

Ecological Risk Assessment and the MRBCA for Petroleum Storage Tanks

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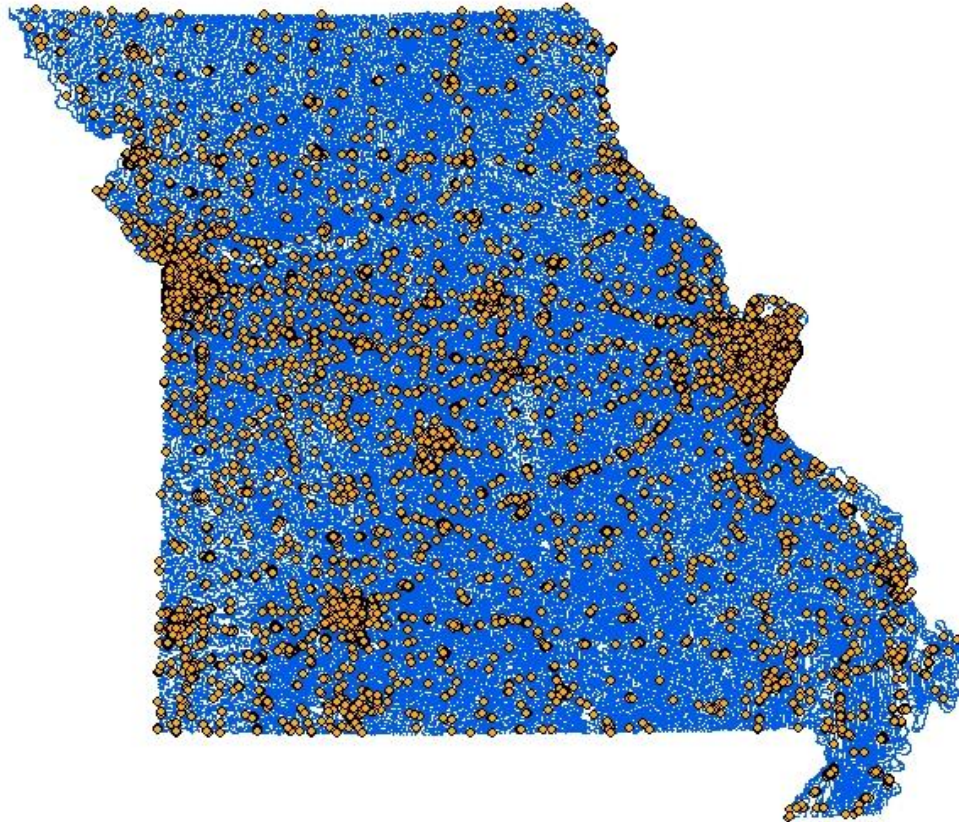
Overview

- Why Consider Ecological Risk?
- What is the Process?
- Sources of Information
- Surface Water Sampling and Risk Evaluation
- Karst & Ozark Cavefish

Why Consider Ecological Risk?

- “The mission of the Missouri Department of Natural Resources is to **protect Missouri’s natural resources** while promoting the environmentally sound operations of businesses, agriculture and industry in our interactions with the public.”
- “The goal of the tanks section is to protect human health **and the environment** by building conditions under which good management of underground storage tank (UST) systems is common business practice.”
- 319.109 RSMo “... the department shall use risk-based corrective standards which take into account the level of risk to public health **and the environment** associated with site-specific conditions and future land usage.”

...but maybe more importantly, we
all use and live near water



What Sites Need an Ecological Evaluation?

- Sites Undergoing Closure Where Contamination is Present Above Default Target Levels (DTLs)
- All Sites With a Confirmed Release
- The Extent of the Ecological Evaluation Will Depend on Many Site-Specific Factors

Ecological Risk Assessment Process ([Section 6.6](#))

- Tier 1 – Using Attachments A & B ([Chapter 5](#))
- Tier 2 – Use of Tier 2 Software
- Tier 3 – Site-Specific Evaluation

Attachments A & B (Chapter 5)

Habitat

- Surface Water
- Wetlands
- Karstic Features
- Environmentally Sensitive Areas
- Contaminated Soils

Species

- Federal Rare, Threatened, or Endangered
- State Rare, Threatened, or Endangered
- Commercially or Recreationally Important

Tier 1 Sources Continued

Natural Heritage Review

(<https://naturalheritagereview.mdc.mo.gov/>)

- Developed by the Missouri Department of Conservation
- Lists Both Federally *and* State Listed Species
- Provides Information on Habitats
- Provides Follow-up Contact Information
- Uses ~1 mile Buffer From the Site

Tier 1 Sources of Information

Missouri Geological Survey Geosciences Technical
Resource Assessment Tool (GeoSTRAT)
(<https://dnr.mo.gov/geostrat/>)

- Geologic Features (Sink Holes, Structures, etc.)
- Dye Traces
- Springs and Gaining/Losing Streams
- Also a good source for well data

Tier 1 Sources Continued

US Fish and Wildlife Service

- Federally Listed Species/Habitat (<https://ecos.fws.gov/ipac/>)
- Wetlands (<https://www.fws.gov/wetlands/data/mapper.html>)

Other:

- Center for Applied Research and Engagement
Systems Map Room
(<https://allthingsmissouri.org/missouri-map-room/>)
- The Department

Tier 2 Sources (Section 6.6)

- Oklahoma's Water Quality Standards
(<https://www.owrb.ok.gov/rules/pdf/current/Ch45.pdf>)
- Ecotox Thresholds (Publication 9354.0-12FSI)
(<https://archive.epa.gov/region5/superfund/ecology/web/pdf/v3no2.pdf>)
- Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota
(<https://rais.ornl.gov/documents/tm96r2.pdf>)
- ECOTOX Knowledgebase
(<https://cfpub.epa.gov/ecotox/index.html>)

Surface Water (Section 5.4.5)

- Requires Location of Surface Water Bodies within 500 Feet of the Site
- In 2013, DNR Classified ~85,000 Miles of Streams
- Map Identifying Classified Streams
(<http://www.dnr.mo.gov/simplemap/construct.do?config=wclsuse>)

Surface Water and Sediment Sampling (Section 5.10)

Does All Surface Water Need to be Sampled?

“...when site investigation data shows or suggests that COCs have migrated to a surface water body.”

What About Sediment Sampling?

“If site investigation data shows or suggests that contaminated groundwater is discharging to a surface water body, sediment samples must be collected...”

Surface Water and Sediment Sampling Continued

What Might Trigger Sampling?

- Odor or Sheen
- Fish Kills
- Elevated COCs in Upgradient Well
- Failed Eco-Risk Assessment

Sampling Considerations

- When will the samples be collected?
- Where within the stream?
- Why are they being collected?
- What method will be used and why?

Include These Items in the Work Plan along
with Citations for Methods

Intended Uses of Stream Sampling

What surface water and sediment sampling is intended for:

- Evaluating current impact
- Assessing current risk
 - Ecological
 - Dermal Contact/Ingestion

What about future risk?



Risk to Streams (Section 6.4.1)

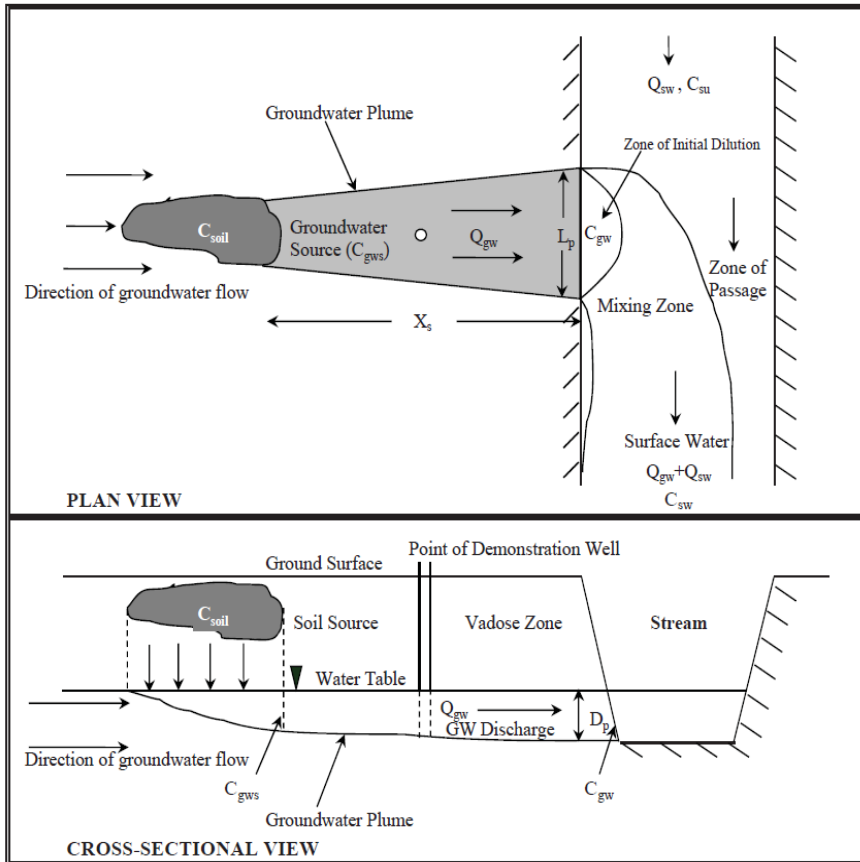


Figure 6-3. Schematic of Leachate Migration From the Soil to a Stream

Important Parameters:

- 7Q10 – Avg. Minimum Flow
 - $0.0 \frac{ft^3}{sec}$ for Unclassified
 - $0.1 \frac{ft^3}{sec}$ for Class C, P, or P1
- X_s – Distance from Downgradient Edge of Groundwater Source to the Stream
- X_{spod} – Distance from Downgradient Edge of Groundwater Source to the Point of Demonstration
- Designated Uses

Risk to Lakes (Section 6.4.2)

Similar Process with the Following Considerations:

- The Mixing Zone Shall Not Exceed $\frac{1}{4}$ of the Lake Width at the Discharge Point or 100 Feet from the Discharge Point, Whichever is Less.
- A Zone of Initial Dilution is Not Allowed
- Information Sources:
10 CSR 20-7.031(5)(A)4.B.(IV)(a-b) and Guidance for Water Quality and Antidegradation Review Assistance Part 2
(<https://dnr.mo.gov/env/wpp/permits/docs/part2intro.pdf>)

Karst/Caves/Sinkholes

- Over 18,000 Known or Probable Sinkholes
- Missouri is “The Cave State” Almost 6,400 Caves
- Considerations for Karst:
 - Are You Delineated Between Site and Feature?
 - Where Does the Water Go?
 - Contact the Department for Data Needs

Ozark Cavefish

- Federally Threatened in 1984
- State Listed as Endangered
- Native to Arkansas, Missouri, and Oklahoma
- Maximum Length ~ 2.5 Inches
- Live 4 – 5 Years
- Eyeless and Unpigmented



Photo courtesy of: <https://nature.mdc.mo.gov/>

Ozark Cavefish Evaluation

1. Conduct your Natural Heritage Review
2. Contact the Missouri Department of Conservation and U.S. Fish and Wildlife
3. Know the Site Geology/Hydrogeology
4. Delineate Dissolved Phase both Vertically and Horizontally (Site-Specific)



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Questions/Comments?

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