

Report from Three SAB Fact-finding Groups to the Chartered SAB for Discussion at the June 5, 2013 Chartered SAB Teleconference

Background

The EPA has recently underscored the need to routinely inform the SAB about proposed and planned agency actions that have a scientific or technical basis. Accordingly, the agency provided notice to the SAB that the Office of Management and Budget published the “Unified (Regulatory) Agenda” on the Web on December 21, 2012 (<http://www.reginfo.gov/public>). On March 7-8, 2013, the chartered SAB held a teleconference meeting (78 FR 9689-9690) to discuss whether it should provide advice and comment on the adequacy of the scientific and technical basis for EPA actions included in the Unified (Regulatory) Agenda. At that meeting, the chartered SAB considered [recommendations](#) from an SAB Work Group on EPA Planned Actions for SAB Consideration of the Underlying Science. Certified minutes and materials from that meeting are available on the [SAB website](#).

At the March teleconference, the chartered SAB identified three planned actions for additional fact-finding: (1) Effluent Guidelines and Standards for Unconventional Oil and Gas Extraction Including Coalbed Methane and Shale Gas Extraction (2040 AF35); (2) Revised Regulations for Environmental Radiation Protection Standards for Nuclear Power Plant Operations (2060 AR12); and (3) Petroleum Refinery Sector Risk and Technology Review (RTR) and New Source Performance Standards (2060 AQ75), which EPA plans to jointly propose with Petroleum Refinery Sector for Flares (2060-AR69). On June 5, 2013, the chartered SAB will discuss additional information relating to these planned actions and determine whether it should provide advice and comment on the adequacy of the scientific and technical basis for those actions.

Contents of this package

This package contains the reports from three SAB fact-finding groups established to provide additional information for the SAB’s consideration on the actions identified above. Each report is supplemented by an attachment summarizing a fact-finding discussion with EPA representatives. The report from the fact-finding group focusing on Effluent Guidelines and Standards for Unconventional Oil and Gas Extraction Including Coalbed Methane and Shale Gas Extraction (2040 AF35) is also supplemented by a multi-part attachment characterizing the scope of the EPA’s hydraulic fracturing research and existing or planned science advice relating to potential environmental effects related to hydraulic fracturing.

Effluent Guidelines and Standards for Unconventional Oil and Gas Extraction Including Coalbed Methane and Shale Gas Extraction (2040 AF35) Report to the Chartered SAB from the SAB Fact-Finding Group

Fact-finding group members: Drs. David Dzombak (lead), Otto Doering, James Mihelcic, James Opaluch, and Jeanne VanBriesen

Brief background:

- The SAB Work Group on EPA Planned Actions for SAB Consideration of the Underlying Science assigned the planned action as highest priority for consideration by the chartered SAB.
- The chartered SAB discussed the action during a public teleconference on March 8, 2013. The sense of the group was that more information was needed about the action, its scope and timing, and the state of EPA research and current science advisory activities regarding the larger question of potential environmental effects related to hydraulic fracturing before the chartered Board could make a decision on the Work Group recommendation.

Charges to fact-finding group:

- Confirm that the scope of the rule is focused on discharges to Publicly Owned Treatment Works (POTWs) and learn how EPA plans to address:
 - a. questions raised during the March 8, 2013 teleconference¹ and
 - b. questions framed by the fact-finding group.²

Responses/Recommendations:

- The scope of the rule is focused on discharges to POTWs for wastewaters from shale gas extraction and from coalbed methane extraction, both direct and indirect, as indicated by Attachment A (Summary of Fact-finding Discussion with Agency Staff, April 3, 2013).
- For discharges of wastewaters associated with shale gas extraction, ***the group does not recommend SAB advice or comment*** because any revision to the existing effluent limitation guidelines (ELGs) would be focused on attainment of zero discharge of wastewater and there are no new technical or scientific issues associated with this component of the rulemaking.

¹Questions raised by the chartered SAB at the March 7-8, 2013 teleconference::

- How will EPA address additives used in hydrofracturing processes as inputs to POTWs?
- How will EPA's planned rule provide adequate public health protection against adverse effects of potentially novel components of reclaimed effluents or of biosolids derived from resource recovery efforts?
- Does planning for the rule include consideration of reclamation of potable water from POTWs receiving discharges from Unconventional Oil and Gas Extraction?

²Questions framed by the SAB fact-finding group:

- Will ORD's research inform development of these ELGs?
- Is there an opportunity to bring new science and technology into the review process or is it strictly a compilation of what is being done? (i.e., application of new technologies that have not been used for this waste water)
- Given there are no ELGs for coalbed methane, how will the process move forward without considering any new science and technology?
- Given the limited plan to collect data from nine or fewer facilities, what is the plan for developing representative data for the industry?

- ***For discharges of wastewater associated with coal bed methane extraction, the group recommends that SAB consider providing advice and comment on the science and technology associated with the planned action*** because the rulemaking would create new ELGs for this industrial sector for which ELGs do not currently exist. EPA is considering establishment of discharge requirements for both direct and indirect discharges as part of the planned rulemaking
2. Characterize the scope of ORD’s hydraulic fracturing research and existing or planned science advice³ relating to potential environmental effects related to hydraulic fracturing.

Response:

- See Attachment B (Characterization of the scope of the EPA’s hydraulic fracturing research and existing or planned science advice relating to potential environmental effects related to hydraulic fracturing), which describes: 1) EPA’s Study on the Potential Impact of Hydraulic Fracturing on Drinking Water Resources; 2) SAB current and recent past activities relating to potential impacts of hydraulic fracturing; 3) other EPA activities related to hydraulic fracturing and hydraulic fracturing science; and 4) other national-level science/science advisory activities related to hydraulic fracturing.
3. After considering the scope of the Effluent Guideline rule and related science, the scope of ORD’s research, and existing science advisory activities underway, identify any significant gaps that might merit a future SAB self-nominated activity or further discussion with EPA.

Recommendation:

The SAB should monitor the progress of the suite of activities described in Attachment B. The SAB has been engaged in review of the ORD study of the relationship of hydraulic fracturing and drinking water resources from the initial scoping of the project to the present. Members of an SAB panel met on May 7-8, 2013, to provide a consultation on the first progress report from this study, released in December 2012, and the panel will review additional products from the ORD research through the 2014-2015 timeframe. The ORD study is considering the complete lifecycle involved with use of hydraulic fracturing in unconventional gas development. As the SAB has an existing, ongoing effort to monitor and review ORD’s research, identification of opportunities for SAB self-nominated activities should await the completion of current efforts. There is no other recommendation for action at this time.

³ Including:

- Past SAB advice, current planned SAB activities, and likely future ORD requests for advice.
- Other science advisory activities underway at the National Research Council, think tanks.

Attachment A
Summary of Fact-finding Discussion with Agency Staff, April 3, 2013

Members of the SAB Fact-finding Group: Drs. David Dzombak (lead), Otto Doering, James Mihelcic, James Opaluch, and Jeanne VanBriesen

Agency participants:

Sandy Evalenko, Office of Water

Jan Matuszko, Office of Water

Lynn Zipf, Office of Water

Thomas Carpenter, SAB Designated Federal Officer (DFO)

Edward Hanlon, SAB Staff Office Designated Federal Officer (DFO) for the SAB Hydraulic Fracturing Advisory Panel

Angela Nugent, SAB Staff Office DFO for the Chartered SAB

Overview Information Provided by Office of Water Representatives

- Currently, 40 CFR Part 435 under the Clean Water Act (CWA) provides authority for discharge limitations for direct discharges of shale gas extraction wastewaters to waters of the United States. Except in limited circumstances, the regulation specifies no discharge of pollutants to waters of the United States. Under the Safe Drinking Water Act, wastewaters from shale gas extraction may be injected underground. Facilities may use alternative approaches as long as they achieve zero discharge of wastewater.
- The CWA also requires EPA to establish pretreatment standards for indirect discharges (those that discharge to a publicly owned treatment works or POTW) for pollutants that may pass through, interfere with, or are otherwise incompatible with a POTW. Pretreatment standards are also designed to ensure that wastewater from direct and indirect discharging facilities are subject to the same standards. If the pollutant is deemed to “pass through,” the indirect discharger is required to control at the same levels as the direct discharger.
- 40 CFR Part 435 does not currently contain pretreatment standards for shale gas extraction, so that is the focus of this current rulemaking.
- When the EPA establishes pretreatment standards for indirect dischargers, the agency typically considers the same factors considered in establishing limitations for direct dischargers. These include considerations such as costs, pollutants reduced, feasibility and availability of the technology basis, and affordability.
- As a result, the EPA considers setting the technology basis and discharge requirements for pretreatment standards for indirect discharges to be the same as those for direct discharges. The EPA looks at requirements on a pollutant-specific basis to determine if the regulated pollutant “passes through” or interferes with a POTW. If it does, then the agency establishes a pretreatment standard for the pollutant in the same ways it did for direct dischargers. If it doesn’t, then the EPA does not establish a pretreatment standard for that pollutant. Basically, “pass through” means that the technology basis removes more of a pollutant than a POTW.
- The existing requirements for direct dischargers are zero discharge of pollutants. So, that is EPA’s starting point for consideration of pretreatment standards. EPA’s data collection to date shows there are multiple ways to achieve zero discharge and that these approaches satisfy the factors specified in the CWA. Additionally, since zero discharge is always more effective than

end-of- the- pipe treatment, the answer to the question of whether a pollutant “passes through” is yes.

- Some members of the public may want the EPA to propose a less stringent requirement and propose a limit that is higher than zero, and that would allow for discharge to a POTW. The pollutant of primary concern most often identified with these wastewaters is total dissolved solids (TDS). All of the information the EPA has obtained on feasible technological approaches to reducing TDS in these wastewaters indicates that use of the treatment technologies is much more expensive than zero discharge.
- As a point of clarification, effluent guidelines limitations and standards are promulgated under the Clean Water Act. The CWA does not address groundwater or drinking water.
- As another point of clarification, brine treatment facilities that are not located at oil and gas extraction facilities are not subject to 40 CFR Part 435. These facilities are subject to ELGs promulgated under 40 CFR Part 427 for Centralized Waste Treatment facilities.
- 40 CFR does not currently apply to coal bed methane wastewater discharges. Therefore, EPA is looking at establishing discharge requirements for both direct and indirect discharges as part of this rulemaking.

Responses to questions from the fact-finding group

Questions raised during the March 8, 2013 Chartered SAB teleconference

- How will EPA address additives used in hydrofracturing processes as inputs to POTWs?
 - Response: EPA will address additives to the extent they are discharged. Under the zero discharge option, there would be no input to POTWs.
- How will EPA’s planned rule provide adequate public health protection against adverse effects of potentially novel components of reclaimed effluents or of biosolids derived from resource recovery efforts?
 - Response: If there is no input to POTWs, there will be zero discharge. Other regulations may govern reclaimed effluents and biosolid applications.
- Does planning for the rule include consideration of reclamation of potable water from POTWs receiving discharges from Unconventional Oil and Gas Extraction?
 - Response: If there is no discharge to POTWs, this would not be a consideration. Reclamation of potable water is not governed by ELGs.

Additional questions from the fact-finding group.

- Will ORD’s research inform development of these ELGs?
 - Response: OW and ORD routinely share relevant information as it becomes available.
- Is there an opportunity to bring new science and technology into the review process or is it strictly compilation of what is being done? (i.e., application of new technologies that have not been used for this waste water)
 - Response: The Clean Water Act allows for consideration of novel technologies to the extent that existing technologies are inadequate. Where existing technological approaches are practiced and demonstrated at full scale to be highly effective, the EPA typically looks to these technologies as possible bases for the requirements. Where the EPA transfers requirements based on technologies in use in other industries, the waste streams being treated should have similar characteristics. In the case of wastewaters associated

with shale gas and coalbed methane extraction, EPA has identified technologies in use within the industry that are highly effective.

- Given there are no ELGs for coalbed methane, how will the process move forward without considering any new science and technology?
 - Response: The EPA conducted a survey of the coalbed methane industry and has data for multiple technology approaches that may serve as the technology basis for discharge requirements. For coalbed methane, the challenge is in identifying economically achievable technologies that effectively remove pollutants of concern.
- Given the limited plan to collect data from nine or fewer facilities, what's the plan for developing representative data for the industry?
 - Response: The EPA is not constrained by the Paperwork Reduction Act in availing ourselves from using information voluntarily provided by stakeholders. For example, the EPA has collected data from publicly available sources, from industry, from states, from treatment vendors, etc. The agency may also request specific data from a limited number of companies without an approved Information Collection Request. EPA resorts to formal Information Requests (or questionnaires) when other fact-finding is insufficient.

Attachment B

Characterization of the scope of the EPA's hydraulic fracturing research and existing or planned science advice relating to potential environmental effects related to hydraulic fracturing

This attachment provides information on:

1. EPA's Study on the Potential Impact of Hydraulic Fracturing on Drinking Water Resources
2. SAB Current and Recent Past Activities Relating to Potential Impacts of Hydraulic Fracturing
3. Other EPA Activities Related to Hydraulic Fracturing and Hydraulic Fracturing Science
4. Other National-Level Science/Science Advisory Activities Related to Hydraulic Fracturing

1. EPA's Study on the Potential Impact of Hydraulic Fracturing on Drinking Water Resources

Background:

On March 18, 2010, at the request of the U.S. Congress, EPA announced plans to develop a comprehensive research study on the potential impact of hydraulic fracturing on drinking water resources. EPA noted that natural gas plays a key role in our nation's clean energy future and the process known as hydraulic fracturing is one way of accessing this vital resource. The agency announced that its study would address whether hydraulic fracturing may impact ground water and surface water quality in ways that threaten human health and the environment.

As part of the process for developing its study, the EPA finalized a [Hydraulic Fracturing Research Study Plan](#)⁴ in November 2011. EPA released its Hydraulic Fracturing Research Progress Report in December 2012.

⁴ The Plan outlines EPA's fundamental, primary and secondary research questions; research objectives; and research activities.
Fundamental Research Questions:

- 1) Water Acquisition: What are the potential impacts of large volume water withdrawals from ground and surface waters on drinking water resources?
- 2) Chemical Mixing: What are the possible impacts of surface spills on or near well pads of hydraulic fracturing fluids on drinking water resources?
- 3) Well Injection: What are the possible impacts of the injection and fracturing process on drinking water resources?
- 4) Flowback and Produced Water: What are the possible impacts of surface spills on or near well pads of flowback and produced water on drinking water resources?
- 5) Wastewater Treatment and Waste Disposal: What are the possible impacts of inadequate treatment of hydraulic fracturing wastewaters on drinking water resources?

Research Approaches .

- 1) Analysis of existing data on hydraulic fracturing from industry, state and federal agencies, academia and other sources.
- 2) Case studies from real-world sites across the US, including locations where hydraulic fracturing has already occurred or will occur in the future.
- 3) Laboratory studies to provide data from experiments conducted in a controlled environment.
- 4) Scenario evaluations using sophisticated computer modeling to generate information about realistic hydraulic fracturing scenarios.
- 5) Toxicological assessments to summarize existing data on human health effects of chemicals currently known to be used in hydraulic fracturing.

EPA Hydraulic Fracturing Research Progress Report:

EPA's Hydraulic Fracturing Research Progress Report was released in December 2012. The *Progress Report* describes the status of EPA's ongoing research on the potential impacts of hydraulic fracturing on drinking water resources. It provides updates on 18 research projects that EPA is conducting on hydraulic fracturing, and details on the agency's research approach as well as next steps for these ongoing projects and analyses.

The 18 research projects are summarized in Table 1, page 10, of EPA's *Progress Report*. This table is excerpted on the next page.

Table 1: Excerpted from Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources; Progress Report” U.S. EPA, EPA/601/R-12/011, p. 10

Research Project	Description
<i>Analysis of Existing Data</i>	
Literature Review	Review and assessment of existing papers and reports, focusing on peer-reviewed literature
Spills Database Analysis	Analysis of selected federal and state databases for information on spills of hydraulic fracturing fluids and wastewaters
Service Company Analysis	Analysis of information provided by nine hydraulic fracturing service companies in response to a September 2010 information request on hydraulic fracturing operations
Well File Review	Analysis of information provided by nine oil and gas operators in response to an August 2011 information request for 350 well files
FracFocus Analysis	Analysis of data compiled from FracFocus, the national hydraulic fracturing chemical registry operated by the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission
<i>Scenario Evaluations</i>	
Subsurface Migration Modeling	Numerical modeling of subsurface fluid migration scenarios that explore the potential for gases and fluids to move from the fractured zone to drinking water aquifers
Surface Water Modeling	Modeling of concentrations of selected chemicals at public water supplies downstream from wastewater treatment facilities that discharge treated hydraulic fracturing wastewater to surface waters
Water Availability Modeling	Assessment and modeling of current and future scenarios exploring the impact of water usage for hydraulic fracturing on drinking water availability in the Upper Colorado River Basin and the Susquehanna River Basin
<i>Laboratory Studies</i>	
Source Apportionment Studies	Identification and quantification of the source(s) of high bromide and chloride concentrations at public water supply intakes downstream from wastewater treatment plants discharging treated hydraulic fracturing wastewater to surface waters
Wastewater Treatability Studies	Assessment of the efficacy of common wastewater treatment processes on removing selected chemicals found in hydraulic fracturing wastewater
Br-DBP Precursor Studies	Assessment of the ability of bromide and brominated compounds present in hydraulic fracturing wastewater to form brominated disinfection byproducts (Br-DBPs) during drinking water treatment processes
Analytical Method Development	Development of analytical methods for selected chemicals found in hydraulic fracturing fluids or wastewater
Research Project	Description
<i>Toxicity Assessment</i>	
Toxicity Assessment	Toxicity assessment of chemicals reportedly used in hydraulic fracturing fluids or found in hydraulic fracturing wastewater
<i>Case Studies</i>	
<i>Retrospective Studies</i>	
<i>Investigations of whether reported drinking water impacts may be associated with or caused by hydraulic fracturing activities</i>	
Las Animas and Huerfano Counties, Colorado	Investigation of potential drinking water impacts from coalbed methane extraction in the Raton Basin
Dunn County, North Dakota	Investigation of potential drinking water impacts from a well blowout during hydraulic fracturing for oil in the Bakken Shale
Bradford County, Pennsylvania	Investigation of potential drinking water impacts from shale gas development in the Marcellus Shale
Washington County, Pennsylvania	Investigation of potential drinking water impacts from shale gas development in the Marcellus Shale
Wise County, Texas	Investigation of potential drinking water impacts from shale gas development in the Barnett Shale
<i>Prospective Studies</i>	
<i>Investigation of potential impacts of hydraulic fracturing through collection of samples from a site before, during, and after well pad construction and hydraulic fracturing</i>	

2. SAB Current and Recent Past Activities Relating to Potential Impacts of Hydraulic Fracturing

The EPA SAB Staff Office formed the SAB Hydraulic Fracturing Research Advisory Panel in March 2013. The panel provided a consultation on May 7-8, 2013 that allowed expert panel members to provide their individual comments on EPA’s *Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources; Progress Report*” (U.S. EPA, EPA/601/R-12/011). The Panel will develop a peer review of EPA’s forthcoming 2014 report of results from this study. When the EPA’s draft “Report of Results” of its Hydraulic Fracturing Research Study is released in late 2014, the Panel will conduct a peer review of that draft report. The EPA provides [information about its Hydraulic Fracturing research efforts on the web](#).

The SAB previously provided two reports to EPA on hydraulic fracturing [[Advisory on EPA’s Research Scoping Document Related to Hydraulic Fracturing \(EPA-SAB-10-009\)](#) and [SAB Review of EPA’s Draft Hydraulic Fracturing Study Plan \(EPA-SAB-11-012\)](#)].

3. Other EPA Activities Related to Hydraulic Fracturing and Hydraulic Fracturing Science

Table 2 lists regulatory activities identified on the EPA website. Table 2 is followed by brief descriptions of each activity.

Table 2: EPA Hydraulic Fracturing Regulatory and Research Activities

	EPA Hydraulic Fracturing Regulatory and Research Activity	Website Address
1	Disposal of Hydraulic Fracturing flowback and produced water via underground injection	http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/hydraulic-fracturing.cfm
2	Disposal of wastewater discharges from Hydraulic Fracturing extraction activities to treatment facilities: a) Standards for wastewater discharges to POTWs – Effluent Guidelines b) Guidance to permitting authorities for addressing treatment and disposal of wastewater from shale gas extraction	http://water.epa.gov/scitech/wastetech/guide/shale.cfm
3	Chloride water quality criteria	No specific website; summary at http://www2.epa.gov/hydraulicfracturing
4	Stormwater discharges from oil and gas operations or transmission facilities	http://cfpub.epa.gov/npdes/stormwater/oilgas.cfm
5	Use of surface impoundments (pits or ponds) for storage or disposal of Hydraulic Fracturing fluids	http://www.epa.gov/epawaste/nonhaz/industrial/special/oil/index.htm
6	Oil and Natural Gas Air Pollution Standards	http://www.epa.gov/airquality/oilandgas/index.html

Additional detail on these activities:

1. Disposal of Hydraulic Fracturing flowback and produced water via underground injection:
EPA has developed draft Underground Injection Control Class II permitting guidance specific to oil and gas hydraulic fracturing activities using diesel fuels. The draft guidance covers proper well siting, construction, and operation to minimize risks to underground sources of drinking water.

2. Disposal of wastewater discharges from Hydraulic Fracturing extraction activities to treatment facilities:
Standards for wastewater discharges to POTWs. In October 2011, EPA announced a schedule to develop standards for wastewater discharges to POTWs from natural gas extraction from underground coalbed and shale formations. To ensure that these wastewaters receive proper treatment and can be properly handled by treatment plants, EPA will gather data; consult with stakeholders, including ongoing consultation with industry; and solicit public comment on a proposed rule for coalbed methane in 2013 and a proposed rule for shale gas in 2014. EPA will be looking at the potential for cost-effective steps for pretreatment of this wastewater based on practices and technologies that are already available and being deployed or tested by industry to reduce pollutants in these discharges.

Guidance to permitting authorities for addressing treatment and disposal of wastewater from shale gas extraction. EPA plans to prepare guidance directed to permitting authorities, pretreatment control authorities and POTWs to provide assistance on how to permit POTWs and centralized waste treatment by clarifying existing Clean Water Act authorities and obligations.

3. Chloride water quality criteria:
EPA's recommended Water Quality Criteria are used by states when considering updates to applicable state water quality standards. Such standards provide a basis for establishing acceptable discharge limits. Because flowback and produced water from fracturing operations have very high levels of total dissolved solids (TDS), and chlorides are the major component of the TDS, updating the water quality criteria for chloride will provide an updated scientific basis on which to issue discharge permits. A draft criteria document is expected in early 2013.

4. Stormwater discharges from oil and gas operations or transmission facilities:
Under the CWA, oil and gas exploration, production, processing, or treatment operations or transmission facilities, including associated construction activities, are not required to obtain National Pollutant Discharge Elimination System permit coverage for stormwater discharges unless there is a reportable quantity spill or the discharge causes or contributes to a water quality violation. There are no current EPA activities to produce guidance or updated regulations related to this topic.

5. Use of surface impoundments (pits or ponds) for storage or disposal of Hydraulic Fracturing fluids:
In some cases, operators use surface storage tanks and pits to temporarily store hydraulic fracturing fluids for re-use or until arrangements are made for disposal. EPA is currently evaluating industry practices and state requirements and is considering the need for technical guidance on the design, operation, maintenance, and closure of pits under the Resource Conservation and Recovery Act in order to minimize potential environmental impacts.

6. Oil and Natural Gas Air Pollution Standards

Final federal air regulations were promulgated in April 2012 setting air standards for natural gas wells.

4. Other National-Level Science/Science Advisory Activities Related to Hydraulic Fracturing

Table 3 lists other national-level science/science advisory activities related to hydraulic fracturing. Table 3 is followed by brief descriptions of each activity.

Table 3: Other National-Level Science/Science Advisory Activities Related to Hydraulic Fracturing

	Other Major Scientific Activities	Website Address
1	NAS NRC Panel on Risk Management and Governance Issues in Shale Gas Extraction	http://sites.nationalacademies.org/DBASSE/BECS/CurrentProjects/DBASSE_069201
2	Council of Canadian Academies Panel on Harnessing Science and Technology to Understand the Environmental Impacts of Shale Gas Extraction	http://www.scienceadvice.ca/en/assessments/in-progress/shale-gas.aspx
3	DOE, DOI, and EPA Multi-Agency Program to address the highest priority challenges associated with safely and prudently developing unconventional shale gas and tight oil resources	http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&pageid=289759 http://unconventional.energy.gov/pdf/Multi-Agency_ResearchPlanPresent.pdf

Additional detail on these activities:

1. NAS NRC Panel on Risk Management and Governance Issues in Shale Gas Extraction

A steering committee established by the National Research Council will organize two workshops to examine the range of social and decision-making issues in risk characterization and governance related to gas shale development. This project, recently funded by the National Science Foundation, commenced September 2012, and will run for approximately 15 months. It will comprise two workshops and a series of commissioned papers. The product will be a rapporteur summary of both workshops, including the whitepapers.

- Central themes of the workshops and papers would include risk governance in the context of (a) risks that emerge as shale gas development expands, and (b) incomplete or declining regulatory capacity in an era of budgetary stringency.
- The first workshop will follow the systematic approach to risk characterization recommended in the 1996 NRC report, *Understanding Risk*, which has not yet been applied in this context. It will engage experts and practitioners in addressing the concerns of a range of interested and affected parties to identify key issues and discussing the state and limits of scientific knowledge on those issues.
- The second workshop would engage social scientists from several research traditions to apply a variety of insights about risk management institutions to the shale gas case, while interacting with each other and with practitioners.

- A rapporteur will write a summary of the risk issues raised in the first workshop, the risk management and governance concepts presented at the second workshop, and the discussions at both workshops. The summary might include a selection of signed papers by workshop presenters, after appropriate review. It would note the risk questions posed at the workshops for future analysis and the risk management challenges and opportunities identified, which could be considered in future national discussions about the development and implementation of the technology. It will not offer consensus judgments or recommendations.

2. Council of Canadian Academies Panel on Harnessing Science and Technology to Understand the Environmental Impacts of Shale Gas Extraction

- The Minister of Environment, on behalf of Environment Canada, has asked the Council of Canadian Academies to provide an evidence-based and authoritative assessment on the state of knowledge of potential environmental impacts from the exploration, extraction and development of Canada's shale gas resources. The Minister has also asked the Council to assess the current state of knowledge regarding associated mitigation options.
- The full assessment process is expected to take 18 to 24 months and will include a rigorous peer review exercise to ensure the report is objective, balanced and evidence-based. Following the review and approval by the Council's Board of Governors, the complete report will be made available on the Council's website in both official languages.
- The Panel held its third meeting November 29-30, 2012 in Toronto. The next panel meeting will take place March 27-28, following which the report will be sent for peer review. The Panel is chaired by John A. Cherry, Director of the University Consortium for Field-Focused Groundwater Contamination Research at the University of Guelph.

3. DOE, DOI, and EPA Multi-Agency Program to address the highest priority challenges associated with safely and prudently developing unconventional shale gas and tight oil resources

- In March 2011, the White House released a [*Blueprint for a Secure Energy Future*](#) (Blueprint), intended as a comprehensive plan which supports the responsible development of the Nation's oil and natural gas, with the specific goals of promoting safe practices and reducing energy imports. The Department of Energy (DOE), the Department of the Interior (DOI), and the Environmental Protection Agency (EPA) each have a critical role to play in this mission.
- To this end, the DOE, DOI, and EPA will develop a multi-agency program directed toward a focused collaborative Federal interagency effort to address the highest priority challenges associated with safely and prudently developing unconventional shale gas and tight oil resources. The goal of this program will focus on timely, policy relevant science directed to research topics where collaboration among the three agencies can be most effectively and efficiently conducted to provide results and technologies that support sound policy decisions by state and Federal agencies responsible for ensuring the prudent development of energy sources while protecting human health and the environment. This program responds to the Blueprint and to relevant recommendations of the Secretary of Energy Advisory Board Subcommittee on Natural Gas.

**Revised Regulations for Environmental Radiation Protection Standards for Nuclear
Power Plant Operations (2060 AR12)
Report to the Chartered SAB from the SAB Fact-Finding Group**

Fact-finding Group Members: Drs. Daniel Stram (lead), William Field, and Bernd Kahn

Brief Background:

- The SAB Work Group on EPA Planned Actions for SAB Consideration of the Underlying Science assigned the planned action as a high priority for consideration by the chartered SAB.
- The chartered SAB discussed the action during a public teleconference on March 8, 2013. The sense of the group was that more information was needed about the action, its scope and timing, and EPA's plans to engage the SAB in the rulemaking.

Charge to fact-finding group and its response/recommendations:

Confirm the timing of the Advance Notice of Proposed Rulemaking (ANPR), identify future consultations with the Board that the EPA plans in the development of the Rulemaking, and discuss with the EPA how the SAB might be most useful at an early stage in development of the rule.

Recommendation

- Based on the information provided by the EPA in a fact-finding discussion on March 26, 2013 about the scope and timing of the regulatory action (See Attachment C), the fact-finding group *recommends that the SAB not provide advice and comment prior to publication of the ANPR on the science underlying the ANPR and instead provide a consultation and/or an SAB advisory following EPA's consideration of public comments in response to the ANPR.*
- After the SAB consultation or advisory, if the EPA decides to develop a proposed rule with supporting scientific and technical analyses technical approach for the proposed rule, *the fact-finding group recommends that SAB provide advice and comment on the scientific and technical basis of the proposed rule.*

Attachment C
Summary of Fact-Finding Discussion with Agency Staff, March 26, 2013

Members of the SAB Fact-finding Group: Drs. Daniel Stram (lead), William Field, and Bernd Kahn
Agency participants:

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Carl Mazza, Special Assistant, OAR
Edward Hanlon, SAB Staff Office Designated Federal Officer (DFO) for the SAB Radiation Advisory Committee
Angela Nugent, SAB Staff Office DFO for the Chartered SAB

- The planned Advance Notice of Proposed Rulemaking (ANPR) will seek public input and suggestions for revisions to Part 190 concerning standards for nuclear power plant operations. A 90-day public comment period is planned. OAR will be seeking input public input (including input from other federal agencies, independent scientists, and industry) on science issues and other aspects of possible revisions to a rule last updated in 1977.
- OAR is “very interested” in SAB participation in later stages of this rulemaking, after the ANPR is published.
- OAR cautions against the SAB requesting review of the draft ANPR because it may slow down issuing this notice, which will request a broad range of public comment. There is no technical document available at this time for SAB review and it would be unusual for the SAB to be involved at the ANPR stage.
- It is the intention of the Agency to seek an SAB consultation to provide early feedback on EPA’s “distillation” of public comments received and on scientific and technical areas that EPA may move forward on. EPA’s summary distilling public comments would suggest which regulatory areas, if any, EPA may pursue in a potential future rule and which science issues to pursue. After the SAB consultation, if the EPA decides to develop a proposed rule with supporting scientific and technical analyses for the proposed rule, it plans to then seek an SAB advisory on related scientific or technical questions.
- OAR staff agreed that they could not anticipate any scenario where OAR would not seek an SAB consultation after the ANPR was published and public comments received.
- It is difficult for OAR to forecast the timing for the ANPR and follow-up action, but OAR might request a consultation meeting for the December 2013-Early 2014 timeframe.

Petroleum Refinery Sector Risk and Technology Review (RTR) and New Source Performance Standards (2060 AQ75) and Petroleum Refinery Sector for Flares (2060-AR69)

Report to the Chartered SAB from the SAB Fact-Finding Group

Fact-finding Group Members: Drs. James Mihelcic (lead) and Peter Thorne

Brief Background:

- The SAB Work Group on EPA Planned Actions for SAB Consideration of the Underlying Science assigned the planned action as highest priority for consideration by the chartered SAB.
- The Chartered SAB discussed the action during a public teleconference on March 8, 2013. The sense of the group was that more information was needed about the action, its scope and timing, questions raised by members of the chartered SAB and by a public commenter.

Charge to fact-finding group and its response/recommendations:

1. Confirm the scope and timing of the rule.

Response: See attached meeting summary

2. Recommend whether the Petroleum Sector Flare component of the rulemaking [described in the semi-annual regulatory agenda as Petroleum Refinery Sector for Flares (2060-AR69)] should be included as part of any SAB review

Response: Based on fact finding summarized in Attachment D, *the group recommends that the Petroleum Sector Flare Rulemaking component not be considered a high priority for SAB review.*

3. Seek answers to questions raised by SAB members during the March 8, 2013 teleconference.⁵

Response: See attached meeting summary (Attachment D)

4. Seek EPA responses to points raised by the public commenter during the May 8, 2013 teleconference⁶

Response: See attached meeting summary (Attachment D)

5. Given the information obtained, recommend whether the Petroleum Refinery Sector Risk and Technology Review (RTR) and New Source Performance Standards (2060 AQ75) should be a priority for SAB review of the supporting science.

Recommendation: Based on additional fact finding, *the group recommends that the Petroleum Refinery Sector Risk and Technology Review (RTR) and New Source Performance Standards (2060 AQ75) component of the rulemaking not be considered a high priority for SAB review.*

⁵Questions raised during the March 8, 2013 teleconference:

- Although the EPA presenter suggests there is no new technology, the EPA did receive new industry data on technology in 2010. How is this discrepancy explained?
- How is EPA identifying and addressing any environmental justice concerns associated with emissions from the facilities?
- What are the novel science and technology issues associated with passive monitoring, and fence line monitoring and related exposure assessment?

⁶Points raised by the public commenter included::

- Is EPA aware of recent information about the efficiency of flares that indicates that flares were “ much less efficient than previously surmised.”
- Is EPA conducting any cumulative impact analysis?
- How is EPA considering risks to children and do the risk assessment methods deviate from the methods for conducting risk assessment as outlined in the Risk and Technology Review Risk Assessment Methodologies? And any other SAB advice relating to cumulative risk and risks to children?

Attachment D

Summary of Fact-Finding Discussion with Agency Staff, April 4, 2013

Members of the SAB Fact-finding Group: Drs. James Mihelcic (lead) and Peter Thorne
Agency participants:

Penny Lassiter, Office of Air and Radiation, Office of Air Quality Planning and Standards

Kelly Rimer, Office of Air and Radiation, Office of Air Quality Planning and Standards

Carl Mazza, Science Advisor, Office of Air and Radiation

Jim DeMocker, Office of Air and Radiation, Office of Policy Analysis and Review

Bob Fegley, Office of Research and Development

Angela Nugent, SAB Staff Office DFO for the Chartered SAB

Suhair Shallal, SAB Staff Office DFO for the SAB RTR Methods Review Panel

Responses to questions from fact-finding group

1. Confirm the scope and timing of the rule

Response:

- EPA last issued refinery Maximum Achievable Control Technology (MACT) standards in 1999 and 2003. The Clean Air Act Amendments of 1990 require assessments of residual risks and advances in technologies within eight years. EPA has not met the statutory deadline for revising the MACT standard for this sector.
- EPA is currently negotiating the timing of the rule with litigants and expects an aggressive schedule. Since publication of the semi-annual regulatory agenda, EPA intends to issue the Petroleum Refinery Sector for Flares (2060-AR69) action as part of this rulemaking.
- EPA also plans to use this rulemaking package as a vehicle to make technical and clarifying amendments to the Refinery NSPS in response to a 2008 petition from the American Petroleum Institute. The agency plans to include these amendments in this rulemaking package as an administrative convenience and cost savings in lieu of a separate package, and it should be noted that this action does not constitute the periodic review of the NSPS required by the Clean Air Act because the agency did that review in 2008.

2. Address questions raised by SAB members during the March 8, 2013 teleconference.

- Although the EPA presenter suggested there is no new technology, the EPA did receive new industry data on technology in 2010. How is this discrepancy explained?

Response: EPA examined information on processes and control technologies collected under the 2011 Refinery Information Collection Request and collected in conjunction with EPA enforcement actions. While the agency did not identify any new control technologies or practices, it will be examining whether technologies and practices in use at some refineries could be applied more broadly across the refining industry. All information not claimed by the refining companies to be confidential business information that was gathered through the 2011 ICR is on the EPA webpage for the Consolidated Petroleum Refinery Rulemaking Repository at <http://www.epa.gov/ttn/atw/petref.html>.

- How is EPA identifying and addressing any environmental justice concerns associated with emissions from the facilities?

Response:

- EPA conducts a demographic analysis within a three-mile radius of refineries to identify populations with minority status, low income and educational status. This information will be summarized in the preamble to the rule and a more detailed report is filed in the docket for the rulemaking.
 - EPA uses this demographic information to develop outreach to involve affected people in the regulatory process through webinars, phone calls, and other means to help people engage with the regulatory process.
 - While low income or minority communities are often in the general proximity of such facilities, the analysis of any unique environmental justice concerns has not been completed for this planned rulemaking.
 - Results from this demographic analysis would be presented to decision makers as part of the rulemaking package because the Clean Air Act requires consideration of risks to all people.
- What are the novel science and technology issues associated with passive monitoring, fence-line monitoring and related exposure assessment?

Response:

- EPA is planning to include fence-line monitoring for fugitive emissions from sources such as equipment leaks, tanks and wastewater handling and treatment. Such monitoring would function as a second check to ensure that fugitive emissions reductions targeted by the existing MACT rule are being achieved. Since benzene is often present from fugitive sources at refineries, this would be the compound that the rule would require for measurement at the fenceline.
 - EPA staff does not consider this technology novel. Europe requires it, there are American Society for Testing and Materials methods for it, and it has been used to detect emissions in a number of applications. This technology is well-understood and simple to operate.
3. Seek EPA responses to points raised by the public commenter during the May 8, 2013 teleconference
- Is EPA aware of recent information about the efficiency of flares that indicates that flares were “much less efficient than previously surmised.”

Response:

- EPA is aware of this information and it was addressed in the peer review conducted by EPA and available at <http://www.epa.gov/ttn/atw/petref.html>.
- The 1999 MACT standard setting found that flares were the best performing technology for eliminating waste gas. Over time, as gas recovery technologies improved, the amount of waste gas going to flares has diminished, while the amount of steam has not diminished, thus negatively impacting the efficiency of flares.

- Is EPA conducting any cumulative impact analysis? How is EPA considering risks to children and do the risk assessment methods deviate from the methods for conducting risk assessment as outlined in the Risk and Technology Review Risk Assessment Methodologies? And any other SAB advice relating to cumulative risk and risks to children?

Responses:

- EPA is following the assessment methods approved by the SAB in 2010 (*SAB Review of EPA's draft entitled, "Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA's Science Advisory Board with Case Studies – MACT I Petroleum Refining Sources and Portland Cement Manufacturing,"* EPA-SAB-10-007)
- EPA is conducting cumulative risk with respect to the following: (1) facility-wide assessments, which include source category emission points as well as other emission points within the facilities (2) overlapping sources in the same category; (3) aggregate cancer risk from all carcinogens; (4) aggregate non-cancer hazard indices from all non-carcinogens (affecting the same target organ system); (5) risks from inhalation and, for some persistent and bioaccumulative pollutants, ingestion routes of exposure; and (6) demographic analysis to determine if any minority groups or low-income population may be disproportionately exposed or at risk due to the exposure.
- To assess children's risks, EPA assumes 24/7 continuous exposure for a 70-year lifetime, including childhood, to protect public health.
- The Office of Air and Radiation uses the Integrated Risk Assessment System (IRIS) as the preferred database for chronic dose-response data. This practice is consistent with other program offices.
- As suggested by the SAB, EPA has evaluated the California approach to developing dose response values to address risks to children. EPA has determined that the current Agency approach and values are appropriately health-protective. For carcinogens, EPA preference is to use IRIS unit risk estimates (UREs), which (using EPA's current Guidance) apply age-dependent adjustment factors for carcinogens operating under a mutagenic mode of action. For noncancer risks, EPA prefers IRIS reference values where available, which apply uncertainty factors to chemical-specific data sets. EPA uses values from other agencies such as ATSDR and California in certain cases, for example when IRIS values are not available. The SAB has endorsed this approach.
- Regarding the [comment the SAB received from the California community groups after the March 8, 2013 SAB teleconference](#):
 - EPA uses the IRIS database for cancer hazard and dose-response information. Quantitative cancer assessments are data-driven and incorporate age-dependent adjustment factors for mutagenic carcinogens. The California method referenced by the public comment involves application of such factors for *all* pollutants when deriving cancer values.
 - EPA also uses the IRIS database for non-cancer information. IRIS reference values include up to a ten-fold uncertainty factor for intra-human variability unless data suggest otherwise, while California uses up to a thirty-fold adjustment factor. EPA

applies up to a ten-fold factor to address database uncertainty; California applies up to a three-fold factor to address this uncertainty.

- The adjustment or uncertainty factors result, not from science alone, but also reflect policy choices.
- If the SAB wishes to provide any comment on agency risk assessment methods involving IRIS, it would be helpful for the SAB to provide these comments in an agency-wide context, based on a comprehensive analysis of current approaches, not limited to the context of this proposed rulemaking.
- EPA developed a detailed response to the 2010 report that goes beyond the brief acknowledgement letter to the SAB. This information is in the EPA docket for past residual risk rules and has been posted on the SAB website at [http://yosemite.epa.gov/sab/sabproduct.nsf/3BE2C36A4ADDC85A85257B48006C88D7/\\$File/EPA+resp+to+SAB+on+RTR+memo.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/3BE2C36A4ADDC85A85257B48006C88D7/$File/EPA+resp+to+SAB+on+RTR+memo.pdf)
- EPA plans to address both actual and allowable emission limits in this rulemaking because the information on actual emissions is available.