FLAG, Flaws, Potential Improvements and Revisions

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Process for Revisions

- Revisions at staff level
- Seeking input from professional groups
- Consult with states
- Take up management chain
- Public comments

"…conserve the scenery and the natural and historic objects and wild life therein…as will **leave them unimpaired** for the enjoyment of future generations." (NPS Organic Act 1916)

"Wilderness areas…shall be administered for the use of the American people 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, and other areas of special national or regional natural, recreational, scenic, or historic value." (Clean Air Act as amended in 1977)

"…declares as a national goal the **prevention of any future, and the remedying of any existing, impairment of visibility** in mandatory class I Federal areas which impairment results from manmade air pollution." (Clean Air Act as amended in 1977)

CAA165 (d)(2)(B)

The Federal Land Manager and the Federal official charged with direct responsibility for management of such lands shall have an *affirmative responsibility* to protect the air quality related values (including visibility) of any such lands within a class I area and to consider, in consultation with the Administrator, whether a proposed major emitting facility will have an adverse impact on such values.

The Senate committee wrote,"[i]n the case of doubt, . . . [to] err on the side of protecting the air quality related values for future generations."

Err on the Side of Protection*

- Focus is on the resource
- Does not mean make everything in the analysis conservative
- Does mean weigh the credibility of the analysis and interpret the uncertainty of the result in favor of the resource

*Presenter's editorial opinion

Background

- Numerous sources locating near SHEN & JARI
  - > 50 km
- Steady-state models didn't cut it
- IWAQM formed
  - CALPUFF recommended for concentration
- FLAG formed
  - AQRV (visibility) methods outlined

Why FLAG?

- Let applicant know what Federal Land Management Agencies expect in an air quality analysis (primarily for PSD)
- Provide consistent approach when impacts span more than one agency jurisdiction

FLAG Challenge

- How to take a rather ill-defined set of decision criteria and pin down a specific methodology
- Generally comfortable with specifying what is not a problem
- More difficult to know when there is a problem – particularly with incomplete analysis techniques

Things affecting AQRVs in FLAG

- Visibility
  - Plumes < 50 km from Class I areas
  - Layered and uniform hazes > 50 km from Class I areas
- Atmospheric Deposition (DAT newer)
  - Nitrogen
  - Sulfur
  - Mercury
- Ozone
- Remainder of talk on Layered and Uniform Hazes > 50 km

Existing FLAG Haze-like Analysis

- Run CALPUFF (3 years MM data)
- Concentrations of SO_4 & NO_3
- Calculate a visibility index – b_{ext}
  - 24-hour average
  - Hour-by-hour b_{ext} using hourly f(RH) concentration (98% rollback)
- Compare change in b_{ext} against average natural conditions

Existing FLAG Haze-like thresholds

- < 5% change – ok
- > 5% < 10% change cumulative analysis
  - If cumulative > 10% and source > 0.4% likely to object
- > 10% likely to object
- Hasn’t totally worked this way

Some FLAG Adaptations

- 95% f(RH) rollback
- Consideration of wx
  - More later
- Ammonia limiting
- Averaging schemes
  - 2 versus 2 prime
  - 7 versus 7 prime

Potential FLAG Changes

- Monthly average f(RH) (MVISBK=6)
- 98th percentile 5% Δb_{ext} (i.e. 8th high)
  - Any 1 year fails test
- Two tiered test
  - Against 20% best natural conditions
  - Against annual average natural conditions
- If fail test look at context and mitigation
- Propose sideboards on further analysis

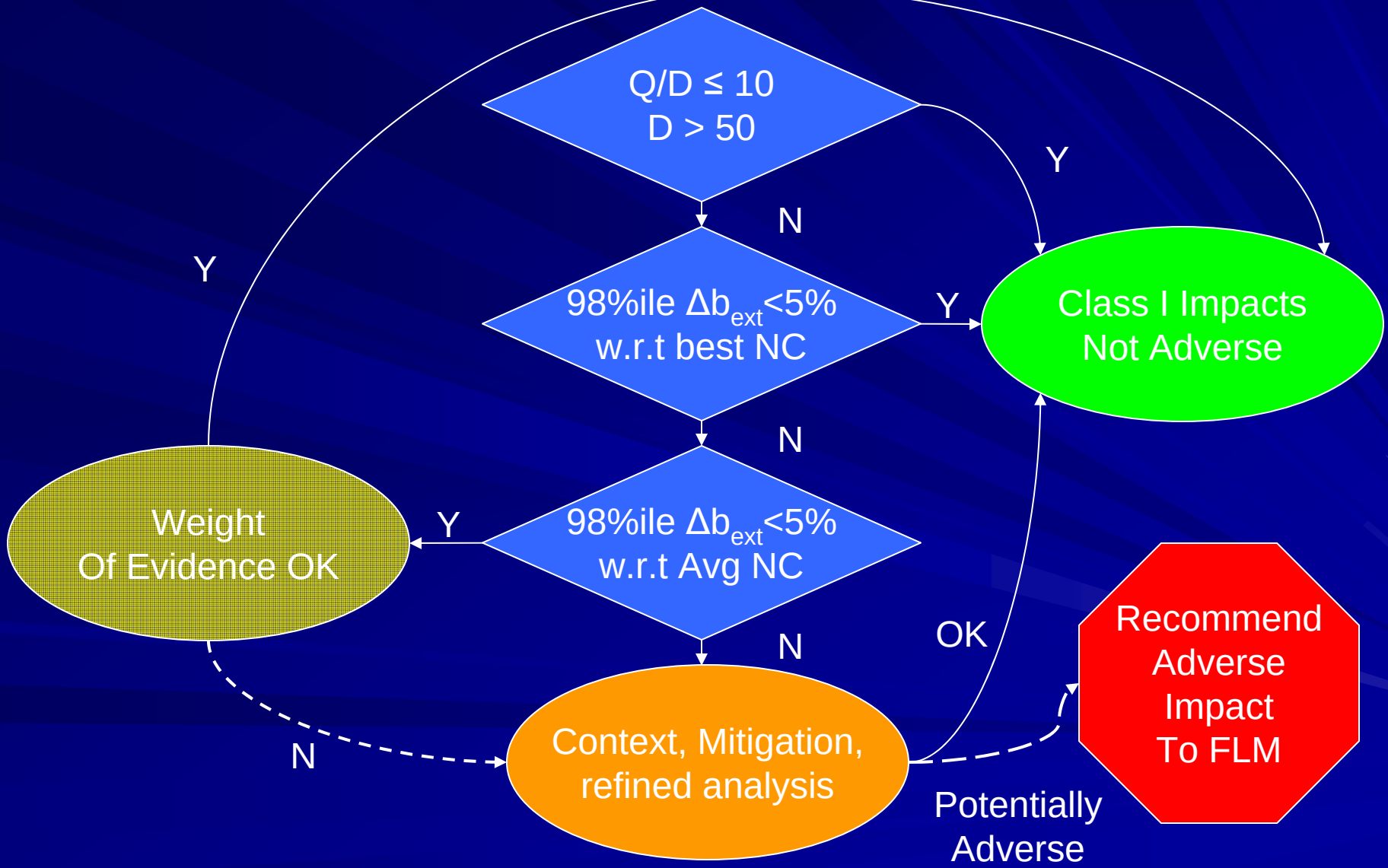
What's Not Changing?

- Note that new IMPROVE algorithm not mentioned
- IT DOES NOT APPLY TO PLUMES
- It only applies to current average distribution of ambient conditions
- Mass used as surrogate for aerosol aging and cloud processing

Not Changing (Continued)

- Minimum 3 years preferred 5 years MM fields
- CALPUFF runs the same
  - Dependent on future EPA guidance
- Considering maximum receptor in Class I area as maximum for that day
- Level-one still 24-hour average

New FLAG Flow Chart



Weight Of Evidence OK

- What the heck does this mean?
- What is the difference between this and

Context, Mitigation, refined analysis

What the heck does this mean?

- If here you have failed the 20% best natural condition test but passed the annual natural condition test
- If BACT in question or multiple Class I areas impacted may jump to context, mitigation, further analysis
- Most cases, with resolution of BACT, probably pass without further analysis

What is the difference?

- Subtle difference
- – First scenario fairly routine examination
- – Second scenario really triggers our concern threshold – further considerations
  - Very tight BACT examination
  - Examine the air quality context
    - – Trends, projected emission reductions, severity of AQRV problem, status of visibility SIP
    - – Frequency, magnitude, extent…
  - May seek mitigation
  - Option of performing refined analysis

Further Considerations

- Regulatory Factors
  - Geographic extent, intensity, duration, frequency, time of visitor use, natural conditions that affect visibility
- Context
  - Expected source life
  - Stringency of BACT
  - Ancillary environmental benefits proposed by applicant
  - Current status and trends of AQRV impacts in Class I area
  - Cumulative impact
  - Regional Haze SIP provisions on new source growth
  - Enforceable emissions reductions in area
  - Comments from public and other agencies

Further Considerations (cont)

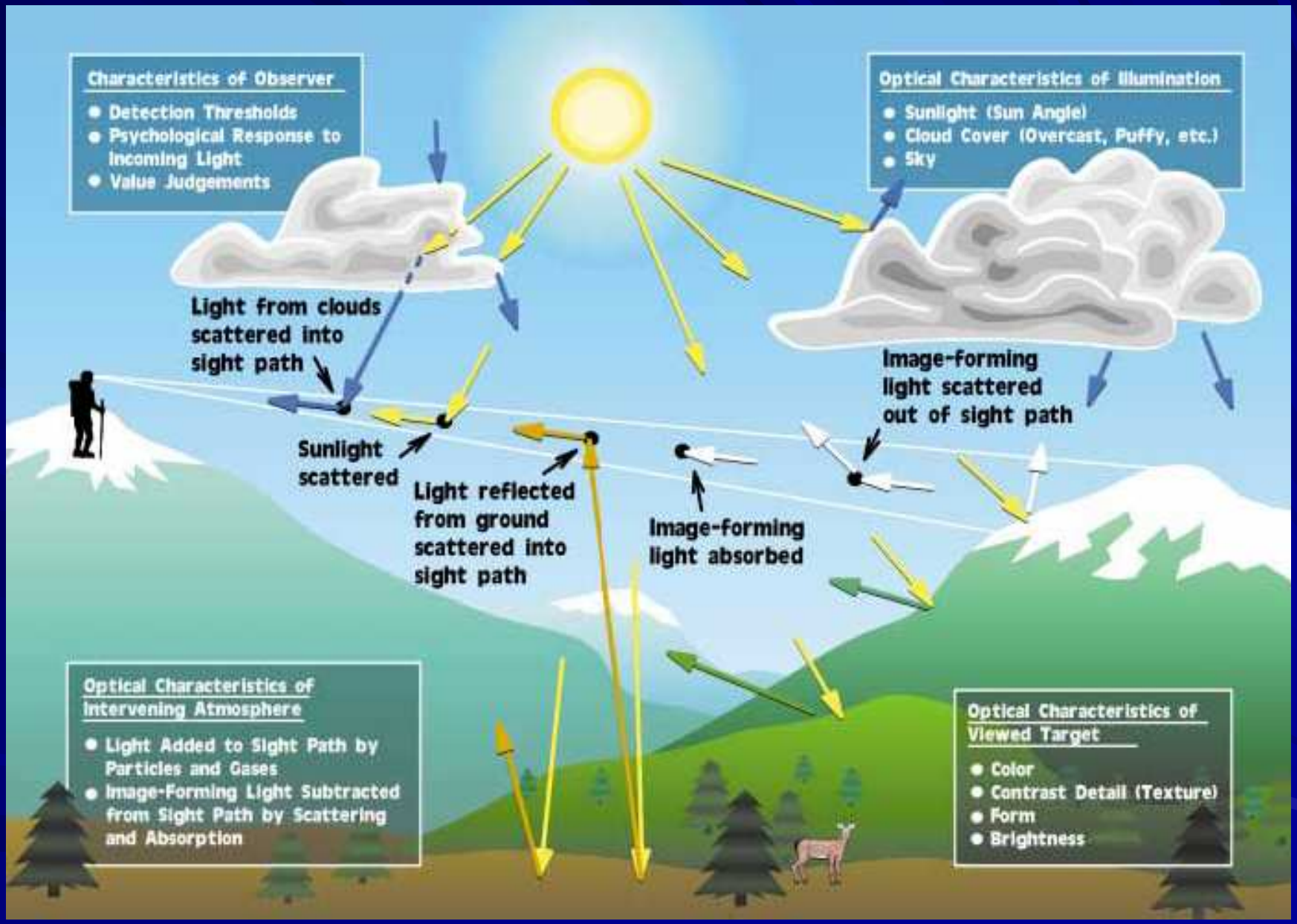
- Mitigation strategies
  - Emission offsets
  - Emission rate reductions
  - Monitoring/special studies leading to future permit revision (monitoring alone NOT a mitigation strategy)
- If no mitigation, agencies likely to recommend adverse impact to FLM
- Or can do a refined analysis

Refinement Expectations

- Refine/advance the science
- Consider all relevant phenomena
  - (e.g. both cloud obscuration and enhanced conversion)
- Only consider time periods relevant for case-by-case visibility analysis (≤ 1-hour)
- Refinements applied to all time periods in analysis, not just failed level-one
- Don’t show us level-one has conservative assumptions – that’s what makes it level-one

Refined Analysis Needs

- End product – estimate of visibility, not visibility index (the index serves us well in level-one)
  - Consideration of scenic elements
  - Lighting
  - Pollutant spatial distribution
  - Particle size distribution
  - Instantaneous time scale (≤ 1-hour)
  - All time periods


Characteristics of Observer
Detection Thresholds
Psychological Response to Incoming Light
Value Judgements
Optical Characteristics of Illumination
Sunlight (Sun Angle)
Cloud Cover (Overcast, Puffy, etc.)
Sky
Light from clouds scattered into sight path
Image-forming light scattered out of sight path
Sunlight scattered
Light reflected from ground scattered into sight path
Image-forming light absorbed
Optical Characteristics of Intervening Atmosphere
Light Added to Sight Path by Particles and Gases
Image-Forming Light Subtracted from Sight Path by Scattering and Absorption
Optical Characteristics of Viewed Target
Color
Contrast Detail (Texture)
Form
Brightness

Refined Analysis Needs (cont)

- Air pollutant concentration estimates
  - Appropriate dispersion scale (channeling, stagnation, recirculation)
  - Treatment of relevant chemical transformation
    - Aqueous phase chemistry
    - Dry phase chemistry
    - Background pollutants
- Meteorological fields
  - Resolution to capture appropriate flow
  - Clouds/precipitation in the right place and right time

Bottom Line

- Lets work together as a scientific community to further the science
- Several talks to follow are addressing some of the technical concerns expressed