

Plume Stability Evaluations and the MRBCA for Petroleum Storage Tanks

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Overview

- Introduction
- Well-by-Well or Whole Plume?
- Plume Stability Monitoring Considerations
- Tips
- Dealing with Incomplete Data Sets

Plume Stability and MRBCA

- What sites need a plume stability evaluation?
 - All sites w/ groundwater contamination > DTLs/MCLs
 - MRBCA 5.9.3
- Quantitative evaluation
- Think with the end in mind
 - Often the last step prior to “NFA”
 - Influenced by all decisions made along the way
 - Corrective action
 - Free product (MEP)
 - Delineation

Well-by-Well vs. Whole Plume?

- Well-by-Well
 - Looks at each well independently
 - Relatively simple to conduct
 - Requires minimum of four events
 - Trends must be decreasing if only four events
 - Six events are needed to show “stable” trends
 - All COCs in all wells must be stable or decreasing

Well-by-Well vs. Whole Plume?

- Whole plume
 - Looks at all wells in monitoring network
 - More labor intensive
 - Requires minimum of four events
 - Trends must be decreasing if only four events
 - Six events are needed to show “stable” trends
 - All plume characteristics (area, mass, avg. conc., COM migration) must be stable or decreasing

Monitoring for Plume Stability

- Work plan approved by the Department
- Are you delineated?
- Frequency – Quarterly
 - “For the MRBCA process, such trend must be apparent over a monitoring period of one to three years, with samples collected on at least a quarterly basis.” – MRBCA Section 5.9.3
 - Needed to evaluate seasonal fluctuation

Monitoring for Plume Stability

- Number of events
 - “For the MRBCA process, such trend must be apparent over a monitoring period of one to three years, with samples collected on at least a quarterly basis.” – MRBCA Section 5.9.3
 - Minimum of 4 events (plume must be decreasing)
 - To demonstrate statistically stable 6 events
 - 3 years without demonstrating stability = non-stable
 - Should use same data that is used in risk assessment

Monitoring for Plume Stability

- Domestic use pathway (Appendix E)
 - If trend is “decreasing” use six events
 - If trend is “stable” use eight events
 - COC detection limits (naphthalene & EDB)
 - EPA 8270 for naphthalene
 - EPA 8011 for EDB (required under 2013 MRBCA)

Monitoring for Plume Stability

- What type of sampling?
 - Same method should be used on all wells in a groundwater zone
 - Same method should be used on all events
- What type of evaluation will be used?
 - Well-by-Well (e.g. Mann-Kendall)
 - Whole Plume (e.g. Ricker Method)
 - Don't Know?

Monitoring for Plume Stability

- Do you have free product?
 - Number of wells with product should be two or fewer if doing whole plume
 - MEP should be demonstrated first
- Corrective action
 - Only data collected after can be used
 - Check for rebound
 - Periodic monitoring during CA may be needed

Monitoring for Plume Stability

- Removing wells from sampling
 - Is the well needed for delineation?
 - Is the well needed for risk assessment?
 - Will you need the well to perform alternative plume stability evaluation?
 - Why eliminate the well from sampling?
 - Do you have a well that provides the same data?
 - Thoughtful consideration and justification

General Tips

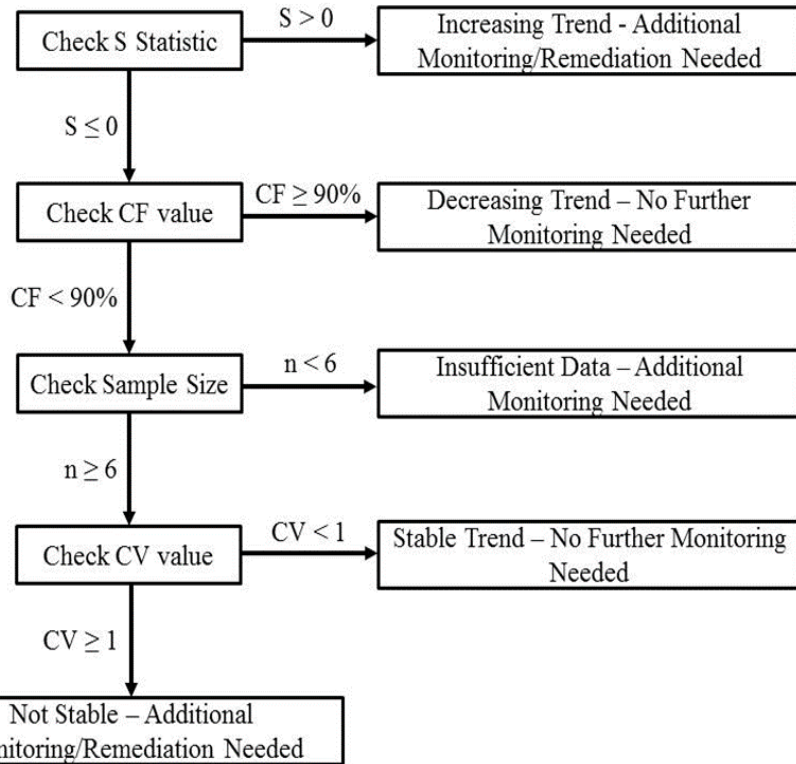
- Start by trying a Mann-Kendall analysis
- Each groundwater zone evaluated separately (e.g. unconsolidated vs. bedrock)
- For non-detect results
 - Standardize to one value
 - Use the reporting limit for J-flag results
 - Limits artificial variation

General Tips

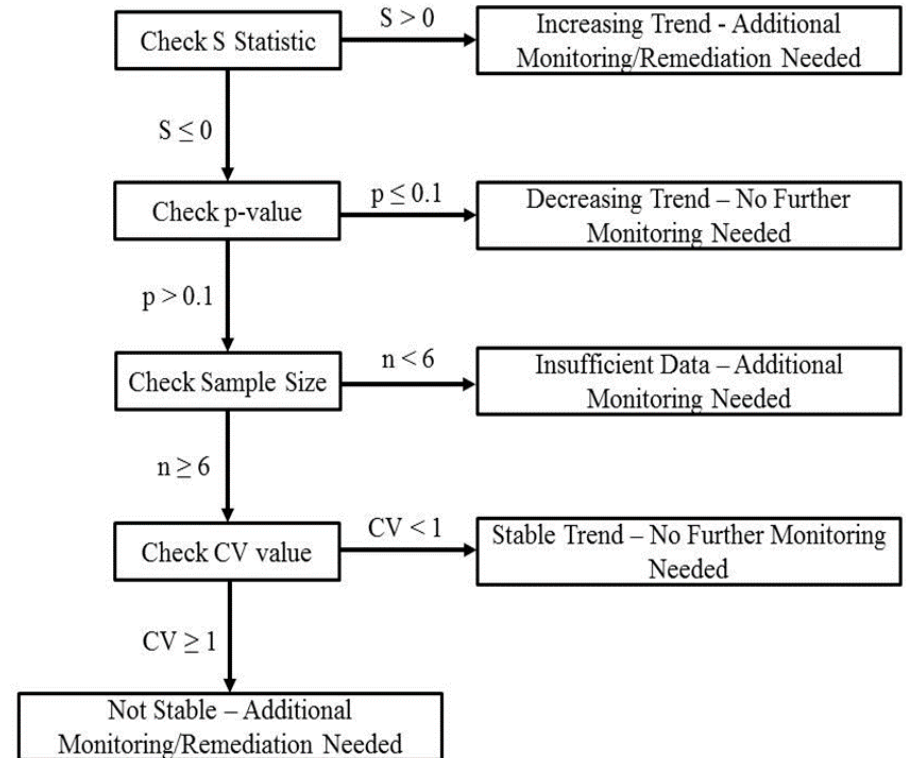
- No evaluation needed if below DTLs/MCLs
- Try using the most recent six events
 - For recent releases plume may still be in expanding phase during initial events
 - If the earliest data is old
- If you have questions, ask us
 - Include project manager on e-mail
 - Send data and site map

Well-by-Well Plume Specific Tips

- Evaluating a Mann-Kendall:



GSI Mann-Kendall



Pro UCL

Whole Plume Specific Tips

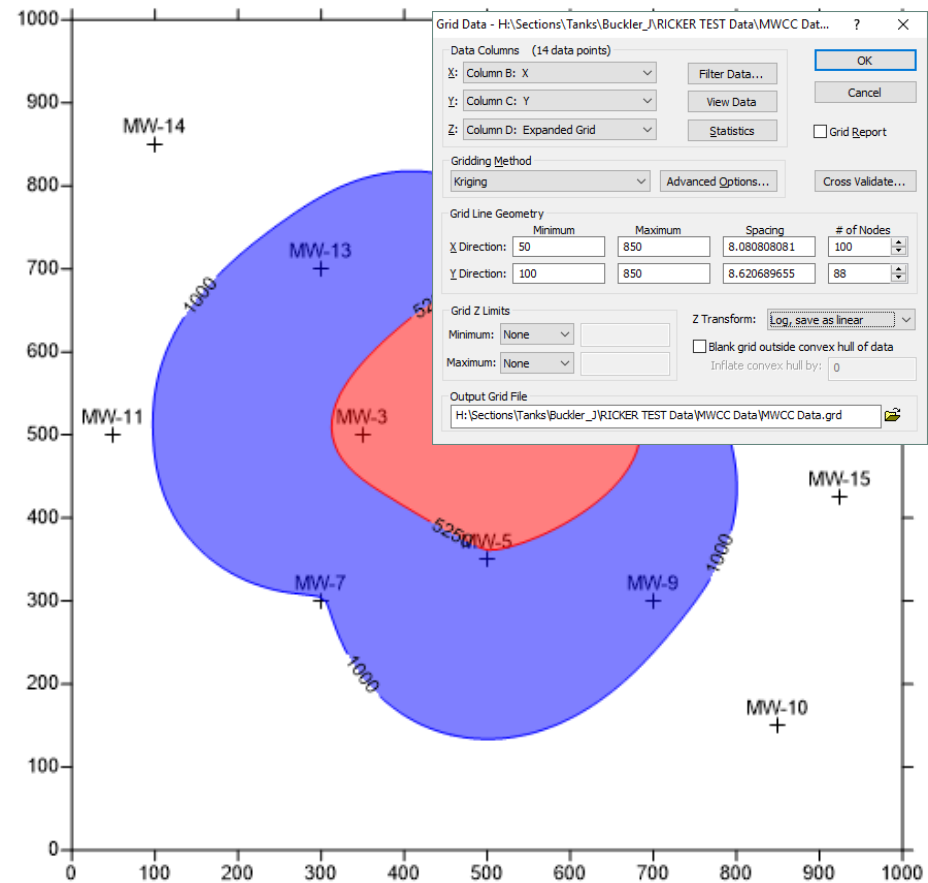
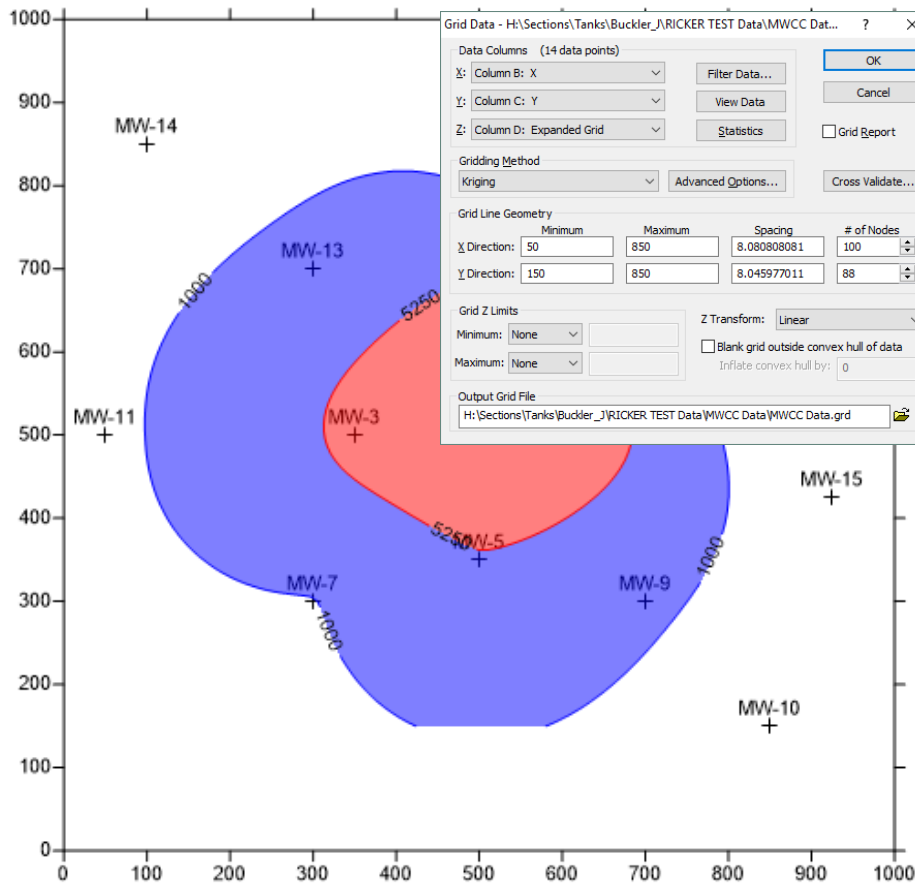
- Before beginning:
 - Is the DU pathway complete or incomplete?
 - What is the delineation criteria for the site?
 - Was the 2004 or 2013 MRBCA used?
 - Any free product (what wells and what dates)?
 - Any corrective action (when did it finish)?

Whole Plume Specific Tips

- Choosing a plume boundary:
 - DTLs/MCLs if domestic use pathway is complete
 - Domestic use pathway incomplete
 - Use applicable RBTL (i.e. residential/non-residential)
 - Something below applicable RBTL
 - Make sure this closes during each event
 - Include this information in the report

Whole Plume Specific Tips

- Expand X-Y coordinates to close boundary



Whole Plume Specific Tips

- Ghost points
 - Generally not acceptable
 - Need Department approval if used
 - Cases where they may be allowed:
 - Discharge to a surface water body
 - Sites with seeps (drainage ditch, sites on hill top)

Incomplete Data Sets

- Interpolation
 - Should be limited to < 10% of the dataset
 - Highlight areas where it is used in reports
 - Discuss method used to interpolate data
 - Averaging is acceptable
 - Other methods would require Department approval

Date	02/01/18	05/01/18	08/01/18	11/01/18	02/01/19	05/01/19
MW-1	0.12	0.10	0.13	0.11	0.08	0.09

Incomplete Data Sets

- What to do instead...
 - Contact us, ask questions
 - If numerous events are missing from the well, exclude it
 - Leave that event with no data during that event



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Questions/Comments?

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