Triad Approach / Best Management Practices
Triad Approach and BMPs

- Systematic Planning
  - Conceptual Site Model (CSM)
- Dynamic Work Strategies
- Real-Time Measurements
What is Systematic Planning?

Process for building a consensus vision (aka CSM) for conducting environmental investigation and remediation.
Triad is About Managing Uncertainty

<table>
<thead>
<tr>
<th>Analytical Uncertainty</th>
<th>Sampling Uncertainty</th>
<th>Site Decision Uncertainty</th>
<th>Resource Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods?</td>
<td>Media?</td>
<td>Risk?</td>
<td>Funding?</td>
</tr>
<tr>
<td>Quantity?</td>
<td>Methods?</td>
<td>Action Levels?</td>
<td>Schedule?</td>
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<tr>
<td>Quality?</td>
<td>Location Distribution?</td>
<td>Remedy?</td>
<td>Personnel?</td>
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<tr>
<td>Validation?</td>
<td>Depth?</td>
<td>Stakeholder Acceptability?</td>
<td>Logistics?</td>
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<tr>
<td>Appropriate Use?</td>
<td>Purpose?</td>
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<td>Weather?</td>
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Systematic planning ensures all forms of uncertainty are managed.
Anatomy and Uses of a CSM

- Description of Past Use
- Previous Investigations
- Geology and Hydrogeology
- Exit Strategies
- Intended Reuse
- Potential Remedies
- Pathway-Receptor Networks
- Decision Criteria

Data gaps serve as basis for Dynamic Work Strategy design.
Helps achieve and maintain Brownfields Stakeholder consensus.
What is a Dynamic Work Strategy?

Work strategy that incorporates flexibility to adapt to data generated by real-time measurement technologies.
Real-Time Measurement Technologies

• Direct sensing tools that provide instantaneous data, e.g.:
  – Field portable instruments
  – Downhole sensors
  – Geophysical techniques

• Field-generated, sample collection and analysis technologies, e.g.:
  – Direct push soil, groundwater, and active soil gas samplers
  – Field test kits; e.g., XRF analyzer
  – Mobile laboratories
What is Meant by “Real-Time?”

Real-time is within a time frame that allows the project team to react to the information while in the field.
Example BMP
High Resolution Site Characterization

- Traditional Static Method – Low Resolution Data
  - Poorly-defined contamination
  - Uncertainty about clean area
  - Less reliable remediation targeting
Example BMP
High Resolution Site Characterization

- Dynamic Work Strategy – High Resolution Data
  - Well-defined contamination
  - Certainty about clean area
  - More effective remediation targeting
Example BMP - Data Visualization

- Traditional approaches typically utilize 2-D data presentations
- Tools are now available for visualizing and evaluating subsurface data in 3-D and 4-D
- Estimate distributions, volume, mass, and behavior over time in high resolution
## Case Studies: Success Stories in Site Remediation and Reuse

<table>
<thead>
<tr>
<th>Site</th>
<th>On Time And Budget</th>
<th>End Goals Met</th>
<th>Minimized Workload</th>
<th>Uncertainty Managed For Quality</th>
<th>High ROI</th>
<th>Maximum Protectiveness &amp; Reuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poudre River Site, Fort Collins, CO</td>
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Who Can BTSC Help?

Direct Technical Assistance
- State and local governments
- Tribes
- Brownfields Grantees
- EPA Regional Coordinators
- EPA Remedial Project Managers
- EPA On-Scene Coordinators
- Other EPA Regional staff

Information Support
- Real estate professionals
- Developers and financial institutions
- Other private redevelopment interests
- Consultants, engineers and remediators
- Potentially Responsible Parties (PRPs)
- Affected Communities
- General public
Direct Technical Assistance Services

- Project Strategy Consultation
  - Including use of the Triad Approach, Exit Strategies
- Facilitation of Systematic Project Planning
- Review or development of:
  - Conceptual Site Models (CSMs)
  - Dynamic Work Strategies
- Recommendation of innovative and real-time investigation technologies
- Evaluation of remedial technologies
- Review of remedial designs
- Training – Live / Webcast / Archived
“Self-Help” Information Assistance

- Guidance Documents
- Special Issues Primers
- Technical Bulletins
- Fact Sheets
- Case Studies
- Technology Descriptions
- Web-resources

Triad Resource Center
www.triadcentral.org
Multiple resources dedicated to effective Triad implementation

CLU-IN
www.clu-in.org
Provides information about innovative treatment and site characterization technologies
Acts as a forum for all waste remediation stakeholders

Contact EPA for information on how to join today!

Community of Practice (CoP)
Triad practitioners share knowledge and project experience
Free membership comprised of federal and state agencies, private contractors, and academia

Sustainable Cleanups
Triad Approach / BMPs Summary

- Triad is a highly-effective strategy for expediting Targeted Brownfields Assessments
- Triad is the best platform for performing high resolution site characterization efforts
- BMPs apply to all phases of a project’s life cycle

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