Practical Steps for Expeditious Completion of Air Dispersion Modeling for New Source Review Permit Applications

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Career Overview

- BS Degrees in Meteorology and Mathematics
- First 3 Years of Career in Air Permits Division of TCEQ on Air Dispersion Modeling Team
- 9 Years Experience in Consulting Specializing in Air Dispersion Modeling
- 12 Years Experience Total

Presentation Overview

- Strategies for Quick Completion of Air Dispersion Modeling Analyses
- Refinement Techniques for Undesirable Modeling Results
- Ways to Ensure Expeditious Review by State Regulatory Agency
- A Few "Dad Jokes" Thrown In for Fun
- Questions

Dad Joke #1

Question: What did the math nerd tell his friends before everyone went out to celebrate New Year's?

Dad Joke #1

Question: What did the math nerd tell his friends before everyone went out to celebrate New Year's?

Answer: Don't drink and derive.
Know your limit.

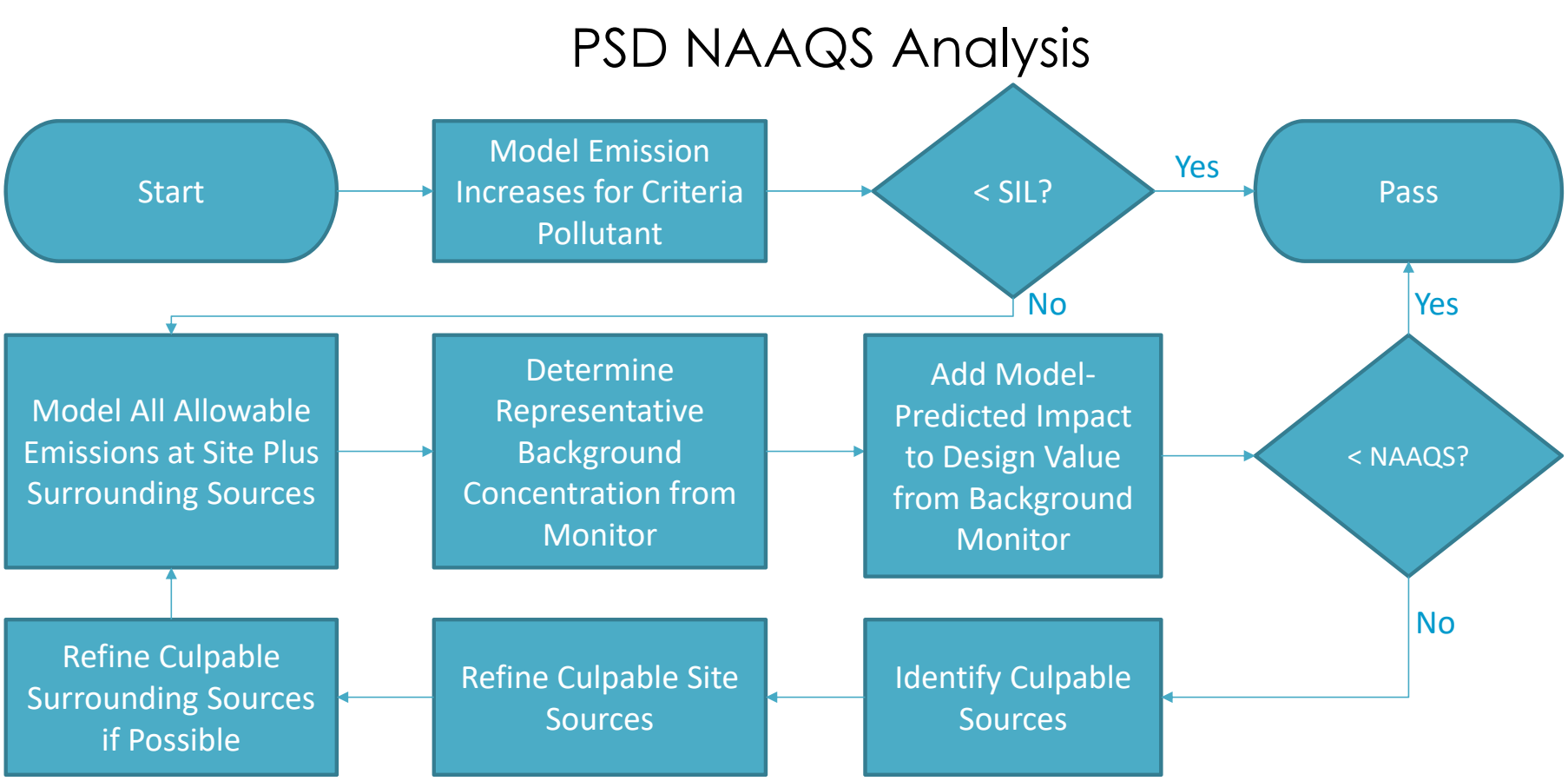
Tips for Quick Modeling Analysis Completion

Four Main Types of Air Dispersion Modeling Analyses Associated With NSR Air Permit Applications:

1. National Ambient Air Quality Standards (NAAQS) Analysis
2. PSD Increment Analysis (Class I and Class II)
3. State Property Line Analysis (Specific to Texas)
4. Health Effects Analysis (Varies by State)

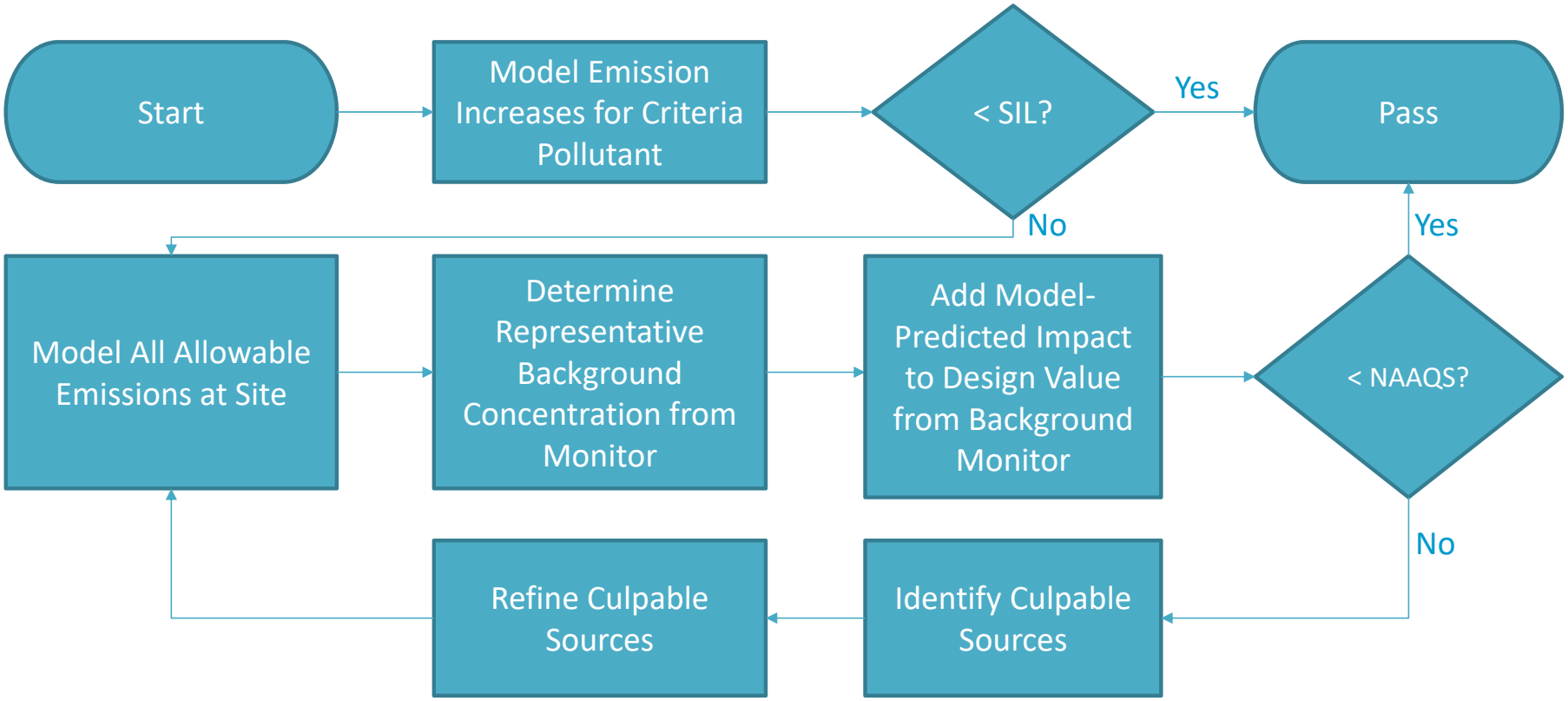
Tip: Try to pass as early as possible in the process for each of these analyses.

Tips for Quick Modeling Analysis Completion



Tips for Quick Modeling Analysis Completion

Minor NSR NAAQS Analysis (TCEQ Procedure)



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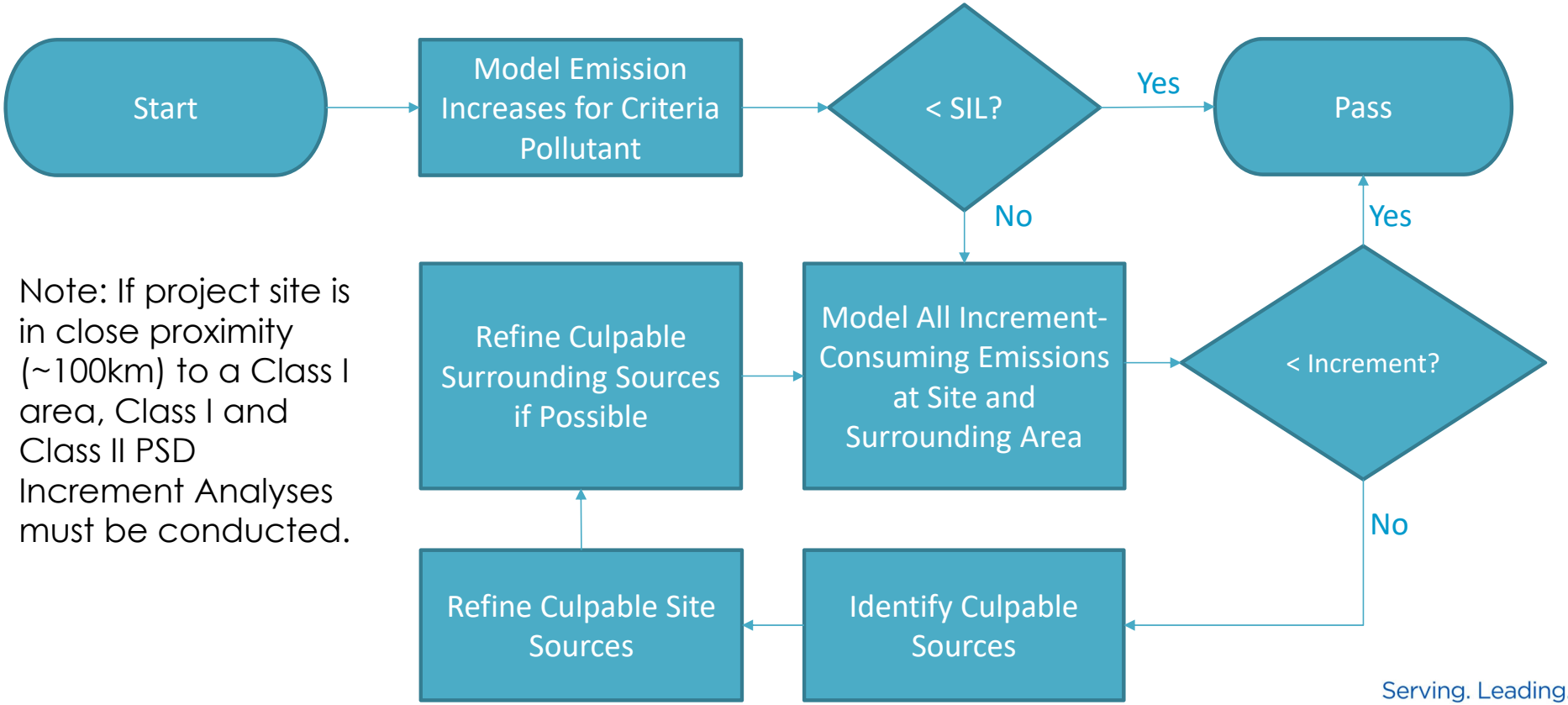
Tips for Quick Modeling Analysis Completion

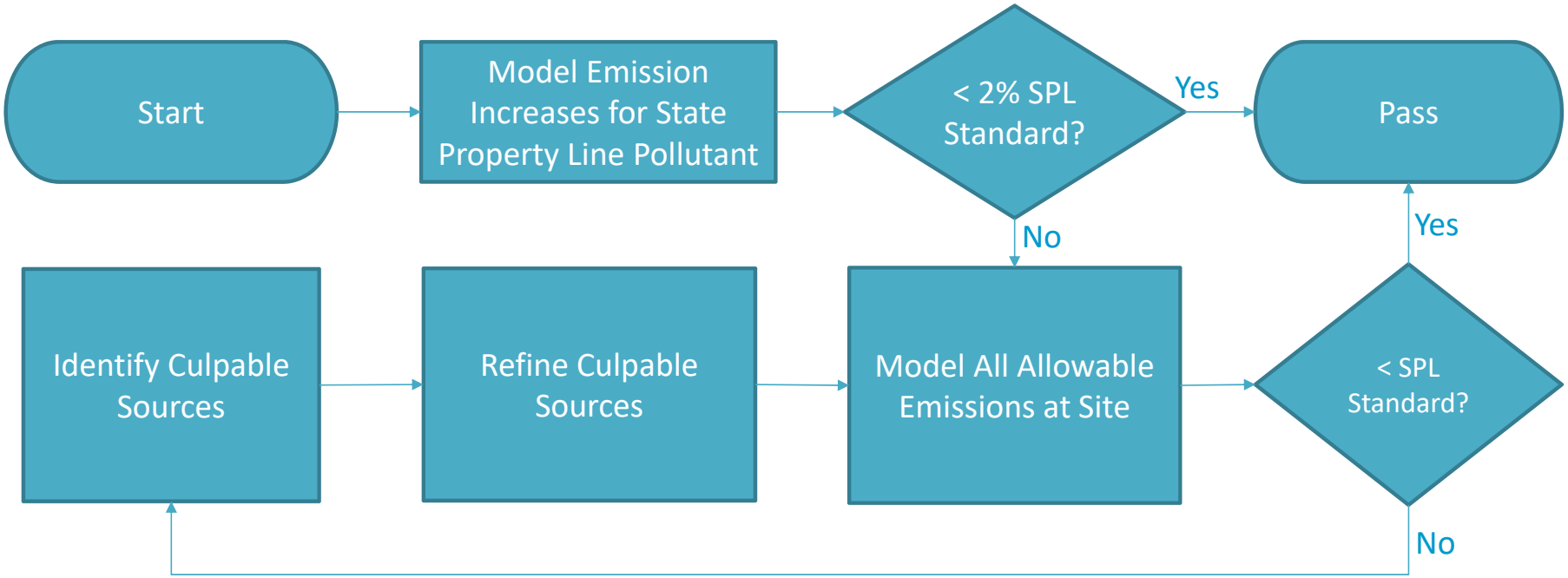
PSD Increment Analysis



Note: If project site is in close proximity (~100km) to a Class I area, Class I and Class II PSD Increment Analyses must be conducted.

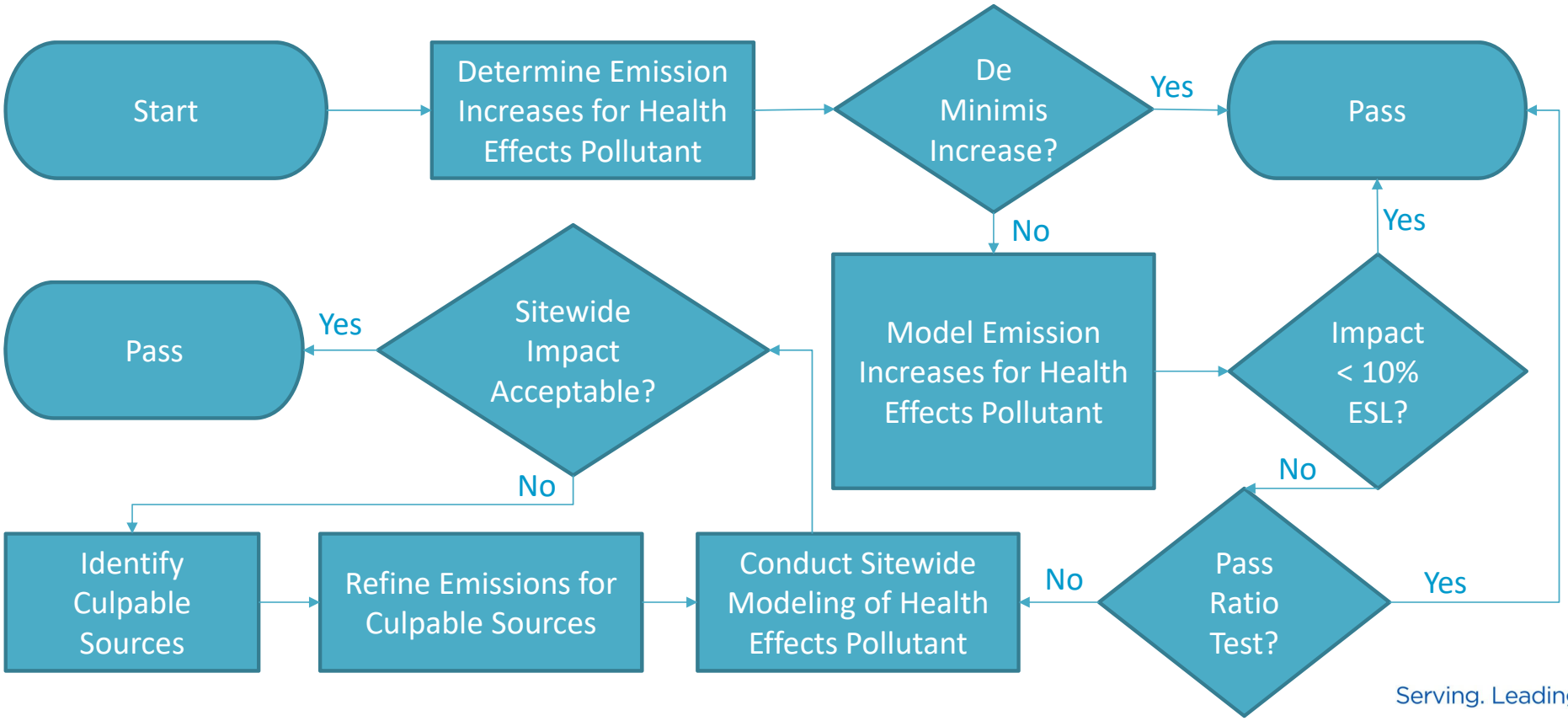
Tips for Quick Modeling Analysis Completion

Texas State Property Line Analysis



Tips for Quick Modeling Analysis Completion

TCEQ Health Effects Analysis



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Question Break #1

Dad Joke #2

Question: Why does the cost of airing up your tires at the gas station keep going up?

Dad Joke #2

Question: Why does the cost of airing up your tires at the gas station keep going up?

Answer: Inflation

Common Modeling Refinement Techniques

- When conducting air dispersion modeling, always model each source in its own source group.
- The sources with the highest individual impacts should be looked at for possible refinement.
- Several factors can be looked at for source refinement:
  - Emission Rates
  - Source Parameters
  - Source Location
- Advanced modeling options available for 24-hour $PM_{2.5}$, 1-hour NO_2, and 1-hour SO_2 NAAQS.

Common Modeling Refinement Techniques

Emission Rates

- Lowering emission rates from the most culpable sources is the most straightforward way to reduce problematic modeling impacts.
- Lower emission rates are generally achieved either by installing new or better control equipment or justifying better emission factors based on reliable technical data for similar sources.
- Very important to be able to justify emission rate decreases and for operations to actually be able to achieve them.

Common Modeling Refinement Techniques

Source Parameters

- Changing source parameters for culpable sources, especially for new sites, is another common way to mitigate problematic modeling impacts:

1. Stack Height (Higher Stack Height = Lower Impacts)
2. Temperature (Higher Temperature = Lower Impacts)
3. Exit Velocity (Higher Exit Velocity = Lower Impacts)
4. Diameter (Larger Diameter = Less Concentrated Emissions)

Common Modeling Refinement Techniques

Source Location

- Impacts from low-level fugitive sources with minimal dispersion will be minimized with greater distance between the source and property lines.
- If possible, it is ideal to locate point sources (stacks) away from structures such as buildings or tanks that could cause downwash effects.
- Ideal for a new proposed site to be away from Class I areas.

Common Modeling Refinement Techniques

Advanced Modeling Options for $PM_{2.5}$, NO_2, and SO_2

- Unlike most other NAAQS, the 24-hour $PM_{2.5}$, 1-hour NO_2, and 1-hour SO_2 NAAQS are statistical standards. The AERMOD model contains the MAXDCONT option for analyzing project contributions to predicted exceedances of these NAAQS.
- Tier 3 methods for NO_X to NO_2 conversion can be used in AERMOD if background ozone data is available.
- Monitor background data can be incorporated into the AERMOD model on an hour-by-hour basis if necessary.

Question Break #2

Dad Joke #3

Question: What is the difference between weather and climate?

Dad Joke #3

Question: What is the difference between weather and climate?

Answer: You can't weather a tree, but you can climate!

Tips for Expeditious Modeling Review

- Start modeling as early on in the project as possible, especially for big projects.
- Conduct initial modeling prior to discussing project with state if possible.
- If required, submit a modeling protocol as early in the process as possible to the state fully describing and justifying the procedures to be used.
- As soon as it becomes clear full NAAQS or PSD Increment modeling will be required, request inventory source data from the state.

Tips for Expeditious Modeling Review

- If refinements are made to inventory source data, include all permit documentation to justify the refinements.
- Ensure all source parameters and emission rates are consistent with the permit application.
- Ensure the modeled locations of all sources and downwash structures included in the modeling and the property line represented in the modeling are consistent with the plot plan and area map included with the permit application.

Tips for Expeditious Modeling Review

- For TCEQ Health Effects Review, get predicted impacts less than ESLs if at all possible. This avoids the requirement of a review from TCEQ Toxicology which can take weeks.
- Ensure modeling techniques and procedures are consistent with federal Guideline on Air Quality Models (40 CFR Part 51, Appendix W) and state modeling guidelines.

Questions and Discussion

Useful Links

TCEQ Air Quality Modeling Guidelines
TCEQ Modeling and Effects Review Applicability (MERA)

Contact

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