas recirculation, combustion chamber modification, manifold air cooling, and turbocharging.

3.4.4 Control Technologies

Control measures to date are primarily directed at limiting NO_x and CO emissions since they are the primary pollutants from these engines. From a NO_x control viewpoint, the most important distinction between different engine models and types of reciprocating engines is whether they are rich-burn or lean-burn. Rich-burn engines have an air-to-fuel ratio operating range that is near stoichiometric or fuel-rich of stoichiometric and as a result the exhaust gas has little or no excess oxygen. A lean-burn engine has an air-to-fuel operating range that is fuel-lean of stoichiometric; therefore, the exhaust from these engines is characterized by medium to high levels of O_2. The most common NO_x control technique for diesel and dual fuel engines focuses on modifying the combustion process. However, selective catalytic reduction (SCR) and nonselective catalytic reduction (NSCR) which are post-combustion techniques are becoming available. Control for CO have been partly adapted from mobile sources.[5]

Combustion modifications include injection timing retard (ITR), preignition chamber combustion (PCC), air-to-fuel ratio, and derating. Injection of fuel into the cylinder of a CI engine initiates the combustion process. Retarding the timing of the diesel fuel injection causes the combustion process to occur later in the power stroke when the piston is in the downward motion and

combustion chamber volume is increasing. By increasing the volume, the combustion temperature and pressure are lowered, thereby lowering NO_x formation. ITR reduces NO_x from all diesel engines; however, the effectiveness is specific to each engine model. The amount of NO_x reduction with ITR diminishes with increasing levels of retard.[5]

Improved swirl patterns promote thorough air and fuel mixing and may include a precombustion chamber (PCC). A PCC is an antechamber that ignites a fuel-rich mixture that propagates to the main combustion chamber. The high exit velocity from the PCC results in improved mixing and complete combustion of the lean air/fuel mixture which lowers combustion temperature, thereby reducing NO_x emissions.[5]

The air-to-fuel ratio for each cylinder can be adjusted by controlling the amount of fuel that enters each cylinder. At air-to-fuel ratios less than stoichiometric (fuel-rich), combustion occurs under conditions of insufficient oxygen which causes NO_x to decrease because of lower oxygen and lower temperatures. Derating involves restricting engine operation to lower than normal levels of power production for the given application. Derating reduces cylinder pressures and temperatures thereby lowering NO_x formation rates.[5]

SCR is an add-on NO_x control placed in the exhaust stream following the engine and involves injecting ammonia (NH_3) into the flue gas. The NH_3 reacts with the NO_x in the presence of a catalyst to form water and nitrogen. The effectiveness of SCR depends on fuel quality and engine duty cycle (load fluctuations). Contaminants in the fuel may poison or mask the catalyst surface causing a reduction or termination in catalyst activity. Load fluctuations can cause variations in exhaust temperature and NO_x concentration which can create problems with the effectiveness of the SCR system.[5]

NSCR is often referred to as a three-way conversion catalyst system because the catalyst reactor simultaneously reduces NO_x, CO, and HC and involves placing a catalyst in the exhaust stream of the engine. The reaction requires that the O_2 levels be kept low and that the engine be operated at fuel-rich air-to-fuel ratios.[5]

3.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section since that date are summarized below. For further detail, consult the memoranda describing each supplement or the background report for this section.

Supplement A, February 1996

No changes.

Supplement B, October 1996

- The general text was updated.
- Controlled NO_x factors and PM factors were added for diesel units.
- Math errors were corrected in factors for CO from diesel units and for uncontrolled NO_x from dual fueled units.

Table 3.4-1. GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESEL AND ALL STATIONARY DUAL-FUEL ENGINES[a]

Pollutant	Diesel Fuel (SCC 2-02-004-01)			Dual Fuel[b] (SCC 2-02-004-02)		
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING
NO_x						
Uncontrolled	0.024	3.2	B	0.018	2.7	D
Controlled	0.013[c]	1.9[c]	B	ND	ND	NA
CO	5.5 E-03	0.85	C	7.5 E-03	1.16	D
SO_x[d]	8.09 E-03S_1	1.01S_1	B	4.06 E-04S_1 + 9.57 E-03S_2	0.05S_1 + 0.895S_2	B
CO_2[e]	1.16	165	B	0.772	110	B
PM	0.0007[c]	0.1[c]	B	ND	ND	NA
TOC (as CH_4)	7.05 E-04	0.09	C	5.29 E-03	0.8	D
Methane	[f]	[f]	E	3.97 E-03	0.6	E
Nonmethane	[f]	[f]	E	1.32 E-03	0.2[g]	E

[a] Based on uncontrolled levels for each fuel, from References 2,6-7. When necessary, the average heating value of diesel was assumed to be 19,300 Btu/lb with a density of 7.1 lb/gallon. The power output and fuel input values were averaged independently from each other, because of the use of actual brake-specific fuel consumption (BSFC) values for each data point and of the use of data possibly sufficient to calculate only 1 of the 2 emission factors (e. g., enough information to calculate lb/MMBtu, but not lb/hp-hr). Factors are based on averages across all manufacturers and duty cycles. The actual emissions from a particular engine or manufacturer could vary considerably from these levels. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code.

[b] Dual fuel assumes 95% natural gas and 5% diesel fuel.

[c] References 8-26. Controlled NO_x is by ignition timing retard.

[d] Assumes that all sulfur in the fuel is converted to SO_2. S_1 = % sulfur in fuel oil; S_2 = % sulfur in natural gas. For example, if sulfer content is 1.5%, then S = 1.5.

[e] Assumes 100% conversion of carbon in fuel to CO_2 with 87 weight % carbon in diesel, 70 weight % carbon in natural gas, dual-fuel mixture of 5% diesel with 95% natural gas, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and natural gas heating value of 1050 Btu/scf.

[f] Based on data from 1 engine, TOC is by weight 9% methane and 91% nonmethane.

[g] Assumes that nonmethane organic compounds are 25% of TOC emissions from dual-fuel engines. Molecular weight of nonmethane gas stream is assumed to be that of methane.

Table 3.4-2. PARTICULATE AND PARTICLE-SIZING EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Filterable particulate[b]	
< 1 μm	0.0478
< 3 μm	0.0479
< 10 μm	0.0496
Total filterable particulate	0.0620
Condensable particulate	0.0077
Total PM-10[c]	0.0573
Total particulate[d]	0.0697

[a] Based on 1 uncontrolled diesel engine from Reference 6. Source Classification Code 2-02-004-01. The data for the particulate emissions were collected using Method 5, and the particle size distributions were collected using a Source Assessment Sampling System. To convert from lb/MMBtu to ng/J, multiply by 430. PM-10 = particulate matter ≤ 10 micrometers (μm) aerometric diameter.

[b] Particle size is expressed as aerodynamic diameter.

[c] Total PM-10 is the sum of filterable particulate less than 10 μm aerodynamic diameter and condensable particulate.

[d] Total particulate is the sum of the total filterable particulate and condensable particulate.

Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Benzene[b]	7.76 E-04
Toluene[b]	2.81 E-04
Xylenes[b]	1.93 E-04
Propylene	2.79 E-03
Formaldehyde[b]	7.89 E-05
Acetaldehyde[b]	2.52 E-05
Acrolein[b]	7.88 E-06

[a]Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.
[b]Hazardous air pollutant listed in the *Clean Air Act*.

Table 3.4-4. PAH EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

PAH	Emission Factor (lb/MMBtu) (fuel input)
Naphthalene[b]	1.30 E-04
Acenaphthylene	9.23 E-06
Acenaphthene	4.68 E-06
Fluorene	1.28 E-05
Phenanthrene	4.08 E-05
Anthracene	1.23 E-06
Fluoranthene	4.03 E-06
Pyrene	3.71 E-06
Benz(a)anthracene	6.22 E-07
Chrysene	1.53 E-06
Benzo(b)fluoranthene	1.11 E-06
Benzo(k)fluoranthene	<2.18 E-07
Benzo(a)pyrene	<2.57 E-07
Indeno(1,2,3-cd)pyrene	<4.14 E-07
Dibenz(a,h)anthracene	<3.46 E-07
Benzo(g,h,l)perylene	<5.56 E-07
TOTAL PAH	<2.12 E-04

[a] Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.

[b] Hazardous air pollutant listed in the *Clean Air Act*.

Table 3.4-5. NO_x REDUCTION AND FUEL CONSUMPTION PENALTIES FOR LARGE STATIONARY DIESEL AND DUAL-FUEL ENGINES[a]

Control Approach		Diesel (SCC 2-02-004-01)		Dual Fuel (SCC 2-02-004-02)	
		NO_x Reduction (%)	ΔBSFC[b] (%)	NO_x Reduction (%)	ΔBSFC (%)
Derate	10%	ND	ND	<20	4
	20%	<20	4	ND	ND
	25%	5 - 23	1 - 5	1 - 33	1 - 7
Retard	2°	<20	4	<20	3
	4°	<40	4	<40	1
	8°	28 - 45	2 - 8	50 - 73	3 - 5
Air-to-fuel	3%	ND	ND	<20	0
	±10%	7 - 8	3	25 - 40	1 - 3
Water injection (H_2O/fuel ratio)	50%	25 - 35	2 - 4	ND	ND
SCR		80 - 95	0	80 - 95	0

[a] References 1,27-28. The reductions shown are typical and will vary depending on the engine and duty cycle. SCC = Source Classification Code. ΔBSFC = change in brake-specific fuel consumption. ND = no data.

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1.3 Fuel Oil Combustion

1.3.1 General[1-3]

Two major categories of fuel oil are burned by combustion sources: distillate oils and residual oils. These oils are further distinguished by grade numbers, with Nos. 1 and 2 being distillate oils; Nos. 5 and 6 being residual oils; and No. 4 being either distillate oil or a mixture of distillate and residual oils. No. 6 fuel oil is sometimes referred to as Bunker C. Distillate oils are more volatile and less viscous than residual oils. They have negligible nitrogen and ash contents and usually contain less than 0.3 percent sulfur (by weight). Distillate oils are used mainly in domestic and small commercial applications, and include kerosene and diesel fuels. Being more viscous and less volatile than distillate oils, the heavier residual oils (Nos. 5 and 6) may need to be heated for ease of handling and to facilitate proper atomization. Because residual oils are produced from the residue remaining after the lighter fractions (gasoline, kerosene, and distillate oils) have been removed from the crude oil, they contain significant quantities of ash, nitrogen, and sulfur. Residual oils are used mainly in utility, industrial, and large commercial applications.

1.3.2 Firing Practices[4]

The major boiler configurations for fuel oil-fired combustors are watertube, firetube, cast iron, and tubeless design. Boilers are classified according to design and orientation of heat transfer surfaces, burner configuration, and size. These factors can all strongly influence emissions as well as the potential for controlling emissions.

Watertube boilers are used in a variety of applications ranging from supplying large amounts of process steam to providing space heat for industrial facilities. In a watertube boiler, combustion heat is transferred to water flowing through tubes which line the furnace walls and boiler passes. The tube surfaces in the furnace (which houses the burner flame) absorb heat primarily by radiation from the flames. The tube surfaces in the boiler passes (adjacent to the primary furnace) absorb heat primarily by convective heat transfer.

Firetube boilers are used primarily for heating systems, industrial process steam generators, and portable power boilers. In firetube boilers, the hot combustion gases flow through the tubes while the water being heated circulates outside of the tubes. At high pressures and when subjected to large variations in steam demand, firetube units are more susceptible to structural failure than watertube boilers. This is because the high-pressure steam in firetube units is contained by the boiler walls rather than by multiple small-diameter watertubes, which are inherently stronger. As a consequence, firetube boilers are typically small and are used primarily where boiler loads are relatively constant. Nearly all firetube boilers are sold as packaged units because of their relatively small size.

A cast iron boiler is one in which combustion gases rise through a vertical heat exchanger and out through an exhaust duct. Water in the heat exchanger tubes is heated as it moves upward through the tubes. Cast iron boilers produce low pressure steam or hot water, and generally burn oil or natural gas. They are used primarily in the residential and commercial sectors.

Another type of heat transfer configuration used on smaller boilers is the tubeless design. This design incorporates nested pressure vessels with water in between the shells. Combustion gases are fired into the inner pressure vessel and are then sometimes recirculated outside the second vessel.

1.3.3 Emissions[5]

Emissions from fuel oil combustion depend on the grade and composition of the fuel, the type and size of the boiler, the firing and loading practices used, and the level of equipment maintenance. Because the combustion characteristics of distillate and residual oils are different, their combustion can produce significantly different emissions. In general, the baseline emissions of criteria and noncriteria pollutants are those from uncontrolled combustion sources. Uncontrolled sources are those without add-on air pollution control (APC) equipment or other combustion modifications designed for emission control. Baseline emissions for sulfur dioxide (SO_2) and particulate matter (PM) can also be obtained from measurements taken upstream of APC equipment.

1.3.3.1 Particulate Matter Emissions[6-15] -

Particulate emissions may be categorized as either filterable or condensable. Filterable emissions are generally considered to be the particules that are trapped by the glass fiber filter in the front half of a Reference Method 5 or Method 17 sampling van. Vapors and particles less than 0.3 microns pass through the filter. Condensable particulate matter is material that is emitted in the vapor state which later condenses to form homogeneous and/or heterogeneous aerosol particles. The condensable particulate emitted from boilers fueled on coal or oil is primarily inorganic in nature.

Filterable particulate matter emissions depend predominantly on the grade of fuel fired. Combustion of lighter distillate oils results in significantly lower PM formation than does combustion of heavier residual oils. Among residual oils, firing of No. 4 or No. 5 oil usually produces less PM than does the firing of heavier No. 6 oil.

In general, filterable PM emissions depend on the completeness of combustion as well as on the oil ash content. The PM emitted by distillate oil-fired boilers primarily comprises carbonaceous particles resulting from incomplete combustion of oil and is not correlated to the ash or sulfur content of the oil. However, PM emissions from residual oil burning are related to the oil sulfur content. This is because low-sulfur No. 6 oil, either from naturally low-sulfur crude oil or desulfurized by one of several processes, exhibits substantially lower viscosity and reduced asphaltene, ash, and sulfur contents, which results in better atomization and more complete combustion.

Boiler load can also affect filterable particulate emissions in units firing No. 6 oil. At low load (50 percent of maximum rating) conditions, particulate emissions from utility boilers may be lowered by 30 to 40 percent and by as much as 60 percent from small industrial and commercial units. However, no significant particulate emission reductions have been noted at low loads from boilers firing any of the lighter grades. At very low load conditions (approximately 30 percent of maximum rating), proper combustion conditions may be difficult to maintain and particulate emissions may increase significantly.

1.3.3.2 Sulfur Oxides Emissions[1-2,6-9,16] -

Sulfur oxides (SO_x) emissions are generated during oil combustion from the oxidation of sulfur contained in the fuel. The emissions of SO_x from conventional combustion systems are predominantly in the form of SO_2. Uncontrolled SO_x emissions are almost entirely dependent on the sulfur content of the fuel and are not affected by boiler size, burner design, or grade of fuel being fired. On average, more than 95 percent of the fuel sulfur is converted to SO_2, about 1 to 5 percent is further oxidized to sulfur trioxide (SO_3), and 1 to 3 percent is emitted as sulfate particulate. SO_3 readily reacts with water vapor (both in the atmosphere and in flue gases) to form a sulfuric acid mist.

1.3.3.3 Nitrogen Oxides Emissions[1-2,6-10,15,17-27] -

Oxides of nitrogen (NO_x) formed in combustion processes are due either to thermal fixation of atmospheric nitrogen in the combustion air ("thermal NO_x"), or to the conversion of chemically bound nitrogen in the fuel ("fuel NO_x"). The term NO_x refers to the composite of nitric oxide (NO) and nitrogen dioxide (NO_2). Test data have shown that for most external fossil fuel combustion systems, over 95 percent of the emitted NO_x is in the form of nitric oxide (NO). Nitrous oxide (N_2O) is not included in NO_x but has recently received increased interest because of atmospheric effects.

Experimental measurements of thermal NO_x formation have shown that NO_x concentration is exponentially dependent on temperature, and proportional to N_2 concentration in the flame, the square root of O_2 concentration in the flame, and the residence time. Thus, the formation of thermal NO_x is affected by four factors: (1) peak temperature, (2) fuel nitrogen concentration, (3) oxygen concentration, and (4) time of exposure at peak temperature. The emission trends due to changes in these factors are generally consistent for all types of boilers: an increase in flame temperature, oxygen availability, and/or residence time at high temperatures leads to an increase in NO_x production.

Fuel nitrogen conversion is the more important NO_x-forming mechanism in residual oil boilers. It can account for 50 percent of the total NO_x emissions from residual oil firing. The percent conversion of fuel nitrogen to NO_x varies greatly, however; typically from 20 to 90 percent of nitrogen in oil is converted to NO_x. Except in certain large units having unusually high peak flame temperatures, or in units firing a low nitrogen content residual oil, fuel NO_x generally accounts for over 50 percent of the total NO_x generated. Thermal fixation, on the other hand, is the dominant NO_x-forming mechanism in units firing distillate oils, primarily because of the negligible nitrogen content in these lighter oils. Because distillate oil-fired boilers are usually smaller and have lower heat release rates, the quantity of thermal NO_x formed in them is less than that of larger units which typically burn residual oil.[28]

A number of variables influence how much NO_x is formed by these two mechanisms. One important variable is firing configuration. NO_x emissions from tangentially (corner) fired boilers are, on the average, less than those of horizontally opposed units. Also important are the firing practices employed during boiler operation. Low excess air (LEA) firing, flue gas recirculation (FGR), staged combustion (SC), reduced air preheat (RAP), low NO_x burners (LNBs), burning oil/water emulsions (OWE), or some combination thereof may result in NO_x reductions of 5 to 60 percent. Load reduction (LR) can likewise decrease NO_x production. Nitrogen oxide emissions may be reduced from 0.5 to 1 percent for each percentage reduction in load from full load operation. It should be noted that most of these variables, with the exception of excess air, only influence the NO_x emissions of large oil-fired boilers. Low excess air-firing is possible in many small boilers, but the resulting NO_x reductions are less significant.

1.3.3.4 Carbon Monoxide Emissions[29-32] -

The rate of carbon monoxide (CO) emissions from combustion sources depends on the oxidation efficiency of the fuel. By controlling the combustion process carefully, CO emissions can be minimized. Thus if a unit is operated improperly or not well maintained, the resulting concentrations of CO (as well as organic compounds) may increase by several orders of magnitude. Smaller boilers, heaters, and furnaces tend to emit more of these pollutants than larger combustors. This is because smaller units usually have a higher ratio of heat transfer surface area to flame volume than larger combustors have; this leads to reduced flame temperature and combustion intensity and, therefore, lower combustion efficiency.

The presence of CO in the exhaust gases of combustion systems results principally from incomplete fuel combustion. Several conditions can lead to incomplete combustion, including insufficient oxygen (O_2) availability; poor fuel/air mixing; cold-wall flame quenching; reduced combustion temperature; decreased combustion gas residence time; and load reduction (i. e., reduced

combustion intensity). Since various combustion modifications for NO_x reduction can produce one or more of the above conditions, the possibility of increased CO emissions is a concern for environmental, energy efficiency, and operational reasons.

1.3.3.5 Organic Compound Emissions[29-39] -

Small amounts of organic compounds are emitted from combustion. As with CO emissions, the rate at which organic compounds are emitted depends, to some extent, on the combustion efficiency of the boiler. Therefore, any combustion modification which reduces the combustion efficiency will most likely increase the concentrations of organic compounds in the flue gases.

Total organic compounds (TOCs) include VOCs, semi-volatile organic compounds, and condensable organic compounds. Emissions of VOCs are primarily characterized by the criteria pollutant class of unburned vapor phase hydrocarbons. Unburned hydrocarbon emissions can include essentially all vapor phase organic compounds emitted from a combustion source. These are primarily emissions of aliphatic, oxygenated, and low molecular weight aromatic compounds which exist in the vapor phase at flue gas temperatures. These emissions include all alkanes, alkenes, aldehydes, carboxylic acids, and substituted benzenes (e. g., benzene, toluene, xylene, and ethyl benzene).

The remaining organic emissions are composed largely of compounds emitted from combustion sources in a condensed phase. These compounds can almost exclusively be classed into a group known as polycyclic organic matter (POM), and a subset of compounds called polynuclear aromatic hydrocarbons (PAH or PNA). There are also PAH-nitrogen analogs. Information available in the literature on POM compounds generally pertains to these PAH groups.

Formaldehyde is formed and emitted during combustion of hydrocarbon-based fuels including coal and oil. Formaldehyde is present in the vapor phase of the flue gas. Formaldehyde is subject to oxidation and decomposition at the high temperatures encountered during combustion. Thus, larger units with efficient combustion (resulting from closely regulated air-fuel ratios, uniformly high combustion chamber temperatures, and relatively long gas retention times) have lower formaldehyde emission rates than do smaller, less efficient combustion units.

1.3.3.6 Trace Element Emissions[29-32,40-44] -

Trace elements are also emitted from the combustion of oil. For this update of AP-42, trace metals included in the list of 189 hazardous air pollutants under Title III of the 1990 Clean Air Act Amendments are considered. The quantity of trace elements entering the combustion device depends solely on the fuel composition. The quantity of trace metals emitted from the source depends on combustion temperature, fuel feed mechanism, and the composition of the fuel. The temperature determines the degree of volatilization of specific compounds contained in the fuel. The fuel feed mechanism affects the separation of emissions into bottom ash and fly ash. In general, the quantity of any given metal emitted depends on the physical and chemical properties of the element itself; concentration of the metal in the fuel; the combustion conditions; and the type of particulate control device used, and its collection efficiency as a function of particle size.

Some trace metals concentrate in certain waste particle streams from a combustor (bottom ash, collector ash, flue gas particulate), while others do not. Various classification schemes to describe this partitioning have been developed. The classification scheme used by Baig, et al.[44] is as follows:

- Class 1: Elements which are approximately equally distributed between fly ash and bottom ash, or show little or no small particle enrichment.

- Class 2: Elements which are enriched in fly ash relative to bottom ash, or show increasing enrichment with decreasing particle size.

- Class 3: Elements which are emitted in the gas phase.

By understanding trace metal partitioning and concentration in fine particulate, it is possible to postulate the effects of combustion controls on incremental trace metal emissions. For example, several NO_x controls for boilers reduce peak flame temperatures (e. g., SC, FGR, RAP, OWE, and LR). If combustion temperatures are reduced, fewer Class 2 metals will initially volatilize, and fewer will be available for subsequent condensation and enrichment on fine PM. Therefore, for combustors with particulate controls, lower volatile metal emissions should result due to improved particulate removal. Flue gas emissions of Class 1 metals (the non-segregating trace metals) should remain relatively unchanged.

Lower local O_2 concentrations is also expected to affect segregating metal emissions from boilers with particle controls. Lower O_2 availability decreases the possibility of volatile metal oxidation to less volatile oxides. Under these conditions, Class 2 metals should remain in the vapor phase as they enter the cooler sections of the boiler. More redistribution to small particles should occur and emissions should increase. Again, Class 1 metal emissions should remain unchanged.

1.3.3.7 Greenhouse Gases[45-50] -

Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions are all produced during fuel oil combustion. Nearly all of the fuel carbon (99 percent) in fuel oil is converted to CO_2 during the combustion process. This conversion is relatively independent of firing configuration. Although the formation of CO acts to reduce CO_2 emissions, the amount of CO produced is insignificant compared to the amount of CO_2 produced. The majority of the fuel carbon not converted to CO_2 is due to incomplete combustion in the fuel stream.

Formation of N_2O during the combustion process is governed by a complex series of reactions and its formation is dependent upon many factors. Formation of N_2O is minimized when combustion temperatures are kept high (above 1475^oF) and excess air is kept to a minimum (less than 1 percent). Additional sampling and research is needed to fully characterize N_2O emissions and to understand the N_2O formation mechanism. Emissions can vary widely from unit to unit, or even from the same unit at different operating conditions. Average emission factors based on reported test data have been developed for conventional oil combustion systems.

Methane emissions vary with the type of fuel and firing configuration, but are highest during periods of incomplete combustion or low-temperature combustion, such as the start-up or shut-down cycle for oil-fired boilers. Typically, conditions that favor formation of N_2O also favor emissions of CH_4.

1.3.4 Controls

Control techniques for criteria pollutants from fuel oil combustion may be classified into three broad categories: fuel substitution/alteration, combustion modification, and postcombustion control. Emissions of noncriteria pollutants such as particulate phase metals have been controlled through the use of post combustion controls designed for criteria pollutants. Fuel substitution reduces SO_2 or NO_x and involves burning a fuel with a lower sulfur or nitrogen content, respectively. Particulate matter will generally be reduced when a lighter grade of fuel oil is burned.[6,8,11] Fuel alteration of heavy oils includes mixing water and heavy oil using emulsifying agents for better atomization and lower combustion temperatures. Under some conditions, emissions of NO_x, CO, and PM may be reduced significantly. Combustion modification includes any physical or operational change in the furnace or boiler and is

applied primarily for NO_x control purposes, although for small units, some reduction in PM emissions may be available through improved combustion practice. Postcombustion control is a device after the combustion of the fuel and is applied to control emissions of PM, SO_2, and NO_x.

1.3.4.1 Particulate Matter Controls[51] -

Control of PM emissions from residential and commercial units is accomplished by improving burner servicing and improving oil atomization and combustion aerodynamics. Optimization of combustion aerodynamics using a flame retention device, swirl, and/or recirculation is considered effective toward achieving the triple goals of low PM emissions, low NO_x emissions, and high thermal efficiency.

Large industrial and utility boilers are generally well-designed and well-maintained so that soot and condensable organic compound emissions are minimized. Particulate matter emissions are more a result of emitted fly ash with a carbon component in such units. Therefore, postcombustion controls (mechanical collectors, ESP, fabric filters, etc.) or fuel substitution/alteration may be used to reduce PM emissions from these sources.

Mechanical collectors, a prevalent type of control device, are primarily useful in controlling particulates generated during soot blowing, during upset conditions, or when a very dirty heavy oil is fired. For these situations, high-efficiency cyclonic collectors can achieve up to 85 percent control of particulate. Under normal firing conditions, or when a clean oil is combusted, cyclonic collectors are not nearly so effective because of the high percentage of small particles (less than 3 micrometers in diameter) emitted.

Electrostatic precipitators (ESPs) are commonly used in oil-fired power plants. Older precipitators, usually small, typically remove 40 to 60 percent of the emitted PM. Because of the low ash content of the oil, greater collection efficiency may not be required. Currently, new or rebuilt ESPs can achieve collection efficiencies of up to 90 percent.

In fabric filtration, a number of filtering elements (bags) along with a bag cleaning system are contained in a main shell structure incorporating dust hoppers. The particulate removal efficiency of the fabric filter system is dependent on a variety of particle and operational characteristics including particle size distribution, particle cohesion characteristics, and particle electrical resistivity. Operational parameters that affect collection efficiency include air-to-cloth ratio, operating pressure loss, cleaning sequence, interval between cleaning, and cleaning intensity. The structure of the fabric filter, filter composition, and bag properties also affect collection efficiency. Collection efficiencies of baghouses may be more than 99 percent.

Scrubbing systems have also been installed on oil-fired boilers to control both sulfur oxides and particulate. These systems can achieve SO_2 removal efficiencies of 90 to 95 percent and particulate control efficiencies of 50 to 60 percent.

Fuel alteration of heavy oil by mixing with water and an emulsifying agent has reduced PM emissions significantly in controlled tests.

1.3.4.2 SO_2 Controls[52-53] -

Commercialized postcombustion flue gas desulfurization (FGD) processes use an alkaline reagent to absorb SO_2 in the flue gas and produce a sodium or a calcium sulfate compound. These solid sulfate compounds are then removed in downstream equipment. Flue gas desulfurization technologies are categorized as wet, semi-dry, or dry depending on the state of the reagent as it leaves the absorber vessel.

These processes are either regenerable (such that the reagent material can be treated and reused) or nonregenerable (in which case all waste streams are de-watered and discarded).

Wet regenerable FGD processes are attractive because they have the potential for better than 95 percent sulfur removal efficiency, have minimal waste water discharges, and produce a saleable sulfur product. Some of the current nonregenerable calcium-based processes can, however, produce a saleable gypsum product.

To date, wet systems are the most commonly applied. Wet systems generally use alkali slurries as the SO_x absorbent medium and can be designed to remove greater than 90 percent of the incoming SO_x. Lime/limestone scrubbers, sodium scrubbers, and dual alkali scrubbing are among the commercially proven wet FGD systems. Effectiveness of these devices depends not only on control device design but also on operating variables.

1.3.4.3 NO_x Controls[41,54-55] -

In boilers fired on crude oil or residual oil, the control of fuel NO_x is very important in achieving the desired degree of NO_x reduction since fuel NO_x typically accounts for 60 to 80 percent of the total NO_x formed. Fuel nitrogen conversion to NO_x is highly dependent on the fuel-to-air ratio in the combustion zone and, in contrast to thermal NO_x formation, is relatively insensitive to small changes in combustion zone temperature. In general, increased mixing of fuel and air increases nitrogen conversion which, in turn, increases fuel NO_x. Thus, to reduce fuel NO_x formation, the most common combustion modification technique is to suppress combustion air levels below the theoretical amount required for complete combustion. The lack of oxygen creates reducing conditions that, given sufficient time at high temperatures, cause volatile fuel nitrogen to convert to N_2 rather than NO.

Several techniques are used to reduce NO_x emissions from fuel oil combustion. Fuel substitution consists of burning lower nitrogen fuels. Fuel alteration includes burning emulsified heavy oil and water mixtures. In addition to these, the primary techniques can be classified into one of two fundamentally different methods — combustion controls and postcombustion controls. Combustion controls reduce NO_x by suppressing NO_x formation during the combustion process while postcombustion controls reduce NO_x emissions after their formation. Combustion controls are the most widely used method of controlling NO_x formation in all types of boilers and include low excess air, burners out of service, biased-burner firing, flue gas recirculation, overfire air, and low-NO_x burners. Postcombustion control methods include selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR). These controls can be used separately, or combined to achieve greater NO_x reduction.

Operating at low excess air involves reducing the amount of combustion air to the lowest possible level while maintaining efficient and environmentally compliant boiler operation. NO_x formation is inhibited because less oxygen is available in the combustion zone. Burners out of service involves withholding fuel flow to all or part of the top row of burners so that only air is allowed to pass through. This method simulates air staging, or overfire air conditions, and limits NO_x formation by lowering the oxygen level in the burner area. Biased-burner firing involves firing the lower rows of burners more fuel-rich than the upper row of burners. This method provides a form of air staging and limits NO_x formation by limiting the amount of oxygen in the firing zone. These methods may change the normal operation of the boiler and the effectiveness is boiler-specific. Implementation of these techniques may also reduce operational flexibility; however, they may reduce NO_x by 10 to 20 percent from uncontrolled levels.

Flue gas recirculation involves extracting a portion of the flue gas from the economizer section or air heater outlet and readmitting it to the furnace through the furnace hopper, the burner windbox, or both. This method reduces the concentration of oxygen in the combustion zone and may reduce NO_x by as much as 40 to 50 percent in some boilers.

Overfire air is a technique in which a percentage of the total combustion air is diverted from the burners and injected through ports above the top burner level. Overfire air limits NO_x by (1) suppressing thermal NO_x by partially delaying and extending the combustion process resulting in less intense combustion and cooler flame temperatures; (2) a reduced flame temperature that limits thermal NO_x formation, and/or (3) a reduced residence time at peak temperature which also limits thermal NO_x formation.

Low NO_x burners are applicable to tangential and wall-fired boilers of various sizes. They have been used as a retrofit NO_x control for existing boilers and can achieve approximately 35 to 55 percent reduction from uncontrolled levels. They are also used in new boilers to meet NSPS limits. Low NO_x burners can be combined with overfire air to achieve even greater NO_x reduction (40 to 60 percent reduction from uncontrolled levels).

SNCR is a postcombustion technique that involves injecting ammonia or urea into specific temperature zones in the upper furnace or convective pass. The ammonia or urea reacts with NO_x in the flue gas to produce nitrogen and water. The effectiveness of SNCR depends on the temperature where reagents are injected; mixing of the reagent in the flue gas; residence time of the reagent within the required temperature window; ratio of reagent to NO_x; and the sulfur content of the fuel that may create sulfur compound that deposit in downstream equipment. There is not as much commercial experience to base effectiveness on a wide range of boiler types; however, in limited applications, NO_x reductions of 25 to 40 percent have been achieved.

SCR is another postcombustion technique that involves injecting ammonia into the flue gas in the presence of a catalyst to reduce NO_x to nitrogen and water. The SCR reactor can be located at various positions in the process including before an air heater and particulate control device, or downstream of the air heater, particulate control device, and flue gas desulfurization systems. The performance of SCR is influenced by flue gas temperature, fuel sulfur content, ammonia to NO_x ratio, inlet NO_x concentration, space velocity, and catalyst condition. NO_x emission reductions of 75 to 85 percent have been achieved through the use of SCR on oil-fired boilers operating in the U.S.

Fuel alteration for NO_x reduction includes use of oil/water emulsion fuels. In controlled tests, a mixture of 9 percent water in No. 6 oil with a petroleum based emulsifying agent reduced NO_x emissions by 36 percent on a Btu basis or 41 percent on a volume basis, compared with the same fuel in unaltered form. The reduction appears to be due primarily to improved atomization with a corresponding reduction of excess combustion air, with lower flame temperature contributing slightly to the reduction.[84]

Tables 1.3-1 and 1.3-3 present emission factors for uncontrolled criteria pollutants from fuel oil combustion. Tables in this section present emission factors on a volume basis ($lb/10^3 gal$). To convert to an energy basis (lb/MMBtu), divide by a heating value of 150 $MMBtu/10^3 gal$ for Nos. 4, 5, 6, and residual fuel oil, and 140 $MMBtu/10^3 gal$ for No. 2 and distillate fuel oil. Table 1.3-2 presents emission factors for condensible particulate matter. Tables 1.3-4, 1.3-5, 1.3-6, and 1.3-7 present cumulative size distribution data and size-specific emission factors for particulate emissions from uncontrolled and controlled fuel oil combustion. Figures 1.3-1, 1.3-2, 1.3-3, and 1.3-4 present size-specific emission factors for particulate emissions from uncontrolled and controlled fuel oil combustion. Emission factors for N_2O, POM, and formaldehyde are presented in Table 1.3-8. Emission factors for speciated organic compounds are presented in Table 1.3-9. Emission factors for trace elements in distillate oil are given in Table 1.3-10. Emission factors for trace metals residual oil are given in Table 1.3-11. Default emission factors for CO_2 are presented in Table 1.3-12. A summary of various SO_2 and NO_x controls for fuel-oil-fired boilers is presented in Table 1.3-13 and 1.3-14, respectively. Emission factors for CO, NO_x, and PM from burning No. 6 oil/water emulsion fuel are presented in Table 1.3-15.

1.3.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section since that date are summarized below. For further detail, consult the background report for this section. These and other documents can be found on the CHIEF website (http://www.epa.gov/ttn/chief/ap42/).

Supplement A, February 1996

- The formulas presented in the footnotes for filterable PM were moved into the table.
- For SO2 and SO3 emission factors, text was added to the table footnotes to clarify that "S" is a weight percent and not a fraction. A similar clarification was made to the CO and NOx footnotes. SCC A2104004/A2104011 was provided for residential furnaces.
- For industrial boilers firing No. 6 and No. 5 oil, the methane emission factor was changed from 1 to 1.0 to show two significant figures.
- For SO2 and SO3 factors, text was added to the table footnotes to clarify that "S" is a weight percent and not a fraction.
- The N2O, POM, and formaldehyde factors were corrected.
- Table 1.3-10 was incorrectly labeled 1.1-10. This was corrected.

Supplement B, October 1996

- Text was added concerning firing practices.
- Factors for N_2O, POM, and formaldehyde were added.
- New data for filterable PM were used to create a new PM factor for residential oil-fired furnaces.
- Many new factors were added for toxic organics, toxic metals from distillate oil, and toxic metals from residual oil.
- A table was added for new CO_2 emission factors.

Supplement E, September 1998

- Table 1.3-1, the sub-heading for "Industrial Boilers" was added to the first column.
- Table 1.3-3, the emission factor for uncontrolled PM less than 0.625 micron was corrected to 1.7A, the emission factor for scrubber controlled PM less than 10 micron was corrected to 0.50A, and the relationships for each content in various fuel oils was corrected in footnote C.
- Table 1.3-4 and 1.3-6, the relationship for ash content in various fuel oils was corrected in the footnote C of each table.
- Table 1.3-9, the emission factors for trace metals in distillate oil were updated with newer data where available.

- Table 1.3-10, the title of the table was changed to clarify these factors apply to uncontrolled fuel oil boilers.

- Text and emission factors were added pertaining to No. 6 oil/water emulsion fuel.

- Table 1.3-1 was revised to include new NOx emission factors.

- Emission factors for condensable particulate matter were added (Table 1.3-2).

Update May 2010 - updates were originally published as erratas on the CHIEF website on April 28, 2000.

- In Table 1.3-1 corrections to SO2 factors were made for No. 2 oil fired and No.2 oil fired, LNB/FGR boilers. An editorial correction was made to PM filterable factors for boilers < 100 million BTU/hr for No. 5 and No. 6 oil.

- In Table 1.3-8 the correct N2O factor is 0.53 lb/1000 gal for No 6 oil and 0.26 lb/1000 gal for distillate oil.

Table 1.3-1. CRITERIA POLLUTANT EMISSION FACTORS FOR FUEL OIL COMBUSTION[a]

Firing Configuration (SCC)[a]	SO_2[b]		SO_3[c]		NO_x[d]		CO[e]		Filterable PM[f]	
	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING
Boilers > 100 Million Btu/hr										
No. 6 oil fired, normal firing (1-01-004-01), (1-02-004-01), (1-03-004-01)	157S	A	5.7S	C	47	A	5	A	9.19(S)+3.22	A
No. 6 oil fired, normal firing, low NO_x burner (1-01-004-01), (1-02-004-01)	157S	A	5.7S	C	40	B	5	A	9.19(S)+3.22	A
No. 6 oil fired, tangential firing, (1-01-004-04)	157S	A	5.7S	C	32	A	5	A	9.19(S)+3.22	A
No. 6 oil fired, tangential firing, low NO_x burner (1-01-004-04)	157S	A	5.7S	C	26	E	5	A	9.19(S)+3.22	A
No. 5 oil fired, normal firing (1-01-004-05), (1-02-004-04)	157S	A	5.7S	C	47	B	5	A	10	B
No. 5 oil fired, tangential firing (1-01-004-06)	157S	A	5.7S	C	32	B	5	A	10	B
No. 4 oil fired, normal firing (1-01-005-04), (1-02-005-04)	150S	A	5.7S	C	47	B	5	A	7	B
No. 4 oil fired, tangential firing (1-01-005-05)	150S	A	5.7S	C	32	B	5	A	7	B
No. 2 oil fired (1-01-005-01), (1-02-005-01), (1-03-005-01)	142S[h]	A	5.7S	C	24	D	5	A	2	A
No.2 oil fired, LNB/FGR, (1-01-005-01), (1-02-005-01), (1-03-005-01)	142S[h]	A	5.7S	A	10	D	5	A	2	A

Table 1.3-1. (cont.)

Firing Configuration (SCC)[a]	SO_2[b]		SO_3[c]		NO_x[d]		CO[e]		Filterable PM[f]	
	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING
Boilers < 100 Million Btu/hr										
No. 6 oil fired (1-02-004-02/03) (1-03-004-02/03)	157S	A	2S	A	55	A	5	A	9.19(S)+3.22[i]	B
No. 5 oil fired (1-03-004-04)	157S	A	2S	A	55	A	5	A	10[i]	A
No. 4 oil fired (1-03-005-04)	150S	A	2S	A	20	A	5	A	7	B
Distillate oil fired (1-02-005-02/03) (1-03-005-02/03)	142S	A	2S	A	20	A	5	A	2	A
Residential furnace (A2104004/A2104011)	142S	A	2S	A	18	A	5	A	0.4[g]	B

a To convert from lb/103 gal to kg/103 L, multiply by 0.120. SCC = Source Classification Code.
b References 1-2,6-9,14,56-60. S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.
c References 1-2,6-8,16,57-60. S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.
d References 6-7,15,19,22,56-62. Expressed as NO2. Test results indicate that at least 95% by weight of NOx is NO for all boiler types except residential furnaces, where about 75% is NO. For utility vertical fired boilers use 105 lb/103 gal at full load and normal (>15%) excess air. Nitrogen oxides emissions from residual oil combustion in industrial and commercial boilers are related to fuel nitrogen content, estimated by the following empirical relationship: lb NO2 /103 gal = 20.54 + 104.39(N), where N is the weight % of nitrogen in the oil. For example, if the fuel is 1% nitrogen, then N = 1.
e References 6-8,14,17-19,56-61. CO emissions may increase by factors of 10 to 100 if the unit is improperly operated or not well maintained.
f References 6-8,10,13-15,56-60,62-63. Filterable PM is that particulate collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train. Particulate emission factors for residual oil combustion are, on average, a function of fuel oil sulfur content where S is the weight % of sulfur in oil. For example, if fuel oil is 1% sulfur, then S = 1.
g Based on data from new burner designs. Pre-1970's burner designs may emit filterable PM as high as 3.0 1b/103 gal.
h The SO2 emission factor for both no. 2 oil fired and for no. 2 oil fired with LNB/FGR, is 142S, not 157S. Errata dated April 28, 2000. Section corrected May 2010.
i The PM factors for No.6 and No. 5 fuel were reversed. Errata dated April 28, 2000. Section corrected May 2010.

Table 1.3-2. CONDENSABLE PARTICULATE MATTER EMISSION FACTORS FOR OIL COMBUSTION[a]

Firing Configuration[b] (SCC)	Controls	CPM - TOT[c, d]		CPM - IOR[c, d]		CPM - ORG[c, d]	
		Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING
No. 2 oil fired (1-01-005-01, 1-02-005-01, 1-03-005-01)	All controls, or uncontrolled	1.3[d, e]	D	65% of CPM-TOT emission factor[c]	D	35% of CPM-TOT emission factor[c]	D
No. 6 oil fired (1-01-004-01/04, 1-02-004-01, 1-03-004-01)	All controls, or uncontrolled	1.5[f]	D	85% of CPM-TOT emission factor[d]	E	15% of CPM-TOT emission factor[d]	E

[a] All condensable PM is assumed to be less than 1.0 micron in diameter.
[b] No data are available for numbers 3, 4, and 5 oil. For number 3 oil, use the factors provided for number 2 oil. For numbers 4 and 5 oil, use the factors provided for number 6 oil.
[c] CPM-TOT = total condensable particulate matter.
CPM-IOR = inorganic condensable particulate matter.
CPM-ORG = organic condensable particulate matter.
[d] To convert to lb/MMBtu of No. 2 oil, divide by 140 MMBtu/10^3 gal. To convert to lb/MMBtu of No. 6 oil, divide by 150 MMBtu/10^3 gal.
[e] References: 76-78.
[f] References: 79-82.

Table 1.3-3. EMISSION FACTORS FOR TOTAL ORGANIC COMPOUNDS (TOC), METHANE, AND NONMETHANE TOC (NMTOC) FROM UNCONTROLLED FUEL OIL COMBUSTION[a]

EMISSION FACTOR RATING: A

Firing Configuration (SCC)	TOC[b] Emission Factor ($lb/10^3$ gal)	Methane[b] Emission Factor ($lb/10^3$ gal)	NMTOC[b] Emission Factor ($lb/10^3$ gal)
Utility boilers			
No. 6 oil fired, normal firing (1-01-004-01)	1.04	0.28	0.76
No. 6 oil fired, tangential firing (1-01-004-04)	1.04	0.28	0.76
No. 5 oil fired, normal firing (1-01-004-05)	1.04	0.28	0.76
No. 5 oil fired, tangential firing (1-01-004-06)	1.04	0.28	0.76
No. 4 oil fired, normal firing (1-01-005-04)	1.04	0.28	0.76
No. 4 oil fired, tangential firing (1-01-005-05)	1.04	0.28	0.76
Industrial boilers			
No. 6 oil fired (1-02-004-01/02/03)	1.28	1.00	0.28
No. 5 oil fired (1-02-004-04)	1.28	1.00	0.28
Distillate oil fired (1-02-005-01/02/03)	0.252	0.052	0.2
No. 4 oil fired (1-02-005-04)	0.252	0.052	0.2
Commercial/institutional/residential combustors			
No. 6 oil fired (1-03-004-01/02/03)	1.605	0.475	1.13
No. 5 oil fired (1-03-004-04)	1.605	0.475	1.13
Distillate oil fired (1-03-005-01/02/03)	0.556	0.216	0.34
No. 4 oil fired (1-03-005-04)	0.556	0.216	0.34
Residential furnace (A2104004/A2104011)	2.493	1.78	0.713

a To convert from lb/103 gal to kg/103 L, multiply by 0.12. SCC = Source Classification Code.

b References 29-32. Volatile organic compound emissions can increase by several orders of magnitude if the boiler is improperly operated or is not well maintained.

Table 1.3-4. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE-SPECIFIC EMISSION FACTORS FOR UTILITY BOILERS FIRING RESIDUAL OILa

Particle Size[b] (μm)	Cumulative Mass % Stated Size			Cumulative Emission Factor lb/10^3 gal)					
		Controlled		Uncontrolled[c]		ESP Controlled[d]		Scrubber Controlled[e]	
	Uncon-trolled	ESP	Scrubber	Emission Factor	EMISSION FACTOR RATING	Emission Factor	EMISSION FACTOR RATING	Emission Factor	EMISSION FACTOR RATING
15	80	75	100	6.7A	C	0.05A	E	0.50A	D
10	71	63	100	5.9A	C	0.042A	E	0.50A	D
6	58	52	100	4.8A	C	0.035A	E	0.50A	D
2.5	52	41	97	4.3A	C	0.028A	E	0.48A	D
1.25	43	31	91	3.6A	C	0.021A	E	0.46A	D
1.00	39	28	84	3.3A	C	0.018A	E	0.42A	D
0.625	20	20	64	1.7A	C	0.007A	E	0.32A	D
TOTAL	100	100	100	8.3A	C	0.067A	E	0.50A	D

a Reference 26. Source Classification Codes 1-01-004-01/04/05/06 and 1-01-005-04/05. To convert from lb/103 gal to kg/m3, multiply by 0.120. ESP = electrostatic precipitator.

b Expressed as aerodynamic equivalent diameter.

c Particulate emission factors for residual oil combustion without emission controls are, on average, a function of fuel oil grade and sulfur content where S is the weight % of sulfur in the oil. For example, if the fuel is 1.00% sulfur, then S = 1.
No. 6 oil: A = 1.12(S) + 0.37
No. 5 oil: A = 1.2
No. 4 oil: A = 0.84

d Estimated control efficiency for ESP is 99.2%.

e Estimated control efficiency for scrubber is 94%

Table 1.3-5. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE-SPECIFIC EMISSION FACTORS FOR INDUSTRIAL BOILERS FIRING RESIDUAL OIL[a]

Particle Size[b] (μm)	Cumulative Mass %. Stated Size		Cumulative Emission Factor[c] (lb/10^3 gal)			
			Uncontrolled		Multiple Cyclone Controlled[d]	
	Uncontrolled	Multiple Cyclone Controlled	Emission Factor	EMISSION FACTOR RATING	Emission Factor	EMISSION FACTOR RATING
15	91	100	7.59A	D	1.67A	E
10	86	95	7.17A	D	1.58A	E
6	77	72	6.42A	D	1.17A	E
2.5	56	22	4.67A	D	0.33A	E
1.25	39	21	3.25A	D	0.33A	E
1.00	36	21	3.00A	D	0.33A	E
0.625	30	—[e]	2.50A	D	—[e]	NA
TOTAL	100	100	8.34A	D	1.67A	E

a Reference 26. Source Classification Codes 1-02-004-01/02/03/04 and 1-02-005-04. To convert lb/103 gal to kg/103 L, multiply by 0.120. NA = not applicable.

b Expressed as aerodynamic equivalent diameter.

c Particulate emission factors for residual oil combustion without emission controls are, on average, a function of fuel oil grade and sulfur content where S is the weight % of sulfur in the oil. For example, if the fuel is 1.0% sulfur, then S = 1.
No. 6 oil: A = 1.12(S) + 0.37
No. 5 oil: A = 1.2
No. 4 oil: A = 0.84

d Estimated control efficiency for multiple cyclone is 80%.

e Insufficient data.

Table 1.3-6. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE-SPECIFIC EMISSION FACTORS FOR UNCONTROLLED INDUSTRIAL BOILERS FIRING DISTILLATE OIL[a]

EMISSION FACTOR RATING: E

Particle Size[b] (μm)	Cumulative Mass %. Stated Size	Cumulative Emission Factor ($lb/10^3$ gal)
15	68	1.33
10	50	1.00
6	30	0.58
2.5	12	0.25
1.25	9	0.17
1.00	8	0.17
0.625	2	0.04
TOTAL	100	2.00

[a] Reference 26. Source Classification Codes 1-02-005-01/02/03. To convert from $lb/10^3$ gal to $kg/10^3$ L, multiply by 0.12.
[b] Expressed as aerodynamic equivalent diameter.

Table 1.3-7. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE-SPECIFIC EMISSION FACTORS UNCONTROLLED COMMERCIAL BOILERS BURNING RESIDUAL OR DISTILLATE OIL[a]

EMISSION FACTOR RATING: D

Particle Size[b] (μm)	Cumulative Mass %. Stated Size		Cumulative Emission Factor[c] ($lb/10^3$ gal)	
	Residual Oil	Distillate Oil	Residual Oil	Distillate Oil
15	78	60	6.50A	1.17
10	62	55	5.17A	1.08
6	44	49	3.67A	1.00
2.5	23	42	1.92A	0.83
1.25	16	38	1.33A	0.75
1.00	14	37	1.17A	0.75
0.625	13	35	1.08A	0.67
TOTAL	100	100	8.34A	2.00

[a] Reference 26. Source Classification Codes: 1-03-004-01/02/03/04 and 1-03-005-01/02/03/04. To convert from $lb/10^3$ gal to $kg/10^3$ L, multiply by 0.12.
[b] Expressed as aerodynamic equivalent diameter.
[c] Particulate emission factors for residual oil combustion without emission controls are, on average, a function of fuel oil grade and sulfur content where S is the weight % of sulfur in the fuel. For example, if the fuel is 1.0% sulfur, then S = 1.
No. 6 oil: A = 1.12(S) + 0.37
No. 5 oil: A = 1.2
No. 4 oil: A = 0.84
No. 2 oil: A = 0.24

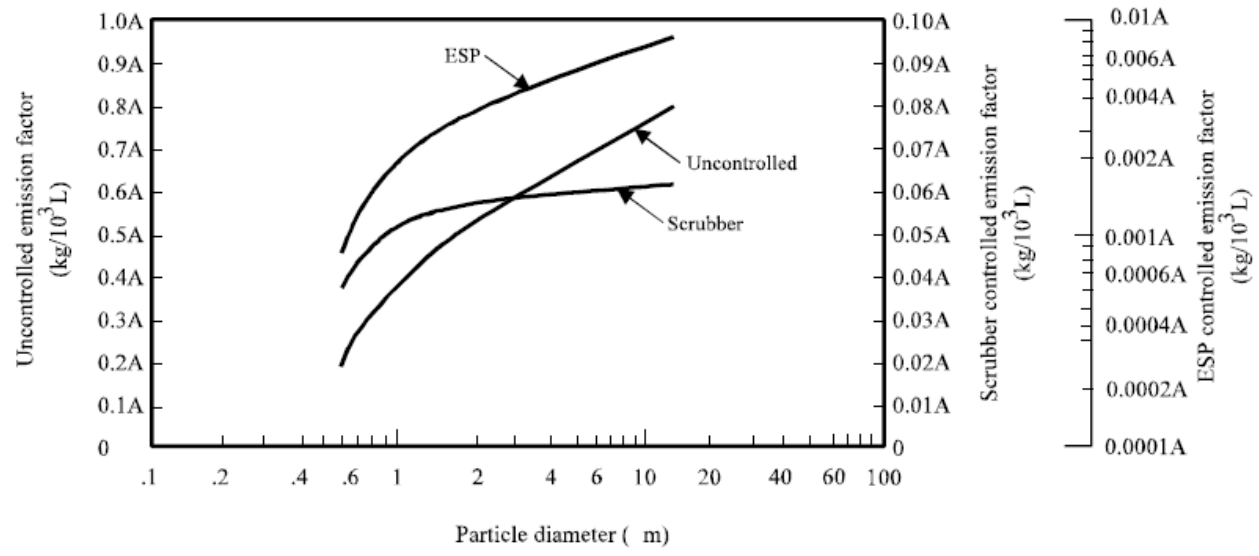

Figure 1.3-1. Cumulative size-specific emission factors for utility boilers firing residual oil.

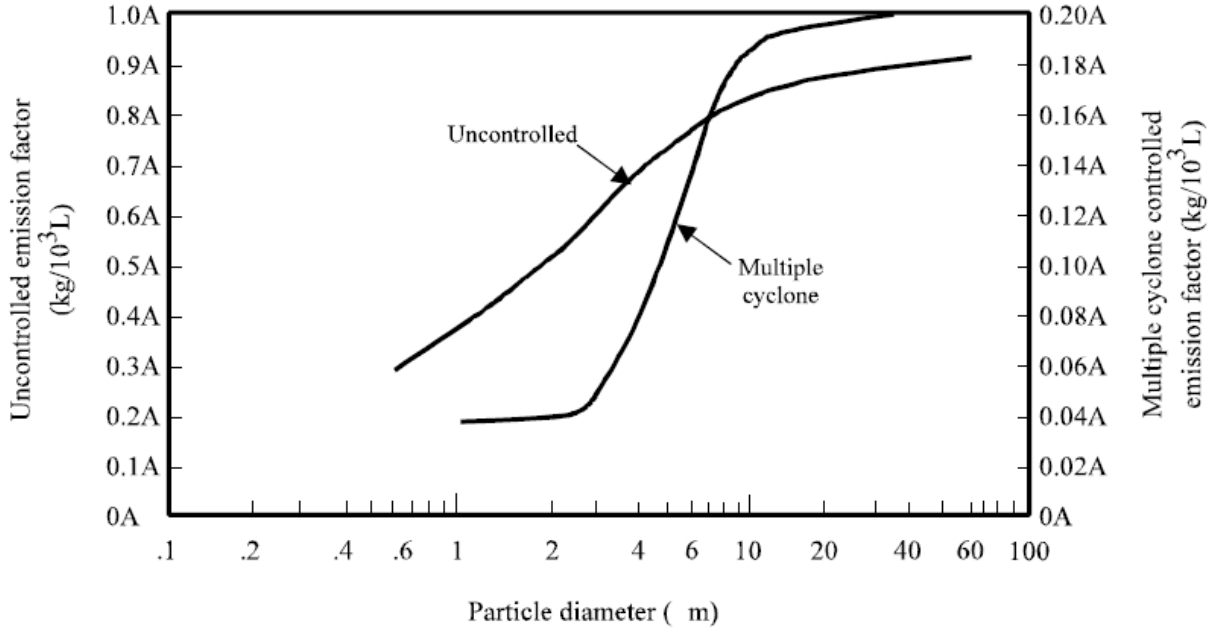

Figure 1.3-2. Cumulative size-specific emission factors for industrial boilers firing residual oil.

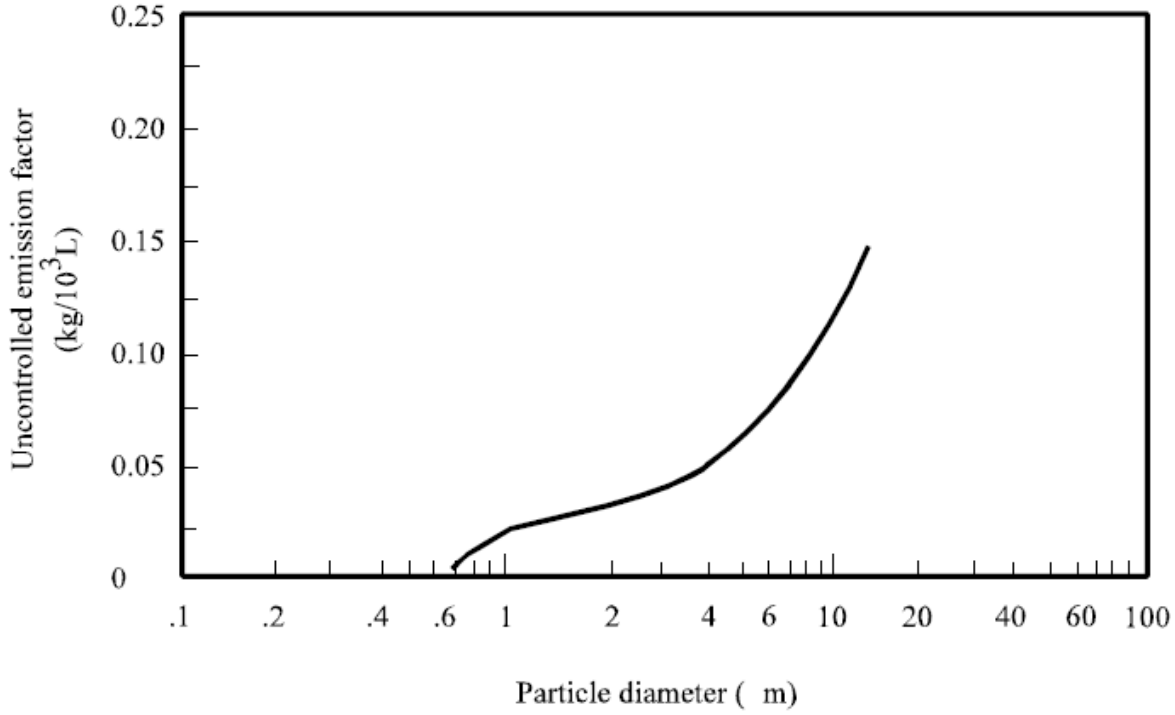

Figure 1.3-3. Cumulative size-specific emission factors for uncontrolled industrial boilers firing distillate oil.

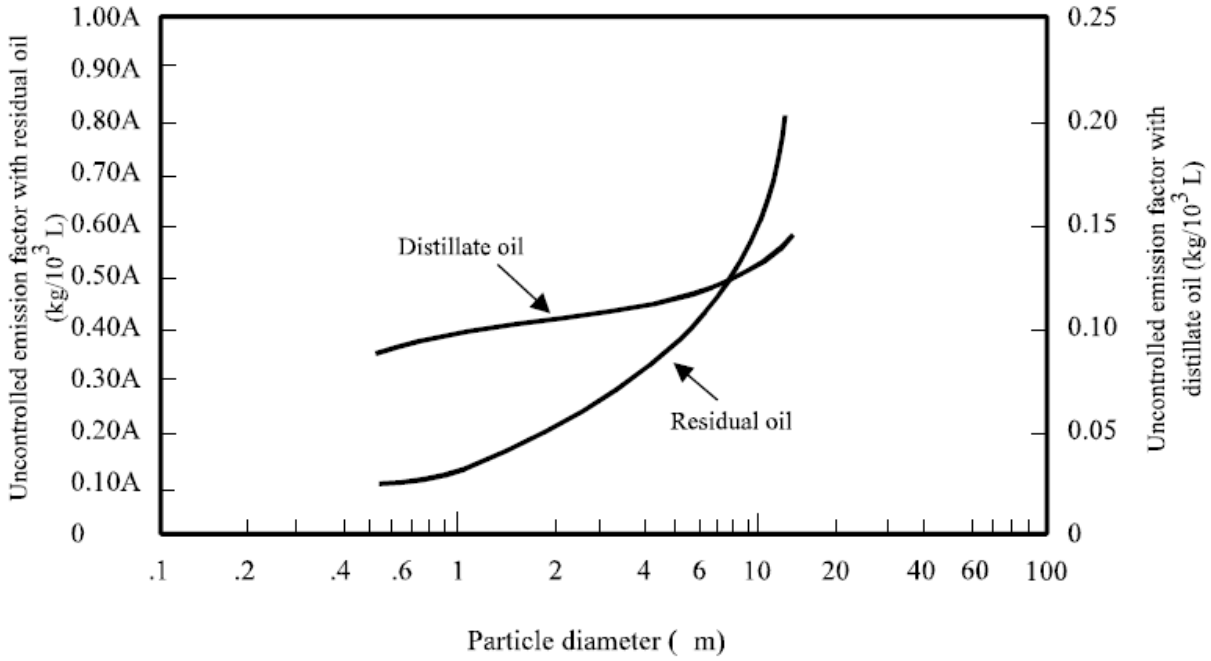

Figure 1.3-4. Cumulative size-specific emission factors for uncontrolled commercial boilers burning residual and distillate oil.

Table 1.3-8. EMISSION FACTORS FOR NITROUS OXIDE (N_2O), POLYCYCLIC ORGANIC MATTER (POM), AND FORMALDEHYDE (HCOH) FROM FUEL OIL COMBUSTION[a]

EMISSION FACTOR RATING: E

Firing Configuration (SCC)	Emission Factor (lb/10^3 gal)		
	N_2O[b]	POM[c]	HCOH[c]
Utility/industrial/commercial boilers			
No. 6 oil fired (1-01-004-01, 1-02-004-01, 1-03-004-01)	0.53	0.0011 - 0.0013[d]	0.024 - 0.061
Distillate oil fired (1-01-005-01, 1-02-005-01, 1-03-005-01)	0.26	0.0033[e]	0.035 - 0.061
Residential furnaces (A2104004/A2104011)	0.05	ND	ND

[a] To convert from lb/10^3 gal to kg/10^3 L, multiply by 0.12. SCC = Source Classification Code. ND = no data.
[b] References 45-46. EMISSION FACTOR RATING = B.
[c] References 29-32.
[d] Particulate and gaseous POM.
[e] Particulate POM only.

Table 1.3-9. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM FUEL OIL COMBUSTION[a]

Organic Compound	Average Emission Factor[b] ($lb/10^3$ Gal)	EMISSION FACTOR RATING
Benzene	2.14E-04	C
Ethylbenzene	6.36E-05[c]	E
Formaldehyde[d]	3.30E-02	C
Naphthalene	1.13E-03	C
1,1,1-Trichloroethane	2.36E-04[c]	E
Toluene	6.20E-03	D
o-Xylene	1.09E-04[c]	E
Acenaphthene	2.11E-05	C
Acenaphthylene	2.53E-07	D
Anthracene	1.22E-06	C
Benz(a)anthracene	4.01E-06	C
Benzo(b,k)fluoranthene	1.48E-06	C
Benzo(g,h,i)perylene	2.26E-06	C
Chrysene	2.38E-06	C
Dibenzo(a,h) anthracene	1.67E-06	D
Fluoranthene	4.84E-06	C
Fluorene	4.47E-06	C
Indo(1,2,3-cd)pyrene	2.14E-06	C
Phenanthrene	1.05E-05	C
Pyrene	4.25E-06	C
OCDD	3.10E-09[c]	E

[a] Data are for residual oil fired boilers, Source Classification Codes (SCCs) 1-01-004-01/04.
[b] References 64-72. To convert from $lb/10^3$ gal to $kg/10^3$ L, multiply by 0.12.
[c] Based on data from one source test (Reference 67).
[d] The formaldehyde number presented here is based only on data from utilities using No. 6 oil. The number presented in Table 1.3-7 is based on utility, commercial, and industrial boilers.

Table 1.3-10. EMISSION FACTORS FOR TRACE ELEMENTS FROM DISTILLATE FUEL OIL COMBUSTION SOURCES[a]

EMISSION FACTOR RATING: E

Firing Configuration (SCC)	Emission Factor (lb/10^{12} Btu)										
	As	Be	Cd	Cr	Cu	Pb	Hg	Mn	Ni	Se	Zn
Distillate oil fired (1-01-005-01, 1-02-005-01, 1-03-005-01)	4	3	3	3	6	9	3	6	3	15	4

[a] Data are for distillate oil fired boilers, SCC codes 1-01-005-01, 1-02-005-01, and 1-03-005-01. References 29-32, 40-44 and 83. To convert from lb/10^{12} Btu to pg/J, multiply by 0.43.

Table 1.3-11. EMISSION FACTORS FOR METALS FROM UNCONTROLLED NO. 6 FUEL OIL COMBUSTION[a]

Metal	Average Emission Factor[b, d] ($lb/10^3$ Gal)	EMISSION FACTOR RATING
Antimony	5.25E-03[c]	E
Arsenic	1.32E-03	C
Barium	2.57E-03	D
Beryllium	2.78E-05	C
Cadmium	3.98E-04	C
Chloride	3.47E-01	D
Chromium	8.45E-04	C
Chromium VI	2.48E-04	C
Cobalt	6.02E-03	D
Copper	1.76E-03	C
Fluoride	3.73E-02	D
Lead	1.51E-03	C
Manganese	3.00E-03	C
Mercury	1.13E-04	C
Molybdenum	7.87E-04	D
Nickel	8.45E-02	C
Phosphorous	9.46E-03	D
Selenium	6.83E-04	C
Vanadium	3.18E-02	D
Zinc	2.91E-02	D

[a] Data are for residual oil fired boilers, Source Classification Codes (SCCs) 1-01-004-01/04.

[b] References 64-72. 18 of 19 sources were uncontrolled and 1 source was controlled with low efficiency ESP. To convert from $lb/10^3$ gal to $kg/10^3$ L, multiply by 0.12.

[c] References 29-32,40-44.

[d] For oil/water mixture, reduce factors in proportion to water content of the fuel (due to dilution). To adjust the listed values for water content, multiply the listed value by 1-decimal fraction of water (ex: For fuel with 9 percent water by volume, multiply by 1-0.9=.91).

Table 1.3-12. DEFAULT CO_2 EMISSION FACTORS FOR LIQUID FUELS[a]

EMISSION FACTOR RATING: B

Fuel Type	%C[b]	Density[c] (lb/gal)	Emission Factor (lb/10^3 gal)
No. 1 (kerosene)	86.25	6.88	21,500
No. 2	87.25	7.05	22,300
Low Sulfur No. 6	87.26	7.88	25,000
High Sulfur No. 6	85.14	7.88	24,400

[a] Based on 99% conversion of fuel carbon content to CO_2. To convert from lb/gal to gram/cm^3, multiply by 0.12. To convert from lb/10^3 gal to kg/m^3, multiply by 0.12.

[b] Based on an average of fuel carbon contents given in references 73-74.

[c] References 73, 75.

Table 1.3-13. POSTCOMBUSTION SO_2 CONTROLS FOR FUEL OIL COMBUSTION SOURCES

Control Technology	Process	Typical Control Efficiencies	Remarks
Wet scrubber	Lime/limestone	80-95+%	Applicable to high-sulfur fuels, Wet sludge product
	Sodium carbonate	80-98%	5-430 MMBtu/hr typical application range, High reagent costs
	Magnesium oxide/hydroxide	80-95+%	Can be regenerated
	Dual alkali	90-96%	Uses lime to regenerate sodium-based scrubbing liquor
Spray drying	Calcium hydroxide slurry, vaporizes in spray vessel	70-90%	Applicable to low-and medium-sulfur fuels, Produces dry product
Furnace injection	Dry calcium carbonate/hydrate injection in upper furnace cavity	25-50%	Commercialized in Europe, Several U.S. demonstration projects underway
Duct injection	Dry sorbent injection into duct, sometimes combined with water spray	25-50+%	Several R&D and demonstration projects underway, Not yet Commercially available in the U.S.

Table 1.3-14. NO_x CONTROL OPTIONS FOR OIL-FIRED BOILERS[a]

Control Technique	Description Of Technique	NO_x Reduction Potential (%)		Range Of Application	Commercial Availability/ R&D Status	Comments
		Residual Oil	Distillate Oil			
Low Excess Air (LEA)	Reduction of combustion air	0 to 28	0 to 24	Generally excess O_2 can be reduced to 2.5% representing a 3% drop from baseline	Available for boilers with sufficient operational flexibility.	Added benefits included increase in boiler efficiency. Limited by increase in CO, HC, and smoke emissions.
Staged Combustion (SC)	Fuel-rich firing burners with secondary combustion air ports	20 to 50	17 to 44	70-90% burner stoichiometries can be used with proper installation of secondary air ports	Technique is applicable on packaged and field-erected units. However, not commercially available for all design types.	Best implemented on new units. Retrofit is probably not feasible for most units, especially packaged ones.
Burners Out of Service (BOOS)	One or more burners on air only. Remainder of burners firing fuel-rich	10 to 30	ND	Most effective on boilers with 4 or more burners in a square pattern.	Available.	Requires careful selection of BOOS pattern and control of air flow. May result in boiler de-rating unless fuel delivery system is modified.
Flue Gas Recirculation (FGR)	Recirculation of portion of flue gas to burners	15 to 30	58 to 73	Up to 25-30% of flue gas recycled. Can be implemented on most design types.	Available. Best suited for new units.	Requires extensive modifications to the burner and windbox. Possible flame instability at high FGR rates.
Flue Gas Recirculation Plus Staged Combustion	Combined techniques of FGR and staged combustion	25 to 53	73 to 77	Maximum FGR rates set at 25% for distillate oil and 20% for residual oil.	Available for boilers with sufficient operational flexibility.	May not be feasible on all existing boiler types. Best implemented on new units.

Table 1.3-14 (cont.).

Control Technique	Description Of Technique	NO_x Reduction Potential (%)		Range Of Application	Commercial Availability/ R&D Status	Comments
		Residual Oil	Distillate Oil			
Load Reduction (LR)	Reduction of air and fuel flow to all burners in service	33% decrease to 25% increase in No_x	31% decrease to 17% increase in NO_x	Applicable to all boiler types and sizes. Load can be reduced to 25% of maximum.	Available in retrofit applications.	Technique not effective when it necessitates an increase in excess O_2 levels. LR possibly implemented in new designs as reduced combustion intensity (i. e., enlarged furnace plan area).
Low NO_x Burners (LNB)	New burner designs with controlled air/fuel mixing and increased heat dissipation	20 to 50	20 to 50	New burners described generally applicable to all boilers.	Commercially available.	Specific emissions data from industrial boilers equipped with LNB are lacking.
Reduced Air Preheat (RAP)	Bypass of combustion air preheater	5 to 16	ND	Combustion air temperature can be reduced to ambient conditions.	Available.	Application of this technique on new boilers requires installation of alternate heat recovery system (e. g., an economizer).
Selective Noncatalytic Reduction (SNCR)	Injection of NH_3 or urea as a reducing agent in the flue gas	40 to 70	40 to 70	Applicable for large packaged and field-erected watertube boilers. May not be feasible for fire-tube boilers.	Commercially offered but not widely demonstrated on large boilers.	Elaborate reagent injection, monitoring, and control system required. Possible load restrictions on boilers and air preheater fouling when burning high sulfur oil. Must have sufficient residence time at correct temperature.
Conventional Selective Catalytic Reduction (SCR)	Injections of NH_3 in the presence of a catalyst (usually upstream of air heater).	Up to 90% (estimated)	Up to 90% (estimated)	Typically large boiler designs	Commercially offered but not widely demonstrated.	Applicable to most boiler designs as a retrofit technology or for new boilers.

Table 1.3-14 (cont.).

Control Technique	Description Of Technique	NO_x Reduction Potential (%)		Range Of Application	Commercial Availability/ R&D Status	Comments
		Residual Oil	Distillate Oil			
Air Heater (SCR)	Catalyst-coated baskets in the air heater.	40-65 (estimated)	40-65 (estimated)	Boilers with rotating-basket air heaters	Available but not widely demonstrated	Design must address pressure drop and maintain heat transfer.
Duct SCR	A smaller version of conventional SCR is placed in existing ductwork	30 (estimated)	30 (estimated)	Typically large boiler designs	Available but not widely demonstrated.	Location of SCR in duct is temperature dependent.
Activated Carbon SCR	Activated carbon catalyst, installed downstream of air heater.	ND	ND	Typically large boiler designs	Available but not widely demonstrated.	High pressure drop.
Oil/Water Emulsified Fuel[a,b]	Oil/water fuel with emulsifying agent	41	ND	Firetube boilers	Available but not widely demonstrated	Thermal efficiency reduced due to water content

[a] ND = no data.

[b] Test conducted by EPA using commercially premixed fuel and water (9 percent water) containing a petroleum based emulsifying agent. Test boiler was a 2400 lb/hr, 15 psig Scotch Marine firetube type, fired at 2×10^6 Btu/hr.

Table 1.3-15. EMISSION FACTORS FOR NO. 6 OIL/WATER EMULSION IN INDUSTRIAL/COMMERCIAL/INSTITUTIONAL BOILERS[a]

Pollutant	Emission Factor ($lb/10^3$ gal)	Factor Rating	Comments
CO	1.90	C	33% Reduction from plain oil
NO_x	38.0	C	41% Reduction
PM	14.9	C	45% Reduction

[a] Test conducted by EPA using commercially premixed fuel and water (9 percent water) containing a petroleum based emulsifying agent. Test boiler was a 2400 lb/hr, 15 psig Scotch Marine firetube type, fired at 2×10^6 Btu/hr.

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CleaverBrooks®

CBEX-3W

Steam Firetube Boiler
250 to 800 HP

A Cleaver-Brooks
Sustainable Solution

Sustainable for the Environment, Strategic for Your Bottom Line

CBEX technology is unmatched in the industry. That means greater advantages for your company now and into the future.

The CBEX is the result of decades of boiler engineering experience, and our commitment to the four cornerstones of a successful plant operation: Safety, Efficiency, Reliability and Sustainability.

The CBEX firetube boiler:

- Achieves **higher operating efficiency** than competitors' boilers, leading to lower fuel consumption over its lifetime
- Can burn **renewable fuels** and meets the lowest possible emissions without SCR to achieve sustainability goals
- Delivers the **highest part-load efficiency** on the market for the lowest operating costs in real-world applications
- Offers the **lowest total cost of ownership** considering maintenance, unplanned downtime and years of service

Our CBEX boiler meets the strict performance and sustainability criteria required to earn the Cleaver-Brooks Sustainability Seal. Find out more at cleaverbrooks.com/sustainability.

The Most Efficient Firetube Ever Built

Many attributes make the CBEX the most unique and technologically advanced firetube design. Our EX technology provides for a revolutionary boiler system, featuring ultra low emissions and optimal combustion, making it the **most efficient firetube boiler on the market today.** It achieves 10:1 turndown while maintaining 3% O_2 across the full operating range and meets 9 ppm NOx without SCR.

85%
EFFICIENCY

Furnace Designed for Optimal Combustion

The larger furnace area in the CBEX allows for lower heat release rates, resulting in reduced thermal stresses within the furnace and a longer lifespan. The furnace dimensions have also been optimized to allow for low NOx emissions without SCR.

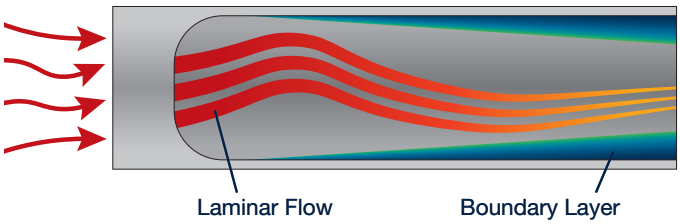
Burner and Controls Package

With technology in mind, Cleaver-Brooks designed a burner and controls package for a single-source, factory-tested setup to ensure that your boiler will operate at peak efficiency with the lowest-possible emissions. Our research, design and testing result in a reliable and safe boiler system for your plant.

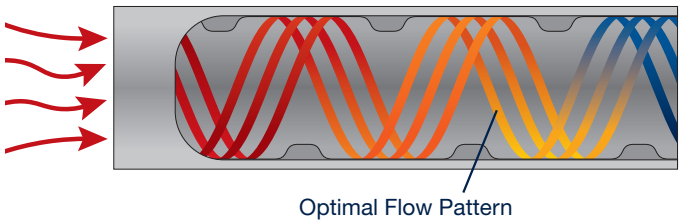
Advanced Heat Transfer Tube

With the use of advanced engineering methods, Cleaver-Brooks designed the EX tube technology to increase heat transfer up to 85% over traditional boiler tubes. This allows for optimal furnace design and helps provide the lowest possible emissions.

Typical Straight Boiler Tube



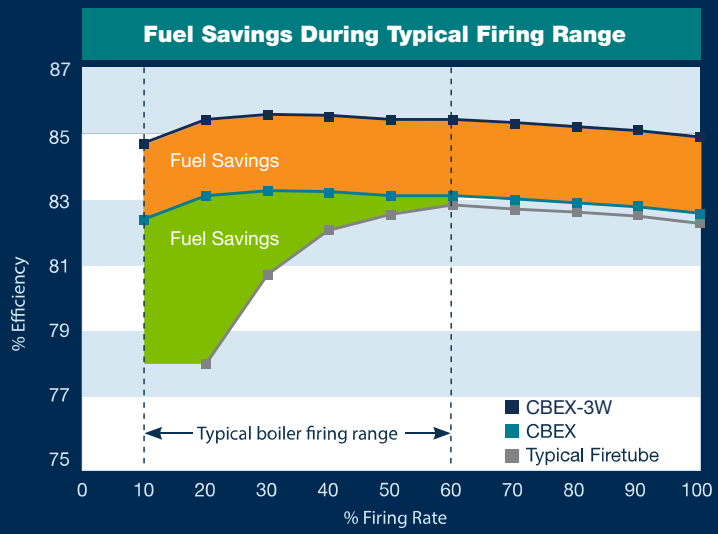
Cleaver-Brooks Advanced Heat Transfer Tube



Highest Operating Efficiency of Any Firetube

10:1 turndown while maintaining 3% O_2 across the firing range

To achieve the best operating efficiency, boiler engineers strive to maintain the lowest excess air throughout the firing range. Maintaining low excess air translates into higher efficiency. The CBEX is the only firetube to achieve 3% O_2 across the entire 10:1 turndown range*, making it the most efficient firetube boiler ever built. The high operating efficiency paired with the high turndown rate means the boiler cycles less, minimizing the purging of energy caused by boiler cycling.



Industry Leading Boiler — Backed by Cleaver-Brooks

Only Cleaver-Brooks can offer **performance guarantees** and **enhanced warranties** on every CBEX boiler because we design, manufacture, and test every part of every boiler to our exacting standards.

Performance Guarantees:

- Efficiency
- Emissions
- Steam Quality
- Turndown

Enhanced Warranties:

- CBEX Pressure Vessel
- Integral Burner

*See website or contact your local representative for detailed information

Integral Economizer Option

- Economizer is built in accordance with Section VIII, Div. 1 of ASME code
- Recover sensible heat from boiler exhaust to add heat to boiler feedwater
- Single-stage economizer includes pre-piped feedwater supply
- Access to economizer coil on side of boiler for ease of access for maintenance

Exclusive Burner Technology

CBEX boilers are available with the Cleaver-Brooks exclusive integral burner. Cleaver-Brooks tests every single boiler and burner combination at our research and development facility to ensure the highest performance and reliable, repeatable operation. We are so confident in the reliability of our integral burner that Cleaver-Brooks is the only manufacturer to offer an extended 10-year burner warranty as standard.

250 to 800 HP

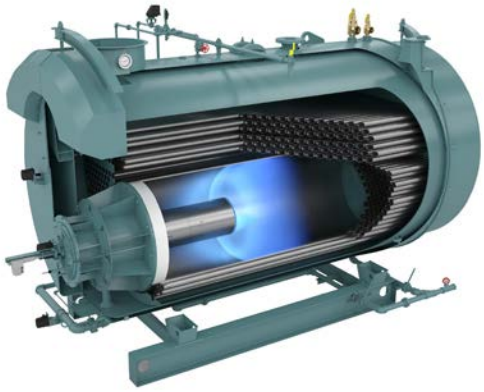
Integral Burner

- Reliable performance
- Long lifespan
- Quiet operation
- Small footprint
- Easy maintenance
- Up to 10:1 turndown

Cleaver-Brooks exclusive integral burner technology has led the industry for more than 60 years.

NTI Series Integrated Burner

The NTI series features a unique flame pattern enabling the burner to operate with low emissions throughout the turndown range. Advanced technology allows the NTI series to offer 9 ppm NOx, low CO emissions and 30% excess air up to 5:1 turndown.



Additional Benefits of the Integral Burners

- Verification testing has been reviewed and approved by Underwriter's Laboratory for the Integral Burner, Pressure Vessel and Controls, so a UL Listed label for the entire boiler package is included as a standard.
  - Only manufacturer with UL listed boiler package.
- Low NOx emissions are achieved with the use of internal Flue Gas Recirculation, which eliminates the added cost to install external FGR ductwork.
- Combustion air make-up requirements are easily accommodated for high altitude or 50 Hertz applications.

Integral Economizer Features

- Built in accordance with Section VIII, Div. 1 of ASME Code
- Factory mounted ASME Code feedwater piping
- Sensible heat from boiler exhaust is recovered and added to boiler feedwater
- Lowers fuel usage
- Environmental sustainability by reducing exhaust emissions
- Single stage
- Can accommodate low boiler ceiling height
- Easy access from ground floor
- Structurally supported within boiler vessel

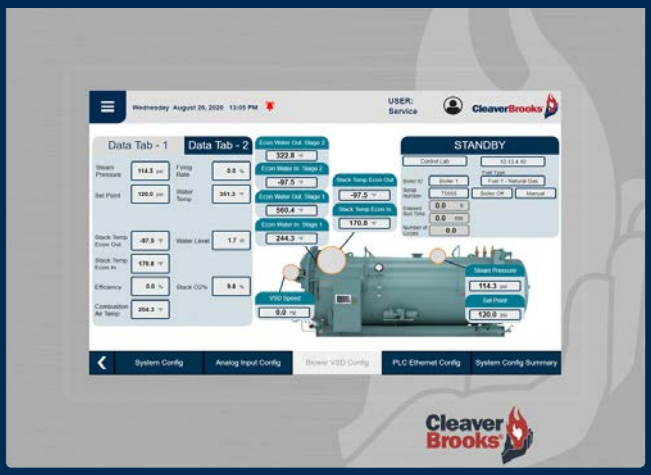
Integral economizer benefits

- Increase boiler efficiency 1.5% to 2%
- Reduce rigging time
- Reduce on-site installation costs because:
  - ASME feedwater piping is factory-mounted to the boiler
  - Feedwater valve control wiring is included
  - Specially engineered economizer support is not required
  - Easier stack installation with less transitions.
- Additional height in the boiler room is not required
- Ladder with access platform is not required to maintain economizer
- Economizer maintenance is performed off of the boiler room floor

Hawk Integrated Controls System

The Hawk Control, which serves as the brain of the EX system, enables you to run your boiler safely and efficiently.

- Completely integrated boiler/burner control is fully tested during development
- Automatically tunes boiler for changes in environmental conditions
- Combustion air fan vibration monitoring
- Linkageless control eliminates single-point control hysteresis
- Optional VSD control reduces fan horsepower load
- Advanced emissions controls with NOx trim option
- Unlimited options for system customization and optimization
- NFPA and UL® compliant for maximum safety
  - Return to Pilot functionality for immediate ignition
  - Hawk water level control, draft control, third fuel option
  - Integrated deaerator and Host Panel controls



Industry Leading Interface

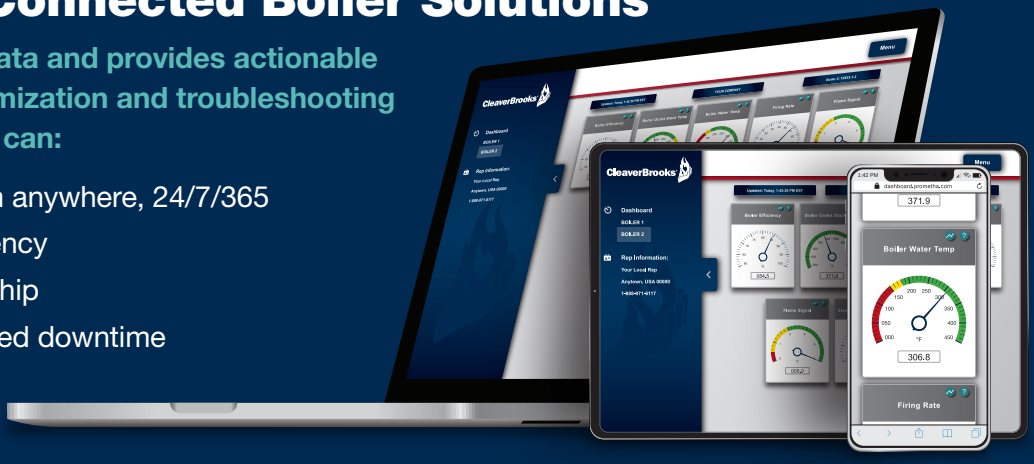
The Hawk is the most powerful boiler control system available in the industry. Its user-friendly interface features:

- Highest resolution screen on the market
- Intuitive navigation
- Built-in maintenance manual
- E-mail and text alerts

Prometha® IoT-Connected Boiler Solutions

Prometha collects critical data and provides actionable insights, making boiler optimization and troubleshooting simple. With Prometha, you can:

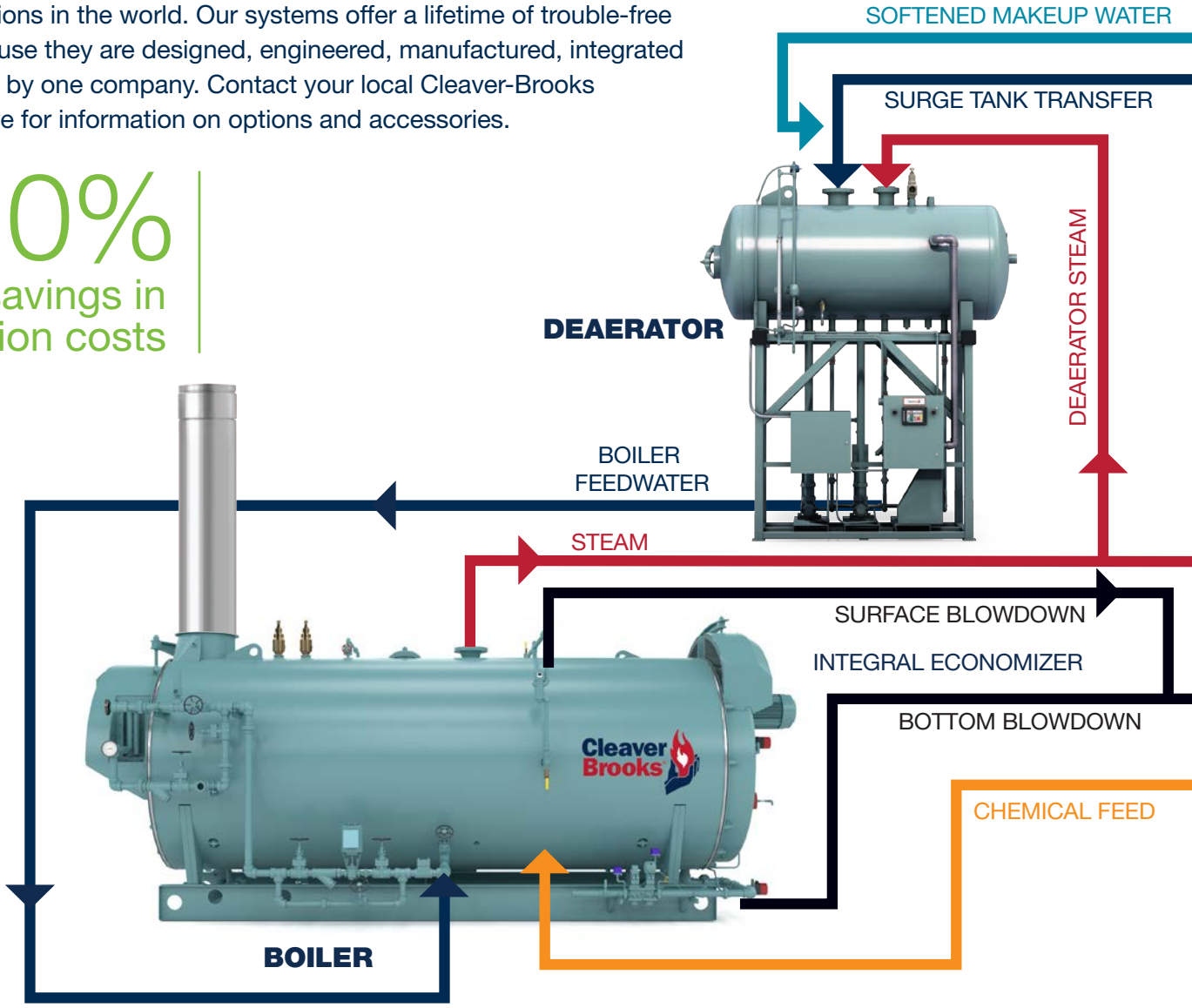
- Access boiler insights from anywhere, 24/7/365
- Increase operational efficiency
- Lower total cost of ownership
- Prevent or reduce unplanned downtime



Take Optimization to the Limit

Cleaver-Brooks complete system integration produces the most efficient, reliable solutions in the world. Our systems offer a lifetime of trouble-free service because they are designed, engineered, manufactured, integrated and serviced by one company. Contact your local Cleaver-Brooks representative for information on options and accessories.

5-10%
savings in installation costs



Advanced Controls

- Hawk boiler controls
- Prometha® IoT Solutions
- Advanced deaerator controls
- Host Panel

High-Pressure Condensate Systems

- Improves overall system efficiency
- Integrated controls for high-pressure operation

Deaerators

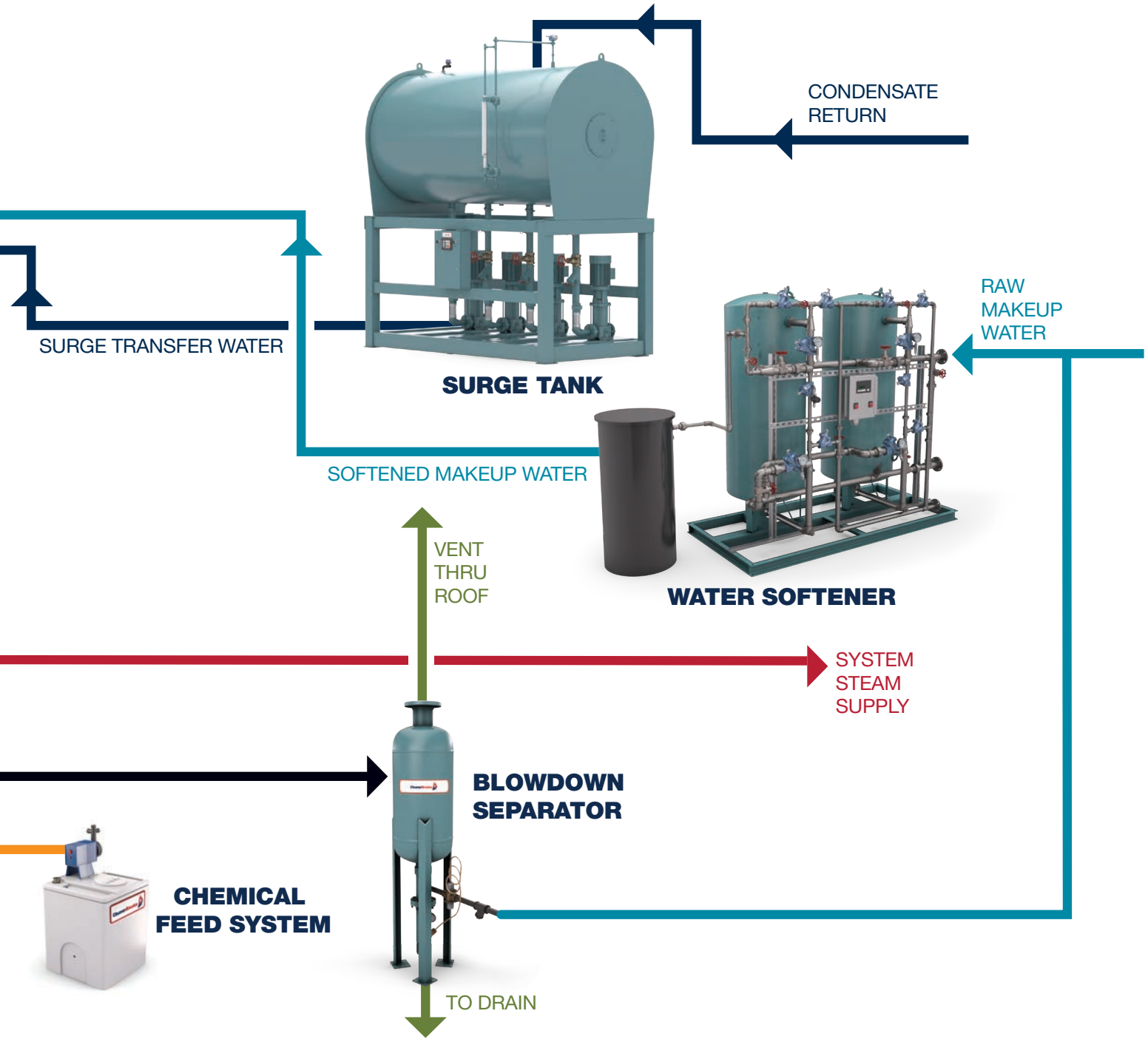
- Preheats boiler feedwater
- Removes dissolved gases
- Improves lifespan and efficiency of boilers

Surge Tanks

- Collects and stores condensate
- Reduces makeup water and chemical usage

Chemical Feed Systems

- Chemicals treat the boiler system to maintain peak efficiency and reliability
- Variety of options available depending on system specifics



Duo Tank Systems

- Combines spray-type deaerator and surge tank
- Simplifies installation

Water Softeners

- Removes minerals that will create scale within boilers
- Ensures long equipment life

Blowdown Separators and Tanks

- Cools blowdown water to safe temperature for discharge to drain
- Required by code for most steam systems

Waterback Configuration

Offered in a three-pass, waterback design, the CBEX-3W boiler package is engineered for long life, highest fuel-to-steam/water efficiency, maximum safety and lowest emissions. Its quiet operation, ease of maintenance and the ability to add desired options further enhance the package.

Waterback

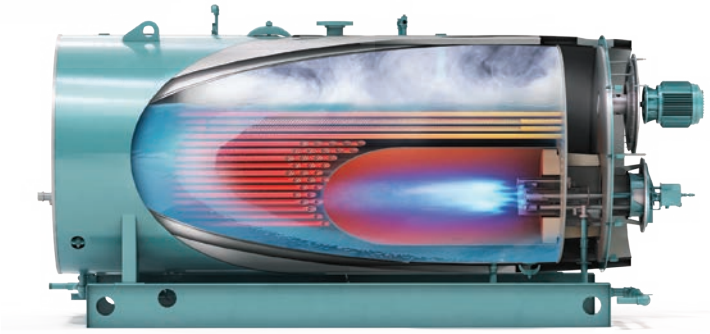
- Less refractory maintenance at rear of boiler
- Water-cooled rear turnaround
- Limited rear clearance area required
- Small footprint
- About 8% less weight than standard models

SMALL FOOTPRINT

8-10%
less length

Versatile Vessel Design

The optimized pressure vessel design allows for reduced thermal stresses, leading to longer boiler life and maximized operational efficiency.



Reliable and Consistent Manufacturing

As a single-source provider, we control the manufacturing process of the burner, boiler, and controls, delivering consistency, reliability, and repeatability in all products.

CBEX-3W Dimensions and Ratings

CBEX-3W Waterback (250-800 HP)

Boiler Output (HP)	250	300	350	400	500	600	700	800
Firing Rate, Btu/hr	10,205,793	12,246,951	14,288,110	16,329,268	20,411,585	24,493,902	28,576,220	32,658,537
Rated Capacity (lb-steam/hr at 212F)	8,625	10,350	12,075	13,800	17,250	20,700	24,150	27,600
Btu Output (1000 Btu/hr)	8,369	10,043	11,716	13,390	16,738	20,085	23,433	26,780
Overall Length (30 PPM System)	228.6"	236.3"	241.4"	260.3"	246.6"	266.6"	257.5"	272.2"
Overall Length (30 PPM System) with Economizer	249.1"	256.8"	261.9"	280.8	267.1"	287.1"	279.6"	294.3"
Overall Width	97.4"	97.4"	103.5"	103.5"	117.33"	117.33"	131.5"	131.5"
Base to top of Front Head Bolt	108"	108"	114"	114"	130.64"	130.64"	144.8"	144.8"
Base to Steam Outlet	96.4"	96.4"	101.75"	101.75"	118"	118"	130.6"	130.6"
Feedwater Inlet (Both Sides)	2	2	2	2	2.5	2.5	2.5	2.5
Steam Nozzle, 150 psig Design Pressure(300# Flange)	6	6	6	6	8	8	8	8
Blowdown-Front & Rear	1.5	1.5	1.5	2	2	2	2	2
Vent Stack Diameter (Flanged)	20	20	24	24	24	24	24	24
Weights and Water Volume with Economizer								
Total Dry Weight, lbs.	21,918	22,753	26,816	28,716	36,855	39,783	46,834	49,287
Water Volume - Operating, Gal.	1,500	1,519	1,734	1,930	2,255	2,536	3,621	3,802
Water Volume - Flooded, Gal.	1,746	1,774	2,082	2,314	2,769	3,110	4,405	4,635
Water Weight - Operating, lbs.	12,498	12,657	14,446	16,076	18,783	21,129	30,167	31,671
Water Weight - Flooded, lbs.	14,547	14,777	17,341	19,275	23,062	25,903	36,693	38,613
Total Weight - Operating, lbs.	34,416	35,410	41,262	44,792	55,638	60,912	77,001	80,958
Total Weight - Flooded, lbs.	36,465	37,530	44,157	47,992	59,917	65,686	83,527	87,900
Without Economizer								
Total Dry Weight, lbs.	21,364	22,199	26,208	28,108	36,011	38,938	45,724	48,177
Water Volume - Operating, Gal.	1,496	1,514	1,728	1,923	2,246	2,526	3,610	3,788
Water Volume - Flooded, Gal.	1,742	1,769	2,076	2,307	2,760	3,099	4,393	4,622
Water Weight - Operating, lbs.	12,462	12,614	14,396	16,019	18,712	21,044	30,068	31,558
Water Weight - Flooded, lbs.	14,511	14,734	17,291	19,219	22,991	25,818	36,594	38,500
Total Weight - Operating, lbs.	33,826	34,813	40,605	44,127	54,723	59,982	75,792	79,735
Total Weight - Flooded, lbs.	35,875	36,933	43,500	47,327	59,002	64,756	82,318	86,676
Minimum Clearances, inches								
Tube Removal - Front from Head Flange	122.7	127.0	131.2	148.4	131.4	151.4	149.0	158.3
Tube Removal - Rear from Rear Head Flange w/o Econ	151.25	157.25	161.25	179.25	162.25	182.25	176.25	188.25
Tube Removal - Rear from Rear Head Flange with Econ	130.75	136.75	140.75	158.75	141.75	161.75	154.2	166.2
Front Door Swing *	82	82	89	89	102	102	118	118
Rear Door Swing without Econ *	45	45	46	46	54	54	60	60
Rear Door Swing with Econ*	66	66	67	67	75	75	82	82
Econ Minimum Removal Clearance from Boiler Center w/o Pipe**	88.22	88.22	94.11	94.11	115.25	115.25	136	136

*250 and 800 HP are davited
**left side standard; contact CB for right side access

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CB-8654
02/2023

1.4 Natural Gas Combustion

1.4.1 General[1-2]

Natural gas is one of the major combustion fuels used throughout the country. It is mainly used to generate industrial and utility electric power, produce industrial process steam and heat, and heat residential and commercial space. Natural gas consists of a high percentage of methane (generally above 85 percent) and varying amounts of ethane, propane, butane, and inerts (typically nitrogen, carbon dioxide, and helium). The average gross heating value of natural gas is approximately 1,020 British thermal units per standard cubic foot (Btu/scf), usually varying from 950 to 1,050 Btu/scf.

1.4.2 Firing Practices[3-5]

There are three major types of boilers used for natural gas combustion in commercial, industrial, and utility applications: watertube, firetube, and cast iron. Watertube boilers are designed to pass water through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot combustion gases and through radiant heat transfer. The watertube design is the most common in utility and large industrial boilers. Watertube boilers are used for a variety of applications, ranging from providing large amounts of process steam, to providing hot water or steam for space heating, to generating high-temperature, high-pressure steam for producing electricity. Furthermore, watertube boilers can be distinguished either as field erected units or packaged units.

Field erected boilers are boilers that are constructed on site and comprise the larger sized watertube boilers. Generally, boilers with heat input levels greater than 100 MMBtu/hr, are field erected. Field erected units usually have multiple burners and, given the customized nature of their construction, also have greater operational flexibility and NO_x control options. Field erected units can also be further categorized as wall-fired or tangential-fired. Wall-fired units are characterized by multiple individual burners located on a single wall or on opposing walls of the furnace while tangential units have several rows of air and fuel nozzles located in each of the four corners of the boiler.

Package units are constructed off-site and shipped to the location where they are needed. While the heat input levels of packaged units may range up to 250 MMBtu/hr, the physical size of these units are constrained by shipping considerations and generally have heat input levels less than 100 MMBtu/hr. Packaged units are always wall-fired units with one or more individual burners. Given the size limitations imposed on packaged boilers, they have limited operational flexibility and cannot feasibly incorporate some NO_x control options.

Firetube boilers are designed such that the hot combustion gases flow through tubes, which heat the water circulating outside of the tubes. These boilers are used primarily for space heating systems, industrial process steam, and portable power boilers. Firetube boilers are almost exclusively packaged units. The two major types of firetube units are Scotch Marine boilers and the older firebox boilers. In cast iron boilers, as in firetube boilers, the hot gases are contained inside the tubes and the water being heated circulates outside the tubes. However, the units are constructed of cast iron rather than steel. Virtually all cast iron boilers are constructed as package boilers. These boilers are used to produce either low-pressure steam or hot water, and are most commonly used in small commercial applications.

Natural gas is also combusted in residential boilers and furnaces. Residential boilers and furnaces generally resemble firetube boilers with flue gas traveling through several channels or tubes with water or air circulated outside the channels or tubes.

1.4.3 Emissions[3-4]

The emissions from natural gas-fired boilers and furnaces include nitrogen oxides (NO_x), carbon monoxide (CO), and carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), volatile organic compounds (VOCs), trace amounts of sulfur dioxide (SO_2), and particulate matter (PM).

Nitrogen Oxides -

Nitrogen oxides formation occurs by three fundamentally different mechanisms. The principal mechanism of NO_x formation in natural gas combustion is thermal NO_x. The thermal NO_x mechanism occurs through the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most NO_x formed through the thermal NO_x mechanism occurs in the high temperature flame zone near the burners. The formation of thermal NO_x is affected by three furnace-zone factors: (1) oxygen concentration, (2) peak temperature, and (3) time of exposure at peak temperature. As these three factors increase, NO_x emission levels increase. The emission trends due to changes in these factors are fairly consistent for all types of natural gas-fired boilers and furnaces. Emission levels vary considerably with the type and size of combustor and with operating conditions (e.g., combustion air temperature, volumetric heat release rate, load, and excess oxygen level).

The second mechanism of NO_x formation, called prompt NO_x, occurs through early reactions of nitrogen molecules in the combustion air and hydrocarbon radicals from the fuel. Prompt NO_x reactions occur within the flame and are usually negligible when compared to the amount of NO_x formed through the thermal NO_x mechanism. However, prompt NO_x levels may become significant with ultra-low-NO_x burners.

The third mechanism of NO_x formation, called fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Due to the characteristically low fuel nitrogen content of natural gas, NO_x formation through the fuel NO_x mechanism is insignificant.

Carbon Monoxide -

The rate of CO emissions from boilers depends on the efficiency of natural gas combustion. Improperly tuned boilers and boilers operating at off-design levels decrease combustion efficiency resulting in increased CO emissions. In some cases, the addition of NO_x control systems such as low NO_x burners and flue gas recirculation (FGR) may also reduce combustion efficiency, resulting in higher CO emissions relative to uncontrolled boilers.

Volatile Organic Compounds -

The rate of VOC emissions from boilers and furnaces also depends on combustion efficiency. VOC emissions are minimized by combustion practices that promote high combustion temperatures, long residence times at those temperatures, and turbulent mixing of fuel and combustion air. Trace amounts of VOC species in the natural gas fuel (e.g., formaldehyde and benzene) may also contribute to VOC emissions if they are not completely combusted in the boiler.

Sulfur Oxides -

Emissions of SO_2 from natural gas-fired boilers are low because pipeline quality natural gas typically has sulfur levels of 2,000 grains per million cubic feet. However, sulfur-containing odorants are added to natural gas for detecting leaks, leading to small amounts of SO_2 emissions. Boilers combusting unprocessed natural gas may have higher SO_2 emissions due to higher levels of sulfur in the natural gas. For these units, a sulfur mass balance should be used to determine SO_2 emissions.

Particulate Matter -

Because natural gas is a gaseous fuel, filterable PM emissions are typically low. Particulate matter from natural gas combustion has been estimated to be less than 1 micrometer in size and has filterable and condensable fractions. Particulate matter in natural gas combustion are usually larger molecular weight hydrocarbons that are not fully combusted. Increased PM emissions may result from poor air/fuel mixing or maintenance problems.

Greenhouse Gases -[6-9]

CO_2, CH_4, and N_2O emissions are all produced during natural gas combustion. In properly tuned boilers, nearly all of the fuel carbon (99.9 percent) in natural gas is converted to CO_2 during the combustion process. This conversion is relatively independent of boiler or combustor type. Fuel carbon not converted to CO_2 results in CH_4, CO, and/or VOC emissions and is due to incomplete combustion. Even in boilers operating with poor combustion efficiency, the amount of CH_4, CO, and VOC produced is insignificant compared to CO_2 levels.

Formation of N_2O during the combustion process is affected by two furnace-zone factors. N_2O emissions are minimized when combustion temperatures are kept high (above 1475°F) and excess oxygen is kept to a minimum (less than 1 percent).

Methane emissions are highest during low-temperature combustion or incomplete combustion, such as the start-up or shut-down cycle for boilers. Typically, conditions that favor formation of N_2O also favor emissions of methane.

1.4.4 Controls[4,10]

NO_x Controls -

Currently, the two most prevalent combustion control techniques used to reduce NO_x emissions from natural gas-fired boilers are flue gas recirculation (FGR) and low NO_x burners. In an FGR system, a portion of the flue gas is recycled from the stack to the burner windbox. Upon entering the windbox, the recirculated gas is mixed with combustion air prior to being fed to the burner. The recycled flue gas consists of combustion products which act as inerts during combustion of the fuel/air mixture. The FGR system reduces NO_x emissions by two mechanisms. Primarily, the recirculated gas acts as a dilutent to reduce combustion temperatures, thus suppressing the thermal NO_x mechanism. To a lesser extent, FGR also reduces NO_x formation by lowering the oxygen concentration in the primary flame zone. The amount of recirculated flue gas is a key operating parameter influencing NO_x emission rates for these systems. An FGR system is normally used in combination with specially designed low NO_x burners capable of sustaining a stable flame with the increased inert gas flow resulting from the use of FGR. When low NO_x burners and FGR are used in combination, these techniques are capable of reducing NO_x emissions by 60 to 90 percent.

Low NO_x burners reduce NO_x by accomplishing the combustion process in stages. Staging partially delays the combustion process, resulting in a cooler flame which suppresses thermal NO_x formation. The two most common types of low NO_x burners being applied to natural gas-fired boilers are staged air burners and staged fuel burners. NO_x emission reductions of 40 to 85 percent (relative to uncontrolled emission levels) have been observed with low NO_x burners.

Other combustion control techniques used to reduce NO_x emissions include staged combustion and gas reburning. In staged combustion (e.g., burners-out-of-service and overfire air), the degree of staging is a key operating parameter influencing NO_x emission rates. Gas reburning is similar to the use of overfire in the use of combustion staging. However, gas reburning injects additional amounts of natural gas in the upper furnace, just before the overfire air ports, to provide increased reduction of NO_x to NO_2.

Two postcombustion technologies that may be applied to natural gas-fired boilers to reduce NO_x emissions are selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR). The SNCR system injects ammonia (NH_3) or urea into combustion flue gases (in a specific temperature zone) to reduce NO_x emission. The Alternative Control Techniques (ACT) document for NO_x emissions from utility boilers, maximum SNCR performance was estimated to range from 25 to 40 percent for natural gas-fired boilers.[12] Performance data available from several natural gas fired utility boilers with SNCR show a 24 percent reduction in NO_x for applications on wall-fired boilers and a 13 percent reduction in NO_x for applications on tangential-fired boilers.[11] In many situations, a boiler may have an SNCR system installed to trim NO_x emissions to meet permitted levels. In these cases, the SNCR system may not be operated to achieve maximum NO_x reduction. The SCR system involves injecting NH_3 into the flue gas in the presence of a catalyst to reduce NO_x emissions. No data were available on SCR performance on natural gas fired boilers at the time of this publication. However, the ACT Document for utility boilers estimates NO_x reduction efficiencies for SCR control ranging from 80 to 90 percent.[12]

Emission factors for natural gas combustion in boilers and furnaces are presented in Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.[11] Tables in this section present emission factors on a volume basis ($lb/10^6$ scf). To convert to an energy basis (lb/MMBtu), divide by a heating value of 1,020 MMBtu/10^6 scf. For the purposes of developing emission factors, natural gas combustors have been organized into three general categories: large wall-fired boilers with greater than 100 MMBtu/hr of heat input, boilers and residential furnaces with less than 100 MMBtu/hr of heat input, and tangential-fired boilers. Boilers within these categories share the same general design and operating characteristics and hence have similar emission characteristics when combusting natural gas.

Emission factors are rated from A to E to provide the user with an indication of how "good" the factor is, with "A" being excellent and "E" being poor. The criteria that are used to determine a rating for an emission factor can be found in the Emission Factor Documentation for AP-42 Section 1.4 and in the introduction to the AP-42 document.

1.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section are summarized below. For further detail, consult the Emission Factor Documentation for this section. These and other documents can be found on the Emission Factor and Inventory Group (EFIG) home page (http://www.epa.gov/ttn/chief).

Supplement D, March 1998

- Text was revised concerning Firing Practices, Emissions, and Controls.
- All emission factors were updated based on 482 data points taken from 151 source tests. Many new emission factors have been added for speciated organic compounds, including hazardous air pollutants.

July 1998 - minor changes

- Footnote D was added to table 1.4-3 to explain why the sum of individual HAP may exceed VOC or TOC, the web address was updated, and the references were reordered.

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]		CO	
	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_X emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_X emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6 \text{ scf}] = (3.67)(CON)(C)(D)$, where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, 4.2×10^4 $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2. Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
91-57-6	2-Methylnaphthalene[b, c]	2.4E-05	D
56-49-5	3-Methylcholanthrene[b, c]	<1.8E-06	E
	7,12-Dimethylbenz(a)anthracene[b,c]	<1.6E-05	E
83-32-9	Acenaphthene[b,c]	<1.8E-06	E
203-96-8	Acenaphthylene[b,c]	<1.8E-06	E
120-12-7	Anthracene[b,c]	<2.4E-06	E
56-55-3	Benz(a)anthracene[b,c]	<1.8E-06	E
71-43-2	Benzene[b]	2.1E-03	B
50-32-8	Benzo(a)pyrene[b,c]	<1.2E-06	E
205-99-2	Benzo(b)fluoranthene[b,c]	<1.8E-06	E
191-24-2	Benzo(g,h,i)perylene[b,c]	<1.2E-06	E
207-08-9	Benzo(k)fluoranthene[b,c]	<1.8E-06	E
106-97-8	Butane	2.1E+00	E
218-01-9	Chrysene[b,c]	<1.8E-06	E
53-70-3	Dibenzo(a,h)anthracene[b,c]	<1.2E-06	E
25321-22-6	Dichlorobenzene[b]	1.2E-03	E
74-84-0	Ethane	3.1E+00	E
206-44-0	Fluoranthene[b,c]	3.0E-06	E
86-73-7	Fluorene[b,c]	2.8E-06	E
50-00-0	Formaldehyde[b]	7.5E-02	B
110-54-3	Hexane[b]	1.8E+00	E
193-39-5	Indeno(1,2,3-cd)pyrene[b,c]	<1.8E-06	E
91-20-3	Naphthalene[b]	6.1E-04	E
109-66-0	Pentane	2.6E+00	E
85-01-8	Phenanathrene[b,c]	1.7E-05	D
74-98-6	Propane	1.6E+00	E

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
129-00-0	Pyrene[b, c]	5.0E-06	E
108-88-3	Toluene[b]	3.4E-03	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

[d] The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.

TABLE 1.4-4. EMISSION FACTORS FOR METALS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
7440-38-2	Arsenic[b]	2.0E-04	E
7440-39-3	Barium	4.4E-03	D
7440-41-7	Beryllium[b]	<1.2E-05	E
7440-43-9	Cadmium[b]	1.1E-03	D
7440-47-3	Chromium[b]	1.4E-03	D
7440-48-4	Cobalt[b]	8.4E-05	D
7440-50-8	Copper	8.5E-04	C
7439-96-5	Manganese[b]	3.8E-04	D
7439-97-6	Mercury[b]	2.6E-04	D
7439-98-7	Molybdenum	1.1E-03	D
7440-02-0	Nickel[b]	2.1E-03	C
7782-49-2	Selenium[b]	<2.4E-05	E
7440-62-2	Vanadium	2.3E-03	D
7440-66-6	Zinc	2.9E-02	E

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. Emission factors preceeded by a less-than symbol are based on method detection limits. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by l6. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020.

[b] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

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Attachment 8

Emission Calculations

Curia New Mexico, LLC

Facility Emissions Summary

Proposed Revision to Emission Unit #6 - Kohler Emergency Generator
Proposed Revision to Emission Unit #7 - Cleaver Brooks Boiler

	Current Permit Emissions Summary (Air Quality Construction Permit #1097-M5-1AR)																**Proposed Emission Unit Permit Limits/Changes**				**Proposed Construction Permit (Final Emergency Generator and Boiler Selections)**			
Unit #	#1 Diesel Emergency Generator		#3 Diesel Emergency Generator		#4 Diesel Emergency Generator		#5 Superior Natural Gas Boiler		#6 Cummins 1750 kW Diesel Emergency Generator		#7 Johnston 16.7 MMBTU/hr Natural Gas Boiler		Solvent and Chemical Usage[1]		Facility Totals		#6 Kohler 1780 kW Diesel Emergency Generator (Revised)		#7 Cleaver Brooks 400 HP Natural Gas Boiler (Revised)		Net Changes (for permit modification with new emergency generator and boiler)		Proposed Construction Permit (#6 -Kohler Emergency Generator, #7 - Cleaver Brooks Boiler, and Permit Corrections)	
	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year	pounds per hour	tons per year
CO	1.56	0.39	2.67	0.67	5.57	1.39	0.16	0.70	14.43	3.61	1.38	6.02			25.8	12.8	16.82	4.20	1.34	5.89	2.32	0.44	28.12	13.24
NOx	7.25	1.81	2.9	0.72	9.67	2.42	0.13	0.57	25.07	6.27	0.52	2.29			45.6	14.1	29.22	7.30	0.51	2.24	4.08	0.97	49.68	15.07
VOC[2]	0.58	0.14	0.15	0.04	0.51	0.13	0.03	0.15	1.32	0.33	0.09	0.39	1.28	4.0	4.0	5.2	1.54	0.38	0.09	0.39	0.18	0.03	4.18	5.23
SO2	0.48	0.12	0.11	0.03	0.01	3.0E-03	4.0E-03	0.02	0.03	0.01	0.01	0.04			0.65	0.22	0.04	0.01	0.01	0.04	1.1E-03	3.9E-03	0.65	0.22
TSP/PM	0.51	0.13	0.15	0.04	0.32	0.08	0.02	0.09	0.83	0.21	0.12	0.55			2.0	1.1	0.96	0.24	0.12	0.53	0.08	0.01	2.08	1.11
PM10	0.51	0.13	0.15	0.04	0.32	0.08	0.02	0.09	0.83	0.21	0.12	0.55			2.0	1.1	0.96	0.24	0.12	0.53	0.08	0.01	2.08	1.11
PM2.5	0.51	0.13	0.15	0.04	0.32	0.08	0.02	0.09	0.83	0.21	0.12	0.55			2.0	1.1	0.96	0.24	0.12	0.53	0.08	0.01	2.08	1.11
Total HAP	0.01	1.4E-03	0.02	0.01	0.03	0.01	0.05	0.20	2.6E-03	0.01	0.18	0.81			0.31	1.0	0.03	0.01	0.18	0.79	1.9E-03	0.02	0.31	1.02

Notes:

1. Limit on VOC emission from solvent and chemical usage in the existing permit is 4.0 tpy. Annual hours of operations are assumed to be 6,240 hours/year to estimate the lb/hr emissions.

Estimated Emissions

Modification - Unit #6

Kohler Model: 1750REOZMD

Manufacturer Provided Specifications:			Source:	Calculation Basis/Conversion
Site Rated Standby kW Generator	1780	kW		Gross Heat Content of Die
Gross Engine Power Output	2923	bhp	Kohler 1750REOZMD Data Sheet	137,000 Btu/gal
Gross Engine Power Output	2180	kW		
Standby Fuel Consumption	141.6	gal/hr		Diesel Fuel Sulfur Content
Standby Heat Input Capacity	19.3992	MMBTU/hr		15 ppm
				0.0015 percent
				Convert Grams to lbs:
Annual Operating Hours:	500	hrs/yr		0.00220462 lb= 1 g
				2544.43 BTU/HP-hr
				0.7457 kW/hp

Emission Estimates

	Emission Factor			Estimated Emissions	
Air Contaminant	**g/kW-hr**	**lb/hp-hr (power output)**	**Emission Factor Source**	**pounds per hour**	**tons per year**
CO	3.5		EPA-420-B-16-022 (March 2016), Nonroad CI EPA Tier 2 Standards for kW>560 per 40 CFR 1039, Appendix I	16.82	4.20
NOx+NMHC	6.4				
NOx[1]	6.08			29.22	7.30
VOC[1]	0.32			1.54	0.38
SO_2[2]		1.214E-05	AP-42 Chapter 3.4, Table 3.4-1 for Large Stationary Diesel (greater than 600 hp)	0.04	0.01
PM/TSP	0.2		EPA-420-B-16-022 (March 2016), Nonroad CI EPA Tier 2 Standards for kW>560 per 40 CFR 1039, Appendix I	0.96	0.24
PM10[3]	0.2			0.96	0.24
PM2.5[3]	0.2			0.96	0.24
HAPs	**Lb/MMBTU (fuel input)**			**pounds per hour**	**tons per year**
Acenaphthene	4.68E-06		AP-42, Fifth Edition, Volume 1, Chapter 3, Section 3.4, Tables 3.4-3 and 3.4-4 (10/96) for Large Stationary Diesel (greater than 600 hp)	9.08E-05	2.27E-05
Acenaphthylene	9.23E-06			1.79E-04	4.48E-05
Acetaldehyde	2.52E-05			4.89E-04	1.22E-04
Acrolein	7.88E-06			1.53E-04	3.82E-05
Anthracene	1.23E-06			2.39E-05	5.97E-06
Benz(a)anthracene	6.22E-07			1.21E-05	3.02E-06
Benzene	7.76E-04			1.51E-02	3.76E-03
Benzo(a)pyrene	2.57E-07			4.99E-06	1.25E-06
Benzo(b)fluoranthene	1.11E-06			2.15E-05	5.38E-06
Benzo(g,h,l)pyrene	5.56E-07			1.08E-05	2.70E-06
Benzo(k)fluoranthene	2.18E-07			4.23E-06	1.06E-06
Chrysene	1.53E-06			2.97E-05	7.42E-06
Dibenz(a,h)anthracene	3.46E-07			6.71E-06	1.68E-06
Flouranthene	4.03E-06			7.82E-05	1.95E-05
Flourene	1.28E-05			2.48E-04	6.21E-05
Formaldehyde	7.89E-05			1.53E-03	3.83E-04
Indeno(1,2,3-cd)pyrene	4.14E-07			8.03E-06	2.01E-06
Naphthalene	1.30E-04			2.52E-03	6.30E-04
Phenanthrene	4.08E-05			7.91E-04	1.98E-04
Pyrene	3.71E-06			7.20E-05	1.80E-05
Toluene	2.81E-04			5.45E-03	1.36E-03
Xylenes	1.93E-04			3.74E-03	9.36E-04
Arsenic	4.00E-06		EPA AP-42, Table 1.3-10	7.76E-05	1.94E-05
Beryllium	3.00E-06			5.82E-05	1.45E-05
Cadmium	3.00E-06			5.82E-05	1.45E-05
Chromium	3.00E-06			5.82E-05	1.45E-05
Lead	9.00E-06			1.75E-04	4.36E-05
Mercury	3.00E-06			5.82E-05	1.45E-05
Manganese	6.00E-06			1.16E-04	2.91E-05
Nickel	3.00E-06			5.82E-05	1.45E-05
Selenium	1.50E-05			2.91E-04	7.27E-05
Total HAPs				0.03	0.01

Notes:

1. EPA Tier 2 NOx+NMHC emission standard for engine kW > 560 is 6.4 g/kW-hr. A 95%/5% split of NOx/VOC was used based on the 2004 California Air Resources Board (CARB) policy "CARB Emission Factors for CI Diesel Engines – Percent HC in Relation to NMHC + NOx."

2. SOx emission factor assumes low-sulfur diesel maximum sulfur content of 15 ppm (8.09E-03S lb/hp-hr from AP-42, Table 3.4-1).

3. For the purposes of these calculations, it was assumed PM = PM10 = PM2.5 as a conservative estimate of PM10 and PM2.5.

Estimated Emissions

Modification - Unit #7

Cleaver Brooks CBEX-3W 400 HP Fire Tube Boiler

Ultra-Low-NOx Configuration

Manufacturer Provided Specifications:

Boiler Output	400	HP
Firing Rate	16,329.3	MBTU/hr
Fuel Heat Content (Natural Gas)	1,020	BTU/CF
Burner Max Rate (Gas Input)	16,009	SCFH

Manufacturer Specified Emission Rate:

NOx	9	< ppm

Operating Hours (Hr/yr) 8760

	Emission Factor			Estimated Emissions	
Pollutant	**CAS**	**Emission Factor (lb/MMBtu)**	**Emission Factor Source**	**pounds per hour**	**tons per year**
CO		84	EPA AP-42, Table 1.4-1	1.34	5.89
NOx		32	EPA AP-42, Table 1.4-1 Controlled Low NOx Burners /Flue Gas Recirculation (Manufacturer <9 ppm)	0.51	2.24
VOC		5.5	EPA AP-42, Table 1.4-2	0.09	0.39
SO_2		0.6	EPA AP-42, Table 1.4-2	0.01	0.04
$PM/PM_{10}/PM_{2.5}$		7.6	EPA AP-42, Table 1.4-2	0.122	0.533
HAPs				**pounds per hour**	**tons per year**
2-Methylnaphthalene	91-57-6	2.40E-05	EPA AP-42, Table 1.4-3	3.84E-07	1.68E-06
3-Methylcholanthrene	56-49-5	1.80E-06		2.88E-08	1.26E-07
7,12-Dimethylbenz(a)anthracene	No CAS	1.60E-05		2.56E-07	1.12E-06
Acenaphthene	83-32-9	1.80E-06		2.88E-08	1.26E-07
Acenaphthylene	203-96-8	1.80E-06		2.88E-08	1.26E-07
Anthracene	120-12-7	2.40E-06		3.84E-08	1.68E-07
Benz(a)anthracene	56-55-3	1.80E-06		2.88E-08	1.26E-07
Benzene	71-43-2	2.10E-03		3.36E-05	1.47E-04
Benzo(a)pyrene	50-32-8	1.20E-06		1.92E-08	8.41E-08
Benzo(b)fluoranthene	205-99-2	1.80E-06		2.88E-08	1.26E-07
Benzo(g,h,i)perylene	191-24-2	1.20E-06		1.92E-08	8.41E-08
Benzo(k)fluoranthene	207-08-9	1.80E-06		2.88E-08	1.26E-07
Butane	106-97-8	2.10E+00		3.36E-02	1.47E-01
Chrysene	218-01-9	1.80E-06		2.88E-08	1.26E-07
Dibenzo(a,h)anthracene	53-70-3	1.20E-06		1.92E-08	8.41E-08
Dichlorobenzene	25321-22-6	1.20E-03		1.92E-05	8.41E-05
Ethane	74-84-0	3.10E+00		4.96E-02	2.17E-01
Fluoranthene	206-44-0	3.00E-06		4.80E-08	2.10E-07
Fluorene	86-73-7	2.80E-06		4.48E-08	1.96E-07
Formaldehyde	50-00-0	7.50E-02		1.20E-03	5.26E-03
Hexane	110-54-3	1.80E+00		2.88E-02	1.26E-01
Indeno(1,2,3-cd)pyrene	193-39-5	1.80E-06		2.88E-08	1.26E-07
Naphthalene	91-20-3	6.10E-04		9.77E-06	4.28E-05
Pentane	109-66-0	2.60E+00		4.16E-02	1.82E-01
Phenanathrene	85-01-8	1.70E-05		2.72E-07	1.19E-06
Propane	74-98-6	1.60E+00		2.56E-02	1.12E-01
Pyrene	129-00-0	5.00E-06		8.00E-08	3.51E-07
Toluene	108-88-3	3.40E-03		5.44E-05	2.38E-04
Lead	7439-92-1	0.0005	EPA AP-42, Table 1.4-2	8.00E-06	3.51E-05
Arsenic	7440-38-2	2.00E-04	EPA AP-42, Table 1.4-4	3.20E-06	1.40E-05
Beryllium	7440-41-7	1.20E-05		1.92E-07	8.41E-07
Cadmium	7440-43-9	1.10E-03		1.76E-05	7.71E-05
Chromium	7440-47-3	1.40E-03		2.24E-05	9.82E-05
Cobalt	7440-48-4	8.40E-05		1.34E-06	5.89E-06
Manganese	7439-96-5	3.80E-04		6.08E-06	2.66E-05
Mercury	7439-97-6	2.60E-04		4.16E-06	1.82E-05
Nickel	7440-02-0	2.10E-03		3.36E-05	1.47E-04
Selenium	7782-49-2	2.40E-05		3.84E-07	1.68E-06
Total HAPS:				0.18	0.79

Attachment 9

Operational and Maintenance Strategy

Curia New Mexico, LLC
Permit 1097-M5-1AR Modification Application
Operational and Maintenance Strategy

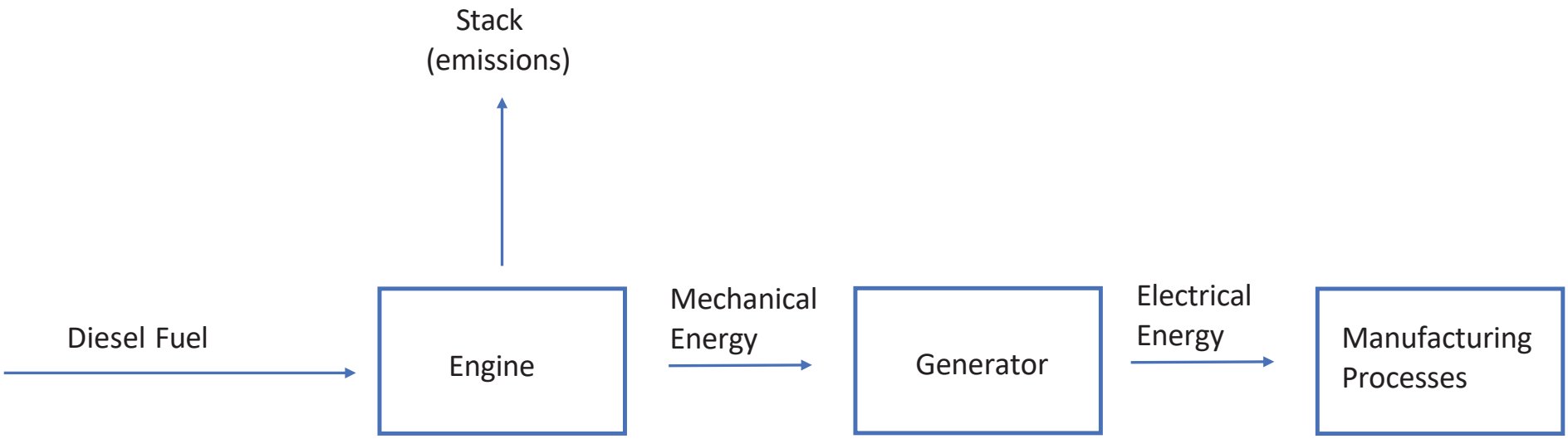
1. The engineering and maintenance (E&M) departments performs routine daily, weekly, monthly, semi-annual, and annual maintenance on the boilers and emergency generators. If they are not operating within specification and the issue cannot be resolved internally, the E&M Department will schedule an emergency service call with a qualified contractor who specializes in the service of boilers or emergency generators. The equipment will be shut down until such service occurs.

2. The boilers operate continuously. The site may shutdown the boilers, only one at a time, due to: 1) routine maintenance (as specified by the manufacturer); 2) site emergency; or 3) equipment malfunction. This proposed boiler has an integrated flue gas recirculation (FGR). The site emergency generators are tested monthly and are inspected annually. The emergency generator's pollution control is limited operating hours (not to exceed 500 hours per year and the site has averaged about 10 hours per year of use).

3. The site uses routine daily, weekly, monthly, semi-annual, and annual maintenance on the boilers and emergency generators to ensure the equipment is operating according to manufacturer's specifications.

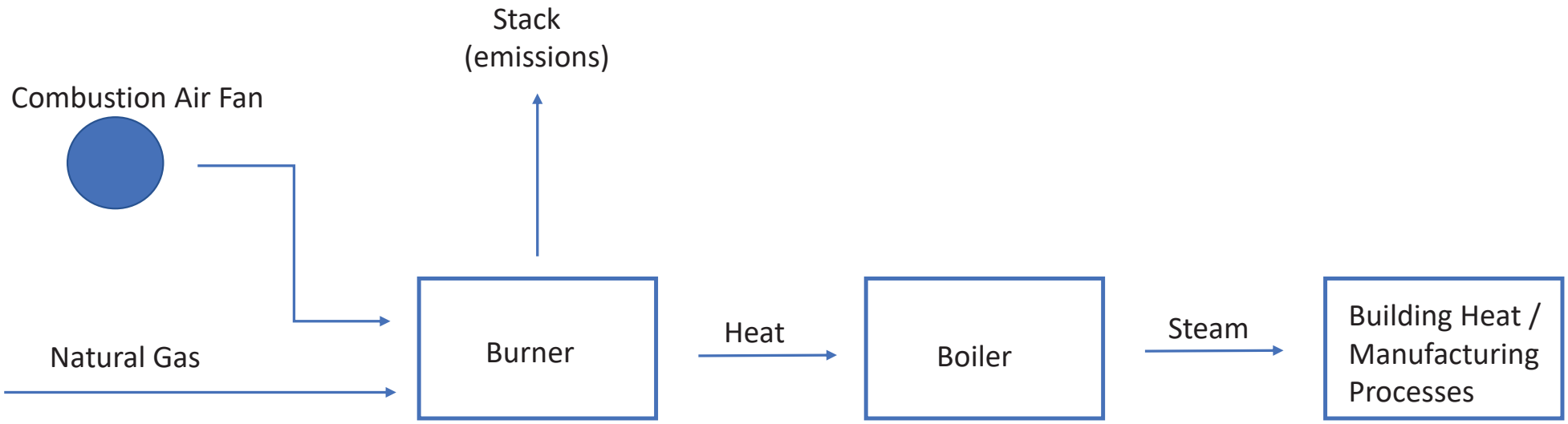
Attachment 10

Process Flow Diagram: Emergency Generator and Boiler



Curia New Mexico, LLC
Permit 1097-M5-1AR Modification Application
December 22, 2023

Process Flow Diagram
Unit 6
Emergency Generator

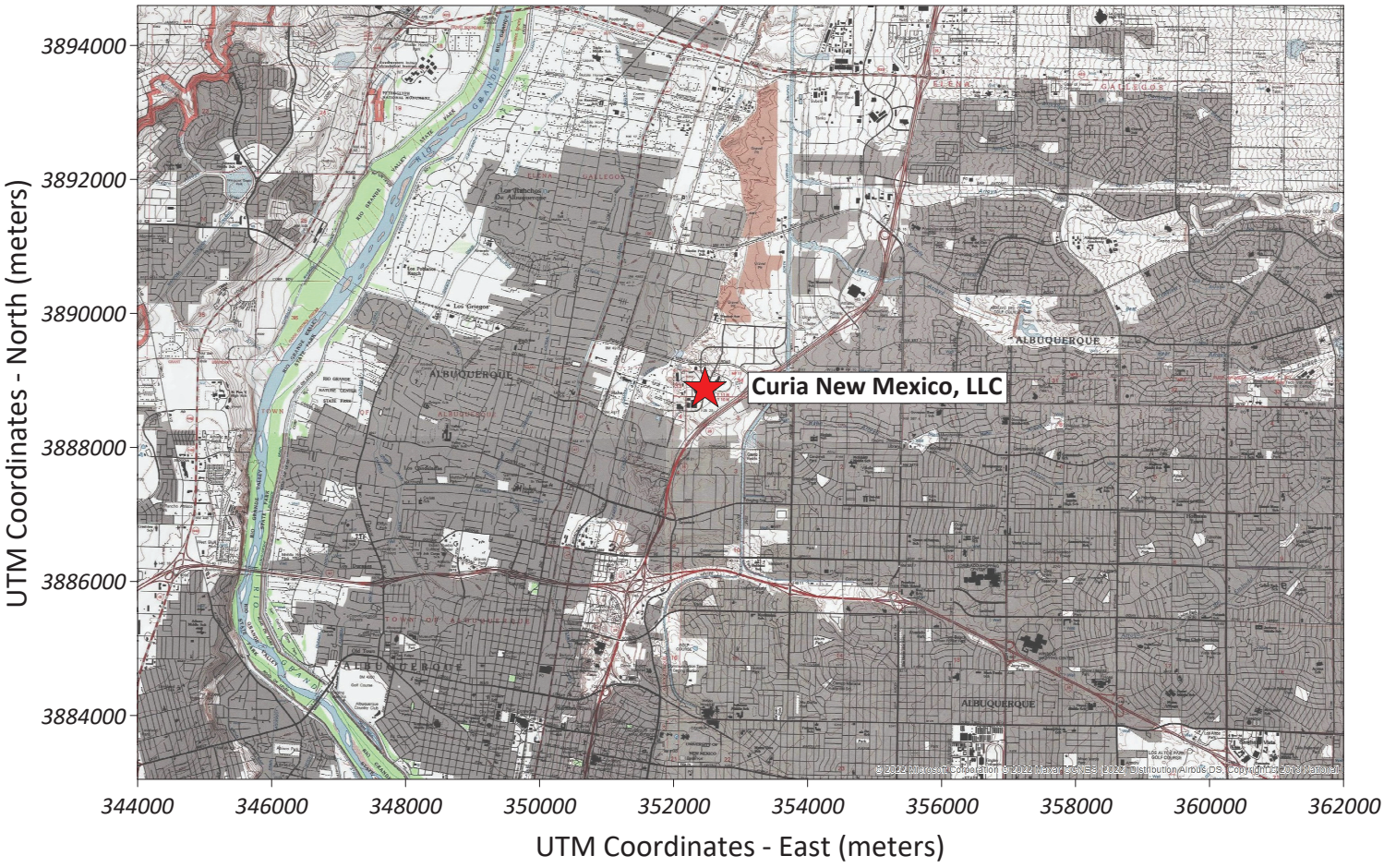


Curia New Mexico, LLC
Permit 1097-M5-1AR Modification Application
December 22, 2023

Process Flow Diagram
Unit 7
Boiler

Attachment 11

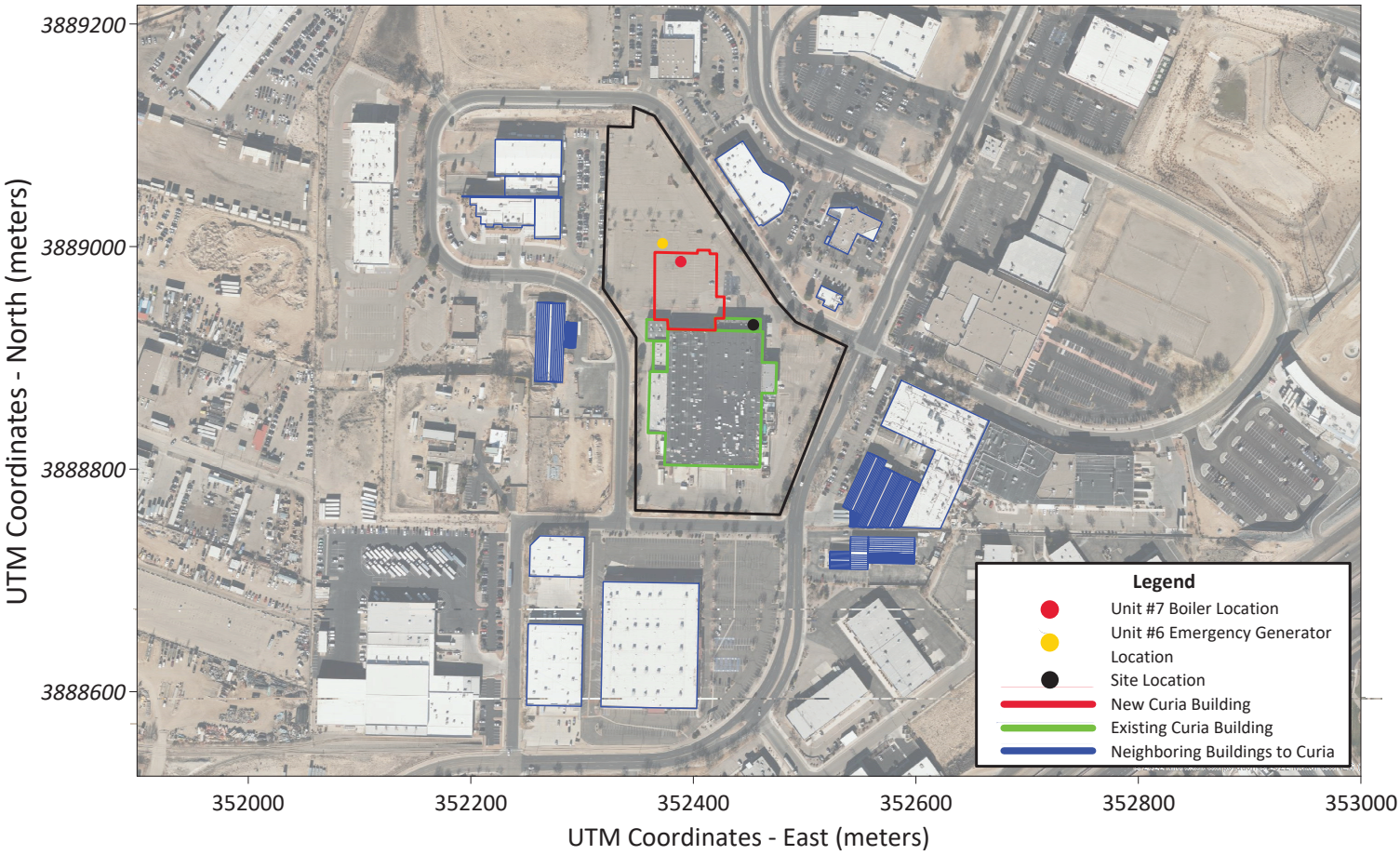
Site Location Map and Aerial Photograph



Site Location Map

Environmental Resources Management
www.erm.com

Curia New Mexico, LLC
Albuquerque, NM



Aerial Photograph

ERM Environmental Resources Management
www.erm.com

Curia New Mexico, LLC
Albuquerque, NM

Attachment 12

Compliance History Disclosure Form

City of Albuquerque
Environmental Health Department
Air Quality Program

Air Quality
Compliance History Disclosure Form

The Albuquerque-Bernalillo County Joint Air Quality Program ("Program") administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County") on behalf of the City Environmental Health Department, including the New Mexico Air Quality Control Act ("AQCA"), NMSA 1978, Sections 74-2-1 to -17. In accordance with Sections 74-2-7(P) and (S) of the AQCA, the Program may deny any permit application or revoke any permit issued pursuant to the AQCA if, within ten years immediately preceding the date of submission of the permit application, the applicant or permittee meets any one of the criteria outlined in the AQCA. The Program requires applicants to file this Compliance History Disclosure Form in order for the Program to deem an air permit application administratively complete, or issue an air permit for those permits without an initial administrative completeness determination process. Additionally, an existing permit holder (permits issued prior to the Effective Date of this Form) shall provide this Compliance History Disclosure Form to the Program upon the Program's request. Note: Program Staff can answer basic questions about this Compliance History Disclosure Form but cannot provide specific guidance or legal advice.

Instructions

1. Applications filed pursuant to the following regulations shall include this Compliance History Disclosure Form, in accordance with Section 74-2-7(S) of the AQCA: *Construction Permits* (20.11.41 NMAC); *Operating Permits* (20.11.42 NMAC); *Nonattainment Areas* (20.11.60 NMAC); *Prevention of Significant Deterioration* (20.11.61 NMAC); *Acid Rain* (20.11.62 NMAC); and *Fugitive Dust* (20.11.20 NMAC) except this Form shall not be required for asbestos notifications under 20.11.20.22 NMAC.
2. The permittee identified on this Compliance History Disclosure Form shall match the permittee in the existing permit or new application. If the information in an existing permit needs to be changed, please contact the Program about revisions and ownership transfers.
3. Answer every question completely and truthfully, and do not leave any blank spaces. If there is nothing to disclose in answer to a particular question, check the box labeled "No." Failure to provide any of the information requested in this Compliance History Disclosure Form may constitute grounds for an incompleteness determination, application denial, or permit revocation.
4. Be especially careful not to leave out information in a way that might create an impression that you are trying to hide it. Omitting information, even unintentionally, may result in application denial or permit revocation.
5. If necessary, continue answers on a separate page and identify the question. If you submit any document in connection with your answer to any question, refer to it as, "Exhibit No.__", and attach it at the end of the Compliance History Disclosure Form, consecutively numbering each additional page at the top right corner.
6. The Program may require additional information to make a thorough review of an application. At all times before the Program has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Program. The applicant's duty to supplement and correct the application includes, but is not limited to, relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Program's review and decision. While the Program is processing an application, regardless of whether the Program has determined the application is administratively complete, if the Program determines that additional information is necessary to evaluate or make a final decision regarding the application, the Program may request additional information and the applicant shall provide the requested additional information.
7. Supplementary information required by the Program may include responses to public comment received by the Program during the application review process.
8. Any fees submitted for processing an application that has been denied will not be refunded. If the Program denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

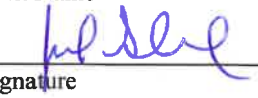
COMPLIANCE HISTORY		
A. Applicant/Permittee Name: **Curia New Mexico, LLC**		*Check Applicable Box*: ☒ Applicant ☒ Permittee
B. Time Period of Compliance Reporting (10 Years): 12/14/2013 to 12/14/2023 *Instructions: For applicants, answer the following questions with information from within the 10 years preceding the current application. For existing permit holders, answer the following questions with information from within the 10 years preceding the Program's issuance of the permit.*		
C. Questions		
1	Knowingly misrepresented a material fact in an application for a permit?	☐ Yes ☒ No
2	Refused to disclose information required by the provisions of the New Mexico Air Quality Control Act?	☐ Yes ☒ No
3	Been convicted in any court of any state or the United States of a felony related to environmental crime?	☐ Yes ☒ No
4	Been convicted in any court of any state or the United States of a crime defined by state or federal statute as involving or being in restraint of trade, price fixing, bribery, or fraud?	☐ Yes ☒ No
5a	Constructed or operated any facility for which a permit was sought, including the current application, without the required air quality permit(s) under 20.11.41 NMAC, 20.11.42 NMAC, 20.11.60 NMAC, 20.11.61 NMAC, or 20.11.62 NMAC?	☐ Yes ☒ No
5b	If "No" to question 5a, go to question 6. If "Yes" to question 5a, state whether each facility that was constructed or operated without the required air quality permit met at least one of the following exceptions: i. The unpermitted facility was discovered after acquisition during a timely environmental audit that was authorized by the Program or the New Mexico Environment Department; or ii. The operator of the facility, using good engineering practices and established approved calculation methodologies, estimated that the facility's emissions would not require an air permit, **and** the operator applied for an air permit within 30 calendar days of discovering that an air permit was required for the facility.	☐ Yes ☐ No
6	Had any permit revoked or permanently suspended for cause under the environmental laws of any state or the United States?	☐ Yes ☒ No
7	For each "yes" answer, please attach an explanation and supporting documentation.	

I, the undersigned, hereby certify under penalty of law that this Compliance History Disclosure Form (Form) and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. I have knowledge of the information in this Form and it is, to the best of my knowledge and belief, true, accurate, and complete. I understand that there are significant penalties for submitting false information, including denial of the application or revocation of a permit, as well as fines and imprisonment for knowing violations. If I filed an application, I covenant and agree to promptly supplement and correct information in this Form until the Program makes a final decision regarding the application. Further, I certify that I am qualified and authorized to file this Form, to certify to the truth and accuracy of the information herein, and bind the permittee and source.

Signed on 12/21/2023

John Gerbacki
Print Name

Sr. Manager of EHS
Print Title


Signature

Curia New Mexico, LLC
Company Name

Attachment 13

Permit Application Review Fee Checklist

City of Albuquerque
Environmental Health Department
Air Quality Program

Permit Application Review Fee Instructions

All source registration and construction permit applications for stationary or portable sources shall be charged an application review fee according to the fee schedule in 20.11.2 NMAC. These filing fees are required for both new construction, reconstruction, and permit modification applications. Qualified small businesses as defined in 20.11.2 NMAC may be eligible to pay one-half of the application review fees and 100% of all applicable federal program review fees.

Please fill out the permit application review fee checklist and submit with a check or money order payable to the "City of Albuquerque Fund 242" and either:

1. deliver it in person to the Albuquerque Environmental Health Department, 3rd floor, Suite 3023, Albuquerque-Bernalillo County Government Center, south building, One Civic Plaza NW, Albuquerque, NM or,

2. mail it to Albuquerque Environmental Health Department, Air Quality Program, Permitting Division, P.O. Box 1293, Albuquerque, NM 87103.

3. online fee payments are now accepted as well. Application must be submitted first, then Department will provide invoice for online payment.

The Department will provide a receipt of payment to the applicant. The person delivering or filing a submittal shall attach a copy of the receipt of payment to the submittal as proof of payment. Application review fees shall not be refunded without the written approval of the manager. If a refund is requested, a reasonable professional service fee to cover the costs of staff time involved in processing such requests shall be assessed. Please refer to 20.11.2 NMAC (effective January 10, 2011) for more detail concerning the "Fees" regulation as this checklist does not relieve the applicant from any applicable requirement of the regulation.

City of Albuquerque
Environmental Health Department
Air Quality Program

Permit Application Review Fee Checklist Effective January 1, 2023 – December 31, 2023

Please completely fill out the information in each section. Incompleteness of this checklist may result in the Albuquerque Environmental Health Department not accepting the application review fees. If you should have any questions concerning this checklist, please call 768-1972.

I. COMPANY INFORMATION:

Company Name	Curia New Mexico, LLC	
Company Address	4401 Alexander Blvd. NE, Albuquerque, New Mexico, 87107	
Facility Name	Curia New Mexico, LLC	
Facility Address	4401 Alexander Blvd. NE, Albuquerque, New Mexico, 87107	
Contact Person	John Gerback, Jr.	
Contact Person Phone Number	505-340-5989	
Are these application review fees for an existing permitted source located within the City of Albuquerque or Bernalillo County?	**Yes** ☒	**No** ☐
If yes, what is the permit number associated with this modification?	**Permit #** 1097-M5-1AR	
Is this application review fee for a Qualified Small Business as defined in 20.11.2 NMAC? (See Definition of Qualified Small Business on Page 4)	**Yes** ☐	**No** ☒

II. STATIONARY SOURCE APPLICATION REVIEW FEES:

If the application is for a new stationary source facility, please check all that apply. If this application is for a modification to an existing permit please see Section III.

Check All That Apply	Stationary Sources	Review Fee	Program Element
	Air Quality Notifications		
☐	AQN New Application	$645.00	2801
☐	AQN Technical Amendment	$352.00	2802
☐	AQN Transfer of a Prior Authorization	$352.00	2803
☒	*Not Applicable*	*See Sections Below*	
	Stationary Source Review Fees (Not Based on Proposed Allowable Emission Rate)		
☐	Source Registration required by 20.11.40 NMAC	$657.00	2401
☐	A Stationary Source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$1,314.00	2301
☒	*Not Applicable*	*See Sections Below*	
	Stationary Source Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)		
☐	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$986.00	2302
☐	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$1,971.00	2303
☐	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$3,942.00	2304
☐	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$5,913.00	2305
☐	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$7,884.00	2306
☐	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$9,855.00	2307
☒	*Not Applicable*	*See Sections Below*	

Federal Program Review Fees for each subpart (In addition to the Stationary Source Application Review Fees above)			
☐	40 CFR 60 – "New Source Performance Standards" (NSPS)	$1,314.00	2308
☐	40 CFR 61 – "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$1,314.00	2309
☐	40 CFR 63 – (NESHAPs) Promulgated Standards	$1,314.00	2310
☐	40 CFR 63 – (NESHAPs) Case-by-Case MACT Review	$13,140.00	2311
☐	20.11.61 NMAC – Prevention of Significant Deterioration (PSD) Permit	$6,570.00	2312
☐	20.11.60 NMAC – Non-Attainment Area Permit	$6,570.00	2313
☒	*Not Applicable*	*Not Applicable*	

III. MODIFICATION TO EXISTING PERMIT APPLICATION REVIEW FEES:

If the permit application is for a modification to an existing permit, please check all that apply. If this application is for a new stationary source facility, please see Section II.

Check All That Apply	Modifications	Review Fee	Program Element
Modification Application Review Fees (Not Based on Proposed Allowable Emission Rate)			
☐	Proposed modification to an existing stationary source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$1,314	2321
☒	*Not Applicable*	*See Sections Below*	
Modification Application Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)			
☐	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$986.00	2322
☒	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$1,971.00	2323
☐	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$3,942.00	2324
☐	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$5,913.00	2325
☐	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$7,884.00	2326
☐	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$9,855.00	2327
☐	*Not Applicable*	*See Sections Below*	
Major Modifications Review Fees (In addition to the Modification Application Review Fees above)			
☐	20.11.60 NMAC – Permitting in Non-Attainment Areas	$6,570	2333
☐	20.11.61 NMAC – Prevention of Significant Deterioration	$6,570	2334
☒	*Not Applicable*	*Not Applicable*	
Federal Program Review Fees for each subpart (This section applies only if a Federal Program Review is triggered by the proposed modification) (These fees are in addition to the Modification and Major Modification Application Review Fees above)			
☒	40 CFR 60 – "New Source Performance Standards" (NSPS)	$1,314.00	2328
☐	40 CFR 61 – "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$1,314.00	2329
☐	40 CFR 63 – (NESHAPs) Promulgated Standards	$1,314.00	2330
☐	40 CFR 63 – (NESHAPs) Case-by-Case MACT Review	$13,140.00	2331
☐	20.11.61 NMAC – Prevention of Significant Deterioration (PSD) Permit	$6,570.00	2332
☐	20.11.60 NMAC – Non-Attainment Area Permit	$6,570.00	2333
☐	*Not Applicable*	*Not Applicable*	

IV. ADMINISTRATIVE AND TECHNICAL REVISION APPLICATION REVIEW FEES:

If the permit application is for an administrative or technical revision of an existing permit issued pursuant to 20.11.41 NMAC, please check one that applies.

Check One	Revision Type	Review Fee	Program Element
☐	Administrative Revisions	$250.00	2340
☐	Technical Revisions	$500.00	2341
☒	*Not Applicable*	*See Sections II, III or V*	

V. PORTABLE STATIONARY SOURCE RELOCATION FEES:

If the permit application is for a portable stationary source relocation of an existing permit, please check one that applies.

Check One	Portable Stationary Source Relocation Type	Review Fee	Program Element
☐	No New Air Dispersion Modeling Required	$500.00	2501
☐	New Air Dispersion Modeling Required	$750.00	2502
☒	*Not Applicable*	*See Sections II, III or IV*	

VI. Please submit payment in the amount shown for the total application review fee.

Section Totals	Review Fee Amount
Section II Total	$
Section III Total	$3,285.00
Section IV Total	$
Section V Total	$
Total Application Review Fee	**$3,285.00**

I, the undersigned, a responsible official of the applicant company, certify that to the best of my knowledge, the information stated on this checklist, give a true and complete representation of the permit application review fees which are being submitted. I also understand that an incorrect submittal of permit application reviews may cause an incompleteness determination of the submitted permit application and that the balance of the appropriate permit application review fees shall be paid in full prior to further processing of the application.

Signed this 21st day of December, 20 23

John Gerbach
Print Name

Sr. Manager of EHS
Print Title

Signature

Definition of Qualified Small Business as defined in 20.11.2 NMAC:
"Qualified small business" means a business that meets all of the following requirements:

(1) a business that has 100 or fewer employees;
(2) a small business concern as defined by the federal Small Business Act;
(3) a source that emits less than 50 tons per year of any individual regulated air pollutant, or less than 75 tons per year of all regulated air pollutants combined; and
(4) a source that is not a major source or major stationary source.

Note: Beginning January 1, 2011, and every January 1 thereafter, an increase based on the consumer price index shall be added to the application review fees. The application review fees established in Subsection A through D of 20.11.2.18 NMAC shall be adjusted by an amount equal to the increase in the consumer price index for the immediately-preceding year. Application review fee adjustments equal to or greater than fifty cents ($0.50) shall be rounded up to the next highest whole dollar. Application review fee adjustments totaling less than fifty cents ($0.50) shall be rounded down to the next lowest whole dollar. The department shall post the application review fees on the city of Albuquerque environmental health department air quality program website.