Overview of 40 CFR Part 60, Subpart TTTT

September 10, 2018 – NetDAHS Edge Users Group

John Downs
Regulatory Manager,
CEMTEK KVB-Enertec

Quad T or 4T

- New Source Performance Standard affecting EGUs "***40 CFR 60, Subpart TTTT – Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units***"
- Steam Generating unit, IGCC, or Stationary Combustion Turbine
  - Commence Construction After January 8, 2014 or
  - Commences Mod. Or Reconstruction > June18, 2014

Quad T Applicability

- APPLICABLE (cont.):
  - Unit has a base load rating > 250 mmBtu/hr AND
  - Server generator(s) capable of selling >25 MW of electricity to power distribution system
- NOT APPLICABLE if:
  - Permit* limits output to 1/3 potential or 219,000 MWH which ever is greater, or
  - Capable of combusting ≥50% non-fossil fuel and subject to permit* limiting ACF to ≤10% fossil fuel, or

CEMTEK KVB-Enertec

** Federally enforceable*

4T Not Applicable (cont.)

- NOT APPLICABLE (cont.):
  - Combined Heat & Power units with permit* limit to no more than 219,000 MWh or product of design efficiency x potential electric output, whichever is greater; or
  - EGU serves generator with effective capacity of 25 MWh or less ; or
  - MSW's subject to 40 CFR 60 Subpart Eb; or
  - CISWI units subject to 40 CFR 60 Subpart CCCC; or
  - Steam Generator/IGCC modified where hr. CO_2 increase ≤10%; or
  - EGU is CT not capable of combusting Natural Gas; or
  - One of the specific facility's located in Georgia or Kansas

CEMTEK KVB-Enertec

**** Federally enforceable***

4T Limits (Table 1)

Affected EGU	CO2 Emission standard
Newly constructed steam generating unit or integrated gasification combined cycle (IGCC).	640 kg CO2/MWh of gross energy output (1,400 lb CO2/MWh)
Reconstructed steam generating unit or IGCC that has base load rating of 2,100 GJ/h (2,000 MMBtu/h) or less	910 kg of CO2 per MWh of gross energy output (2,000 lb CO2/MWh)
Reconstructed steam generating unit or IGCC that has a base load rating greater than 2,100 GJ/h (2,000 MMBtu/h).	820 kg of CO2 per MWh of gross energy output (1,800 lb CO2/MWh).
Modified steam generating unit or IGCC	A unit-specific emission limit determined by the unit's best historical annual CO2 emission rate (from 2002 to the date of the modification); The emission limit will be no lower than: - 1,800 lb CO2/MWh-gross for units with a base load rating greater than 2,000 MMBtu/h; or - 2,000 lb CO2/MWh-gross for units with a base load rating of 2,000 MMBtu/h or less

4T Limits (Table 2)

Affected EGU	CO2 Emission standard
CT suppling > its design efficiency or 50 percent, whichever is less, times its potential electric output as net-electric sales on **both** a 12-operating month and a 3-year rolling average basis and combusts more than 90% natural gas on a heat input basis on a 12-operating month rolling average basis.	450 kg of CO2 per MWh of gross energy output (1,000 lb CO2/MWh); or 470 kilograms (kg) of CO2 per megawatt-hour (MWh) of net energy output (1,030 lb/MWh).
CT suppling its design efficiency or 50 percent, whichever is less, times its potential electric output **or less** as net-electric sales on **either** a 12-operating month or a 3-year rolling average basis and combusts more than 90% natural gas on a heat input basis on a 12-operating month rolling average basis	50 kg CO2 per gigajoule (GJ) of heat input (120 lb CO2/MMBtu).
CT that combusts 90% or less natural gas on a heat input basis on a 12-operating- month rolling average basis.	50 kg CO2/GJ of heat input (120 lb/MMBtu) to 69 kg CO2/GJ of heat input (160 lb/MMBtu) as determined by the procedures in § 60.5525

How to Determine Units CO2 Emissions for 4T

- Use only valid operating hours, no data substitution or bias adjusted values.
- Limits are based on 12-OPERATING month rolling average.
- Determine initial 12-operating month average.
  - Once that is determined, reporting is required

Determining Emissions / 4T

- Calculate the total CO2 mass emissions by summing valid hourly CO2 mass emissions values for all valid operating hour in compliance period.
- CO2 Mass emission is the hourly CO2 rate in tons/hr times the hour operating fraction.

e.g.: *24.2 tons CO2/hr * 0.6 hr. = 14.52 tons CO2*

(.6 hour = 36 minutes operating time in clock hour)

CEMTEK KVB-Enertec

Determining Emissions / 4T

- 60.5535 allows for use of CO2 CEMS or App. D/G methods to be followed.
- Using F-11, as noted, multiply the CO2 tons/hr result by the hourly operating time to give CO2 mass (tons).
- Sites subject to electric output standard take the CO2 mass and convert to Kilograms (Kg)
  - Multiply the CO2 Tons by 909.1 and round to nearest kg.
  - Hourly CO2 kg values are not reported in ECMPS, the underlying CO2 tons/hr values are for downstream compliance verification.

CEMTEK KVB-Enertec

Determining Emissions / 4T

- Output based sites **without** CEMS are required to implement 40CFR75 App. D methods to determine HI on hourly basis. – requires fuel flow and periodic* GCV determination.
- Use equation G-4 to determine hourly CO2 tons/hr rates. Follow same process as above to convert to kg except round off to 2 significant figures.
- If subject to electric output based standard, must install, calibrate and maintain watt meters. CHP units must also determine and record thermal output;
  - Steam applications must determine and record hourly steam flow rate, temperature, and pressure
- If unit subject to heat input (HI) standard, must determine total HI using either:
  - Appendix D to Part 75; or
  - Procedures under 60.107a(d); or
  - Tier 3 methodology from 40 CFR 98.33(a)(3) and use the appropriate EF from Table C-1

CEMTEK KVB-Enertec

** monthly*

Determining Emissions / 4T

- Once Hourly CO2 is converted to a mass value, next step is to determine initial compliance value.
  - Use only valid data
  - Use only valid hourly gross or net energy output values are obtained
  - Exclude hours where:
    - Substituted data following Part 75 methods are applied
    - Hours where full-scale range of analyzer is exceeded
    - Total or net MW hours or Heat Input is unavailable
  - At least 95% of operating hourly data must be valid
  - Calculate total CO2 mass by summing all valid hourly CO values in the compliance period.

CEMTEK
KVB-Enertec

Determining Emissions / 4T

- Determine hourly gross MW or hourly total Heat Input by summing the total MWs or the total HI.
  - Hours where MW (for output based compliance) < auxiliary loads, net output is considered zero for calculation.

- Output* based: $CO2(kg/MWh) = \ total\ CO2\ (kg)/total\ MW$
- Heat-Input based: $CO2(kg/Gj) = \ total\ CO2\ (kg)/total\ HI\ (Gj)$

- → Result is your initial compliance demonstration value
- → New value is determined at end of next operating month

CEMTEK KVB-Enertec

** Net or Gross, MW, Steam, or thermal energy, as appropriate*

Quad T / 4T Reporting

- Initial compliance value must be reported.
- Quad T states that once ECMPS reporting is developed, sites must begin to use ECMPS for reporting.
- EPA announced in May 2018 that ECMPS was ready to accept data.
  - *No DAHS vendors were notified prior to this announcement.*

CEMTEK KVB-Enertec

Quad T / 4T Reporting

- EPA released new emissions XSD schema with 2nd Q 2018 ECMPS release
- Site must notify CAMD if your site is subject to 4T
- ECMPS is not performing any data validation checks on submissions
- Data schema is not overly complex and is reported under main parent Emissions data element

CEMTEK
KVB-Enertec

Quad T / 4T Reporting

- Required to be incorporated into your site monitoring plan per 40 CFR 75.53(g) and (h).
  - Portion of Monplan to be reported electronically in ECMPS (*new program code NSPS4T*)
- Data required to be reported at all times, including during periods of Startup and Shutdown (SUSD)
- Non-collection considered a violation

Quad T / 4T Reporting

- Initial quarterly report after 12th month includes
  - Initial compliance value
  - Plus each subsequent compliance value (i.e. next 12 operating month rolling value)
  - CO2 emissions standard code, i.e. code that let's EPA know which emissions standard in Tables 1 or 2 that unit is subject
    - The value of the standard is reported only if you are subject to a unit-specific standard

CEMTEK KVB-Enertec

Quad T / 4T Reporting

- An indicator value if a compliance period ended in the quarter. A “1” for yes or a “0” value for no.
  - A 0 would be reported only if a non-operating quarter for unit
  - If 0 is reported, site needs to include statement letting EPA know that no compliance period ended in quarter. Brief and generic statement is acceptable.
- Compliance Period End Data, including Average CO2 emissions rate, unit of measure code, percent valid hours, and indicator if the standard was violated with comment.

CEMTEK KVB-Enertec

Quad T / 4T Reporting

- In 4th quarter EM file only, report total amount of output sold; with code indicating total sold is either the Gross or the Net; and
- The Annual Potential electric output of the EGU.
  - Note that this it is not defined if unit complies with Heat-input standard if this is still required

CEMTEK KVB-Enertec

Quad T / 4T Reporting

- CEMTEK KVB-Enertec has had email exchanges and phone discussions with EPA in effort to define exactly what needs to be reported
- This discussion is still on-going
- Initial EPA response was to manually add data to XML emissions file. → ???

Quad T Applicability II

- If unit is subject to 4T but not Acid Rain Program, must begin recording and reporting CO2 emissions using CEMS or Appendix G methodology.
- 60.5520(d)(1) - Stationary combustion turbines permitted to burn fuels with a consistent chemical composition (*i.e.,* uniform fuels) resulting in a consistent emission rate of 160 lb CO2/MMBtu or less are not subject to any monitoring or reporting requirements under this subpart.
  - Stationary combustion turbines qualifying under this paragraph are only required to maintain purchase records for permitted fuels.

CEMTEK KVB-Enertec

DAHS Changes

- In order to fully support software changes are required. Both core software version upgrades as well as potential configuration changes will be required.
- If your EGU is not subject to 40 CFR 60, part TTTT, no changes are required and future releases will not affect your DAHS.
- EPA still has open questions from us that need to be answered before we can implement.
- Please contact me or software support if you have a unit that is subject to Quad T by email:
  - jdowns@cemteks.com or netdahs@cemteks.com

CEMTEK KVB-Enertec

Questions?

John Downs
Regulatory Manager
CEMTEK KVB-Enertec
405.360.1833 Office
215.353.6125 Cell
jdowns@cemteks.com
www.cemteks.com

CEMTEK
KVB-Enertec