Common Issues in Ecological Risk Assessments

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May 2022

Introduction

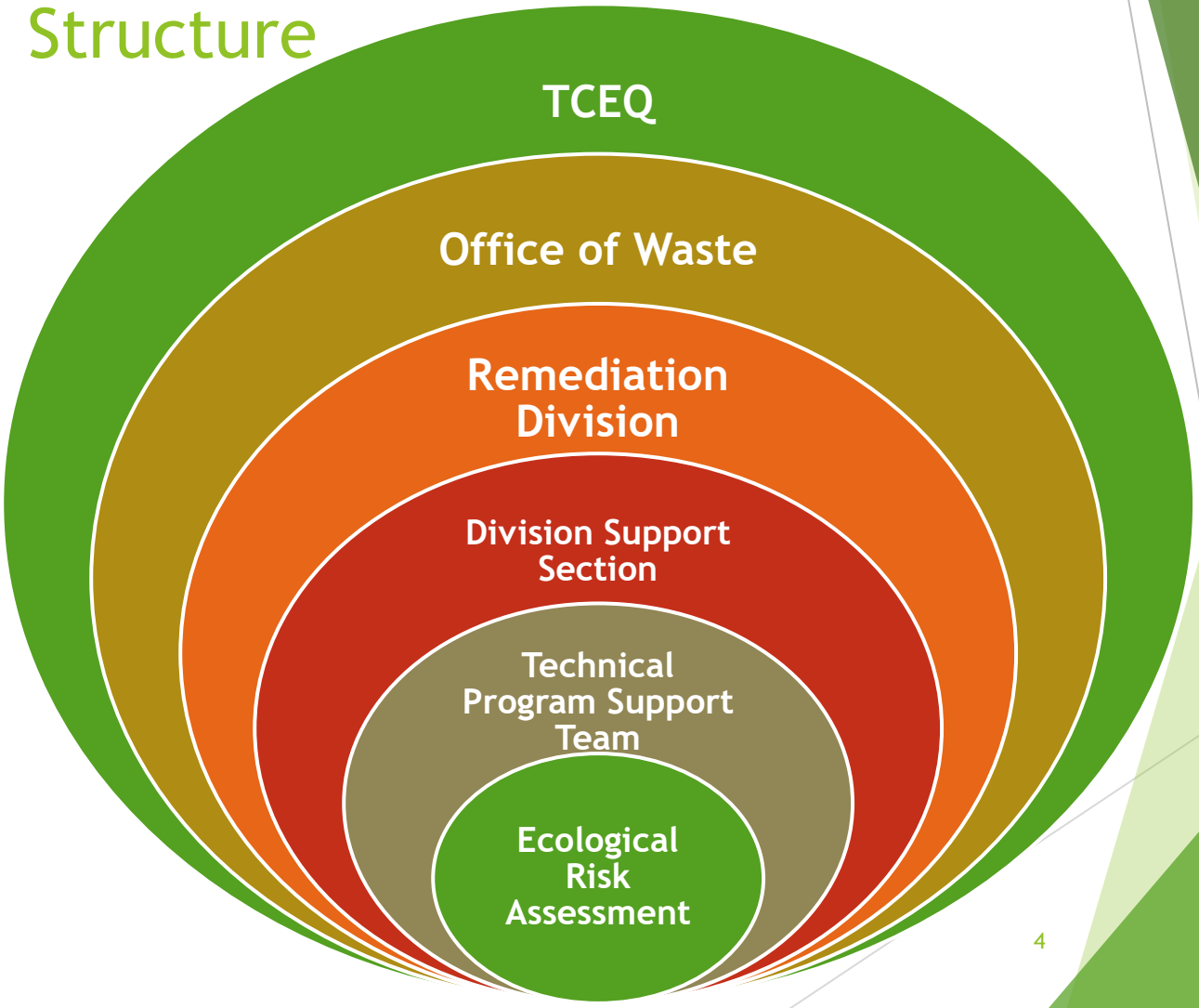
Introduction
Objectives of this Training

- Illustrate common issues in ERAs and related submittals for review by the TCEQ's ERA Program.
- Summarize how we typically respond and ways to resolve these issues.
- Explain why all this matters.






Introduction
Org. Structure



Introduction
Main Guidance Documents

The following are available online at https://www.tceq.texas.gov/remediation/eco/eco.html

- Conducting Ecological Risk Assessments at Remediation Sites in Texas – RG-263
- Supporting Documentation for the TCEQ's Ecological Benchmark Tables - RG-263b
- Case Study for the TCEQ's Ecological Risk Assessment Process - RG-263c
- Determining Representative Concentrations of Chemicals of Concern for Ecological Receptors - TRRP-15eco
- Determining PCLs for Surface Water and Sediment - TRRP-24

Introduction
Key acronyms and definitions

- COC – chemical of concern
- NRT – Natural Resource Trustee (NOAA, TPWD, Texas GLO, USFWS)
- Person – "An individual, corporation, organization, government… or any other legal entity." [30 TAC 350.4(a)(62)]
- PCL – protective concentration level
- RAL – residential assessment level
- RBEL – risk-based exposure limit
- SLERA – screening level ERA (a.k.a. "Tier 2" SLERA)
- SSERA – site-specific ERA (a.k.a. "Tier 3" SSERA)
- Surface water in the state – see 30 TAC 307.3(a)(70)
- TRRP – Texas Risk Reduction Program
- TRV – toxicity reference value (NOAELs, LOAELs)

Introduction
Scope of the TCEQ ERA Program

- Ecological Risk Assessment (ERA) – a process that evaluates adverse ecological effects as a result of exposure to one or more environmental stressors.
- TCEQ's ERA program focuses on **chemical** threats.
- Formalized under the TRRP rule, 30 TAC 350.
- Also applies to Risk Reduction Rule (30 TAC 335, Subchapter S).
- ERAs often form part of the evaluation for various remediation cleanup programs.

Introduction
The importance of ecosystems

- Ecological services
  - Primary production
  - Regulation of climate, local weather conditions
  - Nutrient cycling
  - Mitigation of floods
  - Recreation
    - Hunting, fishing
    - Swimming, boating, hiking, etc.

Introduction
TCEQ's ERA Program – A Tiered Process

- 3 Tiers
  - Tier 1 – Ecological Screening Checklist

    [30 TAC 350.77(b)]
    - Establishes general location of site, as it relates to potentially impacted ecosystems.
    - Basically a "yes/no" approach for determining complete ecological exposure pathways.

Introduction
TCEQ's ERA Program – A Tiered Process

- 3 Tiers (cont'd.)
  - Tier 2 – Screening Level ERA (SLERA)

    [30 TAC 350.77(c)]
    - 10 key elements
    - Requires data from the affected property but relies on scientific literature for the development of PCLs.
  - Tier 3 – Site-specific ERA (SSERA)

    [30 TAC 350.77(d)]
    - Undertaken if SLERA results are believed to not be representative enough of site-specific conditions.
    - May include site-specific toxicity data, field studies, or other more in-depth approaches not required in a SLERA.

Common Issues

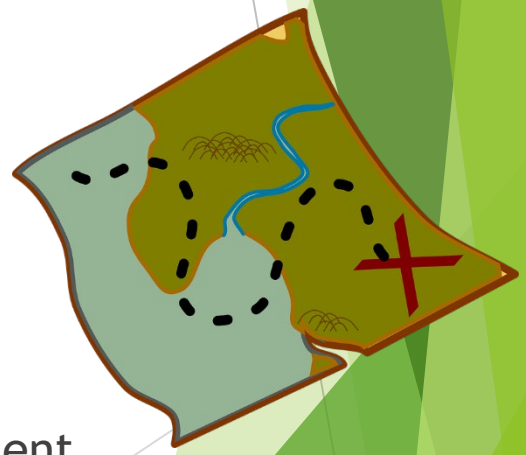
Tier 1 Checklist & Follow-up

Tier 1 Checklist & Follow-up

Basic Content Issues

- Classified stream segments and use not fully described
  - Should correspond to 30 TAC 307.10
- Complete pathways not fully identified.

  Pathways to ecological receptors will usually include some combination of the following:
  - Surface water (direct discharge, runoff, ^{SW}GW)
  - Sediment (direct discharge, runoff, ^{Sed}GW)
  - Soil
- Misunderstanding of exclusion criteria
  - Part II, Subpart A applies to surface water/sediment.
  - Part II, Subparts B-D apply to soil.
  - Part III must be completed and signed.



Tier 1 Checklist & Follow-up
Checklist Conclusions

- Tier 1 checklist demonstrates complete ecological exposure pathways, but site representatives may not wish to perform the appropriate follow-up ERA.
- This is one of the more challenging issues faced by the TCEQ's ERA program.
- In addition to larger habitats, the following often require further assessment:
  - Small ponds
  - Drainage ditches/pathways
  - Navigational waterways
  - Small terrestrial habitats in urban or suburban settings
- The rule and guidance need to be applied consistently.

Tier 1 Checklist & Follow-up
Reasoned Justification

- An RJ:
  - Is not a substitute for a SLERA.
  - Requires supporting documentation and/or follow-up.
  - Requires consideration of ecological exposure pathways.
  - Is evaluated on a case-by-case basis.
- The guidelines regarding development-based RJs are now in RG-263 (Sec. 3.5.1, TCEQ, 2018).

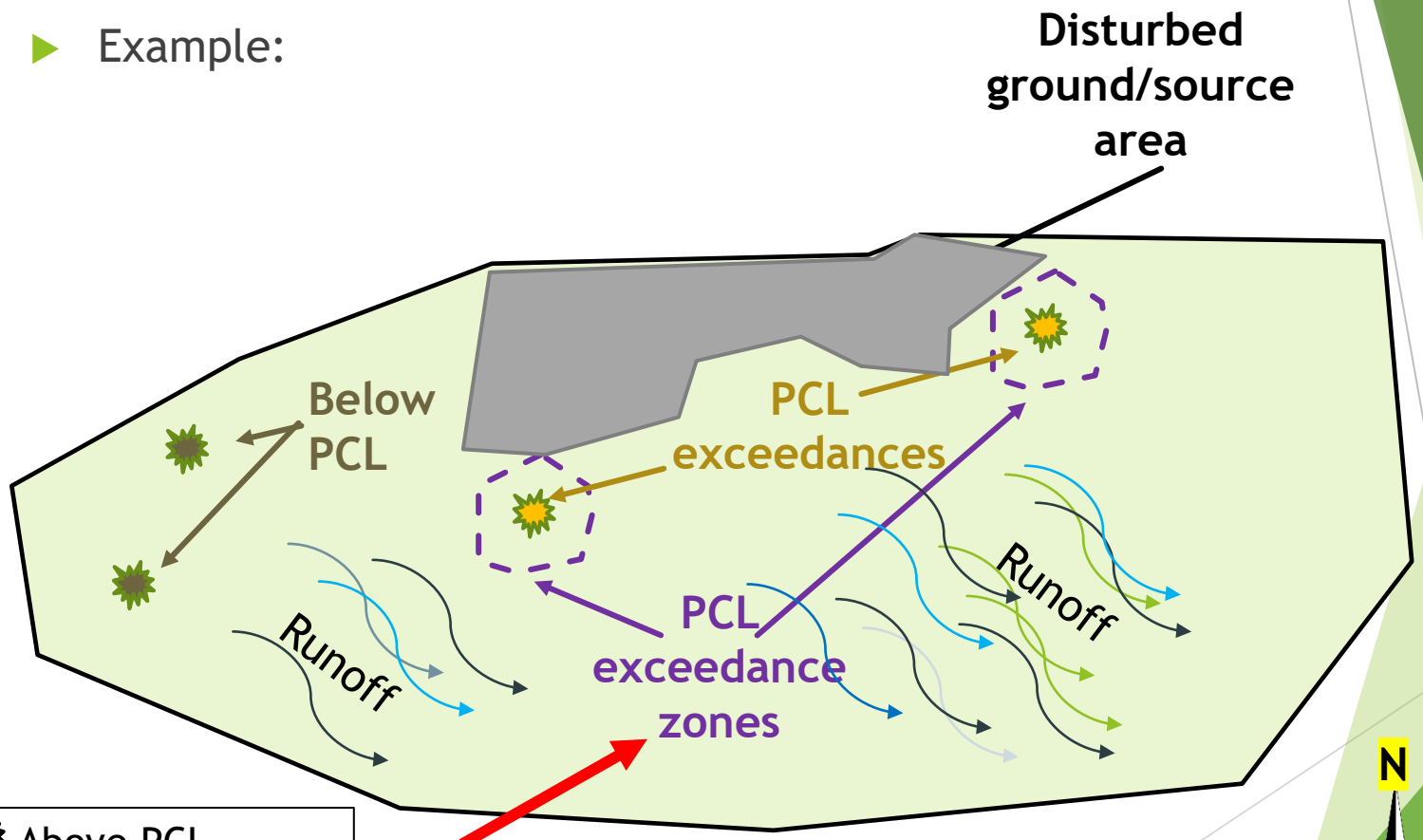
Data or Sampling Gaps

Data or Sampling Gaps
Missing or Insufficient Data

- Data for specific media not included.
- Data for specific COCs not included.
- Missing species or feeding guilds (e.g., herbivorous birds, omnivorous mammals).
- Insufficient data for proper delineation of PCLE Zones (see following slides).

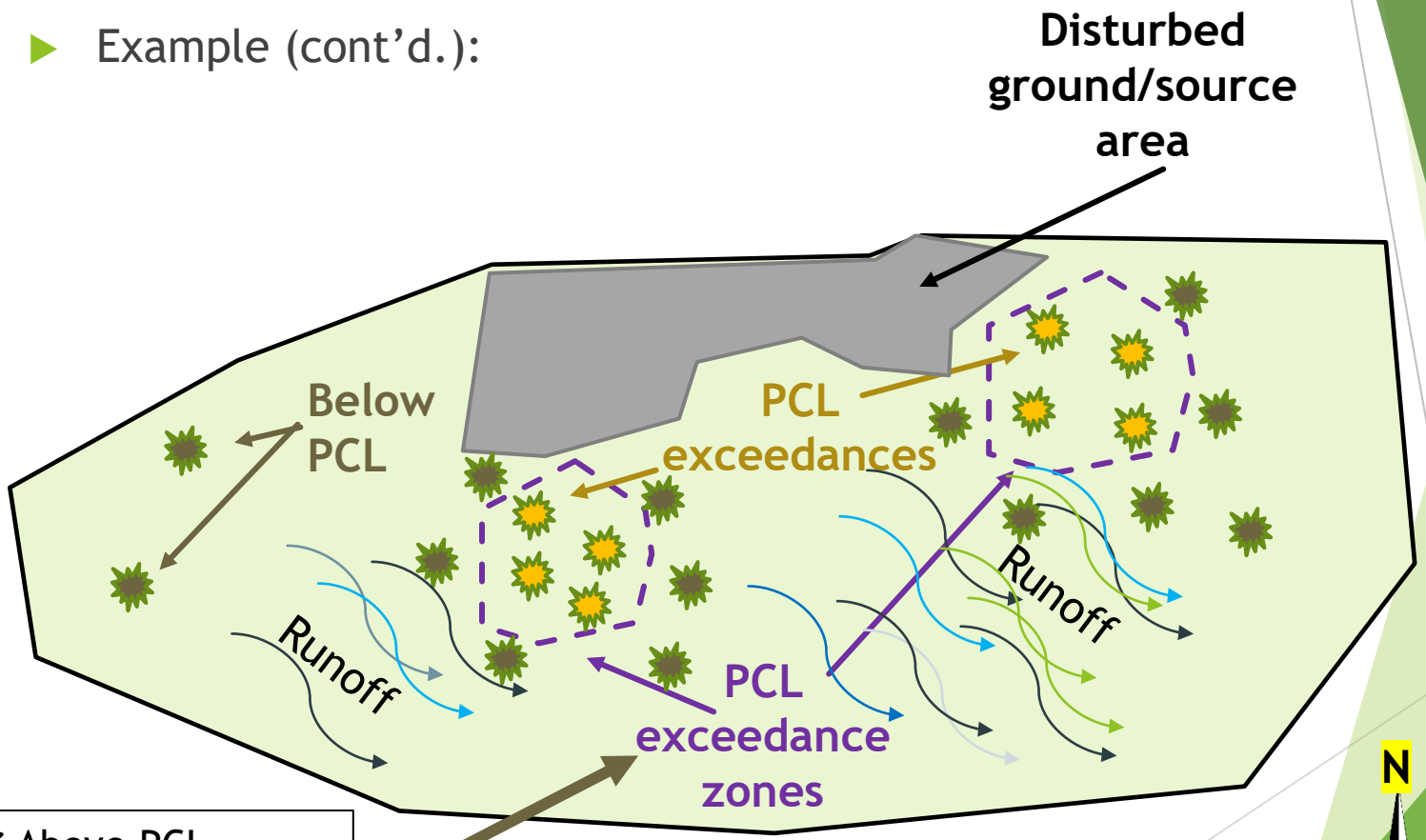
Data or Sampling Gaps
Insufficient Delineation

- Example:



Data or Sampling Gaps
Insufficient Delineation (cont'd.)

- Example (cont'd.):



Calculations & Numerical Comparisons

Calculations & Numerical Comparisons
Initial Screening

- Marine benchmarks instead of freshwater benchmarks (or vice versa)
- Soil benchmarks instead of sediment benchmarks (or vice versa)

Calculations & Numerical Comparisons
Initial Screening

- Human health RALs instead of ecological benchmarks or PCLs
  - 30 TAC 350.4(a)(1): "Affected property" definition. Focuses on residential land use and groundwater classification.
  - 30 TAC 350.4(a)(3): "Assessment level" definition. Accounts for both human health and ecological PCLs.
  - 30 TAC 350.77(b): "…The person will have fulfilled the ecological risk assessment requirements if the affected property meets the exclusion criteria."

Calculations & Numerical Comparisons
Initial Screening (cont'd.)

- Human health RALs instead of ecological benchmarks or PCLs (cont'd)
  - Checklist Part II Subpart D (*de minimis* criterion) explicitly mentions the use of human health PCLs. It is the only exclusion criterion that does.
  - The checklist also includes the following footnote:

"These definitions were taken from 30 TAC §350.4 and may have both ecological and human health applications. **For the purpose of this checklist, it is understood that only the ecological applications are of concern.**"

Calculations & Numerical Comparisons
Inputs

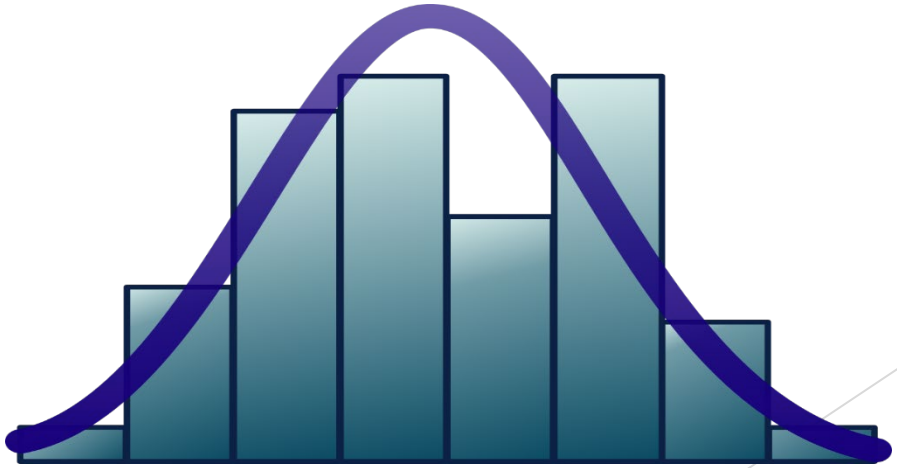
- Choice of toxicity reference values (TRVs)
  - These come from the literature, but some are more conservative/protective than others.
- Choice of home ranges (affects area use factors [AUFs])
  - Overestimating home range may inappropriately decrease the AUF and raise the PCL.

Calculations & Numerical Comparisons
Outputs and Conversions

- Wet-weight vs. dry-weight.
  - A concern for sediment or fish tissue.
  - Sometimes, it's not clear which is being documented, and this needs to be clarified.
- Dissolved vs. total concentrations.
  - A concern for inorganics in surface water.
  - Again, it may just need to be clarified.
  - Total concentrations are generally more conservative.
- PCLs exceed solubility limits (or other practical limits).
  - This is often a consequence of an AUF or another modifying factor.

Calculations & Numerical Comparisons
Statistics

- Insufficient sample sizes
- Statistical outliers removed from the dataset without explanation.



Calculations & Numerical Comparison

Interpretation of exceedances

- HQ > 1 dismissed as insignificant.
- PCL exceedances dismissed as insignificant.

Other Study Design Features

Other Study Design Features
Incorrect Soil Depths

- Soil samples may be collected at inappropriate depths.
- Re-collection may be required.
- See 30 TAC 350.4(a)(88) and (86) for definitions of surface and subsurface soil:
  - Surface soil: 0-0.5 feet below ground surface
  - Subsurface soil: 0.5-5 feet below ground surface

Other Study Design Features
Detection Limits too High

- COCs should be detected at concentrations at least as low as the benchmark/PCL/RBEL.
- If sample detection limits (SDLs) are above values indicative of potential ecological risk (benchmarks, PCLs), such risk may not be identified.
  - See 30 TAC 350.54
- If SDLs cannot be lowered, site representatives may determine if less conservative assumptions (e.g., refined PCLs) can aid in making the most of the available data.
  - Not ideal, but possible in some cases.
- Proxy values may also be considered.
  - See 30 TAC 350.51(n).

Other Study Design Features
Miscellaneous Concerns

- The list of COCs varies within the site, between locations, without explanation.
- Presence/absence of perennial pools is not clear.
  - This *can* affect which aquatic benchmarks are used in evaluating surface water impacts.
  - See guidance TRRP-24 (2007), section 3.1.1 and Table 3-1.

Other Common Issues

Other Common Issues
Older Data

- Generally, new data is preferred (i.e., within a couple years of the SLERA).
- Older data may be usable if demonstrating low initial levels of contamination with no known or suspected increases, changes in pathways, or continuing inputs since that time.
- Older data may also be used to demonstrate decreasing concentrations over time (in which case, newer data would also be included).

Other Common Issues
Misuse of Uncertainty Discussion

- The purpose of the uncertainty discussion in a SLERA or SSERA is to address those areas where the preferred information could not reasonably be obtained. For example:
  - Toxicity reference values for uncommon COCs.
  - Species information.
  - Historical on-site practices (depending on the site age and availability of records).

Other Common Issues
Misuse of Uncertainty Discussion (cont'd.)

- This section can also mention other uncertainties, but should not rely on them to avoid the technical expectations of a SLERA:
  - Conservatism in the PCL calculations
  - Data heterogeneity
- The uncertainty discussion is not a substitute for the following:
  - Proper sampling/delineation
  - PCL analyses/refinements
  - Outlier analyses
  - Efforts to obtain historical site info.

Conclusions

Conclusions
Awareness of Common Issues

- The TRRP rule *requires* certain efforts to be undertaken for an ecological risk assessment.
- Some common issues are easily addressed. However, there are many cases where additional work and substantial revisions may be required.

Conclusions
What can be done?

- The guidance documents are publicly available for use in developing ERAs.
- If in doubt on how to proceed on an ERA, the TCEQ can meet/discuss.
- Consistency is key.
  - Professional judgment is allowed in the rule and the guidance, and it may be necessary in some circumstances.

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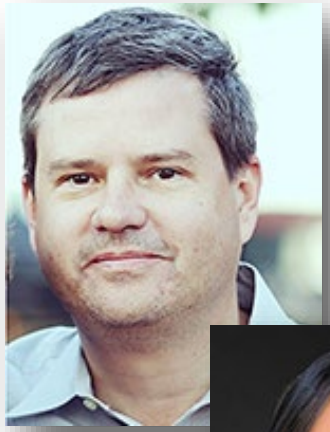

Questions?