1. **Welcome and Introductions** (Greg Beachley)

2. **Approval of Fall 2019 Minutes** (Greg Beachley)
   - Minutes were approved

3. Meeting Outline (Greg Beachley)

- White Paper (WP) Update:
  - Science of the Total Environment, Virtual Special Issue
    - Ten articles currently under review
  - EM magazine, July issue
    - Three articles accepted with minor revision:
      1. Evolution of Monitoring and Modeling reactive Nitrogen Deposition in the U.S.
      2. Long-term Trends in reactive N Deposition in the U.S.
      3. Need for Improved Monitoring of Spatial and Temporal Trends of Reduced Nitrogen
  - Next Steps:
    - TDep Seminars: Draft schedule sent out by K Morris
      Every 3rd Tuesday around 1400-1500
      There will be 2 20-minute presentations
      Will begin August 20th
    - TDep Project Queue: Request was sent out a few weeks ago. Purpose is to link active research to white paper. Will fold in the work group structure. Will also serve as an informal list to help TDep track projects and keep science focus
  - TDep Work Groups (WG):
    - Will increase TDep structure and collaborative work
    - Distribute workload and make projects more accessible
    - Get more accomplished between meetings
    - There will be a trial of the three targeted WG's:
      1. Stakeholder WG; Lead: John Walker
      2. Measurement Model Fusion WG; Lead: Greg Beachley
      3. Deposition Uncertainty WG (joint effort with CLAD); Lead: Mike Bell
  - EOS Restructuring: TDep representatives will be Kristi Morris and Chris Rogers.
  - Current List of Research Projects that will be tracked by the TDep Project Queue:

- AMoN Site Characterization (Walker)
- Throughfall Database (Bell)
- Flux Metadatabase (Walker)
- CLAD/TDep WG-4: Deposition Uncertainty (Bell)
- NHx Study (Puchalski)
- COTAG (Walker)
- In-canopy source-sink modeling (Wu)
- Duke Forest Atmosphere/Biosphere Exchange (Walker)
- Advanced air-surface exchange modeling (Saylor)

➢ TDep Outreach
- TDep posters and sign-up sheets
- Keep TDep in mind when going to conferences
- Engage deposition focused research groups

➢ Long-range Outlook
- Boulder, CO 2019: agricultural workshop. No TDep committee meeting
- Madison, WI 2020 and Fall 2020: Get back to science focus on deposition; white paper based research; updated Tdep measurement model fusion (MMF) product

4. TDep Stakeholder Workgroup (SHWG) (John Walker)

- WG currently consists of John Walker, Karelyn Cruz, Bret Schichtel, Kristi Morris, Greg Beachley, Anne Rea, Chris Rogers.
- One of the objectives of the TDep WP was to identify and prioritize research needs.
- In developing WP, enhanced coordination and collaboration across Federal and State agencies, academia, and non-profit groups was identified as a need to address the most critical knowledge and data gaps in a timely manner. A stakeholder WG focused on building collaboration among groups interested in Nr deposition science has been initiated.
- SHWG objectives:
  - ➢ Increase communication across scientific communities.
  - ➢ Create new opportunities for collaborative research by promoting the inclusion of deposition science in grant programs.
  - ➢ Advance the integration of TDep science needs into existing research programs across the stakeholder groups.
  - ➢ Facilitate communication among program managers within stakeholder agencies and other user groups.
- Current activities:
  - ➢ Planning of Fall 2019 TDep agricultural workshop.
  - ➢ Participation in new USDA North Central Regional Development Committee. Project developed by Rich Grant and colleagues: NCDC233 Sources and Fate

of NH3 Across the Region.

- Fall 2019 agricultural workshop
  - Theme: Better understanding the linkages between agriculture and reactive N deposition
  - Planning committee: SHWG, Rich Grant, Jamie Schauer, Mike Olson, Amanda Cole, Donna Schwede, Melissa Puchalski, Dave Schmeltz
  - One day workshop on Monday, November 4, 2019, in lieu of fall TDep meeting
  - Registration fee, lunch provided
  - Objectives:
    - Combine science and stakeholder engagement
    - Exchange of scientific information relevant to TDep mission and knowledge gaps identified in Nr WP
    - Gather input from stakeholders on science needs and opportunities for engagement with TDep
  - Outcomes:
    - Advancement of research to address science needs identified in TDep Nr WP
    - Advancement of ideas for TDep involvement in NCDC233 project
    - Harmonization of TDep and stakeholder needs
    - New participation in TDep
  - Products:
    - Workshop report for NADP
    - Journal article summarizing state of the science
    - Stakeholder engagement plan for TDep working group
  - Format:
    - Morning session of science topics
      1. Modeling and source apportionment
         a. Current knowledge of agricultural contributions to Nr deposition
         b. State of the science of modeling Nr deposition
      2. Emissions
         a. Status and need for agricultural NH3 emission inventories
         b. Characterization of non-agricultural sources
      3. Spatial and temporal patterns
         a. What additional monitoring is needed to better characterize patterns and trends in NHx concentrations and deposition?
    - There will be two 20-minute invited presentations followed by 40-minute panel consisting of presenters and two additional invited panelists. Six speakers total, three panels
    - Afternoon session will be focused on stakeholder engagement. Federal and state agencies, non-profits, commodity groups

a. Three 15-minute presentations followed by 40-minute panel consisting of speakers and two additional invited panelists. Six speakers total from stakeholder groups, two panels

- Status of planning:
  - May: planning committee to finalize topics for scientific presentations. Finalize list of invited speakers, panelists, and other attendees
  - June: Contact invitees, finalize topics for presentations and panel participants, workshop announcement
- NCDC233 – Sources and Fate of NH3 across the landscape:
  - USDA North Central Regional Development Committee has been established to write a proposal to USDA NIFA for formation of a Multistate Research Committee (MSRP) within two years
  - USDA and non-USDA can sign up to participate in proposal development
  - If proposal accepted, interested parties sign up to participate in project
  - https://www.nimss.org/projects/view/mrp/outline/18558

5. Measurement Model Fusion WG (MMFWG): TDep Map Update (Greg Beachley)

- Recap from Fall meeting in Albany, NY
  - Description of updated version 2018v2:
    - Correction of aggregation error in 2002
    - Changes from 2015 to 2016 maps
    - Nr trends now reflect the entire TDep grid rather than CASTNET sites
  - Outlined plans for script conversion and 2018 MMF product.
  - Established Measurement Model Fusion Workgroup (MMFWG).
- MMFWG
  - Objectives:
    - Caretakers of the TDep MMF product output
    - Ensure that TDep MMF stays at the State of Science
    - Identify, prioritize, and improve the TDep model
    - Communication with CMAQ team and other MMF groups
    - Help work on outputs (maps summary, version years, maps output format)
    - Field questions on TDep
  - Current Focus:
    - Script conversion product
    - TDep MMF products
    - Work with Deposition Uncertainty Workgroup
  - Current Progress:
    - Behind the scenes work in drafting the SOW and applying the TDep MMF product toward NOx/SOx/PM secondary standard
    - Will have more formal kickoff meeting in June 2019

- TDep Products
  - 2016 Maps summary available on-line.
  - 2017 Maps summary available on-line prior to fall meeting.
  - 2018 maps to be run with CMAQv5.3 and in new scripting language.
  - New CMAQ time series run in development.
- "State of the Science" of TDep MMF Maps
  - TDep WP used the TDep MMF to illustrate the main points of the state of the science of Nr deposition.
  - Key limitations listed of the TDep MMF maps were:
    - Large uncertainty in the most dominant deposition pathway (dry)
    - Lack of incorporation of NH3 measurement data
    - Lack of full representation of Nr budget: hourly NO2 measurements, wet and dry ON measurements
    - Limited focus on urban deposition
  - Laundry list of needs from previous requests:
    - Expanded data inclusion:
      1. 1in3 networks such as IMPROVE
      2. Urban continuous networks for NO2, SO2; NCORE/PAMS
      3. Ozone dry deposition
      4. Higher resolution wet deposition data
      5. Time format and flexibility to resolution
      6. Incorporation of remote sensing data
    - Geo-spatial interpolation: New PRISM algorithm, 2 versus 4 km precipitation grids, computational precision difference, AIRMoN precipitation, MDN sites, completeness criteria
    - CTM Output:
      1. Ammonia:Issues with emissions inventory and fusing bi-di surfaces with measured values
      2. Sea salt surface estimates
      3. Extending CMAQ coverage beyond the CONUS
      4. Land-surface dependent deposition parameterization
- Script Conversion
  - Map reproduction and consistency: recode the AML script without significant modifications to ensure consistent deposition estimates for trends assessment.
  - Code and model flexibility: open-source code and easier scripting structure to allow for easy modification for improvement and for custom applications such as NOx/SOx secondary standard.
  - Some potential specifics:

- Streamlining procedures, file structure and data storage, and redundant protocols. Example: bring parameter definitions to a universal input file rather than buried in scripts
- Modifications to input data: expand to include hourly data and 1in3 network data; improve temporal resolution of wet dep data as currently only available as annual data
- Modifications for different MMF techniques: geo-spatial interpolation methods (radius of influence); bias adjustments (land use specific based on ecosystems)
- Modernization and flexibility of output data: Tool to export grid data nearest to entered coordinates

- TDep MMF Trends 2000 to 2017
  - Not much change from 2016 to 2017
  - Major shift in total Nr deposition from NOy to NHx dominated
  - Subtler shift from dry to wet
  - Large increases in wet dep NH4 (NADP) and dry NH3 (CMAQ)
  - Large decrease in dry HNO3 (CASTNET) and wet NO3 (NADP)
  - Comparison of TDep trends to CMAQ v5.2.1 output
    - CMAQ high for dry HNO3 and low for wet NH4
    - Reasonable agreement for dry NH3 and wet NO3
    - Have concluded that difference is due to measurement bias adjustment
  - Precipitation amount increased from 2016 to 2017 in the southeast, northeast, Sierra Nevadas, eastern NM to southeast Colorado, Oklahoma to SW Missouri and in the Sawtooth Mountains. Decreases were seen in the southeastern shore , central to south Texas, northern Louisiana and in Montana, North Dakota and Minnesota.
  - Total Nr deposition increased in the southeast (AL, north GA,TN) , northeast, Sierra Nevadas, eastern NM to southeast Colorado, Oklahoma, southwest Missouri and northern Arkansas, and in the western Wyoming's Cache Valley. Decreases were seen in southeastern SC and NC, central to south Texas and northern Louisiana, and Montana, North Dakota, and Minnesota.
  - Precipitation is driving the changes in Nr.
  - Changes in wet and dry deposition; changes versus wet and dry Nr deposition; changes in NOy and NHx deposition; changes versus total NOy and NHx deposition; total sulfur deposition; and base cations were presented.

5. **Education and Outreach Subcommittee (EOS) Update** (Kristi Morris)
   - Kristi Morris and Chris Rogers are the TDep representatives on this committee.
   - Group has not yet met.
   - Would like to look at NADP web site presentations.

- Produce a fact sheet coming from the WP for managers.
- Skype seminars of WP topics starting in late summer.
- Facilitate conversations about what would be useful coming out of this group.

6. **CLAD/TDep Deposition Uncertainty Workgroup: Introduction to the Weighted Deposition Uncertainty Metric (WDUM)** (Mike Bell)
   - This is WG 4 in CLAD and was started about two years ago when CLAD stated using TDep maps. Meetings occur on a monthly basis.
   - Manuscript currently under review at Science of the Total Environment: *Assessing uncertainty in total Nr deposition estimates for North American critical load applications*. Walker, et.al.
   - Motivation for WG was:
     - Determination of the amount of deposition in excess of the critical load requires an estimate of total deposition. Currently, estimates of uncertainty are not available for the Nr total deposition estimates most commonly used for North American ecosystem assessments.
   - Aspects of uncertainty in deposition budgets:
     - Measured deposition
       - Uncertainty in deposition and air concentrations measurements
       - Completeness of the Nr chemical budget
       - Spatial and temporal representativeness
     - Modeled deposition
       - Completeness of the Nr chemical budget
       - Uncertainty in inputs of emissions and meteorology
       - Representation of chemical reactions
       - Deposition algorithms
       - Spatial averaging of sub-grid processes
       - Measurement-model fusion procedures: bias correction, spatial interpolation,
   - Challenges in quantifying uncertainty
     - Quantitative estimates of uncertainty for some aspects of the deposition budget are available:
       - Measured wet deposition and air concentrations
       - Spatial interpolation of wet deposition
     - Uncertainty in some components of the modeled deposition budget can be informed by model-to-measurement or model-to-model comparisons.
     - Methods for aggregating the component uncertainties within and across chemical species and then propagating to the annual scale are needed.
     - Incompleteness of the measured and modeled budgets with respect to deposition of organic N and other species would still be an issue.

    - In absence of rigorous estimate of uncertainty, a simpler metric of relative uncertainty may be useful for critical loads assessments.
- Weighted deposition uncertainty metric (WDUM). Uncertainty methodology applied to TDep total deposition grids:
    - At each location, apply an “uncertainty rating” to each component (HNO3 dry, NO3 dry, NH4 dry, etc.) of the total deposition budget.
    - Calculate the fraction of total deposition contributed by each component.
    - Calculate fractional deposition weighted uncertainty for each component using uncertainty ratings.
    - Sum deposition weighted uncertainties for each component.
    - WDUM for total N deposition.
- WDUM = Sum($FTDep_i * UR_i$) where $FTDEP_i$ is the fractional contribution of component i to total deposition and Uri is the uncertainty rating for component i of the total deposition budget.
- Uncertainty ratings are based on understanding of deposition processes relative to measured wet deposition and informed by comparisons of dry deposition models.
    - Is bias correction applied to MMF procedure?
- WDUM can range from a value of 1 at locations where 100% of the total deposition is contributed by components with a rating of 1 to 4 where 100% of the budget is contributed by components with a rating of 4.
- Simplifications and limitations:
    - Implied linear relationship between uncertainties of the deposition components
    - Uncertainty rating is a constant value.
        - Ignores spatial and temporal variability: greater uncertainty in complex terrain, urban-rural gradients; phenology, temporal patterns in air concentrations
- Herbaceous richness CLs and associated deposition uncertainty:
    - CL for N for decreased herbaceous richness.
    - Points are split into open and closed canopy systems.
    - Out of 16,523 plots the TDep total N is within ±2 kg/ha/year of CL for 1,550 plots (9.3%).
    - Areas with higher CLs have more uncertainty within closed canopy.
    - Areas with higher deposition have more uncertainty in closed canopy.
    - Areas with higher exceedance have more uncertainty.
    - Example: Croatan National Forest
        - High uncertainty area mainly due to NH3, non-measured species
        - Need better sense of what is happening with NH3
    - Example: Monongahela National Forest
        - High uncertainty value for HNO3 which is a rare contributor to the east coast. Either not accurate or an actual novelty.

- Conclusions and Next Steps
  - WDUM is the first step in a more quantitative uncertainty assessment for specific locations.
  - Some issues that will be pursued:
    - Spatial variability in uncertainty
    - Elevation/precipitation impacts
    - Dry deposition in different climates
  - For this dataset, near exceedances in higher deposition areas have more uncertainty
  - Due to the spatial variability of WDUM, this metric is more suitable for use at a local scale.
    - Example: site where the uncertainty is dominated by NH3, then could focus in to examine the sensitivity of NH3 deposition to specific model processes.

7. AMoN Site Characterization Study Update (John Walker)

- Objectives:
  - Develop methodology for using 2-week average AMoN concentrations in bi-directional NH3 flux model.
  - Provide NADP with a model for calculating and reporting net and component NH3 fluxes at AMoN sites.
  - Inform the use of AMoN measurements in TDep maps.
- Review of bi-directional flux model
  - Can we parameterize based on literature values or do we need better numbers?
- Study Design
  - Phase I: Develop databases of soil and vegetation chemistry, micrometeorology, and surface physical characteristics at three AMoN sites.
  - Phase II: Use datasets to parameterize and test a bi-directional NH3 flux model for use at AMoN sites.
    - Assess model sensitivities to biogeochemical and meteorological inputs
    - Develop methods for use of two-week NH3 concentrations
    - Standardize model for implementation across AMoN
- Pilot Amon Sites:
  - Chiricahua National Monument, AZ (CHA467): range land
  - Bondville, IL (BVL130): agricultural
  - Duke Forest, NC (DUK008): hardwood forest
- Field Measurements
  - Meteorological measurements: hourly averages of 3D wind components, solar radiation, temperature (2 and 9m), wetness, wind speed and direction
  - Soil conditions: hourly averages of moisture, temperature

- Soil chemistry: moisture, NH4 and NO3 concentrations, pH; 15 locations per site; 5 soil cores within a 1x1 m plot, separated by O and A horizons
- Vegetation structure: leaf area indeces from 15 locations
- Vegetation chemistry: moisture and total N, NH4 concentrations and pH of bulk leaf and litter from 15 locations

- Status of activities
  - Phase I: Field data collection completed
    - All soil/vegetation chemistry data received from lab; chemistry data sets near completion
    - Processing of micrometeorological measurements underway
    - Processing of leaf area measurements underway
  - Phase II: activities initiated
    - Development of Phase II QA Plan
    - Development of continuous leaf area time series
    - Development of modeled meteorology datasets
- Measured versus modeled meteorology
  - Network-wide implementation of the NH3 flux model will require the use of modeled meteorology at most AMoN sites.
  - Assessing the potential uncertainty associated with the use of modeled meteorology.
  - Measured and modeled meteorology will be compared at the three pilot sites and differences in modeled flux using measured versus modeled meteorology will be assessed.
- Modeled meteorology products
  - National weather service real-time mesoscale analysis (RTMA): hourly wind speed, RH, ambient temp, precipitation, pressure
  - North American land data assimilation system (NLDAS): hourly shortwave/longwave radiation
  - Noah land surface model: hourly u_*, Obukhov length, soil temperature, soil moisture
- Measured versus modeled meteorology: DUK008 Hardwood Tower
  - Lower model wind speed and u* at night.
  - Causes higher model aerodynamic resistance at night (lower deposition); good agreement during the day.
  - Model generates warmer temperatures during the day which causes higher model stomatal compensation point during the day.
  - Good agreement for radiation and daytime stomatal resistance.
  - Higher model RH during the day which causes lower model cuticular resistance during the day (higher deposition).
- Next steps

- Completion of soil and vegetation chemistry datasets: spring 2019
- Completion of measured micrometeorological datasets: summer 2019
- Begin comprehensive bi-directional model evaluation at pilot sites: summer 2019

8. Flux Metadatabase Update (John Walker)

- Purpose:
  - Collect metadata on completed and ongoing Nr flux measurement studies: direct flux measurements, micrometeorological methods.
  - Construct publicly available (NADP) searchable metadatabase of study details: global coverage.
  - Metadatabase will
    - Increase availability of Nr flux datasets
    - Facilitate evaluation and improvement of dry deposition models
    - Promote collaboration among flux measurement and modeling communities
    - Complement similar effort for through fall measurements in the U.S.
- Status:
  - 14 questionnaires received on crops, wetlands, forests and grasslands.
  - 8 additional positive responses indicating intention to submit questionnaire. Many intend to submit multiple datasets.
  - Follow up needed with others.
  - Routine developed to process pdf questionnaires without manual entry.
- Details of questionnaires received:
  - Crops:
    - Corn, NH3, SE US
    - Soybean, NH3, SE US
    - Corn, NH3, total Nr, Germany
    - Wheat, NH3, total Nr, Germany
  - Wetland:
    - NH3, Germany
  - Forest:
    - Mixed, NH3, HNO3, HONO, aerosol NH4, aerosol NO3, Germany
    - Mixed, organic N, SE US
    - Mixed, NOy, NE US
  - Grassland:
    - NH3, NO, NO2, O3, Switzerland
    - NH3, HNO3, aerosol NO3, Aerosol NH4, SE US
- Next steps:

- Continue to follow up with individuals that have not responded or indicated they would but have not.
- Continue processing questionnaires.
- Make database publicly available in July 2019.
- Annual literature review to identify new datasets.

9. Summary of 2019 World Meteorological Organization (WMO) Expert Meeting on Measurement-Model Fusion for Global Total Atmospheric Deposition (MMF-GTAD)

- Workshop objectives:
  - To share updates since the 2017 workshop and advance the Global Atmosphere Watch (GAW)on MMF-GTAD project.
  - Project goals:
    - Explore the feasibility and methodology for producing global maps of atmospheric concentrations of gas and aerosol species as well as wet, dry, and total deposition.
    - Meet the needs of policy-makers, science programs and client communities including human and ecosystem health, biogeochemical cycling, biodiversity, agriculture, and climate change.
- Expected Outcomes
  - Revised set of project goals based on advances on the state-of-science in the field of MMF techniques, modeling and available measurement data.
  - Roadmap with defined steps and involvement of experts for accomplishing the project's goals.
  - Estimate of the costs involved for each goal/step and exploration of possible financing mechanisms.
- Participants
  - International programs (INMA, GESAMP)
  - MMF and data assimilation (TDep, CAMS, ADAGIO, Norway/Sweden)
  - Global and regional modeling and evaluation (HTAP, UNECE-TFMM/Eurodelta, MICS-Asia, AQMEII, CCMI)
  - Data management, analysis and distribution
  - Satellite observations and applications to human health and deposition
  - Ground-based gas, aerosol and deposition measurement databases
  - WMO
  - WMO/GAW Scientific Advisory groups and expert teams
- Workshop Structure
  - WMO GAW context and vision:
    - Reorganization to be determined at June 2019 WMO Congress
    - Vision of MMF-GTAD as client-driven service
  - Update from potential clients and contributors:

        - N cycle, climate links, ocean impacts, agriculture
        - Current MMF-GTAD projects and activities worldwide
        - Surface and satellite measurements
        - Regional and global modeling, evaluation and comparability
    - Project planning and discussion
        - Revisiting the three goals from 2017
        - Identifying contributors to each activity
        - Possible funding sources
        - Canvasing for project steering committee
- Major Outcomes:
    - Confirmation of formal WMO/GAW MMF-GTAD project with multiple components:
        - Proof-concept paper to summarize the evolution of deposition estimates and highlight the importance of deposition
        - MMF of existing 2010 ensemble global model results with an updated data set
        - Stitch together existing and new regional/global MMF-TAD maps (Canada, USA, UK, Sweden, Norway, Asia, Europe
    - Leads identified for most components, but funding needed
    - Scientific Steering Committee – volunteers identified
    - Meeting report and roadmap in progress
- Links to NADP/TDep:
    - Cross-pollination with global efforts
        - D. Schwede, A. Cole on steering committee for MMF- GTAD
    - Increased attention to N and S deposition and variability in model comparisons, reanalyses, and evaluation
    - Focus on model development of dry deposition schemes, land use
    - Global dataset compilations (2010, 2017 or 2018)
    - Further development of fusion/assimilation methods tailored to deposition
    - Client for N flux database

10. Updating the CMAQ Time Series for TDep (Donna Schwede)

- CMAQv5.3
    - Expected release summer 2019
    - Peer review panel - May 21-22, 2019
        - Report will be released with the model
    - Code and documentation available from GitHub:
        - https:github.com/USEPA/CMAQ
    - CMAQ webpage: https:www.epa.gov/cmaq
- Science application goals:

- Improve capabilities for addressing local nonattainment issue.
- Enable examination of US air pollution in context of changing global emissions.
- Quantify natural contributions versus anthropogenic enhancements, especially with lower NAAQS threshold.
- Improve cross-media application capability.

- User-oriented development goals
  - Greater transparency of emissions source options and online scaling.
  - Improved diagnostic tools for probing and understanding model results.
  - Increased numerical efficiency with expanded use of modern high performance computing techniques.
  - Improved user-oriented design features like better organized output logs with consistent and expanded meta-data.
- Setting up the next time series
  - Huge investment of resources
  - Multiple users of the end product
  - Workgroups meeting to discuss
  - Targeted years: 2002-2017 (2018 if ready)
  - Consistent runs to preserve the trends
  - Emissions are the challenge: need to be generated for the chemical mechanism
- Meteorology
  - WRF v4.0
    - 4.1 about to be released. Further testing with CMAQ needed
    - New hybrid vertical coordinate system that is better for complex terrain
    - Landcover
      1. MODIS: avoids boundary issues; some errors?
      2. NLCD: has jumps in land use from year to year
  - Lightning data assimilation
    - Would improve wet dep for future fusion
    - Data not available for all years
- Emission Inputs
  - Emissions inventory
    - Only available every 3 years
    - Errors not corrected retroactively
    - 2016 has a lot of state updates that are not in other years; it is more like an NEI year than 2015
  - Mobile sources
    - New version of MOVES needs to be run for all years
    - Vehicle miles traveled differs each year

        - SCC system changed around 2011; makes it hard to go back
        - Not sure interpolation between years would work
    - Non-road
        - New version of model would need to be run
        - Working on spatial allocation of agriculture and construction vehicles and growth rates
        - Might be able to interpolate between years
    - Wildfires
        - Would need to go back and run the same version of SMARTFIRE
        - Go back and separate smoldering versus active fires?
        - Cannot interpolate between years
    - Agricultural emissions: CAFOS, fires, EPIC
- Timeline for new runs
    - Meteorology: should be able to start soon
    - Emissions
        - Still working out who will do the work
        - Need to decide how to interpolate between years
        - Probably August before all emissions are ready
    - CMAQ
    - Peer review results needed to ensure there are no issues (end of June)

11. Additional Business

No additional business

12. Meeting Adjourned