

Since submission of our 2012 Recommendations, we have done further legal research and policy analysis concerning the issue of the trade secret exemption to disclosure of hydraulic fracturing fluids. We have come to share the view that there is no sound legal or policy justification for permitting companies to claim, or for NYSDEC to honor, any trade secret privilege with respect to hydraulic fracturing and gas production operations. Indeed, the State of Alaska has just proposed a new disclosure rule that eliminates trade secret protection.<sup>16</sup>

NYSDEC's response to the comment requesting full disclosure, *i.e.*, no trade secret exemption, was incomplete. NYSDEC stated that: "Existing state law, [Public Officers Law ("POL")] 87(2)(d), recognizes the right of persons who submit information to the Department to request that such information be exempted from public disclosure if the information qualifies as a trade secret." [Response 6116]. Although persons may request this protection, the statute does not require that agencies honor such requests. The cited section of the statute provides that: "Each agency *shall*, in accordance with its published rules, make available for public inspection and copying all records, except that such agency *may* deny access to records or portions thereof that: . . . (d) are trade secrets . . . which if disclosed would cause substantial injury to the competitive position of the subject enterprise." POL § 87(2)(d) (emphasis added). Courts have appropriately summarized these exemptions in discretionary language, explaining, for example, that records meeting the exemption are "*not required* to be disclosed and *may* be redacted."<sup>17</sup> Moreover, the Revised Proposed Regulations governing disclosure will not require disclosure of any formulae for the additives or other information that ordinarily might qualify for protection. Although NYSDEC's own Records Access Regulation (6 NYCRR § 616.7) presently does require the Department to exempt qualified trade secrets from disclosure, as summarized in Response 6116, the Department can and should amend this regulation to abrogate trade secret protection in the context of hydraulic fracturing fluid constituents.

At a minimum, NYSDEC should amend 6 NYCRR § 616.7 to provide for immediate disclosure of trade secrets to emergency and health professionals when such information will assist these professionals in their duties. [See Joint Legal Comment at 19; see also Comment 6125]. Colorado, for example, requires disclosure of otherwise confidential or trade secret information in these circumstances.<sup>18</sup> Such disclosure is necessary because, for instance, if the identities of certain chemicals are withheld, physicians may be unaware of certain chemicals to which a patient may have been exposed. This may make it difficult or impossible to accurately diagnose and treat the patient, or to understand the interactive effects that chemicals can have on a patient's health. Because complete information is necessary to "ensure that acute exposures are handled appropriately and to ensure that surveillance programs are optimized," the Pediatric Environmental Health Specialty Units, a network of experts in children's environmental health, have recommended full disclosure of all chemical information.<sup>19</sup>

In responding to comments regarding disclosure to emergency responders, NYSDEC observed that section 616.7(b) "does not provide for the disclosure of trade secret information by the Department in the

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<sup>16</sup> See <http://doa.alaska.gov/ogc/heard/HydraulicFrac.pdf>.

<sup>17</sup> *Prof'l Standards Review Council of Am. Inc. v. New York State Dep't of Health*, 193 A.D.2d 937, 940, 597 N.Y.S.2d 829, 831 (1993) (emphasis added).

<sup>18</sup> 2 Colo. Code Regs. § 404-1:205A(b)(5).

<sup>19</sup> Pediatric Environmental Health Specialty Units, *PEHSU Information on Natural Gas Extraction and Hydraulic Fracturing for Health Professionals* 3 (Aug. 2011), available at [http://aocc.org/pehsu/documents/hydraulic\\_fracturing\\_and\\_children\\_2011\\_health\\_prof.pdf](http://aocc.org/pehsu/documents/hydraulic_fracturing_and_children_2011_health_prof.pdf).

event of non-routine incidents or emergencies.” [Response 6125]. An appropriate solution, if NYSDEC chooses to protect trade secrets regarding fluid constituents generally, is for the NYCRR to simply specify that section 616.7 does not apply when disclosure of hydraulic fracturing fluid constituents is necessary to allow an emergency or health professional to discharge their duties. As section 616.7 is NYSDEC’s own regulation, NYSDEC has the authority to craft exemptions thereto. Alternatively, NYSDEC could compel well operators to provide this information directly to emergency and health professionals when warranted. Section 616.7, as currently drafted, poses no barrier to this option. Of course, these options are not mutually exclusive, and by adopting both concurrently, NYSDEC would ensure that emergency and health professionals would be able to secure needed information from whichever entity was able to respond most quickly.

If NYSDEC maintains any exemption to disclosure for trade secrets, which we recommend strongly against, NYSDEC must ensure that the exception from disclosure remains narrow and is stringently enforced. As New York courts have explained, under the POL provisions at issue “there is ‘a broad standard of disclosure upon the State and its agencies’, with exemptions to be construed narrowly.”<sup>20</sup> To be exempt from disclosure, it is not enough that a purported trade secret provide some advantage to the controlling entity – the entity must affirmatively show, in its initial claim for secrecy, that “disclos[ure] would likely cause substantial injury to the competitive position of the subject enterprise.”<sup>21</sup> Stringent enforcement of this standard is crucial because, as other states’ experience demonstrates, failure to construe the exemptions narrowly can lead to the granting of unwarranted claims of trade secrecy. For example, in Wyoming, many companies have sought and received trade secret protection on the basis of vague and unsupported assertions of competitive harm. Here, if NYSDEC exercises its discretion under the Public Officers Law to exempt trade secrets from disclosure, NYSDEC must ensure that it will have sufficient resources in place to review the legitimacy of any claims of trade secrecy at the time the information is submitted. If NYSDEC instead waits until a member of the public challenges a claim of trade secrecy to review whether the exemption is appropriate, this will defeat the underlying purpose of the rule requiring prior public disclosure of hydraulic fracturing fluid constituents generally. For example, by the time a member of the public succeeds in challenging an unwarranted claim of trade secrecy, it is likely that the fracturing job will already have occurred (absent an expensive and uncertain effort to secure immediate injunctive relief), eliminating the possibility of baseline testing for the undisclosed ingredients. The regulations should also make clear that the Department’s determination to afford trade secret protection to a disclosure is itself subject to review in any appeal under Part 616.

**Recommendations:** NYSDEC should require full public disclosure of all relevant information, including but not limited to the composition, concentration, and chemical identities of all hydraulic fracturing fluids. 6 NYCRR §§ 560.3(d)(2)-(3) and 560.5(h)(2)-(3) should be deleted, and 6 NYCRR § 616.7 should be amended to make information disclosed pursuant to 560.3(d)(1) ineligible for trade secret protection. Specifically, 6 NYCRR § 616.7(b)(1) should be amended as follows:

*Except for information submitted pursuant to 6 NYCRR § 560.3(d) or 6 NYCRR § 560.5(h), information submitted as provided in subdivision (a) of this section shall be excepted from disclosure and be maintained apart by the department from all other records until 15 days after the entitlement to such exception has been finally determined by the department or such further time as ordered by a court of competent jurisdiction. Pursuant to paragraph (d) of subdivision*

<sup>20</sup> *New York State Elec. & Gas Corp. v. New York State Energy Planning Bd.*, 221 A.D.2d 121, 124, 645 N.Y.S.2d 145, 147 (1996) (quoting *Capital Newspapers Div. of Hearst Corp. v. Burns*, 67 N.Y.2d 562, 565-66, 505 N.Y.S.2d 576, 496 N.E.2d 665)

<sup>21</sup> 6 NYCRR § 616.7(a)(4).

(2) of section 87 of the Public Officers Law, the department will decline to exempt from disclosure any trade secret or confidential commercial information submitted pursuant to 6 NYCRR § 560.3(d) or 6 NYCRR § 560.5(h).

In the event that NYSDEC continues to allow for the claiming of trade secret protection, NYSDEC should make two critical additions to the proposed regulations.

First, a provision should be added providing for an appeal of the denial of access to records on the basis of trade secret protection. Specifically, a new subsection 6 NYCRR §§ 560.3(d)(4) should be added (with the existing subsection (4) renumbered as subsection (6)) that reads as follows:

*(4) When a request for trade secret protection is made, the owner or operator or other persons who supply information pursuant to paragraph (1) [(ix) and/or (x)] of this subdivision shall submit both redacted and un-redacted versions of the application or report containing the information for which trade secret protection is requested. Until a grant or denial of the trade secret protection request has been made by the department, the redacted version shall be used for purposes of public disclosure and in response to requests for information received by the department pursuant to Part 616 of this Title. A person whose request to inspect or copy a public record is denied, in whole or in part, because of a grant of trade secret protection may file an appeal with the Public Access Officer in accordance with 6 NYCRR § 616.28 for the purpose of reviewing whether the department properly determined that the trade secret protection should be granted.*

Second, NYSDEC should allow for immediate disclosure of hydraulic fracturing fluid contents to medical professionals and first responders. Medical professionals require full access to information on what their patients may have been exposed to, and in what concentrations, for diagnosis and treatment. First responders need access to all information related to well stimulation in order to appropriately respond to accidents and emergencies. A number of state hydraulic fracturing rules include provisions allowing medical professionals and first responders to obtain trade secret information. These states include Arkansas, Colorado, Montana, Ohio, Pennsylvania and Texas. New York must also ensure that all information is accessible to these parties. To ensure that information is provided without delay, medical professionals and first responders should be allowed to obtain the information either from the Department or the operator.

Specifically, a new subsection 6 NYCRR §§ 560.3(d)(5) should be added that reads:

*(5) Notwithstanding any other provision of this subdivision, any health professional or emergency responder who states a need for disclosure of information submitted pursuant to this subdivision in order to respond to an emergency situation shall be provided such information immediately even if otherwise exempt from disclosure as trade secret or confidential commercial information. Any such health professional or emergency responder may share such information with the affected patient and with any other health professionals involved in the diagnosis and treatment of that patient. In such an emergency situation the information shall be available from both (1) the applicable operator, supplier, or vendor, and (2) the department. In a non-emergency situation, any health professional or emergency responder who states a need for disclosure of information submitted pursuant to this subdivision in order to treat a patient may obtain such information from the department even if otherwise exempt from disclosure as trade secret or confidential commercial information, if, after 10 days or less if the professional considers such information necessary to perform their duties, reasonable efforts to obtain the*

*information immediately from the operator, supplier, or vendor, have been unsuccessful. No provision of 6 NYCRR § 616.7 shall limit the disclosure provided for by this subsection.*

Lastly, all of the information identified in other sections as information that should be disclosed publicly should be posted on a portion of the NYSDEC's website that is available for public review, as amended by our specific recommendations on those sections, including the information required to be provided under 6 NYCRR §§ 550.3(az); 551.1(a); 552.1(b); 553.4(a); 554.7; 555.5; 556; 560.3(a)-(d); 560.3(e)(5); 560.5(a)-(c), (d)(3), (e)-(h); 560.6(c)(3), (4), (10)(x), (11), (13), (15), (21), (22), (26)(ix); 560.7(g), (i), (k), (l); 750-3.6(d), (e); 750-3.7(k)(4), (o); 750-3.8; 750-3.12(f).

### 6 NYCRR § 560.3(e) Denial of Permits for Bad Actors

**Revised Proposed Regulation:** The revised proposed regulations do not expressly contain a provision by which NYSDEC may deny permit applications based on an applicant's history of violations.

**Previous Comment and Response:** Our 2012 Recommendations suggested that NYSDEC revise its regulations to include provisions similar to those under UPA regulations, which give NYSDEC the right to deny, suspend, modify, or revoke permits for cause. [Joint Legal Comments at 26.] NYSDEC did not respond to this comment. Considering the extremely small penalties that may be assessed against violators of the oil and gas law and regulations, in the absence of such provisions NYSDEC cannot adequately protect New Yorkers against companies that engage or have engaged in the past in repeated violations of those laws and regulations.

**Recommendation:** NYSDEC should revise its regulations to include provisions similar to those promulgated under the UPA, 6 NYCRR § 621.13, which give NYSDEC the authority to deny, suspend, modify, or revoke permits for, *inter alia*, materially false statements, failure to comply with permit conditions, or exceeding the scope of the permitted project.

### 6 NYCRR § 560.3(e)(5) Public Comment on HVHF Applications

**Revised Proposed Regulation:** NYSDEC has proposed a new subsection 6 NYCRR § 560.3(e)(5) to require a public notice period of at least 15 days after publication of a draft HVHF permit in the ENB. The proposed regulations do not specify any required information for such notice. Nor do they specify how a copy of the draft well permit would be made available to the public, other than to require that a copy be published on a publicly available website.

**Prior Comment and Response:** In our 2012 Recommendations, we commented on the lack of opportunity for public involvement in HVHF permit applications and called for a 30-day public review period. [Joint Legal Comments at 23-24.] We strongly support the inclusion of public review provisions for HVHF permit applications in 6 NYCRR § 560.3(e)(5). However, the 15-day period that this subsection provides is insufficient to guarantee meaningful public involvement in the permitting process. NYSDEC has provided no justification for requiring only a 15-day public review period rather than the 30-day period found in other parts of ECL Article 23, such as in § 23-0503(3). Moreover, the public notice provision in this subsection does not specify what information must be included in the ENB notice. NYSDEC should adopt the UPA regulatory requirements with respect to the content of the ENB notice. As required by 6 NYCRR § 621.7(b)(6), this subsection should provide that the ENB notice contain:

*(1) The applicant's name; (2) A brief description of the proposed project and its location; (3) A list of all department permits for the project for which application has been made, and*

*identification numbers for those applications; (4) The name and telephone number of the department representative and, where applicable, of any lead agency representative to contact for further information; (5) The status of environmental reviews conducted under SEQR . . .*

Notice in the ENB alone is insufficient to alert key stakeholders of the pending HVHF permit application. Residents who would be most affected may not be aware of such an application or the publication of the draft permit, especially given the short timeframe provided for public comment. The UPA regulations provide that the Department may require the applicant to provide other reasonable notice of a complete application, such as distribution or posting of information, public information meetings, or translation of notices for non-English speaking communities. 6 NYCRR § 621.7(e). The regulations further require that a notice of complete application be provided to agencies which have jurisdiction to fund or to approve or are directly undertaking the project; agencies with which the Department is required to consult prior to its determination of completeness, including but not limited to those responsible for historic preservation and costal management; and any person on a mailing list, developed by the Department, of persons interested in such projects. 6 NYCRR § 621.7(i).

In addition, providing for publication of the draft well permit on “a publicly available website,” without specifying that the publication will be on NYSDEC’s website, does not ensure that the draft well permit will be easily reviewable by the public. Without reasonable and timely access to the permit application and supporting documentation, including the draft permit, the public cannot assess the accuracy of those documents nor comment meaningfully on the application within the time frames provided.

**Recommendation:** NYSDEC should amend 6 NYCRR § 560.3(e)(5) to provide for a 30-day comment period consistent with that required by ECL § 23-0503(3), and incorporate the language of 6 NYCRR § 621.7(b) specifying the information required in the ENB notice. NYSDEC also should post the permit application and all supporting documentation, including a copy of the draft permit, on the Department’s website. Finally, notice of a complete permit application and a copy of the draft permit should be provided to all authorities listed in 6 NYCRR 621.7(i), as well as to the municipal and county chief executive officers and all residents and property owners of the spacing unit in which HVHF operations would take place.

#### 6 NYCRR § 560.3(e) Public Hearings for HVHF Permits

**Revised Proposed Regulation:** New subsection 6 NYCRR § 560.3(e) does not provide for public hearings.

**Prior Comment and Response:** In our 2012 Recommendations, we commented on the lack of public involvement in HVHF permit applications and called for a 30-day public review period. [Joint Legal Comments at 23-24.] We support NYSDEC’s inclusion of public review provisions for HVHF applications in 6 NYCRR § 560.3(e), but strongly recommend that NYSDEC include a provision in this subsection that affords the same opportunity for a public hearing provided for by 6 NYCRR § 553.4 in the case of an application for a permit and spacing variance. Controversial applications for draft permits may raise substantive and significant issues that should be the subject of a public hearing. NYSDEC should specify that this hearing decision and process will be governed by the UPA and its implementing regulations at 6 NYCRR § 621.8. NYSDEC has not provided any justification as to why it should not afford the opportunity for public hearing on HVHF permit applications in the same manner that it does for variance applications.

**Recommendation:** NYSDEC should revise 6 NYCRR § 560.3(e) to include a hearing provision similar to that proposed in 6 NYCRR § 553.4(b) and specify that the determination to hold a hearing and the hearing process be governed by the UPA and its implementing regulations at 6 NYCRR § 621.8.

### 6 NYCRR § 560.3(e)(7) Applications for Permitting of Additional Wells

**Revised Proposed Regulation:** NYSDEC has proposed a new subsection 6 NYCRR § 560.3(e)(7) which provides:

*Unless otherwise required by law, applications for the permitting of additional wells on a well pad associated with any well that has already been granted a permit pursuant to this Part shall not be subject to the public notice or comment period provided for under this section.*

We disapprove of NYSDEC's proposed addition to 6 NYCRR § 560.3, which does not require public notice and comment for draft HVHF permits for additional wells on a well pad. NYSDEC has not justified this provision, which allows HVHF operators to drill multiple wells on a well pad without notifying the public or providing the opportunity to comment on each well.

The public should have the opportunity to comment on the draft permit with an understanding of the additional wells and well locations that will be authorized under that permit. In addition, NYSDEC should have an opportunity to prepare for additional wells before HVHF operations commence, to make certain that it has the regulatory and enforcement resources and staff in place to handle the number of wells that may be permitted.

**Recommendation:** NYSDEC should revise 6 NYCRR § 560.3(e)(7) to require that an HVHF operator's first application for a HVHF permit identify all wells intended for a well pad. Any wells not previously identified in an application should be subject to the notice and comment provision of 6 NYCRR § 560.3(e)(5), modified as recommended by our comments on that subsection.

### 6 NYCRR § 560.4 Setbacks

**Revised Proposed Regulation:** NYSDEC did not improve the setback requirements for HVHF wells at 6 NYCRR § 560.4 as requested by many commenters.

**Prior Comment and Response:** NYSDEC received public comment that overwhelmingly requested increased setback distances for HVHF wells. [See Comments 3826, 3837, 3842, 3843, 4407, 4409, 6099, 6126, 6127, 6128, 6129, 6130, 6131, 6132, and 6133]. The only opposition to the setback distances was from IOGA [Comment 6136], but as explained below in our comments on 6 NYCRR § 560.4(c), IOGA's request to reduce or waive setbacks was not scientifically, technically, or statistically supported.

As explained in our extensive setback comments provided above on 6 NYCRR § 553.2, we requested increased setback distances for all oil and gas wells in NYS, including HVHF wells. Our setback comments on 6 NYCRR § 553.2 also apply to 6 NYCRR § 560.4, and they are listed here again for completeness.

NYSDEC responded that it increased the well setback to 500' for HVHF wells located near inhabited private dwellings and places of assembly, which is an improvement over the existing setback requirements of 100' and 150' respectively; however, NYSDEC did not apply the 500' standard to all wells. Nor did NYSDEC provide any scientific or technical analysis to justify its 500' distance, or to justify its decision not to increase any other surface setback distances despite extensive comment received on this topic from a number of commenters.

NYSDEC did not adequately address Comment 4231 that recommended that NYSDEC increase well setbacks for all wells, not just HVHF wells, to:

- 500' from homes and public buildings;
- 1,000' from homes whose owners did not sign a lease;
- 1,000' from schools;
- 2,000' from any water body; and
- 5,000' from residential and municipal water well sources.

NYSDEC did not adequately address Comment 7806 that recommended NYSDEC increase well setbacks for all wells, not just HVHF wells, to:

- 3,000' from any stream, river, other body of water or private water well; and
- ¼ mile setback from public buildings, as California does, to account for air quality impacts.

NYSDEC did not acknowledge or respond to our 2012 Recommendations on surface setbacks at all. Specifically, the Harvey Report Recommendations Nos. 61-72 proposed that NYSDEC complete the following scientific and technical assessment and establish improved surface setbacks for all wells in NYS, not just HVHF wells.

- **Recommendation No. 61:** The SGEIS should provide scientific and technical justification for each setback distance proposed to demonstrate how that distance is protective of the nearby sensitive receptor. A hazard identification analysis should be completed to assess the safe distance from human and sensitive environmental receptors to proposed shale gas drilling and HVHF operations. The analysis should assess blowout radius, spill trajectory, explosion hazards, other industrial hazards, fire code compliance, human health, agricultural health, and quality-of-life factors. Improved setbacks as a result of this analysis should be included in the SGEIS as a mitigation measure and codified in the NYCRR.
- **Recommendation No. 62:** The SGEIS and NYCRR should allow local zoning authorities to establish more protective setbacks than statewide regulations to address unique and site-specific local concerns and community characteristics. The ability to improve local setbacks should be included in the SGEIS as a mitigation measure and codified in the NYCRR.
- **Recommendation No. 63:** The process for revising the 500' setback from primary and principal aquifers and the 2,000' setback from a public water supply in two and three years, respectively, is unclear. NYSDEC should clarify the review process, including an explanation of its plans for public review and comment. NYSDEC should revise its regulations at 6 NYCRR § 617.4(b) to provide that the siting of any oil or gas well within 500' of a primary aquifer or within 2,000' of a public water supply is a Type I action.
- **Recommendation No. 64:** The SGEIS should examine whether waivers to the 500' private water well setback comport with federal law and the requirement to protect Underground Sources of Drinking Water (USDWs). The SGEIS should provide technical justification for any reduction in this setback, and should not allow a private well owner to reduce the setback such that it poses a risk to its water supply, as well as other user in the area. Private land owners should not be allowed to waive setbacks from private water wells and adversely affect the water quality of neighboring wells.

- **Recommendation No. 65:** Our 2012 Recommendations noted inconsistencies between the RDSGEIS and the proposed regulations concerning setbacks around lakes, rivers and streams. Those inconsistencies have since been resolved. In our comments on Revised Proposed § 750-3.3(a)(5), set forth below, we recommend a 500' setback from lakes, rivers and streams that are tributaries to a public water supply, beyond one mile. In our comments on Revised Proposed § 750-3.11(d), we recommend a 660' setback requiring individual SPDES coverage for perennial or intermittent streams that are not tributaries to a water supply. We reiterate that recommendation here.
- **Recommendation No. 66:** The 4,000' setback from NYC and Syracuse watersheds should be added to the proposed regulatory revisions for operations associated with HVHF at 6 NYCRR § 560.4. The SGEIS and NYCRR should also clarify if activities associated with HVHF drilling and completions will be prohibited underneath the watershed as well as on the surface.
- **Recommendation No. 67:** The setback increases proposed in the RDSGEIS should apply to all oil and gas drilling in NYS and should be codified at 6 NYCRR § 553.2.
- **Recommendation No. 68:** Improved setbacks should be included in the SGEIS as a mitigation measure and codified in the NYCRR. Specifically, the SGEIS and NYCRR should be revised at 6 NYCRR § 553.2 to include the following minimum setbacks: homes, public buildings, and schools (1,320'; ¼ mile); private and public wells, primary aquifers, and other sensitive water resources (4,000'); and other water resources (660'; 1/8 mile). In our comments on Revised Proposed §§ 750-3.3(a) and 750-3.11(d), we now recommend a 4000' setback from both primary and principal aquifers. We reiterate that recommendation here. Additionally, NYSDEC should clarify the authority of local zoning authorities to establish minimum setbacks that are more protective than NYS' minimum standards in order for localities to address unique and site-specific local concerns and community characteristics.
- **Recommendation No. 69:** The NYCRR should be revised at 6 NYCRR § 552.3 to allow the well location to be adjusted by 75' without a permit amendment only if all the statewide and local setback requirements are still preserved.
- **Recommendation No. 70:** We previously requested a setback of at least 100' from wetlands. We now recommend a wetland setback that is the same as the 300' buffer for wetlands provided for in 6 NYCRR § 750-3.11(d).
- **Recommendation No. 71:** The NYCRR should be revised at 6 NYCRR § 750-3.2, 6 NYCRR § 750-3.11(d), 6 NYCRR § 553.2, and 6 NYCRR § 560.4 to provide consistent setback requirements that are protective of water sources, including rivers, streams, lakes, and private water supplies.
- **Recommendation No. 72:** NYCRR and the SGEIS should clarify that setbacks are measured from the edge of the well site, as defined in Revised Proposed 6 NYCRR § 750-3.2(b)(52). Wells should be centered on the well pad and should be set back at least 100' from the pad edge, to maximize well setbacks from sensitive receptors.

The Myers Report also recommended that:

- NYSDEC examine existing setbacks to verify if they have been successful or whether increased setbacks are warranted;
- Wells be set back at least 4,000' from primary aquifers and public water supplies; and
- Well not be placed within the 500-year flood plain.



While NYSDEC stresses the importance of establishing setbacks, it does not provide any scientific or technical assessment to demonstrate that its proposed setbacks meet its own stated criteria. Instead, NYSDEC's reasoning behind its proposed setback distances is often uncertain or unspecified.

For example, NYSDEC states that it requires setbacks "to conservatively provide a margin of safety should the operational mitigation measures fail or not be implemented in a particular instance" and that "setbacks serve as a means of helping to prevent a spill from reaching and contaminating critical water resources. Depending on the scope of the setback (**the larger the distance the greater the protection**), a spill can potentially be contained, or sufficiently delayed before reaching the water source to reduce the potential impact." [Response 6136]. If these are NYSDEC's primary goals, then sites that are on a flowpath either downstream or downgradient from a gas well should be farther from the gas well than a site cross-gradient or upgradient from the gas well.

In general, NYSDEC does not respond to Commenters' concerns about setbacks with logic and reasoning – it just disagrees. For example, in response to Comment 3826 about the need for increased setback distances, NYSDEC writes: "*The Department does not agree that the commenter's proposed prohibitions are necessary. Existing Parts 550 – 559 regulations, the proposed Part 560 regulations and the prohibitions/restrictions found in the rdSGEIS provide adequate protections for the public drinking water supplies, and the environment. The presence of FIDs or faults does not mean these features are open and able to transmit fluids at depth.*" [Response 3826]. Here, NYSDEC simply asserts a disagreement and states that regulations are adequate without providing any reasoning. As for faults, some may not transmit fluids, but many do, and NYSDEC has chosen to ignore that possibility.

Additionally, NYSDEC's responses categorically dismiss increased setbacks stating that the work completed in the RDSGEIS was sufficient to support the setbacks. We disagree. For example, NYSDEC provides no basis for its decision not to include requirements for site-specific SEQRA determinations in regulation. [Response 3842]. A patchwork of requirements located in various documents will be difficult to administer, and for the public and industry to refer to and follow. We have repeatedly requested that NYSDEC consolidate all requirements applicable to all oil and gas operations into regulations so that the public and industry alike can refer to one document that contains a complete set of requirements.

NYSDEC's Response 6136 argues that setbacks "conservatively provide a margin of safety should the operational mitigation measures fail" and also worries that additional prohibitions "may lead to a waste of natural gas." We disagree that these setbacks are conservative. Moreover, we disagree that potential "waste of natural gas" is a valid basis for rejecting setbacks that are established to protect health, safety and/or the environment consistent with NYSDEC's primary mission. NYSDEC references setbacks required under others of its programs, but provides no facts or studies to demonstrate those setbacks are adequate.

Additionally, 6 NYCRR § 560.4 (a)(2) only requires a 500' setback from an "inhabited dwelling" or "place of assembly;" whereas, 6 NYCRR § 553.2 requires setback protection for more types of buildings and locations that could be inhabited, including "any public building or area which may be used as a place of resort, assembly, education, entertainment, lodging, trade, manufacture, repair, storage, traffic or occupancy by the public."

**Recommendation:** As explained in our extensive setback comments provided above on 6 NYCRR § 553.2, setback distances should be increased for all oil and gas wells in NYS, including HVHF wells. Our setback comments on 6 NYCRR § 553.2 and 6 NYCRR § 750-3.3(a) and 3.11(d) should also apply to 6 NYCRR § 560.4.

## 6 NYCRR § 560.4(c) Setback Variances

**Revised Proposed Regulation:** NYSDEC added a new proposed regulation at 6 NYCRR § 560.4(c) that grants the Department broad discretion to grant variances to the setback requirements at 6 NYCRR § 560.4(a)(1)-(2) and at 6 NYCRR § 750-3.3(a)(6).

*(c) The department may permit reasonable well location variances to the setback requirements in sections 560.4(a) (1), 560.4(a) (2) and 750-3.3 (a)(6) of this Title. Any such variance to the setback requirement of section 560.4(a) (1) or Section 750-3.3(a)(6) of this Title shall be subject to the written consent of the landowner or landowners whose residential water well, domestic supply spring, or water well or spring used for livestock or crops is located within 500 feet of the proposed well pad. Any variance to the setback requirement of section 560.4(a) (2) of this Part shall be subject to the written consent of the landowner of the inhabited dwelling or place of assembly within 500 feet of a well pad, and, in the case of an inhabited dwelling, the written consent of all tenant(s), if any. The applicant for a variance must show that there are no reasonable allowable alternative locations within the spacing unit where the well pad could be sited consistent with the setback requirements of this section and the well spacing requirements of Part 553 of this Title. In approving a variance, the department shall maximize the separation distance by granting the minimum variance that it deems necessary and adequate. The department shall have the authority to impose such reasonable and necessary conditions to minimize any adverse impact on the water supplies, inhabited dwellings or places of assembly within 500 feet of the well pad [emphasis added].*

**Prior Comment and Response:** Industry Comment 6136 from the Independent Oil and Gas Association (IOGA) requested:

*. . . broad waiver provisions be included in the regulations to allow setbacks to be waived by the Department for good cause shown based upon the application of superior technology [emphasis added].*

IOGA challenges NYSDEC's estimate that only 3% of the hydrocarbons will not be accessed using its proposed setbacks:

*Industry estimates that the cumulative impact of these prohibitions and setbacks will strand approximately 50% of the acreage that is prospective for shale development in New York State.*

We reviewed IOGA's January 11, 2012 comment to NYDEC in more detail to see if IOGA's claim of 50% was technically supported. We found that IOGA's comments (page 66) based its 50% claim on the analysis of one operator that reports it purchased 50-60% of leases in Chemung County in primary aquifer areas. IOGA does not provide any technical analysis of this single situation to show that "superior technology" could not be used to access the hydrocarbons under this one operator's acreage in a single NYS county. Nor does IOGA provide any scientific, technical or statistical analysis of all leases in NYS to support its claim that 50% of NYS's hydrocarbon resources would be stranded, based on this reported problem from one operator.

NYSDEC responded that:

*However, for now, the Department expects to implement the Part 560 prohibitions without discretion and does not have plans to incorporate a provision allowing variances from the prohibitions proposed in 560.4(a)(3)-(5). Note that proposed Part 560.4 has been revised to permit reasonable well location variances to the setbacks from certain private water wells, inhabited dwellings and places of assembly where written consent has been given by potentially affected landowners. [Response 6136].*

While we support NYSDEC's proposal not to grant waivers to the setback provisions at 6 NYCRR § 560.4(a)(3)-(5), we do not support NYSDEC's proposal to grant waivers to setbacks from "private water wells, inhabited dwellings and places of assembly where written consent has been given by potentially affected landowners" at 6 NYCRR § 560.4(a)(1)-(2) and at 6 NYCRR § 750-3.3(a)(6).

Our 2012 Recommendations opposed NYSDEC's proposal to allow landowners to waive setbacks,. See Myers Report at 24 and 28. Landowners should not be allowed to waive setbacks for short-term, personal financial gain, because such waivers place other humans and air and water resources at risk of adverse impacts.

Comment 4405 also opposed NYSDEC's proposal to allow landowners to waive setbacks, putting protected water resources at risk. NYSDEC did not provide a scientific or technical basis for dismissing Comment 4405, and only pointed generally to the RDSGEIS and ECL and regulations.

*The Department does not agree that a decision by the landowner to waive the 500-foot setback will endanger the water quality for the aquifer. The protections and requirements found in the rdSGEIS, Environmental Conservation Law, and Regulations provide protection to the aquifer and the environment. Likewise the Department does not agree that an attempt to waive the 500-foot setback should require that the action be classified as Type 1. [Response 4405].*

At a minimum, NYSDEC should have provided scientific and technical analysis to demonstrate that a reduction of the 6 NYCRR § 560.4(a)(1)-(2) and at 6 NYCRR § 750-3.3(a)(6) setbacks could be achieved and that there would not be a direct pathway for contaminant transport between the gas well and water resource or long-term human health or environmental impact; however, NYSDEC did not provide such an analysis.

**Recommendation:** The newly proposed waiver provision for setbacks at 6 NYCRR § 560.4(c) should be deleted in its entirety.

### 6 NYCRR § 560.5(a) Emergency Response Plan

**Revised Proposed Regulation:** NYSDEC added a new proposed regulation at 6 NYCRR § 560.5(a) requiring an emergency response plan (ERP). The requirement applies only to HVHF wells, includes an unspecified scope, and must be submitted only three days prior to spudding a well.

*6 NYCRR § 560.5(a) An emergency response plan containing elements specified by the department must be prepared by the owner or operator and kept on-site during any well operation from well spud through well completion. The well's name and number, its location in decimal latitude and longitude in North American Datum 83, the location of the access road entrance in decimal latitude and longitude in North American Datum 83 and a list of emergency contact numbers for the area in which the well site is located must be included in the emergency response plan, and such information must be*

*prominently displayed on a weatherproof sign at the well site during operations covered by the department-issued permit to drill, deepen, plug back or convert. A copy of the emergency response plan must be provided to the department at least three days prior to well spud [emphasis added].*

NYSDEC does not require the ERP to be approved by the Department for adequacy prior to drilling.

**Prior Comment and Response:** Our 2012 Recommendations requested that NYSDEC require improved emergency response planning. See Harvey Report Recommendations Nos. 100-102.

NYSDEC included a requirement for an ERP for HVHF wells but did not include all the elements recommended in our comments. And, while NYSDEC's proposed requirement for an ERP for HVHF wells at 6 NYCRR § 560.5(a) is an improvement and prescriptively lists some contents (e.g. well name, well number, GPS data, location of access road, and emergency phone numbers), it provides the Department with broad discretion to define (outside of regulation) the mandatory minimum requirements for an ERP. We do not agree that critical components of the plan should be left unspecified; this creates uncertainty for the public and industry alike.

Commenter 6137 also requested that the ERP content be specified. NYSDEC disagreed. [Response 6137].

Commenter 6138 opposed the short 3-day window for NYSDEC to review and approve an ERP, and recommended that the ERP be provided to and approved by local emergency response personnel and the town supervisor before the permit is issued. NYSDEC disagreed, stating that it had authority to suspend any permit, but never explaining how it could possibly review and approve a company's ERP, which typically is a large, complex document, in three days, especially when plans could arrive on a Friday or over a holiday. [Response 6173].

**Recommendation:** NYSDEC should revise 6 NYCRR § 560.5(a) to:

- Require a well blowout response plan (either included in the ERP or as a separate plan), a contract retainer with an emergency well control expert, and prearranged access to a relief well rig.
- Identify an ERP review, approval, and audit process to ensure that quality plans are developed, including adequately trained and qualified personnel, and the availability of adequate equipment.
- Require that, if local emergency response resources are relied on in the ERP, operators ensure the local personnel are trained, qualified, and equipped to respond to an industrial accident, and if such personnel are not available, operators should be required to provide their own industrial response equipment and personnel.
- Require NYSDEC audits of drills, exercises, equipment inspections, and personnel training.
- Require that the ERP be submitted to NYSDEC with the well application for review and approval prior issuing the permit to drill.

The information required to be submitted to the Department pursuant to 6 NYCRR § 560.5(a) should be made publicly available on NYSDEC.

### 6 NYCRR § 560.5(b) County Notification - Emergency Response

**Revised Proposed Regulation:** NYSDEC added a new proposed regulation at 6 NYCRR § 560.5(b) requiring the county emergency management office to be notified prior to spudding the well, flaring or HVHF operations. The regulation does not specify the advance notice time requirement, nor does it require the owner/operator to provide the county with a copy of its ERP required at 6 NYCRR § 560.5(a).

**Recommendation:** NYSDEC should revise 6 NYCRR § 560.5(b) to include a requirement that all local government offices and volunteer organizations that may be required to respond to an emergency be provided with a copy of the ERP upon submission to NYSDEC and be notified at least 7 days prior to spudding the well, flaring, or HVHF operations. This process will provide local emergency response teams time to get familiar with the site and emergency response procedures that might be required.

### 6 NYCRR § 560.5(c) Incident Notification

**Revised Proposed Regulation:** NYSDEC added a new proposed regulation at 6 NYCRR § 560.5(c) that requires incident reporting for “non-routine incidents” and proposes to require HVHF operations to cease after “non-routine incidents,” only to resume upon NYSDEC approval:

*6 NYCRR § 560.5 (c) Any non-routine incident of potential environmental and/or public safety significance during access road and well pad construction, well drilling and stimulation, well production, and well plugging that may affect the health, safety, welfare, or property of any person must be verbally reported to the department within two hours of the incident’s known occurrence or discovery, with a written report detailing the non-routine incident to follow within twenty-four hours of the incident’s known occurrence or discovery. Non-routine incidents of potential environmental and/or public safety significance may include, but are not limited to: casing, drill pipe or hydraulic fracturing equipment failures, cement failures, fishing jobs, fires, seepages, blowouts, surface chemical spills, observed leaks in surface equipment, observed pit liner failure, surface effects at previously plugged or other wells, observed effects at water wells or at the surface, complaints of water well contamination, anomalous pressure and/or flow conditions indicated or occurring during hydraulic fracturing operations, or other potentially polluting non-routine incident or incident that may affect the health, safety, welfare, or property of any person. Provided the environment and public safety would not be further endangered, any action and/or condition known or suspected of causing and/or contributing to a non-routine incident must cease immediately upon known occurrence or discovery of the incident, and appropriate initial remedial actions commenced. The required written non-routine incident report noted above must provide details of the incident and include, as necessary, a proposed remedial plan for department review and approval. In the case of suspended hydraulic fracturing pumping operations and non-routine incident reporting of such, the owner or operator must receive department approval prior to recommencing hydraulic fracturing activities in the same well. The department may issue an order to take appropriate actions consistent with this subdivision, including an order to cease all activities [emphasis added].*

**Prior Comment and Response:** Comment 3762 requested that NYSDOH also be notified of all non-routine incidents. NYSDEC disagreed. [Response 3762].

**Recommendation:** We support NYSDEC's requirement for industry to rapidly notify the Department of incidents and take immediate remedial action. In addition:

1. NYSDEC should notify nearby residents of all reported incidents.
2. NYSDEC should expand its requirement at 6 NYCRR § 560.5(c) to require cessation of all operations associated with all non-routine incidents of potential environmental and/or public safety significance, not just HVHF operations, and require Department approval to re-commence any operation (other than responding to the incident) at any oil or gas well.
3. The term “*anomalous pressure and/or flow conditions indicated or occurring during hydraulic fracturing operations*” should be further defined to specify what constitutes an anomalous pressure or flow.
4. The term “*non-routine*” should be deleted. The term “*incident*” followed by the clause “*of potential environmental and/or public safety significance*” is clear. The use of the term “*non-routine*” indicates “*routine*” incidents of potential environmental and/or public safety significance need not be reported to NYSDEC. All such incidents should be reported, although the timeframe for doing so may vary based on the magnitude of the incident.

#### 6 NYCRR § 560.5(d)(1) Water Well and Spring Testing Radius & Test Parameters

**Revised Proposed Regulation:** NYSDEC added a new proposed regulation at 6 NYCRR § 560.5(d)(1) that requires water well and spring testing:

*6 NYCRR § 560.5(d)(1) prior to site disturbance for a new pad or a new well spud for an existing pad, the **owner or operator must make all reasonable attempts, with the landowner's permission, to sample and test, at the owner's or operator's expense, all residential water wells, domestic supply springs, and water wells and springs that are used as water supply for livestock or crops, that are within 1,000 feet of the well pad for the parameters specified by the department, which at a minimum include barium, chloride, conductivity, gross alpha/beta, iron, manganese, dissolved methane and ethane, pH, sodium, static water level (when possible), total dissolved solids (TDS), and volatile organic compounds (VOCs), specifically BTEX. **If no wells or springs are available for sampling within 1,000 feet of the well pad, either because there are none of record or because any landowners within 1,000 feet of the well pad deny the owner or operator permission to sample their wells or springs, then the owner or operator must make all reasonable attempts, with the landowner's permission, to sample and test such water wells and springs within 2,000 feet for the parameters specified by the department.** The landowner of any water well or spring tested must be provided with a copy of the test results within 30 days of the owner's or operator's receipt of the results [emphasis added].***

**Prior Comment and Response:** NYSDEC did not respond to our 2012 Recommendation to require testing for specific hydraulic fracturing fluids planned for use, and toxic volatiles (benzene, toluene, xylenes). See Miller Report, Recommendation at 14. Dr. Miller wrote that “[t]he analytes that should be determined should include, at a minimum, the components of natural gas (methane, ethane, etc.) and also toxic volatiles from the formation water (benzene, toluene, xylenes), salts and relevant inorganic contaminants, **and the additive used during the hydraulic fracturing.**” Miller Report at 16 (emphasis added).

Comment 3764 requested that a specific list of test parameters be specified in regulation. NYSDEC agreed and included a proposed list in 6 NYCRR § 560.5(d)(1). [Response 3764].

In response to a suggestion that the test parameters be more inclusive, NYSDEC replied that operators could “include additional parameters at their discretion.” [Response 3764]. Additionally, NYSDEC responds that it could “specify additional parameters it may deem necessary on a site-specific basis” without providing guidance to the Department regarding additional parameters. [Response 6124].

Comment 6513 requested that all wells within a five-year transport zone around the proposed well should be located and included in the testing program and that dedicated monitoring wells also should be established within this zone and included in the testing program. NYSDEC responded that well testing will be used to investigate complaints from well owners, and that it may require a ground water monitoring program, but neither response provided any technical reasons to ignore the commenter’s request for well testing and a monitoring program in a 5-year transport zone. [Response 6513].

Comment 6146 indicated that wells should be tested based on the potential for contaminant migration, but, in lieu of that, requested wells to be tested to 2,500’ or 5,000’ from the proposed gas well. NYSDEC responded that a monitoring plan may be required at Part 750, but did not address the commenter’s recommendation to increase the testing radius. [Response 6146]. It should also be noted that the groundwater monitoring added to the Part 750-3 regulations applies only if the Department chooses to require it and also does not provide specifics as to what must be considered. See the discussion below.

Comment 3849 requested that qualified professionals and labs be used:

*Part 560.5(d) should specify in accordance with page 7-47 of the rdSGEIS that the water samples be collected by a qualified professional and analyzed utilizing a laboratory approved by the New York State Department of Health's Environmental Laboratory Approval Program, including the use of proper sampling and laboratory protocol, in addition to the use of proper sample containers, preservation methods, holding times, chain of custody, analytical methods, and laboratory quality assurance/quality control.*

NYSDEC responded that it did not include a requirement for qualified professionals and labs because it wanted the flexibility to change permit conditions included in the RDSGEIS over time, and didn’t want to be bound by this requirement in NYCRR. [Response 3849].

Comment 6147 requested that NYSDOH oversee and quality control the water testing program to ensure the use of certified procedures and a scientific, unbiased protocol. Comment 6148 requested independent third-party testing. NYSDEC responded that results will be provided to NYSDOH and a certified lab is required by the RDSGEIS, but did not explain why this requirement was not codified in NYCRR.

**Recommendation:** To optimize the sampling and monitoring regime, the operator or NYSDEC should complete a detailed contaminant transport analysis to identify the likely pathways for contaminant movement away from the well or well pad which would then be used to select wells and springs for sampling, as well as identify monitoring well locations as recommended in Part 750-3. In lieu of a detailed scientific analysis, NYSDEC could require sampling of wells within a mile of the well pad or a minimum of 1,000’ from any point along the horizontal wellbore where, whichever is greater.

Sampling from the vertical portion of the well ignores the potential for contamination away from the horizontal wellbore. Osborn found that water wells within a kilometer of Marcellus wells had significantly higher methane concentrations.<sup>22</sup> Myers found that vertical movement of fluids was possible from the area of the shale that receives a hydraulic fracturing treatment. Eventually, all wells that lie above developed gas plays may have a potential for contamination.

Proposed regulation 6 NYCRR § 560.5(d)(1) requires that the operator sample all wells and water supply springs within 1,000' of the gas well, and up to 2,000' of the gas well only if water wells within 1,000' are nonexistent or inaccessible. Sampling of nearby wells and springs is an important new requirement; but the sampling distance is insufficient. For one, it is unusual to require all wells and springs be sampled out to a radius of 2,000' only if no wells or springs could be found within 1,000'. In other words, NYSDEC suggests sampling is complete even if just one sample can be taken within 1,000' of the gas well; if that cannot be done, the operator must sample all sources within an additional area, the incremental area between 1,000' and 2,000', which is three times larger than the original area. If sampling all sources to 2,000' is proper, and it is, it should be the default and not the fallback position to use only if there are no wells to be sampled within 1,000'. However, we find the 1,000' and 2000' radii to be insufficient as described further in this section.

Proposed regulation 6 NYCRR § 560.5(d)(1) includes a prescriptive list of tests that need to be conducted on each water sample, which is an improvement. However, we find the required list of tests insufficient because it does not include contaminants that have been found at other sites and does not include test parameters that even industry groups recommend.

In Table 1 below, we compared the NYSDEC proposed list of test parameters to the list of contaminants potentially linked to hydraulic fracturing found in groundwater near Pavillion Wyoming,<sup>23</sup> and with parameters recommended by the Colorado Oil and Gas Association (COGA)<sup>24</sup> for testing. At a minimum, NYSDEC should include each of the testing parameters as mandatory minimum testing requirements at 6 NYCRR § 560.5(d)(1).

We support NYSDEC's proposal to include gross alpha/beta because of the potential for NORM in the formation water.

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<sup>22</sup> Osborn SG, Vengosh A, Warner NR, Jackson RB (2011) Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing. *Proceedings of the National Academy of Sciences* pnas:1100682108.

<sup>23</sup> DiGiulio DC, Wilkin RT, Miller C, Oberly G (2011) DRAFT: Investigation of Ground Water Contamination near Pavillion, Wyoming. U.S. Environmental Protection Agency, Office of Research and Development, Ada, OK

<sup>24</sup> Colorado Oil and Gas Association (COGA) 2011 Voluntary baseline groundwater quality sampling program, Example sampling and analysis plan, Developed in cooperation with the Colorado Oil and Gas Conservation Commission.



**Table 1:** The three columns indicate whether the constituent was either elevated or detected at Pavillion WY (DiGuilio et al 2011), recommended for sampling by COGA (2011), or recommended by NYSDEC in 6 NYCRR § 560.5(d)(1)

Constituent	Elevated concentration or detectable at Pavillion	COGA Listed	NYSDEC
pH	X	X	X
Specific conductance	X	X	X
Total Dissolved Solids		X	X
Alkalinity	X	X	
Bromide		X	
Barium			X (2)
Chloride		X	X
Sulfate		X	
Nitrate and nitrite (N)		X	
Phosphorus		X	
Arsenic	(1)		(2)
Boron		X	
Calcium		X	
Iron		X	X
Magnesium		X	
Manganese		X	X
Potassium	X	X	
Selenium		X	
Sodium		X	X
Strontium		X	
Gross alpha/beta			X
Methane	X	X	X
Ethane	X	X	X
Propane	X	X	
Benzene	X	X	X
Toluene	X	X	X
Ethylbenzene	X	X	X
Xylene	X	X	X
Trimethylbenzenes	X		
Isopropanol	X		
Diethylene glycol	X		
Triethylene glycol	X		
Tert-butyl alcohol	X		
Gasoline range organics	X		
Diesel range organics	X		
Naphthalene	X		
(1) Arsenic was noted in drilling fluids at Pavillion and was detected but not an exceedance in groundwater.			
(2) Arsenic and barium were found in wells at Dimock, PA <sup>25</sup>			

6 NYCRR § 560.5(d)(1) should be revised to:

1. Expand the minimum mandatory well and spring testing radius to one mile from the edge of the well pad or a minimum of 1,000' from any point along the horizontal wellbore where, whichever is greater.

<sup>25</sup> Memorandum: Request for Funding for a Removal Action at the Dimock Residential Groundwater Site, Intersection of PA Routs 29 and 2024, Dimock Township, Susquehanna County, Pennsylvania. From Richard M. Fetzer, Eastern Response Branch to Dennis P Carney, Hazardous Site Cleanup Division, January 19, 2012.

2. In lieu of the sampling wells and springs according to those distance requirements, the operator could perform a detailed contaminant transport analysis and sample all wells and springs within a five year travel time from the well. The analysis must account for the movement of gas as well as fluids.
3. Expand the minimum mandatory well and spring testing parameters, as described above.
4. Require an independent third party contractor to obtain and test the composition of the water samples prior to commencing any drilling or hydraulic fracturing operations. The independent third party contractor must be qualified to collect water samples, complete the required tests, and include as summary of its training, qualifications, quality control, quality assurance and chain of custody procedures in each report.

More specifically, the section 6 NYCRR § 560.5(d)(1) should be revised to read:

*Prior to site disturbance for a new pad or a new well spud for an existing pad, the owner or operator must make all reasonable attempts, with the landowner's permission, to sample and test, at the owner's or operator's expense, all water wells, domestic supply springs, and water wells and springs that are used as water supply for livestock or crops, that are within one mile from the edge of the well pad or a minimum of 1,000' from any point along the horizontal wellbore where, whichever is greater.*

*Alternatively, the operator may submit a detailed contaminant transport analysis to show how far a conservative (non-reactive) contaminant could be transported within five years and sample all water sources within that potentially affected area.*

*The sampling should include the following parameters specified by the department, which at a minimum include: static water level (when possible) pH, specific conductance, total dissolved solids (TDS), alkalinity, bromide, barium, chloride, sulfate, nitrate and nitrite (N), phosphorus, arsenic, boron, calcium, iron, magnesium, manganese, potassium, selenium, sodium, strontium, gross alpha/beta, methane, ethane, propane, benzene, toluene, ethylbenzene, xylene, trimethylbenzenes, Isopropanol, diethylene glycol, triethylene glycol, tert-butyl alcohol, gasoline range organics, diesel range organics, naphthalene and other polycyclic aromatic hydrocarbons (PAHs), and all other chemicals planned to be used in hydraulic fracturing operations or drilling.*

*An independent third party contractor must be used to obtain and test the composition of the water samples prior to commencing any drilling or hydraulic fracturing operations. The independent third party contractor must be qualified to collect water samples, complete the required tests, and include as summary of its training, qualifications, quality control, quality assurance and chain of custody procedures in each report.*

*The landowner of any water well or spring tested must be provided with a copy of the test results within 30 days of the owner's or operator's receipt of the results.*

## 6 NYCRR § 560.5(d)(2) Water Well and Spring Testing Intervals and Restoration or Replacement of Affected Water Supplies

**Revised Proposed Regulation:** NYSDEC added a new proposed regulation at 6 NYCRR § 560.5(d)(2) that requires water wells and springs to be tested at unspecified intervals subject to broad NYSDEC discretion, and requires reporting of “significant” deviations from baseline compositions:

*(2) the owner or operator must sample and test residential water wells and springs in the same manner as provided in paragraph (1) of this subdivision, at other intervals specified by the department after the well reaches total measured depth specified on an application for a permit to drill. Any and all significant deviation(s) from the baseline compositions must be reported to the Department within 5 business days of determining any such deviation [emphasis added].*

**Prior Comment and Response:** In our 2012 Recommendations, we argued strongly for a dedicated groundwater monitoring system (Myers Report at 17-19) and for routine testing of water wells for at least 20 years after a nearby well is constructed (Miller Report, Recommendation 14). See also our comments at 6 NYCRR § 750-3.7(o) pertaining to the need for mandatory dedicated ground water monitoring systems.

Comment 3779 pointed out that the proposed well testing intervals at 6 NYCRR § 560.5(d)(2) were inconsistent with Section 7.1.4.1 Private Water Well Testing of the RDSGEIS.

*Part 560.5(d): Water well testing appears to deviate from section 7.1.4.1, Private Water Well Testing of the rdSGEIS. Section 7.1.4.1 outlines a schedule where the operator would have all identified residential water wells within the area of concern sampled and analyzed prior to the commencement of drilling for each well on a pad; sampled and analyzed three months after each well has reached total measured depth (TMD) if there is to be a hiatus greater than three months between reaching TMD and the next applicable milestone; and sampled and analyzed three months, six months, and one year after the conclusion of hydraulic fracturing operations of each well on the pad. 560.5(d) Water well testing only proposes sampling and analysis be completed prior to well spud (paragraph (1) and "at other intervals specified by the department after the well reaches total measured depth" paragraph (3)). When a primary concern surrounding the high-volume hydraulic fracturing process is the potential contamination of residential water wells, it is imperative the regulations adopt the recommendations of the rdSGEIS and plainly state its schedule for sampling and analyzing.*

NYSDEC responded that it wanted the flexibility to change permit conditions included in the RDSGEIS over time, and didn't want to be bound by this requirement in NYCRR.

*The Department acknowledges that in some cases the rdSGEIS is more detailed than a proposed regulation. Mitigation measures contained in the Final SGEIS will be required and enforced as permit conditions. This provides flexibility for other approaches to be implemented as operators and the Department gain experience. While the rdSGEIS reflects those approaches that the Department has determined would effectively achieve an environmental objective, there may be other ways to accomplish the same objective that exist now or that will be developed as technology advances. The Department always has the option to propose additional regulations should a specific approach to a given*

*objective become standardized or be deemed the only acceptable alternative.* [Response 3779].

**Recommendation:** 6 NYCRR § 560.5(d)(2) should be revised to:

1. If there is a dedicated monitoring plan pursuant to 6 NYCRR § 750-3.7(o), which we recommend be included as a mandatory requirement pursuant to our comments at Part 750, water wells and springs should be sampled and tested within three months after well spud, and annually thereafter. Well and spring testing should continue for 20 years after the hydrocarbon well has been plugged and abandoned.
2. If there is no a dedicated monitoring plan (we recommend against this option pursuant to our comments at Part 750), water wells and springs should be sampled and tested within three months after well spud, and quarterly thereafter. Quarterly testing should continue for at least two years after all the wells have been drilled on a well site; then testing frequency can be reduced to annually thereafter. Well and spring testing should continue for 20 years after the hydrocarbon well has been plugged and abandoned.
3. Increase testing frequency if contamination is observed.
4. Provide specific criteria for what constitutes a significant deviation from a baseline composition. Typically, a significant deviation may be considered as a certain percent of the mean established over a specified time frame. Ideally, it would be more than one standard deviation determined from a mean of eight quarterly samples. If it is not possible to establish a baseline over that time period, and NYSDEC recommends using just one sample collected prior to well spud, it is common to use 25% of the baseline, or simply the presence of any parameter that was not observed during baseline sampling.
5. Include a requirement to take immediate action to notify affected landowners and water well and spring users of significant deviation from a baseline composition.

More specifically, 6 NYCRR § 560.5(d)(2) should be replaced with the following:

*The owner or operator must sample and test residential water wells and springs in the same manner as provided in paragraph (1) of this subdivision at the following intervals or other, more frequent intervals specified by the department after the well reaches total measured depth specified on an application for a permit to drill:*

*(i) if there is a dedicated monitoring plan pursuant to 6 NYCRR § 750-3.7(o), residential water wells and springs shall be sampled and tested within three months after each well is spud, and annually thereafter. Subsequent to that period, sampling and testing should occur annually and continue for at least twenty years after the final well on the pad has been abandoned properly.*

*(ii) if there is no dedicated monitoring plan, residential water wells and springs shall be sampled and tested within three months after each well is spud, and quarterly thereafter. Subsequent to that period, sampling and testing should occur annually and continue for at least twenty years after the final well on the pad has been abandoned properly.*

*(iii) if at any time one or more of the parameters being monitored increases or otherwise deviates more than 25% from baseline, or is detected in the case of parameters which had been non-detect*

*during baseline sampling, the sampling frequency shall be increased to monthly if the frequency was quarterly and to quarterly if the frequency had been decreased to annually. Where the testing frequency has been increased from yearly to quarterly, if two consecutive quarterly reports demonstrate more than a 25% increase of baseline for one or more of the monitored parameters, the testing frequency shall increase to monthly.*

*Any and all deviation(s) from the baseline compositions as described in subsection (d)(2)(iii) of this section must be reported to the department and to all affected landowners and water well and spring users within 5 business days of determining any such deviation and provide copies of subsequent quarterly or monthly testing reports required at subsection (d)(2)(iii) of this section.*

Additionally we recommend that where monitoring reveals pollution or diminution of a water supply, the Department require the owner/operator to provide temporary replacement water to end users as well as, ultimately, a restored or replaced water supply adequate in quantity and quality for the purposes served by that supply. The Department should also evaluate an appropriate penalty to assure compliance with this new subsection, and provide that it may assess such a penalty in the event the owner or operator fails or refuses to provide temporary replacement water. Accordingly, a new subsection (e) should be added as follows (with the existing subsections (e)-(h) renamed subsections (f)-(i)).<sup>26</sup>

*§ 560.5(e) Restoration or Replacement of Affected Water Supplies.*

*(1) An owner or operator who affects a public or private water supply including, but not limited to, a residential water well, domestic supply spring or water well or spring used as a water supply for livestock or crops, by pollution or diminution shall restore or replace the affected supply with an alternate source of water adequate in quantity and quality for the purposes served by the supply. For the purposes of this subsection "pollution" shall mean the throwing, discharging, draining, running, flowing, pumping or otherwise releasing of any organic or inorganic materials onto the surface lands or waters or into subsurface waters in such volume or manner as to make a public or private water supply fail to meet the criteria for adequacy outlined subsection (e)(6)(ii) of this section.*

*(2) A landowner, water purveyor or affected person suffering pollution or diminution of a water supply as a result of drilling, altering or operating an oil or gas well may so notify the department and request that an investigation be conducted.*

*(3) Within 5 days of the receipt of the investigation request, the department shall investigate the claim and shall, within 25 days of receipt of the request, make a determination. If the department finds that pollution or diminution was caused by the drilling, alteration or operation activities of the owner or operator the department shall issue orders to the well owner or operator necessary to assure compliance with this section simultaneously with the determination. If the department cannot identify the cause of the pollution or diminution within 25 days of the receipt of the request, but cannot conclusively rule out drilling, alteration, or operation activities of the owner or operator as the cause, and the pollution or diminution occurred after drilling, alteration, or operation activities of the owner or operator started, the department shall immediately issue orders the well owner or*

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<sup>26</sup> The recommended regulatory provision below is based substantially upon a similar provision of the Pennsylvania Administrative Code at 25 Pa. Code § 78.51, with appropriate improvements.

*operator to provide temporary water supplies to all affected persons under subsection (e)(4) of this section until the department can confirm with certainty that the owner or operator is not responsible.*

*(4) If an owner or operator has affected a public or private water supply by pollution or diminution, the operator shall provide a temporary water supply as expeditiously as possible, but no later than 5 days after orders have been issued under subsection (e)(3) of this section if the affected water user is without a readily available alternative source of water. The temporary water supply provided under this subsection shall be adequate in quantity and quality for the purposes served by the supply. If the owner or operator refuses to or delays in providing temporary water supplies under this subsection, the department may assess penalties in the amount of [\_\_\_\_\_].*

*(5) Tank trucks or bottled water are acceptable only as temporary water replacement as specified in subsection (e)(4) and do not relieve the operator of the obligation to provide a restored or replaced water supply.*

*(6) A restored or replaced water supply includes any public or private water supply approved by the department, which meets the criteria for adequacy as follows:*

*(i) Reliability, cost, maintenance and control. A restored or replaced water supply, at a minimum, must:*

*(A) Be as reliable as the previous water supply.*

*(B) Be as permanent as the previous water supply.*

*(C) Not require excessive maintenance.*

*(D) Provide the water user with as much control and accessibility as exercised over the previous water supply.*

*(E) Not result in increased costs to operate and maintain. If the operation and maintenance costs of the restored or replaced water supply are increased, the operator shall provide for permanent payment of the increased operation and maintenance costs of the restored or replaced water supply.*

*(ii) Quality. The quality of a restored or replaced water supply will be deemed adequate if it:*

*(A) Does not exceed the primary and secondary maximum contaminant levels established under the New York Public Health Law (10 NYCRR at Part 5) and the federal Safe Drinking Water Act (40 C.F.R. Parts 141 to 143) or is comparable to the quality of the water supply before it was affected by the owner or operator if that water supply was of a better quality; and*

*(B) Does not contain contaminants as a result of the pollution of the water supply by the owner or operator that may affect the health of the supply's user or the usability of the supply.*

*(iii) Adequate quantity. A restored or replaced water supply will be deemed adequate in quantity if it meets one of the following as determined by the department:*

*(A) It delivers the amount of water necessary to satisfy the water user's needs and the demands of any reasonably foreseeable uses.*

*(B) It is established through a connection to a public water supply system that is capable of delivering the amount of water necessary to satisfy the water user's needs and the demands of any reasonably foreseeable uses.*

*(C) For purposes of this paragraph and with respect to a water supply used for livestock or crops, the term reasonably foreseeable uses includes the reasonable expansion of use where the water supply available prior to drilling exceeded the actual use.*

*(iv) Water source serviceability. Replacement of a water supply includes providing plumbing, conveyance, pumping, or auxiliary equipment and facilities necessary for the water user to utilize the water supply.*

*(7) In addition to meeting the criteria for adequacy in subsection (e)(6) of this section, if the water supply is for uses other than human consumption, the owner or operator shall demonstrate to the department's satisfaction that the restored or replaced water supply is adequate for the purposes served by the supply.*

*(8) An owner or operator who receives notice from a landowner, water purveyor, or affected person that a water supply has been affected by pollution or diminution, shall report receipt of notice from an affected person to the department within 24 hours of receiving the notice.*

### 6 NYCRR § 560.5(d)(3) Retention of Sampling Records

**Revised Proposed Recommendation:** 6 NYCRR § 560.5(d)(3) provides:

*copies of test results and documentation related to delivery or attempted delivery of test results to the owners of water wells or springs must be submitted to the New York State Department of Health within 45 days of the owner or operator's receipt of the results, and must be made available to the Department upon Department request. Such records must be maintained and available to the Department for a period up to and including five years after the well is permanently plugged and abandoned consistent with Part 555 of this Title. For multi-well pads, the five-year term specified in this paragraph shall begin after the last well subject to Part 552 of this Title is permanently plugged and abandoned pursuant to a plugging permit issued by the Department.*

**Prior Comment and Response:** Comment 6152 requested that records be maintained for 50 years because of the slow movement of contaminants through faults to shallow aquifers. NYSDEC's response did not consider the facts or potential of movement but said that five years is consistent with Department retention policies. [Response 6152].

The proposed regulation does not require the operator to provide the record to the Department. It would be preferable for all records to be maintained in a central location for the full period which should be at least 50 years for reasons in comment 6152 and as discussed elsewhere herein regarding vertical movement of contaminants.

**Recommendation:** NYSDEC should require that records be provided to the Department and change the retention time to fifty years. Records should be delivered and stored in electronic format, so that they can be easily retained for long periods of time and made available on-line for public review.

#### 6 NYCRR § 560.5(e) Blowout Preventer Testing Recordkeeping and Reporting

**Revised Proposed Regulation:** NYSDEC added a new proposed regulation at 6 NYCRR § 560.5(e) requiring blowout preventer testing recordkeeping and reporting requirements for HVHF wells.

**Prior Comment and Response:** NYS provides no justification for requiring blowout preventer testing recordkeeping and reporting requirements for HVHF wells and not all other oil and gas wells drilled in NYS.

**Recommendation:** We support this requirement, but request that this blowout preventer testing recordkeeping and reporting requirements be required for all oil and gas wells in NYS, not just HVHF wells. NYSDEC also should require that records be provided to the Department. Records should be delivered and stored in electronic format so that they can be easily retained and made available on-line for public review. These requirements could be included at Part 554.

#### 6 NYCRR § 560.5(f) and (g) Waste Tracking Recordkeeping and Reporting

**Revised Proposed Regulation:** NYSDEC added a new proposed regulations at 6 NYCRR § 560.5(f) and (g) requiring waste tracking recordkeeping and reporting requirements for HVHF wells.

**Prior Comment and Response:** NYS provides no justification for requiring waste tracking recordkeeping and reporting requirements for HVHF wells and not all other oil and gas wells drilled in NYS.

**Recommendation:** We support this requirement, but request that this waste tracking recordkeeping and reporting requirements be required for all oil and gas wells in NYS, not just HVHF wells. NYSDEC also should require that records be provided to the Department. Records should be delivered and stored in electronic format so that they can be easily retained and made available on-line for public review. These requirements should also be included at 6 NYCRR Part 554.

#### 6 NYCRR § 560.5(h) HF Fluid Disclosure Following Well Completion

**Revised Proposed Regulation:** Following well completion, proposed 6 NYCRR § 560.5(h)(1)(vi) would require the owner or operator to report “the total volume of the water-based fluid used in the hydraulic fracturing treatment of the well.” Proposed 6 NYCRR § 560.5(h)(1)(x) would require the reporting of “the actual or maximum concentration, in percent by mass, of each chemical constituent intentionally added to the base fluid” (emphasis added).

Owners or operators should be required to disclose the nature and source of the base fluid, as well as the actual concentrations of chemical constituents used. They should not be limited to disclosing only “intentionally” added constituents, because this would exclude chemicals that may be present in recycled flowback/produced water that may be present because they were disturbed in the stimulation process or are chemicals that were injected during previous operations. To the extent the industry claims that it is not possible to determine chemicals that are incidentally, *i.e.*, non-intentionally, present, owners and



operators could be required to demonstrate that such chemicals could not have been identified through reasonable sampling and analysis procedures.

**Recommendations:** While we generally support the requirement for post-well completion hydraulic fracturing fluid disclosure, we recommend that 6 NYCRR § 560.5(h)(1)(vii) be amended to read:

*...the total volume of the water-based fluid used in the hydraulic fracturing treatment of the well, including the type of base fluid (whether fresh water, recycled flowback water, or some other fluid) and source of the fluid used.*

We recommend that 6 NYCRR § 560.5(h)(1)(x) be amended to read:

*...the actual ~~or maximum~~ concentration, in percent by mass, of each chemical constituent ~~intentionally~~ added to the base fluid.*

In the event industry claims, and the Department concludes, that it cannot ascertain incidental chemicals, the following requirement could be added to this subsection:

*The owner or operator, directly or through a service company and/or chemical supplier(s), is not responsible for disclosing ingredients that occur incidentally or are otherwise unintentionally present in the high volume horizontal hydraulic fracturing fluid, and could not have been identified through reasonable sampling and analysis procedures.*

## 6 NYCRR § 560.6 Well Production and Monitoring

**Revised Proposed Regulation:** NYSDEC did not propose new regulations at 6 NYCRR § 560.6 for monitoring well condition after drilling and completion operations are finished.

**Prior Comment and Response:** Commenter 4558 proposed improved well production and monitoring. NYSDEC refused to include the improvements in the NYCRR, citing the need for flexibility in applying requirements to future permits. [Response 4558]. The response is inadequate because the requested safety standard sets a regulatory floor but does not bind operators to a particular technology, which could improve over time.

**Recommendations:** It is recommended that a new section be added to 6 NYCRR § 560.6 to address well production and monitoring requirements as follows:

1. This subsection applies to all wells that have not been plugged and abandoned.
2. Each well shall be carefully monitored on a daily basis for the first 30 days and monthly thereafter, to identify any potential problems with the well's operation or integrity which could endanger any underground source of protected water or pose a health, safety or environmental risk. Immediate action must be taken to remedy the problem and notify the Department.
3. All surface wellhead control system equipment shall be maintained and tested at least quarterly to ensure pressure control is maintained throughout the life of the well.
4. Tubing and casing pressure shall be monitored at each well at least quarterly and reported to the Department within 7 days. If annular overpressure is observed, immediate action shall be taken

to remedy the overpressure situation, notify the Department, and institute a daily monitoring program until the Department specifies otherwise.

5. Each well shall be monitored at least weekly for surface equipment corrosion, equipment deterioration, hydrocarbon release or changes in well characteristics that could potentially indicate a deficiency in the wellhead, tree and related surface control equipment, production casing, intermediate casing, surface casing, tubing, cement, packers, or any other aspect of well integrity necessary to ensure isolation of any underground sources of protected water and prevent any other health, safety or environmental issue. Immediate action shall be taken to remedy any deficiencies found and notify the Department.
6. A casing inspection log, temperature log, and mechanical integrity test shall be run in each well at least once every 5 years and reported to the Department within 7 days. Immediate action shall be taken to remedy any deficiencies found and notify the Department.

These requirements should apply to all oil and gas wells, not just to HVHF wells; therefore, these requirements should also be included in Part 554.

The information required to be submitted to the Department pursuant to 6 NYCRR § 560.6 should be made publicly available on NYSDEC.

### 6 NYCRR § 560.6(a) Well Site Preparation

**Revised Proposed Regulations:** NYSDEC proposes new regulations at 6 NYCRR § 560.6(a) for well site preparation that will only apply to wells that will undergo a HVHF operation. The proposed regulation at 6 NYCRR § 560.6(a) includes standards for: access road location; topsoil excavation and remediation; reserve pit construction; and equipment used to handle flowback water.

NYSDEC revised its 2011 proposed regulation at 6 NYCRR § 560.6(a)(4) to delete the requirement to divert surface water and stormwater runoff away from reserve pits, drilling pits or mud pits and removed the requirement to maintain a two-foot freeboard.

**Prior Comments and Response:** Our 2012 Recommendations requested that all best technology and operating practices identified be applied to all oil and gas wells drilled in NYS, and not just apply to HVHF wells, unless the proposed technology or practice was unique to HVHF well operations.

The proposed standards for access road location, topsoil excavation and remediation, and reserve pit construction at 6 NYCRR § 560.6(a)(1)(2) and (4) should apply to all oil and gas wells in NYS. While we support these improved standards for HVHF wells, the problems they address are not unique to HVHF wells.

The proposed standards for equipment used to handle flowback water at 6 NYCRR § 560.6(a)(3) should apply to all oil and gas wells in NYS that are hydraulically fractured. While we support these improved standards for HVHF wells, the problems they address are not unique to HVHF wells.

We do not support NYSDEC's proposed regulation at 6 NYCRR § 560.6(a)(4) to the extent that it deletes the requirement to divert surface water and stormwater runoff away from reserve pits, drilling pits, or mud pits and removes the requirement to maintain a two-foot freeboard.

**Recommendation:** 6 NYCRR § 560.6(a)(1)(2) and (4) should apply to all oil and gas wells in NYS.

6 NYCRR § 560.6(a)(3) should apply to all oil and gas wells in NYS that are hydraulically fractured. These improved requirements should also be included in Part 554.

6 NYCRR § 560.6(a)(4) should be amended to restore the prior requirement that surface water and stormwater runoff be diverted away from reserve pits, drilling pits, or mud pits and that operators maintain a two-foot freeboard in all pits.

### 6 NYCRR § 560.6(b)(1)-(2) Well Site Maintenance

**Revised Proposed Regulations:** NYSDEC proposes new regulations at 6 NYCRR § 560.6(b)(1)-(2) for well site maintenance, including secondary containment requirements for fuel tanks, fuel tank siting requirements, fuel tank filling, and transfer spill prevention requirements, and limitations on the duration of on-site waste storage.

**Prior Comments and Response:** Our 2012 Recommendations requested that all best technology and operating practices identified be applied to all oil and gas wells drilled in NYS, and not just to HVHF wells, unless the proposed technology or practice was unique to HVHF well operations. The proposed standards at 6 NYCRR § 560.6(b)(1)-(2) should apply to all oil and gas wells in NYS. While we support these improved standards for HVHF wells, the problems they address are not unique to HVHF wells.

**Recommendation:** 6 NYCRR § 560.6(b)(1)-(2) should apply to all oil and gas wells in NYS. These improved requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c) Conductor Casing and Cementing

**Revised Proposed Regulation:** NYSDEC did not propose new regulations at 6 NYCRR § 560.6(c) for conductor casing.

**Prior Comments and Response:** Our 2012 Recommendations made casing and cementing best technology and practice recommendations for conductor casing. *See Harvey Report Recommendation No. 6.* NYDEC did not respond to our recommendation.

**Recommendation:** We recommend adding the following conductor casing requirements to 6 NYCRR § 560.6(c):

1. New conductor casing must be set to stabilize unconsolidated sediments and isolate shallow groundwater.
2. Conductor casing must be set to a depth sufficient to provide solid structural anchorage for a diverter system unless the operator provides sufficient technical justification to that the absence of conductor casing will not jeopardize well control.
3. Conductor casing must be new casing and be placed across the entire length of the conductor casing hole.
4. Conductor casing may be driven into the ground, or a hole may be drilled into the ground and the conductor casing set and cemented in that hole.

5. Conductor casing design and setting depth must be based on engineering and geologic factors relevant to the immediate vicinity, including the presence or absence of hydrocarbons and potential drilling hazards.
6. Conductor casing set in a drilled hole must be cemented by filling the annular space with cement from the shoe to the surface. At least two centralizers must be run with one at the shoe and one at the middle of the casing string. Operator must verify cement is returned to the surface and that the annular space is completely filled with cement.
7. A mechanical or cement seal must be installed at the surface to block downward migration of surface pollutants.

These requirements should apply to all oil and gas wells, not just to HVHF wells; therefore, these improved requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c) Confining Layer Analysis

**Revised Proposed Regulation:** 6 NYCRR § 560.6(c) does not require a confining layer analysis to be completed prior to a HVHF treatment.

**Prior Comment and Response:** Our 2012 Recommendations requested that a confining layer analysis be completed to prevent hydraulic fluids from contaminating water supplies. Owners/operators would be required to perform a geologic and hydrologic mapping and risk analysis to demonstrate geologic suitability and the presence of an appropriate confining zone to inhibit vertical migration of contaminants. See Myer Report at 6. NYSDEC did not respond to our comments.

In September 2012, NRDC provided more specific recommendations to BLM on requirements for completing a confining layer analysis.<sup>27</sup> We recommend these same requirements be adopted by NYSDEC.

**Recommendation:** 6 NYCRR § 560.6(c) should be revised to require the owner/operator to confirm that a confining zone will prevent hydraulic fluids from contaminating water supplies by performing a geologic and hydrologic mapping and risk analysis to demonstrate geologic suitability and the presence of an appropriate confining zone to inhibit vertical migration of contaminants. The owner/operator must complete the following prior to conducting a HVHF treatment:

1. Complete a confining layer analysis of sufficient areal extent to verify that a confining layer is sufficient to prevent the movement of fluids to USDWs, based on the projected lateral extent of hydraulically induced fractures, injected stimulation fluids, and displaced formation fluids over the life of the project. Verify that the confining layer:
  - a. Is sufficiently impermeable to prevent the vertical migration of injected stimulation fluids or displaced formation fluids over the life of the project;

<sup>27</sup> Natural Resources Defense Council, Memorandum to Mike Pool, Acting Director of the Bureau of Land Management Re: Comments on Proposed Rule on Oil and Gas; Well Stimulation, Including Hydraulic Fracturing, on Federal and State Lands, September 10, 2012.

- b. Is free of transmissive faults or fractures that could allow the movement of injected stimulation fluids or displaced formation fluids to USDWs; and
    - c. Contains at least one formation of sufficient thickness and with lithologic and stress characteristics capable of preventing or arresting vertical propagation of fractures.
  2. Verify that the well is sited in a geologically suitable location prior to hydraulic fracture treatment by:
    - a. Completing a detailed analysis of regional and local geologic stratigraphy and structure including, at a minimum, lithology, geologic facies, faults, fractures, stress regimes, seismicity, and rock mechanical properties.
    - b. Completing a detailed analysis of regional and local hydrology including, at a minimum, hydrologic flow and transport data and modeling and aquifer hydrodynamics; properties of the producing and confining zone(s); groundwater levels for relevant formations; discharge points, including springs, seeps, streams, and wetlands; recharge rates and primary zones; and water balance for the area, including estimates of recharge, discharge, and pumping.
    - c. Completing a detailed analysis of the cumulative impacts of well stimulation on the geology of producing and confining zone(s) over the life of the project. This must include, but is not limited to, analyses of changes to conductivity, porosity, and permeability; geochemistry; rock mechanical properties; hydrologic flow; and fracture mechanics.
    - d. Making a determination that the geology of the area can be described confidently and that the fate and transport of injected fluids and displaced formation fluids can be accurately predicted through the use of models.
    - e. Collecting additional geophysical and reservoir data to support a reservoir simulation model.
  3. Complete a geophysical description of the Area of Review ("AoR") by:
    - a. Providing geological names, a geological description, and the proposed measured and true vertical depth of the top and the bottom of the formation into which well stimulation fluids are to be injected, and of the confining zone.
    - b. Identifying the geologic structure, stratigraphy, and hydrogeologic properties of the proposed producing formation(s) and confining zone(s), including: maps and cross-sections of the area of review; the location, orientation, and properties of known or suspected faults, fractures, and joint sets that may transect the producing and confining zone(s) in the area of review, and a determination that they would not provide migration pathways for injected fluids or displaced formation fluids to USDWs.
    - c. Collecting data on the depth, areal extent, thickness, mineralogy, porosity, permeability, and capillary pressure of the producing and confining zone(s), including geology/facies changes based on field data which may include geologic cores, outcrop data, seismic surveys, well logs, and names and lithologic descriptions; geomechanical information on

- fractures, stress, ductility, rock strength, and in situ fluid pressures within the producing and confining zone(s).
- d. Collecting information on the seismic history, including the presence and depth of seismic sources and a determination that the seismicity would not affect the integrity of the confining zone(s).
  - e. Developing geologic and topographic maps and cross sections illustrating regional geology, hydrogeology, and the geologic structure of the local area's hydrologic flow and transport data and modeling.
  - f. Obtaining whole or sidewall cores of the producing and confining zone(s) and formation fluid samples from the producing zone(s) and conduct routine core analysis on core samples representative of the range of lithology and facies present in the producing and confining zone(s). Special Core Analysis (SCAL) should also be considered, particularly for samples of the confining zone, where detailed knowledge of rock mechanical properties is necessary to determine whether the confining zone can prevent or arrest the propagation of fractures.
4. Confirm the fluid temperature, pH, conductivity, reservoir pressure, and static fluid level of the producing and confining zone(s) and prepare a detailed report on the physical and chemical characteristics of the producing and confining zone(s) and formation fluids that integrates data obtained from well logs, cores, and fluid samples, including the fracture pressure of both the producing and confining zone(s).
  5. Complete a fracture gradient analysis to ensure that hydraulic fracturing operations will not initiate fractures in the confining zone.
  6. Provide the location, orientation, and a report on the mechanical condition of each well that may transect the confining zones and information sufficient to support a determination that such wells will not interfere with containment of the hydraulic fracturing fluid.

### 6 NYCRR § 560.6(c) Well Construction Design

**Revised Proposed Regulation:** NYSDEC did not propose new regulations at 6 NYCRR § 560.6(c) to specify minimum well construction design elements.

**Recommendation:** Add the following requirements in 6 NYCRR § 560.6(c):

1. Well drilling and casing design shall estimate and address, at a minimum: pore pressures; formation fracture gradient; potential lost circulation zones; shallow gas hazards; the potential to penetrate a mine, coal seam, or overpressured gas storage areas; depths to tops of significant marker formations; depth to base of protected groundwater; depth to hydrocarbon zones or abnormally pressured zones; depth to significant faults; drilling fluid weight; casing setting depth; and maximum anticipated surface pressures.
2. Well drilling and casing design shall describe plans and procedures that demonstrate the well will be drilled and completed safely, including verification of: the rated capacity of the drilling rig and major drilling equipment; minimum quantities of drilling fluid materials, including weighting materials, and cement to be kept onsite; hole size and casing size (including casing weights,

grades, collapse and burst values and setting depths); casing design safety factors used for tension, collapse, and burst, type and amount of cement planned for each casing string and additives; coring at specified depths (if planned); logging and sampling plans; maintaining safe drilling margins between drilling fluid weights and estimated pore pressures; a plan to have at least two independent tested barriers, including one mechanical barrier, across each flow path during well completion activities; and that the casing and cementing design is appropriate for the purpose for which it is intended under expected wellbore conditions.

These requirements should apply to all oil and gas wells, not just to HVHF wells; therefore, these requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c) Wellhead Controls

**Revised Proposed Regulation:** NYSDEC did not propose new regulations at 6 NYCRR § 560.6(c) to specify wellhead assembly controls.

**Prior Comment and Response:** Commenter 4558 proposed improved wellhead controls. NYSDEC refused to include the improvements in the NYCRR, citing the need for flexibility in applying requirements to future permits. [Response 4558]. The response is inadequate because the requested safety standard sets a regulatory floor but does not bind operators to a particular technology, which could improve over time.

**Recommendation:** Add the following requirements in 6 NYCRR § 560.6(c):

1. Wellhead control systems shall be installed on all wells to maintain surface control of the well. Each component of the wellhead shall have a pressure rating at least 25% greater than the anticipated pressure to which the component might be exposed during the course of drilling, testing, completing, or producing the well.
2. All wellhead connections shall be assembled and tested prior to installation.
3. Wells shall be equipped to monitor casing pressure.

These requirements should apply to all oil and gas wells, not just to HVHF wells; therefore, these requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c) Drilling Fluid Systems

**Revised Proposed Regulation:** NYSDEC did not propose new regulations at 6 NYCRR § 560.6(c) to specify drilling fluid system requirements.

**Prior Comment and Response:** Commenter 4558 proposed improved drilling fluid systems. NYSDEC refused to include the improvements in the NYCRR, citing the need for flexibility in applying requirements to future permits. [Response 4558]. The response is inadequate because the requested standards establish a regulatory floor but do not bind operators to a particular technology, which could improve over time.

**Recommendation:** Add the following requirements in 6 NYCRR § 560.6(c):

1. The drilling fluid system shall be designed to maintain control of the wellbore in an overbalanced condition and with rheological properties to minimize the potential of a hydrostatic pressure surge or swab when the drilling assembly is run into or pulled out of the wellbore.
2. Drilling fluid mud shall be in balance and conditioned to maintain drilling fluid properties within close tolerance to the properties necessary for well control as specified in the permit to drill.
3. Adequate supplies of drilling fluid shall be maintained at the well location. The wellbore shall be kept full of mud at all times. When pulling drill pipe, the mud volume required to keep the wellbore full shall be measured to assure that it corresponds with the displacement of pipe pulled.
4. A drilling fluid monitoring unit shall be used and continuously observed during drilling operations, including tripping, to monitor and record: gas entrained in the drilling fluid; drilling fluid density; drilling fluid salinity; the rate of penetration; and hydrogen sulfide.
5. The rig shall be equipped with a recording mud tank level indicator to determine mud tank volume gains and losses. This indicator shall include both a visual and an audible warning device.
6. Mud quality tests shall be made at least once per day, including: density, viscosity, and gel strength; hydrogen ion concentration (pH); filtration; and other tests the Department may require.
7. All drilling fluids shall be conditioned prior to cement placement. The wellbore shall be stable with respect to formation influx prior to placing the cement, and shall be kept stable after the cement is placed.
8. All hole intervals drilled prior to reaching the base of protected groundwater shall be drilled with air, fresh water, or a fresh water based drilling fluid. Freshwater drilling mud additives, if used, shall be non-toxic. Drilling with synthetic muds and oil based muds is prohibited when drilling through protected groundwater zones.

These requirements should apply to all oil and gas wells, not just to HVHF wells; therefore, these requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c) Existing Well Condition Prior to Hydraulic Fracturing

**Revised Proposed Regulation:** NYSDEC did not propose new regulations at 6 NYCRR § 560.6(c) that require a well integrity review and Department approval prior to conducting hydraulic fracturing operations in an existing well (where “existing well” means a well that was constructed prior to the effective date of these regulations).

**Recommendation:** Add the following requirements in 6 NYCRR § 560.6(c):

1. Prior to hydraulically fracturing a well that was constructed prior to the effective date of these regulations, a well integrity analysis shall be completed to verify the well construction practices used, current condition of the well casing, tubing, cement, downhole and surface equipment meet the current standards of the NYCRR.
2. The well integrity analysis shall be submitted to the Department for review and approval prior to conducting hydraulic fracturing.



3. Hydraulic fracturing is prohibited in wells that do not meet the current standards of the NYCRR.

These requirements should apply to all oil and gas wells where hydraulic fracturing is planned, not just to HVHF wells; therefore these requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c)(1) Well Construction Plans

**Revised Proposed Regulation:** NYSDEC proposes a new regulation at 6 NYCRR § 560.6(c)(1) that would require an owner/operator planning to construct a HVHF well to provide the drilling company it hires with:

*... a well prognosis indicating anticipated formation to top depths with appropriate warning comments prior to well spud.*

**Recommendation:** The proposed regulations at 6 NYCRR § 560.6(c)(1) are unclear and incomplete. It is insufficient to merely provide the drilling contractor with a well prognosis. The drilling contractor needs a complete copy of the well construction plan and a copy of all permits. Furthermore, the owner/operator should be required to verify that the drilling contractor is equipped, trained, and qualified to carry out the proposed well construction plan prior to hiring that contractor.

6 NYCRR § 560.6(c)(1) should be revised to require the owner/operator to:

1. Select a drilling company that is equipped, trained, and qualified to carry out the planned well construction operations;
2. Examine the health, safety, environment, and management systems of the drilling company to ensure that it can comply with NYCRR best industry practices for well construction and that it has a proven successful and safe track record;
3. Provide the drilling company with a complete well construction plan and a copy of all associated permits (not just the well prognosis, which is just a fraction of the plan), and verify that the drilling contractor is equipped, trained and qualified to construct the well and comply with all permit requirements; and
4. Complete a bridging document to ensure that the combined team of the owner's or operator's staff, drilling contractors, and other contractors brought to the well location have an integrated health, safety, environment, and management system plan, identifying those with lead and supporting roles, to ensure that the entire project functions as one system and one plan incorporating all contingency plans, including blowout and well control.

6 NYCRR § 560.6(c)(1), including the proposed revision above, should apply to all oil and gas wells, not just to HVHF wells; therefore, these improved requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c)(2) Drilling Crew Responsibilities for Well Blowouts

**Revised Proposed Regulation:** NYSDEC proposes a new regulation at 6 NYCRR § 560.6(c)(2) requiring that drilling crew responsibilities be posted on a bulletin board and that the crew be made aware of its responsibilities prior to commencing drilling or well work. It also requires that one person at the well site have a well control certification, and that "appropriate pressure control procedures" are in place.

**Prior Comments and Response:** As explained in our 2012 Recommendations and comments at § 554, § 556, and § 560.5(a), the owner/operator should be required to have a complete emergency response plan (ERP) including a well blowout control plan and a contract retainer with an emergency well control expert. Additionally, the owner's or operator's drilling engineers and drilling contractor's key staff (not just one person at the site) should have well control certification and the rest of the drilling crew must be trained and experienced to carry out well control procedure instructions. All this training and certification should be completed well in advance of any planned well operations, and should be documented and audited.

While it is important to provide notification to drilling crew staff of any unique drilling risks or technical challenges on a planned well prior to construction by posting updates on the rig bulletin board, this is not an adequate replacement for ensuring that there is trained and qualified well control experts on staff on the rig.

**Recommendation:** In addition to posting drilling crew responsibilities on the bulletin board, proposed regulations at 6 NYCRR § 560.6(c)(2) should be substantially enhanced to require training and qualifications for well control and well safety to be implemented and verified prior to conducting any well operations. 6 NYCRR 560.6(c)(2) should include the following additional provisions:

1. The drilling contractor staff shall be provided with a copy of the well construction plan prior to drilling and the owner/operator shall verify that the drilling contractor's staff is trained and qualified to carry out all well control operations, including blowout well control, prior to spudding the well or conducting well workover operations on the well.
2. The owner/operator's drilling engineer and Company Person (otherwise referred to as "Company Man") responsible for overseeing the well construction plan, as well as the Drilling Contractor's "Tool Pusher," shall hold a current International Association of Drilling Contractors (IADC) well control certification, or equivalent.
3. The owner/operator and drilling company shall have a training program for all staff involved in well construction and workover for well control and well safety operating practices and document that all staff are trained and qualified prior to commencing any well operations.

6 NYCRR § 560.6(c)(2), including the proposed revision above, should apply to all oil and gas wells, not just to HVHF wells; therefore, these improved requirements should be included in Part 554.

### 6 NYCRR § 560.6(c)(3) Well Control Equipment and Testing

**Revised Proposed Regulation:** NYSDEC proposes a new regulation at 6 NYCRR § 560.6(c)(3) that requires notification prior to blowout preventer (BOP) testing, includes a minimum well control barrier policy, and includes a remote BOP actuator to be located at least 50' from the wellhead.

**Prior Comments and Response:** Our 2012 Recommendations recommended improvements in well control equipment and testing. NYSDEC made some improvements in the HVHF well control regulations but did not include all known best technologies and practices, nor did the Department apply improved standards to all oil and gas wells in NYS.

**Recommendation:** We support the proposed requirement for blowout preventer at 6 NYCRR § 560.6(c)(3); however, we recommend that the owner/operator also be required to include important well

control equipment and testing requirements found in major hydrocarbon resource extraction states such as Texas and Alaska:

1. Install a diverter system while drilling surface casing, unless waived by NYSDEC based on prior drilling data that confirms shallow gas and other drilling hazards are not present, to divert any wellbore fluids and gases away from the rig floor to a flare pit a safe distance from the well.
2. Install two diverter control stations, one on the drilling floor and one located at a safe distance and readily accessible away from the drilling floor.
3. Maintain the diverter system in effective working condition and function test the diverter system when installed and at regular intervals during drilling operations.
4. Discontinue drilling operations if a test or other information indicates the diverter system is unable to function or operate as designed.
5. Install and test a blowout preventer as soon as practicable but no later than prior to drilling out of the surface casing.
6. Use a BOP stack that includes at least an annular BOP, pipe rams and blind-shear rams. The blind-shear rams must be capable of shearing the drill pipe that is in the hole.
7. Include two BOP control stations, one on the drilling floor and one located at a safe distance and readily accessible away from the drilling floor.
8. Install an accumulator system that provides 1.5 times the volume of fluid capacity necessary to close and hold closed all BOP components, with an automatic backup.
9. Test the accumulator system to verify pre-charge of accumulator bottle, accumulator response time and the capability of closing on the minimum size drill pipe being used.
10. Install, operate, test, and maintain all blowout prevention equipment in accordance with API RP 53 (Recommended Practices for Blowout Prevention Equipment Systems).
11. Verify the required working pressure rating of all BOPs and related equipment shall be based on known or anticipated subsurface pressure, geologic conditions, or accepted engineering practices, and shall exceed the maximum anticipated pressure to be contained at the surface. In the absence of better data, the maximum anticipated surface pressure shall be determined by using a normal pressure gradient of 0.44 psi per foot and assuming that at least one-third of the drilling mud is evacuated from the wellbore when at the interval's deepest true vertical depth.
12. Test the blind-shear rams prior to drilling and test the ram-type blowout preventers during drilling operation by closing at least once each trip and test the annular-type preventer by closing on the drill pipe at least once each week.
13. Discontinue drilling operations if a test or other information indicates the BOP system is unable to function or operate as designed.
14. Complete a formation integrity test (FIT) if a BOP is installed on the surface casing. The FIT must be completed after drilling out below the surface casing shoe into at least 20 feet, but not more than 50 feet of new formation, in order to verify the integrity of the cement in the surface casing annulus at the surface casing shoe. The FIT results should demonstrate that the integrity of the casing shoe is sufficient to contain the anticipated wellbore pressures identified in the application for the Permit to Drill; no flow path exists to formations above the casing shoe; and that the casing shoe is competent to handle an influx of formation fluid or gas without breaking down.

15. Notify NYSDEC at least 24 hours prior to commencing any BOP testing, casing integrity testing, or casing cementing operations such that agency staff can witness the testing.

6 NYCRR § 560.6(c)(3), including proposed revision above, should apply to all oil and gas wells, not just to HVHF wells; therefore, these improved requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c)(4) Hydrogen Sulfide

**Revised Proposed Regulation:** NYSDEC proposes a new regulation at 6 NYCRR § 560.6(c)(4) that requires the owner/operator to comply with unspecified “industry standards” when hydrogen sulfide (H<sub>2</sub>S) is present.

**Prior Comments and Response:** Our 2012 Recommendations included a number of improved testing, monitoring and operating practices for hydrogen sulfide that were not included in the proposed regulations. NYSDEC responded only that H<sub>2</sub>S must be reported as a non-routine incident. [Response 6179].

**Recommendation:** We support the requirement at 6 NYCRR § 560.6(c)(4) for additional precautions to be taken when H<sub>2</sub>S is detected; however, we recommend that further requirements be added. Specifically, the owner/operator should be required to:

1. Follow American Petroleum Institute Recommended Practice 49 (API RP 49) for Drilling and Well Servicing Operations Involving Hydrogen Sulfide and API RP 55 for Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide, to protect employees and the public or an equivalent or better standard.
2. Vent gas containing H<sub>2</sub>S through a flare stack to combust the dangerous vapors.
3. Conduct initial H<sub>2</sub>S testing at each well pad. Subsequent test frequency should be based on the results of initial testing; however, testing should be completed at least annually because H<sub>2</sub>S levels can increase over time as gas fields age and sour.
4. Notify nearby neighbors, local authorities, and public facilities when H<sub>2</sub>S is present and provide information on the safety and control measures that the operator will undertake to protect human health and safety.
5. Install audible alarms to alert the public to evacuate in cases where elevated H<sub>2</sub>S levels are present.

6 NYCRR § 560.6(c)(4), including the proposed revisions above, should apply to all oil and gas wells, not just to HVHF wells; therefore, these improved requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c)(5) Annular Disposal

**Revised Proposed Regulation:** NYSDEC proposes a new regulation at 6 NYCRR § 560.6(c)(5) that prohibits the “intentional” annular disposal of drill cuttings or fluid.

**Prior Comments and Response:** NYSDEC disagreed with Commenter 6181, who requested that the word “intentional” be added; yet, the regulation was revised to add the word, contrary to NYSDEC’s intent. [Response 6181].

**Recommendation:** We support the requirement to prohibit annular disposal of drill cuttings or fluid at 6 NYCRR § 560.6(c)(5). We therefore agree with NYSDEC that the word “intentional” should not be included in the provision.

6 NYCRR § 560.6(c)(5) should be revised to delete the word “intentional,” and the revised rule should apply to all oil and gas wells, not just to HVHF wells. Therefore, the rule, so revised, should also be included in Part 554.

### 6 NYCRR § 560.6(c)(7)-(8) Closed-Loop Tank Systems vs. Reserve Pits

**Revised Proposed Regulation:** NYSDEC proposes a new regulation at 6 NYCRR § 560.6(c)(7)-(8) that requires the owner/operator to use a closed-loop tank system instead of a reserve pit to manage drilling fluids and cuttings only for horizontal drilling in the Marcellus Shale (unless an acid rock drainage (ARD) mitigation plan for on-site burial is developed), and for any drilling that requires drill cuttings to be disposed off-site.

**Prior Comments and Response:** Our 2012 Recommendations requested that NYSDEC adopt regulations requiring closed-loop tank systems as best practice, instead of the use of temporary reserve pits to handle and store drill muds and cuttings, unless the operator demonstrates that closed-loop tank systems are not technically feasible. *See* Harvey Report Recommendations Nos. 43-45.

Commenters 6165 and 6168 also recommended closed-loop tank systems.

NYSDEC did not respond to our comment or provide any technical analysis to show that closed-loop systems are not technically feasible. Instead, NYSDEC responded only that closed-loop tank systems were studied in the RDSGEIS. [Responses 6165 and 6168].

Our 2012 Recommendations explained that the 2011 RDSGEIS recommends closed-loop tank systems as best practice only in some circumstances, but in other circumstances defaults to the use of reserve pits, without demonstrating that reserve pits are environmentally preferable.

The RDSGEIS requires a closed-loop tank system for horizontal drilling operations in the Marcellus Shale that do not have an acceptable ARD mitigation plan<sup>28</sup> for on-site cuttings burial; and drill cuttings that are coated with Synthetic-Based Muds (SBM) and Oil-Based Muds (OBM).

Appendix 10, Proposed Supplementary Permit Conditions for HVHF, Condition No. 56 requires the operator to provide NYSDEC with an ARD mitigation plan if NYSDEC requests the plan. However, there are no specific criteria established to define what constitutes an acceptable ARD mitigation plan.

The RDSGEIS proposal to permit reserve pits is internally inconsistent with the RDSGEIS' conclusion that closed-loop tank systems are environmentally preferable for the following reasons:

*Depending on the configuration and design of a closed-loop tank system use of such a system can offer the following advantages:*

<sup>28</sup> 2011 NYSDEC, RDSGEIS, Page 7-67.

- *Eliminates the time and expense associated with reserve pit construction and reclamation;*
- *Reduces the surface disturbance associated with the well pad;*
- *Reduces the amount of water and mud additives required as a result of re-circulation of drilling mud;*
- *Lowers mud replacement costs by capturing and re-circulating drilling mud;*
- *Reduces the wastes associated with drilling by separating additional drilling mud from the cuttings; and*
- *Reduces expenses and truck traffic associated with transporting drilling waste due to the reduced volume of the waste.<sup>29</sup>*

Additionally, the 2011 RDSGEIS explains that the environmental risks of reserve pits include:

- **Pit leakage or failure;**
- **A greater intensity and duration of surface activities associated with well pads with multiple wells increases the potential for an accidental spill, pit leak, or pit failure;**
- Heightened concerns for on-site pits for handling drilling fluids in primary and principal aquifer areas, or are constructed on the filled portion of a cut-and-filled well pad.

Of even greater concern is the RDSGEIS' proposal to allow drill cuttings to be buried onsite in some cases. Marcellus Shale cuttings contain NORM and are coated with drilling muds, including Water-Based Mud (WBM). The proposed revisions to the NYCRR would require the reserve pit liner to be ripped and perforated as part of the onsite burial process; therefore, contaminated drill cuttings would be in direct contact with soils and surface waters.

While the RDSGEIS generally takes the position that WBM-coated cuttings can be stored in reserve pits and buried onsite, in some cases it allows waivers. It is not clear what additional limitations may be applied to WBM-coated drill-cuttings disposal. NYSDEC recognizes that onsite burial of chemical additives included in WBM may not be prudent. However, the RDSGEIS does not spell out criteria for determining what types of WBM-coated cuttings may and may not be stored and buried in reserve pits. The RDSGEIS proposes this decision be left to a later NYSDEC consultation process.

Additionally, it is inefficient from a logistics and energy use standpoint to construct a reserve pit for the temporary storage of drill cuttings and then remove this pit at a later time. It is substantially more efficient to use a closed-loop tank system to collect the drill cuttings, because the cuttings can be directly transported to a waste handling facility. The RDSGEIS agrees with the efficiencies gained through closed-loop tank systems, but incongruously does not recommend them in all cases.

**Recommendation:** We support the requirement for closed-loop tanks to be used instead of reserve pits at 6 NYCRR § 560.6(c)(7)-(8) to manage drilling fluids and cuttings; however, we recommend that this requirement apply to *all* substances and for *all* oil and gas wells in NYS, unless demonstrated to be technically infeasible.

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<sup>29</sup> 2011 NYSDEC, RDSGEIS, Page 5-39.

If NYSDEC continues to reject our recommendation, at a minimum, 6 NYCRR § 560.6(c)(7) should clarify that closed-loop systems must be used for:

1. Drill cuttings that are coated with Synthetic-Based Muds (SBM) and Oil-Based Muds (OBM); and
2. Drill cuttings that are coated with Water-Based Muds, where NYSDEC has not verified that the chemical additives are safe and non-toxic to humans and the environment.

NYSDEC also should clarify what constitutes an acceptable ARD mitigation plan.

6 NYCRR § 560.6(c)(7)-(8), including the proposed revisions above, should apply to all oil and gas wells, and not just to HVHF wells; therefore, these improved requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c)(9) Biocide Use

**Revised Proposed Regulation:** NYSDEC proposes a new regulation at 6 NYCRR § 560.6(c)(9) that limits biocide use to “biocides registered for use in New York.”

**Recommendation:** We support the requirement at 6 NYCRR § 560.6(c)(9) that limits biocide use; however, the regulation should clearly reference the applicable list of registered biocides

6 NYCRR § 560.6(c)(5), including proposed revision above, should apply to all oil and gas wells that use biocides. Biocide use is not unique to HVHF wells; therefore, these improved requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c)(10) Casing and Cementing - All Casing Strings

**Revised Proposed Regulation:** NYSDEC proposes a new regulation at 6 NYCRR § 560.6(c)(10) that requires: the owner/operator to follow its permit; mud to be circulated and conditioned prior to cementing; a spacer to be pumped; cement to be pumped to inhibit channeling; an 8-hour cement curing time; a casing thread compound and centralizers specified by the Department; cement mixtures to minimize its freewater content and contain a gas-blocking additive; and record keeping. The provision also prohibits welded connections.

**Prior Comments and Response:** Our 2012 Recommendations made extensive casing and cementing best technology and practice recommendations. *See Harvey Report Recommendations Nos. [6-21].* Additionally, numerous other commenters requested casing and cementing improvements.

We appreciate the inclusion of a number of our recommended improvements, however, NYDEC did not respond to all of our recommendations. For the recommendations that were not included, NYSDEC did not provide any information to show that these best technology practices are not technically feasible.

**Recommendation:** We support the casing and cementing regulations proposed at 6 NYCRR § 560.6(c)(10). However, we recommend that the requirements be expanded to include all best technology and practice recommendations. 6 NYCRR § 560.6(c)(10) should require:

1. Use of compressed air or water based mud (with no toxic additives) when drilling through protected water zones.

2. Use of float valves and verification that they have held to prevent cement backflow in the drill string.
3. Installation of a cement sheath of at least 1-1/4".
4. Use of 25% excess cement, unless a caliper log is run to assess the hole shape and required cement volume. [NYSDEC agrees with the 25% standard, but allows a waiver without criteria for reducing the cement volume. We recommend a caliper log be run to more accurately estimate cement needs].
5. Cement free water separation that averages no more than six milliliters per 250 milliliters of tested cement. [NYSDEC agrees with the need to limit free water separation but did not set a standard; we recommend a minimum standard of 6ml/250ml].
6. Casing to be rotated and reciprocated while cementing to improve cement placement, if well conditions allow.
7. Cement must include additives in areas where CO<sub>2</sub> and H<sub>2</sub>S, and other lithologic and physical conditions exist surrounding the wellbore to protect the casing from corrosion and the cement from subsequent deterioration and resist degradation by chemical and physical conditions anticipated in the well.
8. Implementation of lost circulation control procedures.
9. All potentially productive zones, zones capable of over-pressurizing the surface casing annulus, or corrosive zones be isolated and sealed off to the extent that such isolation is necessary to prevent vertical migration of fluids or gases behind the casing.<sup>30</sup>
10. Mud to be circulated and conditioned with a minimum of two hole volumes; adjusting drilling fluid rheology to optimize conditions for displacement of the drilling fluid and ensuring that the wellbore is static and that all gas flows are killed.
11. Casing to be hydrostatically pressure tested with an applied pressure that exceeds the maximum pressure to which the pipe will be subjected in the well, by at least 25%.
12. Casing used to conducting hydraulic fracturing operations shall meet new API casing standards, including API Spec 5CT, for compression, tension, collapse, and burst resistance. It must be designed to withstand the anticipated hydraulic fracturing pressure to which it will be subjected, production pressures, corrosive conditions and all other conditions that may be reasonably anticipated.
13. Casing used to isolate protected water must not be used as the production string in the well in which it is installed, and may not be perforated for purposes of conducting a hydraulic fracture treatment through it.

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<sup>30</sup> See California Dep't of Conservation, Pre-Rulemaking Discussion Draft Hydraulic Fracturing Regulations at 2, [http://www.conservation.ca.gov/dog/general\\_information/Documents/121712DiscussionDraftofHFRegs.pdf](http://www.conservation.ca.gov/dog/general_information/Documents/121712DiscussionDraftofHFRegs.pdf).



14. Reserve the agency's right to require industry to install additional cemented casing strings in wells, and repair defective casing or cementing, as deemed necessary for environmental and/or public safety reasons.

6 NYCRR Part 560.6(c)(10), including proposed revision above, should apply to all oil and gas wells. It is not unique to HVHF wells; therefore, these improved requirements should also be included in Part 554.

### 6 NYCRR § 560.6(c)(11)-(12) Surface Casing and Cementing

**Revised Proposed Regulation:** NYSDEC proposes new regulations at 6 NYCRR § 560.6(c)(11)-(12) that require: the owner/operator to follow its permit; surface casing to be set 75 below the base of potable water (determined by logging); cement to be placed by the pump and plug method using 25% excess cement and lost circulation material (unless a different amount required by the Department); the annulus to be completely cemented; notification prior to cementing; and where potable water is found below the surface casing seat, use of an external casing packer on intermediate casing to isolate the potable freshwater zones.

**Prior Comments and Response:** Our 2012 Recommendations made extensive casing and cementing best technology and practice recommendations for surface casing. *See Harvey Report Recommendations Nos. 7-14.* Additionally, numerous other commenters requested casing and cementing improvements.

We appreciate the inclusion of a number of our recommended improvements, however, NYDEC did not respond to all of our recommendations. For the recommendations that were not included, NYSDEC did not provide any information to show that these best technology practices are not technically feasible.

For example, NYSDEC uses a 75' surface casing setting depth below potable water, but does not provide a technical basis for this depth or explain why a 100' surface casing setting depth to increase groundwater protection and reduce risk of contamination is not preferred.

NYSDEC retains discretion to require a cement evaluation tool to examine surface casing cement quality, but does not make use of the tool mandatory, or explain the criteria the Department would use to decide whether to require such use.

**Recommendation:** We support the casing and cementing regulations proposed at 6 NYCRR § 560.6(c)(11)-(12). However, we recommend that the requirements be expanded to include all best technology and practice recommendations. 6 NYCRR § 560.6(c)(11)-(12) should be revised to add the following requirements:

1. Surface casing shall be set and cemented to a minimum depth of at least 100 feet below the base of the deepest strata containing protected groundwater, but above any hydrocarbon strata.
2. Surface casing shall be set deep enough and into a competent formation to ensure the BOP can contain any formation pressure that may be encountered when drilling the next section of the hole below the surface casing shoe.
3. If a shallow gas hazard is encountered, surface hole drilling shall stop and surface casing shall be set and cemented before drilling deeper. Any shallow gas hazards encountered while drilling shall be recorded and reported electronically to the Department and made available to other operators and potentially affected residents in the area.

4. Surface casing strings shall stand under pressure until the cement has reached a compressive strength of at least 500 psi in the zone of critical cement, before drilling out the cement plug or initiating a test. The cement mixture in the zone of critical cement shall have a 72-hour compressive strength of at least 1,200 psi.
5. If an intermediate casing is waived under 6 NYCRR § 560.6(c)(13) and the cement evaluation tool is not run on intermediate casing, a cement evaluation tool and temperature survey shall be run to verify cement placement and remedial cementing operations shall be completed before drilling deeper into the hole. [We agree with NYSDEC that a cement evaluation tool should be required only on the intermediate casing and not the surface casing and intermediate casing both, but we are concerned that in the case that the intermediate casing requirement is waived, that there be a mandatory requirement to run a cement evaluation tool on the surface casing so that there is a cement evaluation across the water protection string.]
6. A formation integrity test shall be completed to verify the integrity of the cement in the surface casing annulus at the surface casing shoe. The test shall be conducted after drilling out of the casing shoe, into at least 20 feet, but not more than 50 feet of new formation. The test results must demonstrate that the integrity of the casing shoe is sufficient to contain the anticipated wellbore pressures identified in the application for the Permit to Drill.
7. Surface casing shall be pressure tested to ensure it can hold the required working pressure of the BOP.

In addition, the term “potable freshwater” should be replaced with the term “protected groundwater,” as is further explained in our comments.

6 NYCRR § 560.6(c)(11)-(12), including proposed revision above, should apply to all oil and gas wells, not just to HVHF wells; therefore, these improved requirements should also be included in Part 554.

#### 6 NYCRR § 560.6(c)(13)-(15) Intermediate Casing and Cementing

**Revised Proposed Regulation:** NYSDEC proposes new regulations at 6 NYCRR § 560.6(c)(13)-(15) that require: the owner/operator to follow its permit; intermediate casing to be installed and run to the surface (with a waiver provision); cement to be placed by the pump and plug method using 25% excess cement and lost circulation material (unless a caliper log is run); the annulus to be completely cemented; notification prior to cementing; and running of a cement evaluation tool.

**Prior Comments and Response:** Our 2012 Recommendations made extensive casing and cementing best technology and practice recommendations for intermediate casing. *See Harvey Report Recommendations Nos. 16-18.* Additionally, numerous other commenters requested casing and cementing improvements.

We appreciate the inclusion of a number of our recommended improvements. NYSDEC admits:

*In general, the Department agrees that the industry best practices referenced in the Harvey Report should be followed.*

NYSDEC nevertheless did not include all the Harvey Report recommendations. For the recommendations that were not included, NYSDEC provided no information to show that these best technology practices are not technically feasible.

Of primary concern, NYSDEC allows an intermediate casing waiver provision but does not establish criteria in regulation for making that determination. NYSDEC's Response to Comments lists some criteria that it envisions granting waivers:

“ . . .without compromise to environmental protection. . .” [Response 6192];

if “ . . .environmental protection and public safety will not be compromised;” [Response 6197];

if the following conditions are met “ . . .deep-set surface casing; shallow total well depth; and absence of fluid and gas between the surface casing shoe and the target interval.” [Response 6197].

**Recommendation:** We support the casing and cementing regulations proposed at 6 NYCRR § 560.6(c)(13)-(15). However, we recommend that the requirements be expanded to include all best technology and practice recommendations. 6 NYCRR § 560.6(c)(13)-(15) should be revised to add the following requirements:

1. Where protected groundwater is found below the surface casing seat, intermediate casing shall be set a minimum of 100' below the base of protected groundwater to increase groundwater protection, to reduce risk of contamination, and to seal off anomalous pressure zones, lost circulation zones, and other drilling hazards.
2. Anomalous pressure zones, lost circulation zones, and other drilling hazards encountered while drilling the intermediate casing hole shall be recorded and reported electronically to the Department and made available to other operators and potentially affected residents in the area.
3. Casing string shall stand under pressure until the cement has reached a compressive strength of at least 500 psi in the zone of critical cement, before drilling out the cement plug or initiating a test, or disturbing the cement in any way. The cement mixture in the zone of critical cement shall have a 72-hour compressive strength of at least 1,200 psi.
4. Immediately after drilling out below the intermediate casing shoe, a formation pressure integrity test shall be performed to determine that formation integrity at the casing shoe is adequate to meet the maximum anticipated wellbore pressure at total depth. The formation pressure integrity test results should demonstrate that the integrity of the casing shoe is sufficient to contain the anticipated wellbore pressures identified in the application for the Permit to Drill; that no flow path exists to formations above the casing shoe; and that the casing shoe is competent to handle an influx of formation fluid or gas without breaking down.

NYSDEC should remove the waiver provision for HVHF well intermediate casing. If NYSDEC does not remove the waiver provision entirely, it should include criteria for granting the waiver that require the Department to produce a technical support document for each waiver that describes the technical basis for granting the waiver, explains why the waiver constitutes the best practice, and verifies the waiver will not compromise environmental protection or public safety.

6 NYCRR § 560.6(c)(13)-(15), including the proposed revisions above, should apply to all oil and gas wells where intermediate casing is run; therefore, these improved requirements should also be included in Part 554 and applied when intermediate casing is run on a case-by-case basis for oil and gas wells that do not meet the HVHF well definition.

### 6 NYCRR § 560.6(c)(16)-(17) Production Casing and Cementing

**Revised Proposed Regulation:** NYSDEC proposes new regulations at 6 NYCRR § 560.6(c)(16)-(17) that require: the owner/operator to follow its permit; production casing to be installed and run to the surface and cemented, if intermediate casing is waived; if intermediate casing is set and cemented, production casing must be set and cemented to tie into the intermediate casing by 500'; a waiver provision to reduce cementing requirements (with criteria for granting the waiver); and running of a cement evaluation tool.

**Prior Comments and Response:** Our 2012 Recommendations made extensive casing and cementing best technology and practice recommendations for production casing. We appreciate the inclusion of our recommended improvements.

**Recommendation:** We support the casing and cementing regulations proposed at 6 NYCRR § 560.6(c)(16)-(17). The recommendations listed above for the overall casing and cementing requirements at 6 NYCRR § 560.6(c)(10) should also apply to production casing and cementing.

### 6 NYCRR § 560.6(c)(20)-(21) Pressure Testing Prior to Hydraulic Fracturing

**Revised Proposed Regulation:** NYSDEC proposes two new requirements at 6 NYCRR § 560.6(c)(20)-(21) to pressure test prior to hydraulic fracturing. The proposed test procedure requires a pressure test of downhole and surface equipment at:

*“...the maximum anticipated treatment pressure for at least 30 minutes with less than a 10 percent pressure loss” [emphasis added].*

The proposed regulation concludes that a successful pressure test is one that leaked at a rate of less than 10% over a period of 30 minutes.

While pressure readings may initially fluctuate during a pressure test (+/-10%) until the pressure is stabilized, a pressure test should not be determined to be successful if the pressure dropped at a rate of 10% over a 30 minute period. A continued pressure drop indicates a leak. Instead, the operator should ensure that the pressure stabilizes and holds constant for a 30 minute period.

Mechanical integrity tests should be run at 110% of the maximum anticipated treatment pressure to provide an additional safety margin.

NYS's proposed regulations do not require tubing strings to be tested or require any specific action after a failed pressure test.

**Recommendation:** 6 NYCRR § 560.6(c)(20)-(21) should be revised to include these requirements:

4. Prior to conducting hydraulic fracturing operations in a well, mechanical integrity tests shall be run at 110% of the maximum anticipated treatment pressure. The test shall be run for a sufficient period of time to allow the pressure to stabilize at that required test pressure. Once the pressure stabilizes, the operator must monitor the pressure gauge to ensure the pressure remains stable for a full 30 minutes.

5. Mechanical integrity tests shall be conducted on casing strings and tubing strings planned for use in hydraulic fracturing treatments.
6. If a mechanical integrity test fails, the operator shall remedy the failure and repeat a pressure test until successful.

#### 6 NYCRR § 560.6(c)(22) HVHF Design and Monitoring

**Revised Proposed Regulation:** NYSDEC's proposed regulation at 6 NYCRR § 560.6(c)(22) requires a HVHF treatment plan to be submitted to the Department 3 days prior to a HVHF operation. There is no Department review or approval of the HVHF treatment plan required.

As proposed, the HVHF treatment plan needs to include only a profile showing anticipated pressures and volumes of fluid for pumping the first stage and a description of the planned treatment interval for the well (*i.e.*, top and bottom of perforations expressed in both True Vertical Depth and True Measured Depth).

There is no requirement to model the HVHF treatment to ensure the job will not fracture out-of-zone; nor is there any follow-up on whether the job was successful or failed. More specifically, 6 NYCRR § 560.6(c)(22) does not require the owner/operator to: estimate the vertical and horizontal fracture length using a three-dimensional model; verify that HVHF design and actual implementation in the field match; and notify NYSDEC if the actual vertical and/or horizontal fracture length greatly exceeds the job design, such that risk may be present to the environment.

**Prior Comment and Response:** Our 2012 Recommendations requested that NYSDEC require the owner/operator to: estimate the vertical and horizontal fracture length using a three-dimensional model; verify that HVHF design and actual implementation in the field match; and notify NYSDEC if the actual vertical and/or horizontal fracture length greatly exceeds the job design, such that risk may be present to the environment. Harvey Report Recommendations Nos. 32-36; Myers Report at 8-12.

NYSDEC responded that it did require a hydraulic fracture stimulation model to be run [Response 6194], but a search of the proposed regulation for the term "hydraulic fracture stimulation model" or even the term "model" shows no such requirement exists.

The 2012 Recommendations pointed out that because fracture treatments may be executed several thousand feet below the surface of the earth, and can only be indirectly observed, it is important for engineers to have a 3D model to guide design. California's proposed hydraulic fracturing regulations call for fracture radius analyses to verify that no fracturing fluids or hydrocarbons will migrate into a strata or zone that contains protected water and require operators to utilize modeling that will simulate the projected fracture height growth.<sup>31</sup> While 3D modeling is not an exact science, the model provides an engineer with an estimating method for predicting both horizontal and vertical fracture length. Data collected during drilling, well logging, coring, and other geophysical activities and HVHF implementation can be used to continuously improve the model quality and predictive capability.

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<sup>31</sup> California Dep't of Conservation, Pre-Rulemaking Discussion Draft Hydraulic Fracturing Regulations at 3, [http://www.conservation.ca.gov/dog/general\\_information/Documents/121712DiscussionDraftofHFRregs.pdf](http://www.conservation.ca.gov/dog/general_information/Documents/121712DiscussionDraftofHFRregs.pdf).

We explained that HVHF treatments in thin shale zones increase the risk of fracturing out-of-zone unless a very cautious approach is taken by tailoring the design to the geophysical properties of the shale, taking into account shale thickness, local stress conditions, compressibility, and rigidity. For example, Marcellus Shale thickness lessens substantially in western NYS to less than 75' for roughly one-third of the total anticipated development area.<sup>32</sup>

The RDSGEIS agreed that in new areas hydraulic fracture model development and design is important, citing recommendations from the Ground Water Protection Council and its consultant ICF. Yet, incongruously, the RDSGEIS concludes it is unnecessary for operators to be required do this work in NYS.

The RDSGEIS requires the operator to abide by only a 1000' vertical offset from protected aquifers and collect data during the HVHF job to evaluate whether the job was implemented as planned.<sup>33</sup>

Knowing whether a job was implemented as planned is helpful only if the initial design is protective of human health and environment. If the job is poorly planned, and is implemented as planned, that only proves that a poor job was actually implemented.

Instead, NYSDEC needs to first verify that the operator has engineered a HVHF treatment that is protective of human health and environment, and then, second, verify that the job was implemented to that protective standard. A rigorous engineering analysis is a critical design step. Proper design and monitoring of HVHF jobs is not only best practice from an environmental and human health perspective; it is also good business because it optimizes gas production and reduces hydraulic fracture treatment costs.

The RDSGEIS assumes that any HVHF job, no matter the volume, no matter the pressure, and no matter the shale thickness, will be safe, as long as it is conducted at a depth below 2,000'. Yet, the RDSGEIS lacks technical and scientific data to support the hypothesis that all HVHF treatments, regardless of design, at 2000' or deeper will be safe or identify a safe horizontal fracture length.

**Recommendation:** We support the 6 NYCRR § 560.6(c)(22) requirement for a treatment plan to be submitted to NYSDEC; however, the treatment plan should be substantially more robust, including a requirement for that plan to be developed using a 3D model and submitted to the Department for review and approval prior to commencing HVHF operations. It appears from NYSDEC Response 6194 that the Department intends to implement such a requirement, but the current text of the proposed regulation does not impose it.

More specifically, the regulation should require the owner/operator to:

1. Collect additional geophysical and reservoir data to support a reservoir simulation model;
2. Develop a high-quality 3D reservoir model(s) to safely design fracture treatments;
3. Maintain and run hydraulic fracture models prior to each fracture treatment to ensure that the fracture is contained in zone;
4. Estimate the maximum vertical and horizontal fracture propagation length for each well, and submit technical information (e.g. model output) with its application to support its computations;

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<sup>32</sup> 2009 NYSDEC, DSGEIS, Figure 4.9.

<sup>33</sup> 2011 NYSDEC, RDSGEIS, Page 5-88.

5. Design the HVHF treatment to mitigate vertical propagation out-of-zone and prevent fractures from intersecting with existing improperly constructed and improperly abandoned wells and transmissive faults and fractures, which can provide pollutants a direct pathway to protected groundwater resources;
5. Collect and carefully analyze data from HVHF treatments to optimize future HVHF treatments;
6. Describe in its post-well completion report whether the predicted vertical and horizontal fracture propagation lengths were accurate, or note discrepancies;
7. Certify that the actual HVHF job was implemented safely, and fracture propagations did not intersect protected aquifers or nearby wells; and
8. Immediately notify NYSDEC if the actual vertical and/or horizontal fracture length greatly exceeds the job design, such that risk may be present to the environment.

### 6 NYCRR § 560.6(c)(23)-(24) Hydraulic Fracturing Fluid Chemical Limitations

**Revised Proposed Regulation:** NYSDEC proposes a regulation that limits the use of hydraulic fracturing fluids to those chemicals listed in an operator's approved permit [6 NYCRR § 560.6(c)(23)] and prohibits the use of diesel [6 NYCRR § 560.6(c)(24)].

As proposed, 6 NYCRR § 560.6(c)(23) is a meaningless regulation because it allows industry to propose any chemical it wants to use in hydraulic fracturing. As long as it is listed on the permit it can be used. The only exception is diesel.

Therefore, an owner/operator could use any chemical proposed in its permit application (except diesel), even if it is a carcinogen, highly toxic, or otherwise known to be harmful to human health or the environment.

While NYSDEC proposed regulation 6 NYCRR § 560.3(d)(1)(viii) requests industry to examine chemical additives that exhibit reduced aquatic toxicity and pose a lower risk, there is no mandatory requirement to use those chemicals and the NYCRR does not provide specific criteria for determining whether a reduction in toxicity offers an acceptable reduction in risk.

If an operator proposes a chemical additive that is known to impact the environment and be persistent if it remains in the environment, but the operator proposes no other alternative, or states that this is the only chemical that will be effective for its planned job, neither the RDSGEIS or the NYCRR prohibits the operator from using this chemical, even if it is harmful.

As proposed, the NYCRR would still allow the use of a highly toxic chemical, as long as it was slightly less toxic than the most toxic chemical available. This is not best practice. Best practice would be to use the chemical with the lowest impact and risk, not just a slightly improved risk. Best practice would also be for NYSDEC to develop a list of prohibited chemicals that pose an unacceptable risk to human health and the environment.

Although the percentage of hydraulic fracturing fluid that is composed of chemicals may be small—typically 0.5 to 2 percent of the total volume required for a Marcellus Shale hydraulic fracture stimulation—the absolute volume of chemicals used is very large. A typical Marcellus Shale well may require the use of more than five million gallons of freshwater for drilling and hydraulic fracturing. A five-million-gallon hydraulic fracture treatment would require approximately 25,000 to 100,000 gallons of hydraulic fracturing chemicals per well at a chemical additive dosage of 0.5 to 2 percent. Some of

these chemicals are toxic, including known or possible human carcinogens, chemicals regulated under the Safe Drinking Water Act due to their risks to human health, and chemicals regulated under the Clean Air Act as hazardous air pollutants.<sup>34</sup>

**Prior Comment and Response:** While we support NYSDEC's proposal to prohibit the use of diesel fuel as a hydraulic fluid treatment additive, NYSDEC does not propose to prohibit the use of any other specific hydraulic fracturing treatment chemicals as requested in our 2012 Recommendations. See Harvey Report at Recommendations Nos. 37-39; Miller Report Recommendation No. 8. We requested that NYSDEC:

*Develop a list of prohibited fracture treatment additives based on the known list of chemicals currently used in hydraulic fracturing. The list of prohibited fracture treatment additives should apply to all hydraulic fracture treatments, not just HVHF treatments. NYSDEC should also develop a process to evaluate newly proposed hydraulic fracturing chemical additives to determine whether they should be added to the prohibited list. No chemical should be used until NYSDEC and/or the NYSDOH has assessed whether it is protective of human health and the environment, and has determined whether or not it warrants inclusion on the list of prohibited hydraulic fracturing chemical additives for NYS. The burden of proof should be on industry to demonstrate, via scientific and technical data and analysis, and risk assessment work, that the chemical is safe. Fracture treatment additive prohibitions should be included in the SGEIS as a mitigation measure and codified in the NYCRR.*

*The NYSDEC should re-examine the additives used in hydraulic fracturing and conduct a much more detailed analysis of the risk of these compounds. Specifically, acrylamide and acrylonitrile, a carcinogenic and exclusively anthropogenic compound used in hydraulic fracturing, should be measured in flowback water, and an assessment made as to whether and/or how use of this compound should be permitted. The conclusions of such analysis should be included in the SGEIS as a mitigation measure and codified in the NYCRR.*

Other commenters also recommended that NYSDEC specifically prohibit the use of any substances that are known carcinogens, endocrine disruptors, or contain BTEX. [Comments 6118, 6120, 6202, 6121, and 6122].

NYSDEC agreed that diesel fuel should be prohibited because of its known human health hazards, but rejected all other recommendations to restrict the type of hydraulic fracturing chemicals use. [Responses 6118, 6120, 6202, 6121, and 6122].

Inconsistently, NYSDEC concludes that it make sense to prohibit diesel because of the human health hazards associated with using diesel (it is a known carcinogen), but rejects the idea of prohibiting other chemicals that are known to be hazardous to human health or the environment. NYSDEC does not respond to Dr. Miller's specific request to prohibit carcinogens such as acrylamide and acrylonitrile. It is inconsistent to prohibit one type of carcinogen and not another.

NYSDEC states, without scientific or technical justification, that:

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<sup>34</sup> United States House of Representatives, Committee on Energy and Commerce, Minority Staff, Chemicals Used in Hydraulic Fracturing, April 2011.



*The Department does not agree that requiring additional assessments for each proposed fracturing fluid would measurably add to the protection of the public health or the environment. [Response 6122].*

.At the very least, new assessments should be prepared for chemicals not listed as proposed fracturing fluid constituents in the RDSGEIS. Manufacturers and processors of newly developed additives should be required to prove the safety of the additives before NYSDEC allows them to be used in fracturing treatments.

Refusing to impose any other chemical limitations, NYSDEC relies solely on prevention measures (e.g. setbacks, buffers, exclusion areas, secondary containment, etc.) to prevent hazardous chemicals from reaching humans or sensitive environmental receptors.

*The approach taken in the proposed regulations and assumes that hydraulic fracturing fluid additives, if released into the environment, may pose some potential impact that depends on site-specific circumstances. Therefore, the requirements contained in the proposed regulations, Chapter 7 and Appendix 10 of the rdSGEIS, including setbacks, buffers, exclusion areas, secondary containment requirements, inspection and preventative maintenance protocols, and well construction requirements, are included as precautionary measures that are intended to reduce and/or prevent any releases and environmental and human exposures. This approach addresses a broader range of potential impacts than attempting to apply a toxicity or hazard characterization to any specific chemicals, since all chemicals are toxic at some exposure level. Regardless of additive composition, the potential impacts from the chemicals utilized in hydraulic fracturing are mitigated by the required design and operational controls to prevent releases and exposures. Therefore, prohibiting specific chemicals or additives is not necessary. [Response 6121; emphasis added].*

NYSDEC does not explain why a combination of prevention measures and chemical prohibitions is not a lower risk, more prudent approach.

Comment 6201 requested that NYSDEC periodically test hydraulic fracturing fluid used on actual stimulation jobs to ensure that the chemicals used are the same ones listed by industry in its disclosure. NYSDEC rejected the recommendation to audit the chemicals actually used. [Response 6201].

**Recommendation:** We support the prohibition on use of diesel at 6 NYCRR § 560.6(c)(24). We do not support NYSDEC's proposal at 6 NYCRR § 560.6(c)(23) to allow any other chemicals to be used in hydraulic fracturing if it is merely listed in a permit application. NYSDEC should do the following.

1. Develop a list of prohibited fracture treatment additives based on the known list of chemicals currently used in hydraulic fracturing. The list of prohibited fracture treatment additives should apply to all hydraulic fracture treatments, not just HVHF treatments.
2. Develop a process to evaluate newly proposed hydraulic fracturing chemical additives to determine whether they should be added to the prohibited list.
3. Require the burden of proof to be on industry to demonstrate, via scientific and technical data and analysis and risk assessment work, that any newly proposed hydraulic fracturing chemical is safe.

4. Prohibit any chemical from use in a hydraulic fracturing treatment until NYSDEC and/or the NYSDOH has assessed the industry's toxicity studies and other documentation concerning the impact of the chemical on human health and the environment and has determined whether or not it warrants inclusion on the list of prohibited hydraulic fracturing chemical additives for NYS.
5. Include fracture treatment additive prohibitions at 6 NYCRR § 560.6(c)(23).
6. Periodically test hydraulic fracturing fluid used on actual stimulation jobs to ensure that the chemicals used are the same ones allowed.

#### 6 NYCRR § 560.6(c)(26) Secondary Containment

**Revised Proposed Regulation:** NYSDEC proposes secondary containment requirements at 6 NYCRR § 560.6(c)(26).

**Recommendation:** We support the proposed regulation at 6 NYCRR § 560.6(c)(26); however, the requirement should also state that secondary containment materials must be chemically resistant to deterioration and compatible with the materials stored. This will prevent chemical spills into secondary containment from leaking through the containment barrier.

#### 6 NYCRR § 560.6(c)(26) Hydraulic Fracturing Operational Procedures

**Revised Proposed Regulation:** 6 NYCRR § 560.6(c)(26) proposes that a number of operational limitations, monitoring, and testing procedures be implemented during a hydraulic fracturing operation.

However, NYSDEC did not include any limitation on the depth where a HVHF job could commence.

**Prior Comment and Response:** Our 2012 Recommendations requested that NYSDEC justify its proposal to allow HVHF wells as long as they are conducted below 2,000' TVD and 1,000' below the base of potable water. Harvey Report Recommendation No. 35; Myers Report at 25. Our 2012 Recommendations pointed out that the 1,000' vertical offset proposed by ICF was not technically supported, and a horizontal buffer zone is also needed. We recommended that vertical and horizontal offsets be based on actual field data, 3D reservoir simulation modeling, and a peer-reviewed hydrological assessment and recommended these steps be taken to ensure aquifers are protected and nearby wellbore intersections are avoided.

The RDSGEIS did not provide technical justification for the proposed minimum 1,000' vertical offset, nor did it make a recommendation for a horizontal offset from existing wells. Instead, the RDSGEIS requires only that the operator abide by a 1000' vertical offset from protected aquifers and collect data during the HVHF job to evaluate whether the job was implemented as planned.<sup>35</sup> The RDSGEIS provided data, however, showing that HVHF treatments in the Marcellus Shale have propagated vertical fractures up to 1500' in length and that horizontal fractures can extend hundreds to thousands of feet. This data does not support the proposed buffers.

The RDSGEIS assumes that any HVHF job, no matter the volume, no matter the pressure, and no matter the shale thickness, will be safe as long as it is conducted at a depth below 2,000'. The RDSGEIS recommends that site-specific SEQRA reviews be limited to wells shallower than 2000' and within 1000'

<sup>35</sup> 2011 NYSDEC, RDSGEIS, Page 5-88.

of a protected aquifer.<sup>36</sup> The RDSGEIS lacks technical and scientific data to support the hypothesis that all HVHF treatments, regardless of design, at 2000' or deeper will be safe.

Neither the 2009 DSGEIS nor the 2011 RDSGEIS contained site-specific NYS Marcellus Shale hydraulic fracture model data to support NYSDEC's conclusion that a 1,000' vertical separation will be protective in all cases in NYS, especially where thinner, shallower shales are present. Furthermore, the RDSGEIS lacks data on vertical and horizontal fracture propagation in the Marcellus Shale at depths between 2000' and 5000' (depths at which NYSDEC proposes to permit HVHF).

The use of vertical offset limits to separate hydrocarbon recovery operations from protected aquifers must be scientifically and technical supported. While it is possible that a 1,000' vertical offset may be sufficiently protective, the RDSGEIS does not provide sufficient scientific data or technical examination to support this recommended threshold.

In addition to understanding the maximum vertical fracture propagation height, horizontal fracture propagation distance is an important consideration, especially when developing shallower shale zones. Fractures in shallower formations will tend to propagate on the horizontal plane. HVHF treatments should be designed to prevent fractures from intersecting with existing improperly constructed and improperly abandoned wells, and transmissive faults and fractures, which can provide pollutants a direct pathway to protected groundwater resources.

**Recommendation:** We support the proposed improvements at 6 NYCRR § 560.6(c)(26); however, these requirements should apply to all hydraulic fracture treatments, not just HVHF treatments, and therefore should also be included in Part 554.

Additionally, 6 NYCRR § 560.6(c)(26) should include a limitation on the depth where a HVHF job could commence. The regulation should include the following:

1. Initial HVHF treatments should be completed in the deepest, thickest sections of the Marcellus Shale (below 4,000'), maximizing the vertical separation from drinking water aquifers and maximizing data collection on overlying drinking water aquifers and geologic barriers that will limit fracture propagation, before development in shallower zones is permitted.
2. Initially, smaller fracture treatments should be used as tests. These treatments can be increased in size over time, if data support the conclusion that large fracture treatments can remain in zone.
3. Use data collected during drilling and HVHF treatments in the Marcellus Shale below 4,000' deep to populate an accurate field-calibrated 3D reservoir simulation model to examine whether HVHF treatments are likely to remain in zone at shallower and thinner intervals.
4. Revise the regulations at a later date to approve shallower HVHF treatments, if technical and scientifically supported.

### 6 NYCRR § 560.6(c)(27) Hydraulic Fracturing Flowback Handling

**Revised Proposed Regulation:** 6 NYCRR § 560.6(c)(27) proposes the use of close-loop tank systems for HVHF flowback. The regulation states that:

<sup>36</sup> 2011 NYSDEC, RDSGEIS, Page 7-59.

*“Flowback water is prohibited from being directed to or stored in any on-site pit or impoundment.”*

While the regulation prohibits hydraulic fracturing fluid impoundments “on-site,” it is unclear whether or not this prohibits the use of centralized impoundments.

**Prior Comments and Response:** As explained in more detail in comments at 6 NYCRR § 750-3.11(f)(1) below, our 2012 Recommendations requested that centralized impoundments be prohibited because of the risk of surface and ground water contamination and because they are major sources of air pollution.

**Recommendation:** We support the proposed improvements at 6 NYCRR § 560.6(c)(27); however, we request that 6 NYCRR § 560.6(c)(27) be revised to clearly prohibit centralized waste impoundments in addition to waste impoundments on or near the well pad.

Additionally these requirements should apply to all hydraulic fracture treatments, not just HVHF treatments, and should also be included in Part 554.

### 6 NYCRR § 560.6(c)(28)–(29) Air Pollution Controls

**Revised Proposed Regulation:** 6 NYCRR § 560.6(c)(28)-(29) proposes the mandatory use of self-ignited flare systems and reduced emission completions (“green completions”) during HVHF treatments.

**Recommendation:** We support the proposed improvements at 6 NYCRR § 560.6(c)(28)-(29); however, these requirements should apply to all hydraulic fracture treatments, not just HVHF treatments, and should also be included in Part 554.

### 6 NYCRR § 560.6(c)(26)(ix) Hydraulic Fracturing Report

**Revised Proposed Regulation:** NYSDEC’s proposed regulation at 6 NYCRR § 560.6(c) requires a hydraulic fracturing report to be submitted.

**Recommendation:** We support the requirement for a hydraulic fracturing report to be submitted; however, we recommend that the entire report be submitted to NYSDEC (not just a synopsis) and that the report include the following information, in addition to the information NYSDEC proposes:

1. Total hydraulic fracturing fluid and proppant volumes used in the well.
2. Type and volume of base fluid used in the hydraulic fracturing treatment.
3. Type and volume of all chemicals added to the base fluid and used in the hydraulic fracturing treatment.
4. Maximum surface treating pressure observed during the hydraulic fracturing treatment, and annulus pressure and surface casing pressure.
5. A copy of the contractor’s hydraulic fracturing treatment field ticket.

6 NYCRR § 560.6(c)(26)(ix), including the proposed revision above, should apply to all oil and gas wells that hydraulically fractured, not just to HVHF wells; therefore, these improved requirements should be included in Part 554.

### 6 NYCRR § 560.7 (a) Waste Removal Timing

**Revised Proposed Regulation:** NYSDEC proposes a requirement to remove waste from the well pad within 45 days 6 NYCRR § 560.7(a).

**Recommendation:** We support the 45-day timeline for waste removal proposed at 6 NYCRR § 560.7(a); however, this requirement should apply to all oil and gas wells and all hydraulic fracture treatments, not just HVHF treatments, and should be included in Part 554.

### 6 NYCRR § 560.7(c) and (g) On-site Burial of Cuttings

**Revised Proposed Regulation:** NYSDEC proposes a requirement at 6 NYCRR § 560.7(c) to prohibit onsite burial of drill cuttings contaminated with oil-based muds or polymer-based muds containing mineral oil lubricants, except that some Marcellus Shale cuttings may be buried pursuant to 6 NYCRR § 560.7(g).

**Prior Comments and Response:** Our 2012 Recommendations requested that onsite burial of cutting be prohibited. If allowed by NYSDEC, we recommended that burial be limited to cuttings that do not contain NORM and are not coated with drill muds containing mercury, heavy metals, and other chemical additives and that NYCRR be expanded to provide specific instruction on how to properly dispose of contaminated drill cuttings. Harvey Report Recommendations No. 44, 82, and 83.

**Recommendation:** We support the proposed requirement set forth at 6 NYCRR § 560.7(c) to prohibit onsite burial of drill cuttings contaminated with oil-based muds or polymer-based muds containing mineral oil lubricants. However, we recommend that NSYDEC specifically prohibit onsite cuttings burial if the cuttings contain NORM or mercury. We do not support any onsite burial of Marcellus Shale cuttings because they contain NORM.

6 NYCRR § 560.7(c) should include specific instruction on how to properly dispose of contaminated drill cuttings.

These requirements should apply to all oil and gas wells and all hydraulic fracture treatments, not just HVHF treatments, and should be included in Part 554.

### 6 NYCRR § 560.7(i) and (k) Flowback, Soil, and Equipment Testing for NORM

**Revised Proposed Regulation:** NYSDEC proposes a requirement at 6 NYCRR § 560.7(i) and (k) to test flowback, soils, and equipment for NORM at the well pad. However, the testing requirements do not include testing for polonium or instructions on how to properly treat and dispose of waste containing NORM.

**Prior Comments and Response:** Our 2012 Recommendations requested NORM testing and testing for polonium, and instructions on how to properly treat and dispose of waste containing NORM. Miller Report Recommendations No. 1-5, and 7-8; Harvey Report Recommendations No. 73-78.

**Recommendations:** We support the proposed requirements at 6 NYCRR § 560.7(i) and (k) for NORM testing; however, the requirements should be expanded to include the following:

1. Provide specific treatment and disposal instructions for flowback, soil, and equipment contaminated with NORM.

2. All components of the gross alpha radioactivity should be identified.
3. Test for polonium.
4. Specify the analytical test methods required.
5. Specify the frequency for equipment testing (instead of just saying a schedule prescribed by the Department).
6. Explicitly state that land and road spreading of waste containing NORM is prohibited.

This requirement should apply to all oil and gas wells and all hydraulic fracture treatments, not just HVHF treatments, and should be included in Part 554.

### 6 NYCRR § 560.7(l) Reclamation Plans

**Revised Proposed Regulation:** NYSDEC proposes site reclamation requirements at 6 NYCRR § 560.7(l). However, the reclamation plan requirements have no criteria specified other than the requirement to submit a plan (on an unspecified timeline) with unspecified contents, to be approved by the Department (using unspecified approval criteria) at a date (unknown). There is no timeline set for when partial or final reclamation is required and no definition provided as to the difference between partial and final reclamation.

**Recommendation:** We support the requirement at 6 NYCRR § 560.7 (l) for a reclamation plan to be submitted and approved by NYSDEC; however, the plan submittal timing, contents, and approval criteria should be clearly stated; the terms “partial” and “final reclamation” should be defined; and the timeframe for completion should be specified.

These requirement should apply to all oil and gas wells and all hydraulic fracture treatments, not just HVHF treatments, and should be included in Part 554.

The information required to be submitted to the Department pursuant to 6 NYCRR § 560.7 should be made publicly available on NYSDEC.

### 6 NYCRR § 750-3.2(b)(19) Definition of Formation Fluids

**Revised Proposed Regulation:** NYSDEC added a new definition for “formation fluids” in the 2011 proposed regulations. There is no revision proposed in this subsection.

NYSDEC’s current regulations define formation fluids as:

*6 NYCRR § 750-3.2(b)(19): Formation fluids means fluids in a liquid or gaseous physical state, present within the pore spaces, fractures, faults, caverns, or any other spaces of formations, whether or not naturally occurring or injected therein.*

**Prior Comment and Response:** Comment 5769 recommended deleting this definition, because the term did not appear in the 2011 proposed regulations. NYSDEC declined to delete it because the regulations now do use the term. Because the Revised Proposed Regulations do use the term, it is important that NYSDEC get the definition correct.

**Recommendation:** 6 NYCRR § 750-3.2(b)(19) should be revised to read: “Formation fluids means fluids in a liquid state or containing dissolved gases, present within the pore spaces, fractures, faults, caverns, or any other spaces of formations, whether or not naturally occurring or injected therein.”

### 6 NYCRR § 750-3.2(b)(21) Definition of Fresh Water Supply

**Revised Proposed Regulation:** NYSDEC added a new definition for “fresh water supply” at 6 NYCRR § 750-3.2(b)(21).

*6 NYCRR § 750-3.2(b)(21): Fresh water supply means those groundwaters having a chloride concentration equal to or less than 250 mg/l or a total dissolved solids concentration equal to or less than 1,000 mg/l.*

**Prior Comment and Response:** NYSDEC’s proposed addition to the NYCRR did not respond to the comments in the Myers Report and the Harvey Report recommending that NYSDEC adopt the EPA standard for an Underground Source of Drinking Water (USDW) when defining fresh water supplies. [Myers Report at 4-6; Harvey Report at 12-14.] In addition to NYSDEC’s proposal to protect fresh water including groundwater having a chloride concentration equal to or less than 250 mg/l or a total dissolved solids concentration equal to or less than 1,000 mg/l, Harvey recommended that the protected groundwater standard be expanded to include all water also protected under the federal USDW program, up to and including a 10,000 ppm TSD threshold. [Harvey Report at 14, Recommendation No. 5.] Harvey explained that NYSDEC’s proposed definition of fresh water did not include water with less than 10,000 ppm TDS but greater than 1,000 ppm TDS, meaning that NYS’s proposed regulations would not protect waters that could qualify as USDWs under the Safe Drinking Water Act.<sup>37</sup> Harvey also recommended that the USDW standard be used as a minimum threshold to be consistent with federal law, and that NYSDEC should propose more protective standards for New York State if needed to protect the State’s future water supply needs if the threshold is found insufficient. [Harvey Report at 13-14, Recommendation Nos. 3-5.]

In addition, the use of two different terms for fresh water, “fresh water supply” in 6 NYCRR § 750-3.2(b)(21), and “potable fresh water” in 6 NYCRR § 550.3(au), is confusing. Although they are in separate regulatory parts, it is inconsistent to use two different terms which are defined by virtually the same standard: waters with a chloride concentration equal to or less than 250 mg/l or a total dissolved solids concentration equal to or less than 1,000 mg/l.

**Recommendation:** The definition of “fresh water supply” in subsection 750-3.2(b)(21) should adopt the definition that we have proposed for 6 NYCRR § 550.3(au). The new definition should provide: “‘Protected groundwater’ shall mean potable fresh water and all underground sources of drinking water, as defined in 40 CFR §§ 144.3, 146.4.” All instances of “fresh water supply” in 6 NYCRR § 750-3 should be revised accordingly.

<sup>37</sup> 40 CFR §§ 144.3, 146.4.

**6 NYCRR § 750-3.3(a)(1) Setbacks from Unfiltered Drinking Water Supplies within Which HVHF Well Pads Are Prohibited**

**Revised Proposed Regulation:** 6 NYCRR § 750-3.3(a)(1) prohibits well pads for HVHF operations within 4,000' of, and including, an unfiltered surface drinking water supply watershed and states that no SPDES permits will be issued authorizing well pads for HVHF operations or discharges in that buffer area.

**Prior Comment and Response:** NYSDEC did not adequately address Comment 3837, which recommended that the regulations clarify whether HVHF activities will be prohibited underneath the watershed as well as on the surface. In its response, NYSDEC clarified that the setback in 6 NYCRR § 750-3.3(a)(1) applies to well pads at the surface only and does not prohibit HVHF subsurface activities under either the 4,000' buffer area or the drinking water supply watersheds themselves. NYSDEC did not acknowledge the concern that 4,000' buffers may not prevent migration of contaminants underneath unfiltered drinking water supply watersheds, particularly when the well site and associated activities (as opposed to the well pad *per se*) may still lie within 4,000' and subsurface HVHF activities may occur within 4,000'. Permitting drilling underneath unfiltered drinking water supplies significantly threatens the New York City watershed, and such a threat may cause EPA to retract its filtration avoidance determination.

**Recommendation:** NYSDEC should revise 6 NYCRR § 750-3.3(a)(1) to prohibit all surface and subsurface HVHF activities within 4,000' of, and including, an unfiltered surface drinking water supply and to require operators to analyze the local hydrogeology to demonstrate that the groundwater divide would not allow transport of contaminants into any unfiltered surface water supply watershed from activities proposed within one mile of the 4,000' setback.

**6 NYCRR § 750-3.3(a)(2) Setbacks from Primary Aquifers within Which HVHF Well Pads Are Prohibited**

**Revised Proposed Regulation:** 6 NYCRR § 750-3.3(a)(2) prohibits well pads for HVHF operations within 500' of, and including, a primary aquifer and states that no SPDES permits will be issued authorizing well pads for HVHF operations or discharges in that buffer area.

**Prior Comment and Response:** NYSDEC did not address comments in the Myers Report recommending that wells be set back at least 4,000' from primary aquifers, which is the same as the regulated distance proposed by NYSDEC around unfiltered surface drinking water supply watersheds. [Myers Report at 23-24.] If the groundwater in the bedrock connects with the aquifer, the potential exists for rapid transport of contaminants from a spill through fractures to the aquifer. Since the risk to primary aquifers is the same as to unfiltered drinking water supply watersheds - the contamination of sources of public water supply - setbacks around primary aquifers should be the same as those around unfiltered, surface public water supplies.

In Response 2453, NYSDEC states that the proposed setbacks are meant to “conservatively add an additional layer of protection to [] water resources from significant adverse impacts from potential surface spills or other releases” and that “the magnitude of the setback should also reflect the magnitude of the potential risk and the potential harm.” 500' setbacks around primary aquifers do not satisfy these goals. In addition, NYSDEC provides no scientific or technical justification for the adequacy of 500' setbacks.

**Recommendation:** NYSDEC should revise 6 NYCRR § 750-3.3(a)(2) to increase setbacks around primary aquifers to at least 4,000'.



**6 NYCRR § 750-3.3(a)(3) Prohibition of HVHF Well Pads within 100-year Floodplains**

**Revised Proposed Regulation:** 6 NYCRR § 750-3.3(a)(3) prohibits well pads for HVHF operations within 100-year floodplains and states that no SPDES permits will be issued authorizing well pads for HVHF operations or discharges in those floodplains.

**Prior Comment and Response:** As noted in our 2012 Recommendations, prohibiting HVHF operations within 100-year floodplains is insufficient. For wells that might operate for 30 years, there is a 26% chance of a 100-year flood occurring during the period the well would be operated. [Myers Report at 24; Knowlton Report at 2-3.] Instead, HVHF activities should be prohibited within 500-year floodplains and the regulations should specify approved sources for floodplain information and location. In Response 6131, NYSDEC rejected this contention, asserting that a prohibition within 100-year floodplains is adequately protective of potential flooding impacts. NYSDEC does not, however, provide any scientific or technical justification responding to the concerns outlined in the Myers and Knowlton Reports. In addition, NYSDEC does not acknowledge its concession in the RDSGEIS that although the Federal Emergency Management Agency (FEMA) is currently updating Flood Insurance Rate Maps (FIRMs) in several high-flood areas in the state. Increased frequency and magnitude of flooding due to the advent of extreme precipitation events and an overall increase in average precipitation has raised concerns regarding the reliability of existing FIRMs in the Susquehanna and Delaware River basins.<sup>38</sup> NYSDEC does not address this concern in Response 6131, stating only that “FEMA Floodplain Insurance Rate Maps are one source of information discussed [in the RDSGEIS].”

Although Response 6131 states that 6 NYCRR § 560.3 has been revised to provide a notice period during which local officials can inform NYSDEC of site-specific issues, this does not afford sufficient protection to floodplains. First, this provision has not been incorporated into Part 750 regulations governing SPDES permits. Second, “the opportunity to mention areas outside the 100-year floodplain that are known to be susceptible to flooding and where the Department should consider mitigation measures” is inadequate. [Response 6131.] This regulatory approach improperly relies on local officials to put NYSDEC on notice of the potential flood risk to drilling outside 100-year floodplains and assumes that local officials have knowledge of such risks.

The Myers Technical Memorandum, attached as Appendix A, points out that floodplain mapping is required by FEMA for primary waterway channels. A watershed consists of smaller drainages and wetlands that are not included in FIRMs and these control the flow and contribute substantial amounts of the sediment produced in floods. The Myers Technical Memorandum advises that runoff and erosion from hill slope areas can present a risk of contamination should gas development occur there. Of particular importance is the finding stated in this Memorandum that climate variability and landscape management at small scales has the most effect on flow pathways. Much of the landscape in the New York portions of the Delaware River and Susquehanna River basins, including the Catskills, is characterized by small subwatersheds that do not tip the threshold requirement for FEMA mapping. Without mapping the floodplains for these small drainages, increased flood flows, erosion and stream channel changes, and pollution from gas activities is a greater risk and can greatly impair efforts downstream to control flood flows.

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<sup>38</sup> 2011 NYSDEC, RDSGEIS, Page 2-33.

Appendix A addresses additional comments on the inadequacy of the prohibition of HVHF operations in 100-year floodplains in 6 NYCRR § 750-3.3(a)(3).

**Recommendation:** NYSDEC should revise 6 NYCRR § 750-3.3(a)(3) to prohibit HVHF operations and the issuance of SPDES permits for activity or discharge within 500-year floodplains. NYSDEC also should revise 6 NYCRR § 750-3.3(a)(3) to require the mapping of the floodplain for smaller drainage areas that do not require FIRMs under FEMA; the maps should be produced by the applicant based on the presence of riparian soils through standard soil testing analysis.

#### 6 NYCRR § 750-3.3(a)(4) Setbacks from Public Drinking Water Sources within Which HVHF Well Pads Are Prohibited

**Revised Proposed Regulation:** 6 NYCRR § 750-3.3(a)(4) prohibits well pads for HVHF operations within 2,000' of any public drinking water supply well, reservoir, natural lake, man-made impoundment, or spring, and states that no SPDES permits will be issued authorizing well pads for HVHF operations or discharges within those buffer areas.

**Prior Comment and Response:** NYSDEC did not address comments in the Myers Report recommending that wells be set back at least 4,000' from public drinking water sources, which is the same as the regulated distance proposed by NYSDEC around unfiltered surface drinking water supply watersheds and our recommended distance from both principal and primary aquifers. [Myers Report at 23-24.] In addition, the Myers Report recommended that HVHF operators be required to identify the capture zone for flow to the well and identify the five-year transport distance contour. [Myers Report at 24.] If the public drinking water supply well could draw contaminants from a spill at a gas well site, that gas well should not be sited in that location.

**Recommendation:** NYSDEC should revise 6 NYCRR § 750-3.3(a)(4) to increase setbacks around public drinking water supply wells, reservoirs, natural lakes, man-made impoundments, and springs to at least 4,000', and should require operators to identify the capture zone for flow to the well, as well as the five-year transport distance contour. If these data show that the drinking water well could draw contaminants from a spill at the gas well, then the well pad should be prohibited within the capture zone.

#### 6 NYCRR § 750-3.3(a)(5) Setbacks around Public Drinking Water Supply Intakes within Which HVHF Well Pads Are Prohibited

**Revised Proposed Regulation:** NYSDEC revised 6 NYCRR § 750-3.3(a)(5) to prohibit well pads for HVHF operations within 2,000' around a public drinking water supply intake in flowing water, with an additional prohibition of 1,000' on each side of the main flowing waterbody and any upstream tributary to that waterbody for a distance of one mile from the public drinking water supply intake, and to state that no SPDES permits will be issued authorizing well pads for HVHF operations or discharges in those buffer areas.

**Prior Comment and Response:** Although we support explicit setbacks around waterbodies and tributaries that feed into public drinking water supplies, there are significant problems with the revised 6 NYCRR § 750-3.3(a)(5) language.

First, the protection around public drinking water supply intakes in flowing water should be 4,000' to sufficiently protect these resources. This is consistent with our 2012 Recommendations and current

recommendations of 4,000' buffers around primary and principal aquifers. [LBG Report at 7; Harvey Report at 136, Recommendation No. 68.] Public water supplies and primary and principal aquifers should all be afforded the same level of protection. NYSDEC did not respond to our 2012 Recommendations suggesting this setback increase.

Second, the prohibition on HVHF operations within 1,000' on either side of main flowing waterbodies and their upstream tributaries for a distance of one mile from public drinking water supply intakes does not afford sufficient protection to those public drinking water supplies. Numerous perennial and intermittent streams lead to public drinking water supplies, but are outside the one-mile buffer around the water supply intake. These tributaries beyond one mile do not receive the protection of 6 NYCRR § 750-3.3(a)(5) and instead fall under 6 NYCRR § 750-3.11(d), which allows HVHF operations near perennial and intermittent streams over a mile from the public drinking water supply intake within a 300' buffer, as long as the HVHF operator obtains an individual SPDES permit instead of an HVHF general permit (GP). These revisions reduce protections afforded under the 2011 proposed regulations, in which subparagraph 750-3.3(b)(4) contained explicit prohibitions on HVHF operations within 2,000' of *any* public water supply intake, and subparagraph 750-3.21(f)(4) included an additional 500' buffer within which an individual SPDES permit was required for the entire remaining length of streams tributary to surface public drinking water supplies. The reduced buffer area is insufficient to protect both the tributaries that lead to public drinking water supplies and the terminal drinking water supplies themselves. NYSDEC has provided no scientific evidence or reasoned explanation justifying the reduction in setback distance for perennial and intermittent streams more than a mile from public water supply intakes from 500' to 300' or showing that such a reduced buffer is sufficient to protect these waterbodies or the public drinking water supplies that they feed.

Third, the draft SPDES General Permit for Stormwater Discharges is inconsistent with the current proposed regulations. It does not contain a provision for the prohibition of HVHF within 2,000' of a public drinking water supply intake or the additional prohibition of 1,000' on each side of the main waterbody and any upstream tributary to that water body for a distance of one mile from the public drinking water supply intake. NYSDEC should revise the draft SPDES General Permit for Stormwater Discharges to reflect its final setback regulations.

**Recommendation:** NYSDEC should increase setbacks around public drinking water supply intakes in all main flowing waterbodies to at least 4,000', while retaining the 1,000' setback on each side of the main waterbody and any upstream tributary within a mile of the intake. For upstream tributaries more than a mile from the intake, NYSDEC should reinstate a 500' setback. This setback should be provided for in 6 NYCRR § 750-3.3(a)(5), however, not in 6 NYCRR § 750-3.11(d). In addition, the draft SPDES General Permit for Stormwater Discharges must be revised to reflect NYSDEC's final setback regulations.

#### **6 NYCRR § 750-3.3(a)(6) Setbacks from Private Water Supplies within which HVHF Well Pads Are Prohibited**

**Revised Proposed Regulation:** NYSDEC revised 6 NYCRR § 750-3.3(a)(6) to prohibit well pads for HVHF operations within 500' of private water wells, domestic use springs, and water supplies for crops or livestock and to state that no SPDES permits will be issued authorizing well pads for HVHF operations or discharges within those buffer areas.

**Prior Comment and Response:** NYSDEC did not acknowledge or respond to our 2012 Recommendations requesting that NYSDEC establish 4,000' setbacks around private drinking water

supplies. [LBG Report at 7; Harvey Report at 136, Recommendation No. 68.] It is unclear why unfiltered drinking water supplies and public water supplies should be afforded a higher level of protection than private wells. All public and private drinking water supplies should have equivalent setbacks. NYSDEC also did not adequately address comments in the Myers Report and Harvey Report objecting to any provision allowing private water well owners to waive setbacks around their wells, which has been deleted from 6 NYCRR Part 750 and added to 6 NYCRR § 560.4(c) as an NYSDEC variance with landowner consent. [Myers Report at 24; Harvey Report at 132, Recommendation No. 64.] Authorizing NYSDEC to grant a variance to setback requirements permitting drilling near private water sources endangers public health and safety. Instead of analyzing these risks, NYSDEC simply stated in Response 4405 that it does not agree that allowing landowners to permit drilling near private wells endangers water quality, and that protections in the RDSGEIS and the ECL will adequately protect water sources and the environment. NYSDEC has not, however, provided any scientific or technical justification for its conclusion.

**Recommendation:** NYSDEC should revise 6 NYCRR § 750-3.3(a)(6) to increase setbacks around private water wells, domestic use springs, and water supplies for crops or livestock to at least 4,000'. NYSDEC should remove the provision referencing the variance exception from 6 NYCRR § 750-3.3(a)(6), and should amend 6 NYCRR § 560.4(c) to remove the provision authorizing NYSDEC to grant a variance to setback requirements with the written consent of landowners and tenants, essentially permitting well owners to waive setbacks around private water supplies that may have connections to other private water wells.

### 6 NYCRR § 750-3.3(b) Measuring Setbacks

**Revised Proposed Regulation:** 6 NYCRR § 750-3.3(b) requires all setbacks in subparagraph 750-3.3(a) to be measured from the closest edge of the HVHF well pad.

**Prior Comment and Response:** NYSDEC did not adequately respond to our 2012 Recommendations requesting that NYSDEC require all setbacks to be measured from the edge of the well site, which, according to the definition in 6 NYCRR § 750-3.2(52), includes the contiguous disturbed area and ancillary facilities around the well pad. Our 2012 Recommendations also stated that NYSDEC should require all wells on the well site to be centered on the well pad and set back at least 100' from the pad edge to maximize setbacks from sensitive receptors. [Harvey Report at 137, Recommendation No. 72.] In Response 6136, NYSDEC did not explain why setbacks, which "are designed to provide an added level of protection from potential surface spills from a well pad," must therefore be "measured from the closest edge of the well pad instead of the drill site."

**Recommendation:** NYSDEC should specify that setbacks are measured from the edge of the well site, as defined in proposed 6 NYCRR § 750-3.2(52). Wells should be centered on the well pad and set back at least 100' from the pad edge to maximize well setbacks from sensitive receptors.

### 6 NYCRR § 750-3.5(b) and (c) Exception to the Requirement for a SPDES Permit

**Revised Proposed Regulation:** 6 NYCRR § 750-3.5(b) permits NYSDEC to allow HVHF operations without the requirement of a SPDES permit when the Department determines that injection into a HVHF well will not result in degradation to ground or surface water resources. 6 NYCRR § 750-3.5(c) provides that NYSDEC may base that determination primarily on the requirement that the top of the target fracture

zone is deeper than 2,000' below the ground surface and deeper than 1,000' below the base of a known fresh water supply.

6 NYCRR § 750-3.1 states that all HVHF operations, meaning all wells that will fracture their target formation by injecting more than 300,000 gallons of HVHF fluid under pressure into the formation, as defined in 6 NYCRR § 750-3.2(b)(22), require a SPDES permit. However, section 750-3.5(b) exempts HVHF injections for well stimulation from the SPDES permit requirement if they satisfy four conditions, the most important of which is a Department determination, set forth at 6 NYCRR § 750-3.5(b)(2), "that such injection will not result in the degradation of ground or surface water resources." NYSDEC is authorized by the proposed Part 750 regulations to base its no-degradation determination on compliance with the separation requirements set forth in subsection 740-3.5(c)(1).

**Prior Comment and Response:** NYSDEC has ignored our 2012 Recommendations expressing concern that NYSDEC, in both the RDSGEIS and its proposed regulations, continues to insist that HVHF operations below 2,000' are safe because New York State does not have any drinking water supplies below 850', even though the RDSGEIS does not show that NYSDEC has examined the availability of drinking water resources below 850'. [Harvey Report at 13.] In fact, the RDSGEIS itself states that potable water is found deeper than 850'.<sup>39</sup> In addition, NYSDEC's assumption that there are no drinking water supplies below 850' does not take into account that under the federal definition of a USDW, drinking water can exist at depths below 850'.

NYSDEC also ignored all of the comments provided in the Myers Report regarding the potential for upward movement of contaminants. Myers concluded that hydraulic fracturing could result in movement of fluids from the Marcellus formation approximately 4,920' (1500 meters) below the surface to shallow groundwater in less than 10 years, if the proper conditions manifest.<sup>40</sup> [Myers Report, Appendix B at 58-60.] (This is further addressed in a peer-reviewed report by Myers published in the publication *Groundwater*.<sup>41</sup>) In addition, NYSDEC should be considering new geochemical evidence found in Pennsylvania that links the Marcellus formation brine to shallow aquifers,<sup>42</sup> as well as recent research

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<sup>39</sup> 2011 NYSDEC, RDSGEIS, Page 2-23.

<sup>40</sup> The appendix to the Myers Report since has been published in the journal *Ground Water*. See Myers, T. (2012) Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers. *Ground Water*. DOI: 10.1111/j.1745-6584.2012.00933.x.

<sup>41</sup> Myers, Tom, (2012) Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers, *Groundwater*: 1-11.

<sup>42</sup> Warner, N.R., Jackson, R.B., Darrah, T.H., Osborn, S.G., Down, A., Zhao, K., White, A., and Vengosh, A. (2012) Geochemical Evidence for Possible Natural Migration of Marcellus Formation Brine to Shallow Aquifers in Pennsylvania. *Proceedings of the National Academy of Sciences* 109(30): 11961-11966. Warner et al. stated in their abstract that "[w]e present geochemical evidence from northeastern Pennsylvania showing that pathways, unrelated to recent drilling activities, exist in some locations between deep underlying formations and shallow drinking water aquifers." *Id.* at 11961. It is important to note that these pathways exist even without hydraulic fracturing and potential out-of-formation fracturing or other means of activating existing faults. In their final paragraphs, they state that "the coincidence of elevated salinity in shallow groundwater with a geochemical signature similar to produced water from the Marcellus formation suggests that these areas could be a greater risk of contamination from shale gas development because of a preexisting network of cross-formational pathways that has enhanced hydraulic connectivity to deeper geological formations." *Id.* at 11965.

which concludes that vertical movement of fluids from the Marcellus formation to shallow groundwater is possible.<sup>43</sup> These three studies are evidence that it is not proper to conclude that fracking below 2,000' below the ground surface will not pollute shallow groundwater. In addition, EPA is currently examining evidence and completing models of the potential for vertical movement of hydraulic fracturing fluid or formation fluid to near-surface aquifers.<sup>44</sup> While the subject of potential vertical flow from the Marcellus formation remains controversial, NYSDEC has no scientific basis for its assumption, embodied in regulation, that hydraulic fracturing will not degrade groundwater if it occurs deeper than 2000' and at least 1000' below fresh water supplies.

Comments 6136, 4027, 5788, 5826, 5845, and 6968 address this depth limit in various ways, but NYSDEC does not defend its depth choice either against comments that it is too stringent or not stringent enough. Moreover, NYSDEC has not provided a scientific basis to justify linking its SPDES permit exception for HVHF injections to one specified fracture zone separation requirement for all wells in the Marcellus and Utica shale plays.

**Recommendation:** NYSDEC should amend 6 NYCRR § 750-3.5(b) to require individual SPDES permits for most HVHF operations. In addition, NYSDEC should set standards in 6 NYCRR § 750-3.5 that require an operator to maintain a mandatory vertical buffer and to provide the Department with scientific and technical analyses verifying that the vertical buffer is adequately protective. This analysis should include a survey for nearby faults and an examination of upward vertical gradients.<sup>45</sup> NYSDEC should amend 6 NYCRR § 750-3.5(c) to include requirements for the operator to demonstrate either that there are no faults within a mile of the well bore or that there is no vertical gradient. Absent such a showing, the SPDES permit exception provided for in subsection 750-3.5(c) would not be applicable. Specifically, NYSDEC should revise 6 NYCRR § 750-3.5(c) to say:

*750-3.5(c) At a minimum, in order for the department to make a determination that the injection will not result in the degradation of ground or surface water resources pursuant to paragraph 750-3.5(b)(2) of this Part:*

*(1) the top of the target fracture zone, at any point along any part of the proposed length of the wellbore, for HVHF must be deeper than 2,000 feet below the ground surface and must be deeper than 1,000 feet below the base of a known freshwater supply; and*

*(2) the operator must show with reasonable certainty that:*

*(i) there are no fault or fracture zones within 5280 feet (one mile) of the well bore, including the horizontal well bore, that could allow vertical transport of fluids; or*

*(ii) there is not an upward vertical gradient which could cause an upward movement of fluids at any zone above the target formation; and*

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<sup>43</sup> Rozell, D.J., and Reaven, S.J. (2012) Water Pollution Risk Associated with Natural Gas Extraction from the Marcellus Shale, *Risk Analysis* 32(8): 1382-1393. Rozell and Reaven estimated that an expected value of approximately 7,000 cubic feet (200 cubic meters) of contaminated fluid would be released from specific gas wells into local waters. *Id.* at 1389.

<sup>44</sup> EPA's Study of Hydraulic Fracturing Resources and Its Potential Impact on Drinking Water Resources, U.S. EPA, <http://www.epa.gov/hfstudy/index.html> (last updated Jan. 10, 2013).

<sup>45</sup> See the Myers Report for discussion of both vertical gradients and faults, and the need to map both.

*(3) the owner or operator must have measures in place to ensure compliance with the requirements of paragraphs 750-3.7(k)(1), (2), (3), (4), (6), and (7) of this Part and subdivisions 750-3.7(l), (m), and (n) of this Part.*

#### 6 NYCRR § 750-3.6(d) and § 750-3.7(k)(4) Fluid Disposal Plan

**Revised Proposed Regulation:** 6 NYCRR §§ 750-3.6(d) and 750-3.7(k)(4) require the operator to develop and submit a fluid disposal plan.

While we approve of NYSDEC requiring each operator to develop a plan for disposal of wastewater prior to commencing HVHF operations, the “wastewater disposal plan” is not properly defined anywhere in the regulations. Requirements for an “approvable” plan are similarly absent. Previous draft regulation section 750-3.12(b) outlined requirements for disposal plans and offered guidelines for disposal options that operators may identify in their plans. This provision has been inexplicably removed from the regulations, leaving no definition or guidelines for fluid disposal plans.

Additionally, the fluid disposal plan does not address all wastes from HVHF operations, some of which will include solid wastes with the same chemicals and radioactive materials as the fluid wastes.

**Recommendation:** NYSDEC should include in its regulations requirements for disposal options and specifically identify the necessary components of an “approvable” fluid disposal plan. NYSDEC should also require an approvable disposal plan which addresses all other wastes from HVHF operations, including drill cuttings and muds. These plans should be made publicly available on NYSDEC’s website.

#### 6 NYCRR §§ 750-3.7(l), 750-3.12(b), and 750-3.12(e) Naturally Occurring Radioactive Materials

**Revised Proposed Regulation:** NYSDEC has removed all mention of NORM from 6 NYCRR § 750-3.7(l) and § 750-3.12(b) and (e). Language requiring testing of water recovered after HVHF operations and of soil from the surrounding site has been moved to 6 NYCRR § 560.7(i).

**Prior Comment and Response:** We support mandatory testing for NORM of flowback water and production brine recovered during and after HVHF operations, as well as nearby soils, prior to removal from the site. NYSDEC, however, has not adequately addressed comments in the Miller Report, which recommended that NYSDEC specifically address treatment and management methods for waste with high levels of NORM in the SGEIS and codify these mitigation measures in regulation. [Miller Report at 1115.]

In Response 3904, NYSDEC stated that 6 NYCRR § 730-3 includes disposal requirements for various types of HVHF wastewater, including characterizing the waste and identifying its chemical concentration. This response overlooks the fact that NYSDEC has neither set a standard for safe levels for NORM in the flowback water, production brine, or soil, nor established handling and disposal requirements for fluid waste with high levels of NORM. NYSDEC’s Response 3441, intended to address all comments regarding fluid disposal plans, also does not address these issues. Response 3441 only outlines the requirements for a fluid disposal plan codified in the proposed regulations. It does not respond to our concerns about high NORM levels or explain why these concerns have been ignored.

**Recommendation:** NYSDEC should revise its proposed Part 750 regulations to establish a standard for safe levels of NORM and require that any fluids produced during or after the HVHF process that do not meet that standard be treated as radioactive waste under New York's Hazardous Waste Management regulations.

### 6 NYCRR § 750-3.7(o) Dedicated Groundwater Monitoring Plan

**Revised Proposed Regulation:** NYSDEC proposed a new requirement at 6 NYCRR § 750-3.7(o):

*6 NYCRR § 750-3.7(o): The department **may** require that an approvable groundwater monitoring program be developed and implemented [emphasis added].*

The use of the term “may” in this regulation allows NYSDEC to require monitoring with dedicated monitoring wells, but does not explicitly mandate that the Department must do so. What qualifies as “an approvable groundwater monitoring program” also has not been specified. It is unclear whether the well and spring sampling required under 6 NYCRR § 560.5(d), standing alone, would satisfy the requirements of this provision in instances that the department chooses to require a groundwater monitoring program.

**Prior Comment and Response:** NYSDEC refers to groundwater monitoring at several points in its responses to comments. For example, NYSDEC incorrectly claims that “the revised regulations at 6 NYCRR 750-3 require an approvable groundwater monitoring program be developed and implemented.” [Response 3784.] This program is not mandatory but instead is optional under the current Revised Proposed Regulations.

In Response 6146, NYSDEC references the requirement as providing the opportunity for it to consider hydrogeology and potential contaminant transport. The problem is that the regulations do not prescribe how the operator should develop that information, which renders these optional monitoring requirements ineffective for protecting aquifers.

In our 2012 Recommendations, we requested groundwater monitoring, as set forth in the Myers Report at 17-18:

- *The operator should prepare a conceptual flow path model for groundwater and contaminant transport from the drill pad to and through nearby aquifers.*
- *As part of the conceptual model, the operator should estimate the distance that a contaminant would travel from the well pad in various time periods, including one month, six months, one year, and five years.*
- *Dedicated groundwater monitoring wells should be reasonably located along and perpendicular to the projected flow path out to the five-year travel distance. At a minimum, there should be a transect of monitoring wells/piezometers at the one-month travel distance from the well and halfway between the well and important receptors, meaning wells or discharge points such as springs or streams.*
- *Monitor wells should span the surface aquifer and piezometers should have multiport sampling capabilities for twenty foot intervals at the top of the saturated zone and every 100 feet to the bottom of the freshwater zone. This will help establish vertical concentration and hydraulic gradients.*



- *The monitoring system should be established to establish [i.e., collect] baseline data including seasonal variability for at least one year prior to drilling and [hydraulic fracturing].*

NYSDEC did not respond to these comments. Additionally, the Myers Report at pages 18-19 recommended that NYSDEC establish a plan to monitor potential transport of contaminants from the shale or very deep in the well bore to the surface:

*Monitoring transport from the deep shale is more difficult because a substantial flux of contaminants could be released from most anywhere in the fractured shale as a result of oil and gas development. Time intervals for transport could be more than 100 years, but fractures could decrease the time frame to as short a time as a few years. Fracture zones therefore could be monitored, but if they are known the industry should avoid [hydraulic fracturing] near them, both to avoid vertical transport and induced seismicity. It is therefore reasonable to require a dedicated monitoring well in the middle of each well pad wherever there is an upward flow gradient.*

- *Industry should establish a multipoint piezometer system from the shale to the bottom of the freshwater zone in the center of all well pads.*
- *The industry should provide the funding to maintain the piezometers system for at least 100 years beyond the end of gas production, to account for the long potential travel times.*

NYSDEC did not respond to these recommendations.

The need for monitoring using dedicated monitoring wells has become more widely accepted. The National Groundwater Association has taken a position in favor of dedicated monitoring wells: “Integrated groundwater monitoring programs using dedicated wells at both the regional and local scale should be developed to establish baseline conditions, and to determine long-term trends in both water quality and quantity in active oil and gas producing areas.”<sup>46</sup> Dedicated monitoring wells established prior to development can partially obviate the need for monitoring water supply wells, in addition to avoiding the problems with using production wells for monitoring purposes. The purpose of monitoring is to minimize the chance that aquifers are contaminated to avoid the significant cost of remediation and replacement of water resources once they are degraded, and to identify possible problems and potential movement of contaminants before they reach the water supply so that any problems can be addressed before the supply actually becomes contaminated.

A primary reason to require monitoring prior to operations is to establish a baseline water quality for the zones where development will occur. Failure to collect baseline data is often a reason to dispute the results of monitoring or sampling that indicates that development has caused observed degradation. For example, EPA has been unable to rule out that methane had existed in domestic wells prior to gas well development at Pavillion,, WY.<sup>47</sup>

<sup>46</sup> National Groundwater Association, (NGWA), Hydraulic Fracturing: Meeting the Nation’s Energy Needs While Protecting Groundwater Resources, Position Paper, November 2011.

<sup>47</sup> DiGiulio, D..C, Wilkin, R.T., Miller, C. and Oberly, G., (2011) DRAFT: Investigation of Ground Water Contamination near Pavillion, Wyoming. U.S. Environmental Protection Agency, Office of Research and Development, Ada, OK. A lack of baseline data for water wells in Pennsylvania was the reason Davies was able to

NYSDEC's proposed requirement for one baseline sample from wells up to a mile from the site will not establish the seasonal variability for many constituents; it will be useful only for chemicals for which presence/absence is the primary monitoring issue. The U.S. Department of Energy recommended that operators collect baseline data prior to well development. Their reasons include "establishing facts and verifying contamination claims."<sup>48</sup>

The layout of the dedicated monitoring wells should include consideration of the likely travel pathways for contaminants. The operator should submit a conceptual model of the flow pathways so that the monitoring wells are located near the centerline of the likely pathways, accounting for gradient and geologic formations including faults and fractures.

Just as the spatial layout of a monitoring system should be designed to minimize the chance that a plume could pass without being detected, it is important to sample all of the geologic layers through which a contaminant could pass. Each transmissive formation must be screened separately so that samples are representative of only a specific layer. Because a leak could occur anywhere along the borehole or from the horizontal portion within the target formation, all of the formations should be monitored. This is necessary if the source of the leak is to be determined. It is also necessary to target remediation efforts to the aquifer volume actually contaminated. Practicality and cost may limit the monitoring to the formation layers within the freshwater aquifer zone, however.

The monitoring well system must be sampled frequently enough after development to minimize the chance that a plume will pass between sampling events. Monitoring times should consider contaminant travel times:

Dependent on groundwater conditions and the nature of the release, contaminant occurrence in drinking water supplies **may lag, by months or years**, oil and gas well installation and hydraulic fracturing. Monitoring, financial responsibility, and liability provisions related to oil and gas development should be cognizant of the actual travel times observed in natural hydrologic systems.<sup>49</sup>

A temporary leak that does not disperse as it moves with the groundwater flow may pass a site in just a few days whereas a continuous leak may cause a slow increase in concentration occasionally diluted by natural recharge. Even once stopped, a substance that leaked for several years may appear in monitoring

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disagree with the findings of Osborn et al., even though Osborn et al. documented that water wells nearer the hydraulically fractured wells had significantly higher gas concentrations. Baseline data collection would have decreased the disagreements as to whether gas development had degraded these wells. *Compare* Davies, R.J. (2011) Methane contamination of drinking water caused by hydraulic fracturing remains unproven. Proceedings of the National Academy of Sciences USA 108:E871; Osborn SG, Vengosh A, Warner NR, Jackson RB (2011) Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing. Proceedings of the National Academy of Sciences pnas:1100682108.

<sup>48</sup> US Department of Energy (USDOE) (2011) Secretary of Energy Advisory Board. Shale Gas Production Subcommittee. Second Ninety-Day Report – November 18, 2011, at 7; US Department of Energy (USDOE) (2011) Secretary of Energy Advisory Board, Shale Gas Production Subcommittee, Ninety-Day Report – August 11, 2011.

<sup>49</sup> National Groundwater Association, (NGWA), Hydraulic Fracturing: Meeting the Nation's Energy Needs While Protecting Groundwater Resources, Position Paper, November 2011 (emphasis added).

systems for decades due to variable transport rates.<sup>50</sup> A quarterly sampling frequency is acceptable only if transport calculations show that it is unlikely that contamination from a spill could pass the monitoring well between sampling events. There also should be a plan to increase sampling frequency if a parameter of interest begins to increase or exceed standards. Additionally, monitoring wells should include continuous sampling of specific conductivity, pH, and water level so that the time frames associated with recharge events and the potential short-term leak can be recorded and considered.

**Recommendation:** The dedicated groundwater monitoring plan recommended below is in addition to the spring and well sampling as specified in 6 NYCRR § 560.5(d), as amended by our recommendations on that section. NYSDEC should revise 6 NYCRR § 750-3.7(o) as follows:

*For each well pad, the Department shall require that the operator to develop a groundwater monitoring program that meets the following objectives:*

- (1) Provide for monitoring each aquifer layer from the ground surface through the freshwater zone to at least one aquifer below the zone of freshwater.*
- (2) Monitor contaminant flow along the most likely flow pathway downgradient from the well pad. At least two downgradient wells with the capacity to sample from each of the zones specified in (1) shall be constructed.*
- (3) At least one upgradient well shall be constructed in the zones specified in (1).*
- (4) The monitoring program shall be established long enough before oil or gas development to provide for determining a baseline, as described in (5).*
- (5) Monitoring of the established wells shall occur quarterly for a year prior to development on the well pad.*
- (6) Monitoring shall continue quarterly for at least two years after the last well is established at the well pad. Subsequent to that period, sampling should occur annually and continue for at least five years after the final well on the pad has been abandoned properly.*
- (7) If at any time one or more of the parameters being monitored increases or otherwise changes more than would be expected from the baseline sampling, the sampling frequency shall be increased.*
- (8) Notify potentially affected nearby residents and all water end users immediately of any potential contamination of their water supplies.*
- (9) Require implantation of a monitoring plan consistent with the requirements of 6 NYCRR § 650.2(d) [amended pursuant to our recommendations on that subsection].*

In addition, NYSDEC should adopt the recommendations in our comments provided above on 6 NYCRR § 750-3.7(o) and previously recommended by the Myers Report.

### 6 NYCRR § 750-3.8 Monitoring Requirements in HVHF SPDES Permits

**Revised Proposed Regulation:** NYSDEC has revised 6 NYCRR § 750-3.8(b)-(e) to require HVHF operators to keep on-site records of stormwater discharge, water usage, chemical additives used in the

<sup>50</sup> Ridley, M. and MacQueen, D., (2005) Cost-effective Sampling of Groundwater Monitoring Wells: A Data Review and Well Frequency Evaluation. In Proceedings: American Society of Civil Engineers, Anchorage AK, May 15 through May 19, 2005; Johnson, P., Lundegard, P. and Liu, Z., (2006) Source zone natural attenuation at petroleum hydrocarbon spill sites – 1: Site-specific assessment approach. Ground Water Monitoring and Remediation 26(4): 82-92.

HVHF process, flowback and production brine, and wastewater, to be furnished to NYSDEC on request. NYSDEC has removed from 6 NYCRR § 750-3 the monthly compilations provision, previously found in subparagraph 750-3.13(g), which required operators to compile monthly and daily total volumes of flowback water, production brine, and sanitary wastewater collected and transported off-site from the well pad, as well as analytical results for any flowback water samples taken. In addition, the monitoring requirements do not require reporting of the recorded data to NYSDEC.

**Prior Comment and Response:** NYSDEC ignored our 2012 Recommendations, which stated that there should be periodic filings with NYSDEC of the on-site records so that the public can monitor compliance and systematic academic studies can be undertaken. [Myers Report at 28.] It is insufficient just to record the categories of data identified in the regulation without reporting them to the Department. We also recommended that these periodic filings be compiled electronically for ease of submission and public access.

Comment 7006 recommended making reports documenting quantities of water and their sources available to the public on a website using GIS technology. In Response 5880, NYSDEC asserted that the regulations at 6 NYCRR § 750-3 include an “appropriate level” of monitoring requirements. This Response is inadequate to address concerns about regulatory compliance and public access to the records.

Further, in Response 5953, NYSDEC stated that all documents it receives under section 750-3.8 would be available to the public, subject to the limitations of the Freedom of Information Law (FOIL). NYSDEC refused to require that records be available online. Instead, it stated that the “draft HVHF GP requires that ‘The NOI, SWPPP and inspection reports required by the general permit are public documents that the owner or operator must make available for review and copying by any person within five (5) business (sic) of the owner or operator receiving a written request by any such person to review the NOI, SWPPP or inspection reports. Copying . . . will be done at the requester’s expense.’” This Response, however, overlooks the fact that on-site monitoring records are submitted to NYSDEC only upon its request. The public is therefore unable to access records that NYSDEC does not request and cannot easily access even those records that it does. Even if NYSDEC does request certain monitoring records, the public would need to be aware that NYSDEC possesses the documents and submit a FOIL request each time they wished to view monitoring data. It is unacceptable to ask the public to chase down a private owner or operator to obtain public records. NYSDEC also does not even set a limit on the cost the owner or operator could charge to copy the records. Contrary to the Department’s proposal, this information should be readily available to the public at no cost without special request. Pennsylvania posts semiannual discharge reports on its website,<sup>51</sup> as do other states. There is no reason that New York should not utilize the same procedure.

We further disapprove of the removal of the monthly compilations provision in previous section 750-3.13(g). NYSDEC should continue to require these compilations and allow the public to monitor the transport of all sanitary and non-domestic wastewater produced on-site and shipped off-site.

**Recommendation:** NYSDEC should reinsert the monthly compilation requirement in 6 NYCRR § 750-3.8(c)(6), and include a requirement that all operators must post the filings each month on a publicly accessible website maintained by NYSDEC. NYSDEC also should require monthly electronic public filings of all records required by 6 NYCRR § 750-3.8. In addition, NYSDEC should require the operator

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<sup>51</sup> Electronic Discharge Monitoring (eDMR) System, PADEP, <http://www.portal.state.pa.us/portal/server.pt/community/edmr/17879> (last visited Jan. 11, 2013).