



Triad Approach Implementation

A Perspective for
Agricultural
Chemical Sites

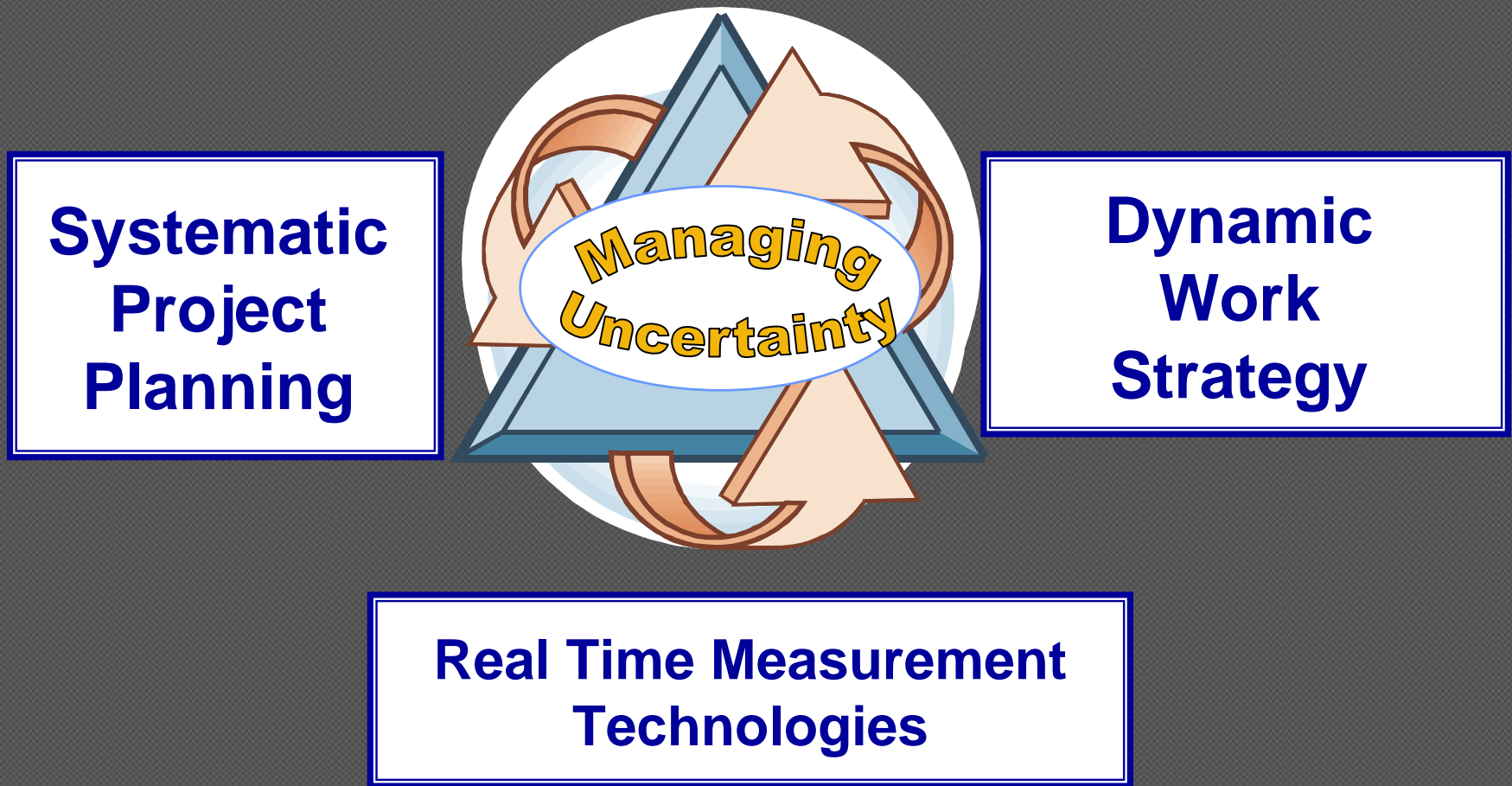
Presentation Overview

- Presenter Experience
- Introduction to Triad
- Overview of an Agronomy Site
- Results and Conclusions

Presenter Experience

- Jason Lowery, P.G.
- Terracon – Appleton, WI
- Have supported DATCP Program since 1995
- Minnesota Department of Agriculture (MDA) has similar program that Terracon supports
- Programmatically, this is a powerful case study of the effective use of “Triad” or “accelerated site characterization”

Introduction to Triad



Synthesizes practitioner experience, successes, and lessons-learned into an institutional framework

Triad Basics

- Systematic Planning – develop conceptual site model (CSM), identify goals to close data gaps, determine cost-effective method to achieve goals .
- Dynamic Work Plan – make decisions in the field, develop a “decision tree”. Requires close communication and more experienced field staff.
- Real Time Measurement – Tied in with dynamic work plan. Decisions based on quick-turn analytical data and pre-defined decision-tree.

Overview of an Agronomy Site

Agricultural Chemicals

- Nitrogen Fertilizers (nitrates and ammonia)
 - Requires QA/QC
- Standard Pesticides
- Others (VOCs, organochlorine pesticides, acid pesticides)
- Groundwater

Typical Agronomy Center



Load-In Auger



Fertilizer Warehouse



Bulk Liquid Storage Dike - Fertilizer



Bulk Liquid Storage Dike - Pesticides



Wash Area



Fertilizer Warehouse



Load-Out Augers



Load Pads



Equipment Parking Areas



Nitrogen Spills



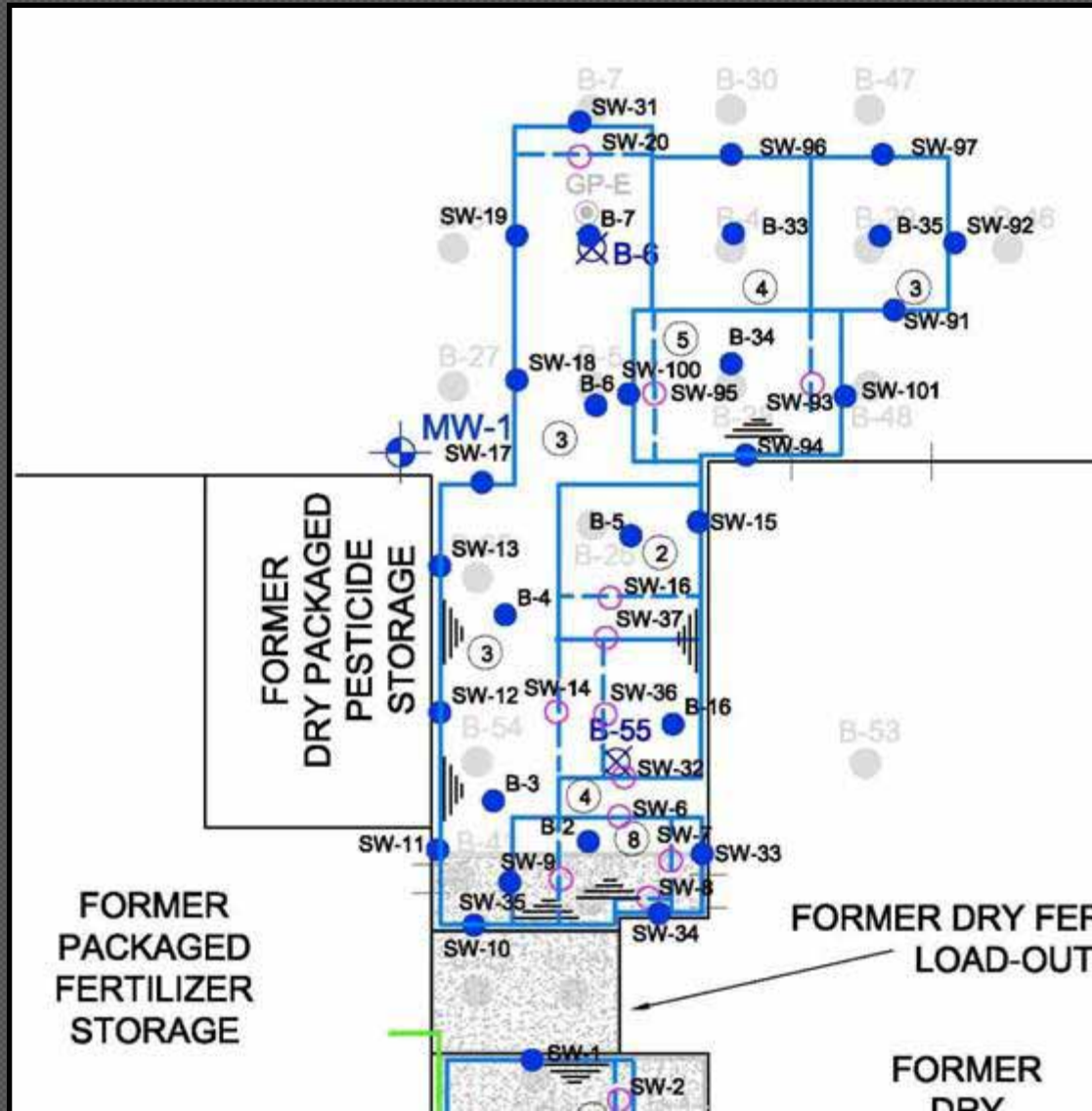
Systematic Planning



Dynamic Work Plan



Dynamic Work Plan – Step Outs



Real-Time Measurement

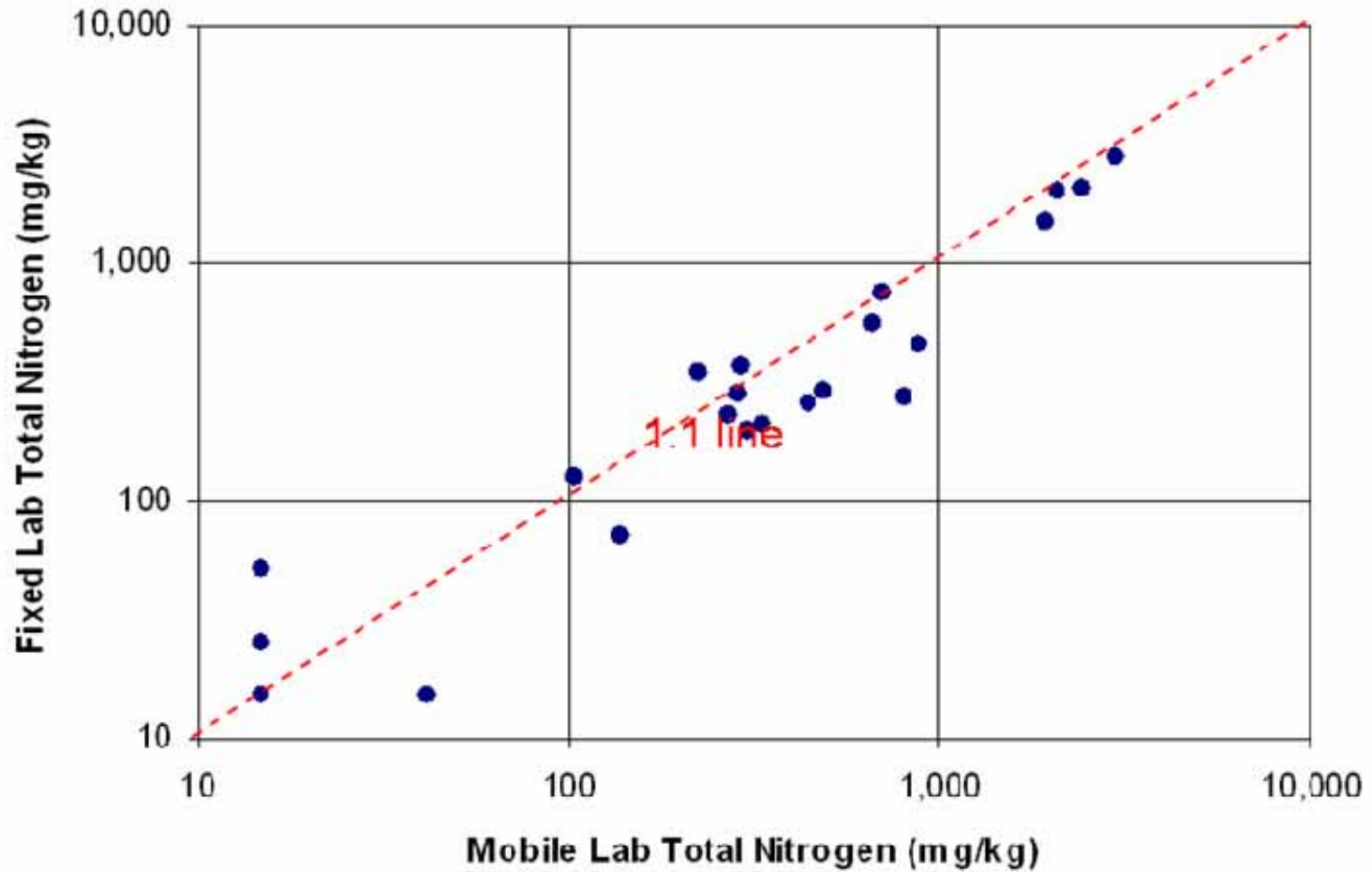


Results

Typical Site Investigation

- 1 or 2 chemists arrive on site early A.M.
- Begin investigation while chemists are setting up (hook up to power, unpack, etc.)
- First sample group arrives within 1 hr, immediately weigh out and extract, more samples arrive every 15-30 minutes
- 1 hour later first N result, nitrogen result every 5-10 minutes
- 2-3 hours later pesticide first result, pesticide every 15 minutes
- Prep and analyze all nitrogen during 10 hr day, 40-50 first day
- Prep all pesticide, 20 results during 10 hr day, 40-50 overnight

Split Sample Comparison - Nitrogen



Analytical Cost

- Based on 6 projects completed by Terracon in Wisconsin in 2007
 - 5 remedial actions and 1 investigation
- Average number of sample per project
 - 195 Nitrogen samples
 - 135 Pesticide samples*
- Average cost per sample
 - \$29 (Nitrate/nitrite + ammonia) vs. \$22
 - \$90 (DATCP pesticide Method 8141A) vs. \$91

Results & Conclusion

- Allows thorough assessment and remediation in single mobilizations
- Saves time & convenient (always)
- Saves money (sometimes)
- Generally faster and more cost effective for agronomy centers
- Something to consider for any site