



SJVAPCD Rule Changes

Equipment Replacement

Ashraf Qader

Sales Manager – Central Valley

R.F. MacDonald Co.



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your boiler & pump solutions team

Introduction



- Ashraf Qader
- Sales Manager – Central Valley
- BS Mechanical Engin. – CSU Fresno
- With R.F. MacDonald Co. since 2009

Applicability



- Central Valley Counties
- Applies to:
 - Boilers
 - Steam Generators
 - Process Heaters
- Sizes >5 MMBtu/hr
- Approximately 1,273 units effected
- First deadline is May 1, 2022
- Compliance with both rules 4306 and 4320 is required

Agenda

- Example of a 'Traditional System'
- Commercial Boiler Solutions
 - Cleaver-Brooks – ClearFire-CE
 - Cleaver-Brooks – ClearFire-H
 - Cleaver-Brooks – CBT
- Skid Fabrication Capabilities
- Cleaver-Brooks CBEX Elite
- Q&A

Example – Traditional System

- ‘Plant A’ is a food processing facility in the Central Valley.
- Central Plant with steam boiler operating at 100 PSI serving multiple processes.
- Breakdown of steam points of use:
 - Cook food products via jacketed vessels – 3,500 Lbs/Hr
 - Hose stations for wash down – indirect via a HX– 5,000 Lbs/Hr
 - Tank sanitation – indirect via a HX – 3,000 Lbs/Hr

Example – Traditional System

- Existing equipment: One (1) 350HP Cleaver-Brooks CBLE w/ a Hawk control and a burner/controls package.
- Capable of achieving 9 ppm NOx.
- ‘Plant A’ has decided they would like to replace their equipment in order to comply with the enhanced schedule of Rule 4320, but also plan for future expansion.

Cleaver-Brooks ClearFire-CE

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

**High Mass Firetube Design
Capable of high ΔT designs**

**Built for use in
Variable Flow Primary
Systems**

High Turndown

**Small footprint for
Retrofit or New Construction**



ClearFire-CE AHRI Efficiencies

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Model	Thermal Efficiency	Combustion Efficiency
CFC-E 500	95.1%	94.4%
CFC-E 750	95.1%	94.4%
CFC-E 1000	96.1%	94.6%
CFC-E 1500	95.1%	94.4%
CFC-E 2000	95.5%	94.3%
CFC-E 2500	94.9%	94.5%
CFC-E 3000	94.4%	94%
CFC-E 3500	95.2%	94.7%
CFC-E 4000	95.4%	94.5%
CFC-E 5000	96%	94.3%
CFC-E 6000	94.9%	94%



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ClearFire-CE – Maintenance

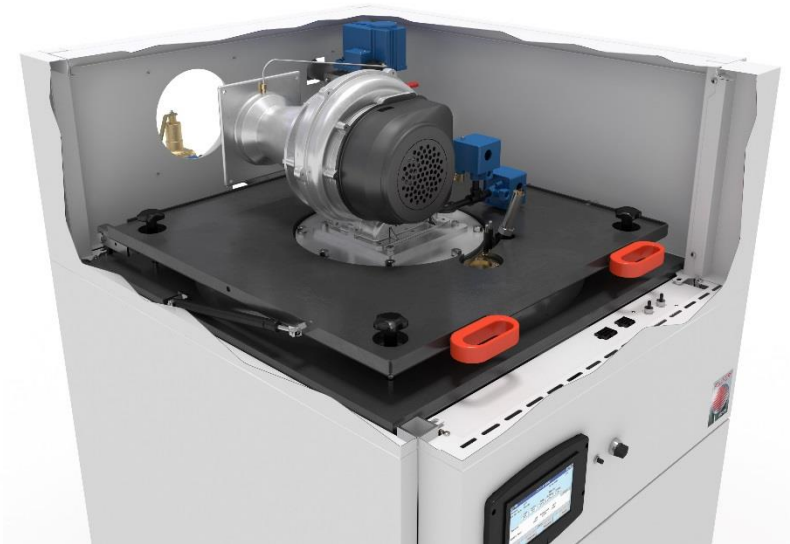
San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

**Proven and reliable
pre-mix venturi burner**

**Linkageless burner does not
need regular tuning**

**Quick fireside access with
hinged burner door**

**UV scanner and few spare
parts required**



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ClearFire-CE – Controls

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AIR POLLUTION CONTROL DISTRICT

**Built-in Lead-Lag (up to 8 boilers) &
Pump/Valve Control**



**Falcon Hydronic
Control**

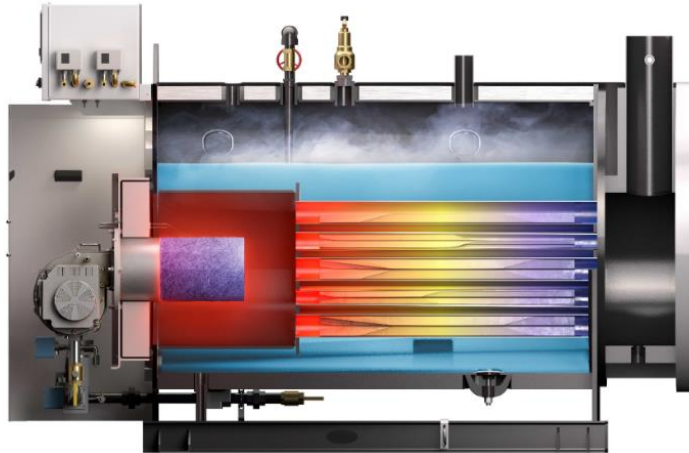


Cleaver-Brooks ClearFire-H

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT



- Capacity 10-80 BHP
- Design Pressure 15 – 150#
- NOx: <7 PPM, 20 PPM
- NG, Propane
- Premix Burner up to 10:1 turndown
- Ideal for Skid Mounting



CFH TUBE

- Carbon steel firetube
- Extended heating surface



Cleaver-Brooks CBT

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT



- Capacity 10-60 BHP
- Design Pressure 15 – 150#
- NOx: <9 PPM, 20 PPM
- NG or Propane
- Premix Burner 5:1 Turndown
- Low water volume – Quick start up and response
- Minimal footprint
- Ideal for skid mounting

Now.. Back to our example.

- We determined the following steam loads for 'Plant A':
 - Jacketed vessels to cook products – 3,500 Lbs/Hr
 - Hose stations – indirect via a HX – 5,000 Lbs/Hr
 - Tank sanitation – indirect via a HX – 3,000 Lbs/Hr

Now.. Back to our example.

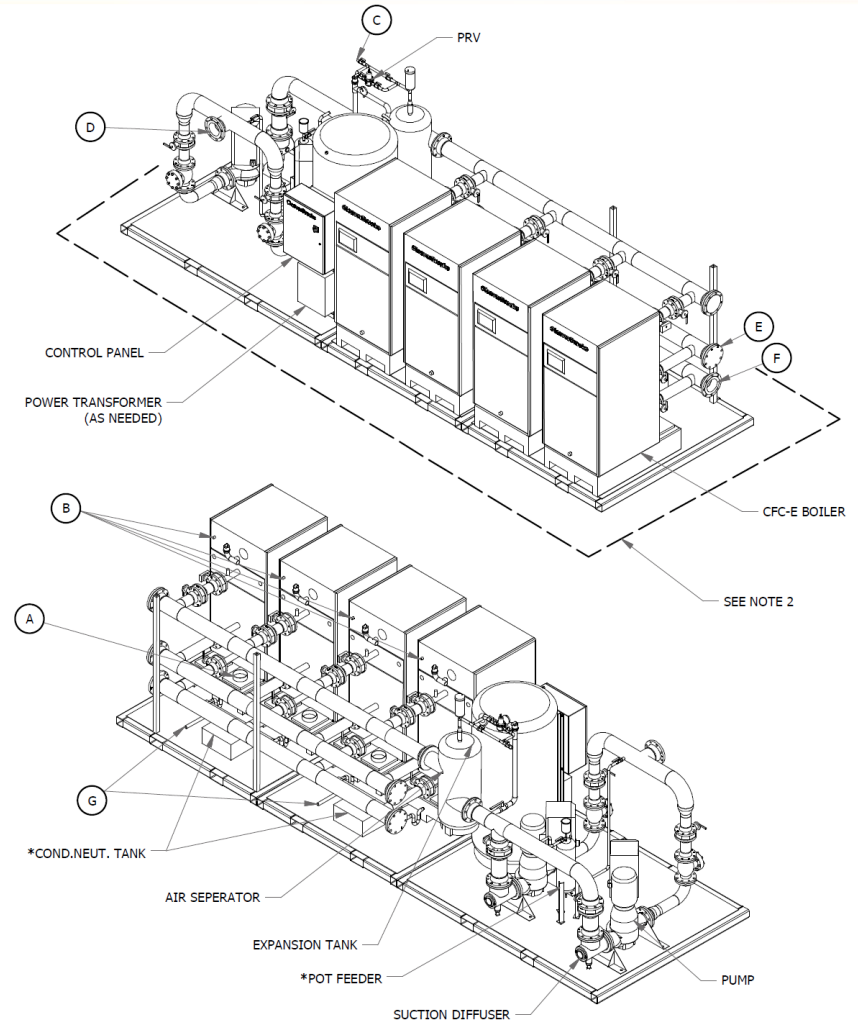
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 - Jacketed vessels to cook products – 3,500 Lbs/Hr
 - Hose stations – indirect via a HX – 5,000 Lbs/Hr
 - Tank sanitation – indirect via a HX – 3,000 Lbs/Hr
- The second and third processes are DHW applications.
- Considering this, we can explore the option of converting from 'STEAM DHW' to 'HHW DHW'

Now.. Back to our example.

- We determined the following steam loads for 'Plant A':
 - Jacketed vessels to cook products – 3,500 Lbs/Hr
 - Hose stations – indirect via a HX – 5,000 Lbs/Hr
 - Tank sanitation – indirect via a HX – 3,000 Lbs/Hr
- That leaves only the first process requiring steam.
- Steam capacity is now reduced from 350HP to under 120HP.

Modular Hydronic Solutions

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Modular Steam Solutions

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT



Horizontal Boiler Skid System

Gas-fired, horizontal boiler skids available in sizes ranging from 300 to 8,000 lbs/hour steam capacity.



Vertical Boiler Skid System

Gas-fired, vertical boiler skids available in sizes ranging from 300 to 6,000 lbs/hour steam capacity.



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CBEX Elite Firetube Boilers

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AIR POLLUTION CONTROL DISTRICT

- Design Pressures up to 300 PSIG
- 100 HP to 2500 HP Range
- NOx: <5PPM, 9 PPM, 30 PPM
- Natural Gas, LP, #2 Fuel Oil
- Turndown – Up to 4:1 at 5PPM Nox, NG
- Turndown – Up to 10:1, at 30ppm NOx, NG
- Large water volume slower warm up and response
- Excellent industrial boiler option



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San Joaquin Valley

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Recommendations for Evaluating Boiler NOx Upgrades

- Every customer is different
- RFM can evaluate site specific conditions and propose customized options
- Evaluation will look at costs:
 - Energy
 - Operations
 - 4320 Fee compliance
- Competitive analysis available to make sure you are making the most of your investment



Rule Change Milestones Reminder

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

4306 – Non-Deferred Units Submit
Emission Control Plan/Authority
to Construct

4320 – Submit Emission Control
Plan/Authority to Construct

May 1, 2022

4306 – Non-Deferred Units
Compliance Date

4320 – Compliance Date

Dec 31, 2023

4306 – Deferred Units Submit
Emission Control Plan/Authority
to Construct

May 1, 2028

4306 – Deferred Units Compliance
Date

Dec 31, 2029

Jan 1, 2025

4320 – Invoices for those choosing
the fee method will be issued for
2024 operations



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Conclusion



- When navigating the new rule changes, each user will have options to evaluate to see what makes the best sense for them
- Some early adopters have the ability to defer compliance until Dec. 31, 2029
- Regardless of the course of action, all users must have compliance plans submitted to the district by May 1, 2022

Future Online Workshops

ONLINE WORKSHOPS

Completed

1

RULES 4306 & 4320
TIMETABLE

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Completed

2

BURNER RETROFITS &
CONTROLS SOLUTIONS

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Completed

3

SELECTIVE CATALYTIC
REDUCTION SOLUTIONS

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Today

4

BOILER EQUIPMENT
REPLACEMENT SOLUTIONS

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5

EMISSIONS PLAN
OVERVIEW & CHECKLIST

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rfmacdonald.com/clear-the-air



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Past

Workshop Solutions – Burner Technology

BURNER RETROFIT & CONTROLS UPGRADE



- Ultra Low Emissions Burners on new units down to 5PPM NOx on sizes up to 50 MMBtu/hr input
- Burner retrofits to existing units down to 5PPM NOx on sizes up to 30 MMBtu/Hr input
- Enhanced PLC controls to maintain NOx repeatability across the firing range while also increasing operational efficiencies



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Past

Workshop Solutions – SCR Technology

SELECTIVE CATALYTIC REDUCTION



- For Sources with limits below 5 PPM NOx requirements
 - Anhydrous Ammonia – Highest Risk
 - Aqueous Ammonia - Moderate Risk
 - Urea – Low Risk

	 ANHYDROUS	 AQUEOUS	 UREA
Ammonia-Based Reagents			
Hazard Rating (Level of Toxicity): 3 = Extreme 2 = Moderate 1 = Low	3	2	1
Level of Usage Risk:	Highest Risk	Moderate Risk	Lowest Risk
Ease of Use / Operational Readiness:	Ready to Operate	Vaporized before Use	Needs Vaporization & Conversion
Safety Requirements:	Training, Emergency Planning, Fire Dept. Audit	Training, Emergency Planning, Fire Dept. Audit	Training
Most Common Applications:	Power Plants, Industrial Facilities	Food Processing, Agriculture, Utilities	Hospitals, Schools, Universities, Prisons
R.F. MacDonald Co. Offers:	Full Installation Support & Service		



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Workshop Solutions - Equipment Replacement

REPLACE YOUR EQUIPMENT



Some Benefits of New Equipment

- Replace older equipment that is at its upper life cycle.
- Replace larger units with multiple smaller boilers that meet requirements.
- Increased efficiency with newer units.



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Equipment Maintenance Program (EMP)

We offer a customizable Boiler Equipment Maintenance Plan to maintain optimum performance, improve system stability, extend equipment life and minimize risk of a boiler system failure.

- Comply with Rule 4320 Section 5.7 for monitoring provisions
- Scheduled/Preventive/Predictive Maintenance options



Membership Term Options

5 YEARS **Five Year Membership Plan**

- Fixed labor rate for three (3) years
- 15% discount on parts for any equipment
- Two (2) free training classes at a local seminar
- Priority scheduling benefits

3 YEARS **Three Year Membership Plan**

- Fixed labor rate for two (2) years
- 10% discount on parts for equip. in program
- One (1) free training class at a local seminar
- Priority scheduling benefits

2 YEARS **Two Year Membership Plan**

- Fixed labor rate for two (2) years
- 5% discount on parts for equip. in program
- Priority scheduling benefits

1 YEAR **One Year Membership Plan**

- 5% discount on parts for equip. in program
- Priority scheduling benefits

CHOOSE YOUR
PLAN

Monthly **M**

Quarterly/Semi-Annual **Q**

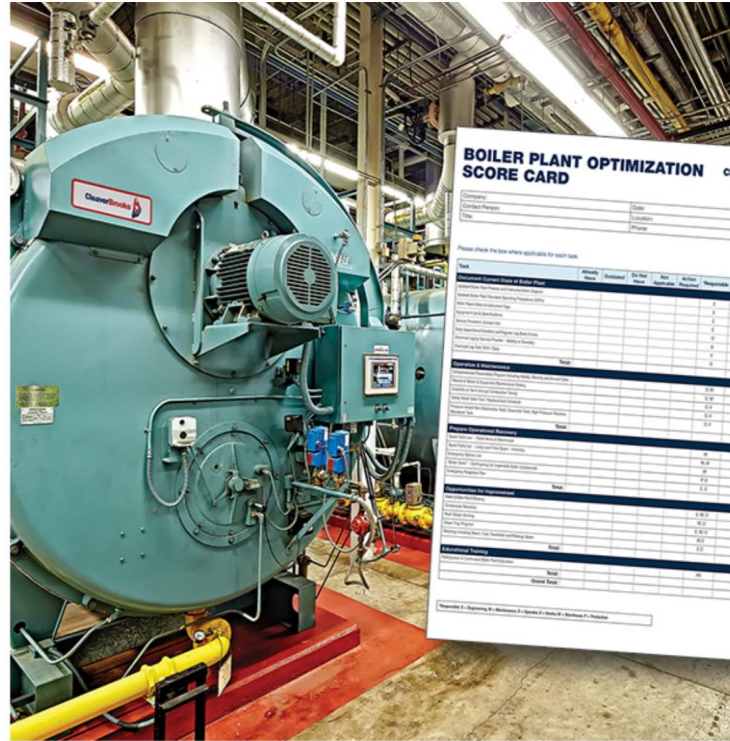
Annual **A**



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Cleaver Brooks Boiler Plant Optimization (BPO)

With our Boiler Plant Optimization (BPO) programs, we can assist with a variety of methodologies to create a successful roadmap to improve and address any site-specific issues. We partner with you to inspect and evaluate the four cornerstones of successful plant operation: Safety, Efficiency, Reliability & Sustainability



Contact Information

Thank you for joining us today. A follow up email will be sent to you with your R.F. MacDonald Co. sales rep's contact information and a link to our workshops.

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