
Introducing Regional Haze

Presented by:

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Regional Haze Program Overview

- What is it?
 - A federally required program to improve visibility from human-caused sources of pollution
 - Goal is to reach natural conditions by 2064 in all Class I Areas
 - New plan is required every 10 years
 - A 5-year progress report submitted between plans
 - Progress towards natural conditions tracked throughout program

Class I Areas

- Class I Areas were identified in the 1977 Clean Air Act Amendments.
- Each of these were National Parks or Wilderness Areas over a threshold of 5,000/6,000 acres at the time.
- In Alaska, the parks and wilderness areas that met this standard were as follows:
 - *Denali National Park*
 - *Tuxedni Wilderness Area*
 - *Simeonof Wilderness Area*
 - *Bering Sea Wilderness Area*



Regional Haze (RH) Program Requirements

- Plans must maintain reasonable progress towards natural conditions at each Class I Area between now and 2064.
- Visibility must improve on the 20% Most Impaired Days and cannot degrade on the 20% Clearest Days.
- State must take some action in each planning period; no action is not permitted.
- 5 years after a plan is submitted, a progress report is due. Yearly progress is expected but no yearly reports.



Photo Courtesy of "Tuxedni Wilderness; Wilderness Connect," available at: <https://wilderness.net/visit-wilderness/?ID=614>

Program Tools: Terminology

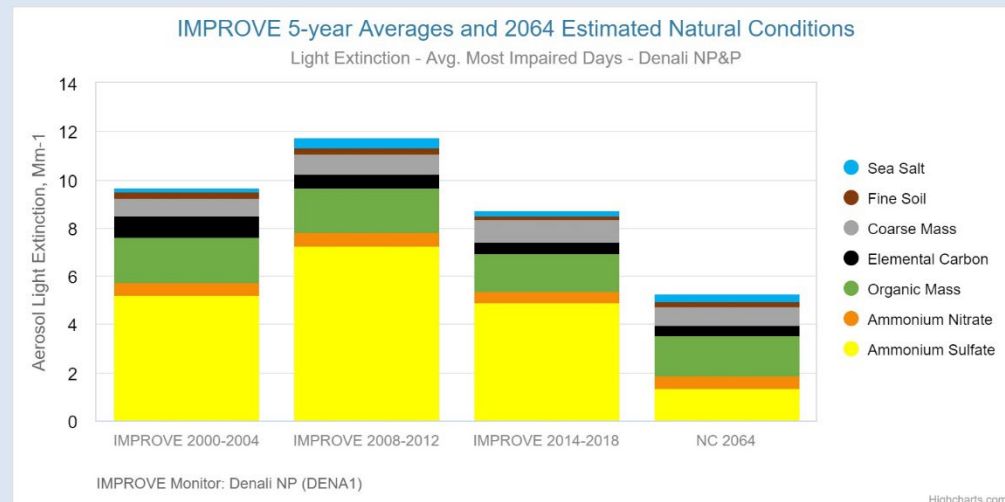
- **Most Impaired Days (MID):** New measurement established by 2017 EPA Guidance.
 - Measures only human-caused pollution in the airshed.
- **Haziest Days:** Old measurement used in First Regional Haze Plan.
 - Measures all visibility impairing pollutants in the airshed.
- **Clearest Days:** Used throughout Regional Haze program since 1999.
 - Refers to days with least amount of visibility-impairing pollutants in the airshed.
- **Natural Visibility Conditions:** Visibility to be reached at end of the program in 2064 when all human-generated impairing pollutants are to be eliminated from Class I Area airsheds.
- **Glideslope:** Visual representation of EPA estimated impairment readings in each Class I Area between the start and end of the program.
- **Baseline:** Visibility conditions and local emissions sources at the start of the monitoring phase at each Class I Area.
- **Anthropogenic:** Human-caused or generated pollution.
- **Deciviews:** Scientific measurement for visibility-impairing pollution.
- **IMPROVE Monitor:** EPA regulatory monitor used to measure visibility impairment at Class I Areas.

Program Tools: Chemical Terminology

- **Sulfur Dioxide (SO₂):** Visibility impairing pollutant generated by both anthropogenic and natural sources.
- **Nitrogen Oxide (NO_x):** Visibility impairing pollutant generated by human sources of emissions.
- **Particulate Matter (PM):** Pollutant generated by both natural and anthropogenic sources; mostly measured in terms of PM_{2.5} (fine) and PM₁₀ (coarse) (Particulate Matter at 10 and 2.5 nanometers).
- **Organic Matter (OM):** Pollutant generated as a result of forest fires and crop burning; can be caused by natural and human sources of ignition.
- **Elemental Carbon (EC):** Generated as a result of combustion processes; both anthropogenic and naturally occurring fires including wildfires and car engines can generate EC.
- **Dimethyl Sulfate (DMS):** A specific form of SO₂ generated by marine algae, plankton, and other biological life which can cause visibility impairment.

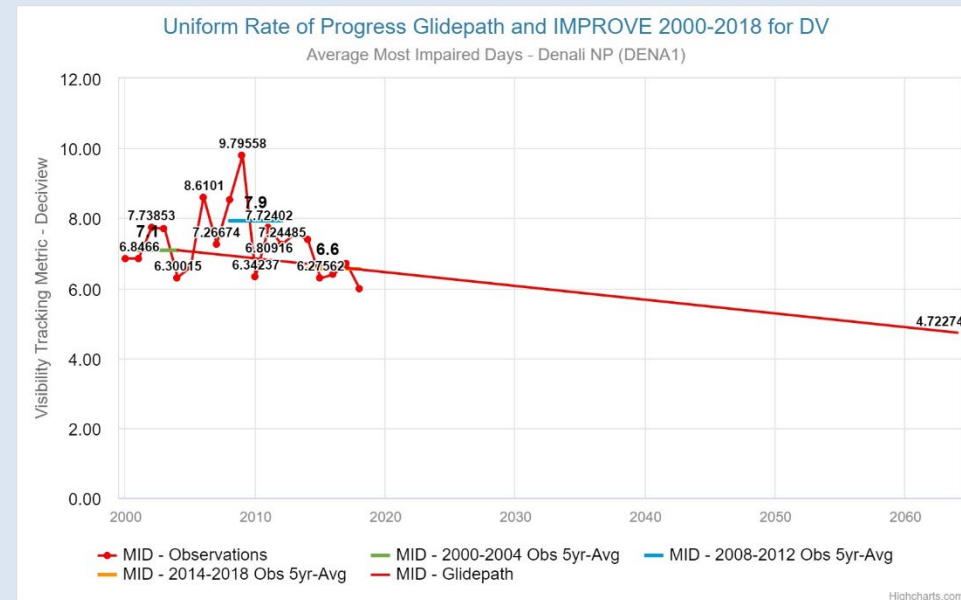
Program Tools: Visibility Baseline

- **Baseline Period: 2000-2004**
- Established visibility conditions at each Class I Area in AK
 - Simeonof baseline of 2 years due to later monitor installation
- Visibility readings: Human-caused *and* natural emissions
- Used throughout program to compare current visibility conditions with initial conditions.
- Yearly progress calculated towards natural conditions from baseline to 2064.



Program Tools: Glideslope

- *Glideslope*: Calculation of progress from beginning (baseline) through 2064, actual emissions plotted against line to show if meeting visibility goals
- Glideslope determines whether a state is meeting its obligations to improve visibility at each Class I Area.
- Glideslope can be adjusted to reflect uncontrollable influences, (natural visibility pollution, international pollution, etc.) - However, if adjusted must document and defend adjustment in plan.



Natural Sources of Visibility Impairment

- Alaska Class I Areas are exposed to a significant amount of naturally-generated visibility impairments.
- These include:
 - Volcanic Eruptions
 - Wildfires
 - Algae/Plankton Blooms
 - Wind-blown Dust
 - Pollen
- None are controllable and amounts must be calculated in airsheds to generate glideslope adjustments.



Photo Courtesy of Lt. Cdr. Nahshon Almandmoss, available at:
<https://avo.alaska.edu/images/image.php?id=93551>

Arctic Haze and Asian Dust

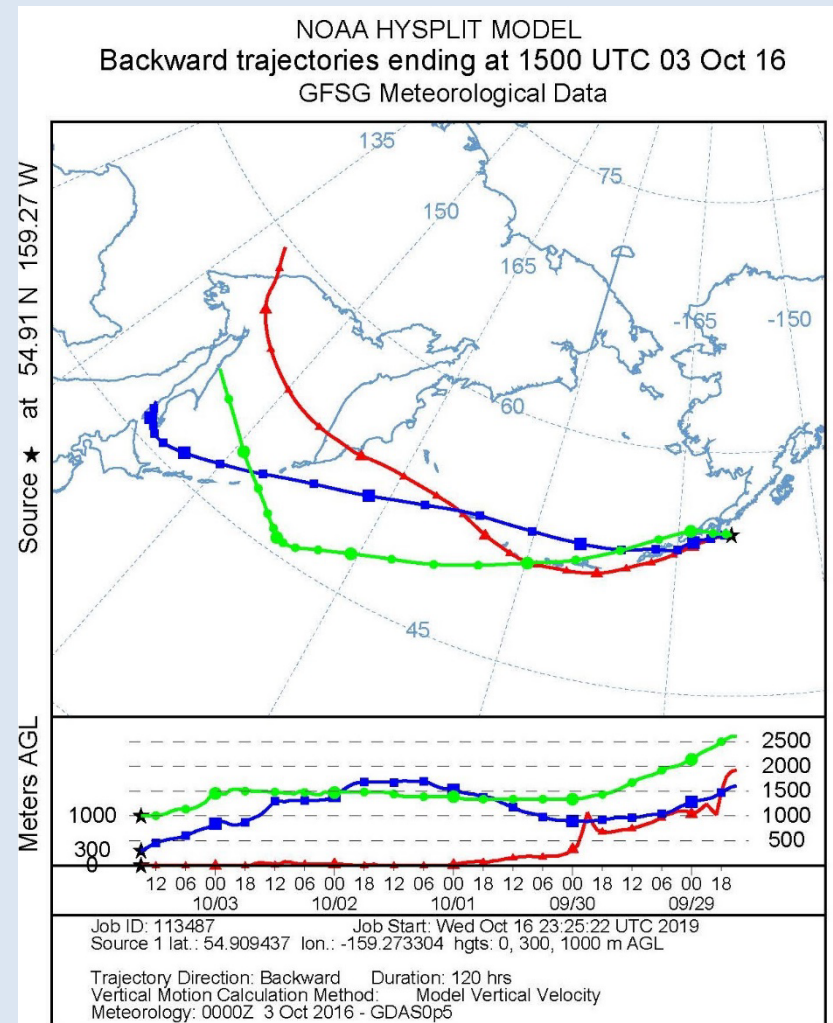
- Both are naturally occurring processes but also include human-caused pollutants.
- **Arctic Haze:** Seasonal process where gaseous pollutants are concentrated in Arctic latitudes.
 - Can be from near or distant pollution sources
- **Asian Dust:** Seasonal natural process of dust transport from the Gobi and Taklimakan Deserts north to the Arctic Circle.
 - Can include pollution from industrial production in China



Photo courtesy of J, Cozic/CIRES/NOAA Chemical Sciences Division, available at: <https://www.gi.alaska.edu/alaska-science-forum/arctic-haze-wane>

International Pollution

- Noticeable amounts of international pollution in AK airshed.
- Sources of international pollution:
 - Distant stationary sources (Russia, China, etc.)
 - Mobile sources (International marine shipping, international air transport, etc.)
 - Natural pollution (wildfire, volcanic eruptions, etc.)
- Weather fronts can transport pollution from northern China, Japan, and Korea out over the North Pacific and eventually over Class I Areas.
- Pollutants concentrate in arctic winter and observed as Arctic Haze.

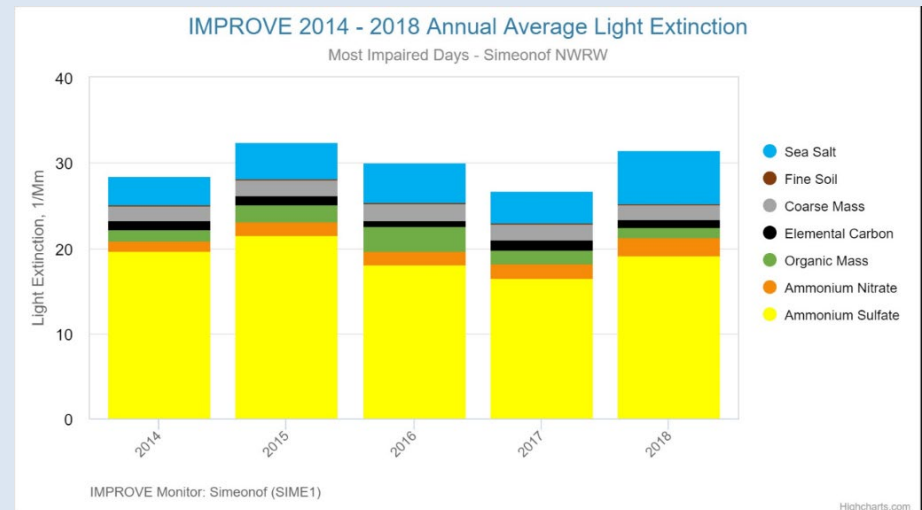
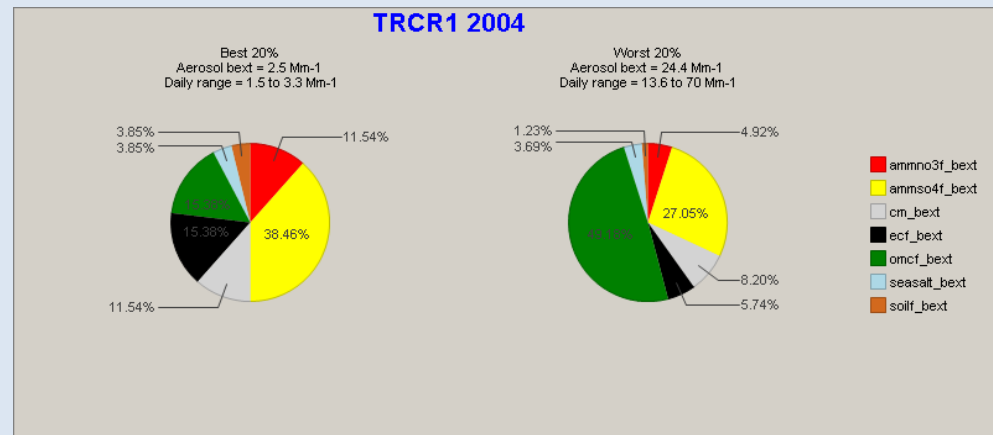


Alaska's Regional Haze Program

- 1st Implementation Period Regional Haze Plan
 - Used Baseline Period data: 2000-2004
 - Submitted to EPA in 2011
 - First Regional Haze Plan in effect: 2011-2017
- Alaska IMPROVE Monitors:
 - Kenai Peninsula Borough Monitor (KPB01) [replaced Tuxedni monitor]
 - Simeonof Monitor (SIME1) [Located in Sand Point]
 - Denali National Park Monitor (DENA1) [Located at Denali Visitors' Center]
 - Trapper Creek Monitor (TRCR1) [Located south of Denali NP]
- First 5-year progress report
 - Submitted 2015
- 2nd Implementation Period Regional Haze Plan
 - Uses 2014-2018 data; baseline data
 - Due July 31, 2021, based on new federal rules
 - Effective Period: 2021-2028

2nd Implementation Plan - new requirements

- Updates to calculations and terminology
- Most important change was in the calculations from Hazeiest to Most Impaired Days
 - Hazeiest Days: All pollutants/sources
 - Most Impaired Days: Human-generated pollutants only
- Prior calculations resulted in a mix of human and naturally occurring visibility impairment events.
- New calculation process attempts to break out and assess non-natural visibility impairment.
- Allows focus on human-caused sources that can potentially be controlled while recognizing natural impairment exists.



Additional differences between 1st and 2nd Regional Haze Plans

- In 2016, the Tuxedni monitor was moved from mainland near Chisik Island (W Cook Inlet) to the Kenai Peninsula (E Cook Inlet).
- Monitor move has resulted in a change in baseline conditions.
- Requires several years of data to complete before MID and Clearest Days glideslopes can be calculated.
- Recalculation will be available for 2nd progress report



Challenges with development of 2nd Regional Haze Plan

- Alaska has unique planning requirements
- Monitor move for Tuxedni has complicated planning
- AK Class I Areas exposed to a variety of pollution from natural and human-caused sources:
 - Natural: Wildfires, DMS, Volcanic Eruptions, Seasonal Asian Dust, Seasonal Arctic Haze, etc.
 - Human-caused: Maritime, Aviation, Power Generation, International Sources, etc.
- Visibility calculations not 100% capable of removing all uncontrollable pollution.
- Glideslope adjustments used to account for uncontrollable pollution.



More Detailed Information Available

See: "Regional Haze – Alaska's 2nd Plan"

- Overview of the results of AK's 2nd Regional Haze Planning efforts.
- Proposed items that will affect sources located within a proposed visibility protection area.
- Updated Alaska's Enhanced Smoke Management Plan and the new Visibility Protection Area (VPA).
- Overview of what is in the plan.
- New information that was used to develop the plan.



Questions?

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