
Regional Haze Introductory Presentation

Presented by:

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December 16, 2020



What is Regional Haze?

- Haze is caused when sunlight encounters tiny pollution particles in the air. Some light is absorbed by particles. Other light is scattered away before it reaches an observer. More pollutants mean more absorption and scattering of light, which reduce the clarity and color of what we see. Some types of particles such as sulfates, scatter more light, particularly during humid conditions.

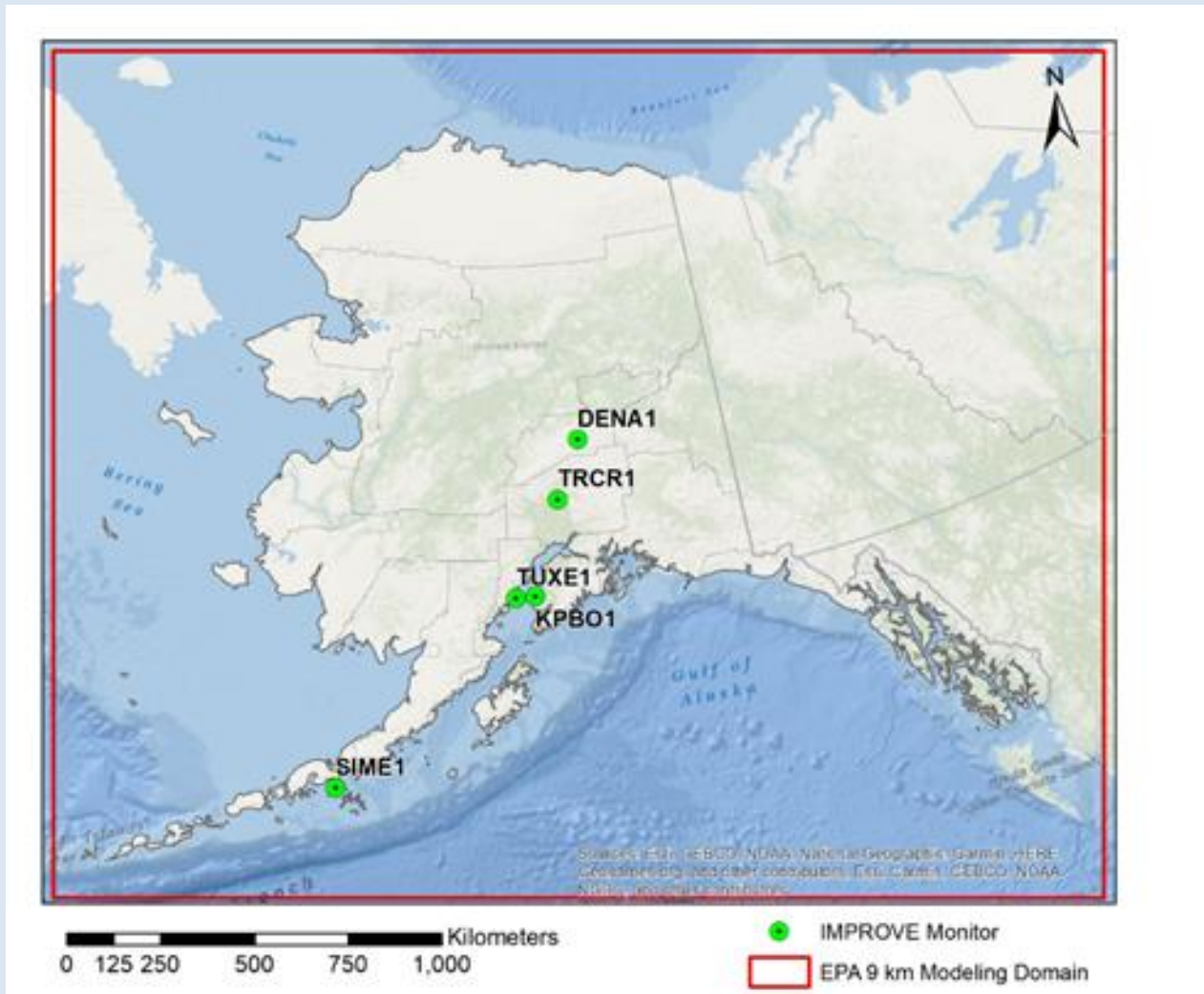


Class I Areas

- Each Class I Area was either a national park greater than 6,000 acres or national wilderness areas larger than 5,000 acres as of 1977, when the designation was established in that year's Clean Air Act amendment.
- 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



Class I Area Monitor Map



Program Tools: Terminology

- **Most Impaired Days (MID):** New measurement established by 2017 EPA Guidance.
 - Measures only anthropogenic 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.

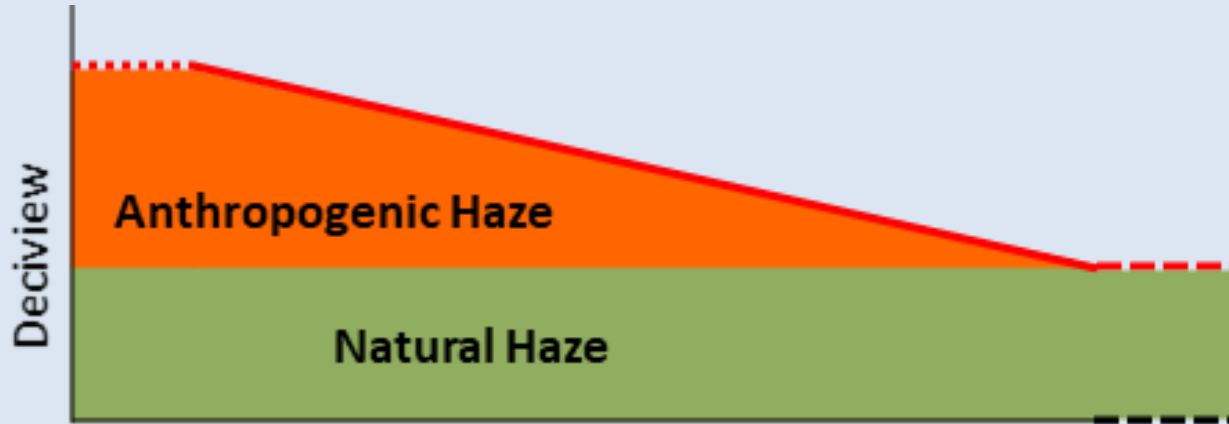
Regional Haze Program Goals

- States are obligated to present a plan that assures “reasonable progress” towards natural conditions at each Class I Area between 2004 to 2064.
- Visibility must improve on the 20% Most Impaired Days and cannot degrade on the 20% Clearest Days.
- Control Measures are identified in each planning period (10-year periods) in which the state will rely upon to reduce emissions.

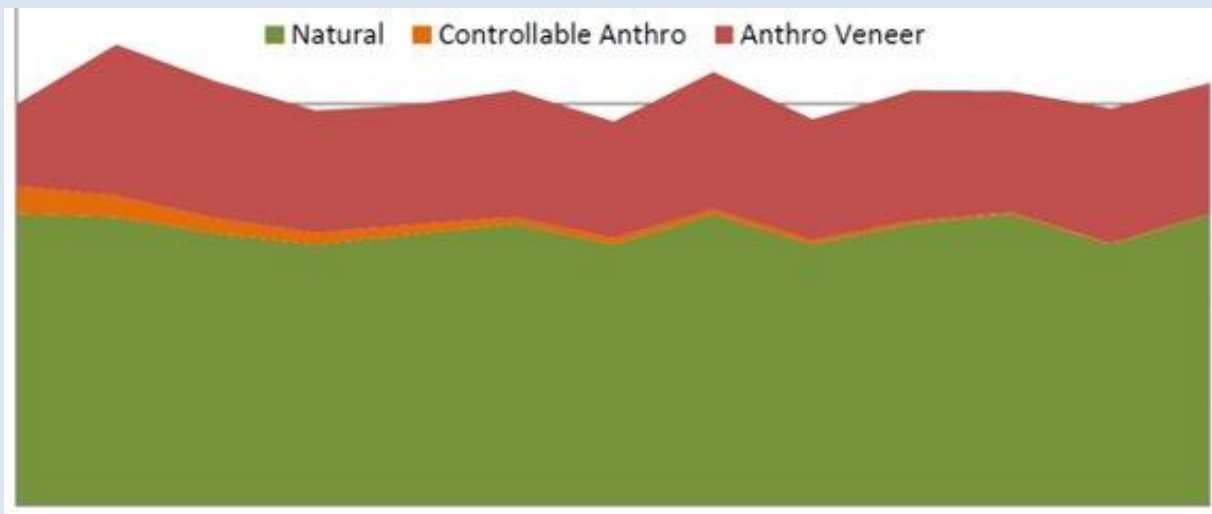


Controllable Emissions vs Uncontrollable

Idealized/Theoretical Approach to Regional Haze

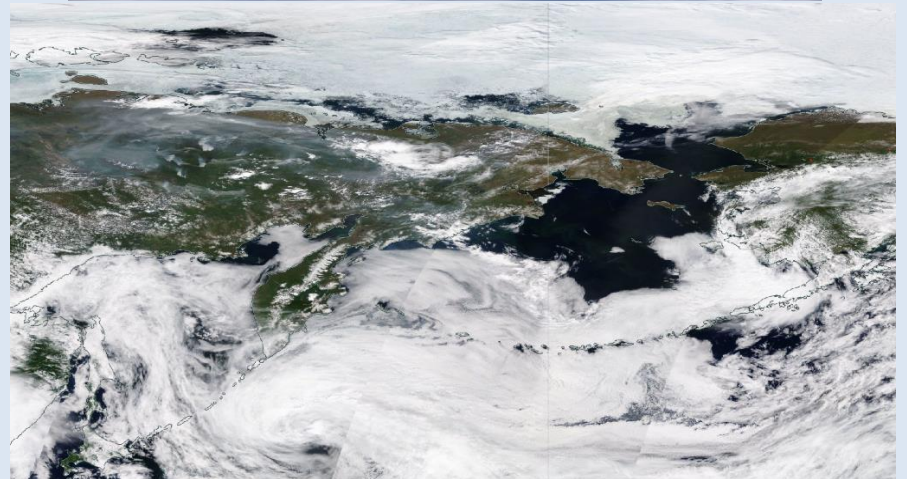


Reality of Regional Haze Planning in Alaska



Natural Sources of Visibility Impairment

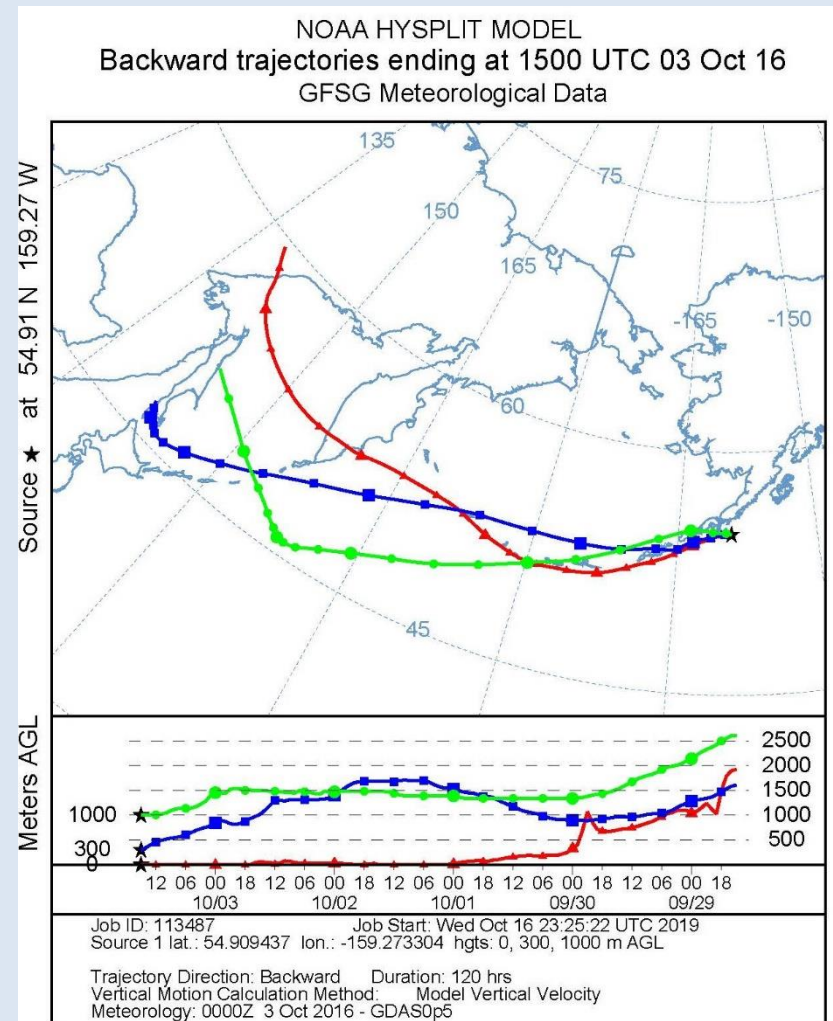
- **Dimethyl Sulfide (DMS):** Oceanic algae blooms, primarily in Bristol Bay, Gulf of AK
- **Volcanoes:** Both eruptions and Off-Gassing (Venting)
- **Asian Dust:** Dust lofted from Central Asia which settles over Arctic.
- **Glacial Dust**
- **Wildfires**
- **Sea Salt**



International Pollution

Alaska is exposed to large amounts of internationally-generated pollution from both natural and human sources. Examples include:

- **Point Sources:**
 - Electrical Generators/Power Plants
 - Factories/Manufacturing
 - Mining
 - Oil and Gas: Drilling and Refining
- **Non-Point and Mobile Sources:**
 - Small Ports and Airports
 - Rock Crushers
 - Asphalt Plants
 - Highways
- **Non-Road Mobile Sources:**
 - Construction Equipment
 - Aircraft
 - Marine Shipping
 - Railroads



Sectors of Pollution

Anthropogenic (Human):

- **Power Plants**
 - Coal
 - Natural Gas
 - Diesel
- **Manufacturing**
 - Petroleum/Chemical Refining
 - Fish/Food Processing
- **Raw Materials**
 - Oil/Petroleum Drilling
 - Mining
- **Agriculture:**
 - Farming
 - Prescribed Burning (Controlled Burns)
- **Mobile Sources**
 - Highways
 - Railroads
 - Maritime Traffic
 - Aircraft

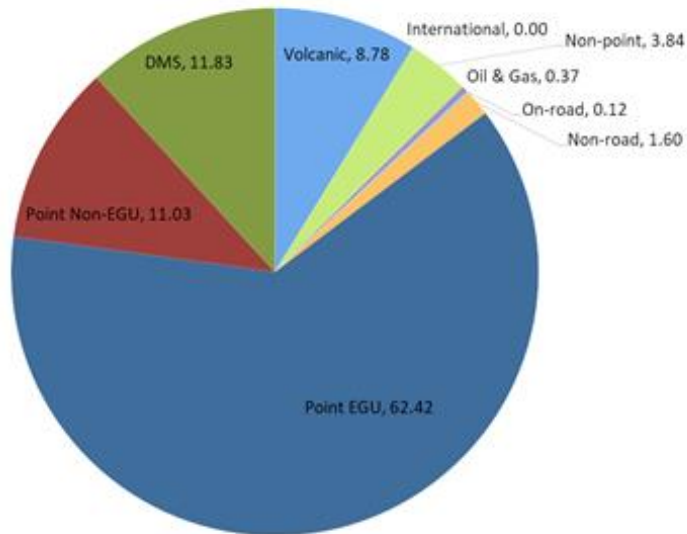
Natural:

- **Volcanoes**
 - Large/Small Eruptions
 - Off-Gassing/Venting
- **Forests:**
 - Forest Fires (Domestic and International Wildfires)
 - Pollen
 - Volatile Organic Hydrocarbons (VOCs)
- **Ocean**
 - Dimethyl Sulfide (DMS)
 - Sea Salt
- **Glacial Dust**

Controllable Emissions vs Uncontrollable

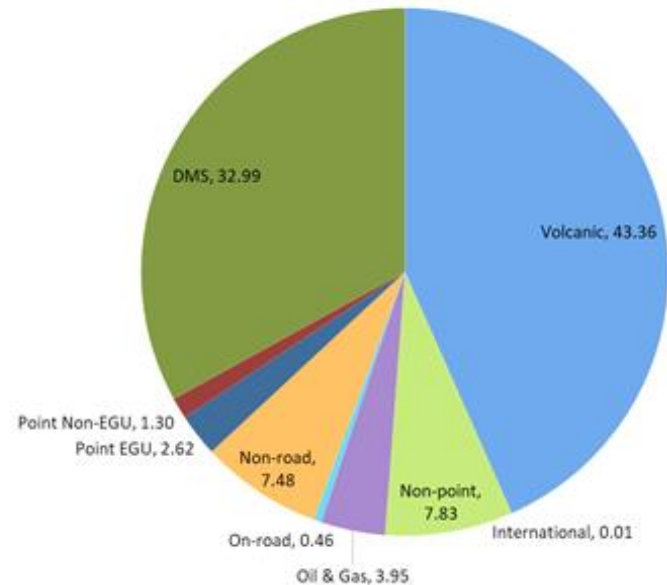
DENA1 Monitoring Site

DENA1 - 20% Most Impaired Days (2014 - 2018) - Weighted Emissions Potential by Source Sector



TRCR1 Monitoring Site

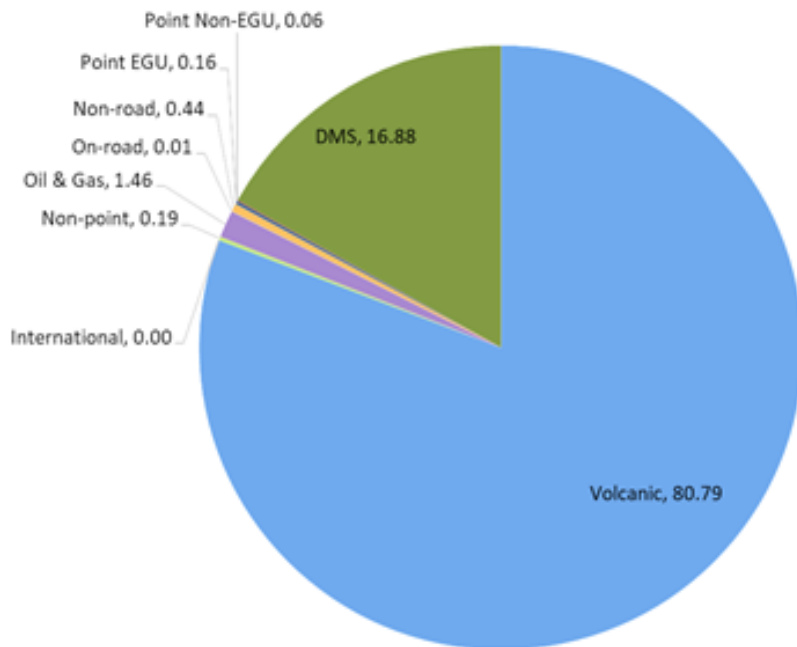
TRCR1 - 20% Most Impaired Days (2014 - 2018) - Weighted Emissions Potential by Source Sector



Controllable Emissions vs Uncontrollable

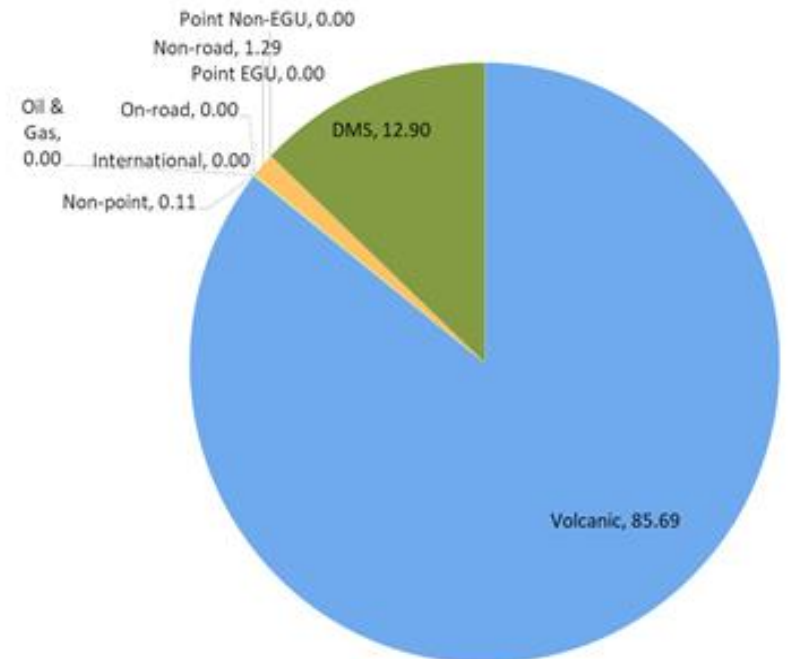
Tuxedni

TUXE1 - 20% Most Impaired Days (2012 - 2014) - Weighted Emissions Potential by Source Sector



Simeonof

SIME1 - 20% Most Impaired Days (2014 - 2018) - Weighted Emissions Potential by Source Sector



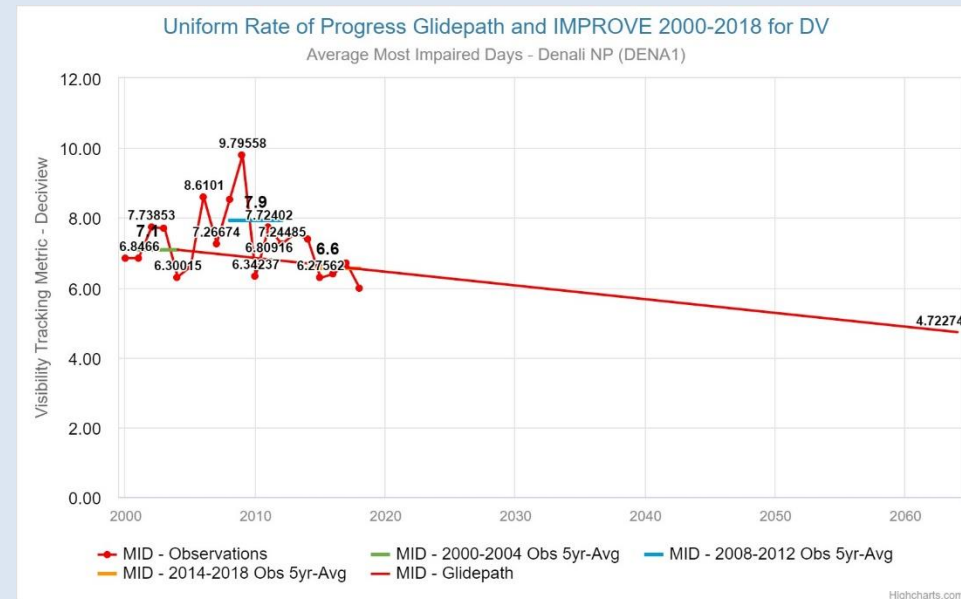
Regional Haze Baseline

- States were allowed a period at the beginning of the program for establishing baseline visibility.
- The baseline period was set from 2000-2004 for all Class I Areas in Alaska and the rest of the nation.



Uniform Rate of Progress (URP) a.k.a. Glideslope

- Glideslope is the visual representation of progress needed at each Class I Area.
- EPA calculates progress using baseline values as the starting point.
- Used to determine whether a state is meeting its obligations under the Regional Haze Rule to improve visibility.
- Can be adjusted to reflect uncontrollable influences.
- If adjusted glideslope is used, state agency will explain differences and why they have chosen to use the adjusted.



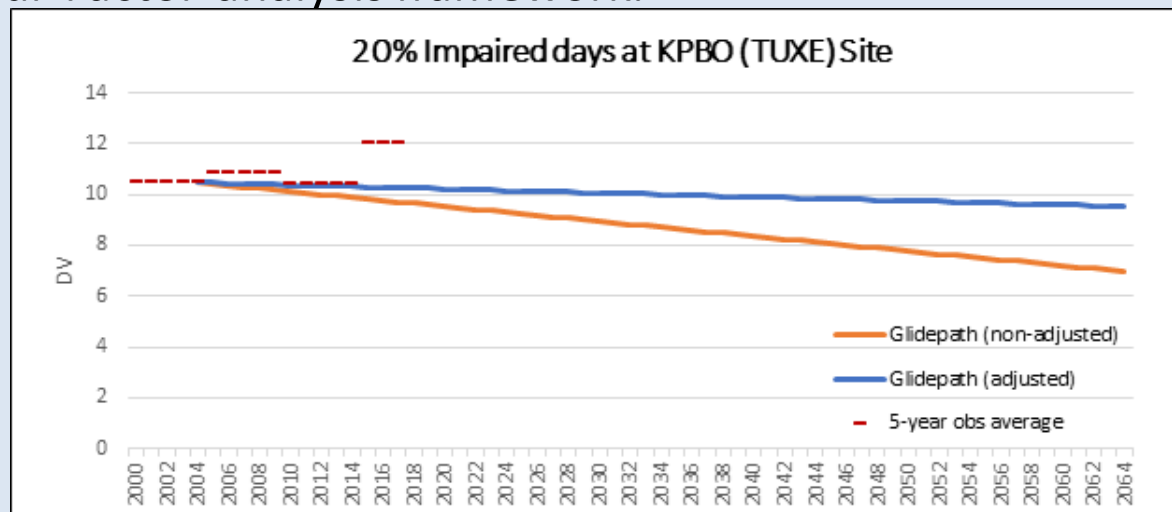
Visibility Impairment Chemicals

- The following chemicals compose the primary haze species monitored by ADEC and EPA:
 - **Sulfur Dioxide (SO₂)**
 - **Nitrogen Oxide (NO_x)**
 - **Ammonium Nitrate (NO₃)**
 - **Particulate Matter (PM)**
 - **Organic Matter Carbon (OMC)**
 - **Elemental Carbon (EC)**
 - **Dimethyl Sulfate (DMS)**
 - **Soil**
 - **Sea Salt**

EPA Rule Update: January 10, 2017

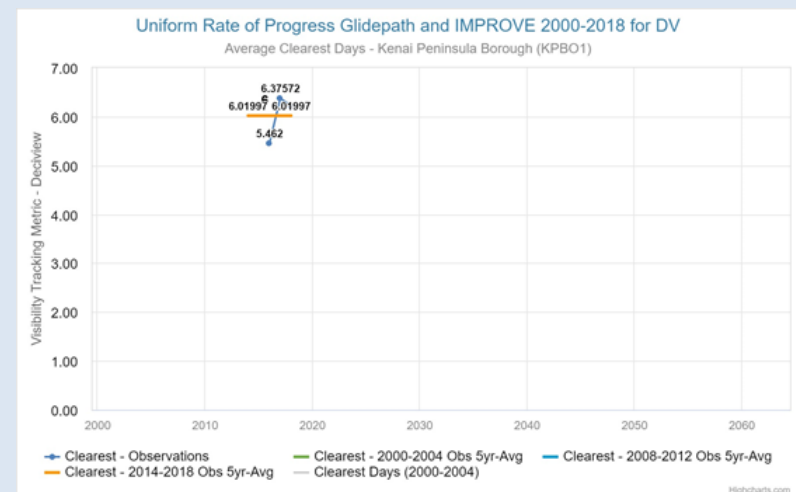
2017 Amendments

- Change from Hazeiest to Most Impaired Days (MID).
- Glidepath Adjustments: Deduction of natural and international emissions from glidepath.
- 95% reduction of wildfire smoke compared with previous rule and guidance
- Longer FLM review period than the first set of rules.
- Initial plan addressed Best Available Retrofit Technology (BART) requirements at specific industrial sources; this plan looks at source controls more broadly via the Four-Factor analysis framework.



Tuxedni Monitor Move

- In 2016, the Tuxedni monitor was moved from its prior location near Chisik Island to the Kenai Peninsula.
- Monitor move resulted in a change in baseline conditions due to larger human activity on the eastern side of Cook Inlet.
- No baseline or glideslope for this planning period.
- Enough data by the progress report in 2024.



Implementation Periods

- **First Implementation Period:** 2008-2018 Submitted in 2011.
- **Progress Report:** Accepted by EPA, 2018.
- **Present - Second Implementation Period:** 2021-2028 (working on this now)



What's next?

- DEC finishes up draft; waiting on information from point sources.
- DEC Regional Haze website updated with new information.
- Draft submitted to Federal Land Managers (FLMs) for review, before public review process initiated.
- Once FLM comments and edits are reviewed, plan will be released for public review and comment.
- Targeting summer release for public comment period.
- Submit to EPA by end of 2021.

Other Resources

- **EPA:**
 - EPA Regional Haze website: <https://www.epa.gov/visibility>
 - EPA Regional Haze Guidance Documents: <https://www.epa.gov/visibility/visibility-guidance-documents>
 - EPA Region 10: <https://www.epa.gov/aboutepa/epa-region-10-pacific-northwest>
- **WESTAR:**
 - WRAP: <https://www.wrapair2.org/>
 - WRAP TSS: <https://views.cira.colostate.edu/tssv2/>
- **WRAP Storyboard:**
 - https://views.cira.colostate.edu/wrap_rhpwg_Storyboard_draftNov20_2019/
- **ADEC:**
 - Regional Haze: <https://dec.alaska.gov/air/anpms/regional-haze/>

Want to learn more?

- DEC would like to invite those interested in a more in-depth look at Regional Haze.
 - Topics could include:
 - Understanding glide path
 - Understanding uniform rate of progress
 - State Sources of Haze
 - International contributions
- Contact: Paul Goodfellow, Molly Birnbaum, ADEC Air Quality, Air Non-Point Mobile Sources Section

Thank you!!

State of Alaska, Department of Environmental Conservation

Air Quality Division

Non-Point Mobile Sources

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