

Response-to-Comments on the Attainment Demonstration Modeling for the 2015 Ozone National Ambient Air Quality Standard Technical Support Document

Comments from WI DNR				
Date	Page/ Section	Existing Text in Draft	Reviewer Comment	Response
6/23	3 Table 1-1 and Table 1-2, 34 Table 3-4	<i>Manitowoc</i>	Misspelled: Manitowoc	Revised as noted
6/23	3, Section 1	<i>Table 1-2</i>	Update to include recent redesignations. (Louisville and others)	Updated to reflect regulatory actions finalized by mid-July 2022
6/23	3, Table 1-2	<i>Door County</i>	EPA refers to this remanded area as: Door County- Revised	Revised as noted
6/23	5, Section 1	<i>...the projected year of attainment (2024)...</i>	... the attainment year (2024)...	Revised as noted
6/23	5, Section 1.1	<i>The site includes conceptual models for the following areas in the LADCO region.</i>	The list of areas that have conceptual modeling TSD does not match the list of conceptual models on the linked webpage.	Revised as noted
6/23	9, Figure 2-1 and Figure 2-2	<i>Nonattainment area shading.</i>	Figures should be updated to recognize recent redesignation requests including: 2008 Chicago, 2015 Door County- Revised, etc. As some redesignations are ongoing, a reference date could be added to avoid confusion (as of mm/dd/yy).	Updated figures to reflect status as of mid-July 2022; date added to figure caption as noted
6/23	13, Section 2.2	<i>The O3 DV reductions are particularly notable for the Manitowoc and Sheboygan areas along Wisconsin's lakeshore...</i>	Door County reductions appear to be equally as large as those observed at Sheboygan and Manitowoc.	Revised to: "The O ₃ DV reductions are particularly notable for the Manitowoc, Sheboygan, and Door County areas along Wisconsin's lakeshore..."
6/23	14, Figure 2-3 and Figure 2-4	<i>3-year O3 design value trends from 2005 to 2019 in the LADCO ozone nonattainment areas</i>	Door County, Louisville, and others are no longer nonattainment areas. Update captions to read "nonattainment and maintenance areas" or remove plots for redesignated areas.	Added "and maintenance areas" to the figure caption
6/23	27, Section 3.4	<i>Description of Figures 3-2 through 3-7.</i>	Note in the description that the scales vary across figures.	Added: "Note that vertical axis of these figures varies from state to state."

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6/23	33, Table 3.3	<i>Onroad Mobile-California</i>	Add note that describes what is included and how this is different from sector tags 9 and 10.	Text added at the bottom of the table: “Emissions for this sector are for sources in California only and were generated with the EMFAC model”
6/23	33, Table 3-4	<i>Describe state tags (IL, IN, WI, etc)</i>	It is not clear that the state tags (IL, IN, WI, etc) are not full state values. For example, add language to clarify that WI tag (Table 3-4, #6) does not include southeast WI emissions (#20) or central coast emissions (#21).	Added: “For the states that have both state and county tags (IL, IN, MI, OH, WI) the state tag includes emissions from the areas of the state outside of the explicitly-tagged counties. For example, the tracer for WI sources (Tag = 6) includes the emissions from all areas of the state except for the counties included in Tags 20 and 21. “
6/23	37, Section 3.7.1	<i>Sigma Theta</i>	This term is not clear to all, can it be defined?	Replaced with: “the standard deviation of the wind direction”
6/23	71, Section 6.1	<i>State list</i>	Is MN purposefully left out?	Added this following footnote to this list: “MN is not included because there are no 2015 O3 NAAQS nonattainment or maintenance areas in the state”
6/23	71, Section 6.1	<i>SMAT-CE uses a four-step process to estimate DVF2023</i>	Note that this is also consistent with EPA guidance.	Noted in the text: “Consistent with US EPA modeling guidance (US EPA, 2018), SMAT-CE uses a four-step...”
6/23	71, Section 6.1	<i>At least 5 days with modeled MDA8 >= 60 ppb are needed to retain the monitor for the future year DV calculation.</i>	In EPA’s recent modeling, this step of the guidance resulted in Sheboygan KA being dropped from further analysis, despite having the highest projected 2023 DV in the region. Were any nonattainment or maintenance monitors NOT retained due to the application of this threshold in LADCO’s modeling?	In our 2016 base year modeling, we had 10 days with a minimum MDA8 of 75 ppb (67 ppb) when calculating future DV using 3x3 water cell included (excluded) at 551170006 (Sheboygan KA) site for the 12 km grid modeling. There were 26 sites total dropped from the DV calculation due to the data completeness criteria but none of these sites are located in a 2015 O3 NAAQS nonattainment or maintenance

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				area.
6/23	79, Section 6.3	<i>Kohler Andrea</i>	Misspelled: Kohler Andrae	Update made
6/23	82, Table 6-1	<i>List of monitors</i>	DV results for all monitors in the 2015 ozone NAAs should be included in Table 6-1 (or somewhere else in the TSD) as an easy reference for attainment plans. This would eliminate the need to point states to the data files on the web to find that information. Another option for this is an appendix with a table that includes the projected 2023 DVs for ALL LADCO state monitors.	Table added to the TSD supplementary materials that includes DVs for all monitors in each NAA from the LADCO 4km simulation that included water cells in the calculation; there is also an updated version of the 2023 DV spreadsheet that includes similar information for all monitors in the LADCO region; note that these tables include 2023 DVs for monitors that passed the SMAT-CE RRF test
6/23	90, Figure 7-1	<i>Normal, IL</i>	Seems to be an error in the data for Normal, IL monitor.	Noted, figure corrected
6/23	97, Section 7.2.1	<i>Southeast WI/ Milwaukee</i>	Racine is the controlling monitor in the Milwaukee area; however, it is discussed in the Southeast WI section and not the Milwaukee section. This may cause some confusion.	Removed the reference to Racine county in the southeast WI area discussion
6/23	91 and 97, Section 7.2.1	<i>Southeast WI/ Northern IN</i>	If only monitors located in the Chicago nonattainment area are considered in these summaries, consider renaming them accordingly - Chicago Area (WI), Chicago Area (IN).	As described in Table 3-4 the northern IN counties tracer includes more than the Chicago, IN counties. As such they can't be described as Chicago Area (IN), Northern IN is a better description
6/23	98, Section 7.2.1	<i>Sheboygan County</i>	Door County section refers to Sheboygan County instead of Door County.	These were typos, text corrected in the report to refer to Door county in this section.
6/23	Section 3.5, Chapter 7	<i>Source Apportionment Modeling Results</i>	The thorough description of how the source apportionment modeling is done and an overview of the results in Chapter 7 is very important information to include in the TSD. It gives states a formal document to reference when discussing the data and employing it for policy decision-making.	Noted. No action taken from this comment as it's being interpreted only as a statement. Please reach out with an additional request if a more active response was expected from this comment.

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Comments from IL EPA				
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9/8	1.1 p. 6	fundamental <i>understand</i>	“fundamental understanding”	Revised as noted
	1.1 p.6	Looks like “• St. Louis, MI/IL” is still in the doc. Another state had pointed it out.		Revised one instance on page 6 to St. Louis MO/IL
	1.4 p. 8	The TSD Supplement is a separate document that <i>included</i> additional supplementary technical information to support this TSD	“includes”	Revised as noted

Comments from IDEM				
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Comments from MI EGLE				
Date	Page/Section	Existing Text in Draft	Reviewer Comment	Response
7/5/2022	1 / exec summary	The LADCO CAMx modeling results are used here to identify O ₃ monitoring sites that may have	The 2015 O3 NAAQS moderate attainment date is August 2024, is there a reason to back date this a month? (Stegman)	That was a typo. It’s been fixed to say “August 2024”

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		nonattainment or maintenance problems for the 2015 O ₃ NAAQS by the attainment date in July 2024		
7/5/ 2022	2 / Intro	On October 1, 2015 the U.S. EPA revised the primary and secondary National Ambient Air Quality Standard (NAAQS) for ozone (O ₃)	Verify date. FR published on 10/26/2015. Effective on December 28, 2015. (Shanley)	Noted and text corrected in the TSD
7/5/ 2022	Table 1-1		Allegan County is missing from the tables. (Stegman)	Revised as noted
7/5/ 2022	Table 1-2	<i>St. Louis line - Boundary chage</i>	Typo- Boundary change	Revised as noted
7/5/ 2022	5 / 1.1	<ul style="list-style-type: none"> St. Louis, MI/IL 	Typo – St. Louis, MO	Revised as noted
7/5/ 2022	6 / 1.2	solutions t3o O ₃ air pollution	Typo - to	Revised as noted
7/5/ 2022	Table 2-1,		Allegan County is missing from the table. Based on Michigan’s AQS data we have the following design values for years 2015 – 2021, respectively: 75, 75, 73, 73, 72, 73, 75. (Stegman)	Revised as noted
7/5/ 2022	Table 2-1, 2-2		Michigan’s monitoring data retrieved from AQS states that the 2021 design value for the New Haven monitor was 68. Could this be updated in the document to reflect the AQS value instead of the AirNow preliminary data used for 2021? (Stegman)	Revised as noted
7/5/	Figure 2-4	... and the dashed line	Typo - Dashed line shows the level of 2008 NAAQS	Revised as noted

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2022	Title	shows the level of the 2015 ozone NAAQS.		
7/5/2022	23 / 3.2	LADCO generated the Weather Research Forecast (WRF) model meteorology (LADCO, 2022) and used initial and boundary conditions came from the U.S. EPA 2016fg CAMx modeling platform (US EPA, 2019).	Typo - The word “came” should be deleted	Revised as noted
7/5/2022	23-24 / 3.2	. LADCO used the 2016 and 2023 inventories developed by the Collaborative for the modeling presented here as they were the most recent inventory data available at the initiation of this project.	Just something to consider....I feel like section 8 (the 2016v1 vs 2016v2 discussion) should be “teased” or briefly acknowledged here. This is not a strongly held opinion. (McDonald)	The following text was added to the end of the quoted paragraph: “Section Error! Reference source not found. presents LADCO’s justification for using the 2016v1 emissions data over the 2016v2 data for the modeling reported in this TSD.”
7/5/2022	31 / 3.4	These announcements came after the ERTAC EGU 16.2 beta emissions were developed	Will the electronic docket feature a list of the units who announced pre-2023 shutdowns prior to the ERTAC EGU 16.1 beta emission were developed and were incorporated accordingly into the inventory? We are fairly certain that the Belle River (St. Clair) plant which shut down May 2022 was incorporated in the 16.2 beta inventory as such, but would like to verify.	Yes. Belle River was included in the shutdowns and it’s document in the TSD supplement
7/5/2022	Table 3-4	St. Claire	Typo - “St. Clair”	Revised as noted
7/5/	Table 3-7	Definition of model	What is “CTM”? It is not defined anywhere in the	Changed to: “...used to evaluate CAMx.”

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2022	Title	performance evaluation statistical measures used to evaluate the CTMs	document.	
7/5/ 2022	48 / 4.2	Error! Reference source not found. shows LADCO state total 2023 O ₃ season (April – October) emissions.	Current ozone season is March 1 – October 31 st , however we recognize that this was updated during the 2015 ozone NAAQS and it may have been established after 2016. Therefore, making March 2016 not a viable data source and we’d want 2023 to parallel that ozone season for accuracy despite the real 2023 ozone season being longer. If this is the case, perhaps additional language could be added here to better explain that.	All tables updated to average ozone season day emissions calculated from March 1 – October 31
7/5/ 2022	Figure 4-4 through 4-9	Figure Error! No text of specified style in document.-1. July 2023 12-km gridded NOx (top) and VOC (bottom) surface layer emissions (tons/month)	The date in the actual figure under the map is July 31, 2016...this appears misleading given these are 2023 emissions. Could the July 31, 2016 either be edited or cropped out to align with the Figure title and avoid any potential confusion? Same comment for the remaining figures (4-5 through 4-9) as well. (Stegman)	Date information cropped out of all emission plots in the TSD. It’s nice to have the min/max values on the plot but it’s not easy to include them without also including the dates; so we just removed all of the footer info in these images
7/5/ 2022	Figure 4-6	Figure Error! No text of specified style in document.-2. July 2023 4-km gridded NOx (left) and VOC (right) surface layer emissions (tons/month)	Update to read: NOx (Top) and VOC(bottom)	Configuration of the plots have been changed in the document, no longer requiring orientation of the multi-panel plots
7/5/ 2022	58 / 4.2.1	. The model imports base year Continuous Emissions Monitoring (CEM) data	Use just “CEM”, previously defined.	Revised as noted

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		from U.S. EPA and sorts the data from the peak to the lowest generation hour.		
7/5/2022	60 / 5.1	LADCO simulated the entire O ₃ season (April 1 – October 31, 2016) with CAMx using the 2016 CAMx modeling platform described previously. Figure Error! No text of specified style in document. -3 summarizes ground level O ₃ concentrations during the 2016 O ₃ season across the 2015 O ₃ NAAQS NAAs in the LADCO region.	The entire O ₃ season is March 1 – October 31.	Dropped the text “the entire ozone season” in this sentence. Now it just reads: “LADCO simulated the April 1 – October 31, 2016 with CAMx...” The reason we did not simulate March is because there were no observed days above 70 ppb in March, and as such none of those days would have factored into the DV calculations.
7/5/2022	60 / 5.1	The model misses the NMB O ₃ performance criteria for sites in St. Louis, Ohio River valley, Indianapolis, and most of Ohio in August in September.	Typo –“in August and September”	Revised as noted
7/5/2022	Figure 5-1	Figure Error! No text of specified style in document. -3. March 1 – October 31, 2016 MDA8 O₃ concentrations in the	Suggest adding “ambient” or “observed” to differentiate from modeled concentrations.	Revised as noted

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		LADCO region 2015 O₃ NAAQS nonattainment areas		
7/5/2022	80 / 6.3	The RRF plot shows that the LADCO CAMx modeling projected all the monitors along the western shore of Lake Michigan and southern shore of Lake Erie, along with a few other areas of the region, to have 5-9% reductions in their DVF ₂₀₂₃ values (RRFs = 0.9-0.95).	Should “(RRFs = 0.9-0.95)” be changed to “0.91-0.95” to match 5-9%?	Revised as noted
7/5/2022	Table 6-1		What do the missing values in the last column mean? (Shanley)	Table replaced with DVFs and RRFs for all of the monitors in all of the NAAs in the region; some monitors get filtered out of the SMAT-CE DV calculation because they either don’t have more than 5 modeled days in 2023 > 60 ppb in the 2023
7/5/2022	85 / 6.3.1	... may be cases where certain cells along the periphery of the 3 x 3 array have different modeled responses than what would be expected at the monitor location at the center of array due to a specific local topographic or	Typo - Missing word before “array”	Text revised to: “3x3 model grid cell matrix”

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		geographical feature (e.g., a large water body or a significant elevation change)		
7/5/2022	94 / 7.2.1	Emissions from the Chicago metro/surburban counties are the largest contributor	Typo "Suburban"	Revised as noted
7/5/2022	101 / 8.	. U.S. EPA then released the rest of the inventory and modeling platform components by October 2022.	Is the year wrong? Past tense, for a future date? (Shanley)	Text revised to "October 2021"

Comments from OH EPA				
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6/22	1/Exec Summary	the attainment date in July 2024	Ohio's attainment date is in August 2024	Revised as noted
6/22	All	Table 1-2 and throughout	Add the Cincinnati redesignation to Table 1-2 and update all text, tables and figures accordingly.	Update made to Table 1-2 per the June 9 final redesignation; the EPA Green Book map used for Figure 1-1 does not yet reflect the change for Cincinnati
6/22	100-101/sect 8	2. While there are differences in the NOx and VOC emissions estimates	Suggest revising as indicated.	Revised as noted

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		between the 2016v1 and 2016v2 platforms, the differences are driven primarily by changes to the biogenic and onroad mobile sectors. LADCO feels that the 2016v2 platform methodological updates to the models used to estimate the emissions for these sectors, BEIS and MOVES, respectively, require further evaluation for sources in the Great Lakes region. As described below, LADCO’s modeling using 2016v1 emissions is well within the model performance benchmarks and is a better model than U.S. EPA’s model using 2016v2 emissions in the LADCO region. Therefore, we did not believe it was a good use of time or resources to evaluate the extent to which the changes to these sectors impacted model performance and attainment testing for receptors in the Great Lakes region.		
6/22	101/8.1.1	A comparison of the 2016v1 and 2016v2 platform estimates of NOx and VOC emissions shows differences for the states in the LADCO region.	Suggest revising as indicated.	Revised as noted
6/22	102/8.1.1	LADCO has concerns about the magnitude of the emissions change from this sector in the v2 platform	Delete this sentence. Replace with new paragraph “As 2016v1 emissions are generally higher than those included in	Revised as noted

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		and wants a more detailed study of the impacts of this change on air quality estimates in the Great Lakes region before using these data for NAAQS attainment planning.	2016v2, LADCO’s modeling using 2016v1 emissions is likely conservative and predicting higher ozone than if 2016v2 emissions were used.”	

Comments from MPCA				
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Comments from EPA			
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	Overall	TSD as currently written does not individually address each nonattainment area needing an attainment demo for its moderate SIP requirements under the 2015 O3 NAAQS. Please address each nonattainment area individually and specifically (in addition to what you already have in terms of MPE and results which address the entire modeling domain, as-a-whole, more generally). Many of the following	NAA-specific information has been added into the document as suggested

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		comments request more specificity with respect to each nonattainment area (NAA). A reader of this document should be able to easily go through and find all the pieces of information pertinent to a specific NAA of interest in the various tables and relevant figures pertaining to their NAA of interest, <i>i.e.</i> in each section and table, including overview, photochem MPE and met MPE, SMAT results for controlling/DV determining monitor(s) in each NAA, <i>e.g.</i> Tables 6-1 and 8-4, among others, are not currently organized by NAA.	
	Intro	Which NAAs does this TSD cover in terms of the attainment demo portion of the moderate area SIPs for the 2015 O ₃ NAAQS? Please specify.	<p>The following text has been added to the introduction:</p> <p>This TSD includes technical analysis to support O₃ NAA SIPs for the following 2015 O₃ NAAQS NAAs:</p> <ul style="list-style-type: none"> • Chicago, IL/IN/WI • St. Louis, IL/MO • Allegan County, MI • Berrien County, MI • Muskegon County, MI • Detroit, MI • Cleveland, OH • Milwaukee, WI • Sheboygan County, WI
	1.1	Chicago area Conceptual Model link is not active. FYI EPA will likely encourage each state to submit the relevant conceptual model(s) as an attachment to their SIP submittals so that a copy makes it into the official CFR docket for each NAA. EPA will communicate this to the States.	Noted.
	1.2	As noted the synthesis report link is not active; has EPA seen a draft of	The report is not available yet, but we expect major

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		this report?	sections will be released by the time this TSD is final
3.1	<p>“LADCO processed most of the 2016 emissions using the U.S. EPA 2016fh_16j Sparse Matrix Operator Kernel Emissions (SMOKE) modeling platform.”</p> <p>Please specify which were not processed w/ SMOKE and explain what they were processed with instead e.g. mobile, biogenic.</p>	<p>Text updated:</p> <p>“Except for electricity generating unit (EGU) point sources, LADCO processed the 2016 emissions using the U.S. EPA 2016fh_16j Sparse Matrix Operator Kernel Emissions (SMOKE) modeling platform.”</p>	
3	<p>Please insert an explanation somewhere in the TSD indicating that a photochemical modeling protocol for the work outlined in this TSD was submitted to EPA for review and that EPA provided feedback on that protocol prior to the commencement of the project. Also insert a statement indicating that a met modeling protocol was submitted to EPA for review and feedback prior to the met modeling work commencing and that the results of the met modeling sensitivity analyses were presented to EPA on various occasions as progress was made on the project. Please include dates and timelines (it looks like EPA reviewed the photochemical modeling protocol in June 2021, and it looks like the met modeling protocol could have been reviewed back in 2019..? Tsengel gave a met modeling results presentation to EPA during a SIP 101 class in-person, so that may have been in 2019 as well? I’m sure there are other instances during which met model results were presented to EPA, e.g. on the monthly O3 calls, this is to demonstrate that you were in ample contact with the reviewing authority during the development of the overall project)</p> <p>Please note and explain any deviations from the original protocols</p>	<p>The following text added to section 3.1:</p> <p>“The LADCO program Quality Assurance Project Plan for fiscal years 2021-22 includes modeling protocols for the 2016 CAMx and WRF modeling used for this TSD. U.S. EPA Region 5 reviewed, provided feedback, and accepted the LADCO QAPP on July 21, 2021. LADCO responded to EPA comments on these protocols and they were finalized before we commenced with the modeling reported in this TSD. LADCO presented intermediate and final results of our 2016 meteorology, emissions, and air quality modeling many times over the past 3 years to various workgroups on which EPA participated. We provided various opportunities for EPA to review and comment on our 2016 modeling and analysis work during monthly LADCO workgroup meetings.”</p> <p>As noted, LADCO has made many presentations on our results to different workgroups over the past few years.</p>	
3.3.1	<p>Not enough to simply reference a met modeling report please insert a section in the TSD describing and summarizing the the met model performance <i>for each nonattainment area</i> including relevant figures/tables (see section 2.6.3 of the 2018 guidance for more info)</p>	<p>New Section 5.1 (WRF 2016 Meteorology Model Performance Evaluation) added to the TSD to address this comment</p>	

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		<p>from the modeling guidance: “The EPA recommends that air agencies devote appropriate effort to the process of evaluating the meteorological inputs to the air quality model as we believe good meteorological model performance will yield more confidence in predictions from the air quality model. One of the objectives of this evaluation should be to determine if the meteorological model output fields represent a reasonable approximation of the actual meteorology that occurred during the modeling period.”</p> <p>Choose time periods which reflect a variety of meteorological conditions that frequently correspond with observed 8-hour daily maxima concentrations greater than the level of the NAAQS at monitoring sites in each nonattainment area.</p>	
	3 (and other various sections throughout the TSD)	“The Electronic Docket to this TSD” Please select a different term for the electronic supporting material associated with this TSD to avoid potential confusion with the official CFR docket(s) to each rulemaking for the overall attainment plans	Changed to “supporting materials”
	3.4	“EPA 2016 v1 (“2016fh_16”) emissions modeling platform” This is also referred to as “2016fh” and “FH” throughout the TSD. It will make it clearer to the reader if you use a consistent term throughout. In the executive summary you have “2016fh_16j emissions modeling platform data (2016v1)”	Changed to “2016fh” to be consistent throughout the TSD
	3.4	“ERTAC EGU 16.2 beta inventory forecasts for 2023 to exclude the emissions from two EGU units that announced shutdowns that will occur before 2023.” Are these sources permanently shut down? If those sources decide not to go through with the shutdowns those EGU emissions should be included in the attainment demo.	A table of EGU shut downs that were modeled as part of this demonstration are included in the TSD supplement; LADCO followed guidance by our member states to include the known shutdowns at the time that our modeling was started [start here]
	Table 3-1	typo concerning the mobile model associated with LADCO’s modeling platform configuration. LADCO cites MOVES2015 for the baseline emissions processing which appears incorrect. LADCO should update to cite the version of EPA’s MOVES2014 model they used to estimate mobile	Revised as noted

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		emissions	
Table 3-2 and Section 3.4 text		“2023 EGU forecasts estimated with the August 2021 version of the ERTAC EGU Tool version 16.2 beta (MARAMA, 2012). LADCO also used a version of the 2016fh non-EGU point inventory that is synchronized with the ERTAC EGU inventory in our 2016 modeling platform to ensure consistency with the EGU sector.” Double check this is reflected correctly in Table 3-2. For EGU Future Year Data Source in the table the section above stated this data source listed in the table was used for non EGU point. For Industrial Point Future Year Data Source in the table, the section above stated this data source listed in the table was used for 2023 EGU. Please double check.	This comment is not clear. Our review of the cited text and table confirms that the documentation of the stationary point emissions configuration that we used for the modeling is accurate. We updated the description of the industrial point data source for 2023 in Table 3-2 to “U.S. EPA 2023fh modified”
Table 3-4		Table 3-4 appears to be jumbled/ missing a row(s) such that counties listed do not appear to be matched with the correct state please adjust	This table is organized as two columns, the left two columns and the right two columns are independent of each other and should not line up. We added a delimiter between the two columns of data to better clarify the information in the table
4		“U.S. EPA 2016fh_16 (“FH”) emissions modeling platform” You called this “2016fh” in section 3.4. I suggest using a consistent term for this modeling platform to make it clear to all readers (keep in mind there may be many non-technical readers) that you are not referring to different platforms. In the executive summary you have “2016fh_16j emissions modeling platform data (2016v1)”	Revised as noted
Table 4-1		ozone related inventories are provided in units of tons per ozone season day (not in units of tons per ozone season); NH3 and PM2.5 are optional to be listed here, you really only need NOx VOC and CO unless you are going to refer back to NH3 and PM2.5 for the purpose of MPE	We’ve updated this table to be tons/ozone season day; we are now only included NOx, VOC and CO emissions per this suggestion
Tables 4-2 and 4-3		missing a CO table; for each table change units to ozone season day	Table added for ozone season CO emissions
Table 4-4		change units to ozone season day; NH3 and PM2.5 optional	Revised as noted
Tables 4-5 and 4-6		missing a CO table; for each table change units to ozone season day; Nonpoint Oil and Gas rows are missing data	Revised as noted; MN and WI do not have any oil and gas emission in the inventory
Tables 4-7 and 4-8		Nonpoint Oil and Gas rows are missing data	MN and WI do not have any oil and gas emission in the inventory

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5	<p>As currently written the MPE only considers ozone, please include some type of performance evaluation for ozone precursors and other species. For more info See section 3.2 of the modeling guidance.</p> <p>Additionally, there are statements made in 3.7.2 of the TSD indicating: “Evaluation should include more than just O3 and PM2.5, such as SO2, NO2 and CO.” and “Spatial displays should be used in the model evaluation to evaluate model predictions away from the monitoring sites. Time series of predicted and observed concentrations at a monitoring site should also be used.” As a reviewer I was expecting to see these later in the TSD. Perhaps they intend to include more in a future iteration of the document? They have monthly aggregated time series but no examples of specific monitoring sites for each NAA, suggest they select and show, at the very least, one monitoring site daily timeseries obs/mod from each NAA; There are also no spatial displays away from the monitoring sites except for Figs 6-1, 2, 4, 5, 7, 8 which show O3 season modeled max MDA8 spatially for each domain for each year (could overlay monitor obs on the 4- and 1.3- km to show comparison or do one for each NAA, preferred).</p> <p>Please keep in mind, MPE and met MPE should be addressed specifically for each nonattainment area. In order to enhance this aspect of the TSD, please insert a discussion of model performance specific to each nonattainment area including relevant figures. Time series plots showing individual monitor obs and model values can help with this. Gridded tile plots with obs overlayed could help as well. It would also be useful to tie the discussion back to the meteorological model performance results for each area <i>e.g.</i> may combine O3 performance co-located with met performance for each NAA monitor where both O3 and met data are available.</p>	<p>Added section 5.3: CAMx 2016 ozone precursor modeling performance evaluation, which includes NOx, CO, and VOC performance statistics.</p> <p>We assessed precursor performance across the 4km modeling domain and by state because we don’t have enough monitoring sites to evaluate by NAA.</p>
Table 5 (5-1 thru 5-5)	double check shading is as intended in these tables	Revised as noted

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		Side note, it's fine and good to focus on the Emery cutoffs, another thing to keep in mind from the modeling guidance: "An internal EPA analysis (U.S. EPA, 2014a) considered whether daily ratios of model future/current maximum daily 8-hour ozone averages (MDA8) varied strongly as a function of site-specific base case model performance. This analysis was completed using a national model simulation that projected 2020 ozone concentrations from a 2007 base case. The analysis determined that when modeled, MDA8 ozone bias was relatively small (e.g., less than +/- 20 ppb), the average response ratios were not a strong function of the model MDA8 bias. This provides confidence that the model can detect the air quality response in the midst of reasonable levels of absolute bias and error"	
	6	Has LADCO considered evaluating the attainment test results for unmonitored areas? See section 4.7 of modeling guidance; any thoughts on this as being relevant for any of the NAAs in the LADCO region based on LADCO modeling?	Not at this time. The monitoring data in this region indicate that high ozone is confined to the lakeshore and near urban areas. The current monitoring network is sufficient to identify the areas where high ozone occurs precluding a need for a UAA
	6.1	"if there are at least 5 days that meet the minimum threshold criteria. SMAT-CE uses a four-step process to estimate DVF ₂₀₂₃ :" Were there any locations that did not meet the criteria? Please explain.	There were 26 sites in the LADCO modeling that did not meet the SMAT-CE data threshold, but none of these sites are in nonattainment or maintenance areas; this point was added as a note in the TSD
	6.1	"sites with an average DVF ₂₀₂₃ that exceeds the 2015 O ₃ NAAQS (71.0 ppb or greater) and that are currently measuring nonattainment (2021-centered DVBS) would be considered nonattainment receptors in 2023." "receptors" seems like holdover language from transport... Re-phrase this sentence in the simple context of meeting the attainment test e.g. The modeled attainment test is considered satisfied when the (DVF) _i is less than or equal to the current NAAQS level (70 ppb truncated).	Revised as noted
	6.2	may want to examine the day- and site-specific model performance for	Noted

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		days that are part of the RRF calculation as part of the MPE and results for each nonattainment area (at least for the controlling/DV determining monitor site(s) for each NAA)	
6.3		“relative reduction factors (RRF)” The term is relative response factor (RRF), please edit.	Revised as noted
Figure 6-7		Please provide commentary on the hotspot in WI, looks like the border of Calumet and Winnebago counties	This is Lake Winnebago and we think it has to do with the decreased mixing due to the lower surface temperatures, similar to the lake effect we see over the Great Lakes
Table 6-1		DVB should be rounded to the tenth of a ppb as per modeling guidance; you can show both the future DV pre-truncation and final future DV as per Table 4.4 of guidance if you’d like. DVB max column can be deleted perhaps this is a holdover from transport, not needed for the modeled attainment test (keeping it in would be optional) column “2019-2021 DVB” is mis-labeled delete ‘DVB’ this column is just the latest 2021 certified DV not a calculated DVB	We pulled the base year design values from the EPA Greenbook and these are integer values; we’ve included the future year average DVs only with one decimal place
Table 6-2		seems incomplete, not every relevant NAA is addressed here; this goes back to the overall comment at the beginning, Please include at a minimum the determining monitor for each NAA and for clarity add a column indicating which NAA that monitor is associated with	We’ve revised the table to include the controlling monitors in every shoreline nonattainment area in the LADCO region; the water vs no water construct is only applicable to the shoreline NAAs
6		From the modeling guidance: “In general, modeling and related analyses are the most useful corroborative analyses for areas with attainment dates which are more than several years in the future. In contrast, ambient data and emissions trends become more important (and hence model results become less important) the closer in time the area is to its attainment date. For example, if an area is only 1 or 2 years away from its attainment date, ambient data is in most cases the best predictor of likely air quality levels in the near future. However, this may not be true if there are large emissions reductions that are expected to occur in the near-term period.” The TSD could benefit from commentary on this topic with respect to each NAA and current certified 2021 and/or preliminary 2022	This argument will be addressed on a case by case basis with the LADCO member states that are using this TSD as part of their weight of evidence. If the states want to use this line of reasoning in their SIPs, LADCO will work with the state to provide information to support their analysis.

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		design values. This type of analysis can be included in the supporting info section for weight of evidence analysis.	
8		“The LADCO 2016v1-based modeling platform has equal or better skill at simulating O3 in the Great Lakes region than the U.S. EPA 2016v2-based platform.” What do you suspect are the reasons for enhanced O3 performance? <i>e.g.</i> resolution, better MPE of other chemical species like O3 precursors, better met performance, etc. Please provide supporting technical evidence/figures to support your rationale.	Better met performance and better grid resolution than the EPA 12km modeling. We feel that we have provided ample evidence in the TSD and supporting documentation to validate this argument.
8		MPE comparison shows overall May-Sept; in addition, please show individual NAA monitoring sites MPE comparisons particularly on high MDA8 days to support the statements being made in this section of the TSD for each NAA covered by this TSD	We do not have access to the EPA results by nonattainment area. We used figures in the EPA 2016v2 modeling platform TSD (US EPA 2022) to draw comparisons with the LADCO model performance.
Table 8-4		again, this table does not clearly break out each NAA, please include at a minimum the determining (highest) monitor(s) from each NAA and add a column indicating which NAA the monitor is affiliated with; ok to optionally delete the max columns if desired as per comment above	Revised as noted
References		“LADCO, 2022. Weather Research Forecast Model Performance Evaluation Report. Hillside, IL.” Please insert a link to this report. Has EPA reviewed this? insert links to other referenced LADCO documents/reports	Link added. EPA did not officially review this report but it was provided to EPA when it became available
3.4		We’re seeing multiple coal fired EGUs in Region 5 states that had previously announced shutdowns change plans and delay retirements due to the change in economic conditions and global supply chain. Please confirm that the two EGU sources that were not included in the emissions projections modeling have actually permanently shut down coal fired operations. It looks like Illinois’ law bans coal fired powerplants by 2030 so if this EGU hasn’t already gone through with the shut down they could potentially delay retirement which affects the 2023 emissions projections.	IL EPA and WI DNR (and other LADCO members) will provide information about the status of EGU shut downs upon request.

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		<p>Examples of other coal EGUs delaying retirement. https://www.jsonline.com/story/money/business/2022/06/23/wisconsin-coal-plants-in-oak-creek-sheboygan-portage-stay-open-longer-due-energy-supply-fears/7705049001/</p> <p>https://www.eenews.net/articles/solar-market-turmoil-delays-ind-coal-shutdown/</p>	
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