

Submitted via electronic mail

December 15, 2008

Attn: Scope Comments
Bureau of Oil & Gas Regulation
NYSDEC Division of Mineral Resources
625 Broadway, Third Floor
Albany, NY 12233-6500

Re: *EARTHWORKS' OGAP comments on the New York State Department of Environmental Conservation's Draft Scope for the Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas, and Solution Mining Regulatory Program*

Dear Sir or Madam:

The following comments are submitted by the Oil & Gas Accountability Project, a program of EARTHWORKS, on the above referenced Draft Scope document. These comments are in addition to the comments submitted jointly by NRDC et al, which we endorse, and focus on issues not covered in those comments.

We appreciate the relative comprehensiveness of the Draft Scoping document and the specific attention to the range of likely impacts resulting from development of the Marcellus shale. We agree with the document's identification of what, in our experience across a number of states, represent the three biggest sources of impacts to soil, water and air: drilling, hauling of fluids and disposal of drilling waste.

It is our view, however, that the level of likely impact from Marcellus gas development and/or the effectiveness of any required mitigation will be at least as dependent upon the regulatory regime in place and the capacity and political will of the agency to implement that regime. In our review of the Draft Scoping document, we see no evidence that this issue has been considered or included as part of the intended analysis. Therefore, we offer the following comments for consideration as the department moves forward with the scoping process.

1. Regulatory regime

We continue to be perplexed by statements made by personnel representing the department that New York has one of the strongest sets of oil and gas regulations in the country. (See, for example, DEC Commissioner's 10/15/08 testimony to the NYS Assembly, p. 4, <http://www.dec.ny.gov/energy/47910.html>.) Our staff has direct experience with the oil and gas rules in a number of states, and it is our view, after reviewing the applicable New York rules, that these rules are considerably weaker than comparable rules in other states with substantial oil and gas development.

Because we keep hearing and reading these statements about the quality of the New York rules, we undertook a direct comparison of the main rules governing drilling in Colorado, New Mexico and New York. That comparison is included as Attachment 1 to these comments. We believe that these states more closely match New York in their reliance on a state agency, as opposed to local governments, to regulate this industry. By way of contrast, Texas, which has the Barnett shale development, affords local governments with far more authority, so that a city such as Fort Worth has an extensive oil and gas ordinance, for example.

This comparison, we believe, illustrates the relative weakness of the New York rules. For example, the New York rules allow the use of lined drilling pits to hold drilling and stimulation fluids, regardless of location. We have been unable to locate any testing or sampling data from soils beneath pits in New York, but the results from testing in both Colorado and New Mexico are that drilling pits, whether lined or not, uniformly contaminate the soils underneath them, and often contaminate any surface or ground water in close proximity to the pit. Likewise, in the areas of setbacks from watercourses and wells, spills reporting and clean-up standards, the New York regulations are either weaker or non-existent. Finally, we note that the New York rules define pollution in a way that allows degradation of the soil and water around a well site, whereas both Colorado and New Mexico have incorporated a non-degradation standard into their rules.

Based upon this comparison, we believe that the Draft Scoping document should assume a relatively weak set of regulations, and consequently, should assume that the likely impacts to soil and water will be higher than would be the case with a stronger set of regulations.

2. Fracturing Fluids

We are also concerned by the apparent assumption on the part of DEC personnel that the technique of hydraulic fracturing has been demonstrated to be benign. To be clear, there have been no independent, peer-reviewed studies that have demonstrated that fracturing fluids are confined to the formation in which they are injected.¹ As the Garza case in Texas has demonstrated, hydraulic fracturing is not a precise science, being akin to trying to hammer a dinner plate into equal pieces.² Nor have there been any independent, peer-reviewed studies demonstrating the safety of the chemical constituents used during fracturing. The industry is simply allowed to proceed without having to make such a demonstration, usually under the rubric that they use mostly sand and water.

Yet, the evidence is mounting that the constituents used in fracturing are not benign, from a health perspective. We have attached, as Attachment 2, a recent review by TEDX of more than 400 chemical constituents identified within fracturing fluids used during natural gas development. This review raises two issues relevant to this scoping process. First, the chemicals reported to be used in hydraulic fracturing are associated with numerous adverse health effects. Therefore, the scoping document should err on the side of greater potential impacts to human health. Second, the TEDX review highlights the lack of information about many of the fracturing fluid constituents on the MSDSs. We have heard and seen DEC assertions that the agency will “require” disclosure of these constituents. However, our review of the New York rules finds no such requirement. The DEC website provides information regarding well data confidentiality and cites to the Technical Guidance Memo 90-3. There is no provision provided that addresses the

¹ The Groundwater Protection Council presentation posted on the DEC website was prepared by an industry consultant and cites only industry sources or undocumented charts and tables. The council, itself, is closely tied to state oil and gas agencies and the industry.

² Coastal Oil & Gas Corp. and Coastal Oil & Gas USA LP v. Garza Energy Trust, et al., S.Ct. of Texas case No. 05-0466.

industry's claims to be able to not disclose the make-up of fracturing fluids. In light of Halliburton and other service company's aggressive efforts to prevent disclosure, we see no enforceable rule that would overcome this industry objection. Moreover, we see no evidence of a mechanism for providing this information, even if required, to the public, local emergency responders, health authorities or landowners. Therefore, we believe that the scoping document must assume, in the absence of changes to the regulations, that disclosure of the constituents in fracturing fluids will not occur, and therefore, the ability to mitigate contamination or exposure by fracturing fluids will be correspondingly reduced.

3. Staffing Levels

Finally, we question whether the current level of staff in the Oil and Gas Bureau is adequate to handle the significant increase in gas development activity that is likely for the Marcellus shale. Given current budget difficulties, we believe that it is unrealistic to assume an increase in staffing, absent a specific dedicated funding mechanism. Therefore, we believe the scoping document should base its analysis on the assumption that inspections and monitoring are unlikely to be able to ensure compliance with regulations, and that the rules will largely be self-enforced by the gas operators. As a consequence, the impacts from development will likely be significantly greater than if a fully staffed agency were in place.

We appreciate this opportunity to comment and look forward to reviewing the final scoping document in the spring of 2009.

Sincerely,

Bruce Baizel
Senior Attorney and Policy Advisor
EARTHWORKS'OGAP
P.O. Box 1102
Durango, Colorado 81302
970-259-3353

ATTACHMENT 1

Oil and Gas Rules Comparison for New York, Colorado, and New Mexico

Prepared by Renee Lewis Kosnik, J.D.
October 2008
Oil & Gas Accountability Project

Casing:

New York:

§557.2-4

Wells used for injection of gas, air or water or other extraneous fluids shall be cased with “safe and adequate” casing in such a manner as to prevent communication between horizons and water sources. Notices of commencement and cessation of operations to the department. Records of volumes of fluids injected and produced and pressures must be maintained.

§554.1(a) and (e)

General pollution prevention mandate regarding casing programs. Casing programs must be devised so as to prevent communication.

§554.3(a)-(c)

Cable tool drilling practices. Casing shall be tested by bailing to insure shutoff before drilling below the casing point proceeds. Blowout prevention measures should be taken. Any oil and gas encountered above the ultimate objective in sufficient amounts to be considered waste must be shutoff before drilling proceeds. This can be accomplished by mudding, cementation or by the running of a string of casing. Bailing must be employed to ensure shutoff.

§554.4(a)-(d)

On all wells where rotary tools are employed and the subsurface is well known, the operator has the option of running surface casing or of cementing the production casing from below the deepest potable fresh water level to the surface. In areas where the subsurface is unknown, casing programs shall be designed to prevent communication. When surface casing is used, it shall be cemented by the pump and plug or displacement method. In areas where the subsurface is well known, blowout prevention shall be employed and this shall include: master gate valve, blowout preventer, and flowline with shutoff valve of adequate size and pressure. Completion reports and well logs are required.

Colorado:

Rule 317(a)-(p)

- Operator shall take all necessary precautions for keeping a well under control while being drilled or deepened.
- Any blowout prevention equipment (BOPE) shall be listed in the APD, as well as any known subsurface conditions (e.g., under or over-pressured formations). Director may require specific BOPE, if deemed necessary.
- Casing program must be planned and maintained to protect oil and gas horizons from communicating with groundwater.
- Surface casing is required where subsurface conditions are unknown or known and deemed necessary.
- Stage cementing the intermediate and/or production string in lieu of surface casing so as to accomplish the required aquifer protection.
- Minimum compression strength of 300 psi after 24 hrs and 800 psi after 72 hours measured at 95 degrees F and at 800 psi.
- All fresh water aquifers, which are exposed below the surface casing shall be cemented behind the production casing. All such cementing around an aquifer shall consist of a continuous cement extending at least 50 feet below the bottom of the fresh water aquifer, which is being protected to at least 50 feet above the top of this aquifer.
- If drilling is suspended before the string is run, precautions must be taken to prevent communication between horizons and water sources. Cement bond logs required.

New Mexico:

Rule 107(a)-(k)

- Any well shall be equipped with such surface and intermediate casing strings and cement as may be necessary to effectively seal off and isolate all water, oil, and gas strata encountered in the well down to the casing point.
- The string shall also be adequate to protect the oil or gas encountered from leaking.
- Sufficient cement shall be used on the surface casing to fill the annular space to the top of the hole, however, this is left to the discretion of the field personnel.
- All cementing shall be by pump and plug method unless otherwise directed by the Division and shall be of conventional type cement (this can be waived by the division also).
- All casing strings shall be tested and shall remain stationary and under pressure for at least 8 hours after the cement has been placed.
- All casing strings except conductor pipe shall be tested after cementing and before commencing any other operations on the well.
- A report shall be filed for each casing string on the grade and weight used and the results.
- Casing strings for wells with rotary tools shall be pressure tested.
- Minimum casing pressure shall be approximately one-third of the manufacturer's rated internal yield pressure except that the test pressure shall not be less than 600 pounds per square inch and not greater than 1500.
- When combined strings are used, different standards apply.
- Casing strings for cable tools may be tested the same as rotary tools, or may employ bailing the well dry and the well must stay satisfactorily dry for a period of 1 hour.

- The tubing of wells is required for oil and gas wells with casing larger than 2 7/8 inches.
 - Exceptions may be granted and tubeless completions may also be granted under certain circumstances.
 - If it appears a casing may be defective, notice shall be given to the division and measures must be taken to mitigate waste or communication.
 - The well shall be plugged and abandoned if these measures are not successful.
 - Blowout prevention equipment must be employed and maintained and a plan must be submitted to the division.
 - When pulling out strings of casing, the space outside the casing left in the hole shall be kept and left full of mud-laden fluid or cement of adequate specific gravity to seal off all fresh and salt water strata and any strata bearing oil or gas not producing.
 - Well logs, completion and workover reports must be maintained and submitted to the Division.
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Chemical Disclosure:

New York:

No current rule applies.

Colorado:

Rule 205 of the rules basically requires any operator or third party operating in the state to disclose all chemicals used during the drilling, completion, production and fracturing phases (above 500lbs) to the regulating agency or state public health dept. upon request within 72 hours.

New Mexico:

No current rule applies.

Pollution Prevention Certification:

New York:

No current rule applies.

Colorado:

Rule 206 as proposed basically requires all operators in the state to complete and maintain a list that indicates compliance with specific environmental and safety rules. These shall include, but are not limited to, stormwater management, odor management, protection of surface water, management of exploration and production waste, and maintenance of chemical inventory.

New Mexico:

No current rule applies.

Protection of Surface Water Drinking Water Supply Areas:

New York:

No current rule applies specifically to surface water protection identified as protecting public drinking water supply. §554.1(b) provides for the general prohibition of pollution of surface and/or groundwater by oil and gas operations. §553.2 provides for 50 ft setbacks from a public stream, river, or other body of water. While other water protections are provided for under the NY Dept. of Environmental Conservation, it is questionable whether they apply to oil and gas operations. See 6 NYCRR § 595 – 614.

Colorado:

Rule 317(b) of the proposed rules basically provides for a minimum of 500 ft buffer of oil and gas facilities from classified surface waters within a public drinking water supply. Oil and operations shall also be a minimum of 500 ft from a water supply spring or ground water well under the influence of surface water, used as a public water supply. Performance standards are also required for operations within a ½ mile from a classified surface water supply segment for a distance of 5 miles upstream of a public water supply intake or a supply spring or groundwater well under the influence of surface water, used as a public water supply. These standards shall include, but are not limited to pitless drilling systems, baseline water testing and follow-up monitoring, and emergency spill response plans.

New Mexico:

No current rule applies to the protection of waters within a public drinking water supply per se, but stronger pit rules and surface waste rules were recently put into place to address surface and groundwater contamination issues. These rules are discussed below.

Residential Setbacks:

New York:

§553.2 provides for 100 foot setback from “inhabited private dwelling house” without written consent of the owner. This section also provides for a 150 foot setback from “public buildings or areas that may be used as a place of resort, assembly, education, entertainment, lodging, trade, manufacture, repair, storage, traffic or occupancy by the public.”

Colorado:

The statewide residential setback is currently 150 feet as provided in the current version of Rule 603. However, many counties in Colorado have higher setbacks. La Plata is currently the highest with a 400 foot setback. The state is also planning to convene a stakeholder group in 2009 to discuss increasing the statewide setback.

New Mexico:

While the OCD rules provide for various setbacks from residences, schools, etc. depending on the type of equipment in question, New Mexico does not have a specific wellhead from residences setback rule.

Spill/Release Reporting:

New York:

§556.4 provides for verbal and written notification to the N.Y. Dept. of Environmental Conservation in the event of a release that creates a fire or pollution hazard or exceeds 100 barrels of oil in the aggregate, or three mcf of gas in the aggregate.

Colorado:

Rule 906 requires notification for any release over 5 barrels or any release of any size that impacts ground and/or surface water.

New Mexico:

Rule 116 provides that notification to the Division shall be given in the event of any unauthorized release occurring during oil/gas field operations and especially if any release may have the reasonable probability to be detrimental to water. A major release includes any release in excess of 25 barrels and a minor release is anything over 5 barrels but no more than 25 barrels.

Pits:

New York:

While providing for a basic pollution prevention provision, the regulations for waste pits provided in 6 NYCRR § 554.1 do not include drilling fluids. This provision requires a plan for the environmentally safe and proper ultimate disposal of brine, salt water, or other potentially polluting fluids, but exempts drilling fluids from this lot. Waste pits that

contain drilling fluids are not required to be lined or cleaned up and disposed of in a permitted facility, or even monitored for potential seepage into groundwater sources.

Colorado:

Highlights of the proposed revisions to Colorado's pit rules in the 900 Series include lining all pits unless the operator can show that the contents of the pits will not degrade the area groundwater, increased construction requirements to protect the environment from spills and leaks such as a minimum of 2 feet of freeboard at all times and increased thickness of liners, and properly fencing and netting that is designed to protect livestock and wildlife from the hazards of open disposal/storage pits. The rules now require well sites to meet the clean up standards found in Table 910-1 of the 900 Series, which requires sites to be cleaned up to a residential use standard.

New Mexico:

Highlights of New Mexico's Pit Rule found in Part 17 include:

19.15.17.10 SITING REQUIREMENTS:

Established for temporary pits and below-grade tanks; permanent pits; excavated material from pit construction; and on-site closure methods, including but not limited to setbacks to watercourses, lakebeds, sinkholes, or playa lakes; a permanent residence, school, hospital, institution or church in existence at the time of initial application; fresh water wells or springs; municipal fresh water well fields; wetlands; subsurface mines; unstable areas; and 100-year floodplains.

- No temporary pit, below-grade tank, permanent pit, or on-site closure method shall be located where ground water is less than 50 feet below the bottom of the design.

- On-site Closure Methods:

-In-place burial:

Where ground water is between 50 and 100 feet below the bottom of the buried waste and the waste material or stabilized soil, mixing ratio no greater than 3:1, does not exceed the specified closure standards.

Where ground water is more than 100 feet below the bottom of the buried waste and the waste material or stabilized soil, mixing ratio no greater than 3:1, does not exceed the specified closure standards.

-On-site trench burial:

Where ground water is more than 100 feet below the bottom of the buried waste and the waste material or stabilized soil, mixing ratio no greater than 3:1, does not exceed the specified closure standards.

19.15.17.11 DESIGN AND CONSTRUCTION SPECIFICATIONS:

Established requirements and specifications regarding stockpiling topsoil, signs, fencing, and netting.

-Temporary pits: Requires a properly constructed foundation, a 20-mil string reinforced LLPE geomembrane liner or equivalent, and welded liner seams.

-Permanent Pits: Requires a properly constructed foundation, a dual geomembrane liner system with a leak detection system, and welded liner seams. The geomembrane liners shall consist of 30-mil PVC or 60-mil HDPE liner or equivalent.

-Closed-Loop System: Requires an appropriate liner, sumps to facilitate the collection of liquids, and berms to prevent run-on of surface water and fluids.

-Below-grade Tanks: If sidewalls are not visible for leak inspection, the design shall be double walled with leak detection. If sidewalls are visible for leak inspection, the design shall include an automatic high-level shut-off control device and manual controls to prevent overflow and a geomembrane liner to divert leaked liquids to a location that can be visually inspected.

-On-site Trenches for Closure: Location must comply with the siting criteria. Design requires a properly constructed foundation; a 20-mil string reinforced LLPE geomembrane liner or equivalent for the trench and trench cover, and welded liner seams.

19.15.17.12 OPERATIONAL REQUIREMENTS:

-Operators must notify the division if a liner is damaged and must repair and/or replace the damaged liner for all pits.

-Operators are required to meet new technical standards for temporary pits (freeboard, daily or weekly inspections).

-Operators must remove drilling fluids within 30 days after the rig is released.

-Operators of permanent pits must permanently mark the three foot freeboard level/limit on the pit.

-Operators must inspect below-grade tanks monthly and maintain inspection records.

-Operators must inspect sumps annually for integrity and maintain inspection records.

19.15.17.13 CLOSURE REQUIREMENTS:

Establishes time requirements for the closure of pits, below-grade tanks, and closed-loop systems existing prior to the effective date of the rule and permitted after the effective date.

Temporary Pits:

Three methods: Waste excavation and removal, On-site burial, and a proposed alternative.

-Waste excavation and removal: Requires the excavation and removal of the pit contents and the liner. Also requires the delineation of the soils beneath the pit to determine if a release has occurred. Release delineation specifications are as follows: Where ground water is between 50 and 100 feet below the bottom of the temporary pit or for cavitation pits, the operator shall collect a five point, composite sample; and collect individual grab samples from any area that is wet, discolored or showing other evidence of a release; and analyze for benzene, total BTEX, TPH, the GRO and DRO combined fraction and chlorides to demonstrate that benzene, does not exceed 0.2 mg/kg; total BTEX does not exceed 50 mg/kg; TPH does not exceed 2500 mg/kg; the GRO and DRO

combined fraction does not exceed 500 mg/kg; and chlorides do not exceed 500 mg/kg or the background concentration, whichever is greater. Where ground water is more than 100 feet below the bottom of the temporary pit, the operator shall collect a five point, composite sample; and collect individual grab samples from any area that is wet, discolored or showing other evidence of a release; and analyze for benzene, total BTEX, TPH, the GRO and DRO combined fraction and chlorides to demonstrate that benzene, does not exceed 0.2 mg/kg; total BTEX does not exceed 50 mg/kg; TPH does not exceed 2500 mg/kg; the GRO and DRO combined fraction does not exceed 500 mg/kg; and chlorides do not exceed 1000 mg/kg or the background concentration, whichever is greater.

Permanent Pits:

Requires the excavation and removal of the pit contents and the liner. Also requires the delineation of the soils beneath the pit to determine if a release has occurred. Release delineation specifications are as follows: the operator shall collect a five point, composite sample; and collect individual grab samples from any area that is wet, discolored or showing other evidence of a release; and analyze for benzene, total BTEX, TPH, and chlorides to demonstrate that benzene, does not exceed 0.2 mg/kg; total BTEX does not exceed 50 mg/kg; TPH does not exceed 100 mg/kg; and chlorides do not exceed 250 mg/kg or the background concentration, whichever is greater.

Closed-loop systems:

Three methods: Waste removal, On-site burial, and a proposed alternative. No release delineation required for waste removal of a closed-loop system.

Below-grade tanks:

Requires the removal of the contents of the below-grade tank and the removal, disposal, recycle, reuse, or reclamation of the below-grade tank. Also requires the delineation of the soils beneath the below-grade tank to determine if a release has occurred; the same release delineation specifications required for permanent pits.

On-site Closure Methods:

- For temporary pits and drying pads associated with closed-loop systems.
- Requires compliance with siting criteria, proof of surface owner notice with application submittal, must comply with on-site closure requirements and standards, and must place a steel marker at the center of an on-site burial.
- Permanent structures shall not be built over an on-site burial without division approval.
- Operators must file a deed notice identifying the exact location of the on-site burial with the appropriate county clerk.
- Two types of on-site closure methods – In-place burial and On-site trench burial.
- In-place burial:

Operators of drying pads associated with closed-loop systems that wish to implement this closure method must construct a temporary pit pursuant to the design and construction specifications of the Rule. Temporary pit and drying pad contents must be stabilized or solidified to bearing capacity sufficient to support the final cover and must not exceed the

3:1 mixing ratio limit. Where ground water is between 50 and 100 feet below the bottom of the buried waste, the operator shall collect a five point, composite sample of the contents of the drying pad or temporary pit prior to or after treatment or stabilization to demonstrate that benzene, does not exceed 0.2 mg/kg; total BTEX does not exceed 50 mg/kg; TPH does not exceed 2500 mg/kg; the GRO and DRO combined fraction does not exceed 500 mg/kg; and chlorides do not exceed 500 mg/kg or the background concentration, whichever is greater. Where ground water is more than 100 feet below the bottom of the buried waste, the operator shall collect a five point, composite sample of the contents of the drying pad or temporary pit prior to or after treatment or stabilization to demonstrate that benzene, does not exceed 0.2 mg/kg; total BTEX does not exceed 50 mg/kg; TPH does not exceed 2500 mg/kg; the GRO and DRO combined fraction does not exceed 500 mg/kg; and chlorides do not exceed 1000 mg/kg or the background concentration, whichever is greater. Operators shall use a separate temporary pit for the closure of each drying pad associated with a closed-loop system. Operators shall backfill the pit, install the prescribed cover, contour, and re-vegetate.

-On-site trench burial:

Operators shall use a separate on-site trench for the closure of each drying pad associated with a closed-loop system or each temporary pit. Pit and drying pad contents must be stabilized or solidified to bearing capacity sufficient to support the final cover and not exceed the 3:1 mixing ratio limit. The operator shall collect a five point, composite sample of the contents of the drying pad or temporary pit prior to or after treatment or stabilization to demonstrate that TPH does not exceed 2500 mg/kg; chlorides do not exceed 250 mg/l and that the concentrations of the water contaminants specified in Subsection A of 20.6.2.3103 NMAC as determined by appropriate EPA methods do not exceed the standards specified in Subsection A of 20.6.2.3103 NMAC, unless otherwise specified. Operators must construct the on-site trench pursuant to the design and construction specifications of the Rule. Excavated material must pass the paint filter test and the closure specified standards for on-site trench burial. Operators must test the soils beneath the temporary pit after excavation to determine if a release has occurred; the same release delineation specifications required for temporary pits regarding the implementation of the waste excavation and removal closure method. Operators shall install the geomembrane cover over the filled on-site trench; install the prescribed cover, contour, and re-vegetate.

-Operators must reclaim and restore the impacted surface areas associated with a closed-loop system, pit, trench or below-grade tank, including associated access roads to a safe and stable condition that blends with the surrounding undisturbed area and to the condition that existed prior to oil and gas operations.

-Operators may propose an alternative to the re-vegetation requirement if the operator demonstrates that the proposed alternative effectively prevents erosion, and protects fresh water, human health and the environment and the alternative is agreed upon by the surface owner.

-Soil cover specifications are established for scenarios regarding the implementation of waste removal closure methods and on-site closure methods.

-The vegetative cover shall equal 70% of the surrounding undisturbed native perennial vegetative cover for two successive growing seasons and no artificial irrigation.

-Operators must notify the surface owner prior of plans to close a temporary pit, a

permanent pit, a below-grade tank or where the operator has approval for on-site closure. Notice to the division is required for on-site closures and the cessation of operations of permanent pits.

-Closure reports shall be submitted with 60 days of closure completion and include such items as the necessary attachments to document all closure activities including sampling results; a plot plan; details on back-filling, capping and covering; and any additional information required by the Rule.

ATTACHMENT 2

TEDX
The Endocrine Disruption Exchange
P.O. Box 1407
Paonia, CO 81428
970-527-4082
tedx@tds.net

Products and Chemicals Used in Fracturing December 8, 2008

The Endocrine Disruption Exchange (TEDX) has compiled a list of the names of products and their chemical constituents reportedly used during the fracturing of natural gas wells. Nalco³ and World Oil⁴ list the functional categories of these chemicals as follows:

- biocides
- breakers
- clay stabilizers
- crosslinkers
- defoamers
- emulsifiers
- fluid loss control
- foamers
- fracturing fluids
- friction reducers
- gellants
- non-emulsifiers
- pH control
- polymers
- proppants
- resins
- scale control
- solvents
- surfactants
- viscosifiers

TEDX's list includes the names of 421 fracturing products containing 329 chemicals as of December 1, 2008. Information about the products and the chemicals they contain came from several states and a variety of sources including Material Data Safety Sheets (MSDSs), state Emergency Planning and Community Right-to-Know Act (EPCRA) Tier II reports, Environmental Impact Statement and Environmental Assessment Statement disclosures, rule-making documents, and from accident and spill reports, etc. The quantity and quality of information varied from these data sources. TEDX makes no

³ List of fracturing products from Nalco, Upstream Petroleum/Natural Gas: Fracturing Additives, http://www.nalco.com/asp/industries_served/upstream_petroleum/drilling/fracturing.asp, Accessed on 11-24-08.

⁴ World Oil, Fracturing products and additives – hydraulic fracturing of oil wells – Fracturing: A Well Completion Reference, http://findarticles.com/p/articles/mi_m3159/is_/ai_21219369, Accessed on 11-24-08.

claim that the following information is complete either in the scope of the products used during fracturing operations, or in the chemical composition of the products.

Material Safety Data Sheets (MSDSs)

MSDSs are designed to inform those who handle, ship, and use the product(s) about their physical and chemical characteristics, and their direct and/or immediate health effects in order to prevent injury while working with the product. The sheets are also designed to inform emergency response crews in case of accidents or spills. The total reported composition of a product on an MSDS can be as little as 0 to <0.1% up to 100%. The health information on MSDSs most often warns of possible harm to the skin and eyes, gastrointestinal and respiratory tracts, followed by the nervous system and brain. Many MSDSs do not address the outcome of long term, intermittent, or chronic exposures, or the adverse health effects that may not be expressed until years after the exposure. MSDSs are not submitted to the Occupational Safety and Health Administration (OSHA) for review. The product manufacturers determine what is revealed on their MSDSs. Of the 421 products on TEDX's list, 299 had an MSDS. Twelve of the MSDSs listed no ingredients, and eight reported only "no hazardous ingredients". Forty-one MSDSs listed at least one ingredient, but no CAS numbers⁵, and 20 of these MSDSs provided no percent of composition either. Among the 238 MSDSs that listed at least one ingredient with a CAS number, 74 provided information on less than 50% of their total composition. Thirty-two MSDSs disclosed over 95% of the product ingredients with CAS numbers.

State Tier II Reports

Information for 80 of the 421 products on the TEDX spreadsheet came from Tier II report data. Tier II reports must be filed by storage facilities under EPCRA. The Act sets a minimum amount above which a product containing a hazardous substance has to be reported in a storage facility. Reporting requirements vary from state to state, and the amount of information included on the form also varies from county to county and company to company. The descriptors on the forms received by TEDX ranged from a functional category name (e.g. surfactants, gellants, etc.) with no product name or no other chemical information, to the name of the product with specific chemical ingredients and CAS numbers. The percent of the total composition of the products is rarely included on these forms.

Twelve of the products listed on Tier II forms did not provide any ingredients, while 62 listed one chemical. Six products listed more than one ingredient, and two of these listed at least one unidentifiable (general) chemical name with no CAS number.

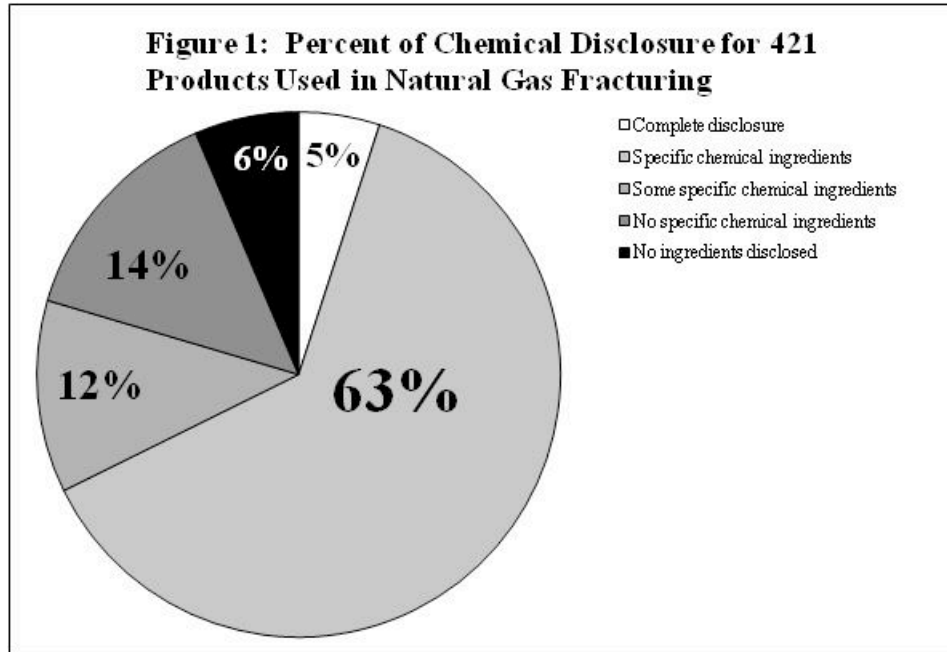
Other Sources of Information

The remaining 43 products on the TEDX list came from a variety of sources mentioned above, with varying amounts of information, ranging from no information about product composition (4), to general chemical class name(s) (9), to specific chemical names (30). The source of information on only one product in this category provided complete information on the specific chemical makeup and over 95% of the composition.

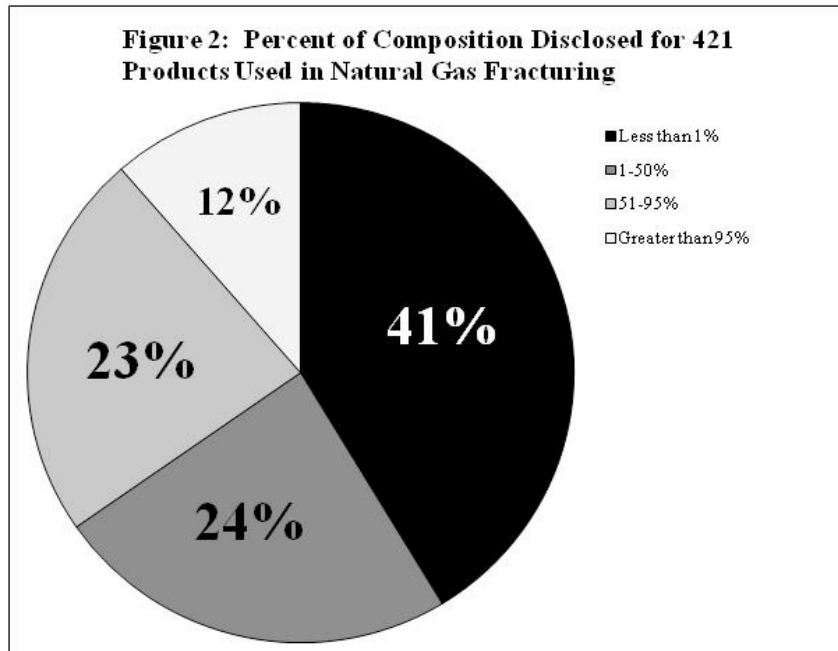
⁵ Chemical Abstracts Service number. This number is used to identify a specific chemical. A single chemical can have many different names, but only one CAS number.

Evaluation of the information available about the 421 products

Two hundred and sixty-four products (63%) have at least one chemical ingredient listed with a CAS number (Figure 1). Twelve percent of the products contain a combination of chemicals with and without CAS numbers, and 14% contain chemicals with only general or non-specific names. No information for the remaining 6% of the products was provided.



Less than 1% of the total composition is known for 174 (41%) of the 421 fracturing products (Figure 2). Less than 50% of the composition is known for 24% of the products, and between 51% and 95% of the composition is known for 98 (23%) of the products. Twelve percent (48) of the products had information about 95% or more of their full composition.

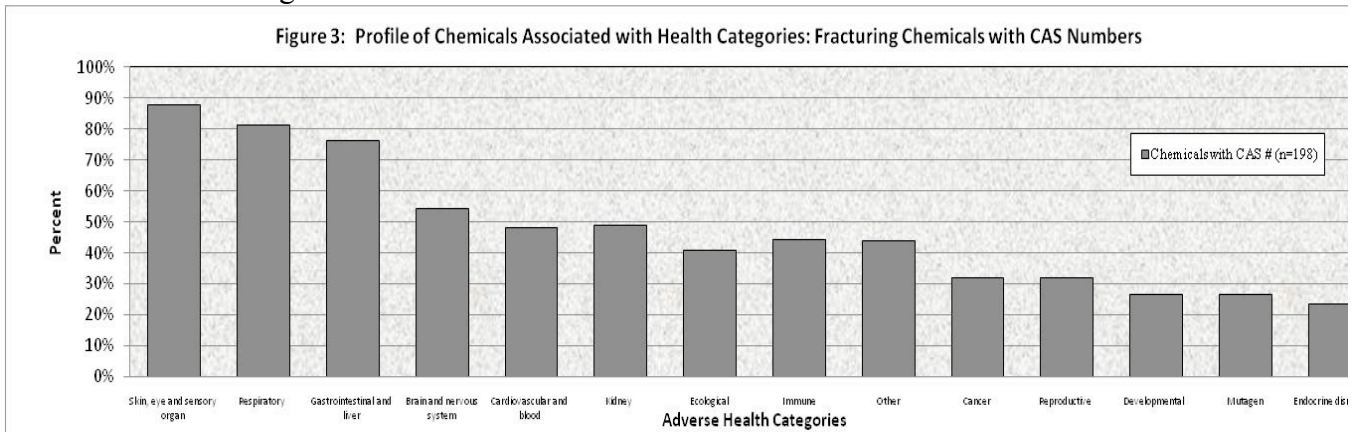


Evaluation of the information available about the 329 chemicals

Specific chemical names and chemical identification numbers (CAS numbers) could not be determined for 131 (40%) of the 329 chemicals on TEDX’s list. The names of these chemicals were too general (e.g. latex base, surfactant, or polymer), or they were listed as “proprietary,” “mixtures,” “unspecified,” “various,” or “no hazardous ingredient.”

For 51 of the 131 chemicals with no CAS number, it was impossible to link those chemicals to any health category aside from the health data reported on an MSDS if one was available. The limitations of MSDS data for possible health effects are noted above. Some health data was provided for another 11 chemicals, but for the remaining 69, no information could be found.

Figure 3 shows the percentages of the 198 chemicals with CAS numbers, which affect the individual health categories.



For Further Consideration

- Full information about ingredients and composition was available for only 5% (20) of the 421 products on TEDX's list (Fig. 1). It is impossible to determine the safety of any product without being able to identify the specific chemical(s) and how much of each is present in the container. It is also necessary to know the exact chemical composition of the vehicle used to dissolve or suspend the chemical(s) and used to fill the product container to the brim.
- Eight of the 21 products with full disclosure of their contents contained only one ingredient, such as starches, cellulose, or carbon, relatively harmless ingredients compared with other chemicals on the list.
- Air is the primary pathway of concern for frac'ing chemicals. Ninety-four percent (280) of MSDSs provide a warning about eye and/or skin harm, 91% warn about respiratory system harm, and 58% warn about brain or neurological harm based primarily on inhalation and/or dermal contact.
- Between 50% and 94% of the volatile chemicals for which TEDX has CAS numbers are associated with eight of the 14 generally accepted health categories used in government reports.
- Numerous products with ingredients that would ordinarily be considered benign, have MSDSs that warn of the irritant nature of the chemical to the eyes, skin, and respiratory tract. In many instances these chemicals exist as fines or dusts.
- The gas field workers are most likely to be the first exposed to the chemicals used in fracturing, especially the air-borne chemicals. As the chemicals disperse from the pad, those living in proximity to fracturing operations will also be exposed.
- A health monitoring program for gas field workers and near-by residents could now be established based on the consistent profile of health categories associated with chemicals used during natural gas operations.
- Although it is apparent that the list TEDX has compiled is limited in many ways, it still provides a glimpse of the kinds of material that are being introduced into the environment where natural gas operations are taking place. It also clearly reveals the need for full disclosure. Disclosure in this case requires more than the names and quantities of all the ingredients in a product, it also requires data on how much of each product is used in frac'ing fluids, the total volume of all the fluids used and recovered during each frac'ing episode, and the concentration of all chemicals in the waste streams and the environmental medium where they finally rest.