Modeling and EMEW Updates

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Environmental Trade Fair 2025

Presentation Overview

- **Part 1**
  - EMEW version 3.0
- **Part 2**
  - Recent modeling updates
  - $PM_{2.5}$ modeling and refinements
- **Q & A**

EMEW Release Version 3.0 Updates Overview

Time for an Upgrade

EMEW Version 3.0 Release

- Released: April 2025
- Required: July 1, 2025

Goals With EMEW v3.0 Updates

- Increase user-friendliness
- Implement lessons learned
- User feedback (internal and external)
- Add consistency
- Accessibility compliance

General Topics

- Universal Changes
- Non-SCREEN3 EMEW Specific Changes
- SCREEN3 EMEW Specific Changes

Universal Changes

General Changes

- Accessibility
- Consistency
- Language, wording
- Examples
- Hyperlinks

Technical Updates

- Updated for Secondary SO_2 NAAQS
- Significant digits, rounding fixes
- Conditional formatting, data validation
- Numerical Source ID/EPN bug fix
- MERPs calculator layout

Major Updates

- Initial Modeling prompt
- Monitoring Data reporting
- Health Effects reporting
  - Results and emissions
- Combined Emissions > Summary of Emissions

Health Effects Changes: Speciated Chemicals

- Repurposed, moved the old sheet
- User input of all ESL data
- Parses phases, averaging times, ESL basis
- Important: **Follow Directions Exactly**
- Input reviewed by APD Staff

Health Effects Changes: Speciated Emissions

- Flare/Point/Area/Volume source tab “unlocking” gone
- Complete reformat
- Phases captured
- Fluorides, fluoride-specific averaging times captured
- No CAS? No ESL? No problem!
- Default ESLs

Health Effects Changes: Results Reporting

- CAS#-based
- Step 6 bug fix
- ADMT/Toxicology Expectations
- Transient/Non-transient
- Receptor Type

Non-SCREEN3 (AERMOD, ISC, etc.) EMEW Changes

```
** Model: AERMOD.EXE     Input File Creation Date: 01/01/2025  Time: 12:34:56 PM
NO ECHO

CO STARTING
CO TITLEONE Test case
CO TITLETWO Max 1-Hr SO2
CO MODELOPT DFAULT CONC NODRYDPLT NOWETDPLT
CO AVERTIME 1
CO POLLUTID SO2
CO RUNORNOT RUN
CO FINISHED

SO STARTING
SO ELEVUNIT METERS
** A simple stack
SO LOCATION STACK POINT 358263.96 3936257.91 603.95
SO SRCPARAM STACK 5. 35. 432. 11.7 2.4
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE ELEVUNIT METERS
RE DISCCART 357924.43 3936260.4 604.46 653.54
RE DISCCART 357937.92 3936279.3 603.7 653.54
RE DISCCART 357951.41 3936298.2 603.16 653.54
RE DISCCART 357964.9 3936317.1 602.8 653.54
RE DISCCART 357978.39 3936336. 602.72 653.54
RE DISCCART 357991.88 3936354.91 602.72 653.54
```

Speciated Emissions: Before

Speciated Emissions by Model ID

CAS #	Chemical Species	Other Species	Short-Term ESL (µg/m³)	Long-Term ESL (µg/m³)	Modeled Project Wide Emission Rate [lb/hr] ID1	Modeled Site Wide Emission Rate [lb/hr] ID1	Modeled Project Wide Emission Rate [tpy] ID1	Modeled Site Wide Emission Rate [tpy] ID1	Modeled Project Wide Emission Rate [lb/hr] ID2	Modeled Site Wide Emission Rate [lb/hr] ID2	Modeled Project Wide Emission Rate [tpy] ID2	Modeled Site Wide Emission Rate [tpy] ID2	Modeled Project Wide Emission Rate [lb/hr] ID3
4050-45-7	trans-2-hexene		1700	170									
763-29-1	2-methyl-1-pentene		1700	170									
625-27-4	Other (Please specify):		Provide Documentation	Provide Documentation									
616-12-6	Other (Please specify):		Provide Documentation	Provide Documentation									
110-54-3	n-hexane		5600	200									
111-66-0	1-octene		3400	340									
71-43-2	benzene		170	4.5									
106-99-0	1,3-butadiene		510	3.9									
108-38-3	m-xylene		2200	180									
111-84-2	n-nonane		4800	450									
111-65-9	n-octane		5600	540									
109-67-1	1-pentene		290	480									
74-85-1	ethylene		1400	34									
590-18-1	cis-2-butene		10000	480									
624-64-6	trans-2-butene		10000	480									
627-20-3	cis-2-pentene		10000	480									
646-04-8	trans-2-pentene		10000	480									
513-35-9	2-methyl-2-butene		10000	480									
592-41-6	1-hexene		1700	170									
4050-45-7	trans-2-hexene		1700	170									
763-29-1	2-methyl-1-pentene		1700	170									
625-27-4	Other (Please specify):		Provide Documentation	Provide Documentation									
616-12-6	Other (Please specify):		Provide Documentation	Provide Documentation									
110-54-3	n-hexane		5600	200									
111-66-0	1-octene		3400	340									

Speciated Emissions: After

Speciated Emissions by Model ID:

EPN	Model ID	Modeling Scenario	Review Context	Modeled Source Group ID (if entering multiple source	CAS #	Chemical Species	Other Species	Short-Term ESL (µg/m³)	Long-Term ESL (µg/m³)	Modeled Averaging Time	Modeled Emission Rate (lb/hr)
1	ID1		Project-Wide		592-41-6	1-hexene		1700	170	1-hr	1.23
2	ID2		Project-Wide		4050-45-7	trans-2-hexene		1700	170	Annual	0.72
3	ID3		Project-Wide		763-29-1	2-methyl-1-pentene		1700	170	1-hr	6.5
4	ID4		Project-Wide		625-27-4	re-enter CAS # in previous column		Provide Documentation	Provide Documentation	1-hr	1.2
1	ID1		Project-Wide		616-12-6	re-enter CAS # in previous column		Provide Documentation	Provide Documentation	1-hr	0.76
2	ID2		Project-Wide		110-54-3	n-hexane		5600	200	Annual	0.07
3	ID3		Project-Wide		111-66-0	1-octene		3400	340	1-hr	2.2
4	ID4		Project-Wide		71-43-2	benzene		170	4.5	1-hr	1.8
1	ID1		Project-Wide		106-99-0	1,3-butadiene		510	9.9	1-hr	0.01
2	ID2		Project-Wide		108-38-3	m-xylene		2200	180	1-hr	0.33
3	ID3		Project-Wide		111-84-2	n-nonane		4800	450	1-hr	0.599
4	ID4		Project-Wide		111-65-9	n-octane		5600	540	1-hr	1.1
1	ID1		Project-Wide		109-67-1	1-pentene		290	480	1-hr	1.24
2	ID2		Project-Wide		74-85-1	ethylene		1400	34	Annual	1.72
3	ID3		Project-Wide		106-98-9	1-butene		19000	1600	1-hr	1.3945
4	ID4		Project-Wide		590-18-1	cis-2-butene		10000	480	1-hr	1.7484

Non-SCREEN3 EMEW Changes

- Modeling files initial submittal prompt
- Additional attachments clarifications
- Generic Reaction Set Method (GSRM) added as Tier 3 NO_X option
- AERMET/AERSURFACE prompts/reorganization

Further Non-SCREEN3 EMEW Changes

- Point (pseudo) added as type
- Pseudo-point release height prompt
- “Health Effects” and “Generic” removal
- Tier 3 NO_X conversion
- Model File Names improvements

Non-SCREEN3 EMEW New Feature: Source Groups

- New Tab
- Sources and documentation
- Up to 15 Source Groups
- Integration with
  - Emission Rate Tabs
  - Intermittent Tab
  - UIM Reporting

Source Groups Visual Example

Modeled Source Groups:

Modeled Source Group ID	Modeled Source Group Description
VENTS	Source group used in generic modeling to obtain UIM for EPN: VENTS. Represents fugitive rooftop venting emissions.
TRBMSSCS	Source group used in determining which MSS activity results in the worst-case impacts.
PIPING	Source group used in generic modeling to obtain UIM for EPN: PIPING. Represents fugitive emissions from proposed site (north and south portions).
FUG_ALL	Source group representing fugitive emissions from proposed site (NW and SW sectors).

Volume Source Parameters | Modeling Scenarios | Modeled Source Groups | Flare & Point Source Emissions | Are

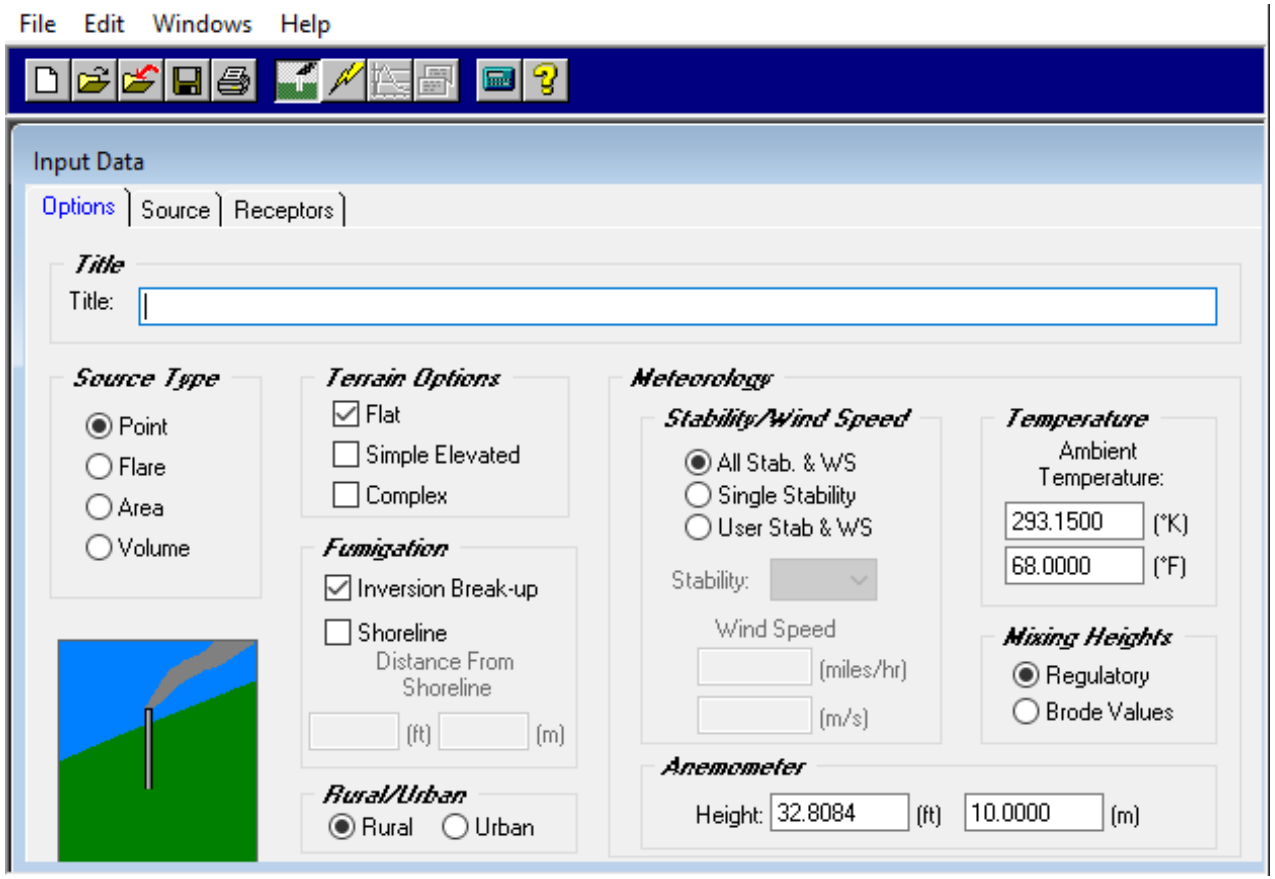
Flare and Point Source Emissions:

EPN	Model ID	Modeling Scenario	Pollutant	Modeled Averaging Time	Standard Type	Review Context	Modeled Source Group ID (if entering multiple source group IDs, separate with semicolon)	Intermittent Source?
1	ID1		NOx	1-hr	NAAQS	SIL Analysis		Yes
2	ID2		NOx	Annual	NAAQS	SIL Analysis		
3	ID3		SO2	1-hr	NAAQS	SIL Analysis	VENTS	No
4	ID4		SO2	1-hr	NAAQS	SIL Analysis	VENTS	No

Unit Impact Multipliers Summary:

EPN	ID Type	Model ID or Source Group ID
	Source Group ID	VENTS
1	Model ID	ID1
2	Model ID	ID2

SCREEN3 EMEW Changes



SCREEN3 EMEW Changes: Downwash

- Tank width calculation
- “L” calculation
- Minimum Distance to Property Line input
  - Cavity zone indicator
- Flare/Point Source Parameter sheets Downwash selection

SCREEN3 EMEW Changes: Misc.

- “Health Effects” pollutant ID removal
- SCREEN3 File Name input added
- Distance to Ambient Air input moved to Source Parameter sheets
- Scalar reporting moved to Summary sheets

SCREEN3 EMEW New Feature: Model Summary Sheets

- One for each source type
- Scalars
- “One stop shop” for ease of review
  - All model input
  - Averaging time conversions
  - Downwash/cavity calculation indicator
  - Refined result (if scalars etc. applicable)

Model Summary Sheet Example

A	B	C	D	E	F	G	H	I	J	K
Row Complete?	**EPN**	**Model ID**	**Modeling Scenario**	**Source Description**	**SCREEN3 File Name**	**Height (m)**	**Stack Diameter (m)**	**Exit Velocity (m/s)**	**Exit Temperature (K)**	**Heat Release (cal/s)**
No - see columns U-Y	FLARE1	FLARE_1	Routine	Flare #1 waste gas flare	FLARE_1_BLDG_A_generic	30.5	n/a	n/a	n/a	36.08
No - see columns U-Y	FLARE2	FLARE_2	Routine	Flare #2 high pressure flare	FLARE_2_BLDG_C_generic	64.6	n/a	n/a	n/a	1375.08
No - see columns U-Y	FLARE2	FLARE_2MSS	MSS	Flare #2 high pressure flare MSS emissions	FLARE_2MSS_BLDG_C_generic	64.6	n/a	n/a	n/a	2188.02
No - see columns U-Y	EMGEN1	EMGEN_1	Routine	Emergency engine #1	NOx_EMGEN_1_BLDG_A	3.45	0.173	83.92	780.23	n/a
No - see columns U-Y	BOILER7	BOILER_7	Routine	Boiler stack #7	BOILER_7_BLDG_C_generic	12.19	0.001	0.001	477.59	n/a
No - see columns U-Y	VMTAMSSB	VTLOADB	MSS	Vacuum truck loading emissions	VTLOADB(MSS)_BLDG_A_generic	1.92	0.001	0.001	273.15	n/a
No - see columns U-Y	TNKHDR	TNKHDR	Routine	Tank header	TNKHDR_TANK1_generic	12.3	0.052	6.096		n/a

Model Summary Sheet Example (2)

U	V	W	X	Y
Unadjusted Model Output: 1-hr GLCmax ($\mu g/m^3$) or ($\mu g/m^3$ per lb/hr)	**Low Wind Speed Adjustment Factor (0.67)**	**Fugitive Adjustment Factor (0.6)**	**Other Adjustment Factor**	**Justification for adjustment factor(s)**

General Modeling Updates and $PM_{2.5}$ Refinements

"Bear" with me here!

Overview of Recent Modeling Updates

- Secondary SO_2 NAAQS update
- Appendix W revisions, AERMOD updates
- AQMG update
- More tidbits:
  - AERSURFACE input data (MLRC tree canopy issue)
  - Plans to update met data
  - Upcoming guidance/other changes

Secondary SO_2 NAAQS Update

- 3-hr secondary NAAQS revised to annual secondary NAAQS
  - Effective January 27, 2025
  - Averaged over three consecutive years
  - 10 ppb
- EPA retained existing secondary standards for NO_X and PM, without revision
- Finalized revisions to the data handling requirements for the secondary SO_2 NAAQS

Secondary SO_2 NAAQS

Averaging Time	SIL ($\mu g/m^3$)	Primary NAAQS ($\mu g/m^3$)	Secondary NAAQS ($\mu g/m^3$)
3-Hour	25	-	-
Annual	1	-	26

Demonstrate Compliance for the Secondary SO_2 NAAQS Update

EPA alternative demonstration approach

- Alternative Demonstration Approach for the 2024 Secondary Sulfur Dioxide National Ambient Air Quality Standard under the Prevention of Significant Deterioration Program

Model annual emissions directly

- Contact us first to see if this is the most appropriate option

Other options

- Depending on your project and site circumstances, there could be other demonstrations to be made

Appendix W Revisions

Published 11/28/2024, effective 3/21/2025

- Incorporation of COARE algorithms into AERMET for overwater modeling
- Generic Reaction Set Method (GSRM) added as Tier 3 NO_X option
- RLINE for mobile source type

AQMG Updates

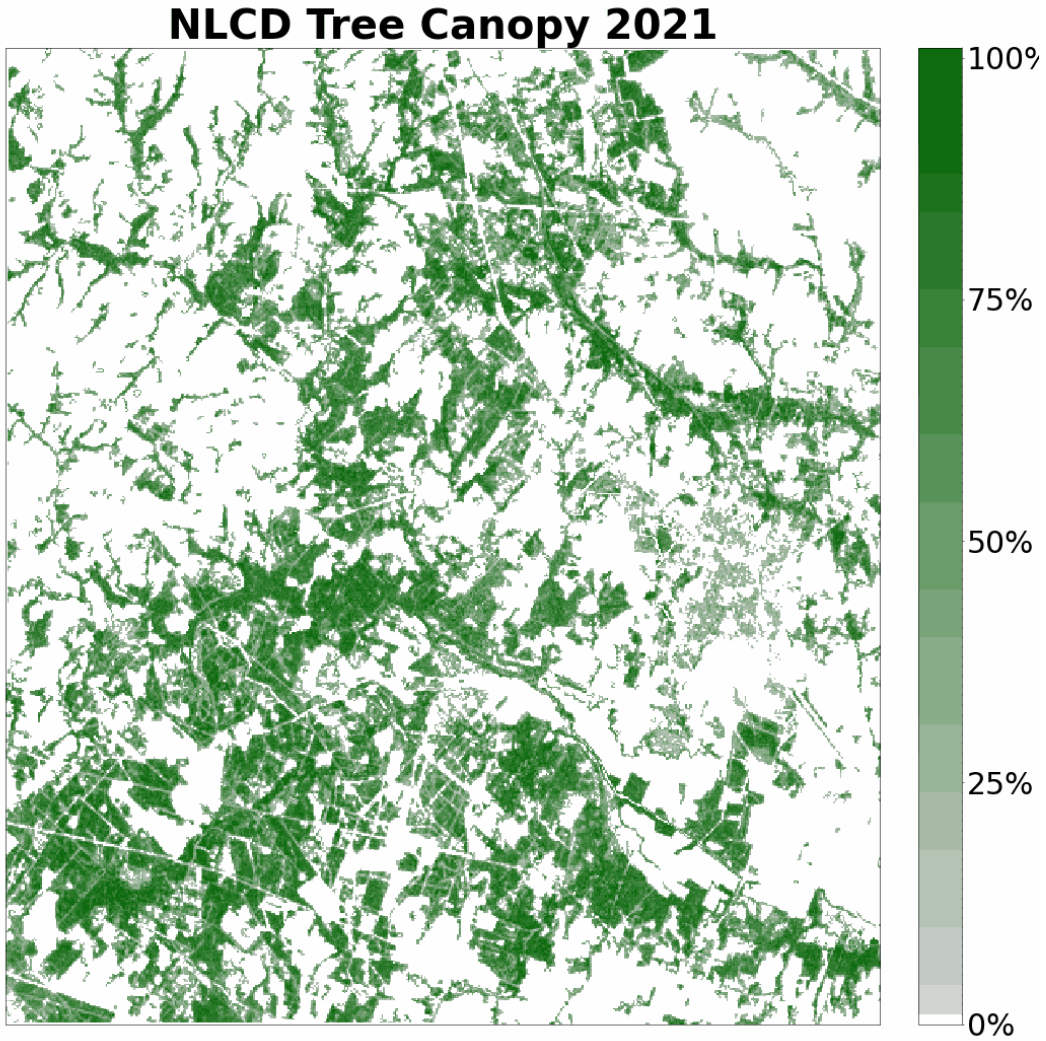
Updated April 2025

- Update to Appendix B – Federal and State Air Quality Standards
- Update to Appendix D – Representative Background Monitoring Concentrations
- Update to Appendix E – Minor and Prevention of Significant Deterioration National Ambient Air Quality Standards
- Minor text and formatting updates

AERSURFACE and AERMET News

AERSURFACE Input Data Reminders

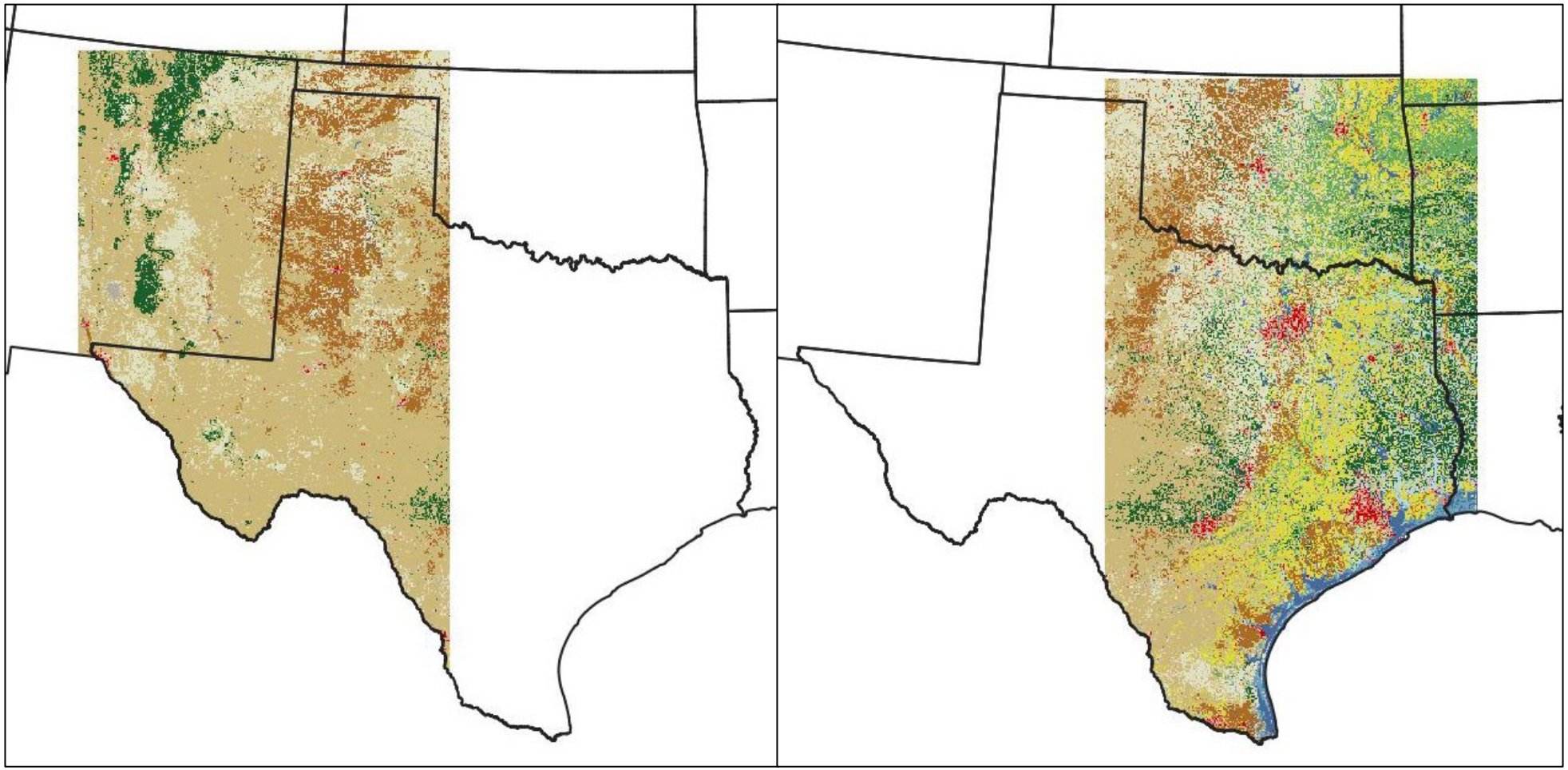
- Most recent MLRC Tree canopy data is from 2021
- Applicants should use the most recent year available
  - All three data types from the same year
  - Land Cover only from the most recent year
- Do not mix years of data



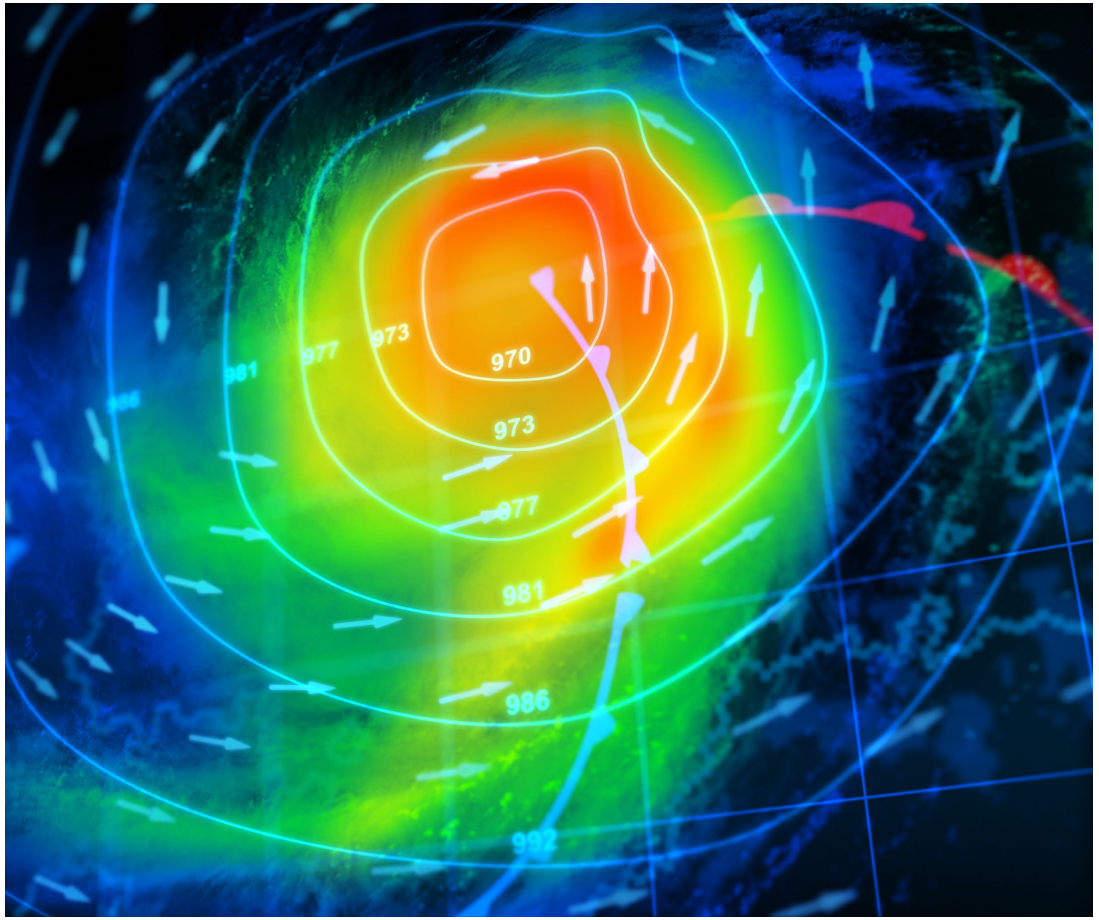
AERSURFACE Data Resource

- Multi-Resolution Land Characteristics (MRLC) consortium data is preferred
  - Services have been down intermittently
  - Albers projection parameters are missing from Tree Canopy TIFF files
- EPA generated GeoTIFF files for National Land Cover Database (NLCD) land cover, tree canopy, and impervious data
  - https://gaftp.epa.gov/aqmg/nlcd/
  - 2021 data is available in two regions: TX-East and TX-West
- EPA also generated GDAL_MRLC_canopy_preprocessor.zip

TX-West & TX-East



ADMT Met Updates



- In the process of updating our AERMET meteorological data sets for all counties
- 2020-2024
- Announcements on the ADMT Webpage and Hot Topics

Annual $PM_{2.5}$ Tips and Refinements

2024 Annual $PM_{2.5}$ NAAQS Revisions

- EPA revised the annual $PM_{2.5}$ recommended significant impact levels (SILs) and primary National Ambient Air Quality Standards (NAAQS)
- Effective May 6, 2024

$PM_{2.5}$ SIL (NAAQS)

Revised Recommended SILs	
Averaging Time	**SIL ($\mu g/m^3$)**
24-hr	1.2
Annual	~~0.2~~ → **0.13**

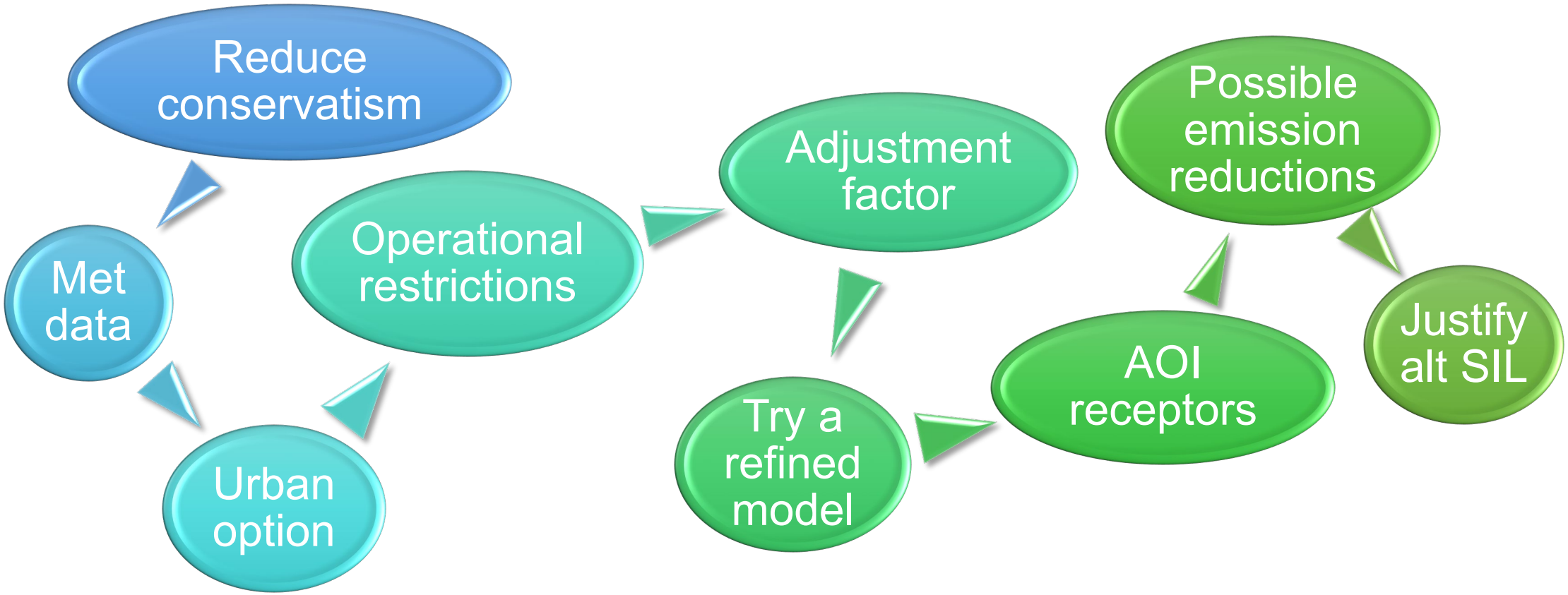
$PM_{2.5}$ SILs (PSD Increment)

Revised Recommended SILs			
Avg. Time	SIL (µg/m³)		
	Class I	Class II	Class III
24-hr	0.27	1.2	1.2
Annual	~~0.05~~ → **0.03**	~~0.2~~ → **0.13**	~~0.2~~ → **0.13**

$PM_{2.5}$ Primary NAAQS

Revised Primary NAAQS	
Averaging Time	**Standard ($\mu g/m^3$)**
24-hr	35
Annual	~~12~~ → **9.0**

Annual $PM_{2.5}$ Modeling Techniques



Annual $PM_{2.5}$ Monitor Refinements

$PM_{2.5}$ Background Concentration Refinements

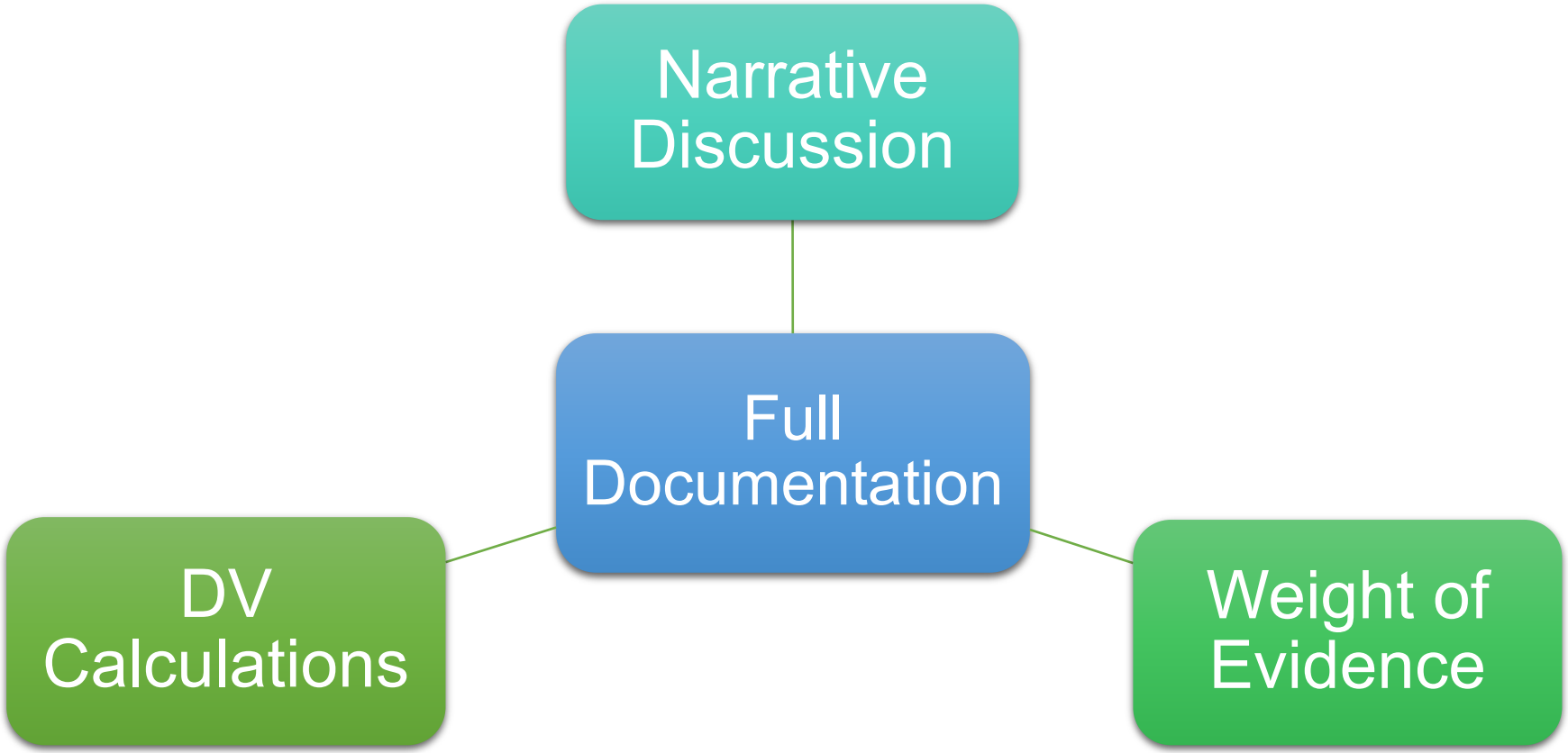
- Multiple methods to refine background monitoring concentrations:
  - Removal of exceptional/atypical events
  - Isolated sources/90-degree sector analysis
  - Pairing monitoring data within model
- Refinements benefit 24-hr design value more than annual design value

Exceptional and Atypical Events Guidance

- Additional Methods, Determinations, and Analyses to Modify Air Quality Data Beyond Exceptional Events – April 4, 2019
- Guidance on the Preparation of Demonstrations in Support of Requests to Exclude Ambient Air Quality Data Influenced by High Wind Dust Events Under the 2016 Exceptional Events Rule – April 4, 2019
- $PM_{2.5}$ Wildland Fire Exceptional Events Tiering Document – April 30, 2024

What to Include with your AQA

What to Include with your AQA



Provide a Narrative

Your main discussion

- Methodology
- Guidance relied-on
- Some written justification (see next slide)
- List and describe all tools/resources, etc.
  - Ex: EPA Wildfire Resource Document, 2016 – see Table 2 for a list of resources

Weight of Evidence

- Clear, causal relationship between the event and monitored data
- Provide justification for each event proposed to be removed
  - At least 2-3 pieces of justification for each event

Design Value Calculations

$PM_{2.5}$ Hourly Monitor Data					
	Report Year: 2001				
Date	Mid	1:00	2:00	3:00	4:00
5-Jan	7	8	6	12	11
6-Jan	4	4	0	1	3
7-Jan	0	1		3	0
8-Jan	3	4	***1***	2	4
9-Jan	13	15	15	12	10
10-Jan	6	12	10	7	6
11-Jan	10	15	8	12	12
12-Jan	**23**	16	18	15	19

- Provide all hourly data
  - Spreadsheets are preferred
- Clearly indicate where data was removed
- Recalculate the design value following 40 CFR Part 50, Appendix N

Things to Consider

- Case-by-case
  - Contact us before submittal
- Intent of *regulatory* exceptional event demonstrations
  - Exceptional vs atypical events
- Removal of exceptional and atypical events does not affect the data completeness

Friendly Monitor Reminders

Remember!

- Select a representative background monitor.
  - Regional considerations are important! Don't simply pick an overly conservative monitor that may not be representative.
- Consider/address those adjacent and nearby sources.
- Address monitors closer to the project site and why they weren't considered.
- Include all documentation and justification with your AQA.
  - This also includes the standard justification to demonstrate the monitor is representative of the project site.
- Contact us early in the process.
- Reference guidance.

Contact Information

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Questions?