



National Park Service  
US Fish and Wildlife Service  
US Forest Service

# FLM UPDATE



# FLMs & Air Quality

“...conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”(NPS Organic Act)



“Wilderness areas...shall be administered...in such a manner as will **leave them unimpaired** for future use and enjoyment as wilderness...” (Wilderness Act of 1964)

“...**preserve, protect and enhance the air quality** in national parks, national wilderness areas, national monuments, national seashores...” (Clean Air Act as amended in 1977)



“**In cases of doubt the land manager should err on the side of protecting the air quality-related values for future generations.**”  
(Senate Report No. 95-127, 95th Congress, 1977)

# History

- Interagency Workgroup on Air Quality Models (IWAQM)
  - Phase 1 – MESOPUFF II
  - Phase 2 – CALPUFF
  - Phase 3 – ...
- FLAG 2000 Established to provide guidance on how to use the new beast
- FLAG updated 2010

# FLAG 2000 vs. 2010

<http://www.nature.nps.gov/air/permits/flag/index.cfm>

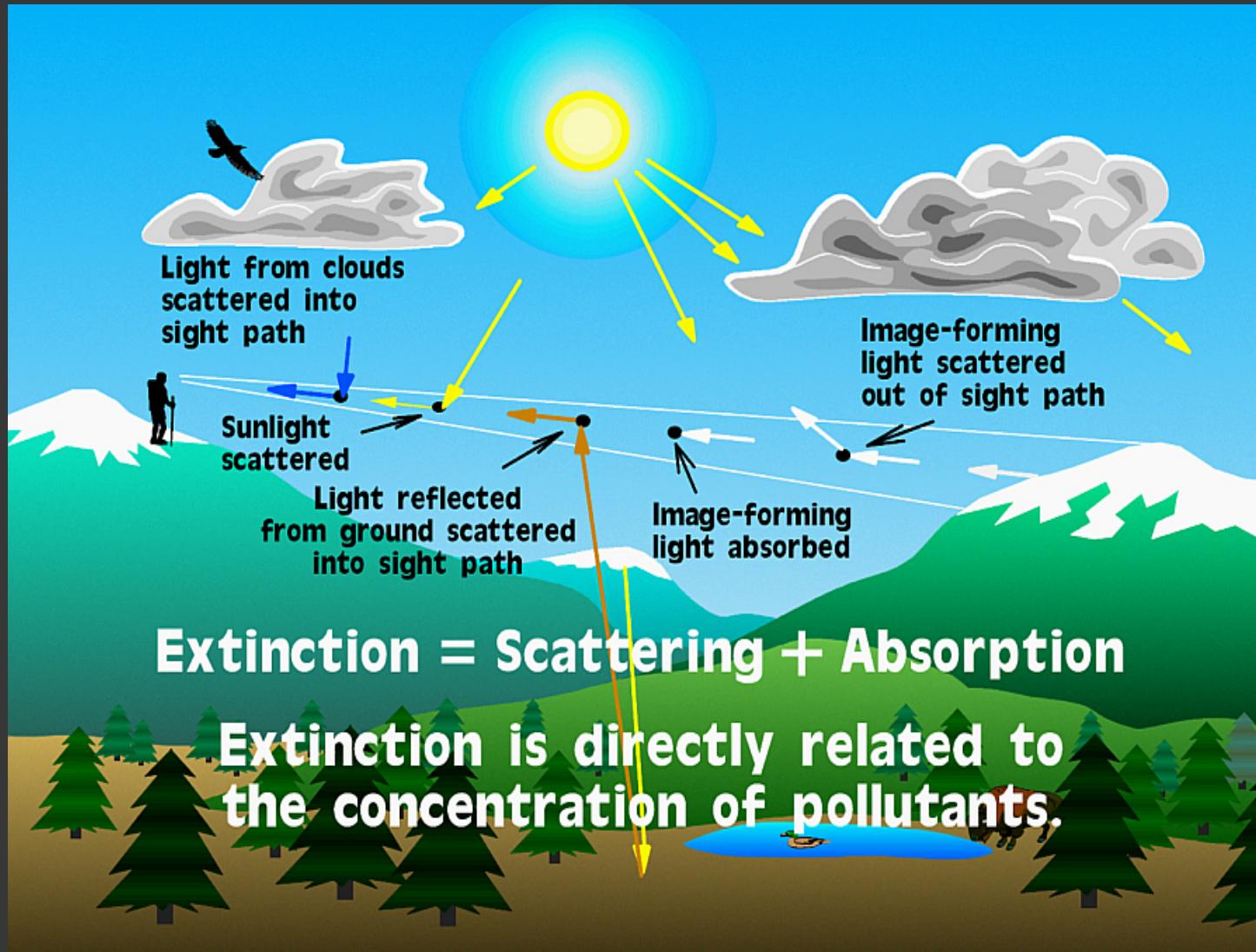
**Table 1. FLAG 2000 vs. FLAG 2010 Analyses**

	FLAG 2000	FLAG 2010
Annual emissions/Distance (Q/D) screening criteria. (Not applicable for Class I increment analyses).	None	≤10 (sum of certain pollutant emissions (TPY) divided by distance (km) from Class I area; applies to all AQRVs, not just visibility. See section 3.2.
Background Visibility Conditions.	Based on annual average natural, using NAPAP estimates.	Based on annual average natural, or 20% best natural, using EPA data from Regional Haze Rule development. See section 3.3.3.
Relative Humidity Adjustment Factor (f(RH)).	Hour-by-hour (with RH capped at 98%).	Monthly average (with RH capped at 95%). See section 3.3.3.
First Level Screening Model.	CALPUFF or CALPUFF-lite.	CALPUFF only. See section 3.3.3.
Visibility Assessment Criteria.	Maximum modeled value.	98 <sup>th</sup> percentile modeled value at any receptor. See section 3.3.3.
Deposition Analysis Thresholds/Concern Thresholds	None	Provided for nitrogen and sulfur deposition. See section 3.5.6.
Adverse Impact Determination Criteria.	"Likely to Object" if 10% threshold exceeded; regulatory factors implicitly considered.	Adverse impact determination process more explicit; considers regulatory and other factors. See sections 4.2-4.4

# Also...

- Expands discussion of “Critical Loads” to reflect some significant developments in this area since FLAG 2000;
- Updates ozone sensitive species lists contained in the FLAG 2000 report, but now includes that information on individual agency websites rather than in the FLAG report;
- Replaces FLAG 2000 W126 and N100 ozone values with current information on the individual agency websites;
- Replaces the dated sulfate, nitrate, and ammonium ion concentration maps with a reference to the NADP site for current trends data.

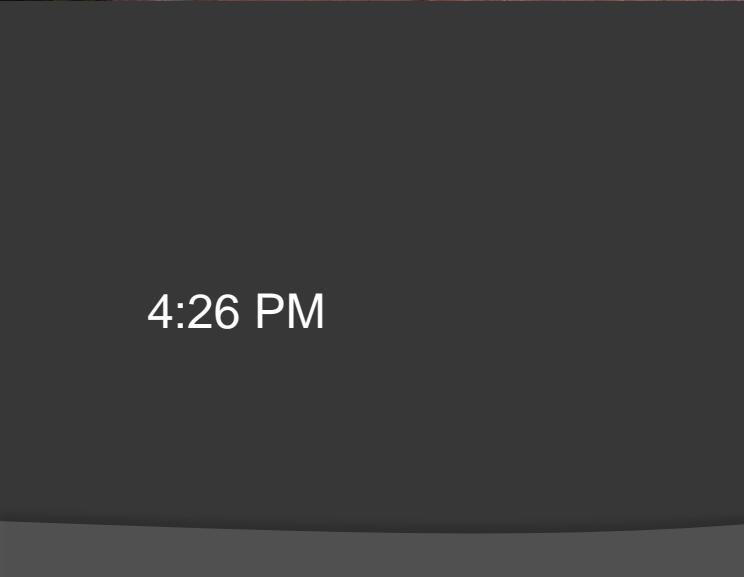
# Light Extinction



Extinction is a visibility metric used to describe the combined effect of scattering and absorption. It is proportional to the total amount of light removed as light passes through the atmosphere and is related to the concentration of pollutants.



6:33 AM



4:26 PM



# La Sals - Layered Haze



# FLAG to FLAG 2010

- Visibility analysis is a *SCREENING* technique
  - Package as a whole
  - “Refine” a piece go to refined (i.e. short-term) visibility assessment
- Clarifies the near field visibility analysis techniques for analyzing plumes or layers viewed against a background

# Policy Challenges

- FLM Role
  - FLM share CAA responsibility with EPA
  - FLM have distinct CAA charge
- Notification
  - Let us know (w/in 300km)
    - Similar to BART
  - Help you screen
    - Request submission of Q/D calculations
- RH SIPs not substitute for PSD review
  - Are a factor in our review of visibility effects
- FLAG and NEPA
- Relationship between Appendix W and FLAG

# NEPA and FLAG

- NEPA

- FLAG addresses PSD, but many of techniques and concepts appropriate for NEPA
- Regional photochemical models more commonly used (O&G)

- Federal interagency agreement for onshore oil/gas AQ/AQRV analysis

- Promotes efficiencies
- Use FLAG methods on FLAG agency lands
  - FLAG methods for photochemical models (coming)
- Analysis at earliest possible phase
- General analysis requirements
- Reusable modeling framework

# Appendix W and FLAG Relationship

- Appendix W states:
  - Section 6.1 (b) – “Although such regulatory requirements and manuals may have come about because of EPA rules or standards, the implementation of such regulations and ***the use of the modeling techniques is under the jurisdiction of the agency issuing the manual or directive.***”
  - **Section 6.2.3 (a)** - “The FLM has an affirmative responsibility to protect air quality related values (AQRVs) that may be affected, and ***to provide the appropriate procedures and analysis techniques.***”
- FLAG 2010 outlines current FLM recommended techniques and procedures for AQRV assessments

# Ongoing Technical Challenges

- Ammonia values and nitrogen post-processing techniques
- Meteorology
  - Grid resolution (2009 Model Clearinghouse Memos on Grid Resolution)
  - Diagnostic v. Prognostic Fields
  - Multiple Years
- Near-field Deposition
  - CALPUFF v. AERMOD for near-field deposition

# Modeling Issues with NH<sub>3</sub>

- What to use for background
- Need to consider NH<sub>X</sub> (NH<sub>3</sub> & NH<sub>4</sub>)
- Still problem with a  
CALPUFF/POSTUTIL receptor  
approach versus plume approach

# Meteorology

- FLM's support use of prognostic meteorological fields using tools such as MMIF in lieu of diagnostic fields
  - Dynamically consistent meteorology
  - Eliminates physically unrealistic artifacts that can be introduced by limitations of objective analysis procedures in diagnostic models
- Advantages:
  - Pre-generated domains consistent with VISTAS BART approach
    - Preapproved by regulatory agencies and FLM's
    - Publish statistical evaluation of pregenerated domains
    - Reduces project time lines and regulatory burden
  - Multiple years of national WRF available
    - Need year-to-year variability
    - Prefer sequential

# Regulation and MMIF

- EPA preliminary opinion was that a Section 3.2.2(d) evaluation would be required to justify use of MMIF. 3.2.2 (d) justifications center upon where a model performance evaluation has shown the alternative model (MMIF) to be superior to the preferred model (CALMET).
- FLM interpretation:
  - Use of CALPUFF for distances greater than 50-km is consistent with its recommendations for regulatory use as specified under A.4 of Appendix W. Thus, applications of CALPUFF with MMIF do not fall under alternative model treatment under Section 3.2 of Appendix W since ‘preferred model’ is exercised consistent with its recommendations for regulatory use and does not alter its status as a ‘preferred model’ (Section 3.1.2 (c) of Appendix W).
  - CALMET is not specifically required by Appendix W for CALPUFF applications. Section 8.3.3.2 (k) of Appendix W states the following:
    - “CALMET is available for use with applications of CALPUFF.”
    - “AERMET, which is patterned after MPRM, should be used to preprocess all data for use with AERMOD “
  - The issue centers upon establishing the suitability of prognostic data sets in conjunction with 8.3 (d) of Appendix W.
- Result was applicant submitting AQRV analysis using MMIF and Class I NAAQS/increment analysis using CALMET.
- We recommend that final regulatory interpretation not introduce unnecessary barriers which will discourage use of prognostic meteorological fields in regulatory applications, but focus encouraging use of these fields

# MMIF cont'd

- FLM's committed at 10<sup>th</sup> Conference on Air Quality Modeling to development of pregenerated MMIF domains consistent with VISTAS BART domains and publication of performance evaluations with MMIFStat
- FLM's have not initiated project yet
  - Regulatory barriers to use of MMIF
  - Future status of Appendix W approval of specific LRT models

# What's Next?

- Federal land management agencies want to progress toward better, state-of-the-science models
  - “Improvements” during regulatory actions are not a good way proceed, but is somewhat of a reality since permits are where modeling is funded
- Will participate in EPA efforts with IWAQM Phase 3

# FLM Efforts

- FWS/USFS testing of PGM's for AQRV assessments
  - Building upon EPA study "*Comparison of Single Source Air Quality Assessment Techniques for Ozone, PM<sub>2.5</sub>, other Criteria Pollutants and AQRV's*"
  - Examining source apportionment techniques for single source applications
  - Development of standardized procedures and databases to streamline process
- Evaluation of FLAG procedures for PGM assessments

# Conclusions

- We want to make sure we are moving forward in modeling
- Needs to be an orderly process where things are evaluated – not ad hoc “improvements”
- Not ultimately wedded to any particular modeling platform
- As modeling technique changes would reevaluate FLAG in that context
- Collaboration – private/government to move forward

# Contact us with your ideas

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