

COMPREHENSIVE LIFECYCLE PLANNING AND MANAGEMENT SYSTEM FOR ADDRESSING WATER ISSUES ASSOCIATED WITH SHALE GAS DEVELOPMENT IN NEW YORK, PENNSYLVANIA, & WEST VIRGINIA

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NETL Project Kick-off Meeting

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WHO WE ARE

- ALL Consulting, LLC
 - Formerly Arthur Langhus Lane, LLC
 - HQ in Tulsa, Oklahoma
- Multi-Disciplinary Consulting Firm
 - Energy (oil & gas, regulatory affairs, permitting, planning, & more)
 - Engineering (well and facility design, construction oversight, etc.)
 - Technology (Databases, GIS, Data Mining, Software Development, etc.)
 - Environmental Consultants (Air, Water, and Waste – COMPLETE Services)
 - Planning (NEPA, State Environmental Policy Acts, Resource Management, etc.)
- Shale Gas Expertise
 - Co-author with GWPC on Shale Gas Primer
 - Multiple technical papers and presentations

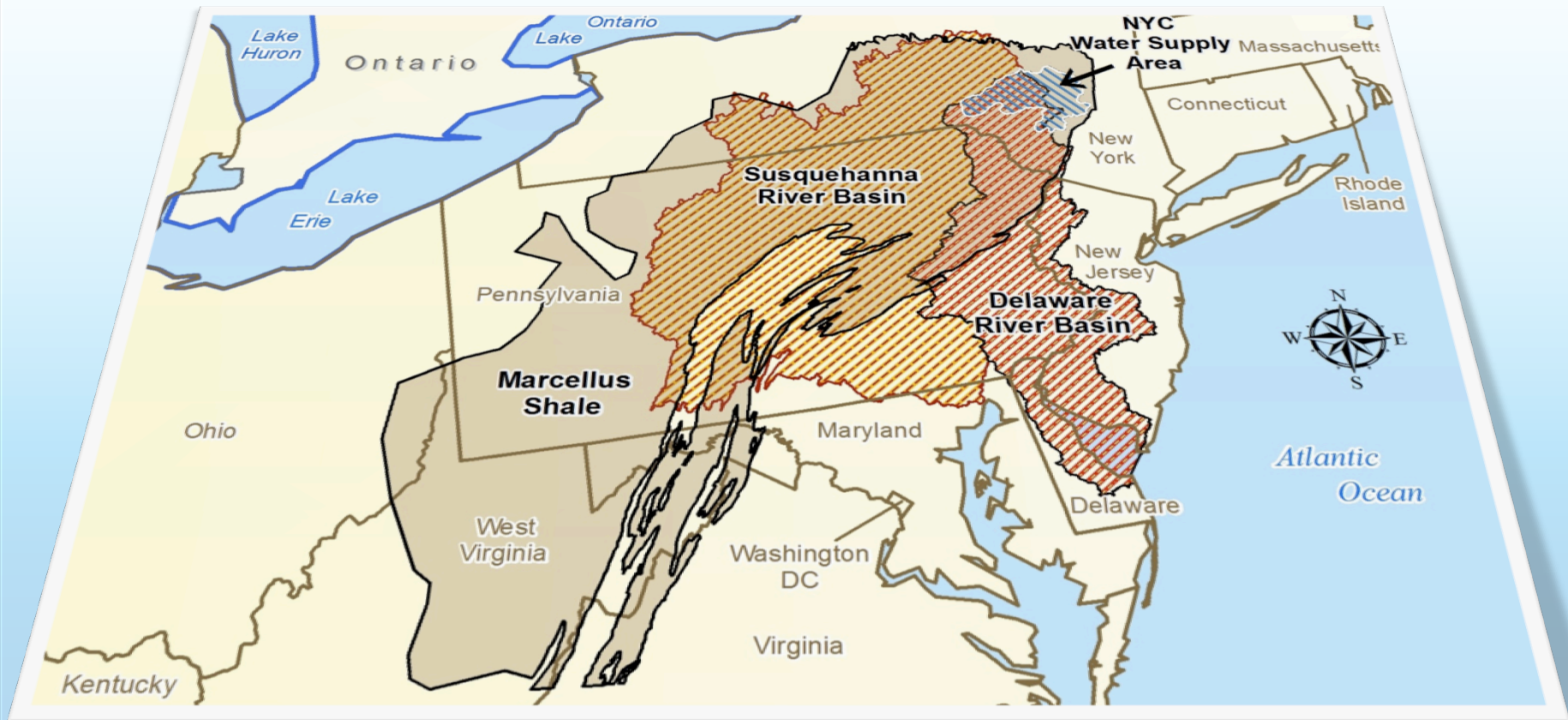
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SHALE GAS BASINS OF THE U.S.



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MARCELLUS SHALE PLAY

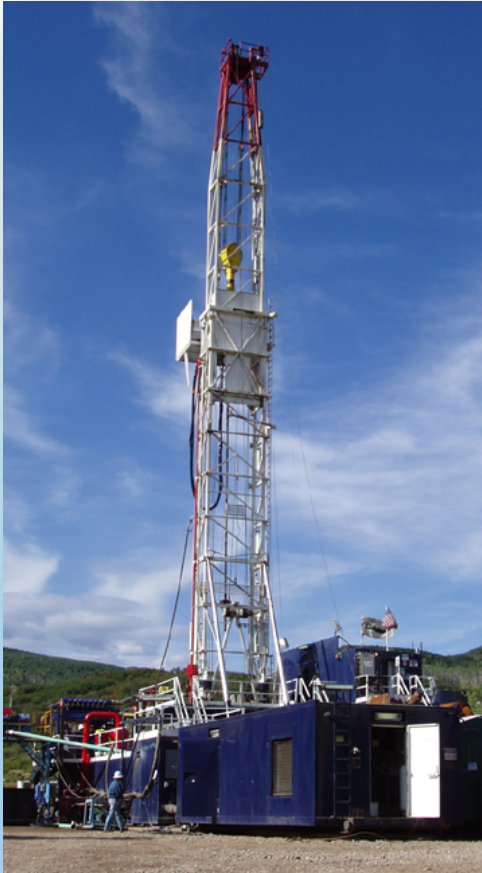


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WATER LIFECYCLE ISSUES

- **Withdrawal:** Access to supply sources, timing, permitting, compliance and reporting
- **Transport:** transport options (truck, pipeline, rail), environmental and best practices, cost, timing
- **Storage:** Cost, surface disturbance, permitting
- **Drilling and Fracturing:** Surface handling, produced water mgmt
- **Treatment:** Benefit, Cost, volume of resulting concentrate
- **Reuse/Recycle:** Reuse for HF, other markets for recycled water, demand characteristics (quantity, quality, timing)
- **Disposal:** Availability/permitting of injection zones, capacity at commercial/municipal plants, discharge permits, compliance

LIFECYCLE SYSTEM



- Goals:
 - Ability to analyze impacts and options
 - Regulatory tracking and compliance
 - Plan for future water use and disposition
- Modules addressing:
 - Withdrawal
 - Recycling/Reuse
 - Disposal
 - Etc...

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PROJECT PARTNERS

- NY State Energy Research & Development Authority (NYSERDA) (\$200K cash cost share)
- Susquehanna River Basin Commission (SRBC) (\$50K in-kind cost share)
- Delaware River Basin Commission (DRBC)



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PROJECT ADVISORY COUNCIL

- NYSERDA
- SRBC
- DRBC
- Proposed:
 - NY DEC, PA DEP, WV DEP
 - Producers, landowner assoc., local government
 - Others



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THREE PHASE PROJECT

- Project started October 1, 2009
- Phase 1: Data collection; initial design
- Phase 2: System design and construction
- Phase 3: Pilot test; final system; distribution; user support



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MAJOR MILESTONES

- Complete initial issue analysis and site visits (9/30/10)
- Complete final system requirements (4/30/11)
- Draft operating water management system for testing (9/30/11)
- Deliver final operating water management system (3/31/12)

PROJECT PHASE I

- Project started October 1, 2009
- Data collection and issues analysis
 - Literature
 - Internet
 - Input from stakeholder groups
 - Compile datasets, documents, maps, and photos
- Begin initial system design



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PHASE I-TASKS 1, 2, 3, 4

- PMP and TSA
- Research Water Issues in the Target Area, Initial System Design and Establish Project Advisory Committee
- Data Collection and Field Site Assessments
- Technology Transfer
 - Project website, presentations and papers

PROJECT PHASE II

- System design and development
- Review with PAC and stakeholder groups
- Incorporate PAC/stakeholder input



PHASE II-TASKS 5, 6, 7

- Final System Requirements
 - Database tables and key data relationships
 - Module design by phase of water lifecycle
 - Permit tracking and compliance capabilities
- System Development
- Continuation of Technology Transfer

PROJECT PHASE III

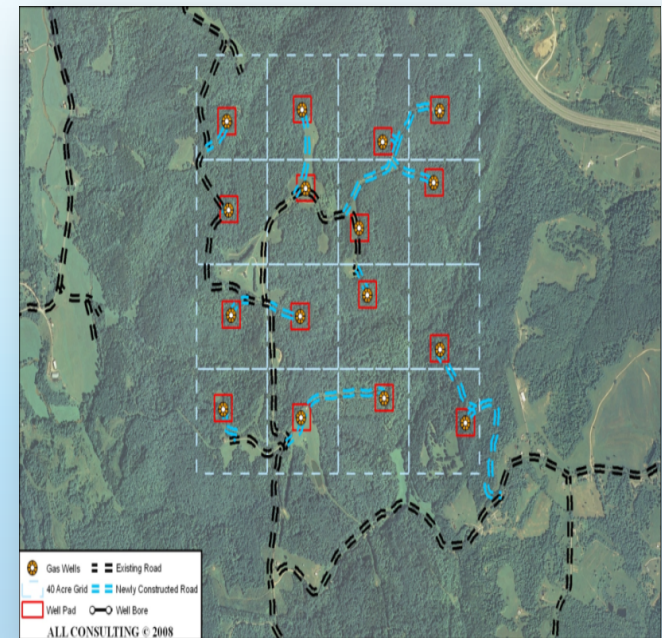


- Pilot test with stakeholders
- Incorporate feedback and finalize
- Announce availability through emails, project website, DOE-NETL, and presentations
- Offer user support through FAQs, email, project website, etc.

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SYSTEM CAPABILITIES

- Planning and Permit Management
- Compliance tracking
- Economic management:
 - volumes, costs, and influences on development strategy
- Cumulative impact analysis
- System is a one-stop-shop for management of shale gas water



PROJECT BENEFITS

- Facilitate planning and evaluation by operators and regulatory agencies (Water Management Planning)
- Perform “What If” scenario analyses
- Incorporate/track regulatory requirements of the appropriate state and regional agencies
- Facilitate permit applications, reporting and compliance management

SUSTAINABLE DEVELOPMENT

- Overall, the water volume needed for shale gas development is small and temporary compared to much more long-term, traditional uses such as electrical power generation.
- Management of water resources will influence the pace of shale gas development.
- Sustainable shale gas development will benefit from a toolbox approach to managing water lifecycle issues.
- This project will allow planning and optimization of water management operations.

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PROJECT OVERVIEW

- Principle Investigator: Dan Arthur, P.E., ALL
- 36 month period of performance
- Total Cost: \$1.2 Million Cost Share: \$335K (27%)



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COST BREAKOUT

(\$THOUSANDS)

	Year 1	Year 2	Year 3	Total
DOE	\$460	\$326	\$126	\$ 913
Cost Share	\$117	\$107	\$111	\$ 335
Total	\$577	\$433	\$237	\$1,248
Cost Share (%)	20.3	24.6	46.9	26.9

CONTACT INFORMATION

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