

# Conservation Committee Report

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Jack Walters—Conservation Chairman

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## The Conservation Pledge

I give my pledge as an American to save and faithfully defend from waste, the natural resources of my country; the soil, the water, the air, the minerals, the plant life and the wildlife.

This is my Pledge!

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## EPA Recommends New Recreational Water Quality Criteria to Better Protect Public Health

Pursuant to an order from a U.S. District Court and as required by the Beaches Environmental Assessment and Coastal Health Act of 2000, the U.S. Environmental Protection Agency (EPA) recommended new recreational water quality criteria for states that will help protect peoples' health during visits to beaches and waters

year round. The science-based criteria provide information to help states improve public health protection by addressing a broader range of illness symptoms, better accounting for pollution after heavy rainfall, providing more protective recommendations for coastal waters, encouraging early alerts to beachgoers and promoting

rapid water testing. The criteria released today do not impose any new requirements; instead, they are a tool that states can choose to use in setting their own standards.

The criteria provide states and communities with the most up to date science and

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## Research Projects Addressing Technical Challenges to Environmentally Acceptable Shale Gas Development Selected by DOE

Fifteen research projects aimed at addressing the technical challenges of producing natural gas from shales and tight sands, while simultaneously reducing environmental footprints and risks, have been selected to receive a

total of \$28 million in funding from the U.S. Department of Energy's Office of Fossil Energy (FE). The projects, valued at just over \$36.6 million over two years, add to the research portfolio for FE's Ultra-

Deepwater and Unconventional Natural Gas and Other Petroleum Resources Research Program, which develops technologies and strategies to improve the safety and

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## **EPA Recommends New Recreational Water Quality Criteria to Better Protect Public Health (continued)**

information that they can use to determine whether water quality is safe for the public and when to issue an advisory or a beach closure. EPA has provided a variety of other tools to help states evaluate and manage recreational waters.

The new criteria are based on several recent health studies and use a broader definition of illness to recognize that symptoms may occur without a fever, including a number of stomach ailments. EPA also narrowed from 90 days to 30 days the time period over which the results of monitoring samples may be averaged. This produces a more accurate picture of the water quality for that given time, allowing for improved notification time about water quality to the public. This shortened time period especially accounts for heavy rainfall that can wash pollution into rivers, lakes or the ocean or cause sewer overflows.

The strengthened recommendations include:

- A short-term and long-term measure of bacteria levels that must be used together to ensure that water quality is properly evaluated.
- Stronger recommendations for coastal water quality so public health is protected similarly in both coastal and fresh waters.
- A new rapid testing method that states can use to determine if water quality is safe within hours of water samples being taken.
- An early-alert approach for states to use to quickly issue swimming advisories for the public.
- Tools that allow states to predict water quality problems and identify sources of pollution, as well as to develop criteria for specific beaches.

Source: U.S. Environmental Protection Agency (EPA)

## Research Projects Addressing Technical Challenges to Environmentally Acceptable Shale Gas Development Selected by DOE (continued)

minimize the environmental impacts of oil and natural gas exploration and production.

The projects will address research needs primarily in four categories: (1) reduced environmental impacts, (2) improved water handling and treating methods, (3) enhanced characterization of shales, and (4) improved understanding of the hydraulic fracturing process.

Projects range from testing innovative technologies for cleaning fracture flowback water, to finding new ways to improve casing cement jobs, to increasing the understanding of the relationship between underground water disposal and induced seismicity.

Approximately \$8.6 million of the total value of the projects is provided via cost-share by the research partners, in addition to \$28 million in federal funds. The research contracts will be administered by the Research Partnership to Secure Energy for America (RPSEA), under the management of FE's National Energy Technology Labora-

tory. The projects selected under today's announcement include:

- **GSI Environmental, Inc. (Houston, TX)**—*Reducing the Environmental Impact of Gas Shale Development: Advanced Analytical Methods for Air and Stray Gas Emissions and Produced Brine Characterization.* The research team will develop practical and cost-effective methods to address three environmental risks associated with shale gas development: potential emissions of volatile air contaminants from produced water impoundments, potential impacts of methane and other gases on groundwater resources, and ineffective treatment, disposal, or reuse of produced water. The research products will be scientifically based protocols for effective sampling, analysis, and interpretation of data during monitoring of waste streams. *DOE share: \$1,542,193; Recipient share: \$510,000; Duration: 1 year*
- **CSI Technologies, Inc. (Houston, TX)**—*Development of Methods to Prohibit and Remediate Loss of Annular Isolation in Shale Gas Wells: Prevention and Remediation of Sustained Casing Pressure and Other Isolation Breaches.* The objectives of this project include the evaluation of sealants and devices capable of shutting off or preventing the formation of pathways for fluid communication in the casing/borehole annulus, and field testing of preventive and remedial protocols in both the Fayetteville and Marcellus shale plays. *DOE share: \$4,005,930; Recipient share: \$2,700,000; Duration: 2 years*
- **The University of Texas at Austin (Austin, TX)**—*Relationships Between Induced Seismicity and Fluid Injection: Development of Strategies to Manage Fluid Disposal in*

## Research Projects Addressing Technical Challenges to Environmentally Acceptable Shale Gas Development Selected by DOE (continued)

*Shale Hydrocarbon Plays.* The research team will seek to learn why fluid disposal induces earthquakes in some areas and not in others, with the aim of developing improved injection technology that optimizes disposal volume and cost while avoiding induced seismicity. The project includes a survey of seismic activity in four basins; acquisition of data concerning injection locations, histories, and volumes; spatial and temporal correlation analysis of injection and earthquake activity; collection of structural data in study areas that show different levels of seismic activity; geomechanical and statistical analysis; and development of improved injection strategies. *DOE share: \$963,792; Recipient share: \$259,123; Duration: 2 years*

- **University of Southern California (Los Angeles, CA)**—*Water Handling and Enhanced Productivity*

*from Gas Shales.* Using a combination of computer modeling, field tests, and laboratory experiments utilizing Marcellus Shale core samples, researchers will seek to improve understanding of the interactions between shale and fracturing fluids, and the impacts of such interactions on well productivity. The results will provide new guidelines on optimal choices for hydraulic fracturing treatment design and the treatment and reuse of fracture flowback water. *DOE share: \$1,741,215; Recipient share: \$506,027; Duration: 2 years*

- **Colorado State University (Fort Collins, CO)**—*Development of GIS-Based Tool for Optimized Fluid Management in Shale Operations.* The researchers will develop a GIS-based tool for optimizing fluids management decisions during shale gas development and production in the Wattenberg field in northeast-

ern Colorado. Products will include case studies, user manuals, and online training materials to allow the tools to be applied in other natural gas basins. *DOE share: \$1,395,949; Recipient share: \$289,898; Duration: 2 years*

- **Southern Research Institute (Birmingham, AL)**—*Advanced Treatment of Shale Gas Frac Water to Produce NPDES Quality Water.* The goal of this project is further development and optimization of four advanced water treatment technologies: two for fracturing flowback water treatment and two for treatment and disposal of residual high solid slurry and concentrated brine. The technologies are magnetic ballast clarification, vortex-generating and nanofiltration membranes, hydrogel adsorption, and a combination of precipitation, solidification and stabilization. *DOE share: \$2,488,919; Recipient*

## Research Projects Addressing Technical Challenges to Environmentally Acceptable Shale Gas Development Selected by DOE (continued)

*share: \$289,898; Duration: 2 years*

- **Ohio University (Athens, OH)**—*Cost-Effective Treatment of Flowback and Produced Waters Via an Integrated Precipitative Supercritical (IPSC) Process.* The objective of this project is to validate the performance and cost-effectiveness of the IPSC process to convert fracture flowback and produced water generated by unconventional shale gas wells into a clean water product. This technology combines ultraviolet light treatment, chemical precipitation, and an advanced supercritical reactor incorporating a hydrocarbon reforming catalyst. *DOE share: \$1,936,630; Recipient share: \$500,160; Duration: 2 years*
- **Battelle Memorial Institute (Columbus, OH)**—*Development of Subsurface Brine Disposal Framework in the Northern Appalachian Basin.* This project will address the need for subsurface brine disposal options in the PA-OH-WV-KY area by compiling geological

and reservoir data, developing geocellular models from logs and seismic data, and carrying out advanced reservoir and geomechanical simulations to better understand the geologic setting, reservoir dynamics, geomechanical issues, and subsurface effects of brine disposal. Maps, geologic cross sections, an inventory of reservoir parameters, and practical guidance for injection operations will constitute the final deliverables. *DOE share: \$1,569,592; Recipient share: \$402,732; Duration: 2 years*

- **Drexel University (Philadelphia, PA)**—*Development of Plasma Technology for the Management of Frac/Produced Water.* The objective of this project is to further develop an integrated plasma water treatment system for improved management of fracturing flowback and produced water. The system will include plasma-induced water softening, plasma-assisted self-cleaning filtration, and vapor-compression distillation. *DOE share: \$1,574,690; Recipient*

*share: \$395,060; Duration: 2 years*

- **Colorado School of Mines (Golden, CO)**—*Advancing a Web-Based Tool for Unconventional Natural Gas Development with Focus on Flowback and Produced Water Characterization, Treatment and Beneficial Use.* The research team will develop a set of web-based tools that will support producers, regulators, and others in the effort to characterize, treat, beneficially use, and manage produced water and fracturing flowback water. Key elements include improved understanding of chemical compositions of flowback and produced waters, models to predict variability of produced water quality, a database of water qualities and quantities, and case studies from industry partners that illustrate and validate application of the tools. *DOE share: \$286,984; Recipient*

## Research Projects Addressing Technical Challenges to Environmentally Acceptable Shale Gas Development Selected by DOE (continued)

- share: \$106,796; Duration: 3 years*

  - **The University of Texas, Bureau of Economic Geology (Austin, TX)**—*Understanding and Managing Environmental Roadblocks to Shale Gas Development: An Analysis of Shallow Gas, NORMs, and Trace Metals (Texas)*. The objectives of this study are to (1) enhance understanding of shallow gas deposits, naturally occurring radioactive materials, and metals (to better characterize the potential risk of groundwater contamination); and (2) enhance understanding of the nature and variability of fracturing flowback water (to better adjust and optimize flowback treatment). *DOE share: \$1,300,504; Recipient share: \$325,144; Duration: 2 years*
  - **Oklahoma State University (Stillwater, OK)**—*Petrophysics and Tight Rock Characterization for the Application of Improved Stimulation and Production Technology in Shale*. The project team will develop new analytical standards for petrophysical characterization of shale and new analytical methods that can reduce cost and increase the reproducibility and reliability of shale characterization results. *DOE share: \$1,529,702; Recipient share: \$383,850; Duration: 2 years*
  - **Texas A&M University (College Station, TX)**—*Conductivity of Complex Fracturing in Unconventional Shale Reservoirs*. The research team will conduct experiments to determine the effect of proppant type, size, and concentration on fracture conductivity in the Barnett, Fayetteville, and Eagle Ford shales. The results will be compared to production history observations to shed light on possible causes of fracture treatment failures and unexpected production performance declines, and to provide guidelines for improving hydraulic fracturing practices in these formations so that fewer wells are needed to develop the resource. *DOE share: \$883,507; Recipient share: \$220,877; Duration: 2 years*
  - **Texas A&M University (College Station, TX)**—*Fracture Permeability Caused by Shear Slip in Gas Shale Reservoirs*. The objectives of this project are to investigate fracture permeability generation in shale, quantify how the fracture permeability changes with normal and shear stress and assess permeability regain when gas flows after shear slip by water pressure. The results will improve the ability to utilize the self-propping character of natural fractures to improve the performance of hydraulically fractured wells and to develop more efficient and less impactful well-stimulation designs. *DOE share: \$622,115; Recipient share: \$155,528; Duration: 2 years*

## Research Projects Addressing Technical Challenges to Environmentally Acceptable Shale Gas Development Selected by DOE (continued)

- **Gas Technology Institute (Chicago, IL)**—*Advanced Hydraulic Fracturing*. The research team will (1) develop a real-time hydraulic fracturing control methodology through coupled analysis of geophysical fracture diagnostic data and pumping pressure, rate, and fluid density; and (2) verify the results through extensive production testing. The work will produce improved guidelines for environmentally safe and economically optimal fracture stimulation of low permeability reservoirs, including the acquisition and use of high-resolution microseismic data for fracture mapping. *DOE share: \$6,201,731; Recipient share: \$1,565,000; Duration: 2 years*

Source: U.S. Department of Energy's Office of Fossil Energy (FE)

# EPA Updates Rule for Pathogens in Drinking Water, Sets Limit for E. Coli

The U.S. Environmental Protection Agency (EPA) has updated the rule for pathogens in drinking water, including setting a limit for the bacteria E. coli to better protect public health.

The Revised Total Coliform Rule ensures that all of the approximately 155,000 public water systems in the United States, which provide drinking water to more than 310 million people, take steps to prevent exposure to pathogens like E. coli. Pathogens like E. coli can cause a variety of illnesses with symptoms such as acute abdominal discomfort or, in more extreme cases, kidney failure or hepatitis.

Under the revised rule, public drinking water systems are required to notify the public if a test exceeds the maximum contaminant level (MCL) for E. coli in drinking water. If E. coli or other indications of drinking water contamination are detected above a certain level, drinking water facilities must assess the system and fix potential sources and pathways of contamination. High-risk drinking water systems with a history of non-compliance must perform more frequent monitoring. The revised rule provides in-

centives for small drinking water systems that consistently meet certain measures of water quality and system performance.

Public water systems and the state and local agencies that oversee them must comply with the requirements of the Revised Total Coliform Rule beginning April 1, 2016. Until then, public water systems and primacy agencies must continue to comply with the 1989 version of the rule.

The Safe Drinking Water Act requires that EPA review each National Primary Drinking Water Regulation, such as the Total Coliform Rule, at least once every six years. The outcome of the review of the 1989 Total Coliform Rule determined that there was an opportunity to reduce implementation burden and improve rule effectiveness while at the same time increasing public health protection against pathogens in the drinking water distribution systems. EPA's revised rule incorporates recommendations from a federal advisory committee comprised of a broad range of stakeholders and considers public comments received during a public comment period held in fall 2010.

Source: The U.S. Environmental Protection Agency (EPA)

## EPA Releases Update on Ongoing Hydraulic Fracturing Study

The U.S. Environmental Protection Agency (EPA) provided an update on its ongoing national study currently underway to better understand any potential impacts of hydraulic fracturing on drinking water resources. Results of the study, which Congress requested EPA to complete, are expected to be released in a draft for public and peer review in 2014. The update provided outlines work currently underway, including the status of research projects that will inform the final study. It is important to note that while this progress report outlines the framework for the final study, it does not draw conclusions about the potential impacts of hydraulic fracturing on drinking water resources, which will be made in the final study.

As the administration and EPA has made clear, natural gas has a central role to play in our energy future, and this important domestic fuel source has extensive economic, energy security, and environmental benefits. The study EPA is currently undertaking is part of EPA's focus to ensure that as the Administration continues to work to expand production of this important domestic resource

safely and responsibly.

Among the information released today are updates on 18 research projects and details on the agency's research approach as well as next steps for these ongoing projects and analyses. Today's update follows the public release, in November 2011, of the agency's final study plan, which underwent scientific peer review and public comment.

EPA has engaged stakeholders, including industry, to ensure that the study reflects current practices in hydraulic fracturing. EPA continues to request data and information from the public and stakeholders and has put out a formal request for information which can be accessed through the federal register at: <https://www.federalregister.gov>

/articles/2012/11/09/2012-27452/

request-for-information-to-inform-hydraulic-fracturing-research-related-to-drinking-water-resources

EPA also expects to release a draft report of results from the study in late 2014. The study has been designated a Highly Influential Scientific Assessment, meaning it will receive the highest level of peer re-

view in accordance with EPA's peer review handbook before it is finalized. The 2014 draft report will synthesize the results from the ongoing projects together with the scientific literature to answer the study's main research questions.

EPA's Science Advisory Board (SAB) is forming a panel of independent experts which will review and provide their individual input on the ongoing study to EPA. The SAB will provide an opportunity for the public to offer comments for consideration by the individual panel members. For more information on the SAB process, please visit:

<http://yosemite.epa.gov/sab/sabpeople.nsf/WebCommittees/BOARD>

More information:

[www.epa.gov/hfstudy](http://www.epa.gov/hfstudy)

Source: The U.S. Environmental Protection Agency (EPA)

# DOE Approves Field Test for Promising Carbon Capture Technology

Membrane System Successfully Captures 90 Percent of CO<sub>2</sub> from Flue Gas, Approved for Scale-Up

A promising post combustion membrane technology that can separate and capture 90 percent of the carbon dioxide (CO<sub>2</sub>) from a pulverized coal plant has been successfully demonstrated and received Department of Energy (DOE) approval to advance to a larger-scale field test.

In an \$18.75 million project funded by the American Recovery and Reinvestment Act of 2009, Membrane Technology and Research Inc. (MTR) and its partners tested the Polaris™ membrane system, which uses a CO<sub>2</sub>-selective polymeric membrane (micro-porous films which act as semi-permanent barriers to separate two different mediums) material and module to capture CO<sub>2</sub> from a plant's flue gas. Post-combustion separation and capture of CO<sub>2</sub> is challenging due to the low pressure and diluted concentration of CO<sub>2</sub> in the waste stream; trace impurities in the flue gas that affect removal processes; and the amount of en-

ergy required for CO<sub>2</sub> capture and compression.

Because the Polaris membranes are 10 times more permeable to CO<sub>2</sub> than conventional materials (reducing the membrane area required), and use a slipstream of combustion air as a sweep gas, the system has great potential for reduced energy requirements, reasonable capture costs and greater efficiencies for post-combustion capture, all important factors for retrofitting existing coal-based plants.

Demonstrating and further validating this innovative, cost-effective membrane CO<sub>2</sub> separation process at the 1 megawatt equivalent (MWe) pilot scale is expected to be a major step toward meeting DOE's program goals of capturing more than 90 percent of CO<sub>2</sub> from flue gas with less than a 35 percent increase in the cost of electricity. Consequently, MTR will now begin fabricating a 1-megawatt (MW) system capable of meeting this goal from a 20-ton-per-day slipstream of coal-fired flue gas.

The 1-MW system will be tested at DOE's National Car-

bon Capture Center (NCCC) in Wilsonville, Ala., beginning in 2013. The Post-Combustion Carbon Capture Center at the NCCC enables testing and integration of advanced CO<sub>2</sub>-capture technologies, at scale, using flue gas from Alabama Power's Gaston power plant Unit 5, an 880-megawatt supercritical pulverized coal unit. Data generated in a 6-month field test of the 1-megawatt system will be used by MTR to develop a preliminary 20-megawatt full-scale commercial design in cooperation with their partners, Vectren and WorleyParsons.

In addition to MTR, other collaborators on the three-year project include the Babcock & Wilcox Company, Electric Power Research Institute, and Southern Company. Objectives of the project, part of DOE's Clean Coal Research Program portfolio, include reducing the capital cost, footprint, and energy penalty for CO<sub>2</sub> capture in conventional coal-fired power plants, compared to existing commercial systems.

Source: U.S. Department of Energy

## DOE, Invensys Operations Management to Develop, Deploy Operator Training System for Supercritical Coal Power Plants

### New System Supports Research Under DOE's Carbon Capture Simulation Initiative

A new U.S. Department of Energy (DOE) cooperative research and development agreement to develop, test, and deploy a dynamic simulator and operator training system (OTS) could eventually help commercialize important carbon capture technologies at the nation's power plants.

The high-fidelity, real-time OTS for a generic supercritical once-through (SCOT) pulverized-coal power plant will be installed at the National Energy Technology Laboratory's (NETL's) Advanced Virtual Energy Simulation Training and Research (AVESTAR) Center in Morgantown, W.Va. It will be used for collaborative research, industry workforce training, and engineering education on SCOT plant operations and control under the agreement signed with Invensys Operations Management.

The SCOT dynamic model will be designed to include all

process- and heat-integration connections to post-combustion CO<sub>2</sub>-capture, -compression, and -utilization processes, allowing it to serve as the baseline power plant model for DOE's Carbon Capture Simulation Initiative (CCSI). The NETL-led CCSI is a partnership among national laboratories, industry, and academic institutions geared toward developing and deploying state-of-the-art computational modeling and simulation tools to accelerate the commercialization and widespread use of carbon-capture technologies at the nation's power plants. By developing effective strategies for the operation and control of carbon-capture technologies, CCSI is expected to have a significant impact on the extent and rate at which commercial-scale capture processes will be scaled-up, deployed, and used.

Working in collaboration with NETL, Invensys will develop the SCOT dynamic simulator/OTS using Invensys' SimSci-Esscor® DYNASIM® dynamic simulation software and Wonderware® InTouch® operator training interface software. NETL and Invensys previously collaborated on the high-fidelity, full-scope,

real-time dynamic simulator/OTS for an integrated gasification combined cycle (IGCC) power plant with CO<sub>2</sub> capture that is currently deployed at the AVESTAR Center. The IGCC dynamic simulator also utilizes Invensys Operations Management's software, ensuring that both simulators will efficiently coexist on the AVESTAR computer hardware.

The SCOT dynamic simulator developed under this agreement will enable the AVESTAR Center to provide a virtual test bed for optimizing the operation and control of post-combustion CO<sub>2</sub>-capture technologies. Ultimately, the collaborative research conducted through this partnership will be used to accelerate progress toward achieving operational excellence for SCOT pulverized-coal power plants with carbon capture.

Source: U.S. Department of Energy (DOE)

# DEP Reminds Pennsylvanians that January is Radon Action Month

Free Webinar on Jan. 16 to Offer Q&A with Experts, Home Testing Tips

As part of National Radon Action Month, the Department of Environmental Protection will present an episode on the subject as part of its quarterly webinar series, DEP at Home, on Wednesday, Jan. 16, from 7 to 8 p.m.

“Radon is the second leading cause of lung cancer in the United States and affects almost half of all Pennsylvania homes,” DEP Secretary Mike Krancer said. “Everyone needs to test their homes for radon.

“The good news is that a radon problem is easily and inexpensively fixed. The webinar will teach people more about this health risk and how they can protect their families.”

The webinar will feature a presentation and live question-and-answer session with Robert Lewis and Matthew Shields of DEP’s Bureau of Radiation Protection and

Kevin Stewart of the American Lung Association.

Radon is a colorless, odorless, radioactive gas that occurs naturally through the breakdown of uranium in soil and rocks. It can seep into homes through cracks in basements and foundations, and can build up inside to concentrations many times the recommended level.

Radon is responsible for an estimated 20,000 lung-cancer deaths in the United States every year, and about 40 percent of Pennsylvania homes have radon levels above the U.S. Environmental Protection Agency’s action level of four picocuries per liter. While radon problems may be more common in some regions, the potential exists for any home to have high radon levels.

Pennsylvania is particularly prone to elevated radon levels, and the only way to know if there is a radon problem is to test the home. DEP recommends testing all homes and public and private buildings. The best time to test is during the cold-weather months, when homes and buildings are

closed and radon is most likely to build up to unhealthy levels.

Residents may hire a certified radon testing company, though it is easy to perform a radon test by using a kit that can be purchased at a home improvement store or a Pennsylvania-certified radon laboratory. Completed test kits are to be sent to a Pennsylvania-certified lab, where the samples are analyzed and the results are then sent to the resident. If results reveal radon levels above the action level, a radon mitigation system may be necessary.

Radon mitigation systems cost between \$700 and \$1,200 and require minimal maintenance. Most home or building owners choose to hire a radon mitigation professional to install the system.

For more information about radon, including information about interpreting test results or to find a Pennsylvania-certified radon contractor,

## **DEP Reminds Pennsylvanians that January is Radon Action Month (continued)**

visit [www.dep.state.pa.us](http://www.dep.state.pa.us),  
keyword: Radon, or call

1-800-23-RADON.

To participate in the webinar,  
visit [www.dep.state.pa.us](http://www.dep.state.pa.us)

and click the “DEP at Home”  
button on the homepage.  
Space is limited and partici-  
pation is based on a first-  
come, first-served basis.

Source: PA Department of  
Environmental Protection