March 3, 2013

Nirav M. Shah, MD, MPH
Commissioner
New York State Department of Health
Albany, NY
Via Email

Dear Dr. Shah:

Thank you for the opportunity to review your Department’s “A Public Health Review of the Department of Environmental Conservation’s Supplemental Generic Environmental Impact Statement for Shale---Gas Development” (hereafter, PHR). Your November 20, 2012 letter included the draft report and associated materials on health outcome surveillance, existing and planned interactions between state and local agencies under the proposed shale-gas program, the DEC’s SGEIS and the response to comments on the SGEIS.

Your charge to reviewers asked us to “focus on whether additional public---health impacts should be considered in the SGEIS and whether additional mitigation measures are needed to address potential public---health impacts.” I provided initial comments on the November 20 draft prior to our conference call on Monday December 3, 2012. After discussion with you, your staff, and my fellow peer reviewers, I wrote the first version of this letter and submitted it to you on December 18, 2012. This new version comments on the updated PHR I received in February 2013. My comments are integrated into the earlier text, with some additional points added as an addendum.

My comments in this letter adopt the convention of using “HVHF” or the phrase “shale gas development” to describe the entire process of natural gas well development and production. I do so because hydraulic fracturing is just one step in the natural gas development process and the potential public health impacts are wide ranging and not limited to fracturing. Lastly, since the final decision ultimately rests with New York decision-makers, these comments are designed to address potential impacts and evaluate proposed mitigations in the event the HVHF ban in New York State is lifted.
My responses to the specific charge questions are below, followed by conclusions and final comments.

**Are there additional potential public---health impacts of HVHF gas development that should be considered beyond those already discussed in the SGEIS?**

If NY State decides to allow HVHF the DOH has developed a viable approach to addressing the main public health issues associated with shale gas development. The PHR and SGEIS describe a phased start to shale gas development that is coupled with baseline and subsequent monitoring of potential impacts. Although the PHR does not miss any major categories, I have highlighted potential impacts that I believe warrant further attention.

The SGEIS acknowledges that increased traffic accidents are among the expected impacts of HVHF. Given that local government jurisdictions, as opposed to the state, have legal authority to designate and enforce local traffic and road---use laws, it is important that DOH provides communities with tools to address this issue. After our phone call it is my understanding that DOH will recommend that DEC seek ways to strengthen the SGEIS in the area of local road---use agreements, including development of model plans, and will develop approaches for including traffic---related injuries in planned prospective surveillance.

The SGEIS addresses concerns about noise and fugitive dust from pads and traffic, but it is important that DOH clearly define what is included in “visual impairment” and address other nuisance issues that residents may experience. “Light pollution,” vibration, and odors can be an issue for residents living near well pads and other production facilities. If gas development occurs in populated areas the impact of odors (as distinct from criteria air pollutants and air toxics) is a likely common complaint. These complaints are often the first signals of air pollution impacts. Details of how DOH plans to work with local health departments to formalize and coordinate systematic data collection on light, vibration, odors, noise, and other nuisance issues should be fleshed out in the PHR and SGEIS. Development of a database for systematic recording of inquiries and citizen complaints can help to identify sentinel events and address community concerns about the potential impacts on health and quality of life.

The SGEIS air analysis looks at both criteria and non---criteria air pollutants and is reasonable to the extent that emission inventories, models, and other key assumptions are reliable. One key uncertainty that should be emphasized in the PHR is the lack of health-based standards for some of the air toxics emitted during well development. Although it is reasonable to use annual and short-term guideline concentrations, EPA provisional risk concentrations, and toxicity values from other authoritative sources, modeling these emissions, as described in the SGEIS, is only the first step in assessing potential air risks. Linking these models to the measurements included in the mitigation plans is important for assessing impacts and evaluating the effectiveness of mitigation.
The term “setback” largely applies to distances to key watersheds in the PHR. I encourage broadening the use of this term in discussions with the public to include distances from air emission sources as well. The PHR summary notes that DEC needs to define more clearly setbacks from NYC watersheds and related infrastructure. The rationale for setbacks for water, air, noise, and other quality of life impacts needs to be clearer throughout the PHR and SGEIS.

The risk from HVHF near plugged or abandoned wells is not directly addressed in the PHR. This potential hazard should also be explored to the extent feasible. Both this hazard and potential well casing failure are scientific uncertainties that may impact on aquifers over time. The SGEIS cites a relatively small probability for well casing failure, but also notes that some parameters that feed into this risk estimate are uncertain. I agree with the DOH’s assertion that the value of a highly uncertain probabilistic risk estimate is difficult for decision---makers to evaluate. Nonetheless, the potential for catastrophic failure should be acknowledged given the potential high consequence of a failure.

The overall impact of stress on individual and community health is an important issue that the DOH and DEC need to acknowledge and assess as rigorously as possible. While this concept is implicit in some of the SGEIS text, stress needs to be more fully addressed in the PHR and SGEIS. To help alleviate this concern the DOH and DEC need to encourage active public participation in the permitting process, foster community right---to---know, and make certain monitoring data is publically available. A substantive, ongoing dialogue between State of NY officials and communities will be needed to address this issue long term.

**Are additional mitigation measures beyond those identified in the SGEIS needed to address the potential health impacts of HVHF? If so, what additional prevention or mitigation measures are recommended?**

As mentioned above, road---use agreements between operators and municipalities are important for reducing potential impacts from truck traffic. While this is appropriate, how this is implemented and enforced at the local level is a key part of mitigation. It is important that DOH work with DEC to develop model agreement language, engage local governments to minimize impacts from trucking operations, and work to ensure this is a “funded” mandate.

The SGEIS includes environmental monitoring as mitigation in cases where the impact of HVHF is uncertain. Continual evaluation of monitoring data is intended to provide assessment of the effectiveness of mitigation requirements and early detection of problems with well construction or operation. It is important that the PHR states the frequency of these evaluations and how this information will be disclosed to the public.
Air monitoring of VOCs for 1 and 24 hrs is mentioned as part of the mitigation strategies outlined in the PHR and SGEIS. It is important to note that even a 1 hr average sample may miss short-term peak pollution levels nearby residents may experience. Though there are no good solutions for real time monitoring for a large number of air toxics, shorter term samples can be collected if done systematically with a strong study design, quality control/assurance, and a clear plan for use of the data. Mitigation approaches should consider using less expensive proxy methods, such as measuring methane plumes, to obtain emission rate estimates. This data may, in turn, be coupled with more rigorous VOC characterization samples to estimate emissions and/or human exposures to air toxics. This VOC characterization is done at the well head in other states. Although the SGEIS states that NY shale is expected to yield mostly “dry” gas, with low petroleum condensate levels, field gas sampling would be informative to help validate existing geochemical data, assess the success of mitigations, and to characterize these potential emission sources. If coupled with radon measurement, this data could be used to address concerns about potential human exposure to radon from this source.

All mitigation assessments sample sizes for baseline air, water, and health indicator measures should be specified to the extent feasible for the proposed “phased” permitting process. While operator groundwater and air monitoring plans proposed in the SGEIS will be reviewed and approved by DEC and DOH, the DEC and DOH should produce guidance on design, implementation and interpretation of monitoring data. This guidance should also define how significant changes from baseline will be determined.

**Are existing and proposed environmental and health monitoring and surveillance systems adequate to establish baseline health indicators and to measure potential health impacts? If not, what additional monitoring is recommended?**

As a new program there are substantial uncertainties associated with developing the health monitoring and surveillance systems through existing health care systems. Use of “near real time” and longer term tracking and reporting mechanisms is good public health practice, but acceptance of these measures as representative and informative depends on an effective communication platform. I agree that respiratory, asthma, and neurological systems are the place to begin evaluation due to the prevalence of these syndromes and existence of sensitive populations. Where feasible, tracking should focus on expanded data collection in sensitive subpopulations.

It would be useful if DOH would conduct an environmental tracking exercise in as near real time as possible to compare baseline, local regulator, state regulator, and operator collected data. This will require highly specific protocols so that data is collected in ways that provide high quality exposure data that can be explored in tandem with the health outcome data.
Impacts of natural gas development on community character is mentioned in the SGEIS, but formal evaluation metrics are not proposed. While metrics for this issue are likely to be qualitative, it is important that guidance describes how this metric will be measured and/or described prior to the initiation of development. The potential mitigation suggested in the SGEIS, i.e., the DEC policy to abide by local laws or ordinances prohibiting HVHF activity for the first 5 years of the program, may address some community concerns if it is coupled with a substantive communication effort.

Addendum: Additional Comments on the PHR from February 2013 Version Review

**Background and Recommendations Section:** The lack of substantive research to address many of the main public health concerns is still one of the major limitations facing both public health experts and decision-makers. While this concern is front and center in this draft, the communication plan should be highlighted here as well. This draft also identifies research by the Federal government and others that will address important uncertainties. It is important to highlight some of the data the proposed monitoring and mitigation would collect and how it would address uncertainties that are specific to HVHF in NY. Given that the final recommendation is about the expert comments, I would also note that it is likely that there will be some unanticipated outcomes – history shows that even the best prepared miss something. The DOH should reserve the option to intervene in cases of unanticipated consequences.

Lastly, the recommendations section should also address more clearly the issue of scale of impacts: if HVHF is allowed in NY State the most public health relevant impacts will be at a local level. The recommendations should be explicit that the mitigations are focused at that level. The section on water, for example, notes that while the total amount of water used at anticipated peak HVHF is small compared to competing demands, there may be “localized or transient impacts that could affect water supplies.” The larger issue here is one of scale: both of the industry at peak development, and the local scale where impacts occur. This point is nicely made in the context of water, but this “scale” of impacts point can and should also be made for air, noise, and community quality of life impacts.

**Concluding Comments**

If shale gas development goes forward in NY the approach outlined in the PHR represents a viable strategy for protecting public health. Prevention of impacts will, however, require a strong partnership between the DOH, DEC, and the local governmental bodies engaged in land use planning, monitoring, and enforcement. It is my belief that mitigation activities will only be perceived as successful if the baseline and follow up monitoring data are high quality, assessment protocols are acceptable to all stakeholders, and the overall process is perceived as unbiased and transparent. This will require an ongoing, substantive dialogue between the public, government, and industry to address stakeholder concerns.
During our conference call you asked the reviewers if a Health Impact Assessment (HIA) should be done for shale gas development in NY and we all said no. As someone who helped develop a HIA in Colorado I know the benefits and shortcomings of HIA for addressing future health impacts from natural gas development. Given the current state of the science I do not think a HIA can project future health effects attributable to shale gas development with reasonable precision. Furthermore, I do not think a state-specific HIA is the best tool for addressing issues that transcend state borders. The impact of methane emissions during well development, for example, is important given the realities of a changing climate. The science assessing the cumulative effects of shale gas development on climate change is, however, still emerging, and the implications of this work for NY-specific regulation unclear. For these reasons I believe New York’s proposed prospective monitoring approach that focuses on preventing future exposures, tracking potential health effects, and mitigation is preferable to a HIA at this time.

In closing, thank you for the opportunity to review the DOH’s work, and please contact me if you have questions.

Sincerely,

John L. Adgate, PhD, MSPH
Professor and Chair
Department of Environmental and Occupational Health
December 18, 2012

Nirav M. Shah, MD, MPH
Commissioner
New York State Department of Health
Albany, NY
Via Email

Dear Dr. Shah:

Thank you for the opportunity to review your Department’s “A Public Health Review of the Department of Environmental Conservation’s Supplemental Generic Environmental Impact Statement for Shale-Gas Development” (hereafter, PHR). Your November 20, 2012 letter included the draft report and associated materials on health outcome surveillance, existing and planned interactions between state and local agencies under the proposed shale-gas program, the DEC’s SGEIS and the response to comments on the SGEIS.

Your charge to reviewers asked us to “focus on whether additional public-health impacts should be considered in the SGEIS and whether additional mitigation measures are needed to address potential public-health impacts.” I provided initial comments on the November 20 draft prior to our conference call on Monday December 3, 2012. After discussion with you, your staff, and my fellow peer reviewers I have revised my comments after receiving the updated “NY DOH Public Health Review” last week.

My comments in this letter adopt the convention of using “HVHF” or the phrase “shale gas development” to describe the entire process of natural gas well development and production. I do so because hydraulic fracturing is just one step in the natural gas development process. The potential public health impacts can occur either during the relatively intense well development phase or over the much longer production phase.

My responses to the specific charge questions are below, followed by conclusions and final comments.
Are there additional potential public-health impacts of HVHF gas development that should be considered beyond those already discussed in the SGEIS?

The DOH has developed a strong document that is a viable approach to addressing the main public health issues associated with shale gas development. The PHR and SGEIS describe a phased start to shale gas development that is coupled with baseline and subsequent monitoring of potential impacts. Although the PHR does not miss any major categories, I have highlighted potential impacts that I believe warrant further attention.

The SGEIS acknowledges that increased traffic accidents are among the expected impacts of HVHF. Given that local government jurisdictions, as opposed to the state, have legal authority to designate and enforce local traffic and road-use laws, it is important that DOH provides communities with tools to address this issue. After our phone call it is my understanding that DOH will recommend that DEC seek ways to strengthen the SGEIS in the area of local road-use agreements, including development of model plans, and will develop approaches for including traffic-related injuries in planned prospective surveillance.

The SGEIS addresses concerns about noise and fugitive dust from pads and traffic, but it is important that DOH clearly define what is included in “visual impairment” and address other nuisance issues that residents may experience. “Light pollution,” vibration, and odors can be an issue for residents living near well pads and other production facilities. As gas development increasingly occurs in populated areas the impact of odors (as distinct from criteria air pollutants and air toxics) is a common complaint. These complaints are often the first signals of air pollution impacts. Details of how DOH plans to work with local health departments to formalize and coordinate systematic data collection on light, vibration, odors, noise, and other nuisance issues should be fleshed out in the PHR and SGEIS. Development of a database for systematic recording of inquiries and citizen complaints can help to identify sentinel events and address community concerns about the potential impacts on health and quality of life.

The SGEIS air analysis looks at both criteria and non-criteria air pollutants and is reasonable to the extent that emission inventories, models, and other key assumptions are reliable. One key uncertainty that should be emphasized in the PHR is the lack of health-based standards for some of the air toxics emitted during well development. Although it is reasonable to use annual and short-term guideline concentrations, EPA provisional risk concentrations, and toxicity values from other authoritative sources, modeling these emissions, as described in the SGEIS, is only the first step in assessing potential air risks. Linking these models to the measurements included in the mitigation plans is important for assessing impacts and evaluating the effectiveness of mitigation.
The term “setback” largely applies to distances to key watersheds in the PHR. I encourage broadening the use of this term in discussions with the public to include distances from air emission sources as well. The PHR summary notes that DEC needs to define more clearly setbacks from NYC watersheds and related infrastructure. The rationale for setbacks for water, air, and noise impacts needs to be clearer throughout the PHR and SGEIS.

While not formally part of this public health review, potential well casing failure and its impact on aquifers over time is a key scientific uncertainty. The SGEIS cites a relatively small probability, but also notes that some parameters that feed into this risk estimate are inherently uncertain. I agree that for decision-makers the value of a probabilistic risk assessment is problematic when outputs of the analysis are highly uncertain. Nonetheless, the potential for catastrophic failure should be acknowledged given the potential high consequence of some failures.

The overall impact of stress on individual and community health is an important issue that the DOH and DEC need to acknowledge and assess as rigorously as possible. While this concept is implicit in some of the SGEIS text, stress needs to be more fully addressed in the PHR and SGEIS. To help alleviate this concern the DOH and DEC need to encourage active public participation in the permitting process, foster community right-to-know, and make certain monitoring data is publically available. A substantive, ongoing dialogue between State of NY officials and communities will be needed to address this issue long term.

**Are additional mitigation measures beyond those identified in the SGEIS needed to address the potential health impacts of HVHF? If so, what additional prevention or mitigation measures are recommended?**

As mentioned above, road-use agreements between operators and municipalities are important for reducing potential impacts from truck traffic. While this is appropriate, how this is implemented and enforced at the local level is a key part of mitigation. It is important that DOH work with DEC to develop model agreement language, engage local governments to minimize impacts from trucking operations, and work to ensure this is a “funded” mandate.

The SGEIS includes environmental monitoring as mitigation in cases where the impact of HVHF is uncertain. Continual evaluation of monitoring data is intended to provide assessment of the effectiveness of mitigation requirements and early detection of problems with well construction or operation. It is important that the PHR states the frequency of these evaluations and how this information will be disclosed to the public.

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no good solutions for real time monitoring for a large number of air toxics, shorter term samples can be collected if done systematically with a strong study design, quality control/assurance, and a clear plan for use of the data. Mitigation approaches should consider using less expensive proxy methods, such as measuring methane plumes, to obtain emission rate estimates. This data may, in turn, be coupled with more rigorous VOC characterization samples to estimate emissions and/or human exposures to air toxics. This VOC characterization is done at the well head in other states. Although the SGEIS states that NY shale is expected to yield mostly “dry” gas, with low petroleum condensate levels, field gas sampling would be informative to help validate existing geochemical data, assess the success of mitigations, and to characterize these potential emission sources.

All mitigation assessments sample sizes for baseline air, water, and health indicator measures should be specified to the extent feasible for the proposed “phased” permitting process. While operator groundwater and air monitoring plans proposed in the SGEIS will be reviewed and approved by DEC and DOH, the DEC and DOH should produce guidance on design, implementation and interpretation of monitoring data. This guidance should also define how significant changes from baseline will be determined.

**Are existing and proposed environmental and health monitoring and surveillance systems adequate to establish baseline health indicators and to measure potential health impacts? If not, what additional monitoring is recommended?**

As a new program there are substantial uncertainties associated with developing the health monitoring and surveillance systems through existing health care systems. Use of “near real time” and longer term tracking and reporting mechanisms is good public health practice, but acceptance of these measures as representative and informative depends on an effective communication platform. I agree that respiratory, asthma, and neurological systems are the place to begin evaluation due to the prevalence of these syndromes and existence of sensitive populations. Where feasible, tracking should focus on expanded data collection in sensitive subpopulations.

It would be useful if DOH would conduct a environmental tracking exercise in as near real time as possible to compare baseline, local regulator, state regulator, and operator collected data. This will require highly specific protocols so that data is collected in ways that provide high quality exposure data that can be explored in tandem with the health outcome data.

Impacts of natural gas development on community character is mentioned in the SGEIS, but no formal evaluation metrics are proposed. While metrics for this issue are likely to be qualitative, it is important that guidance describes how this metric will be measured and/or described prior to the initiation of development. The potential mitigation suggested in the SGEIS, i.e., the DEC policy to abide by local laws or ordinances prohibiting HVHF activity for
the first 5 years of the program, may address some community concerns if it is coupled with a substantive communication effort.

**Concluding Comments**

If shale gas development goes forward in NY the approach outlined in the PHR represents a reasonable strategy for protecting public health. Prevention of impacts will, however, require a strong partnership between the DOH, DEC, and the local governmental bodies engaged in land use planning, monitoring, and enforcement. It is my belief that mitigation activities will only be perceived as successful if the baseline and follow up monitoring data are high quality, assessment protocols are acceptable to all stakeholders, and the overall process is perceived as unbiased and transparent. This will require an ongoing, substantive dialogue between the public, government, and industry to address stakeholder concerns.

During our conference call you asked the reviewers if a Health Impact Assessment (HIA) should be done for shale gas development in NY and we all said no. As someone who helped develop a HIA in Colorado I know the benefits and shortcomings of HIA for addressing future health impacts from natural gas development. Given the current state of the science I do not think a HIA can project future health effects attributable to shale gas development with reasonable precision. Furthermore, I do not think a state-specific HIA is the best tool for addressing issues that transcend state borders. The impact of methane emissions during well development, for example, is important given the realities of a changing climate. The science assessing the cumulative effects of shale gas development on climate change is, however, still emerging, and the implications of this work for NY-specific regulation unclear. For these reasons I believe New York’s proposed prospective monitoring approach that focuses on preventing future exposures, tracking potential health effects, and mitigation is preferable to a HIA at this time.

Thank you for the opportunity to review the DOH’s work, and please contact me if you have questions.

Sincerely,

John L. Adgate, PhD, MSPH
Professor and Chair
Department of Environmental and Occupational Health
March 4, 2013

Nirav R. Shah, M.D., M.P.H.
Commissioner, NY State Department of Health
Corning Tower
Empire State Plaza
Albany, NY 12237

Dear Dr. Shah:

I have completed my peer review of the public-health elements of the Department of Environmental Conservation's (DEC) supplemental generic environmental impact statement (SGEIS) for high-volume hydraulic fracturing (HVHF). As requested, this letter summarizes my review of your Department's effort to date.

Overview

The charge was to "focus on whether additional public-health impacts should be considered in the SGEIS and whether additional mitigation measures are needed to address potential public-health impacts." I also was to "consider whether existing and proposed environmental and health monitoring and surveillance systems are adequate to establish baseline health indicators and to measure potential health impacts." The NY DOH specifically identified several areas of possible concern for public health: contamination of drinking water resources; ambient air pollution; releases of naturally-occurring radioactive materials (NORM); community impacts related to noise and utilization of local services like transportation; healthcare, education, housing and social services; and adequacy of existing and proposed health surveillance and HVHF-related monitoring programs.

Specifically peer reviewers were to address three questions:

1. **Are there additional potential public-health impacts of HVHF gas development that should be considered beyond those already discussed in the SGEIS?**

2. **Are additional mitigation measures beyond those identified in the SGEIS needed to address the potential health impacts of HVHF? If so, what additional prevention or mitigation measures are recommended?**

3. **Are existing and proposed environmental, health monitoring, and surveillance systems adequate to establish baseline health indicators and to measure potential health impacts? If not, what additional monitoring is recommended?**

In addition to the Health Review Scope and Process, you provided a number of documents for review:

NY State has done a credible job of thoroughly reviewing potential environmental health impacts of HVHF. It is commendable that such a review has been undertaken prior to issuing permits for such activities. Although this process did not follow the academic model for a Health Impact Assessment I applaud the DOH for having used the DEC SGEIS process to achieve the same end. In some ways this feels like a better process in that it has established the basis for a stronger role for DOH in working with DEC moving forward. As noted previously, I am pleased that NY is committed to reducing methane emissions in the context of HVHF activities. I recommend that New York State continue and expand its efforts to develop cleaner alternative energy sources. New York's renewable energy portfolio standard, Governor Cuomo's NY-Sun initiative and effort to reduce electricity demand 15 percent by 2015, is a good beginning.

As I have noted previously, many of the proposed mitigation measures are a model for other states that
are considering or undertaking these operations. I agree with the notion embedded in the latest review that such mitigation measures would need to be monitored over time. Second I agree with the notion of a phased approach to HVHF gas-development that would allow public health problems to be identified earlier, and reduce problems resulting from overly rapid growth ("boom and bust"). Third, I especially concur with the notion of not allowing HVHF gas-development activity within 4000 feet of the New York City and Syracuse drinking-water supply watersheds.

I am pleased that in this latest draft the NY DOH has addressed a number of issues that I had flagged in my prior reports. The revised document more strongly emphases the numerous data gaps and uncertainties with regard to potential public health impacts of HVHF. I agree with the notion that studies that are underway nationally (the US EPA hydraulic fracturing study) and in Pennsylvania will be helpful in this regard. I am less sanguine about ongoing health studies because I think these are unlikely to capture subclinical health effects as well as effects that occur with longer latency or lag times. I agree with the DOH recommendation to expand its Behavioral Risk Factors Surveillance System to collect critical baseline information in the Marcellus region. I also agree with the decision to explore approaches for including worker and traffic-related injuries, psychosocial stress and noise. Perhaps most important is the new recommendation that the DOH will collaborate with the DEC in assessing new data on HVHF health and environmental impacts as well as the effectiveness of mitigation measures. Some of the most important information will be environmental information because of the problems (noted above) with needing to protect the public from effects that are subclinical or have long latencies and are difficult to detect in real-time using epidemiology.

As noted in prior communications, I think that DOH would require resources for public communications engagement, particularly for those most concerned about health, for example, local health agencies, health providers and members of the public.

Thank you very much for again having had the opportunity to review the "Public Health Review of the Department of Environmental Conservation's Draft Supplemental Generic Environmental Impact Statement for Shale-Gas Development". This document as it currently stands is an excellent review of the relevant public health issues, and attendant uncertainties and data gaps.

Very truly yours,

Lynn R. Goldman, M.D., M.P.H.
Dean, School of Public Health and Health Services
The George Washington University

Attachment: Attachment A
Dear Dr. Shah:

I have completed my peer review of the public-health elements of the Department of Environmental Conservation’s (DEC) supplemental generic environmental impact statement (SGEIS) for high-volume hydraulic fracturing (HVHF). As requested, this letter summarizes my review of your Department’s effort to date.

Overview

As I understand the charge, it was to "focus on whether additional public-health impacts should be considered in the SGEIS and whether additional mitigation measures are needed to address potential public-health impacts." I also was to "consider whether existing and proposed environmental and health monitoring and surveillance systems are adequate to establish baseline health indicators and to measure potential health impacts." The New York Department of Health (NY DOH) specifically identified several areas of possible concern for public health: contamination of drinking water resources; ambient air pollution; releases of naturally-occurring radioactive materials (NORM); community impacts related to noise and utilization of local services like transportation; healthcare, education, housing and social services; and adequacy of existing and proposed health surveillance and HVHF-related monitoring programs.

You charged peer reviewers to address three questions:

"1. Are there additional potential public-health impacts of HVHF gas development that should be considered beyond those already discussed in the SGEIS?

2. Are additional mitigation measures beyond those identified in the SGEIS needed to address the potential health impacts of HVHF? If so, what additional prevention or mitigation measures are recommended?

3. Are existing and proposed environmental and health monitoring and surveillance systems adequate to establish baseline health indicators and to measure potential health impacts? If not, what additional monitoring is recommended?"

In addition to the Health Review Scope and Process, you provided me with a number of documents for review including:


2. "Development of a Health Outcome Surveillance Program for High-Volume Hydraulic Fracturing in New York"
State" (marked CONFIDENTIAL INTRA-AGENCY DRAFT/FOR DELIBERATION ONLY NOT SUBJECT TO FOIL), dated November 19,2012.

3. "Description of Anticipated Work and Responsibilities for Center of Environmental Health, Local Health Departments/District Offices, and Department of Environmental Conservation Associated with HVHF Gas Well Drilling" (marked CONFIDENTIAL INTRA-AGENCY DRAFT/FOR DELIBERATION ONLY NOT SUBJECT TO FOIL), dated November 19,2012.


5. A complete copy of the Interagency Confidential Draft Final SGEIS.

6. A set of health related excerpts from the Draft Final SGEIS prepared by the NY DOH including: (a) a second copy of the Executive Summary from the Draft Final SGEIS; (b) Section 5.4.3.1 of the SGEIS; (c) Section 6.14 of the SGEIS; and (d) a second copy of the Appendix 34, Summary of Health impacts, a document titled "NYSDOH and DEC Summary of Potential Health-Related Impacts and Proposed Mitigation Measures for High-Volume Hydraulic Fracturing".

7. A set of health-related excerpts from the DEC Document: "Response to Comments. Final Supplemental Generic Environmental Impact Statement" including comments excerpted from all areas that might be health related, not just the "Health Impacts" section.

I sent you a first draft of my review on December 2,2012. You held a conference call with John Adgate, Richard Jackson and I on December 3,2012, during which we discussed potential local-community impacts; health and environmental monitoring and surveillance programs; potential impacts from contamination of air resources; potential impacts from contamination of drinking water resources; potential impacts from naturally-occurring radioactive material (NORM); and other issues that we reviewers had brought forward either in our draft reviews or in our verbal comments and discussion. On December 7,2012, you emailed me: (1) A revised document titled "A Public Health Review of the Department of Environmental Conservation's Supplemental Generic Environmental Impact Statement for Shale-Gas Development" with changes shown in "track changes", dated December 7,2012 and (2) a copy of all three of the draft reviewer’s comments with annotations (in track changes) from NY DOH staff. The copy of my draft responses to the charge questions with the NY DOH staff comments is attached to this letter (Attachment A);

General Comments:

From the review of the documents listed above I conclude that NY State has done a credible job of thoroughly reviewing potential environmental health impacts of HVHF. It is commendable that such a review has been undertaken prior to beginning to issue permits for such activities, and that local communities would be involved in the permitting process. The SGEIS report has been provided to the public for review and the extensive numbers of comments that have been received (as per the Response to Comments document) are indicative of a participatory public process. It is also clear that involvement of the NY DOH over the last few years has helped to highlight and address a number of potential public health concerns. In particular the draft "Description of Anticipated Work and Responsibilities for Center of Environmental Health, Local Health
Departments/District Offices, and Department of Environmental Conservation Associated with HVHF Gas Well Drilling" indicates a thorough and thoughtful approach to assuring that environmental health threats are addressed collaboratively by New York's state and local health and environmental health agencies. In my experience it often is difficult to bring these various branches of government together in order to assure a tight environmental health safety net. This is among the best of such frameworks that I have reviewed. While it is not a formal Health Impact Assessment the review is, nonetheless, very thorough, and I was able to identify only a few areas that require more review.

Generally speaking, if HVHF gas development is permitted in NYS, there are four additional aspects of the approach taken in the SGEIS that are of critical importance for public health. First is that, the proposed mitigation measures should serve as a model for other states that are considering or undertaking these operations. However, no number of mitigation measures can provide one hundred percent assurance of safety and it is therefore important that the New York DOH would have adequate funding for surveillance activities as well as follow up investigations that would allow for identification of ways that mitigation measures need to be improved as well as potential health impacts. Second it is important that, if NY decides to move forward with HVHF gas-development that, as proposed in the SGEIS, there would be a "phased rollout approach". This not only would allow public health problems to be identified earlier, but also reduce problems resulting from overly rapid growth ("boom and bust"). Third, I agree with the SGEIS proposal that would not allow HVHF gas-development activity within 4000 feet of the New York City and Syracuse drinking water supply watersheds. Finally, it is of utmost importance that New York would allow local input into decision-making about permits.

In addition to specific concerns that are described below, there are some general recommendations that I would like to put forward with regard to provision of public information and involvement of the public moving forward:

1. **Continue the Process of Assessing Health Impacts:** Regardless of when and how NY State moves forward with HVHF activities additional health assessment activities are warranted, I recommend that the NY DOH appoint a panel of experts and citizens to constitute a HVHF health assessment committee. Such a committee could support the DOH as well as the DEC and local health and environmental agencies in review of health related data and other issues. Further assessment of health impacts is needed. While the SGEIS accomplishes many of the goals of an HIA there are still additional issues that need to be addressed. If NY State decides to lift the ban on HVHF the committee can guide the NY DOH in its process of adaptive management as well as reviewing any additional data that may come forward. On the other hand, if HVHF is not permitted but continues to be under consideration, NYS should consider conducting a formal HIA an advisory panel could assist with that process. I appreciate that the revised DOH report recommends exploring options for establishing an advisory panel to advise DOH and DEC on health issues. One caveat is that an advisory process would require resources, and that, if NY State moves forward with HVHF resources also should be made available for possible health investigations or even full-scale studies, possibly with guidance from an advisory panel.

2. **Address Right-To-Know:** The CEH DEC and local agencies are planning to develop a tremendous amount of information with regard to HVHF including, potentially: In my draft comments I listed a number of data sets that would be relevant to HVHF-related health concerns and that should be better shared among agencies, industry and the general public. Rightfully there is a focus on information sharing among agencies but public
transparency also is important. The DOH is recommending that DEC upgrade its existing publicly-available web-based oil and gas drilling information to be a clearinghouse that would provide all interested parties with ready access to the breadth of HVHF information collected under the program (e.g., well locations, monitoring data, and health surveillance findings). This is responsive to my concern about this issue. Additionally, I would hope that there would be strong involvement of DOH to assure that health relevant data are captured, including, as noted by DOH, "near-real time monitoring and surveillance results".

3. Engage the Public: It is not clear how the public would be engaged beyond the GEIS process. Local communities have a tremendous amount of information that is useful for agencies, and that understanding their concerns is useful in guiding the development of education and outreach materials. This issue is of great concern both in those communities and statewide and public engagement activities need adequate resources to assure that the State is reaching out and involving the public proactively. In the response to this concern, the DOH has emphasized the efforts that DEC plans to undertake to meet periodically with industry officials and local government staff; to obtain public comment for applications for well pads; to disclose hydraulic fracturing fluid content for each chemical before drilling and after well completion; to post waste tracking forms on a website for view by the public; and to provide local points of contact for disseminating information. These are good efforts. Additionally DOH itself would require resources for public communications engagement, particularly for those most concerned about health, for example, local health agencies, health providers and members of the public.

4. Address Greenhouse Gases: The draft SGEIS correctly identifies greenhouse gases (GHG) as potentially causing public health impacts, especially methane and carbon dioxide. The SGEIS thoroughly assesses the potential for emissions of these gases both in development and production of HVHF wells and in "post production", i.e., transport and use of natural gas, and highlights the requirement to comply with new EPA regulations requiring greenhouse gas mitigation measures and performance standards for new sources in the oil and natural gas industry. However, use of natural gas by utilities and companies to generate electricity in New York will of course emit more GHG's than would result from the development of certain alternative energy sources. Granted, the use of natural gas in New York State will occur regardless of the point of origin of the natural gas. Nonetheless, the draft SGEIS points to credible efforts by New York to promote the transition to cleaner sources of electricity, including the renewable energy portfolio standard, Governor Cuomo's NY-Sun initiative, New York's energy efficiency portfolio standard which seeks to reduce electricity demand 15% by 2015. I recommend that this approach be strengthened in the context of cheaper natural gas, and (to date) lack of a mechanism to internalize the costs of carbon dioxide and methane emissions to the atmosphere, nationally or in New York.

Specific Comments and Recommendations:

Question 1: Additional potential public-health impacts of HVHF gas development that should be considered beyond those already discussed in the SGEIS

Chemicals and Radionuclides: I am pleased that in the December 7 "Public Health Review ..." you noted my concern about the level (and quality) of information about formaldehyde, glycol ethers/ethoxylated alcohols and microbicides (Attachment A), and have stated your intention to request that DEC "DEC, in collaboration with DOH, must revise the SGEIS to reflect additional available" about these chemicals. I also raised a concern with the possibility that flow-back and produced waters could become contaminated by various naturally-
occuring metals like arsenic, cadmium, lead, manganese, and mercury, depending on what is present naturally. NY DOH points to language in the SGEIS indicating that a number of required mitigation measures would be used. I would agree that proper measures need to be taken to assure that such waters are properly handled, treated and disposed of. However, I continue to think that such an approach requires information about levels and toxicity of contaminants, including metals.

As to the more general issue of potential public health impacts of HVHF-related chemicals, one of the recommendations in the DOH report is that DEC must continue to engage DOH to evaluate potential health concerns related to any new fracturing additive chemicals that are proposed for use as HVHF development proceeds and to develop protocols that are to be followed for conducting alternatives assessments for HVHF chemical additive products. I strongly agree with this recommendation.

**Potential Human Health Impacts:**

**Drinking Water:** I support DOH plans to evaluate levels of drinking water pollutants and provide a public health interpretation of these data. DOH would require resources for this.

**Air pollution:** I reviewed the air pollution models and found them to be quite complex and very dependent on conditions that could be site-specific which as stack heights, placement of engines and presence of H2S or "sour" gas in sites. The model for PM2.5 suggests that additional mitigation measures may be needed to prevent short-range impacts. Similarly the model predicts the need for additional controls of benzene and formaldehyde emissions. The SGEIS also provides preliminary models for ozone formation that suggest the need to address ozone projections over time. Although local communities may not be interested in precise quantification of emissions, permit decisions may at least in part depend on anticipated air releases related to these operations. I appreciate that the DOH would review and interpret air monitoring data including assessing potential health impacts.

**Water availability:** I appreciate that in response to my draft comments the DOH report has been revised to refer to potential health impacts related to other water-quality issues, including loss of fish resources (recreationally and as a source of healthy food), water recreational opportunities, and flood control. Also in response to my draft comments, DOH has informed me that the DEC has promulgated water withdrawal regulations ([http://www.dec.ny.gov/regulations/78258.html](http://www.dec.ny.gov/regulations/78258.html)) and that the DOH will reference these regulations in their report. Such regulatory requirements are important, as well as carrying out monitoring activities to make sure that the cumulative sum of water withdrawals related to HVHF does not harm downstream aquatic environments.

**Socioeconomic impacts:** While job creation is expected to occur, new jobs would be distributed unevenly around the state. Some areas could experience short term labor shortages and therefore increased wages, possible negative impacts on existing industries, and in-migration of new specialized workers and their families. Employment in impacted regions is expected to peak in 20 years; income from operations in 30 years. If the additional jobs employ people in these communities who currently are unemployed or underemployed this could increase income to households and reduce service demands on public health. On the other hand, if prices increase rapidly this could have a negative effect on families and increase demands for public health services.
Population impacts: The SGEIS found that while population impacts would be minor statewide there could be more significant impacts in particular areas, perhaps offsetting population declines that are occurring in some of these rural areas. The SGEIS notes that in construction phases there would be many workers who live locally in temporary housing. Local health authorities would experience increased demand for public health services from such temporary residents as well as issues related to safety of food, drinking water and housing. In areas where populations increase quickly there could be impacts on access to medical care and adequacy of emergency medical services.

Traffic: The SGEIS has considered the potential for increased traffic impacts and there likely to would be significant impacts in many areas. In addition to noise and air pollution impacts there are potential impacts due to traffic related injuries. NIOSH has reported that workers in the oil and gas injury have high rates of traffic related injuries and mortality; presumably residential vehicles and pedestrians could be at risk as well.

Healthcare and public health services: I recommend consideration of potential impact on public health systems and healthcare services from rapid population changes. I understand, from responses to my draft comments, that DOH thinks that DEC's proposed phased roll out of HVHF permitting would be expected to mitigate the possible effect of rapid population growth and the associated increased demand for services. DOH stated that ongoing interaction with and monitoring of healthcare facilities would keep the agency appraised of impacts on such facilities. Likewise DOH expects that its routine interactions with the local health departments that provide local public health would keep them informed of potential impacts on local public health programs, and resource needs of these programs. While the phased rollout is likely to be helpful on a statewide basis there could be relatively large changes impacting health and public health services in local communities. I would recommend a more proactive approach that would attempt to anticipate potential impacts on healthcare and public health systems before there are any impacts on health in communities. Finally, DOH has noted in response to my draft comments that, "If HVHF permitting is authorized in NYS, additional resources would be made available to local health departments." I would agree with that approach.

Injury control: In response to another one of my recommendations in the earlier draft, the DOH states that it would address additional injury prevention and surveillance activities by exploring mechanisms to include worker and traffic-related injuries/deaths in health surveillance activities, and to enhance injury prevention activities. I would agree with that approach.

Noise: My draft comments noted that noise impacts of HVHF are greater than conventional gas wells during the period of time when horizontal drilling is underway, that HVHF is associated with more noise from diesel truck traffic, and that the SGEIS did not discuss noise impacts on health. I recommend that if HVHF activities proceed, noise levels near operations should be monitored to determine appropriate mitigation efforts to protect human health. In its response the DOH states that it "will provide DEC with additional information for the SGEIS on the potential human health effects (i.e., beyond simply annoyance) of noise". As they note, the impact analysis discussion and the mitigation measures are targeted at human receptors. However, I think that an understanding of potential health hazards is relevant to decision making including recommendations for local noise monitoring.

Local emergency planning: The draft SGEIS lays out a set of mitigations that include a requirement for operators of sites to respond in emergency situations (Section 7.13). I recommend consideration of potential impacts to local first responder systems. As noted above, the phased rollout would be helpful on a statewide
basis there could be relatively large changes in demand for emergency services impacting local communities.

Psychosocial stress: I am pleased that in response to my draft comments the DOH has indicated that their report will specifically identify stress as a public health issue. DOH has indicated that they "will explore approaches/metrics for evaluating stress (e.g., tracking prescription drug use)" and/or via modifications to the BRFSS.

Question 2: Additional mitigation measures beyond those identified in the SGEIS needed to address the potential health impacts of HVHF

Generally NY State has proposed a set of mitigation measures that, if successful would do much to address the potential impacts of HVHF. As noted in my general comments (above) I have broad concerns about the engagement and participation of the public in decision making going forward, as well as how the public's right-to-know can be addressed via making information available in real-time. In terms of more specific recommendations, and the DOH response to these recommendations:

1. Permitting decisions need to be informed by information about local impacts especially in areas that are difficult to model in the general case, for example in estimation and control of PM2.5 emissions, which can have serious local impacts.

2. Regional impacts on ozone formation also would need to be addressed over time. DOH indicates that it agrees with this point and that the issue is mentioned in the SGEIS.

3. As noted above, DOH indicates that noise will be recognized as a health hazard, measured, and mitigated to control health risks.

4. DOH has indicted that stress and stress-related health effects also will be identified as potential health hazards.

5. DOH indicates that it will address local traffic impacts as causing potential hazards, specifically, air emissions, increased noise, possibly increased stress and increased risk of unintentional injury.

6. I continue to think that specific communities could see local impacts on local public health and healthcare services as well as emergency medical services and first responders, and that this needs to be addressed proactively.

Question 3: Adequacy of existing and proposed environmental and health monitoring and surveillance systems to establish baseline health indicators and to measure potential health impacts

Generally, NY State has a strong public health surveillance system and the kind of expertise in this area that provides a strong foundation for a special surveillance effort such as the one outlined in the draft document: "Development of a Health Outcome Surveillance Program for High-Volume Hydraulic Fracturing in New York State". The basic elements of the system --near real-time surveillance, longer-term surveillance, and a public reporting mechanism -form a sound framework for such a program.

ESSS: The proposed use of the existing Electronic Syndromic Surveillance System (ESSS) seems appropriate. Covering hospital emergency department visits in most of the state, it would pick up unusual upticks in a number of health conditions and I would agree that the selection of respiratory, asthma and neurological
outcomes is a reasonable target for HVHF-related outcomes. I also think that it is reasonable for NY to incorporate new "flags" related to HVHF for detection of unusual numbers of Emergency Room (ER) visits. Additionally the plans for follow-up investigations also are reasonable.

I recommend that NY consider developing and articulating more explicit criteria for when additional actions will be taken in order to fully explicate statements like "unusual patterns or possible links are found". In response to this recommendation DOH indicates that if HVHF permitting is authorized in NYS then they would, a priori, more specifically define what is meant by "unusual patterns" or "possible links". In that case I also recommend that NY DOH obtain input both from scientific peer reviewer and stakeholders to increase the credibility and transparency of the effort.

Longer Term Tracking: The proposed longer term tracking effort is appropriate and builds on New York's existing surveillance capacity. I agree that this longer-term effort should be carried out in the absence of findings from the ESSS system since many health issues would not manifest themselves via time-related clusters of ER visits.

I recommended (and NY DOH indicates that they agree) an initial focus on outcomes with short latency periods, which would include birth outcomes (low birth weight, preterm birth, and birth defects) and hospital admissions for myocardial infarction and respiratory diseases. Cancer surveillance also is important but is a longer term effort. I also recommend monitoring changes in other risk factors for these outcomes, for example, downward trends in air pollution and smoking. As noted above ideally the NY DOH would have resources for follow-up studies.

Additional Surveillance: In addition to the above there are some additional steps that could be taken to enhance public health surveillance. First, ER surveillance could miss episodes where events are more spread out over time and/or where people either do not seek emergency room care. Second, NY DOH should be able to take advantage of existing routine environmental monitoring, especially of air and water pollutants.

I also recommended (and NY DOH agreed) systematic collection of physician and citizen reports of possible adverse health problems associated with HVHF. They also agreed with my recommendation to link traffic injury and mortality data as well as occupational injury data to GIS data on HVHF activities to spot opportunities to mitigate motor vehicle injury risks in association with HVHF activities. Finally, NY DOH indicates that they have intended that they would conduct analyses of air and drinking water data collected by other state and local agencies and provide surveillance summaries of levels and trends of pollutants associated with HVHF activities.

In closing, I recognize the truly impressive quantity and quality of work that has been performed to date by the NY DOH. I also realize that the above recommendations cannot be accomplished without the application of sufficient resources at multiple levels, from communities through the staff at the NY DOH. Thank you very much for the opportunity to peer review the draft SGEIS and the State DOH plans.

Very truly yours,

Lynn R. Goldman, M.D., M.P.H.
Dean

Enclosure
Dr Nirav Shah  
Commissioner, New York State Department of Health  
Los Angeles, CA 90095

Dear Doctor Shah:

Thank you for your request that I and two other independent health advisors review the materials that were provided to us on High-Volume Hydraulic Fracturing (HVHF) in New York State (NYS).

NYS has taken on a very difficult and important challenge. You and your colleagues have devoted considerable resources and hard work in confronting the health issues related to HVHF. These efforts are truly commendable and for this reason I agreed to perform my review on voluntary non-paid basis for NYS, and my comments are my own and are not those of my employer.

As noted in my Curriculum Vitae, I am a physician, a member of the U.S. Institute of Medicine, and have more than thirty years’ experience in environmental public health leadership at the federal and state levels. Given the importance of energy availability and reduction of petroleum imports, and the pervasiveness of the proponents’ advertising campaigns and political power, HVHF is likely to continue in the United States and worldwide. At the same time, HVHF is confounded by serious concerns about environmental degradation and worker and community health impacts. With such important and complex issues regarding HVHF, we are all burdened by inadequate federal health leadership and the paucity of useful federal health research in this area. HVHF is at a scale and impact that the need for a national Health Impact Assessment (HIA) has urgency.

All means of energy production have impacts on health, and these impacts can be substantial at the global, community, and personal levels and include risks to workers, consumers, and residential populations. This is true for the more conventional means of energy production—hydro, coal, petroleum, solar, natural gas. It is also true for HVHP operations.

The public is deeply concerned about HVHF as evidenced by the 80,000 public comments received during the preparation of the NYS SGEIS. The comments enumerated specific health concerns as well as profound worry about the community stress from these operations and impacts to the landscape and beauty of upstate New York. These “quality of life” issues were mentioned but to a lesser extent than quantified toxic exposures in the SGEIS
report. Yet such community impacts perdure; they can be multigenerational and small impacts multiplied by centuries become large.

Because of the unknown risks, NYS is appropriately cautious in the decision about HVHF. The following issues are to me the most important health questions about HVHF:

- Have all negative health impacts that can be reasonably anticipated been identified?
- Are public engagement and communication in the decision process adequate?
- Is there a commitment to HVHF process modifications based on experience in and outside NYS?
- Will effects of HVHF be recorded in real time and in ways that are publically accessible?
- Does NYS DoH possess the necessary authority to monitor HVHF?
- Are there qualified individuals and funding for the health accountability and advisory roles for HVHF?
- If NYS makes a decision to proceed with HVHF, will this occur in a careful phased-in rollout with aggressive health oversight?

The following are my observations and recommendations on issues related to health impacts and risk mitigation of HVHF:

**Air Contamination:** Physical threats to the environment and human health must be appropriately measured and communicated. Placement of real time analyzers at drilling sites is an effective way to monitor airborne threats such as hydrocarbon and greenhouse gas (GHG) emissions and release of pollutants, carcinogens, and neurotoxins into the air and water. At a minimum, testing for contamination of air as well as water must occur with appropriate frequency along with timely and real time notification of DoH and the public.

**Water Contamination:** On the issue of potential water contamination, the DoH’s responsibility for drinking water protection and the prohibition of certain drilling locations are appropriate. It does appear that the DoH will be notified of all permits. This information should be made available in a master information clearinghouse so all impacted parties will be notified as information is being developed.

**Noise Impacts:** Noise measurement and abatement are also necessary. In the SGEIS it appears that intermittent noise exposures are dismissed because they are transient; yet from a health standpoint noise poses a significant risk. For example, engine-brake noise from large trucks passing a school or health facility will be intermittent but disruptive and potentially harmful. It appears there are provisions to mitigate these exposures during the rollout period, and noise abatement measures must be continued.

**Radiation Exposure:** On the issue of radiation exposures, it appears that short term risks above background are not particularly evident. I cannot speak to long term risks and defer to Health Physicists. My experience as Director of CDC’s National Center for Environmental Health and in California as the State Health Officer is that Health Physicists are in short supply. I suspect that DoH could need additional health physicist staffing although I defer to DoH on this.

**Cumulative Risk:** It appears that acute health impacts of HVHF are well covered in the documents. The questions about chronic disease threats are more challenging and the answers more incomplete. It seems to me that appropriate worker and other human health protections are necessary and prudent given the uncertainty
about long term effects. The active monitoring of health impacts of HVHF appears to be proposed in the documents and is essential. There must be an ongoing and transparent “learn as we go” Health Impact Assessment.

**Notification of Risk:** The notification process related to environmental monitoring is important. While drilling firms and property owners will be notified of measured levels, some of the documents indicate cases where the DoH and Emergency Authorities “may” be notified or “should” be notified. From a public health perspective, DoH notification should not be optional or permissive. DoH will need to be involved at some point, and the sooner notification occurs the greater the ability to protect health and mitigate impacts. My experience in other settings such as refineries is that “real time” notification is essential. Delays in or failure to notify health authorities and the public should merit aggressive and increasing penalties.

**Worker Safety:** Workers are the persons most likely to be more exposed. If a site operator contracts or sub-contracts out work, as is often the case for some of the most dangerous work, the operator must still bear the responsibility to protect and train the workers and bear the liability when there are failures. I understand that enforcement authority in New York resides in federal programs; nevertheless worker protection is of great urgency. It is essential that DoH, the National Institute of Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), and other workplace health and safety personnel are able to carry out unannounced inspections and to issue stop-work orders in the presence of imminent hazard. Examples of imminent hazards include violations of the silica respiratory standard, standards for other hydrocarbons, and for noise.

**Community Health:** Health is more than the absence of disease as DoH staff knows well, and environmental health is more than the absence of toxic exposures. The walkability of communities is a legitimate health priority as is the protection of natural, scenic, and other environmental assets that promote physical activity by community residents. Rates of obesity and diabetes have lethally doubled in the last generation in the United States including New York State, and any development that reduces physical activity or encourages inactivity and unhealthy eating is a health threat. Factors that can discourage walking and biking and other outdoor activity, such as noise, odors, and heavy truck traffic that may be present with HVHF, present a real measurable health threat.

**Protection of Sensitive Populations:** On the issue of public protection, the DoH’s HIA now contains more explicit discussion of risks to sensitive populations, especially children and the elderly.

**Tracking documented illness:** In cases of human exposure, there must be prompt and professional medical evaluation and good recordkeeping of workers and others with documented illness. However, registries that track general and undocumented environmental exposures in my own experience are rarely a good investment of limited public health resources. These efforts quickly become financially and administratively untenable.

**Health Communication:** In earlier documents, there is reflected a misunderstanding of “health communication.” A fundamental tenet of health communication is that it is a two-way process involving listening as well as speaking. Yet in the SGEIS the term communication is misused to mean merely dispersing public information. This misunderstanding is not present in the DoH HIA. In addition, more clarification is needed about
how communication will occur and within what timelines. Notification should not be permissive but required. This discussion exemplifies the need for a central clearinghouse for collected data, including planned permits, site locations, drilling dates, discharges, exceedances, and human exposures or illnesses. The public has a “right to know” with appropriate confidentiality of personal protected information.

**Health Advisory Committee:** The report indicates that an external Health Advisory Committee is to be considered. I urge this most strongly. My experience is that elected officials view Advisory Committees with skepticism, however well-balanced committees of knowledgeable and respected persons of good will and courtesy work well in highly contended situations. Advisory Committees do require clear mission and task statements, as well as appropriate staffing and timelines, bylaws, membership rotation, and sunset dates.

**Full Accounting of Impacts:** It is important to fully consider potential impacts to local, county and state levels on both the positive and negative sides. “Boomtowns” have inherent social and public health threats, and these negative effects must be mitigated. HVHF needs to create more health benefits than health negatives. This goes back to my original observation that all means of energy production (particularly old coal-fired power plants) are associated with negative health impacts. Ongoing data to better evaluate benefits are needed.

**Sufficient Funding:** I believe the resource impacts of HVHF on DoH and local health jurisdictions will be substantial. In similar situations of great public concern at CDC we were obliged to assign individuals to regional offices to track concerns. Resources may include health educators, information managers, toxicologists, chemists competent in biomonitoring, industrial hygienists, GIS specialists, occupational health experts, syndromic and sentinel events surveillance, local assignees and clerical staff. My experience is that elected officials often publically promise funding and staffing for roles while the actual funding does not occur or is quietly redirected to other areas.

**Phased Rollout with Health Impact Assessment (HIA):** The 2011 report on HIA by the National Academy of Sciences Committee that I chaired took a team of experts 18 months to develop. Our Committee asserted that traditional Environmental Impact Assessments (EIAs) are often focused on non-human impacts within an engineering and regulatory framework and too often give little attention to personal or population health. In general, the Committee found that large scale projects and programs with a strong likelihood of human health impacts should be subject to rigorous HIA that is consonant with the National Environmental Policy Act (NEPA). HVHF is precisely the kind of activity to which HIA should be applied. I believe the current DoH HIA (Dec 7, 2012 version) enumerates the issues and concerns well. If the policy decision in NYS is to proceed with HVHF, the need for an HIA is not moot, rather what is needed is an aggressive “learn as you go” HIA during a carefully phased rollout.

**In conclusion:** With the increasing pressure for HVHF in NYS, if it is approved, it creates a need to assure long term health benefits. The history of extraction industries with their boom and bust cycles can be dealt with wisely if the good of the public overall is the goal and there is strong regulation. These comments are not an endorsement of HVHF; they reflect my belief that the NYS DoH Public Health Review that was updated and sent to me on December 7, 2012, reflects substantial “due diligence.”

Thank you for the chance to review such an important health issue.
Respectfully submitted,

Richard J. Jackson, MD, MPH, FAAP
Professor and Chair of Environmental Health Sciences