WestJumpAQMS Study
Response to Comments by Air Quality Stakeholder Review
Document: Western Regional Air Partnership (WRAP) West-wide Jump-start Air Quality Modeling Study (WestJumpAQMS) Draft Technical Memorandum "Lessons Learned from the WestJumpAQMS and the Next Steps to Improve Ammonia Emission Estimates in the Western U.S." dated August 29, 2013.
http://www.wrapair2.org/pdf/Memo_NH3_Modeling_NextSteps_Aug29_2013.pdff
Response-to-Comments Dated September 30, 2013

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Comments from EPA Region 8, Gail Tonnesen, September 19, 2013					
1	EPA R8	--	--	One of the recommendations in the memo is to "Investigate adding a bi-directional NH3 exchange model in subsequent modeling studies." We agree with this recommendation, and it is possible that adding a bi-directional surface flux algorithm to the CAMx could improve model simulations of ambient ammonia and nitrogen deposition. The bi-directional surface flux model could also be extended to include snow cover, surface chemistry and bi-directional flux of other species, such as nitric acid and other NOy species, and this would be valuable for modeling winter conditions.	The addition of a full surface flux-chemistry module in CAMx is a major model update that currently has no funding. Certainly it would be desirable to implement a flexible surface module that cannot only just perform the bi-directional ammonia flux but also address heterogeneous reactions on the surface, such as those that may occur on snow to generate HONO that appears to be one of the keys in the winter ozone events. However, without funding or at least seed money it is difficult to see how such a surface module would be implemented with just implementing a bi-directional ammonia flux algorithms being a less costly option.
2	EPA R8	--	--	The memo suggests further evaluation work is needed for ammonia. Even though dry deposition measurements of ammonia are not routinely made, it would be valuable to compare the distribution of modeled ammonia dry deposition velocities over the different major land cover categories and compare that with observed estimates published in literature. This could provide some useful bounding for this important physical process.	This is a good suggestion that 3SDW/3SAQS should pursue. The WestJumpAQMS evaluation suggests that ammonia is underestimated in the summer since: (1) particulate NO3 is underestimated; (2) total NO3 (NO3+HNO3) performance is much better; and (3) wet NH4 depositions is underestimated. Whether the NH3 underestimation is due to too low emissions or too high dry deposition rate or both is not known and the suggested type of analysis might provide some insight into this.
3	EPA R8	--	--	Page 6 states: "While comprehensive evaluation of the NH3 results in the WestJump modeling are not yet available, diagnosis of the cause of the poor performance of the air quality	This is a good suggested and should be pursued in the 3SAQS.

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				models in predicting NH3 concentrations should be a focus area of subsequent modeling studies." Are there plans to evaluate CAMx performance for NH3 and NH4 for the 2008 WestJump modeling, and if not, is this part of the plan for the 3-state study modeling? While limited gas phase ammonia data is available, it might be useful to compare the 2008 or 2011 modeled NH3 to monthly or seasonal averages of the Amon 2012-2013 data. Amon data is not available for 2008 or 2011, so the model cannot be compared to Amon NH3 data paired in time, but the monthly or seasonal average comparison could still be useful.	Many of the AMoN ammonia measurements started in March 2011, although a few were available during 2008 (e.g., Fort Collins). These are two-week samples so data is very sparse spatially and temporally.
4	EPA R8	--	--	For spatial allocation of CAFOs, a process needs to be identified to eliminate/prevent double counting of emissions between the point source inventory and any other approaches developed based on a bottom up or county based estimate.	The spatial allocation of CAFOs would be used to define new spatial surrogates for allocating county-level livestock ammonia emissions in the NEI to the modeling grid. Since the NEI has livestock NH3 emissions in the "Non-Point" category, there would be no livestock point source NH3 emissions to potentially double count.
5	EPA R8	--	--	The memo indicates SMOKE has 2 different options to allocate livestock ammonia emissions using meteorology and then recommends using the SMOKE approach using meteorology. It would be helpful to identify the 2 different approaches and identify which of the 2 was selected.	The SMOKE program Gentpro is instrumented with two equations for estimating the diurnal variability in NH3 emissions: Russell and Cass (1986), which uses ambient temperatures and wind speed, and an equation recently developed by Jesse Bash at EPA that uses Henry's equilibrium for NH3 and bulk aerodynamic resistance. Both equations require a monthly livestock ammonia inventory as input (typically created by distributing an annual inventory to monthly using temporal profiles) and they then calculate monthly to hourly conversions using hourly, simulated meteorology data. There is not a current recommendation for which equation is recommended for this project. The recommendation is to calculate emissions with both equations and then perform a targeted analysis of the results to determine which equation is more appropriate for the project.
6	EPA R8	--	--	The memo states that modeled ammonia diurnal patterns are opposite observed diurnal patterns. This suggests it would be	We know that the diurnal profiles (both static and met-based) for livestock NH3 peak during midday

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				critically important to evaluate the diurnal temporal profile used by SMOKE in addition to the temporal profiles that use meteorology to allocate annual or monthly county totals to specific days.	and are lowest in the middle of the night. The emissions diurnal patterns looks similar to the observations of NH3, which suggests that this problem of anti-correlation is not due to the temporalization of the emissions but some other model process, like deposition or mixing within the boundary layer.
Comments from Colorado Department of Health and Environment, Air Pollution Control Division, Lisa Devore, September 16, 2013					
1	CDPHE APCD	--	--	For the workgroup members in the Next Steps Memo, can you please add Kevin Briggs and Dale Wells from CO APCD?	Done.
2	CDPHE APCD	--	--	The Ammonia Emissions Modeling - Recommendations and Next Steps Memo should carry a strong plea for additional hard data, including monitors, field studies, and information on sources (fertilizer, livestock location, etc.).	Section added to end of Memo.
3	CDPHE APCD	--	--	Were other states involved or could they be involved in the future? On calls with Wyoming and Utah associated with the 3 state study, were ammonia emissions discussed and a request for CAFO/other ammonia emissions data presented? Are there monitors there or could aMoN monitors be used in some context?	We are attempting to get information on CAFOS from all states and got additional information from Wyoming. The AMoN network operated very few sites in 2008. The ramped the network up to ~50 sites in 2011 so it can play a more prominent role in the evaluation of the 3SAQS modeling. But the limited spatial and temporal (two-week samples) limit their use.
4	CDPHE APCD	--	--	Can we call for improvements in fertilizer use and emission factors?	Yes, always looking for more and better data.
5	CDPHE APCD	--	--	Can we call for improvements in data from states on CAFO locations, animal counts, etc. We also need more and better state-specific emission factors.	Yes, always looking for more and better data.