

**West Virginia's  
Review of Longview Power's  
ACE Permit Application  
and  
Lessons Learned**

**Hosted by**



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**West Virginia Division of Air Quality**

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# Overview

- Is WV working on an ACE permit?
- Who is Longview Power?
- Subpart UUUUa (ACE Rule)
- Applied BSERs & HRIs
- Proposed Standards
- Anticipated Future Operational Characteristics
- Monitoring
- Testing
- Recordkeeping
- Reporting
- Resources
- Lessons Learned

# Is WV Working on an ACE Permit?

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- Longview Power has voluntarily proposed to establish CO<sub>2</sub> Emission Standards in accordance with the Emission Guidelines of Subpart UUUUa (ACE Rule) using the WV Minor Source Permitting Rule.
- Currently WV DAQ is developing responses to 10 written comments and 21 oral comments.
- When all comments have been addressed, the WV DAQ will make a final decision on the Longview ACE Permit.

# Who is Longview Power?

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- Longview Power is a merchant power plant operating in the PJM RTO market with a single EGU, located in Madsville, WV.
- The Unit:
  - Gross rating of 789 MW.
  - Once-through, supercritical steam generator.
  - High-pressure, intermediate-pressure and two low-pressure steam turbines on single tandem.
  - Single reheat steam circuit.
  - Pulverized coal-fired unit using bituminous coal.

# Subpart UUUUa (ACE Rule)

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- This rule will require states to establish CO<sub>2</sub> Standards for coal-fired EGUs that commenced construction before June 2014.
- The Standard must be a rate-based standard in the form of mass CO<sub>2</sub> per energy output (e.g. lb CO<sub>2</sub> per megawatt of electricity).
- Seven Candidate Technologies of Heat Rate Improvements must be evaluated as to whether these improvements can be implemented and the potential impact on the unit's heat rate and reduction in CO<sub>2</sub> emissions.

# Candidate Technologies (aka BSERs)

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## Potential Range of Heat Improvements

<b>HRI Measure</b>	<b>% Min</b>	<b>% Max</b>
Neural Network/Intelligent Sootblowers	0.3	0.9
Boiler Feed Pumps	0.2	0.5
Air Heater and Duct Leakage Control	0.1	0.4
Variable Frequency Drives	0.2	1.0
Blade Path Upgrade (Steam Turbine)	1.0	2.9
Redesign/Replace Economizer	0.5	1.0
Improved Operating and Maintenance (O&M) Practices	Can range from 0 to > 2.0% depending on the unit's historical O&M practices	



## Applied BSERs & HRIs

# Summary of LVP's Heat Rate Improvements

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- Upgraded the Neural Network in the Summer of 2015\*
- Installed Intelligent Sootblowing System in the Fall of 2015\*
- Installed Intelligent Combustion System in Fall of 2018
- Operates an Online Condenser Cleaning System\*
- Installed Online Air Heater Basket Cleaning System in 2018

\* Candidate technology of heat rate improvement (HRI).



# Summary of LVP's Original Designs

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- Forced and induced draft fans are axial fans with variable pitch blade design.
- Feed water pumps are variable speed pumps due to hydraulic geared coupling system.
- Air heater seals are an adjustable, double seal designed system.\*
- Siemens' Advance Design steam turbines.
- Economizer is equipped with a by-pass to maintain the optimal flue gas temperature for the SCR.

\* Candidate technology of heat rate improvement (HRI).

# Heat Rates

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<b>Plant Name</b>	<b>State Name</b>	<b>Capacity (MW)</b>	<b>Heat Rate (Btu/kWh)</b>	<b>On Line Year</b>
Longview Power Plant	West Virginia	700	8904	2011
James E. Rogers Energy Complex	North Carolina	844	9090	2012
John W Turk Jr Power Plant	Arkansas	609	9102	2012
Belews Creek	North Carolina	1110	9185	1974
Belews Creek	North Carolina	1110	9203	1975
Marshall (NC)	North Carolina	660	9300	1965

[https://www.epa.gov/sites/production/files/2020-10/needs\\_v620\\_10-05-20\\_0.xlsx](https://www.epa.gov/sites/production/files/2020-10/needs_v620_10-05-20_0.xlsx)

# Issues in Development of the Performance Standards

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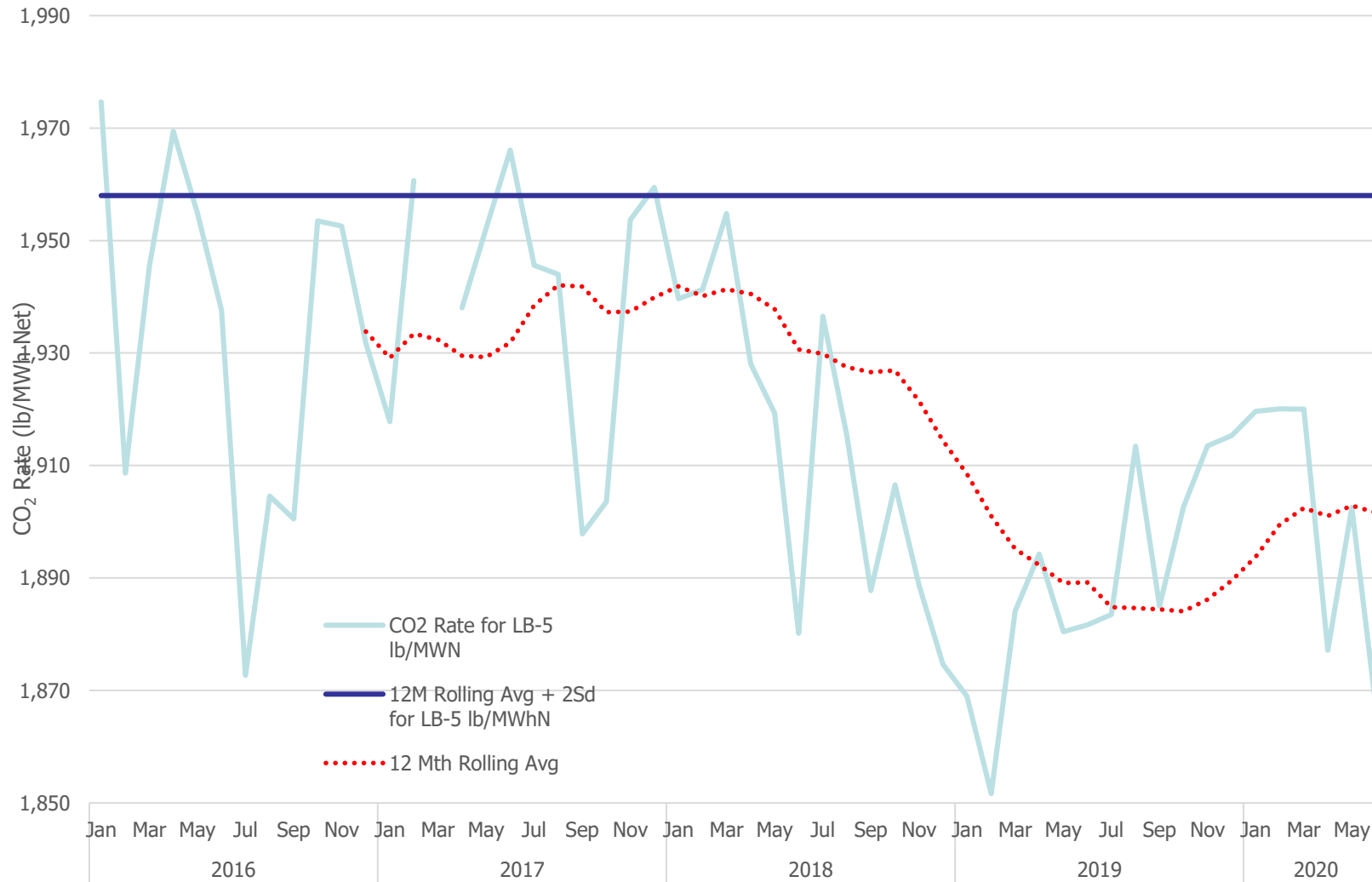
- Baseline Period 2016-2020 2<sup>nd</sup> Quarter.
  - Over 90% of operating time the unit operated within the upper load bin.
- Hourly emission rate varied.
- How to show that the standard is constraining?
- What is reasonable?
- Compliance margins.
- How to account for other changes (e.g., fuel switching, unit degradation, etc.)?
- CBI.

# Overcoming the Issues

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- Broke down the data into load bins.
  - Used unadjusted flowrates.
- Reduced the peaks and valleys in the data.
  - Reduced the hourly emission data to monthly and developed a 12-month rolling average over the entire baseline period.

# CO<sub>2</sub> Emission Rate for Load Bin 5 During the Baseline Period

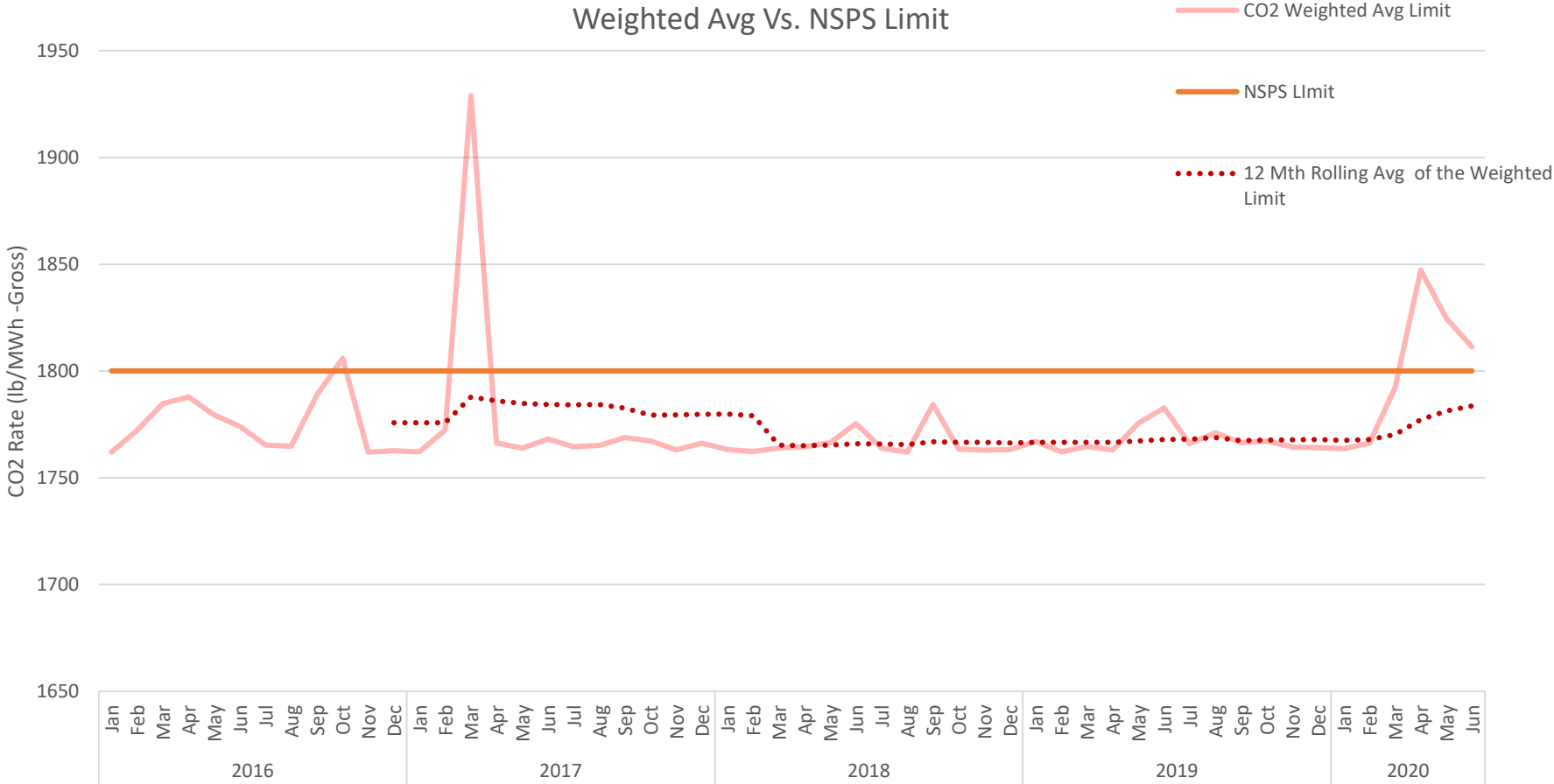


# Overcoming the Issues

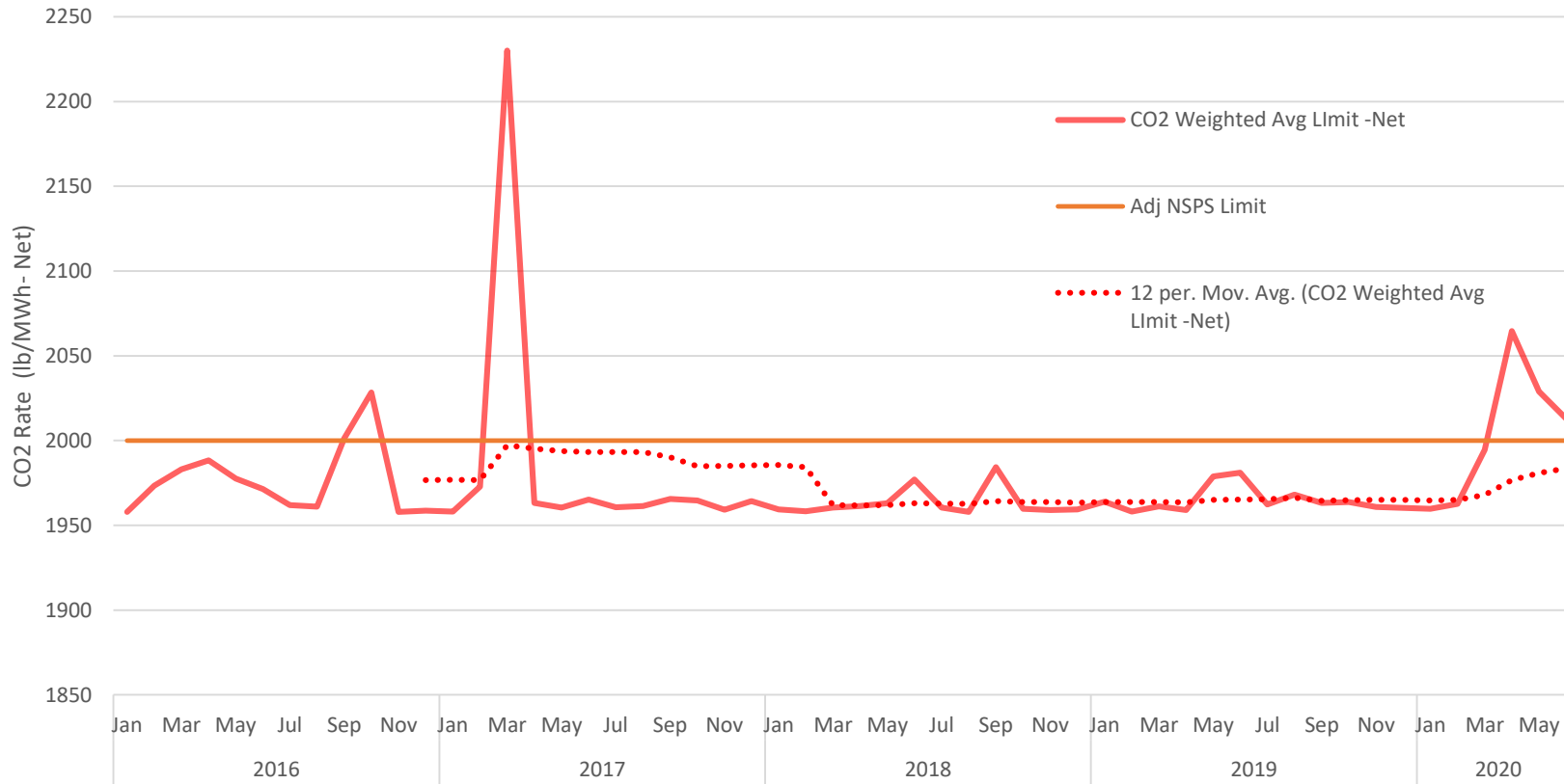
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- Would the historical emissions be constraining?
- What about the NSPS Subpart TTTT limit?
- Level 2 Limit was created for equipment failures where the unit could still operate but with degraded efficiency (impaired operation).
- Unit Degradation Adjustment Factor – includes a recovery rate.
- Coal Adjustment Factor to account for fuel supplier switching. Pre- and post-tests to develop a ratio to be applied to each of the bin limits.

# Weighted Avg Standard Gross Basis verses the NSPS Standard for Reconstructed EGUs



## Weighted Avg Standard (Net) verses the NSPS Standard for Reconstructed EGUs Adj to Net Generation





# Proposed Performance Standards

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- Weighted Average Limit based on 5 Normal Load Bin Limits weighted on hours of operation for each of the load bins on a calendar year basis.
- Two levels of Normal Load Bin Limits (LB-1 through 5).
  - Level 1 – Normal Operations
  - Level 2 – Impaired Operations
- Startup and shutdown emissions has its own limit on a calendar year basis (LB-0).

# Proposed Standard – Bin Limits

- The Bin Limits for LB-1 through LB-5 is in terms of lbs of CO<sub>2</sub> per Megawatt-hour on a net generation basis.
- \* - The limit for LB-0 (SUSD) is in terms of lbs of CO<sub>2</sub> per Megawatt-hour on a gross generation basis.
- The difference between gross and net is:
  - Gross is the total amount of electricity generated.
  - Net is the total amount of electricity generated minus the amount of energy needed to operate the unit.

Level 1 - Normal Operations						
Load Bin	LB-0	LB-1	LB-2	LB-3	LB-4	LB-5
Limit	9,864*	2,230	2,108	2,050	2,002	1,958
Level 2 - Impaired Operations						
Load Bin	LB-0	LB-1	LB-2	LB-3	LB-4	LB-5
Limit	N/A	2,453	2,319	2,255	2,202	2,154

# Proposed Standard – Other Adjustments

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- Unit Degradation Adjustment Factor (UDAF) will increase all the Bin Limits by 0.4% annually with a recovery factor (decrease the limits) of 0.7% applied once every fifth year. This adjustment factor is to account for unit degradation over time up to year 2046. The recovery factor is to account for the recovered degradation as a result of minor/major repair work.
- Coal Adjustment Factor will adjust the Bin Limits due to fuel supplier changes.

# Anticipated Future Operational Characteristics

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- Longview provided annual generation, CO<sub>2</sub> emissions, fuel usage, carbon content, heat rate, electric generation capacity, and capacity factor.
- Avoided the need to use fixed and variable operations and maintenance costs; fuel cost; and wholesale electricity prices (CBI data) to justify or support the standard.

The background features a solid blue area on the left and top, with a white semi-circle on the right. A black circle is positioned on the left side, partially overlapping the blue area and the white semi-circle. Several black dashed lines are scattered in the upper left quadrant of the white semi-circle.

# Requirements

# Monitoring – New Requirements

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- LVP will have to monitor and record the hours of operation in each of the load bins during the compliance period.
- LVP will have to monitor and record the auxiliary load of the unit and determine the net generation on an hourly basis.
- LVP will have to monitor and record the heat rate of the unit and determine the average heat rate during the compliance period.

# Monitoring

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- Existing Monitoring System will be used.
  - Only unbiased monitored data will be used for compliance.
  - Emission Data using Part 75 Substitution Procedures cannot be used for compliance.
  - This includes full span exceedances procedures of Part 75.
- Monitor system (CO<sub>2</sub> and Flow Monitor) must have a monitor availability of 95% or better.
  - Missing Emission Data below the 95% availability requirement shall be determined using procedures for Part 75 Appendix G for compliance.

# Testing

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- The Relative Accuracy Testing Audit (RATA) under Part 75 is still required to be conducted.
- When making fuel supplier changes, LVP will have to conduct testing to determine the Coal Adjustment Factor to adjust the bin limits to account for the changes in the quality of the coal from supplier/source changes.



# Recordkeeping

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- LVP will be required to maintain records of the data used to determine the weighted average for compliance data needed to determine the CO<sub>2</sub> emission rate each compliance period (e.g. net generation, hours operated in each load bin, unbiased flue gas flowrate, and CO<sub>2</sub> concentration).

# Reporting

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- At the end of each compliance period, LVP will be required to submit a compliance demonstration.
- Any time there is an event that causes impaired operations, bimonthly repair progress, root cause analysis reports.
- Any time the fuel supplier changes.

# Public Comment Period

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- Public Meeting was held on Tuesday, October 27.
  - 21 oral comments were taken for the record. 66 individuals registered for the meeting.
- Comment period ended on Monday, November 9.
  - 10 written comment were received.

# Summary

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- LVP is voluntarily seeking a proposed CO<sub>2</sub> Standard for their existing coal fired EGU.
- No physical changes to the facility were proposed as part of this action.
- The standard is using a weighted average with 5 bin limits covering the normal operating range of the unit.
- Startup/Shutdowns have a separate standard.
- Bin limits were developed taking hourly emission data and converting it into monthly rates with respect to load bin. Using the monthly rates, the average and standard deviation was taken from a 12-month rolling average.

# Resources

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- Field Audit Checklist Tool (FACT)
  - [Field Audit Checklist Tool \(FACT\) | Clean Air Markets | US EPA](#)
- EIA-923 Form Data
  - [Form EIA-923 detailed data with previous form data \(EIA-906/920\)](#)
- National Electric Energy Data System (NEEDS)
  - [National Electric Energy Data System \(NEEDS\) v6 | Clean Air Markets | US EPA](#)
- Guidance on Implementing the Affordable Clean Energy Rule: Engineering, Operations and Compliance Considerations
  - [GuidanceonImplementingtheAffordableCleanEnergyRule.pdf \(cooperative.com\)](#)
- Regulatory Impact Analysis for the Repeal of the Clean Power Plan, and the Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units
  - [Regulatory Impact Analysis for the Repeal of the Clean Power Plan, and the Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units \(epa.gov\)](#)

# Lessons Learned

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- Develop a team.
- Be ready to handle large data sets (hardware/software/trained personnel).
- Work concurrently.
- Establish a good relationship with the source.
- Get EPA involved early with your process.
- Look at other sources/units.
- Develop justification as you go forward on everything.
- Upper Management/Legal needs to advise and support the staff.

# Information

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## **Application R13-3495**

[https://dep.wv.gov/daq/permitting/  
Pages/NSR-Permit-  
Applications.aspx](https://dep.wv.gov/daq/permitting/Pages/NSR-Permit-Applications.aspx)

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