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Lessons Learned for Data Centers: Air Permitting Considerations

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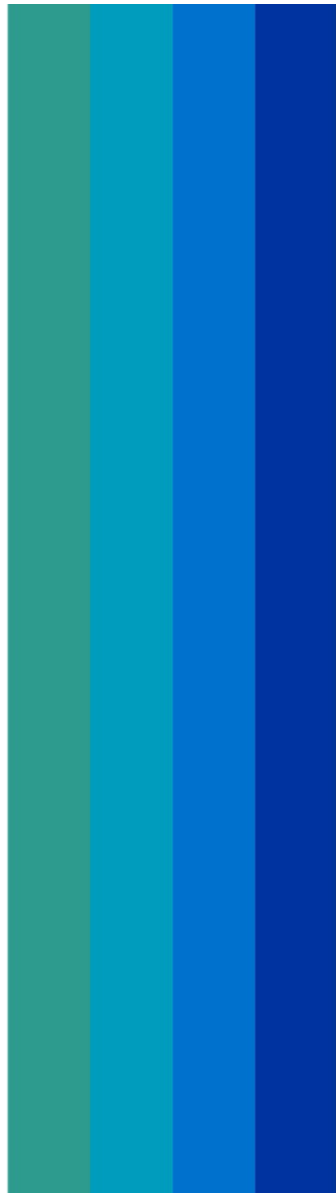
Setting the Stage



Why Is Environmental Important to Project Planning?

Four Key Reasons Environmental Due Diligence and Permitting Are Critical

01

Risk Mitigation

- Identifying potential liabilities, avoiding cleanup or future fines.

02

Regulatory Compliance

- Ensuring adherence to federal, state, and local environmental laws and regulations.

03

Cost and Time Efficiency

- Proactively identifying potential permitting or remediation hurdles can save significant time and money.

04

Reputation Management

- Environmental stewardship is increasingly critical to stakeholders, including investors, customers, and local communities.

Clean Air Act

High variation between permitting authorities can significantly impact design, budget, and timeline.

Regional Background

Attainment Status

Background Concentrations/Offset Availability

Public Involvement and Local Authority – Industry Friendly?

Site Emissions

Site/Project Aggregation

Equipment and Local Emissions Control Requirements

Emission Inventory Procedures Can Vary State to State

Regulations

Permit Classification Thresholds

Requirements Specific to Equipment and Industry Type

Local Application Components (e.g. Modeling, Toxics, Public Comment)

Clean Air Act (CAA) 1970/1977/1990

- Define air quality standards known as **National Ambient Air Quality Standards** (NAAQS)
- Identify **attainment/non-attainment** areas
- Develop and implement plans to achieve and maintain the NAAQS (**State Implementation Plans**)
- Establish minimum standards for new or modified construction for categories of sources (**NSPS**)
- Control hazardous air pollutant emissions from sources that emit the majority of HAPs (**NESHAPs/MACT**)
- Planning to prevent releases of lethal, cloud-forming toxics (**Risk Management Planning**)
- Prevent releases of ozone depleting substances (**ODS**)
- Report greenhouse gas (**GHG**) emissions
- Prove compliance and report non-compliance (**Title V**)

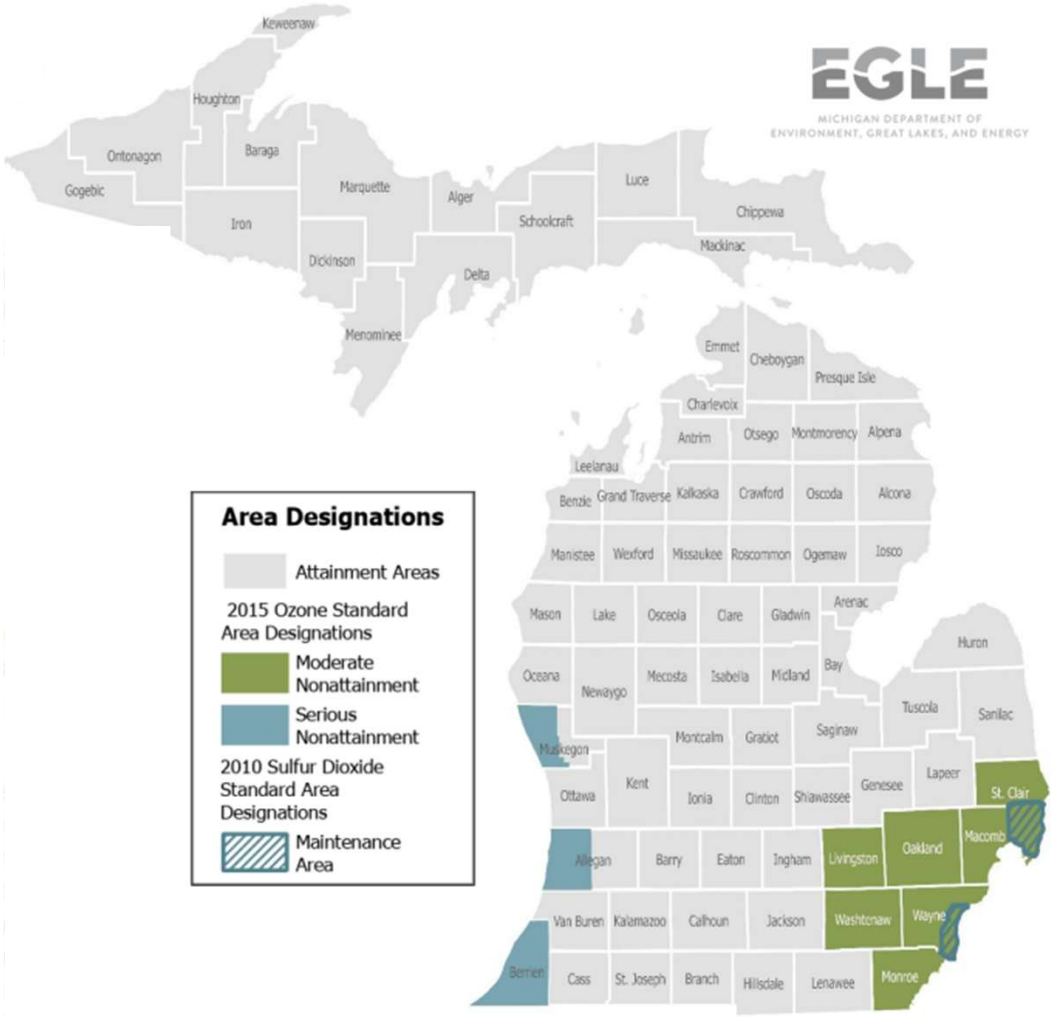
Attainment Status

Nonattainment areas in Michigan are:

- Ozone (8-hour)
  - Berrien County, parts of Allegan and Muskegon Counties
  - Metro Detroit Area (7 Counties)
  - Both proposed as attainment July 28, 2026

All other areas are currently designated as attainment

- SO_2 recently redesignated as attainment, maintenance areas only
- $PM_{2.5}$ designations for the recent annual standard change are not finalized, but EGLE recommended Kalamazoo and Wayne Counties be nonattainment; EPA has not finalized yet (overdue)



Air Permitting Project Considerations

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Air Quality Permitting – Overview

Air quality permitting may have a long lead time – evaluate your strategy early!

01

Source Definition

Determine which operations meet the source definition

- Contiguous or adjacent
- Same industrial grouping (2-digit SIC or support facility)
- Common control

02

Emission Calculations

Basis for permitting strategy and source classification

- Major vs. synthetic minor vs. minor
- Dictates permitting timeline
- Inputs for dispersion modeling

03

Regulatory Analysis

Identify requirements that apply to your emission units

- Emission limits
- Operating limits
- Monitoring requirements

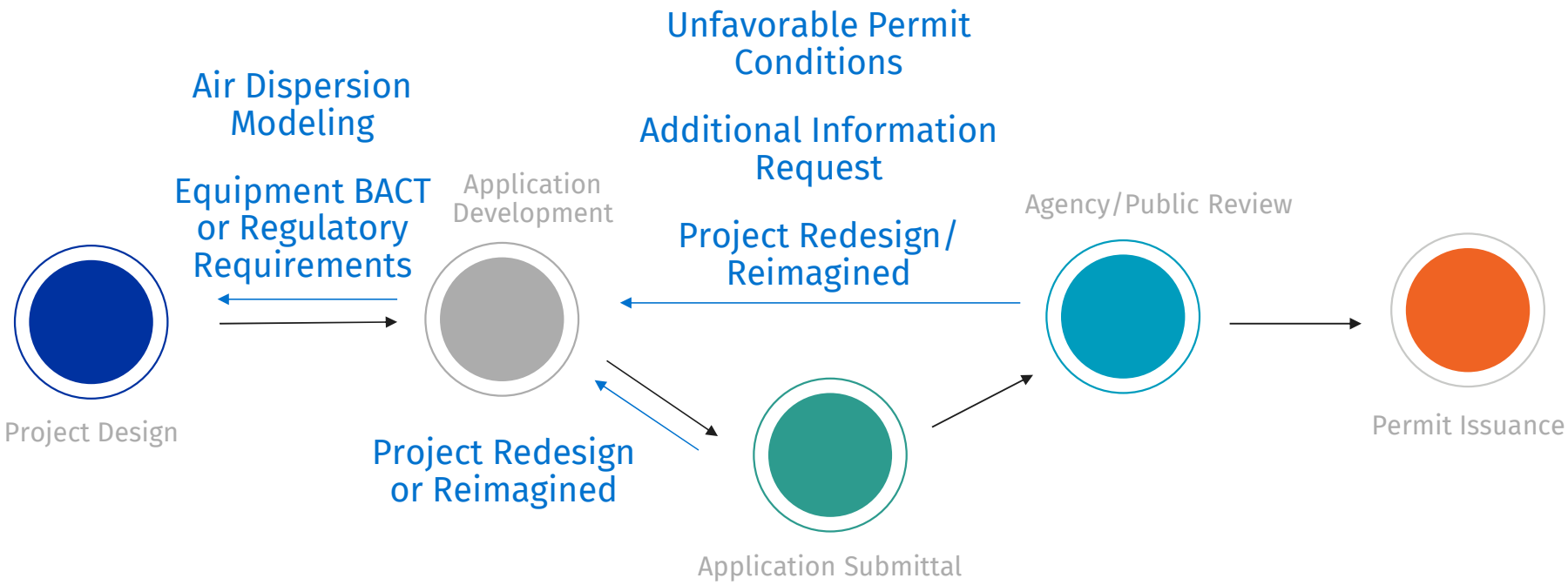
04

Dispersion Modeling

Model to show compliance with ambient standards

- Site characteristics
- Source and building parameters
- Identify any design changes needed to meet standards

Realistic Project Progression



Key Project Considerations for Air Permitting of Data Centers in Michigan

1. Site Location and Source/Project Definition
2. Equipment Design and Operating Conditions
3. Project Emissions and Enforceable Restrictions
4. Air Dispersion Modeling Impacts
5. Expected Air Permit Requirements and Compliance Strategies
6. Activities Allowed Prior to Air Permit Issuance

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Site Location and Source/Project Definition

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Site Location Key Considerations

- Availability of power or will site need to generate its own power?
- Is the location in attainment or nonattainment?
- If in attainment, what are the air monitors showing for concentrations? NAAQS modeling requires background values.
- Who are the surrounding neighbors? Any large industrial operations or other emission units that will need to be included as regional sources in dispersion modeling analyses?
- Is the location in an Environmental Justice area? See https://www.michigan.gov/egle/maps-data/miejscreen
- Does the area have an active public interest group that is expected to submit comments if a draft permit requires public notice?

Definition of “Source” in Permitting Regulations

- A **“source”** is regulated as one entity.

  “The term stationary source means any building, structure, facility, or installation which emits or may emit an air pollutant for which a national standard is in effect.” [40 CFR §52.01(a)]

- **Source** - Group of emission units that have the:
  - same industrial grouping (SIC code),
  - located on contiguous or adjacent property, and
  - are under common control.

Aggregation

Key Air Permitting Component for Data Center and Power Combination Sites

Project

Same Industrial Grouping

Pollutant-emitting activities are considered to be part of the same industrial grouping if they have the same first two-digit Standard Industrial classification code or considered a support facility.

Common Control

Whether one entity can expressly or effectively force another entity to take a specific course of action, which the other entity cannot avoid through its own independent decision making.

Location on Contiguous or Adjacent Property

Source

Potential emissions from all stationary sources and all projects within a specific timeline (dependent on local jurisdiction) at a single site must be aggregated to determine major source status and major source applicability for both New Source Review and operating permit programs

Project Aggregation: Why It Matters

Purpose: Avoid triggering Major NSR (PSD/NNSR) by improperly segmenting large projects into phases (i.e., circumvention)

Red Flags:

- Multiple applications in short time
- Same or related process units
- Economic or technical dependency

Risk: Agencies may reclassify segmented projects as one major project

Equipment Design and Operating Conditions

Equipment Design Considerations

- Permit application needs to address specific equipment options
- Select the make and model early in process – key for project emissions and air dispersion modeling
- Seeing significant equipment lag times between ordering and availability, especially for some control devices for generators
- Consider if project emissions totals and/or air dispersion modeling may require installation of add-on controls not otherwise required by state or federal standards

Equipment Operating Conditions

- Consider typical and maximum operating load requirements for emergency generators
- How many generators need to operate simultaneously?
- How many hours are needed per unit for routine non-emergency operation? How many hours for emergency operation? Permitting needs to consider both emergency and non-emergency total operating hours per year.
- Can operation be limited to certain hours per day only? Even in emergency situations?
- If equipped with control devices, how long from start of engine operation until the device is effective? Is there a minimum operating load for the device to be effective?
- Would the engines need to be used for prime power or non-emergency demand response? Check utility contracts carefully.

40 CFR 63.6640(f)(1)

Emergency RICE Operational Requirements

- No time limit on emergency operation
- Examples of Emergency Operation include:
  - When electrical power from local utility or normal power supply is interrupted
  - When RICE used to pump water in case of fires, floods, etc.
- Up to 100 hours per year allowed for any combination of the following
  - Maintenance checks and readiness testing
- Up to 50 hours per year of non-emergency use allowed
  - Except those 50 hours cannot be used for peak shaving or non-emergency DR, or as part of financial arrangement or supplying power to grid

Temporary Power

Nonroad Engine Definition

40 CFR 1068.30(1)

- Is (or will be) used in or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function; or
- Is (or will be) used in or on a piece of equipment that is intended to be propelled while performing its function; or
- By itself or in or on a piece of equipment, is portable or transportable, meaning designed to be and capable of being carried or moved from one location to another. Indicia of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.

Limitations

40 CFR 1068.30(2)(iii)

- An engine remaining at a single location for more than 12 consecutive months (or seasonally) cannot be classified as a nonroad engine.
- Any engine that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced, include the time period of both engines in calculating the consecutive time period.

Project Emissions and Enforceable Restrictions

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Major Source Permitting Thresholds in Michigan

Pollutant	Construction Permit: PSD/NNSR Major Threshold (tpy)	Operating Permit: Title V Major Threshold (tpy)
CO	250	100
NO_X	250 except 50 for the serious ozone nonattainment areas in Western Michigan, 100 for the moderate nonattainment area in metro Detroit	100 except 50 for the serious ozone nonattainment areas in Western Michigan
PM	250	100
PM_{10} / $PM_{2.5}$	250	100
SO_2	250	100
VOC	250 except 50 for the serious ozone nonattainment areas in Western Michigan, 100 for the moderate nonattainment area in metro Detroit	100 except 50 for the serious ozone nonattainment areas in Western Michigan
Maximum Individual HAP	N/A	10
Total HAP	N/A	25

Title V Operating Permit (aka Renewable Operating Permit) required if PTE exceeds Title V Major Source thresholds.
PSD/NNSR Construction Permit required if PTE exceeds PSD/NNSR Major Threshold.

Potential to Emit

- Maximum capacity to emit (8,760 hr/yr) at full capacity unless limited by:
  - Physical and operational limits
  - Air pollution control equipment
  - Restricted hours of operation
  - Type or amount of material combusted, stored, or processed
- For any limit or condition to be a legitimate restriction on PTE, it must be **federally-enforceable**
- Michigan adheres to the EPA guidance of 500 hr/yr for establishing emergency engine potential emissions unless a different limit is requested

Emission Factors, Obtain From...

01

Direct Measurement

- Source-specific
- CEMS
- Stack Testing

02

Vendor Provided Data

- Watch for exclusions (e.g., formaldehyde)
- Engine raw emissions vs. not to exceed (NTE) values

03

Published "Average" Factors

- https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors
- https://www.sdapcd.org/content/sdapcd/permits/toxics-emissions/calculation-procedures.html
- https://ww2.arb.ca.gov/california-air-toxics-emission-factor

04

Tier/Certification Standards

- They represent sales-weighted averages based on modal testing using unfamiliar methods across a family of engines
- Within one family, all engines must be certified to the most stringent Tier even if some engines are in a different power range
- Tier standards for CO for small engines are very large

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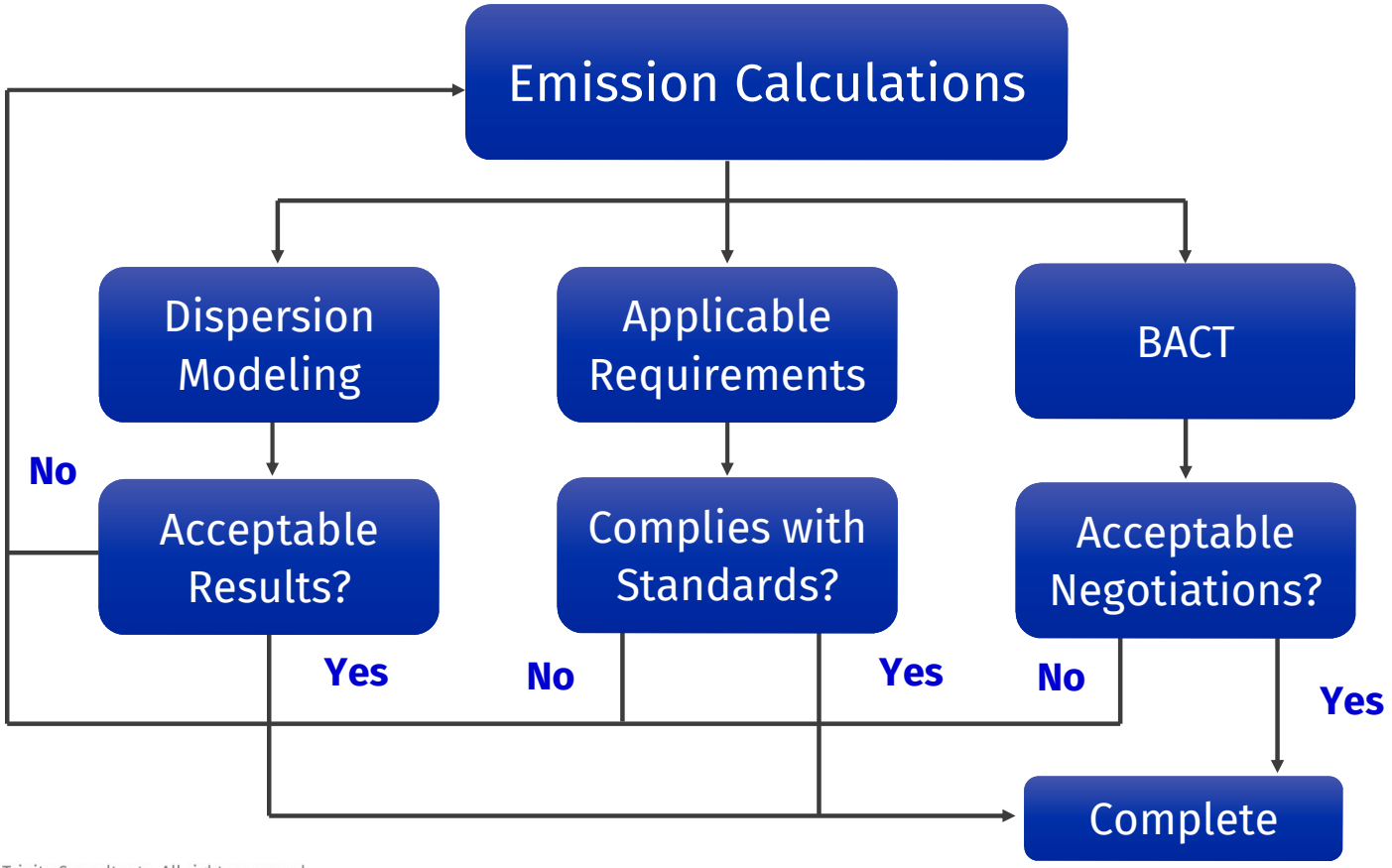
Iterative Nature of Calculations



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Air Dispersion Modeling Impacts

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Minor Source Modeling Regulations and Thresholds

- NAAQS and Increment air dispersion modeling required with minor/synthetic minor construction permit application if net project emissions exceed EGLE's thresholds in AQD-022:

Pollutant	Project Increase (tpy)
CO	100
NO_X	10*
PM_{10}	3.75*
$PM_{2.5}$	0*
SO_2	10*

* Threshold if the minimum stack height/downwash requirements cannot be met, defaulting to the lowest threshold. Thresholds are higher if the stacks are a minimum of 40 ft and 1.5 times the building height and vertically unobstructed.

- EGLE modeling for data centers requires:
  - All emergency operations must be modeled (e.g., hr/day restrictions apply during emergency operation too)
  - Annualized emission rates can be considered for annual standards as well as 1-hour NO2 modeling
  - Permit-exempt sources may have option to be excluded, but regional inventory sources must be included
- State toxics modeling required

Air Dispersion Modeling Project Impacts

Modeling, when required, can be the primary critical path item to preparing a complete air permit application

- Understand modeling applicability criteria as early in the permitting process as possible
- Applicability criteria vary widely by permit level and particularly by air permitting agency

Modeling can take a considerable amount of time

- In range of 4-12 weeks if only modeling the facility being permitted
- In the range of 6-16 weeks (or more) if needing to include nearby sources and monitored background
- Certain projects near Class I areas (e.g., National Parks and Wilderness Areas) may require modeling against even more stringent standards and coordination with additional federal regulatory agencies

Modeling may drive changes to project design to meet air quality standards

- Source locations, stack parameters, building orientations, control equipment, tighter emission guarantees, additional fencing or security to keep the general public offsite, etc.

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Air Dispersion Modeling Timing

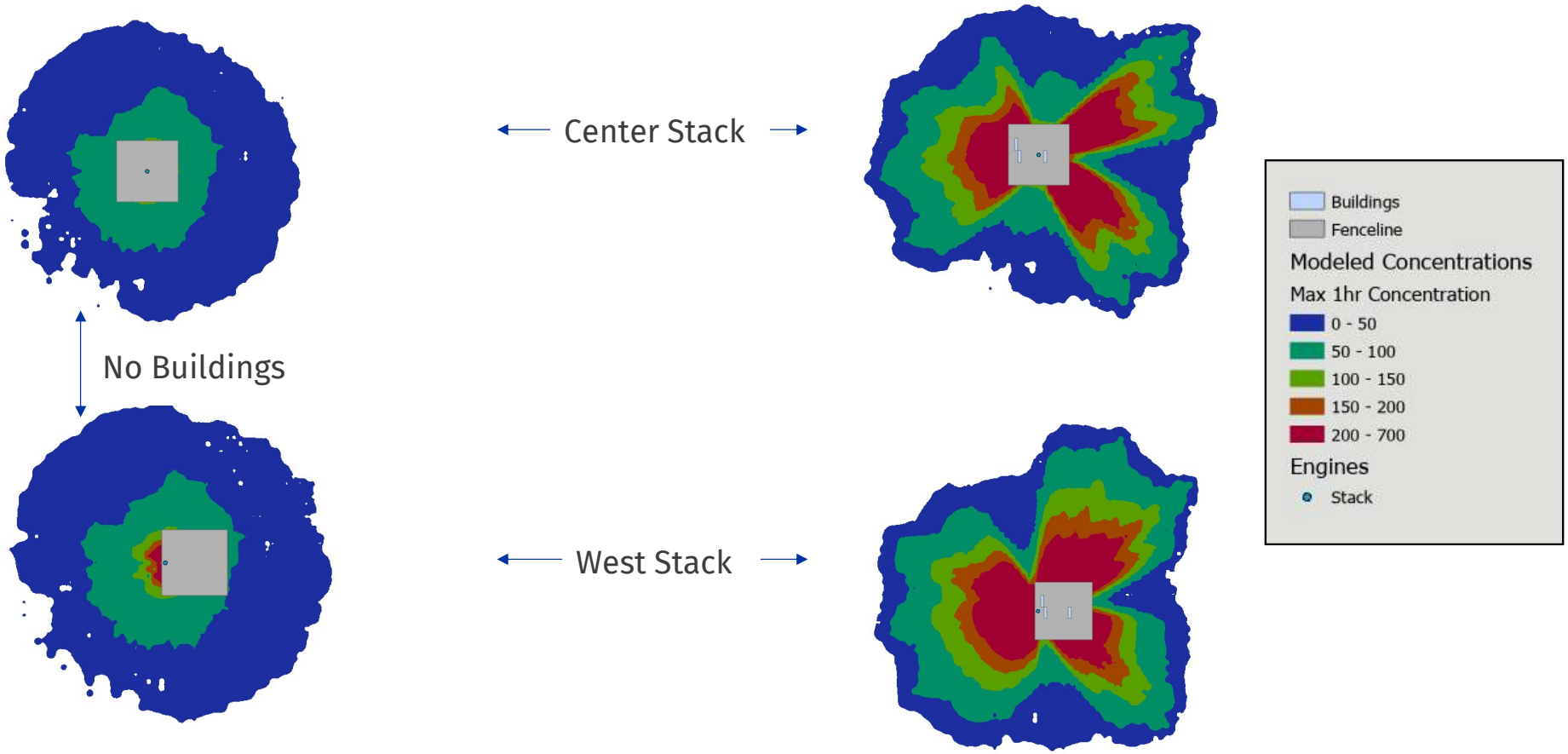
Start early in the permitting process

- Cannot run complete models until initial emission calculations are prepared
- However, models require many inputs, so start to gather/generate this information early
  - Building locations/dimensions, stack locations, stack parameters (height, diameter, exhaust flow, exhaust temp, presence of raincaps, orientation of release (e.g., vertical vs. horizontal)), meteorological data, terrain data, fence/property lines

Focus resources on pollutants known to have most challenging standards

- 1-hr NO_2 NAAQS
- $PM_{2.5}$ NAAQS and Increment
  - Particularly annual NAAQS and 24-hr Increment
- 1-hr SO_2 NAAQS
  - If using relatively high sulfur fuels
- Air toxics

Importance of Source and Building Location



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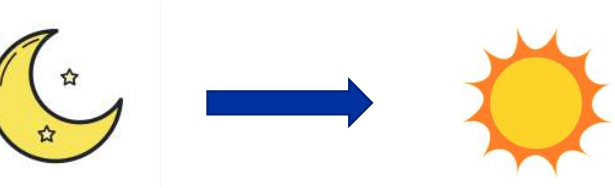
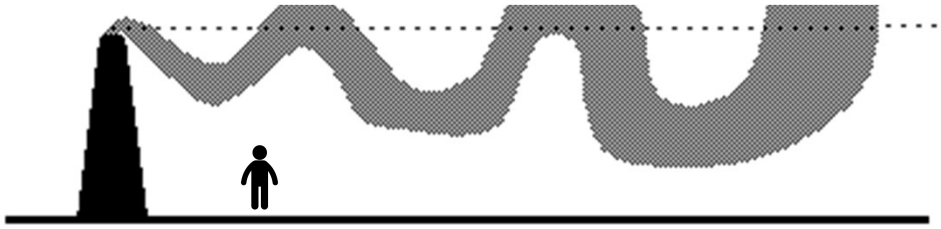
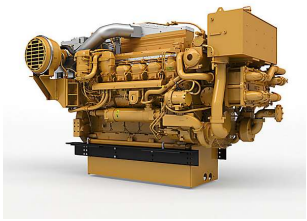
What if modeling doesn't pass?

- Operational Changes:
  - Reduce possible operating hours
  - Restrict time of day for operation
- Physical Changes:
  - Increase stack height
  - Combine stacks
  - Add-on control device:
    - Particulate filter
    - SCR
  - Different equipment
    - Higher tier engine
  - Buy additional property







Expected Air Permit Requirements and Compliance Strategies

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Potential Permit Conditions

- Inventory (number, size, type of generator)
- Emission rate (lbs/hr, lbs/day, tpy)
- Efficiency or uptime of control device (%, time/temp after startup)
- Limit on operating hours (hrs/day, hrs/yr)
- Limit fuel throughput (gal/hr, gal/day, gal/yr)
- Key stack parameters (height, diameter, orientation)

Are limits on each unit/engine? Or site wide? Or both?

What is the averaging period for the limits, monitoring, and/or records?

Can the limits provide necessary flexibility for construction and operation?

Compliance Requirements

- What to test/measure and how frequently
- What data can be directly monitored
- What surrogate parameters can be monitored
- Compliance determination methods - can you accommodate?
  - Consider implied procedures and systems you will need to put into place to certify compliance
  - Examine wording of provisos carefully - is requirement clearly interpreted (avoid subjective language)
- Focus of initial permit negotiation process – consider revisiting in subsequent renewals

Activities Allowed Prior to Air Permit Issuance

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Project Construction Timing

- Air permits are “pre-construction” authorizations
- Must have permit prior to beginning actual construction:
  - Physical on-site construction activities which are of a permanent nature:
    - e.g., Building supports and foundations
  - **Note:** EPA proposed new guidance in May 2026 for major NSR that focuses only changes to the emission unit itself. Implementation of guidance in state programs can vary, however, and rule has not been finalized.
- Start of construction must commence no later than *18 months* after the permit is issued by EGLE, otherwise permit may be voided
- Construction must not lapse for more than *18 months* between phases or the permit is voided
- Permitted equipment will have start of operation notices, which will set the timeline regarding when a Title V operating permit application must be filed (if required)

Definition of Construction in Michigan

- "A person shall not install, construct, reconstruct, relocate, or modify any process or process equipment, including control equipment pertaining thereto, which may emit [an air contaminant], unless a Permit to Install which authorizes such action is issued by the Department" [R336.1201]
- Per R 336.2801(e), "Begin actual construction" means, in general, initiation of physical on-site construction activities on an emissions unit which are of a permanent nature. Such activities include, but are not limited to, installation of building supports and foundations, laying of underground pipework, and construction of permanent storage structures.
- For a new site, the permit must be obtained "prior to pouring the foundations of the new building housing the new emission unit". EGLE typically allows the following prior to issuance of permit(s):
  - Site clearing/grading, soil stabilization, installation of access roads, construction of buildings that do not house emission units, purchasing of generators

Thank you

Additional Questions? Contact Us!

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