

SHALE GAS ROUNDTABLE BACKGROUND

MISSION

In response to the desire of multi-sector high-level leaders to elevate and inform the regional energy dialogue, the Shale Gas Roundtable was created in the fall of 2011 to fulfill a three-part mission related to unconventional oil and gas production, transport, and use:

- Building and sustaining relationships among relevant cross-sector stakeholders and civic leaders to better support diverse regional environmental protection, community quality of life, and economic development goals
- Identifying high-priority focus areas through consensus-building dialogue, extensive research, and shared goals for the region
- Assessing the focus areas and developing ideas and recommendations that promote the improved management of and outcomes from regional unconventional oil and gas development

The principles used to guide the Roundtable's deliberations and activities were:

- Operating with integrity, inclusiveness, and accountability
- Seeking the best possible balance between environmental/community protection and shale gas development/economic growth
- Conducting thorough and objective study of issues
- Seeking the best available data to guide fact-based dialogue
- Incorporating stakeholder input with the help of members
- Working closely with diverse decision makers to seek input and counsel

GEOGRAPHIC FOCUS

The Roundtable's geographic scope included the 10 counties of Southwestern Pennsylvania – Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Lawrence, Indiana, Washington, and Westmoreland. These counties represent approximately one-third of the unconventional oil and gas permits issued, wells drilled, and gas produced in the Commonwealth over the last 10 years. The 10-county Roundtable focus does not imply that unconventional development is only a regional issue. Rather, the region was selected to maintain a manageable geography for frequent in-person member interaction on these issues. The Roundtable recognizes that the state and federal governments will play the largest roles in considering and implementing its recommendations.

ROUNDTABLE MEMBERS AND ROLES

The Roundtable cochair and staff worked thoughtfully and diligently to assemble a high-level, diverse membership of 26 individuals from relevant, interested constituencies. Roundtable members were recruited to serve because of the unique perspectives and contributions each could bring to the effort. A full listing of Roundtable members can be found on pages 3-4.

In adopting this document, the Roundtable members endorse that the final report was built on constructive dialogue, was informed by sound research and information, and that the included recommendations merit consideration by policymakers at all levels as they seek to effectively and safely manage unconventional oil and gas development.

While the Roundtable has achieved general agreement on the report's value in informing decision makers, individual Roundtable members may not agree on the details of every recommendation. The final report reflects the careful deliberations and findings of the Shale Gas Roundtable; it does not necessarily reflect the views of the members' affiliated organizations or of the Institute of Politics.

ROUNDTABLE STAFF SUPPORT

The Shale Gas Roundtable was housed at and staffed by the Institute of Politics at the University of Pittsburgh. The Institute is not an advocacy or a public education organization; it is a nonpartisan entity responding to critical regional needs as defined by its policy committees. The Institute of Politics, through neutral facilitation and unbiased research, establishes productive frameworks for diverse high-level stakeholders to develop, discuss, and evaluate policy ideas and options.

The Institute of Politics staff team did not have a predetermined outcome in mind or established policy agenda for the Shale Gas Roundtable. Instead, the staff provided any necessary services as the Roundtable members collectively determined their own direction, process, and recommendations. The activities of the Shale Gas Roundtable and the services of the Institute of Politics were generously supported by the Pittsburgh Foundation, the Heinz Endowments, and the Richard King Mellon Foundation.

BUILDING A COMMON UNDERSTANDING (2011-12)

The inaugural meeting of the Roundtable was held in September 2011. Agenda items included the development of a work plan, an overview of shale gas development in the region, and an in-depth discussion of goals and interest areas. The resulting work plan was implemented over the subsequent six months and included the following:

- Conducting an extensive literature review of laws, policies, regulations, scientific studies, and advocacy materials related to unconventional oil and gas development in the region
- Investigating and summarizing benchmark information from other oil and gas producing states
- Interviewing relevant multi-sector leaders in Harrisburg and Washington, D.C.
- Continuing outreach to individual Roundtable members and to key stakeholders in Southwestern Pennsylvania to collect as much information as possible about regional unconventional oil and gas development
- Implementing a "Shale Gas University" to allow Roundtable members to participate in shared learning experiences. Educational modules featured expert guest speakers on topics ranging from water management to utility regulation to the full life cycle of natural gas production, transport, and use. Also included were field tours of a compressed natural gas fueling station, a centralized water treatment facility, a drilling site, and areas of the region most impacted by oil and gas development. The Shale Gas University sessions also provided opportunities for relationship building and education on critical issues and were held as needed throughout the entire course of the Roundtable's work.
- Meeting regularly to share the findings and results from the above activities

In late 2011, after completing the literature review, staff conducted benchmarking trips to Colorado, Ohio, New York, Texas, and West Virginia. Information-seeking trips to Harrisburg and Washington, D.C. also were completed during this time. Over the course of 120 meetings in these locations, staff gathered insights from environmental organizations, industry associations, landowner groups, researchers, and regulators and elected officials from the local, county, state, and federal levels. Staff also continued ongoing outreach to individual Roundtable members and to key stakeholders in Southwestern Pennsylvania to collect as much information as possible about unconventional oil and gas development. While the specific context certainly varied, staff found that a common set of issues were on the minds of interviewees in the six states (PA, NY, WV, OH, TX, and CO), including the following:

Community

- Deterioration of local roads and other infrastructure
- Housing availability for industry workers and local citizens
- Noise, light, and other nuisance issues for local communities
- Public health impacts, particularly in rural areas
- Tensions between surface and mineral rights owners

Economic

- Boom-and-bust natural resource extraction cycles and their impacts on communities
- Conversion of vehicle and other engines to run on natural gas and the related necessary construction of a fueling infrastructure
- Creating opportunities for the use of natural gas in local markets
- Job creation and opportunities for new small businesses
- Possibilities for attracting new industries in areas such as petrochemicals and manufacturing
- Workforce development needs to position local workers for jobs in the industry

Environmental

- Absence of baseline environmental and public health monitoring and data
- Acute and cumulative impacts on water and air quality
- Avoiding waste in oil and natural gas development through avoiding the stranding of resources through inefficient practices
- Disposal of drill cuttings and the possibility of problems associated with normally occurring radioactive materials (NORM)
- Induced seismicity from underground injection wells
- Land reclamation, mitigation banking, and bonding requirements
- Need for updated erosion and sedimentation rules to account for new practices
- Siting, stability, and safety of flowback water pits and impoundments
- Surface disturbance from pad, road, and pipeline construction
- Requirements for setbacks from houses, water sources and other important areas
- Underground methane migration
- Water quantity concerns based on the volume of water used in hydraulic fracturing
- Well casing and cementing requirements
- Wildlife and ecosystem protection

Regulatory

- Accountability of operators' subcontractors
- Adaptability of regulation to evolving technology and operations
- Capacity of local governments and counties to have adequate numbers of trained staff for functions such as the clerk of courts and department of emergency services
- Fracturing chemical disclosure
- Inadequacy of staffing and budget resources for state regulatory agencies
- Lack of basic science and data upon which to base sound regulation and policy
- Lack of tools for large-scale comprehensive development planning
- Local and state severance taxes, impact fees, and other revenue streams
- Need for improved communication among government, industry, and key stakeholders
- Role of local, state and federal governments in regulation and monitoring
- Unitization, spacing, conservation, and integration rules for the efficient development of oil and gas

“GETTING IT RIGHT” FRAMEWORK AND RECOMMENDATIONS DEVELOPMENT (2012-13)

The economic benefits of unconventional resource development are often described as worthwhile as long as that development is done right. Roundtable members agree, but “done right” often is not well-defined. Through extensive review and in-depth discussion of the data that resulted from the activities outlined above, the Roundtable concluded that the necessary ingredients for a “getting it right” framework are:

- a strong, adaptive legal and regulatory system with adequate implementation staff and resources;
- aggressive development and industry adoption of best management practices and other operational performance standards;
- investments in technological and operational innovation; and
- carefully targeted and balanced research to inform the continual improvement of statutes, regulations, best management practices, standards, and technology.

If Pennsylvania and its surrounding states pursue excellence in these four areas, the Appalachian Basin could serve as a national model for getting unconventional upstream, midstream, and downstream development right. Specifically, the Roundtable believes that Pennsylvania could best implement this framework by aiming progress at three interrelated goals:

- Minimizing the acute and cumulative impacts of oil and gas activity on the environment, public health, and local communities
- Minimizing surface disturbance from oil and gas activity and maximizing the efficiency of resource recovery and transport
- Enhancing the regional use of natural gas and supporting opportunities for regional economic growth based on the full natural gas value chain

In early 2012, the Roundtable agreed that its attentions would best be concentrated in the legislative, regulatory, and research aspects of this framework. This decision was based largely on the degree to which other organizations and efforts were already focused on creating best management practices and driving innovation. (For more information on the development of best practices, see the Survey of Standards in [Appendix E](#).)

The Roundtable's framework is consistent with an August 2011 report of the U.S. Secretary of Energy Advisory Board's Shale Gas Production Subcommittee.²² The subcommittee was convened by then Secretary of Energy Steven Chu at the direction of President Barack Obama and was tasked with identifying immediate steps that could be taken to improve the safety and environmental performance of shale gas development.

The subcommittee issued recommendations in four key areas:

- **Make information about shale gas development more accessible to the public:** Recommendations in this area included disclosing all chemicals used in fracturing fluid, creating a comprehensive national clearinghouse of all public information related to shale gas, and providing government funding to support existing multi-stakeholder mechanisms such as the Ground Water Protection Council's Risk Based Data Management System and the State Review of Oil and Natural Gas Environmental Regulation (STRONGER).
- **Develop immediate and long-term actions to reduce environmental and safety risks of shale gas development:** Recommendations in this area placed an emphasis on the protection of air and water quality and included designing measurement systems to collect comprehensive air emissions data from shale gas operation sites; taking measures to reduce emissions of air pollutants, ozone precursors, and methane as well as developing national standards to reduce emissions of all air contaminants; encouraging federal interagency collaboration to collect and analyze the overall greenhouse gas footprint of the shale gas industry over its entire life cycle in comparison to that of other fuels; the adoption of a systematic approach to water management that includes consistent measurement and public disclosure; and adopting requirements for the baseline testing of methane levels in water reservoirs and wells in close proximity of drill sites prior to drilling activity.
- **Create a shale gas industry operations organization:** The subcommittee recommended that industry take a more comprehensive and systematic approach to improving the techniques and methods used in the field in order to continually improve their best operating practices.
- **Utilize research and development to improve safety and environmental performance:** The report suggested that the federal government can and should play a role as it relates to the shale gas industry by setting up a research and development mission and appropriate funding level, with a focus on the efficient use of water and other important areas to meet environmental objectives.

²² Natural Gas Subcommittee of the Secretary of Energy Advisory Board. "August 18, 2011 90-day Interim Report." http://www.shalegas.energy.gov/resources/081811_90_day_report_final.pdf

In November 2011, members of the subcommittee released an updated report that prioritized the included recommendations and clarified which actors could implement each recommendation.²³

With the above framework and goals in mind, the Roundtable decided to select a small number of areas for comprehensive exploration and focused recommendations. After deliberatively considering more than 30 potential areas, the members prioritized four areas for targeted attention:

Policy-relevant research: increasing the amount and enhancing the perception of research on the impacts of unconventional oil and gas development and ensuring that the resulting knowledge is used for the improvement of regulations and best practices

Conservation and unitization: developing a balanced proposal for modernizing the 1961 Pennsylvania Oil and Gas Conservation Law to account for modern technologies and approaches, limit surface disturbance, avoid wasted oil and gas resources, and move toward uniform conservation rules for all unconventional shale formations

Water management: protecting water resources through identifying improvements in management and regulation in the areas of water sourcing, hydraulic fracturing chemical disclosure, erosion and sedimentation, impoundments, vehicle traffic for water transport, wastewater treatment and disposal, groundwater protection, water related violations, regional water management, and water monitoring

Midstream development (pipelines and related infrastructure): developing recommendations that minimize the environmental and surface footprints of midstream construction, improve pipeline safety, enhance coordination and planning of siting decisions, and provide increased opportunity for economic and community development

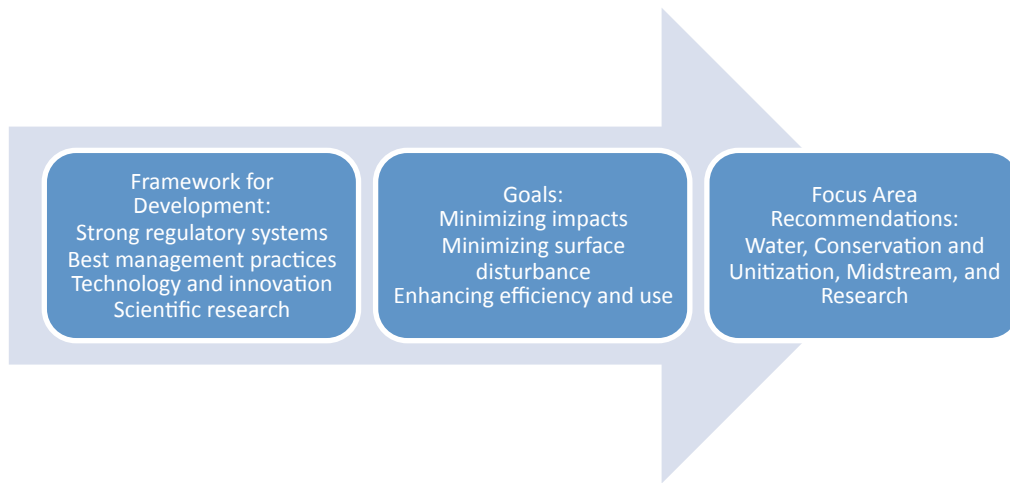
The remainder of this report contains extensive background information and recommendations for each of these four areas along with a set of core recommendations that emerged from the Roundtable's discussions. As described above, the included recommendations were crafted using a thorough and deliberative process to prioritize and address critical issues for Southwestern Pennsylvania.

The Roundtable recognizes that enacting these core and focus area (research, conservation and unitization, water, and midstream) recommendations will require serious consideration and action by a broad group of decision makers. Some recommendations will need legislative action for full implementation; others can be addressed through policy or regulatory actions by federal, state, and local agencies; and some can even be voluntarily pursued by regional stakeholders. In most cases, specific Roundtable recommendations identify which actors can pursue implementation.

²³ Natural Gas Subcommittee of the Secretary of Energy Advisory Board. "November 18, 2011 Final Report." http://www.shalegas.energy.gov/resources/111811_final_report.pdf

A primary goal of this report is to inform the ongoing public policy discussion in this region and in the Commonwealth. As such, the Roundtable will continue to share its recommendations with state and federal officials, local civic leaders, and other relevant regional stakeholders to spread awareness of the report’s contents and key findings – findings that can assist Pennsylvania in improving environmental, public health, and economic outcomes for local communities impacted by unconventional oil and gas development.

Shale Gas Roundtable Recommendations Development Process



APPENDIX E: STANDARDS AND BEST MANAGEMENT PRACTICES FOR SHALE OIL AND GAS DEVELOPMENT

This appendix provides a high-level overview of organizations that have developed or are developing standards or Best Management Practices (BMPs) for shale oil and gas development and its regulation. The included standards apply either to industry operations or to state regulations. They were developed by the following diverse organizations: the American Petroleum Institute, Appalachian Shale Recommended Practices Group, Center for Sustainable Shale Development, Environmental Defense Fund, Intermountain Oil and Gas Best Management Practices Project, Investor Environmental Health Network, Marcellus Shale Coalition, Pennsylvania Department of Environmental Protection, and State Review of Oil and Natural Gas Environmental Regulations. This list of organizations and their associated standards and BMPs is intended as a broad introduction; details can be accessed via the hyperlinks that accompany each program description. The standards cited within this survey have not been independently evaluated by the Shale Gas Roundtable – descriptions are for informational purposes only.

Specific information for each organization, if available, includes the organization’s mission, the titles/categories of the organization’s BMPs, how long the organization has been developing standards, the process used to develop standards, the intended audience, the geography covered, relevant hyperlinks, and an organizational point(s) of contact.

American Petroleum Institute

Established in 1919, the American Petroleum Institute (API) is a trade association that represents the oil and natural gas industry in America. Its members include producers, refiners, suppliers, pipeline operators, marine transporters, and the service and supply companies that support the industry.¹³¹ The mission of API is “to influence public policy in support of a strong, viable U.S. oil and natural gas industry essential to meet the energy needs of consumers in an efficient and environmentally responsible manner.”¹³² API publicly advocates for its members with state governments, the media, Congress, and the executive branch; negotiates with regulatory agencies; represents the industry in legal proceedings; and participates in coalitions and partnerships with other associations.¹³³ API also organizes seminars, workshops, and conferences about policy issues.¹³⁴

In addition to the above activities, API provides certification programs for various segments of the oil and gas industry. These certification programs, based on API operating standards, serve as BMPs for the

¹³¹ API. <http://www.api.org/globalitems/globalheaderpages/about-api/api-overview.aspx>.

¹³² API. <http://www.api.org/globalitems/globalheaderpages/about-api/~link.aspx?id=5A9331A13D0F4F31BC16E003555F123B&z=z>

¹³³ API. <http://www.api.org/globalitems/globalheaderpages/about-api/api-overview.aspx>.

¹³⁴ Ibid.

standardization of industry training. They are widely recognized and used throughout industry.¹³⁵ Certification programs include the following:

- *API Monogram Program*: This program, designed for manufacturers of production, drilling and refinery equipment, verifies that manufacturers are in compliance with industry standards.
<http://www.api.org/certification-programs/api-monogram-program-and-apiqr.aspx>
- *APIQR Program*: This program provides organizations with certifications for quality, environmental, and occupational health and safety management systems.
<http://www.api.org/certification-programs/api-monogram-program-and-apiqr.aspx>
- *Individual Certificate Programs*: Based on industry-developed standards, many of which have served as a model for various state and federal regulations, these programs help to evaluate the knowledge and experience of inspectors and to promote self-regulation, health and safety, improved inspection capabilities, and improved management control and environmental performance.
<http://www.api.org/certification-programs/individual-certification-program-icp.aspx>
- *Witness Programs*: These programs provide individuals with the opportunity to become knowledgeable and experienced witnesses who can observe material and equipment testing and provide verifications with objectivity and reliability.
<http://www.api.org/certification-programs/witnessing-programs.aspx>
- *Training Provider Certificate*: This third-party certification program is used to evaluate and certify industry training courses.
<http://www.api.org/certification-programs/training-provider-tpcp.aspx>

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In addition to certification programs, API also produces numerous publications that contain various standards for the oil and gas industry. These standards, which API has been developing for more than 85 years, are designed through extensive research and represent the industry's collective viewpoints about industry best practices.¹³⁶ API currently maintains more than 600 standards and recommended practices that are used throughout the country.¹³⁷ The following are the general BMP categories that are regularly amended by API as well as the associated contact and hyperlink that provides details about specific standards within each BMP category.

- *Drilling and Production Operations*:
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/drilling%20and%20production%20operations.aspx>

Point of Contact: Roland Goodman, Standards Department; goodmanr@api.org

¹³⁵ Ibid.

¹³⁶ Ibid.

¹³⁷ Ibid.

- Exploration and Production/Oilfield Equipment and Materials:*
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/exploration%20and%20production.aspx>

Point of Contact: Roland Goodman, Standards Department; goodmanr@api.org
- Marketing:*
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/marketing.aspx>

Point of Contact: Steve Crimaudo, Standards Department; crimaudos@api.org
- Measurement:*
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/measurement.aspx>;

Point of Contact: Paula Watkins, Standards Department; watkinsp@api.org
- Pipelines:*
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/pipeline.aspx>

Point of Contact: Ed Baniak, Standards Department; baniake@api.org
- Process Safety:*
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/process%20safety.aspx>

Point of Contact: Steve Crimaudo, Standards Department; crimaudos@api.org
- Refining:*
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/refining.aspx>

Point of Contact: Steve Crimaudo, Standards Department; crimaudos@api.org
- Safety and Fire Inspection:*
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/safety%20and%20fire%20protection.aspx>

Point of Contact: Steve Crimaudo, Standards Department; crimaudos@api.org
- Security:*
<http://www.api.org/publications-standards-and-statistics/annual-standards-plan/standards%20plan%20segments/security.aspx>

Point of Contact: Steve Crimaudo, Standards Department; crimaudos@api.org

- *API Publications Store (Comprehensive Search for Standards Listed in API Publications):*
<http://www.techstreet.com/api/apigate.html>

Appalachian Shale Recommended Practices Group

The Appalachian Shale Recommended Practices Group (ASRPG) is a consortium of the 11 largest Appalachian Basin natural gas and oil producers.¹³⁸ Members are Anadarko Petroleum Corporation, Cabot Oil and Gas Corporation, Chesapeake Energy Corporation, Chevron, EQT Corporation, Seneca Resources Corporation, Shell Oil Company, Southwestern Energy Company, Talisman Energy Inc., WPX Energy, Inc., and XTO Energy, Inc.¹³⁹ ASRPG’s mission is “to identify and disseminate responsible standards and practices for effective environmental, health, and safety practices utilized in shale natural gas and oil development operations in the Appalachian Region.”¹⁴⁰

In April 2012, ASRPG released a BMP document that was developed to promote effective safety, environmental, and health practices that are consistent with key recommendations from the U.S. Secretary of Energy’s Advisory Board and the National Petroleum Council.

Recommended Standards and Practices for Exploration and Production of Natural Gas and Oil from Appalachian Shales, April 2012: These practices are derived from a consensus based approach that examined standards utilized by other industry and stakeholder organizations – though the best practices offered by ASRPG often differed from existing industry standards in order to account for the regional uniqueness of the Appalachian Basin. ASRPG provided the practices to state regulators and legislators within the Appalachian region, to the Interstate Oil and Gas Compact Commission, the State Review of Oil and Natural Gas Environmental Regulations, and important producer organizations. Recommendations in this report included standards related to the following categories:

- General Principles
- Pre-operational Planning
- Site Selection and Assessment
- Site Design and Construction
- Drilling Operations
- Completion/Stimulation Operations
- Flowback Water
- Production Operations
- Measurement and Metrics
- Landowner Relations

http://www.asrpg.org/pdf/ASRPG_standards_and_practices-April2012.pdf

Point of Contact: John Christiansen, 832.636.8736, john.christiansen@anadarko.com

¹³⁸ ASRPG. <http://www.asrpg.org/pdf/ASRPG%20Press%20release.pdf>

¹³⁹ Ibid.

¹⁴⁰ Ibid.

Center for Sustainable Shale Development

Publicly launched in March 2013, the Center for Sustainable Shale Development (CSSD) is an independent, collaborative organization that seeks “to support continuous improvement and innovative practices through performance standards and third-party certification.”¹⁴¹ CSSD’s focus is the Appalachian region. Its creation aligns with a recommendation by the National Petroleum Council and the U.S. Department of Energy’s Shale Gas Production Subcommittee for basin-scale centers of excellence.¹⁴² Funding for CSSD is provided by philanthropic foundations and participating energy companies. Current participants include Chevron, Citizens for Pennsylvania’s Future, Clean Air Task Force, CONSOL Energy, Environmental Defense Fund, EQT Corporation, Group Against Smog and Pollution, The Heinz Endowments, Pennsylvania Environmental Council, Shell, and the William Penn Foundation.¹⁴³

Similar to a LEED certification for environmentally friendly buildings, CSSD will encourage energy companies to apply for a third-party certification that represents a company’s compliance with CSSD’s standards. The current standards are associated with the protection of air quality, water resources, and climate, though CSSD anticipates the promulgation of additional standards over time.¹⁴⁴ The certification process will require companies to be evaluated by third-party auditors – consultant companies ICF International and DCV. The outcome of the audit will deem a company Certified, Certified with Conditions, or Not Certified. A Certified with Conditions ruling means that “only minor deviations from the standard are present and corrections must be made within 90 days.”¹⁴⁵

The 15 standards that CSSD released in March 2013 “apply to unconventional exploration, development, and gathering activities, including site construction, drilling, hydraulic fracturing and production in the Appalachian Basin.”¹⁴⁶ The standards consider “geology, topography, population density, infrastructure, surface water, ground water and other issues of particular concern in the Appalachian Basin.”¹⁴⁷

The standards include the following:

Air and Climate Standards

- Limitations on Flaring
- Use of Green Completions
- Reduced Engine Emissions
- Emissions Control on Storage Tanks

¹⁴¹ CSSD: <http://037186e.netsolhost.com/site/about>

¹⁴² Hopey, Don and Erich Schwartzel. “New Initiative Between Industry and Environmentalists Set Standards for Marcellus Shale Drilling.” *Pittsburgh Post-Gazette*. <http://pipeline.post-gazette.com/news/archives/25103-new-initiative-between-industry-and-environmentalists-sets-standards-for-marcellus-shale-drilling>

¹⁴³ Ibid.

¹⁴⁴ CSSD. <http://037186e.netsolhost.com/site/performance-standards>

¹⁴⁵ CSSD. <http://037186e.netsolhost.com/site/certification>

¹⁴⁶ CSSD. Performance Standards. <http://037186e.netsolhost.com/site/wp-content/uploads/2013/03/CSSD-Performance-Standards-3-13R.pdf>

¹⁴⁷ Ibid.

Surface and Ground Water Performance Standards

- Maximizing Water Recycling
- Development of Groundwater Protection Plan
- Closed Loop Drilling
- Well Casing Design
- Groundwater Monitoring
- Wastewater Disposal
- Impoundment Integrity
- Reduced Toxicity Fracturing Fluid¹⁴⁸

<http://sustainable shale.org>

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Environmental Defense Fund

Founded in 1967, the Environmental Defense Fund (EDF) is an environmental advocacy group with a mission “to preserve the natural systems on which all life depends” and to “find practical and lasting solutions to the most serious environmental problems.”¹⁴⁹ EDF has four primary focus areas: climate and energy, oceans, ecosystems and health.¹⁵⁰ Within the focus area of climate and energy, the natural gas sub-component seeks to work with companies, organizations, and communities to ensure the safe development of natural gas through an examination of exposure to toxic chemicals and waste products, well construction and design, climate impacts, local and regional air quality, land use, and community impacts.¹⁵¹ EDF also is committed to ensuring the comprehensive disclosure of hydraulic fracturing chemicals, the modernization of rules for well construction and operation, systems-based management of wastes and water, state and national standards for improving air quality and reducing climate impacts, and the minimization of land use and community impacts from natural gas development.¹⁵²

EDF is committed to supporting best practices for shale related activities. In 2011, EDF President Fred Krupp was selected to serve on the Natural Gas Subcommittee of the U.S. Secretary of Energy’s Advisory Board. EDF supports the recommendations from this subcommittee, which can be found in the following report:

The Secretary of Energy’s Advisory Board Shale Gas Production Subcommittee 90 Day Report, August 11, 2011. This report provides 20 recommendations that are classified into three categories: recommendations ready for implementation, primarily by the federal agencies; recommendations ready for implementation, primarily by the states; and recommendations that require new partnerships and mechanisms for success. The purpose of the recommendations is

¹⁴⁸ Ibid.

¹⁴⁹ EDF. <http://www.edf.org/about/our-mission-and-history>.

¹⁵⁰ Ibid.

¹⁵¹ Ibid.

¹⁵² Ibid.

to help ensure that shale gas resources are developed in a manner that protects human health and the environment. Recommendations were derived with input from the subcommittee; an interagency working group; consultations with the DOE, EPA and DOI; and advice from industry, state and federal regulators, environmental groups, and other stakeholders.

http://www.shalegas.energy.gov/resources/111011_90_day_report.pdf

In addition to the above report, EDF is currently in the process of developing a model state regulatory framework for shale gas and oil development.

Model Regulatory Framework for Hydraulically Fractured Hydrocarbon Production Wells, Working Draft: While still a work in progress, EDF has worked with state regulators, environmental groups, scientists, and industry (although only Southwestern Energy has officially endorsed the draft¹⁵³) to assist state governments in implementing a regulatory standardization that governs subsurface aspects of the drilling, casing, cementing, hydraulic fracturing stimulation, completion, and production of onshore hydrocarbon exploration and production wells. Draft components of this framework include the following categories:

- *Well Planning (Permitting)*
- *Pre-Drilling Water Sampling*
- *Well Operations – Drilling, Casing, and Cementing*
- *Well Operations – Completing, Hydraulic Fracturing and Subsequent Well Operations*
- *Well Operations – Production and Well Monitoring*
- *Plugging and Well Abandonment*

Draft Framework:

http://portal.ncdenr.org/c/document_library/get_file?uuid=8356eb89-9c9f-4f8e-bb4d-4bb51b605575&groupId=8198095

Point of Contact: Scott Anderson, Senior Policy Advisor, 512.691.3437,

http://www.edf.org/email/154/field_email

Intermountain Oil and Gas Best Management Practices Project

Established at the Getches-Wilkinson Center for Natural Resources, Energy, and the Environment at the University of Colorado Law School, the Intermountain Oil and Gas Best Management Practices Project identifies and categorizes mandatory and voluntary BMPs within a searchable database. The BMPs, as outlined by the Intermountain Oil and Gas BMP Project, are “state-of-the-art mitigation measures applied to areas being developed for oil and gas to promote energy development in an environmentally responsible manner.”¹⁵⁴ The BMP database is not intended to represent a consensus on BMPs, nor is it intended to provide advice about current legal requirements. Instead, the database describes specific BMPs used by or recommended for Colorado, Montana, New Mexico, and Wyoming; provides a source for and link to the BMP; and offers, when possible, supplemental information that includes construction

¹⁵³ Behr, Peter. “Authors of Model Fracking Regulation Find it’s Lonely in the Middle.” *Midwest Energy News*. <http://www.midwestenergynews.com/2012/10/04/authors-of-model-f-regulation-find-its-lonely-in-the-middle/>

¹⁵⁴ Intermountain Oil and Gas Best Management Practices Project. <http://www.oilandgasbmps.org/>

specifications, illustrations, pictures, maps, monitoring reports, and evaluations of the potential of the practice for mitigating impacts of development.¹⁵⁵ The database seeks to help stakeholders specifically “identify appropriate practices for minimizing impacts to surface resources during planning, design, construction, drilling, operations, reclamation, and monitoring.”¹⁵⁶

The following categories are addressed in the BMP database¹⁵⁷:

- Air Quality and Emissions
- Aquatic and Riparian Values
- Community
- Cultural/Historic
- Grazing and Agriculture
- Human Health and Safety
- Land Surface Disturbance
- Noise
- Other
- Soils (Conservation, Pollution, Reclamation)
- Vegetation
- Visual Aesthetics
- Water Quality and Pollution
- Water Quantity and Rights
- Wildlife

<http://www.oilandgasbmps.org/mainsearch.php>

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Investor Environmental Health Network

Founded in 2004, the Investor Environmental Health Network (IEHN) is a collaborative partnership of investment managers that is “concerned about the financial and public health risks associated with corporate toxic chemicals policies.”¹⁵⁸ Advised by nongovernmental groups, IEHN uses dialogue and shareholder resolutions to encourage companies “to adopt policies to continually and systematically reduce and eliminate toxic chemicals in their products and activities.”¹⁵⁹ The members of IEHN, who include foundations, investment management organizations, and health systems¹⁶⁰, manage approximately \$35 billion in assets.¹⁶¹ Specific areas of focus for IEHN include toxic hazards in the marketplace, opportunities in safer materials, and natural gas hydraulic fracturing.¹⁶² Within the natural

¹⁵⁵ Ibid.

¹⁵⁶ University of Colorado. <http://outreach.colorado.edu/programs/details/id/359>

¹⁵⁷ Intermountain Oil and Gas Best Management Practices Project.

¹⁵⁸ IEHN. <http://www.iehn.org/about.whatwedo.php>

¹⁵⁹ Ibid.

¹⁶⁰ IEHN. <http://www.iehn.org/about.members.php>

¹⁶¹ IEHN. <http://www.iehn.org/about.whatwedo.php>

¹⁶² IEHN. <http://www.iehn.org/overview.toxic.php>

gas area, IEHN seeks “to promote improved disclosure by natural gas companies about the business and environmental risks of hydraulic fracturing.”¹⁶³

In order to help investors determine which companies best manage the risks associated with hydraulic fracturing, IEHN produced an investor guide that recommends 12 key management goals that companies should adopt.

Extracting the Facts: An Investor Guide to Disclosing Risks from Hydraulic Fracturing Operations, December 2011. After an eighteen month dialogue with investors about risks, management practices, and disclosure; a review by industry experts of the draft practices and indicators; and input from staff at IEHN and the Interfaith Center on Corporate Responsibility, an investor guide to management goals for natural gas operations was created. This guide is based on the principle that Corporate Core Management Goals, Best Management Practices, and Key Performance Indicators can drive operational efficiencies; provide insurance in case of accident or natural disaster; reduce air emissions and water impacts that trigger violations of environmental standards; and protect and enhance companies’ social license to operate by increasing the odds of positive community response to the best-managed, most transparent companies addressing community needs and concerns.¹⁶⁴ A detailed list of BMPs and how they can be used to secure the above outcomes is linked to and outlined within each of the guide’s key management goals. These goals include the following:

- *Ensure Best in Class Contractor Performance*
- *Ensure Well Integrity*
- *Disclose Fines, Penalties, and Litigations*
- *Manage Risks Transparently and at Board Level*
- *Minimize and Disclose Air Emissions*
- *Prevent Contamination from Solid Waste and Sludge Residuals*
- *Prevent Contamination from Wastewater*
- *Protect Water Quality by Rigorous Monitoring*
- *Reduce and Disclose All Toxic Chemicals*
- *Reduce Surface Footprint*
- *Secure Community Consent*

<http://www.iehn.org/documents/frackguidance.pdf>

In addition to this guide, IEHN provides a comprehensive list of BMPs and Guiding Principles Reports that have been developed by various agencies and organizations - state governments, federal governmental agencies, environmental organizations, exploratory and production companies, etc.

<http://www.iehn.org/overview.naturalgashydraulicfracturing.php>

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¹⁶³ IEHN. <http://www.iehn.org/overview.naturalgashydraulicfracturing.php>

¹⁶⁴ IEHN. “Extracting the Facts: An Investor Guide to Disclosing Risks from Hydraulic Fracturing Operations.” December, 2011.

Marcellus Shale Coalition

Established in 2008, the Marcellus Shale Coalition (MSC) is a membership-driven organization that “works with exploration and production, midstream and supply chain partners in the Appalachian Basin and across the country to address issues regarding the production of clean, job-creating, natural gas from the Marcellus and Utica Shale plays.”¹⁶⁵ The coalition’s guiding principles, established in October 2010, provide the foundation for its development of BMPs: to provide the safest possible workplace for employees and in the communities in which companies operate; to implement state-of-the-art environmental protection across operations; to continuously improve practices and seek transparency in operations; to attract and retain a talented and engaged workforce; to commit to being responsible members of the community; to encourage spirited public-dialogue and fact-based education about responsible shale gas development; and to conduct business in a manner that will provide sustainable and broad-based economic and energy security benefits.¹⁶⁶

Since April 2012, the Marcellus Shale Coalition has produced a series of recommended practices, which are briefly described below. These documents are designed to serve as a reference for industry to improve their effectiveness; they are not intended to establish or impose binding requirements.

Site Planning, Development and Restoration, April 26, 2012: Through research, stakeholder outreach, and collaboration among MSC members, this document was developed to provide guidance for site planning, development, and restoration. A table about the major steps involved in site planning, development, and restoration as well as a discussion about the pertinent health and safety practices are provided.

<http://marcelluscoalition.org/wp-content/uploads/2012/04/Site-Planning-Development-and-Restoration.pdf>

Pre-Drill Water Supply Surveys, August 28, 2012: These practices structure a common approach for operators to conduct a pre-drill water survey on identified water supply sources within a given area of a well-pad surface location in order to establish a baseline of water conditions that existed before drilling. The document provides details about the practices of initial surveying, water sampling, and reporting.

http://marcelluscoalition.org/wp-content/uploads/2012/08/Pre_Drill_Water_Supply_Surveys_8.28.12.pdf

Responding to Stray Gas Incidents, October 16, 2012: Provides considerations and guidelines about how to respond to stray gas incidents in oil and natural exploration and development areas. A definition of stray incidents is provided as well as how to perform initial responses, action plans, corrective actions, documentation, and reporting.

<http://marcelluscoalition.org/wp-content/uploads/2012/10/RP-Stray-Gas-Oct-2012.pdf>

¹⁶⁵ MSC. <http://marcelluscoalition.org/about>

¹⁶⁶ MSC. <http://marcelluscoalition.org/about/guiding-principles>

Motor Vehicle Safety, December 4, 2012: Designed to assist industry professionals -- companies and contractors -- improve their motor vehicle safety related to transportation activities on both public and private roads and company premises. Transportation activities include personnel and freight movements and mobile plant activities.

http://marcelluscoalition.org/wp-content/uploads/2012/12/RP_MVS_Final.pdf

Supply Chain, January 24, 2013: Provides considerations and guidelines about how to engage small, diverse, and local businesses in the supply chain. Specific strategies also are offered about how to comply with Pennsylvania's Act 13, Section 216.

http://marcelluscoalition.org/wp-content/uploads/2013/01/Supply_Chain_RP_UPDATE1.pdf

Water Pipelines, January 31, 2013: General guidelines about water pipe placement, route selection, pipe materials, operational considerations, and pipe deactivation are provided.

http://marcelluscoalition.org/wp-content/uploads/2013/01/Water_Pipeline_RP.pdf

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Pennsylvania Department of Environmental Protection

The Pennsylvania Department of Environmental Protection (DEP) has a mission "to protect Pennsylvania's air, land and water from pollution and to provide for the health and safety of its citizens through a cleaner environment."¹⁶⁷ Within DEP, the Office of Oil and Natural Gas "develops policy and programs for the regulation of oil and gas development and production pursuant to the Oil and Gas Act, the Coal and Gas Resource Coordination Act, and the Oil and Gas Conservation Law; oversees the oil and gas permitting and inspection programs; develops statewide regulation and standards; conducts training programs for industry; and works with the Interstate Oil and Gas Compact Commission and the Technical Advisory Board."¹⁶⁸

Various DEP offices, including the Office of Oil and Natural Gas, develop BMP guides that help regulated parties to minimize or eliminate potential environmental impacts.¹⁶⁹ These BMPs are extensively reviewed by multiple stakeholders and encapsulated in guidance manuals. In the development of BMPs, the department considers cost effectiveness, environmental protection, and safety. Two example manuals are the following:

Oil and Gas Operators Manual, Commonwealth of Pennsylvania, DEP, Guidance No. 550-0300-001, October 2001 as amended and updated: This manual provides a detailed list of the BMPs that are available to industry. Intertwined with these BMPs are enforceable DEP regulations. This manual is expected to be updated after the adoption of Chapter 78 revisions (in turn based on Act 13). The BMPs (and intertwined regulations) provided in this manual are listed in the following categories:

¹⁶⁷ DEP. http://www.depweb.state.pa.us/portal/server.pt/community/about_dep/13464

¹⁶⁸ DEP. http://www.depweb.state.pa.us/portal/server.pt/community/oil_and_gas/6003

¹⁶⁹ DEP. "Oil and Gas Operators Manual, Commonwealth of Pennsylvania, DEP, Guidance No. 550-0300-001." October 2001 as amended and updated.

- *Drilling, Altering and Completing a Well*
- *Guidelines for a Preparedness, Prevention and Contingency Plan for Oil and Gas Development Pollution Prevention Practices*
- *Inactive Status and Well Plugging*
- *Reports Required of Oil and Gas Operators*
- *Site Planning and Erosion and Sediment Control*
- *Underground Gas Storage*
- *Waste Management During Drilling, Operating, and Plugging a Well*
- *Well Operation*
- *Well Site Restoration*

<http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-48243/chap4.pdf>

Erosion and Sediment Pollution Control Program Manual, PA, DEP, Guidance No. 363-2134-008, March 2012, as amended and updated: This manual outlines a variety of BMPs that are intertwined with enforceable DEP regulations. BMPs “are expected to achieve the regulatory standard of minimizing the potential for accelerated erosion and sedimentation, and at the same time to protect, maintain, reclaim and restore water quality and existing and designated uses of surface waters.”¹⁷⁰ Examples of BMP categories include the following:

- *Minimizing Earth Disturbances*
- *Silt Fence*
- *Diversion Ditches*
- *Sediment Traps*
- *Sediment Basins*
- *The Establishment of Grasses for Permanent Stabilization*

<http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-88925/363-2134-008.pdf>

Point of Contact: Scott Perry, Deputy Secretary of Oil and Gas,
Department of Environmental Protection

State Review of Oil and Natural Gas Environmental Regulations

The State Review of Oil and Natural Gas Environmental Regulations (STRONGER) is a non-profit organization that was founded in 1999 with the goal of invigorating and advancing the state review process that was begun in 1988 by the U.S. Environmental Protection Agency (EPA) and the Interstate Oil and Gas Compact Commission (IOGCC).¹⁷¹ The current mission of STRONGER is “to educate and provide services for the continuous improvement of regulatory programs and industry practices in order to enhance human health and the environment.”¹⁷² A multi-stakeholder organization that includes states, industry and environmental organizations, STRONGER provides benchmarks for state regulatory

¹⁷⁰ DEP. “Erosion and Sediment Pollution Control Program Manual, PA, DEP, Guidance No. 363-2134-008.” March 2012, as amended and updated.

¹⁷¹ STRONGER. <http://www.strongerinc.org/who-we-are>

¹⁷² STRONGER. <http://www.strongerinc.org/our-mission>

programs, develops recommended state program guidelines, and implements a review process to evaluate state regulatory programs against its guidelines.¹⁷³

Approximately 22 state regulatory programs have been reviewed by STRONGER, a total of states which represent more than 94% of domestic onshore and gas production.¹⁷⁴ A state review process is conducted by stakeholder teams and includes a completed questionnaire by state volunteers; in-state interviews; an initial draft report that includes findings and recommendations; a second draft report that includes comments; and lastly, a final report that has obtained approval from the board to be published.¹⁷⁵ The guidelines used in the state review process “do not establish specific criteria or prescriptive regulatory standards for the state.”¹⁷⁶ Instead, the guidelines “outline key elements of state oil and gas environmental regulatory programs and establish environmental goals or objectives for these programs.”¹⁷⁷ Guideline categories include: general criteria, administrative criteria, technical criteria, abandoned sites, naturally occurring radioactive materials, stormwater management, and hydraulic fracturing.¹⁷⁸

The *Hydraulic Fracturing Review Guidelines* were drafted in 2010 by the Hydraulic Fracturing Work Group.

Hydraulic Fracturing Review Guidelines, 2010. Hydraulic fracturing reviews have been conducted in six states, including Ohio and Pennsylvania. The following are the list of guideline categories within the *Hydraulic Fracturing Review Guidelines*¹⁷⁹:

- *General (Standards, Reporting, Staffing and Training, Public Information)*
- *Water and Waste Management*

A work group has been convened to consider revisions to these guidelines. The STRONGER website notes that the *Hydraulic Fracturing Review Guidelines* “should be updated to include groundwater protection and pressure monitoring measures.”¹⁸⁰ STRONGER also notes that applicable guidelines should be developed to monitor conflicts that are created when drilling occurs in urban areas, such as the creation of local ordinances that conflict with state requirements.¹⁸¹

<http://67.20.79.30/sites/all/themes/stronger02/downloads/HF%20Guideline%20Web%20posting.pdf>

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¹⁷³ STRONGER. “The State Review Process.”

<http://67.20.79.30/sites/all/themes/stronger02/downloads/STRONGER%20Presentation%20-%2006022012.pdf>

¹⁷⁴ Ibid.

¹⁷⁵ Ibid.

¹⁷⁶ STRONGER. “Hydraulic Fracturing Review Guidelines.” 2010.

<http://67.20.79.30/sites/all/themes/stronger02/downloads/HF%20Guideline%20Web%20posting.pdf>

¹⁷⁷ Ibid.

¹⁷⁸ STRONGER. “The State Review Process.”

¹⁷⁹ STRONGER. “Hydraulic Fracturing Review Guidelines.” 2010.

¹⁸⁰ STRONGER. <http://www.strongerinc.org/process>.

¹⁸¹ Ibid.