



Clarification #2025-02

DATA CENTER AIR PERMITS GUIDELINES

JANUARY 17, 2025

I. PURPOSE

The purpose of this document is to provide clarification to DEQ air compliance and permitting staff, and to the general public, regarding the implementation of certain air permit regulations for data center stationary sources.

II. APPLICABILITY

This document is specifically applicable to data centers that are subject to the New Minor Source Review Air Permit regulations contained in Article 6¹ of Virginia's Administrative Code. While the contents of this document may be of assistance to data centers subject to the Virginia Prevention of Significant Deterioration (PSD) Air Permit regulations in Article 8² or Major Nonattainment New Source Review Permit (NNSR) regulations in Article 9³, such facilities will likely be subject to additional source specific requirements.

III. DATA CENTER BACKUP POWER

- A. Data centers in Northern Virginia have predominantly employed Tier II diesel engine driven generator sets for backup power. These units are also typically classified as emergency under the federal definition in NSPS Subpart IIII⁴ and the more limited definition of the Virginia Administrative Code. However, due to the operational limitations inherent to the "emergency" designation and air pollution control concerns, DEQ is now recommending that data center applicants consider backup power technologies with lower emissions.
- B. Table 1 below presents an engine technology hierarchy with respect to NO_x emissions with the lower emitting units appearing in descending order. It should be understood, however, that the full emission benefit from the "cleaner" technologies will not always manifest during some operating events (short-term maintenance/readiness testing).

¹ 9VAC5 Chapter 80, Article 6 Permits for New and Modified Sources

<https://law.lis.virginia.gov/admincodefull/title9/agency5/chapter80/partII/article6/>

² 9VAC5 Chapter 80, Article 8 Permits for Major Stationary Sources and Major Modifications Locating in Prevention of Significant Deterioration Areas

<https://law.lis.virginia.gov/admincodefull/title9/agency5/chapter80/partII/article8/>

³ 9VAC5 Chapter 80, Article 9 Permits for Major Stationary Sources and Major Modifications Locating in Nonattainment Areas or the Ozone Transport Region

<https://law.lis.virginia.gov/admincodefull/title9/agency5/chapter80/partII/article9/>

⁴ New Source Performance Standards (NSPS) Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

| Table 1: Engine Technology Hierarchy | | | | |
|---|----------------|---------------|--|---------------------------|
| Type | Classification | | Maximum Operating Service | NO _x Emissions |
| | State | Federal | | |
| DIESEL ENGINES | | | | |
| Tier II | Emergency | Emergency | Limit all operation to less than major source levels | 18.0 lb/MW |
| Tier II + SCR* | Non-emergency | Emergency | Limit all operation to less than major source levels | 1.8 lb/MW |
| Tier IV | Non-emergency | Non-emergency | Limit all operation to less than major source levels | 1.8 lb/MW |
| NATURAL GAS ENGINES | | | | |
| EPA Compliant | Emergency | Emergency | Limit all operation to less than major source levels | 6.0 lb/MW |
| EPA Compliant | Non-emergency | Non-emergency | Limit all operation to less than major source levels | 3.0 lb/MW |
| EPA + Controlled | Non-emergency | Non-emergency | Limit all operation to less than major source levels | 0.3-1.5 lb/MW |
| NATURAL GAS SIMPLE CYCLE COMBUSTION TURBINES | | | | |
| Low-NO _x | Non-emergency | Non-emergency | Limit all operation to less than major source levels | 0.3-0.5 lb/MW |
| Low-NO _x with SCR | Non-emergency | Non-emergency | Limit all operation to less than major source levels | 0.1 lb/MW |
| *Where SCR = Selective Catalytic Reduction system = an active air pollution control system that reduces NO _x emissions; a Tier II engine equipped with an add-on SCR is sometimes referred to as a “Tier IV equivalent” engine | | | | |

- C. DEQ also must consider whether lower emissions on an hourly basis from a particular technology are offset by increased operating hours on an annual basis.
- D. The lower NO_x-emitting technologies also typically result in lower emission rates of other pollutants such as carbon monoxide and particulate matter.
- E. While the availability and reliability of the regional natural gas supply has limited the use of this fuel for data centers locating in Northern Virginia in the past, local utility power connection constraints, improved access and alternate site locations have the potential to increase its attractiveness in the future.

F. For diesel engines in particular, DEQ recommends that potential data center developers engage with DEQ air permitting staff prior to finalizing decisions regarding the type of generators to employ. However, staff have found that in typical scenarios, data centers would be well-positioned by using a mixture of controlled (Tier IV or Tier II + Selective Catalytic Reduction (SCR)) and uncontrolled (Tier II) generators. For data centers with large numbers of generators, air permitting issues may dictate the use of 100% controlled generators.

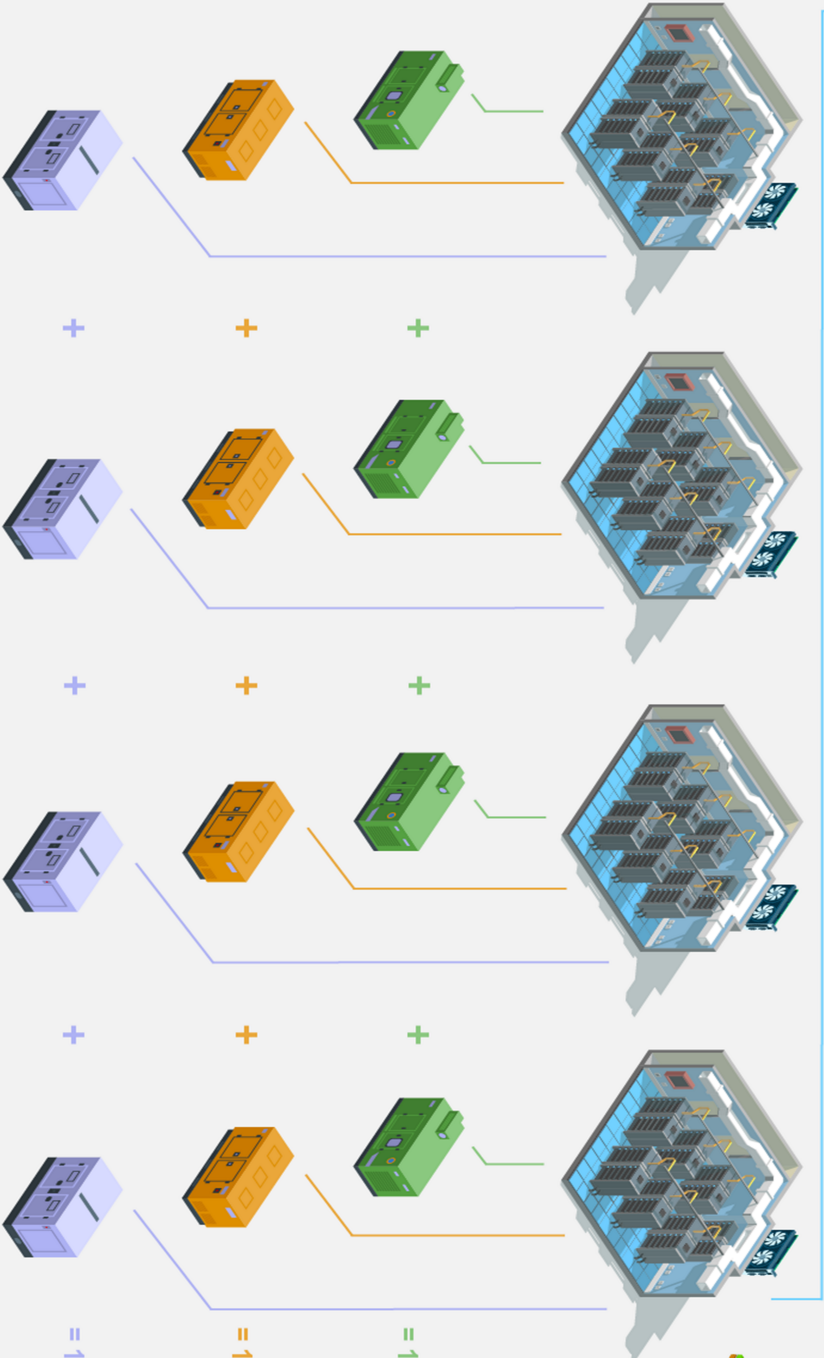


Figure 1, Engine Generator Housing

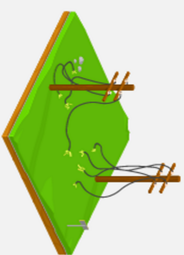
G. As shown below, given that most data centers operate in an “n+2” redundancy mode, it would be financially and environmentally responsible for “n” to be a Tier IV generator, permitted to operate outside of emergencies, and the “+1” and “+2” units being Tier II, emergency-only generators.

Data Center Redundant Generator Use

10 megawatts (mW) are needed to power this data center.



The data center utilizes backup diesel engine-driven generator sets (engine generators) once there is a sudden loss of power from the grid.



Because of the redundancy of engine generators at data centers, in this example N+2, only 1/3 of the total engine generators onsite are expected to be in operation to handle full data center load.

Primary units (N) each rated at 2.5 mW (preferably Tier IV) operate first, maintaining enough power for data center operation.

Redundant units (N+1) (at least Tier II) act as a backup to the primary units. In an emergency, these may turn on under no load if a primary unit experiences a failure.

Additional redundant units (N+2) (at least Tier II) are also in place in case of failures with the primary or redundant engine generators.

IV. MULTIPLE DATA CENTER FACILITIES (DCF)

- A. Another topic frequently associated with data center development is the siting of a new data center facility in close proximity to one or more existing or proposed data center facilities (where a single data center facility may encompass one or more separate buildings/structures). This can result in a challenging situation whereby DEQ must determine whether the proposed pattern of development constitutes separate stationary sources (each data center with a separate permit) or a single stationary source (with a single permit).
- B. Both Virginia and EPA regulations require the aggregation into a single stationary source of all polluting emitting activities that are under common control; within the same industrial category; and that are located on properties that are either contiguous (touching) or adjacent (nearby). With one exception,⁵ neither Virginia nor EPA has established a discrete distance that indicates whether one facility is close enough to another facility such that the two facilities should be considered adjacent for the purpose of determining that they are a single stationary source.



Figure 1, A data center under construction

C. Therefore, as specified in the most recent guidance that exists (APG-204 for DEQ⁶ and the 2019 *Idsall memo* for EPA), DEQ must make a source specific case-by-case adjacency determination for each proposed project involving multiple DCFs in close proximity to each other. In making such adjacency determinations, the EPA memo is clear (and APG-204 does not contradict) that single source determinations should be based on the “common sense notion of a plant,” and that the physical proximity or

distance between the boundary of the relevant properties should be the exclusive consideration when evaluating adjacency.

⁵ The oil and natural gas extraction industry

⁶ <https://townhall.virginia.gov/L/ViewGDoc.cfm?gdid=2177>

- D. Given this background, DEQ is unable to provide a discrete distance that will always indicate that multiple DCFs should be considered separate stationary sources (i.e. not adjacent).
- i. However, DEQ believes that multiple DCFs⁷ that are each separated by a distance of 0.25 miles or greater (based upon property boundaries) should generally not be considered adjacent.
 - ii. Where multiple DCFs are separated by distances less than 0.25 miles but greater than 0.125 miles (based upon property boundaries), DEQ will evaluate whether the DCFs should be considered adjacent based on the “common sense notion of a plant”⁸ on a case-by-case basis.
 - iii. Where multiple DCFs are separated by distances less than 0.125 miles (based upon property boundaries), DEQ believes that such DCFs should generally be considered adjacent.
- E. It is important to note that DEQ does not intend to revisit past adjacency determinations based solely upon the contents of this document. However, for any adjacency determination (past or future) where the circumstances (property boundaries and/or ownership) subsequently change, DEQ may be required to reevaluate its decision.
- F. It is important to note that no air permit determination (inclusive of any adjacency evaluation) is final or should be relied upon until the completion of any required public participation process and that DEQ is unable to pre-approve any particular project prior to receiving a complete permit application.



Figure 2, An operating data center.

⁷ Presuming common ownership

⁸ 1980 *Alabama Power* decision

V. Data Center Development

- A. Data centers developers routinely build out DCFs in incremental phases. Where construction of a new source or a project is accomplished in contemporaneous increments, these increments may be added together, or “aggregated”, for determining the applicability and Best Available Control Technology (BACT) requirements of any particular change. For Virginia’s minor new source review program, a period of five (5) years is utilized when determining if incremental changes are contemporaneous.⁹
- B. There is no defined limit on the duration to consider for project aggregation for the major new source review (NSR) program, however. Given the nature and the historical pattern of data center development, DCFs should avoid exceeding the major NSR thresholds (100 tons/year in most areas of Northern Virginia) at any stage of development.
- C. DEQ’s air permit regulations generally require that any required permit be issued before construction of a new stationary source or a project at an existing stationary source can begin. In the context of data centers, this prohibition applies to any construction activity necessary for an air pollution emitting primary and/or backup power systems, but not to activities related to data server infrastructure. For more information, see the Clarifications on Construction Activities Permissible Prior to Receiving an Air Permit - 03 document ([link](#)).
- D. Permit approvals to construct and operate emissions units become invalid if a program of continuous construction is not commenced within 18 months from the date of the approval or if a program of construction is discontinued for a period of 18 months or more, or is not completed within a reasonable time. An extension may be granted by the DEQ if the facility can satisfactorily demonstrate that previous BACT analysis is still appropriate and if the request to extend the approval is received prior to the initial approval becoming invalid.

VI. Maintenance/Readiness Testing Schedule

- A. The vast majority of data center permits issued by DEQ to date have addressed the diesel engines used by facilities as backup power systems. DEQ has an interest in insuring that these diesel engines (and any other air-pollutant emitting backup power systems) are maintained in good operating condition such that if they are ever called upon to operate for a substantial period, their emissions will be within the established permit limits.
- B. In order to remain in good operating condition, these diesel engines must be operated on a routine basis (typically as recommended by the engine manufacturer) for short periods of time; i.e. operation for maintenance/readiness testing.
- C. However, DEQ also has an interest in minimizing these operations to the extent possible since for most data centers, the emissions from such operations represent the vast majority of actual emissions.
- D. To this end, DEQ encourages data center developers to include in their applications a maintenance/readiness testing schedule (such as Table 2 below) for their backup power systems. After consultation with the applicant, DEQ will typically incorporate some version of the schedule (operating limits) in any issued permit.

⁹ 9VAC5-80-1100 E.

| Table 2: Example Maintenance/Readiness Testing Schedule | | |
|--|---|---------------------------------------|
| Activity | Annual Allowance (hours/generator) | Frequency (duration/event) |
| Readiness Testing | 13 | Weekly (15 minutes) |
| Maintenance & Testing: 3-Month | 4 | Quarterly (1 hour) |
| Maintenance & Testing: 12-Month | 8 | Annually (8 hour) |
| Maintenance & Testing: 36-Month | 8 | Once every three years (8 hours) |
| Total | 33 | |

VII. Petroleum Storage Tanks - Diesel Powered Generator Sets

- A. For emergency generators fueled by petroleum underground storage tanks (USTs), the facility must comply with the UST technical requirements of 9VAC25-580, which includes proper installation, operation, and maintenance of the tank and piping systems to prevent and detect releases. This includes having appropriate release detection systems for both the tank and associated piping systems. DEQ has developed a fact sheet regarding these requirements: Emergency Generator Underground Storage Tanks (USTs) Release Detection. The facility must also register the tank with DEQ and demonstrate financial responsibility pursuant to 9VAC25-590.
- B. For emergency generators fueled by a petroleum aboveground storage tank (AST) with a capacity more than 660 gallons piped to the generator, the facility must comply with the AST technical requirements of 9VAC25-91. The facility must also register the tank with DEQ and demonstrate financial responsibility pursuant to 9VAC25-640. For facilities with an aggregate AST storage capacity of 25,000 gallons or more, an Oil Discharge Contingency Plan (ODCP) must also be submitted to DEQ and approved prior to operation. Additionally, while ASTs that hold 660 gallons or less are not regulated by DEQ, they may be regulated by local governments through local building and fire codes.

VIII. More Information/Legal

- A. Air permits are issued from the DEQ regional offices. Please contact the appropriate regional office if you have more questions regarding the air permitting of data centers.
- B. DEQ's public website ([link](#)) provides additional information regarding air permit topics and also can be used to access DEQ's Permit Enhancement and Evaluation Platform (PEEP) and the statewide Virginia Permit Transparency (VPT) system.
- C. This document is neither a regulation subject to notice-and-comment rulemaking requirements nor a final agency action. This document does not amend the definition of "adjacent" in DEQ regulations and does not create or change any legal requirements applicable to DEQ, permit applicants, or the public. Source determinations are made by DEQ on a case-by-case basis after consideration of the relevant administrative record.