

Rocky Mountain National Park Initiative
RMNP 2012 Nitrogen Deposition Milestone Report
Public Comment Summary & MOU Agency Responses
June 17, 2014

I. Several Estes Park citizens provided comments to the report. The comments are listed by topic below:

Susan Wolff, Estes Park, CO
Tom Street, Estes Park, CO
Johanna Darden, Estes Park, CO
Thomas Gootz, Ph.D., Estes Park, CO
Graham Hodgkin, Estes Park, CO

- A. Comment: Reduce the number of motor vehicles in the park during the worst periods of pollution.

Response: From 2001 to present, RMNP has operated a formal visitor transportation system along the popular Bear Lake Corridor with two main routes. The Bear Lake Route moves visitors from RMNP's transportation hub, known as the Park and Ride, to Bear Lake with stops at popular trailheads. The Moraine Park Route connects RMNP's two main campgrounds to the Park and Ride. Shuttles run from Memorial Day through Columbus Day with over 450,000 people riding these routes in an average year. Operating the Bear Lake shuttle routes during this period likely reduces the motor vehicle miles traveled in the park during the busiest summer months when pollution is higher.

Beginning in 2006, RMNP, in conjunction with the Town of Estes Park, launched a pilot project to test an integrated visitor transportation system. This integrated system provides easy access from lodging establishments, the Estes Park Visitor Center, and the town's Fairgrounds Park and Ride to downtown shopping and RMNP access. The Town of Estes Park provides four routes as part of their portion of the integrated system; two routes serve lodging establishments along Colorado Highway 34 and Colorado Highway 36, while the third is known as the "campground route" which serves private campgrounds in the Estes Park area. An additional shuttle provides access from the Town's Fairgrounds Park and Ride. RMNP added a connecting route known as the "Hiker Shuttle" which is an express route that runs from the Estes Park Visitor Center to RMNP's Beaver Meadows Visitor Center, and on to the Bear Lake Road Park and Ride. In 2012, over 53,000 people rode the Hiker Shuttle which reduces the number of motor vehicles in the park during the busiest summer months when pollution is higher.

- B. Comment: Expand the shuttle system to offer stops at Alpine Visitor Center, Estes Park, Lyons, Loveland.

Response: The Town of Estes Park is currently studying a transit and highway improvement project for downtown Estes Park funded by the Federal Highway Administration Federal Lands Access Program (FLAP) & the Colorado Department of Transportation Responsible Acceleration of Maintenance and Partnerships (RAMP) Grants. If implemented, shuttle service from the Town to RMNP is likely to continue. Commercial bus operators offer tours up to the Alpine Visitor Center with increasing service to meet the current demand over the past 5 years.

Shuttle system connections to Lyons and Loveland would need to be addressed through a regional transit association involving all regional transportation systems.

- C. Comment: Increase the size of Beaver Meadow Visitor Center (BMVC) parking lot so that more visitors can take shuttles from that location.

Response: Since 2011, the park has conducted a pilot Intelligent Transportation System (ITS) program aimed at providing early information on traffic congestion and limited parking to park and Town of Estes Park visitors. This system uses dynamic message signs to provide information on alternate parking facilities and shuttles for accessing the park and downtown destinations. ITS messaging will help intercept visitor traffic from the east at the Estes Park Fairgrounds Park and Ride and Visitor Center parking garage soon to be built. This project is being conducted in partnership with the Town of Estes Park, the Federal Highways Administration – Central Federal Lands, and the Colorado Department of Transportation. With the assistance of the ITS, RMNP has no plans to construct additional parking within the park.

- D. Comment: Remove the Bear Lake Road Park and Ride parking lot to encourage shuttle use. Use one shuttle route to connect BMVC, Glacier Gorge, and Bear Lake.

Response: Use of one Bear Lake Road shuttle and removal of the Bear Lake Road Park and Ride parking lot would require additional shuttle service to, and greater capacity at, the intercept parking lots at BMVC and in Estes Park. The ongoing transit and highway improvement project in Estes Park could inform future alternatives for transportation along the Bear Lake corridor. A decision to remove the Bear Lake Road Park and Ride parking lot may require a Transportation Plan for an overall transit system between the park and Estes Park.

- E. Comment: Mandate the use of shuttles to access Bear Lake Road and elsewhere. “The main issue with RMNP is that it is almost completely dependent upon the private auto to get people to and from the park.”

Response: Limiting vehicle use or mandating the use of shuttles conflicts with the park’s enabling legislation requiring the “freest use” for recreational purposes. Also, these decisions would require development of a Transportation Plan for an overall transit system between the park and Estes Park that may require larger parking lots and additional shuttle service from Estes Park.

- F. Comment: The Town of Estes Park FLAP and RAMP Grants project under consideration for downtown Estes Park transit and highway improvement will speed up automobiles through the Town and increase nitrogen emissions. Building roads and parking structures will encourage more people with cars to come and result in more idling while waiting to enter the garages.

Response: Downtown Estes Park current traffic congestion during the summer months forces motor vehicles to spend significant time idling at stoplights, pedestrian crossings, and in stop-and-go traffic. The proposed one-way couplet will allow traffic to move more efficiently through downtown Estes Park and will likely reduce emissions. The extent to which motor vehicle

emissions would be affected by the FLAP and RAMP transit and highway improvement project is undetermined. An integrated visitor transportation system and the ITS are current methods to reduce RMNP and Estes Park mobile source emissions.

- G. Comment: Increase park fleet efficiency by requiring hybrid vehicles and shuttles. Provide electric car recharging stations for the visitors and staff.

Response: RMNP is increasing efficiency of its fleet by adopting hybrid electric technology, educating drivers on fuel saving practices, and optimizing fleet size and consumption. RMNP's 2013 fleet contained 219 vehicles including 19 hybrids (up from 4 in 2007) and one full electric vehicle. In 2013, RMNP was awarded funding through the Department of Energy's Clean Cities National Parks Initiative. The Initiative supports transportation projects that educate RMNP staff and visitors on the benefits of reducing dependence on petroleum, cutting greenhouse gases, and easing traffic congestion. With support from the Northern Colorado Clean Cities, RMNP purchased two Chevy Volts, installed electric vehicle charging stations (for official park use), and adopted idle-reduction programs as well as an education and outreach program for staff and visitors. With the assistance of partners, RMNP is investigating opportunities for local public use electric vehicle charging stations.

- H. Comment: Retrofit park shuttle buses to reduce pollution.

Response: The 2013 park shuttle fleet, including more than ten diesel buses, was fitted with diesel particulate filters to remove much of the soot particulates from shuttle exhaust. The 2014 shuttle fleets includes two hybrid electric buses that are up to 30% more efficient and have greater passenger capacity.

- I. Comment: Provide safe bicycle lanes within RMNP that connect with the Town of Estes Park trails to encourage bicycle use over motor vehicle transportation to reduce pollution.

Response: RMNP is exploring the possibility of developing a multiuse trail on the east side of the park that would roughly parallel, but be separate from, existing roadways. The trail would be located outside designated wilderness and could accommodate non-motorized, self-propelled modes of travel (including bikes) on up to 15.5 miles of trail from the Fall River Entrance to Sprague Lake, with potential connection to three visitor centers, three campgrounds, and numerous hiker shuttle stops. If developed, the trail could connect to the multiuse trail system that is being developed within the Estes Valley. As part of the planning and decision making process an Environmental Assessment (EA) is being prepared. The EA will evaluate the potential impacts on natural resources, cultural resources, and socioeconomics, and will afford the public an opportunity to comment on the proposal. More details on this project are available at <http://parkplanning.nps.gov/romo>.

- J. Comment: Install solar panels in RMNP as an alternative to energy from fossil fuel from power plants.

Response: RMNP operations use electricity (from power plants), natural gas, propane, and biodiesel for energy. Through the use of energy saving technologies and staff observation of the

park's energy and waste reduction guidelines, RMNP has reduced its annual energy use in park buildings by 30% in the last decade.

Two diesel-powered generators provide electricity to the Alpine Visitor Center and Trail Ridge Store during the summer months atop Trail Ridge Road at 11,796 feet in elevation where electric service is otherwise not available. The Alpine Visitor Center is closed during the fall, winter and spring months. Energy efficient biodiesel powered electrical generators were installed in 2005 that reduced fuel consumption by approximately 45%. The administrative facilities within RMNP are powered and heated with electricity produced by local hydroelectric plants.

Beginning in 2015, facilities at the RMNP Hidden Valley area will be entirely powered by solar energy.

- K. Comment: "I would like to recommend the following:Oil and gas drilling including fracking is causing pollution in the park. Weld County has more active oil and gas wells than any county in the US with nearly 18,000 wells. Work on regulations for fracking wells in order to reduce air pollution and possibly a reduction of fracking wells in the state. A number of cities have moratoriums on fracking. Currently, the Platte River Power Authority is selling surplus water for the fracking industry and the Mayor of Estes Park supports this."

Response: During the past decade, Colorado has been a national leader in developing and implementing regulatory requirements to reduce air emissions from the oil and gas production sector. Since 2004, the Colorado Air Quality Control Commission (AQCC) and Colorado Oil and Gas Conservation Commission (COGCC) have adopted six separate set of requirements to reduce oil and gas air emissions. As a result of these regulations the ambient air concentrations of oil and gas associated volatile organic compound (VOC) emissions in Weld County have dropped significantly. Most recently, in February 2014 the AQCC adopted a ground-breaking set of new regulations that are projected to reduce oil and gas VOC emissions by approximately 93, 000 tons per year. Additionally, the State has developed and implemented regulations directly associated with oil and gas well hydraulic fracturing, or "fracking" process. Well operators are required under COGCC Rule 205A to disclose to FracFocus¹ the chemicals or additives used in the fracking activity. Moreover, operators are required under COGCC Rule 805, to capture gases² during the well completion phase (when flow-back occurs) when technically and economically feasible. While these rules do not reduce nitrogen deposition in the park, they do illustrate the effort by the state of Colorado to ensure oil and gas is developed in an environmentally safe manner. Specific to nitrogen, Reciprocating Internal Combustion Engines used in oil and gas sector throughout the state are required to meet NOx limits. Federal regulations restrict NOx emissions from drill rigs and other mobile sources associated with the oil and gas sector.

- L. Comment: "Oil and gas drilling produces nitrogen, and the industry is not aggressively dealing with a solution to capture and dispose of the many pollutants produced in this

¹ Fracfocus is a website registry for disclosure of chemicals associated with oil and gas well hydraulic fracturing. The website link is at the following address: <http://fracfocus.org/>

² Referred to as a "Green Completion"

process. The incredible amount of water that is used in this process will only create more water problems in our state. The Platt River Power Authority sells effluent water to an intermediary, which then sells that water to the oil and gas industry for fracking. I only need to drive through Weld County, CO in order to get a headache. The Platt River Power Authority is a not-for-profit business which is quasi-governmental. Although their Board of Directors consists of the mayor of Loveland, Fort Collins, Estes Park and Longmont along with each municipality's utilities manager, they do not seem to be doing enough either to insure a healthy ecosystem in Rocky Mountain National Park.”

Response: In the context of nitrogen deposition in the park, oil and gas drilling operations are a minor contributor (<10%) of nitrogen oxide emissions when reviewing the Colorado 2011 Ozone Nonattainment Area (NAA) NOx Emission Inventory, but a potential source of nitrogen nonetheless. Drill rigs relocate frequently so they are not considered stationary sources. Thus, drill rigs are generally preempted from state regulation; however, drill rigs are subject to federal regulation as mobile sources. Newer drill rigs are subject to stricter NOx emission standards. Hydraulic fracturing, or fracking does produce some NOx emissions that are associated with the engines that pump the fluid into the well bore, but again according to the Colorado 2011 Ozone NAA NOx Emission Inventory, these emissions are also a minor source of nitrogen emissions.

As shown in the Milestone Report, recent CDPHE estimates show that as a whole, oil and gas point and area sources contribute about 17.5% of total statewide NOx emissions, although the extent of predicted future development is uncertain. Emission estimates for this source category will continue to be refined and tracked in the future.

As part of the requirements for Colorado's Regional Haze State Implementation Plan (SIP), Platte River Power Authority recently installed enhanced combustion control (ECC) technology that reduces almost 500 tons per year of NOx emissions from the Rawhide Power Plant located in Larimer County east of the park. This reduction in NOx emissions from this power plant and others across Colorado as a result of the Regional Haze SIP will help decrease future nitrogen deposition in the park.

Regarding the use of water for fracking activities, the State of Colorado does not limit the transfer of water among entities provided that all applicable regulations are followed. Water rights and sales do not fall within the context of the goals of the 2012 Milestone Report.

M. Comment: “I would like to recommend the following: work towards requiring emission testing for all vehicles in the Estes Valley. Currently, emissions testing is NOT required.”

Response: In 2011, the Colorado Air Quality Control Commission (AQCC) considered a proposal to expand the I&M program to the Estes Valley. This proposal was not approved largely because of the long travel distance to the nearest test station (near Loveland) and the small amount of emission reductions achieved from testing a relatively small number (< 5,000) of vehicles. The APCD remains committed to evaluating and proposing cost effective mobile source emission reduction strategies statewide.

- N. Comment: “Furthermore, there is a lack of enforcement of vehicle pollution standards in the state. In fact, some communities nearest RMNP such as Estes Park have waved all pollution inspection standards for their residents for political theater. Furthermore, many of the thousands of cars that come to RMNP come from states with not vehicle standards at all. Therefore, not invoking the nitrogen reduction contingency plan only delays any improvement in nitrogen levels.”

Response: The federal Environmental Protection Agency (EPA) is responsible for establishing national motor vehicle emission standards. All new vehicles are subject to these standards and as a result emissions have been significantly reduced over time. In the urbanized portions of the 9-county³ Denver Metro Area/North Front Range (DMA/NFR) area, Colorado has established a periodic vehicle inspection and maintenance (I&M) program to ensure compliance with the federal emission standards because of the areas designation as an Ozone non-attainment area. Within the I&M program area, subject vehicles that fail to meet federal emission standards must be repaired (except in some economic hardship situations – where temporary exceptions are granted). Outside of the 9-county DMA/NFR area, the state does not require vehicle inspection and maintenance program because these areas attain the national ambient air quality standards. Due to the stringent national standards for new vehicles and expected fleet turnover, emissions from vehicles outside the I&M program area, are expected to continue to decline.

- O. Comment: “Colorado must take a stand to convince other neighboring states that they must come into the 21st century and take vehicle and factory emissions seriously. The money that is being spent inside RMNP to further study the problem of nitrogen precipitation could better be spent lobbying other “flat land” states to adopt pollution standards.”

Response: Nitrogen precipitation chemistry is complex. Clearly sources outside of Colorado do contribute to the nitrogen deposition in the park. In recognition of this, Colorado⁴ and The National Park Service (NPS) Air Resources Division evaluated and commented on the impacts of several major pollution sources in Wyoming (Jim Bridger, Dave Johnston, and Laramie River power plants) as well as in Nebraska (Gerald Gentleman power plant). Air Resources Division comments were important in the EPA deciding to promulgate tighter nitrogen oxides emission limits on the Wyoming power plants. The MOU Agencies also review the potential impacts of proposed major stationary sources and major modifications within 300 km of the Park and make comments to state agencies where appropriate.

- P. Comment: “Because of the concern about the affects of nitrogen on the alpine plants, I have another question. Maybe it is not pertinent to this particular study, but I wonder if a study is being considered to review the effects of high aluminum levels in the mountains. I am not sure of the truth of the claims that chemical trails ("chemtrails") which are constantly seen criss-crossing over the mountains, outside of the normal commercial air

³ The 9-county area includes Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, and portions of Larimer and Weld Counties.

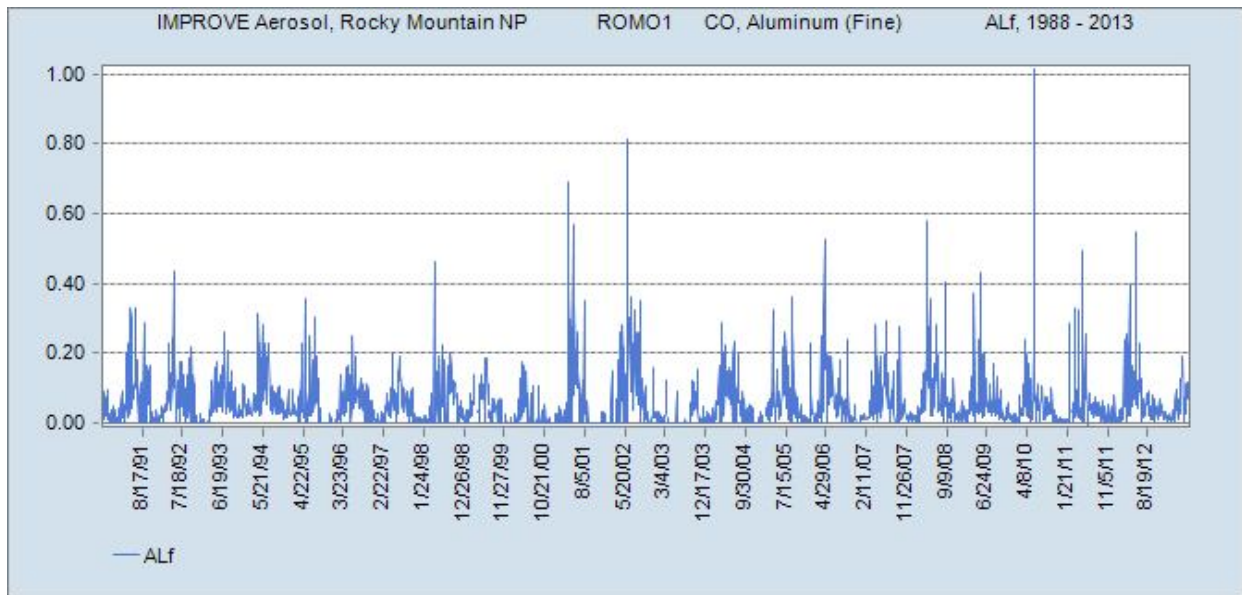
⁴ Colorado Department of Public Health and Environment – Air Pollution Control Division, letters commenting on SO₂ and NO_x controls for units 1 and 2 at Gerald Gentlemen Station, the largest power plant in the state of Nebraska, dated June 23, 2009, January 21, 2011, and April 25, 2014.

traffic lanes, are dropping aluminum particles and other substances, which make their way to the ground.

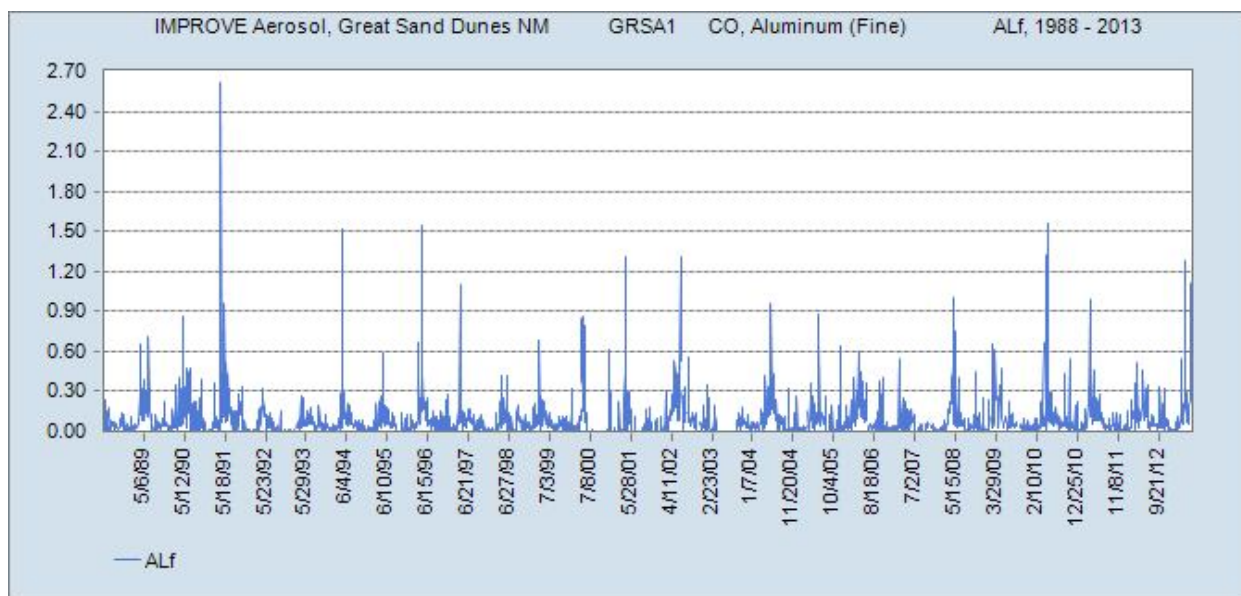
I have seen reports that elevated aluminum levels in the soil (PH) are detrimental to several crops. IF this is true, isn't it possible that the alpine tundra and other plants might be affected?

Please advise if this is worth follow up in the near future.”

Response: In response to your question about high aluminum levels in the mountains, we evaluated data from the Interagency Monitoring of Protected Visual Environments (IMPROVE) speciation particulate monitor (ROMO1) in RMNP nearby the Longs Peak Ranger Station. The IMPROVE particulate monitor is comprised of four different cartridges that are changed every three days. The IMPROVE cartridges are analyzed for various elements including fine aluminum (Alf) particulates. The below graph depicts the fine aluminum mass ($\mu\text{g}/\text{m}^3$) for the period 1990 to 2013. Over the past 23 years it appears aluminum particulate levels have remained fairly stable, with a slight increase in variability. Another speciation particulate monitor in Commerce City, Colorado (fairly close to Denver International Airport) averages about $0.097 \mu\text{g}/\text{m}^3$ of fine aluminum. If aircraft are the dominant source of aluminum, one would expect much higher levels at Commerce City relative to RMNP.



For comparative purposes, the below graph depicts the levels of aluminum at Great Sand Dunes National Park, which appear to be much higher. Generally, aluminum is the most abundant metallic element in the earth's crust at about 8%. Since GSNP is far from most commercial aircraft routes, it is more likely that blown material in native soils is the most common source. Consequently, it appears that aluminum emissions from aircraft are unlikely to be a significant source of the aluminum particulates in either park.



Additionally, from APCD PM2.5 particulate speciation sampling and the US EPA's IMPROVE network sampling, average aluminum and barium levels that we see in the ambient air are in typical ranges, as indicated by ATSDR (U.S. Agency for Toxic Substances and Disease Registry) in their ToxGuides, shown below.

	ATSDR	Commerce City	Mt. Zirkel Wilderness
Aluminum	0.005-0.18 ug/m3	0.097 ug/m3	0.044 ug/m3
Barium	<0.05 ug/m3	0.008 ug/m3	no data

(2013 data)

The subject of aluminum and soil pH is very complex and not easily summarized in a response to comment. Nonetheless, it would seem unlikely that the soils are experiencing aluminum toxicity from deposition, because the concentrations monitored in the ambient air rarely exceed a couple millionths of a gram per square meter in any 3-day period. Over the span of 20 years this amounts to less than 4.9 milligrams of aluminum per square meter.

Q. Comment: “I applaud the efforts of Rocky Mountain National Park as far as trying to reduce the impacts of nitrogen pollution, but I believe more can be done. I would like to recommend the following Work towards emission standards for feedlots.”

Response: The MOU agencies support the need for increased information related to emissions from feedlots and other production agriculture. The “National Air Emissions Monitoring Study (NAEMS)”, discussed on pages 66-67 of the Milestone Report, has examined data from emissions monitoring conducted at approximately 2,600 animal feeding operations (AFOs). The Environmental Protection Agency has been developing draft emission-estimating methodologies to characterize emissions from the AFOs participating in the study. Although similar methodologies are used to calculate emissions from industries where site-specific monitoring data are not available; AFO emissions are difficult to characterize due to physical site characteristics and the site-specific management practices used, which can significantly alter

emissions. More information on the NAEMS is available on EPA's web site:
<http://www.epa.gov/airquality/agmonitoring/index.html>.

- R. Comment: Spraying plants with insecticides and fertilizing is a known problem for farmers on the front range. I understand that some efforts are being made in the manner in which plants are being watered to reduce ground water pollutants. There are still winds which carry these pollutants up to Rocky Mountain National Park. Perhaps crop rotation will be a better method to keep the soil full of the necessary nutrients, and fertilizers (i.e., nitrogen) will no longer be needed.”

Response: The MOU agencies agree that agriculture and many other sources along the Front Range (and other areas) contribute to nitrogen deposition. However, ground water pollution and insecticide usage are not specifically considered in the 2012 Milestone Nitrogen Deposition Report. The MOU agencies are sensitive to the complicated mechanisms that comprise the nitrogen cycle and the complexity of management decisions required in any farming operation. Strategies are being considered that will allow for seasonal implementation of best management practices (BMPs) to reduce the transport of nitrogen and ammonia to the park during upslope weather events. The MOU agencies believe these BMPs will provide management flexibility to agricultural producers, and provide the greatest protection to the park during certain and specific weather events.

- S. Comment “Feed lots are also a problem. The nitrogen produced there ends up in Rocky Mountain National Park.”

Response: A strategy using an Early Warning System is being piloted in 2014 as a means to address the specific weather conditions that are most likely to carry nitrogen and deposit it at the park during rain/snow events. The MOU agencies will be carefully evaluating this strategy and hope to address the most significant wet nitrogen deposition events at RMNP.

- T. Comment: “I believe the reason for [this] is due to the lack of response and commitment of the farming industry in Colorado to the voluntary best practice methods to limit nitrogen pollution.” (Where [this] is chronic condition of excess nitrogen caused from vehicles and large-scale farming/ranching).

Response: The MOU agencies disagree with the characterization that there has been a lack of response and commitment of the farming industry in Colorado to the voluntary BMPs to limit nitrogen pollution. The nitrogen cycle is complicated and difficult to manage in an organic system, such as with feedlots. As such, the MOU agencies recognize the need to allow the implementation of practices to be voluntary. The RMNP Ag Subcommittee members meet regularly, support valuable best management practice research, monitoring and have invested a significant amount of dollars and time toward the development of an “early warning system”. The RMNP Ag Subcommittee has representatives from the Colorado Livestock Association, Colorado Cattleman Association, Colorado Corn Growers Association and a large number of other agricultural groups that continue to participate in conversations to identify possible solutions to address the concerns at the park in an economically feasible and sustainable manner for agricultural producers.

- U. Comment: (The MOU Agencies...) work towards national secondary air quality standards and enforcement; the primary air quality standards do not include ammonia and ammonium which are agricultural sources of pollution in RMNP. Ammonia is precursor to smog and is problem for people with asthma.

Response: Thank you for your concern about ammonia, its role in air pollution, and its effect on public health and the environment. As you mentioned, ammonia is not a "criteria" pollutant under the Clean Air Act (CAA) and therefore is not directly regulated as part of the National Ambient Air Quality Standards (NAAQS) or New Source Performance Standards (NSPS). However, at the national level significant consideration has been given to characterizing ammonia emissions and related impacts in recent years. It is known that ammonia chemically reacts with nitric and sulfuric acids in the atmosphere and thus is a precursor to the formation of fine particulate matter, or PM_{2.5}. In addition, sources of ammonia emissions (including agricultural and related sources) have become areas of interest as potentially contributing to changes in ecosystems from nutrient imbalances, such as the changes in high-elevation ecosystems at the park from increased nitrogen deposition.

The CAA requires EPA to set NAAQS for common air pollutants. Presently there are six such compounds, referred to as the six criteria pollutants. The six criteria pollutants are particulate matter (PM₁₀ and PM_{2.5}), ground-level ozone (O₃), carbon monoxide (CO), sulfur oxides (SO_x), nitrogen oxides (NO_x), and lead (Pb). EPA is responsible for establishing air quality "criteria" for air pollutants based on the latest scientific knowledge of human health-based and/or environmentally-based information (science-based guidelines) that is used for setting permissible levels. The set of limits based on human health is called primary standards. Another set of limits intended to prevent environmental and property damage is called secondary standards.

Sections 108 and 109 of the CAA govern the establishment, review, and revision, as appropriate, of the NAAQS to provide protection for the nation's public health and the environment. The CAA requires periodic review of the science upon which the standards are based and the standards themselves. Reviewing the NAAQS is a lengthy undertaking and includes the following major phases: Planning; Integrated Science Assessment; Risk/Exposure Assessment; Policy Assessment; and, Rulemaking. EPA continues to evaluate new and additional information relevant to the NAAQS for the six criteria pollutants and the potential for establishing new, or linking other pollutants to the existing, criteria pollutants and their primary and secondary standards.

As discussed in the RMNP Initiative 2012 Nitrogen Deposition Milestone Report, in the most recent review of the NAAQS for oxidized forms of nitrogen, EPA considered adoption of a new, combined secondary standard for NO_x and SO_x in the form of an aquatic acidification index that would be based on effects of deposition of these constituents on acidification of sensitive ecosystems. Although EPA, in their 2012 final rule, declined to adopt such a standard, the discussion of the new approach included effects of ammonia emissions and deposition on these same ecosystems.

In 2012, EPA strengthened the PM_{2.5} NAAQS annual standard from a level of 15 micrograms per cubic meter (ug/m³) to 12 ug/m³. In addition, a court decision in January 2013 required EPA to implement the PM_{2.5} standards according to “subpart 4” of the nonattainment provisions of the CAA (sections 188-190). EPA is developing a PM_{2.5} implementation rule for proposal later this year. While all PM_{2.5} precursors (including ammonia) presumptively need to be addressed in state implementation plans, the proposed rule will include a discussion of options for determining whether certain precursors do not have a significant contribution to PM_{2.5} levels that exceed the standard and therefore would not need to be subject to certain emission reduction measures. The rule is expected to be finalized in 2015.

II. Colorado Livestock Association- William Hammerich

- A. Comment: “The Milestone Report briefly mentions the booming growth of the Front Range population and associated increases in vehicle miles travelled, but the report does not address how emissions from such rapid growth will be addressed in light of nitrogen deposition in RMNP. Rapid growth in the Front Range population will lead to:
- a. Decreases in farm land and reductions in commercial livestock populations in Front Range counties;
 - b. Increases in emissions of reduced nitrogen from urban sources such as urban and commercial fertilizer use, wastewater treatment plants, and increases in biosolids production/application;
 - c. Increases in emissions of oxidized nitrogen from urban sources, such as tailpipe emissions, that may potentially lead to both direct increases in oxides of nitrogen reaching the park and provide compounds with which ammonia may react to form atmospherically stable PM_{2.5} that transports into the park more readily than gaseous ammonia; and,
- We are concerned about the implications of such growth on nitrogen deposition in RMNP. **CLA encourages the MOU agencies to proactively plan and publicize outreach and mitigation efforts oriented towards this growing population.”**

Response to a: The impacts associated with population growth will require a comprehensive evaluation of sources of oxidized and reduced nitrogen. Based on wet nitrogen deposition data,⁵ both nitrate and ammonium are equal contributors to inorganic nitrogen in the park. The MOU agencies continue to evaluate all significant ammonia and nitric oxides (NO_x) emission sources for practical and cost effective reductions.

Land development associated with population growth has led to some loss of farm lands; however, in the 9- County Denver Metro Area/North Front Range (DMA/NFR) area, farm lands represent a small portion of the reduced nitrogen emissions⁶ except for Weld County which experienced some relatively minor loss in agricultural lands. Generally, livestock populations vary from year to year depending on weather, feed costs, and calving rates making it difficult to

⁵ See 2012 Monitoring and Tracking Wet Nitrogen Deposition at Rocky Mountain Nation Park, January 2014. Natural Resource Report NPS/ARD/NRR – 2014/757

⁶ Based on 2009 Ammonia Emissions Inventory, fertilizer usage in the 9-County DMA/NFR accounts for about 3.5% of total ammonia emissions, whereas Weld County fertilizer usage is about 1.6 %

conclude that metro area population increases directly correlate with reductions in cattle production. In fact, population increases generally boost consumer demand for beef products. Since 2004, statewide cattle production⁷ has generally increased, except for a temporary decrease in 2009. In the North Front Range, Weld County, which is typically ranked as the first or second highest cattle producer in the state, there was an approximate 8.7% increase⁸ in cattle population (from 2004 to 2012), during a similar period when the Weld County citizen population increased⁹ by about 18%.

Response to b: Urban population growth will lead to some increases in reduced nitrogen emissions from commercial/municipal/residential fertilizer application, wastewater treatment plant processing, and potential biosolid land applications. The MOU agencies agree that further outreach efforts are necessary. The Agriculture Communication workgroup is focusing on outreach to these source categories in conjunction with MOU agencies.

Response to c: Some increases in oxidized nitrogen will occur from urban population growth, but it is not clear that motor vehicle tailpipe emissions will increase accordingly. In fact, mobile source fleet turnover in the DMA/NFR is expected to reduce NO_x emissions substantially over the next five years due to replacement of older vehicles and continued improvement in federal vehicle emission standards. Since 2006, vehicle traffic in the Denver region has experienced little growth¹⁰, only about one million vehicle miles traveled (VMT) per day increase between 2006 and 2010. North Front Range vehicle traffic is experiencing some growth, but it is only about 14% of total VMT¹¹ in the DMA/NFR region.

Many current and future emission reduction activities are planned and anticipated over the next decade. Several significant upcoming NO_x emission reductions are noted, including natural gas compressor engine Best Available Control Technology (BACT) requirements, retrofit controls on larger engines, Regional Haze State Implementation Plan (SIP) provisions, statewide regulatory regimes, and other programs. By 2018, a combined statewide approximate 37% NO_x reduction is estimated, which is anticipated to decrease nitrogen deposition in RMNP.

Particulate nitrate aerosols, such as ammonium nitrate (NH₄NO₃), are chemically formed when nitric acid and ammonia, react in the atmosphere. Ammonia and nitric oxides (NO_x) are precursors to the formation of nitric acid. Gaseous ammonia is very reactive and readily forms stable particulate in the presence of nitric acid. Based on the ROMANS I and II studies, long-range transport is connected with impacts at the park. Consequently, pursuing reductions for both precursors, NO_x and ammonia, is necessary to make progress in reducing nitrogen deposition impacts in the park.

- B. Comment “While the Agriculture Subcommittee has been actively involved in developing abatement strategies for agricultural sources, it is not apparent that MOU agencies have made concerted efforts to reach out to other major sources of nitrogen, especially reduced nitrogen, with regards to reducing impacts on RMNP

⁷ See Cattle and Calves Inventory - Figure 20 of the 2012 Milestone Report, on page 41.

⁸ In Weld County, according to Colorado Agricultural Statistics, in 2004 the number of cattle and calves was 520,000, the number of cattle and calves was 565,000 in 2012.

⁹ Based on data from Colorado Department of Local Affairs – State Demography Office, Weld County population was estimated at 223,432 (in 2005) and 263,746 (in 2012).

¹⁰ See 2010 Annual Report on Traffic Congestion in the Denver Region, Denver Regional Council of Governments, May 5, 2011.

¹¹ Total VMT in DRCOG region is about 74 million miles annually (2010). Total VMT in NFRMPO region is about 12 million miles annually (2009).

ecosystems. For example, commercial composting, biosolids applications, and urban fertilizer use represent non-trivial sources of ammonia emissions, yet no efforts to reach these sources are noted in the Milestone Report. CLA and other agricultural organizations will continue outreach efforts to the agricultural community, but **we ask that MOU agencies work to reach other sources of nitrogen that may be impacting RMNP.”**

Response: The MOU agencies appreciate the active involvement of the agriculture community in collaborating with researchers evaluating potential ammonia abatement strategies. The Milestone Report was intended to highlight NOx and ammonia emission trends of significant sources which include agriculture. The MOU Agencies have worked with source categories that emit nitrogen oxides, including power plants, cement kilns, vehicles, and engines, through the Regional Haze and nonattainment SIP processes along with other regulatory mechanisms, to reduce NOx.

Over the past several years, the CDPHE - APCD has been working to better characterize ammonia emissions from commercial composting, biosolid land application, and urban fertilizer use. Based on some preliminary analysis, these categories appear to be relatively minor sources of ammonia but a contributor nonetheless. The APCD has done some outreach in terms of gathering data for evaluating source emissions by working with other Divisions at CDPHE and other state agencies to determine source contributions and potential mitigation strategies. The MOU agencies look forward to working with the Ag Communication Workgroup that is being organized by CDPHE Division of Environmental Health and Sustainability (DEHS) on outreach to these source categories in 2014 and beyond. The agencies are committed to working with nitrogen sources that contribute to deposition in the park

- C. Comment: “Efforts to reduce nitrogen deposition in RMNP to date have focused almost, if not completely, on sources of nitrogen within Colorado. The ROMANS I and II studies found that somewhere between 30 and 45% of reduced nitrogen reaching RMNP originates outside of Colorado, and over half of the oxidized nitrogen comes from out of state. “Source contribution estimates for ambient ammonia from California, Utah, and the Idaho Snake River Valley varied from 7 – 12%. This implies that there are regional components to both reduced and oxidized nitrogen deposition in RMNP.” The NDRP calls for nitrogen deposition in RMNP to be reduced by more than half. This goal **cannot** be achieved by Colorado sources of nitrogen alone. **If resource management goals are to be met, it is incumbent upon the MOU agencies to expand outreach efforts beyond the borders of Colorado!**

Response: Clearly sources outside of Colorado do contribute to the nitrogen deposition in the park. In recognition of this, Colorado¹², the National Park Service (NPS) Air Resources Division, and environmental groups evaluated and commented on the impacts of several major pollution sources in Wyoming (Jim Bridger, Dave Johnston, and Laramie River power plants) as well as in Nebraska (Gerald Gentleman power plant) that are sources of oxidized nitrogen. As

¹² Colorado Department of Public Health and Environment – Air Pollution Control Division, letters commenting on SO₂ and NO_x controls for units 1 and 2 at Gerald Gentlemen Station, the largest power plant in the state of Nebraska, dated June 23, 2009, January 21, 2011, and April 25, 2014.

noted in an earlier comment, this was important in the Environmental Protection Agency (EPA) deciding to promulgate tighter nitrogen oxides emission limits on the Wyoming power plants. MOU Agencies also review the potential impacts of proposed major stationary sources and major modifications within 300 km of the Park and make comments to state permitting authorities when appropriate.

The MOU agencies agree that outreach efforts beyond Colorado are likely necessary regarding ammonia, or reduced nitrogen, emissions, although the timing of such outreach requires an understanding of what sources should be evaluated for reductions and whether realistic voluntary measures are proven to benefit the park. Based on the ROMANS I & II studies, it appears that reduced nitrogen sources from out-of-state agriculture operations should be evaluated. However, the ongoing best management practice (BMP) research on agricultural operations is not complete and more work is necessary to identify which BMPs are effective before the MOU agencies can begin outreach efforts with other states. During the interim period, more BMP work with local agriculture operations could help confirm which voluntary measures are practical and cost effective.

- D. Comment: “While CLA and the agricultural community work to address concerns about emissions from eastern Colorado, we ask that the MOU agencies define more specific plans to address emissions contributions from a growing Front Range population, from sources of nitrogen outside of Colorado, and from other significant emissions sources within the state.”

Response: The complexity of reactive nitrogen deposition and the governing atmospheric processes prevents us from being able to develop “air quality testing that determines exact sources of where nitrogen originates”. As our monitoring and modeling methods improve we should be able to reduce some of the uncertainty in the current estimates. There are two studies that will help to reduce this uncertainty. One is the Three State Air Quality Study, which is a modeling study of air quality in the western U.S. during the year 2011. This model will use updated emissions including those from the oil and gas and agricultural sectors. In addition, advanced chemical transport models with improved chemical and deposition mechanisms will be used. The primary focus of the study is to better understand ozone pollution, however, NPS-ARD will use the modeling inputs and tools to simulate reactive N deposition in the Rocky Mountains and elsewhere.

The second area MOU agencies are working to better understand emission contributions in the Front Range and outside Colorado. Specifically, CDPHE is a major funding partner for the upcoming Front Range Air Pollution and Photochemistry Experiment (FRAPPE) 2014 air quality field study (<https://www2.acd.ucar.edu/frappe>). FRAPPE is a comprehensive air quality study with goals that include understanding ozone formation, improving emissions inventories, pollution chemistry and transport, improving meteorological and air quality forecasting and improving photochemical modeling within the state. The study will be complementary to the larger NASA-funded DISCOVER-AQ (short for: Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality) and the combined campaigns will provide some of the most detailed and comprehensive air quality related measurements ever made in Colorado. Partner agencies include the National Oceanic and

Atmospheric Administration (NOAA), EPA, NPS and scientists from major research institutions from all over the country (including the University of Colorado and Colorado State University). Several research aircraft, vehicle-based mobile labs and 6 major ground sites will be included. Specifically, a full suite of nitrogen cycle measurements will be on the largest two aircraft including measurements of gas and particle phase reduced and oxidized nitrogen species. Gas phase ammonia and NOx as well as particle ammonium and nitrate will be measured from mobile labs. The NCAR aircraft that will be used during FRAPPE will be particularly suited to address transport of a wide range of pollutants inside and from outside of the state.

Throughout the process, CDPHE has advocated for measurements that include better characterization of the entire nitrogen cycle from emissions to chemistry and transport as well as the meteorological conditions that carry these emissions toward the park. Upon completion of this project, there should be a much greater understanding of many of the processes raised by the CLA comments after this campaign and hope that the CLA and other local agricultural associations in Colorado will support the upcoming campaign to the greatest extent possible.

- E. Comment: “CLA is fully supportive of the decision by the agencies involved in the RMNP Initiative MOU to abstain from triggering the RMNP Nitrogen Deposition Contingency Plan at this time. There are numerous positive aspects to the 2012 Milestone Report, and CLA will continue to support efforts to reduce nitrogen deposition in RMNP.”

Response: The MOU agencies appreciate the support of the CLA in the decision and would like to affirm the continued participation of CLA and the agricultural community in supporting the efforts to reduce nitrogen deposition in RMNP.

III. Colorado Cattlemen’s Association (CCA)- Gene Manuello

- A. Comment: “CCA appreciates the opportunity to review this report. It also appreciates that no contingency plans were put into effect, despite not meeting the 2012 goal. Though not reaching that goal, the trend line clearly shows that the work being done has reduced the amount of nitrogen deposition and this amount is trending downward. The agriculture organizations have also stepped up and created the Ag Early Warning Program which should prove beneficial in meeting the 2017 goal. This program shows agriculture’s willingness to work to meet these goals and their commitment to sustainability and the environment.”

Response: The MOU agencies appreciate the comments and concur that the “Early Warning System” has potential to help reach the 2017 Milestone goal. The MOU agencies are interested in seeing a report on the success of the first year of the Early Warning System and look forward to the build-out of the system over the next few years.

- B. Comment: “We would ask that there be more inclusion of air quality testing that determines exact sources of where nitrogen originates. The current approaches give a basic idea of the nitrogen sources; however, there is still no exact way to measure if the

nitrogen sources that are of greatest concern are native to Colorado, or if the sources are outside the state lines.”

Response: The complexity of reactive nitrogen deposition and the governing atmospheric processes prevents us from being able to develop “air quality testing that determines exact sources of where nitrogen originates”. As our monitoring and modeling methods improve, we should be able to reduce some of the uncertainty in the current estimates. There are two studies that will help to reduce this uncertainty. One is the Three State Air Quality Study, which is a modeling study of air quality in the western U.S. during the year 2011. This model will use updated emissions including those from the oil and gas and agricultural sectors. In addition, advanced chemical transport models with improved chemical and deposition mechanisms will be used. The primary focus of the study is to better understand ozone pollution; however, NPS-ARD will use the modeling inputs and tools to simulate reactive nitrogen deposition in the Rocky Mountains and elsewhere.

The second effort is the Colorado northern FRAPPE and DISCOVER-AQ (Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality) field studies. These field studies will be conducted during the summer of 2014. They are designed to investigate the relative contributions of diverse local sources of pollution, including oil and gas development and agriculture to air quality and photochemical oxidant formation in the Front Range. NPS-ARD will be funding additional reactive nitrogen monitoring in Rocky Mountain NP. These data, in conjunction with the data collected as part of DISCOVER-AQ and FRAPPE’, should help us better understand the contributions of different source types and regions to reactive nitrogen deposition in Rocky Mountain NP.

IV. Environmental Defense Fund-Graham G. McCahan

Comment: “...EDF strongly supports the MOU agencies’ commitment to continue to assess progress along the glide path and to determine whether the Contingency Plan should be triggered prior to the 2017 milestone evaluation. EDF respectfully urges the MOU agencies to submit a formal report containing this progress assessment and Contingency Plan determination to the Colorado Air Quality Control Commission (“AQCC”) by March 2015. If the progress assessment shows that the glide path rate of progress for RMNP is not being met by the end of this year, then EDF also urges the MOU agencies to include an associated request that the AQCC provide an opportunity for public discussion and public input regarding appropriate responses and measures to regain lost ground.”

Response: The MOU agencies will continue to assess the progress made in reducing nitrogen deposition impacts in RMNP, and commit to issue the next report for the 2017 milestone. Prior to 2017, and until nitrogen deposition approximates the glidepath at Loch Vale, the MOU agencies will use the weight of evidence approach to determine whether the 2017 milestone can be achieved with the current and anticipated emission reductions. Should the weight of evidence suggest the 2017 milestone cannot be achieved and there is greater departure from the glidepath and/or declining progress of partners, the MOU agencies may determine, with stakeholder input,

whether the RMNP Nitrogen Deposition Contingency Plan may be triggered before the 2017 milestone evaluation.

This approach increases MOU agency ability to manage adaptively by allowing current and developing strategies adequate time to show effectiveness while allowing opportunities to trigger the Contingency Plan before 2017. MOU agencies provide an annual update to the Colorado Air Quality control Commission. This update includes nitrogen deposition glide path progress assessment and weight of the evidence updates. MOU agencies will continue to publish annual nitrogen deposition monitoring and tracking reports to inform stakeholders and the public about the current status and trends, and to provide an assessment of progress along the NDRP glidepath. Should the annual assessment and weight of evidence for any year prior to 2017 suggest that the 2017 milestone cannot be achieved, a formal progress report with Contingency Plan determination and stakeholder input, will be completed. Therefore, MOU Agencies will issue formal progress reports adaptively prior to 2017 as the weight of evidence suggests.