Effective PSD Permitting Strategies for GHG Emissions

Presented by

Kermit C. Wittenburg, PE

Environmental Chemical Specialist – Staff

LDEQ – Air Permits Division

Kermit.Wittenburg@la.gov

- What is required before Permitting the Green House Gas Emissions ?

- How will the permit be affected?

What is required before permitting the GHG emissions?

To understand if a permit from LDEQ is required, you have to understand the emissions from the facility.

Four situations may arise:

1. Add a new facility – Over or Under the CO_{2e} threshold
2. Modify an existing facility with no PSD required
3. Modify an existing facility with PSD for one or more Criteria Pollutants
4. Modify an existing facility with CO_{2e} over the Threshold

The final rule was promulgated on June 3, 2010 (75 FR 31514) and became effective on August 2, 2010.

Thresholds are based on carbon dioxide equivalents (CO_2e). The aggregate sum of the following six greenhouse gases constitutes CO_2e:

- CO_2: 1
- Methane: 21
- Nitrous oxide: 310
- Hydrofluorocarbons: Varies
- Perfluorocarbons: Varies
- Sulfur hexafluoride: 23,900

New sources, as well as existing sources not already subject to Title V, that emit or have the potential to emit at least 100,000 TPY CO_2e will become subject to the PSD and Title V requirements. In addition, sources that emit or have the potential to emit at least 100,000 TPY CO_2e and that undertake a modification that increases net emissions of GHGs by at least 75,000 TPY CO_2e will also be subject to PSD requirements.

- LDEQ shall continue to review and issue permit decisions for GHG PSD/NNSR permits, in the same manner as other PSD/NNSR pollutants.
- LDEQ continues to stress that Actual emissions from stack tests, or CEMS is preferred over the emission factors supplied in 40 CFR 98.
- Where 40 CFR 98 does not contain adequate emission factors for GHG pollutants, AP-42 emission factors will be accepted.
- BACT analysis shall continue to use the “Top Down” method.
- As directed in the EPA Guidance, energy efficiency will probably be the main focus of those BACT determinations.

Applicable Requirements

Title V Applications

- Sources not otherwise subject to Title V can become major sources subject to Title V due to emissions of GHGs no sooner than July 1, 2011. If a source becomes "subject to the [operating] permit program" on July 1, 2011, then its permit application would have to be submitted no later than **July 1, 2012**.
- In addition, where a source becomes subject to additional applicable requirements, the permitting authority is required to reopen the permit to add those applicable requirements if the permit term has 3 or more years remaining *and* the applicable requirements will be in effect prior to the date the permit is due to expire.

Flares: Design considerations (Example)

- BACT for flares would no longer be set at 98% efficiency.
  - CO_2 has a 1:1 relationship to CO_{2e}
  - Methane has a 21:1 relationship to CO_{2e}, therefore BACT will be the highest efficiency flare available, so that the methane is converted to CO_2.
- Mandatory settings with perhaps automated controls for steam assisted flares so that over steaming does not occur.
- Installing more efficient Flare gas recovery systems (this may mean more collection points within a landfill.
- Evaluating low BTU content pilots and wind shields
- Other options as researched.

For a New Landfill, to generate the 100,000 tons per year of Methane, it would need a yearly flow of 6,355,980.5 cubic meters per year. $6.36x10^6$. (Not total Landfill gas, but just the methane portion)

Several landfill applications do exceed this methane creation level. That is roughly about 430 cubic feet per minute for methane and if methane is 50% of the landfill gas, then about 860 cfm landfill gas.

Of course CO_2 is also generated and needs to be included in the amount of CO_{2e} being released. So smaller air flows may trigger the rule depending on the CO_2 concentration of the land fill gases.

Lastly, the numbers change if the landfill gas is flared or combusted.

Miscellaneous: Example considerations

LDEQ's draft PSD permit for a natural gas combustion source contains an efficiency limit, as opposed to establishing a mass- or C02e-based limit.

- The fuel is methane gas which has a CO_{2e} of 21 compared to CO_2. It is therefore in the best interest to combust as much of the natural gas so that it can be converted to CO_2 and water.

- Establishing a maximum limit for CO_2 makes no sense as poor combustion practices could lower CO_2 emissions by not combusting the methane which actually significantly increases CO_{2e} emissions. (Methane is 21 times worse)

- Establishing a maximum limit for CO_2 makes no sense as better than expected combustion of the methane would generate higher CO_2 emissions but actually lower uncombusted methane creating a significantly lower CO_{2e} emission level.

  Example, if calculated at 98% combustion efficiency, but actual efficiency was 99.5 %, a maximum limit for CO_2 would be exceeded, while overall CO_{2e} is lower.

- Establishing a minimum limit for CO_2 makes no sense as overall product production levels (based upon consumer demand) could easily cause any such limit to be practically infeasible.

- Establishing BACT on a facility-wide basis is consistent with EPA‘s —PSD and Title V Permitting Guidance For Greenhouse Gases, which states that:

  - For new sources triggering PSD review, the CAA and **EPA rules provide discretion for permitting authorities to evaluate BACT on a facility-wide basis** by taking into account operations and equipment which affect the environmental performance of the overall facility. The term facility and source used in applicable provisions of the CAA and EPA rules encompass the entire facility and are not limited to individual emissions units.

Miscellaneous: Efficiency considerations

- Virtually all tests and literature discussing natural gas consumption use optimal steady state operation as the basis for measurement. This excludes emissions from startup, shutdown, and process upsets that will necessarily occur. Batch processes may startup and shutdown as frequently as twice a week in order to adjust for different product quality needs of specific orders, as opposed to the once or twice a year of many petrochemical sources (or less frequent). Therefore an efficiency BACT may need to be inclusive of all product material leaving the process, including off-spec and any emissions which may be generated during startup and shutdown.

Miscellaneous: Efficiency considerations

- Literature discussing natural gas consumption from DRI units sometimes use net heating value (lower heating value, or LHV). Natural gas may be sold based on gross heating value (higher heating value or HHV). Just to be clear, the basic difference is that HHV accounts for all of the energy released during combustion (which assumes the flue gas has returned to ambient temperature), while LHV accounts for the fact that some of the energy is lost as unrecoverable heat in the flue gas. As a rule of thumb, LHV is approximately 10% less than HHV for combustion. An efficiency limit for total natural gas consumption may be based on HHV so that there is no confusion on the issue with regard to the metering of natural gas.

Miscellaneous: Monitoring considerations

For many combustion sources, the stack may be required to install a NO_X CEMS. The requirement will be modified to specify that when PS 2 offers the option of using a O_2 monitor or a CO_2 monitor, the facility may be required to use the CO_2 monitor as part of the NO_X CEMS. Thus CO_2 data will be measured and recorded.

Miscellaneous:

A revised EIQ with the GHG pollutants is now available in the drop down, so everyone can start using that now. This includes CO_{2e}.

The application and instructions have also been revised for GHG.

The emission rate report has been revised with the following title:

EMISSION RATES FOR CRITERIA POLLUTANTS AND CO2e

The front has CO, NO_X, PM_{10} and SO_2, the back of the page will have VOC, Lead, $PM_{2.5}$ and CO_{2e}.

Facilities that are greater than 50% of the NSR threshold for CO_{2e} emissions will be subject to the provisions of 509.R.6.c or 504.D.9.c.