

High Volume Hydraulic Fracturing, Marcellus Shale and other Low Permeability Reservoirs: SGEIS Comments

The following comments were submitted by Cornell University personnel on 12/31/09.

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David Kay, Senior Extension Associate, Cornell University

Dlk2@cornell.edu

607-255-2123

Cornell Community and Rural Development Institute (CaRDI), Department of Development Sociology
Mr. Kay is a Senior Extension Associate who currently provides leadership for CaRDI in the area of Landscape Management and Land Use Planning, with the goal of helping to "support sound management of New York's land resources". His land use programming involves research, outreach, and training efforts that focus on building community-based decision making capacity and helping to weave local policy into a regionally coherent fabric. He has served for many years on his local planning board and has also served as an officer on the boards of the New York Planning Federation and the Upstate Chapter of the American Planning Association. In addition, he has worked extensively at Cornell as a regional economic analyst using IMPLAN and related economic modeling tools associated with input output analysis. Mr. Kay holds a BA in Economics from the University of California, Berkeley and an MA from Cornell in Agricultural Economics.

Comments on: Regional Economic Effects of Marcellus Shale Development

In the Draft SGEIS (Section 2.2, Public Need and Benefit), reference is made to a Pennsylvania and to a Broome County economic impact study. Both studies utilize IMPLAN, a proprietary and widely used "input-output" data and analysis package, to estimate indirect and induced effects of drilling activity. In addition, Chapter XVIII ("Economics") of the 1992 FGEIS contains numerous general references to "multiplier" effects, though without any region specific impact analysis of the character of the two studies just mentioned. (Multiplier effects are most commonly estimated through input-output modeling.) The two cited studies are not directly related to the primary Draft SGEIS goal of identifying negative environmental impacts and proposed mitigations, but are nonetheless worthy of some words of caution since their results are presented without important caveats.

1. Input-output modeling includes some fundamental assumptions about how the economy functions. One important assumption is that of perfect elasticity of supply in all markets in the region. In practical terms, this assumption means that economic expansion occurs only to an extent that does not cause any significant price increases in any input markets for fuel, land, labor, capital, or in any materials or services. This assumption would be reasonable in an integrated economy that is large in relation to the increases in demand being projected. However, even though the assumption of no effect on prices is reasonable for the natural gas market itself, it is unlikely to hold for many of the labor, materials, service and related input markets that will be affected by economic expansion in many upstate New York submarkets. In general, insofar as price increases in input markets are to be expected, input-output models will overestimate the extent of total economic expansion.
2. Input-output models can be flexibly used to evaluate the economic impacts of many development scenarios. But as with most models, no matter how strong the model itself, the assumptions that go into defining the scenarios (in this case, the array of direct impacts) will be determinative of the outcomes. Two key scenario assumptions are discussed:
 - a. One limitation of the cited studies is that neither even conceptually considers the possibility of negative economic effects of natural gas development. The Broome County study authors are most nearly explicit about this assumption, asserting only in a footnote and without adducing any supporting evidence that “It should be kept in mind, however, that with new horizontal drilling methods, production can occur in densely populated or developed areas with minimal economic or environmental disruption”. Whether true or not, no substantive evidence is presented in these studies, or in the Draft SGEIS itself for that matter, that there will be no negative effects, even temporarily, of gas development on other industries. It seems plausible, for example, that businesses that to some extent use local or regional “quality of life” (e.g. wineries, agri-tourism and more traditional tourism industries, educational institutions, organic and community supported agriculture, etc.) to attract customers might be harmed in some situations by a significant transformation of the quality of life and landscape during periods of intensive drilling activity. (The potential for price effects on other industries due to increased competition for inputs was made in the previous point.) As an illustrative contrast to the unrelievedly positive assumption of no possibility of negative economic effects of energy development, a study of western states, “Fossil Fuel Extraction as a County Economic Development Strategy are Energy-focusing Counties Benefiting? - July 11, 2009 revision” (http://www.headwaterseconomics.org/energy/HeadwatersEconomics_EnergyFocusing.pdf), concludes that, “Counties that have focused on energy development are underperforming economically compared to peer counties that have little or no energy development.” Another study by Headwaters (<http://www.headwaterseconomics.org/energy/HeadwatersEconomicsImpactsofEnergyCO.pdf>), focusing on Colorado, concludes, “The most recent evidence suggests that the natural gas surge on the West Slope is making it harder, not easier, for other sectors of the regional economy to thrive.” In sum, simply

dismissing the possibility of any negative economic impacts by fiat does not add confidence that the analysis is credible or objective.

- b. The economic impact analyses cannot be meaningfully undertaken if there are no assumptions made about the amount, timing, and location of drilling. Interestingly enough, in contrast to the Draft SGEIS's rejection of the feasibility of doing cumulative impact analysis on the grounds that, "The rate of development cannot be predicted with any certainty", both economic impact studies cited do come up with estimates. The Pennsylvania study contains impact estimates related to both current and projected drilling activity, and the ("preliminary") Broome County study contains only projections, though without certainty to be sure. The Pennsylvania study bases its projection on a regression analysis using time series data for the period 1993 to 2008 from the Barnett Shale, arguing that, "While Barnett and Marcellus have many geophysical and infrastructure differences, the relationship between drilling is largely an economic one, which in principle should be almost the same, especially since they are both shale plays with similar revenue and cost profiles." In contrast, the Broome County projection makes little effort to empirically ground its numbers, simply estimating that a full build out scenario (leaving out the urban centers) would "hypothetically" support a "maximum well count of 4,000" wells drilled (or 400 per year); a second scenario is created by arbitrarily dividing 4,000 by 2, ie. 2000 wells. No assessment is made of the plausibility of either scenario.
3. The *prima facie* limitation on the applicability of both studies for the Draft SGEIS is that neither applies directly to the economy under consideration in the Draft SGEIS. A strength of IMPLAN models is that they are tailored to reflect the specific economic relations in the regional economy under study, and the results are therefore specific to that region. The Broome County study is a single county study of one of the most urbanized counties likely to be affected directly by Marcellus and Utica shale development, while the Pennsylvania study is a statewide study of an entirely different state. *An economic impact study that would have been most appropriate for the region being studied in the Draft SGEIS remains to be done and would serve as an important guide to policy makers.*

Comments on: Land Use Patterns

"6.12.1 Land Use Patterns

The spacing unit density for vertical shale wells is the same as discussed and anticipated in 1992. This density has been experienced in New York in Chautauqua and Seneca Counties without significant changes in land use patterns. The new drilling technology should not be expected to change the 1992 GEIS findings."

"7.12.2 Land Use As stated in Section 6.12.1, the multi-well pad development method "will reduce the cumulative changes to the host community, and should minimize loss or fragmentation of habitats, agricultural areas, forested areas, disruptions to scenic view sheds, and the like." Nevertheless, the Department recognizes the concern that local communities have regarding the scale and potential effects of the proposed activity; therefore, the EAF Addendum submitted with each well permit application will require the

applicant to attest to having reviewed any existing comprehensive, open space and/or agricultural plan or similar policy document(s). Whenever possible, full consideration should be given to locating the well pad in an area that has been previously disturbed.”

1. What is the basis for the conclusion that there have been no significant changes in land use patterns in the named counties? Is this intended only as a casual statement, or is there tangible evidence to support the claim? The DEC’s final SGEIS Scope indicated that, “The dSGEIS will include the following with respect to community impacts: Evaluation of whether any aspect of multi-well site development or high-volume hydraulic fracturing of shale wells could be expected to change the GEIS’s conclusion that major long-term changes to land use patterns, traffic and the need for public services are not anticipated as the result of gas well development. This will include review of the compatibility of shale gas development with other land uses such as agriculture, tourism, and alternative energy development.” While conclusions are asserted, there is no evidence given in either of the Draft SGEIS sections 6.12.1 or 7.12.2 on land use that any “review” has been undertaken.
2. More importantly, land use change occurs not only because of spacing unit density, but because of a variety of factors that could be influenced by drilling activity (e.g. rate of property turnover, road access, current land uses on leased property, character of nearby properties and communities, leased and nonleased landowner management goals, changing economic incentives for land management affecting the highest and best use of property, etc.). Drilling throughout the Marcellus fairway is likely to happen in a variety of different contexts (both in geography and timing) that would not be comparable to the historical development experienced in Chautauqua and Seneca Counties: more urbanized areas of the state, areas subject to substantially different degrees of development pressure, periods of sustained higher gas prices promising substantially greater economic returns to landowners per well, areas experiencing different comparative levels of return to competing land uses like agriculture, recreation, and forestry, etc. The point here is that the SGEIS statement provides no substantive justification for asserting that the (undocumented) historical pattern of change in Chautauqua and Seneca counties is a reliable basis for the future or in other counties in the state likely to see significant natural gas development for the first time.

Next, it is unclear what the Department is trying to communicate when it “recognizes the concern that local communities have regarding the scale and potential effects of the proposed activity” and then goes on to propose some options. One reasonable interpretation – consistent with comments made elsewhere about cumulative impacts, for example (p6-146) is that the Department acknowledges that despite the fact that multi-well pad development will reduce impacts compared to full development of single wells, the “potential effects of the proposed activity” on land use may still be significant.

- a. Requiring the applicant to attest to read any existing planning documents is quite sensible, but is about the weakest possible requirement even among wholly procedural options. *Stronger language that still left the DEC’s permit authority over gas wells intact would be preferable. The applicant could also be required to document its efforts to achieve consistency with any legally adopted comprehensive, open space and/or agricultural plan or similar policy document(s), to the maximum extent practicable and only insofar as those*

documents do not clearly conflict with the supercession provision of ECL § 23-0303(2) (ie. that the State’s oil, gas and solution mining regulatory program “supersede[s] all local laws or ordinances relating to the regulation of the oil, gas and solution mining industries; but shall not supersede local government jurisdiction over local roads or the rights of local governments under the real property tax law.”

3. Just because the use of multi-well pads “will reduce the cumulative changes to the host community, and should minimize loss or fragmentation of habitats, agricultural areas, forested areas, disruptions to scenic view sheds, and the like” relative to 40 acre well spacing, the DEC and the applicant’s obligation remains to minimize these environmental effects to the maximum extent practicable. The DEC’s emphasis in the GEIS (eg. Siting Regulations and Policy, pp. 8-3, ff) and in the Draft SGEIS on site planning considerations is important and indeed capable of being facilitated by the use of multi-well pads. In view of this, the recommendation that, “Whenever possible, full consideration should be given to locating the well pad in an area that has been previously disturbed.” seems reasonable but starkly *ad hoc*, involving only one of a number of important factors that have to be balanced in locating access roads as well as well pads. *An entire range of site planning considerations in relation to land use should be articulated that involve the minimum mandated setbacks but also provide guidance to ensure the DEC achieves mitigations on a specific site to the maximum extent practicable.*

Comments on: Generic Environmental Impact Statements, Community Character, and Cumulative Impact Analysis

Key excerpts from the Draft SGEIS on Cumulative Impacts

“The rate of development cannot be predicted with any certainty based on the factors cited above and in the Final Scoping Document. Nor is it possible to define the threshold at which development results in adverse noise, visual and community character impacts. Some people will feel that one drilling rig on the landscape is too many, while others will find the changes in the landscape inoffensive and will want full development of the resource as quickly as possible. There is no way to objectify these inherently subjective perspectives. As a result, there is no supportable basis on which to set a limit on the rate of development of the Marcellus and other low-permeability gas reservoirs.

It is certain that widespread development of the Marcellus shale as described in this document will have community impacts that will change the quality of life in the affected areas in the short term. For purposes of this review, however, there is no sound basis for an administrative determination limiting the shale development on the basis of those changes at this time. Accordingly, any limitation on development, aside from the mitigation measures discussed in the next chapter, is more appropriately considered in the context of policy making, primarily at the local level, outside of the SGEIS.

pp. 6-145 to 6-146

The appropriate approach for minimizing cumulative impacts associated with noise, aesthetics, traffic and community character, therefore, is to encourage and adhere to the following practices:

- careful siting of well pads,
- use by the operators of site-specific visual and noise impact mitigation plans,
- negotiation of road use agreements with the appropriate local governing authorities, and
- recognition of and, to the extent practical, attention to local planning documents and policies.

pp. 7-112 to 7-113

These and related conclusory statements in the Draft SGEIS undermine the utility and potential benefit of, and many would argue even the responsibility inherent to, completion of a GEIS. They inaccurately overestimate the difficulty of appropriate and relevant analysis, effectively dismissing the feasibility of cumulative impact analysis. The unfortunate language is drawn directly from the NTS study performed under contract to NYSERDA, appears elsewhere in the SGEIS (eg. Chapter 9.2 Phased Permitting Approach), but is also substantively previewed in a tentative form in the Final SGEIS Scope (Section 4.8 Cumulative Impacts).

All sections of the Draft SGEIS depending on this line of argumentation should be revised based on a hard look taken at cumulative impacts. In particular, because the arguments about infeasibility of completing a cumulative impact analysis are the same as those used to reject the Phased Permitting Approach as an Alternative, the whole concept of Phased Permitting should be reevaluated.

Particularly curious is the sentence, “For purposes of this review, however, there is no sound basis for an administrative determination limiting the shale development on the basis of those changes at this time.” Given the statement that quality of life impacts are certain to occur, what is meant by the phrase “at this time”? Is the DEC intending to revisit this issue as development begins to unfold and empirical data on the actual impacts in NYS begins to accumulate?

First Major Concern: As a backdrop to the specific language cited above, what is the overarching justification for the 1992 GEIS and the Draft SGEIS in relation to the inclusion or exclusion of cumulative impact analysis?

Clearly, SEQRA itself anticipates that a GEIS can be used for the purpose of estimating cumulative impacts when it lists first in a list of four justifications: “A generic EIS may be used to assess the environmental impacts of: (1) a number of separate actions in a given geographic area which, if considered singly, may have minor impacts, but if considered together may have significant impacts” (§617.10 Generic environmental impact statements) The DEC’s website (<http://www.dec.ny.gov/permits/56701.html>) affirms this in more explicit language, stating that, “A generic EIS may be useful to account for cumulative impacts...”

The language in the Draft SGEIS appears to ignore the first SEQRA rationale while referencing only the third of the four listed justifications for a GEIS (about “generic or common” rather than “cumulative” impacts) when it states in its introductory sections that, “The Department’s SEQRA regulations... authorize the use of generic environmental impact statements to assess the environmental impacts of separate actions having generic or common impacts.” (Draft SGEIS Chapter 1.4.1 *Generic Environmental Impact Statement (GEIS)*)

Is reference to “common” but not “cumulative” impacts at this early point in the Draft SGEIS intentional? Does it reflect an oversight, a policy decision, a conclusion based on legal or other analysis? There is no clearly stated reason in the Draft SGEIS for ignoring the first listed justification while invoking the third. Given the generally cursory treatment of cumulative impacts in the document, it would be natural to assume some deliberation went into the language. Moreover, the reasoning harkens back at least to a rationale asserted in the 1992 GEIS’s summary section on cumulative impacts (P.3-10)? That document states:

“It is common practice to drill one exploratory well to ensure the economically recoverable resources before proceeding with the drilling of additional wells. Thus, an operator may apply for and receive permits for ten wells but may never drill the additional wells unless the first well is successful. However, in practice the operators usually do not apply for permits on multiple wells unless they are assured that the area is productive because of the high permit fees. Operators cannot afford to pay for permits for wells that will not be drilled. Therefore, cumulative review is impractical and unnecessary when considering most oil and gas drilling because of the independent nature of each of the wells, i.e., no compounding of environmental significance, and the fact that the economics generally dictate a more cautioned approach of obtaining permits sequentially because of the high costs involved.”

Unfortunately, this GEIS language fails to clearly communicate. The logical relation to the kind of impacts of interest here (not “common” impacts but, again, “a number of separate actions in a given geographic area which, if considered singly, may have minor impacts, but if considered together may have significant impacts”) seems opaque except, perhaps, in the context of the permitting and drilling behavior of a single operator. The statement has little or nothing to do with common sense understandings of the potential cumulative impacts on the environment (including community character) of dozens or hundreds or thousands of wells being drilled in a “given geographic area” encompassing a section, neighborhood, community, region or even state. Treating the impact of each well as independent of all others seems to miss the point of a cumulative impact analysis, entirely. Cumulative impacts (including persistent accumulation over time as well as those associated with aggregated quantities and rates of throughput) are highly relevant to such considerations as the ability of freshwater sources to sustain withdrawals, of wastewater treatment facilities to manage throughput, of natural systems like airsheds or wetlands to absorb toxins with or without long term accumulation effects, and likewise of labor markets to supply workers, of communities and schools to absorb new residents, and of community character most broadly defined to adapt to change.

Is it the DEC’s assumption in fact that oil and gas well drilling does NOT involve “a number of separate actions in a given geographic area which, if considered singly, may have minor impacts, but if considered together may have significant impacts.” In addition to contradicting common understanding of cumulative impacts, such an assumption would also be inconsistent with more

explicit language of the 1992 GEIS, echoed in the Draft SGEIS (p. 6-141) that “Additionally, as an unavoidable adverse impact it [ie. the GEIS] states: “Though the potential for severe negative impacts from any one site is low. When all activities in the State are considered together, the potential for negative impacts on water quality, land use, endangered species and sensitive habitats increases significantly.”

This backdrop issue of the role of cumulative impact analysis in justifying the GEIS and Draft SGEIS should be clarified and/or addressed directly in the Final SGEIS. The exclusion of separate actions which if considered together have significant impacts is not supportable.

Second Major Concern: Are the statements in the Draft SGEIS about the difficulties in estimating cumulative impacts tenable in and of themselves? Is the DEC’s proposed response to the asserted estimation difficulties, in effect that though cumulative impacts will occur they cannot and will not be mitigated under this SEQR review, justifiable? As other Cornell colleagues are addressing this essential topic more fully, I’ll just make some limited comments here.

The central argument in the Draft SGEIS case against analyzing cumulative impacts is the “absence of certainty” about the pace, scale, and location of development. However, if certainty about impacts were a necessity for conducting meaningful environmental review under SEQR, many areas of analysis that currently depend on probabilistic estimates of environmental impacts (e.g the use of flood plain maps is one of many examples that springs to mind) would be invalidated. This argument cannot hold water as formulated, and much of the existing Draft SGEIS addresses proceeds with uncertainty about various physical parameters outside of the context of cumulative impacts. Certainty and complete precision are not necessary to identify likely impacts and to propose mitigations that can reduce their likelihood or severity to the maximum extent practicable (hardly a criterion resounding with precision or certainty itself). For planning and mitigation purposes, recognizing the contingencies, conditions, and circumstances under which cumulative impacts become significant is what is important, not predicting with certainty what will happen.

Social science research and experience from other areas that have dealt with natural gas development, including some by Cornell colleagues, already enable much to be said about the likely cumulative effects of drilling on the character of different kinds of communities in the Marcellus shale. If the Draft SGEIS had not assumed the task was impossible before it was undertaken, it would have included a review of this work and built upon it with original contractual analysis.

Additionally, the DEC’s website (<http://www.dec.ny.gov/permits/56701.html>) suggests at least one specific mechanism (others exist) suitable for analyzing impacts especially in a GEIS and that happens to be particularly well suited to contexts involving some uncertainty: the use of “hypothetical scenarios as alternatives that could occur under the proposed generic action.” Indeed, comments submitted by Cornell at the Draft scoping stage suggested precisely this course of action. (Though no clear response to this specific suggestion was made, the Final Scope in Section 8.1.2 relegates “specific scenario” analysis in general to “site specific review”, a context that indeed makes cumulative impact assessment impossible.)

In conclusion, the arguments made in the Draft SGEIS for not undertaking an analysis of cumulative impacts seem like they were already in place at the time of scoping and that the DEC has simply decided to leave the work of cumulative impact analysis regarding community character issues to other bodies – especially those at the local level that by definition lack both the jurisdictional scope to address regional cumulative impacts and the authority, as per DEC, to require any kind of mitigations on the gas development itself. As noted above, this vitiates one of the most important potential benefits of undertaking a GEIS in the first place, and explicitly rejects the idea that a hard look needs to be taken at cumulative community character impacts, at least “at this time”.

Jeffrey Jacquet, Cornell University Dept. of Natural Resources

jeffrey.jacquet@gmail.com

607-272-1410 (H)

607-351-9886 (C)

Mr. Jacquet is an Energy Development Impact Consultant who has over 6 years of experience dealing with the impacts from Natural Gas Drilling in communities in the western and northeastern United States. He has provided impact assessment and mitigation strategies for a host of local, state, and federal government agencies grappling with the effects of natural gas drilling. He has additionally provided Natural Gas related consultation and research to academic institutions such as The Pennsylvania State University, Cornell University, the Penn College of Technology, and The University of Wyoming. He holds M.A. and B.A. degrees in Sociology.

DEC Regulations and Expectations on Drilling Multi-well pads (Various Sections and Pages)

Summary: *DEC should require multi-well pads in most circumstances, and encourage this process by removing the 3-year deadline for drilling multiple wells on a single pad.*

Discussion: In various sections throughout the SGEIS, the DEC assumes that most natural gas wells will be drilled on multi-well pads and that those wells will often be drilled sequentially and in a continuous process (i.e. “the wells will be drilled one-after-another”). DEC also rightly credits multi-well pad drilling as process that can serve to minimize the cumulative ecological and community impacts. However, it is not certain that multi-well pads will be drilled in most cases, and some DEC regulations may in fact encourage the development of single-well pads as development proceeds over time.

Current regulations require that all wells on a multi-well pad be drilled within three years of starting the first well. As industry gains confidence in the production of the play, there is the possibility that all wells on a pad would be drilled, stimulated and completed consecutively. (dSGEIS, Sec. 6.13.1, p. 6-14)

Experience from industry activity in the northern tier of Pennsylvania shows that most operators are currently initially drilling only one well on a pad, and are then moving the rig to a different pad to drill another single well. This approach, among other things, serves the purpose of acting on and securing prime lease locations before the lease expires. The operators can then return to drill additional wells on those multi-well pads at a later time. Janice Lobell, director of community relations for Fortuna Energy has explained this decision on a number of occasions, stating in October that “Fortuna will not apologize for doing what is our best interest”, regarding the strategy of drilling single-well pads in order to secure leases (Lobdell, 2009).

If operators in New York State continue this practice of drilling single wells during initial stages, then the current requirement that all wells be drilled within 3 years of the initial activity may cause more single-well pads to be developed as operators may be forced to choose between either developing multi-well pads within a 3 year window or acting on and securing about-to-

expire leases with a series of single-well pads. If leasing activity is highly competitive (which appears to be the case in many areas of PA, and potentially will be the case in certain areas of NY) or exploratory strategies require it, it may in fact be more attractive for companies to secure the leases with single-well pads instead of drilling multi-well pads within the required 3-year timeframe.

Moreover, during times of an industry slowdown, operator problems, equipment unavailability, regulatory changes, or other circumstances, it may even be impossible for an operator to drill some or all of the wells on the multi-well pad within a 3 year period.

As is noted throughout the dSGEIS, the drilling of multi-well pads is preferable, as the process of drilling single wells can cause a different set of cumulative impacts than drilling multi-well pads. Drilling activity during single-well pads is effectively “spread-out” while multi-well pads contain the impacts to a single location.

The bottom line is that in reality there will likely be a combination of single-well pads and multi-well pads with a varying number of wells developed, and that DEC regulations (while well-intentioned) may have the negative effect of encouraging single-well pads or small-number multi-well pads. If the positive qualities of multi-well pad drilling are indeed as great as DEC portends, the DEC needs to better encourage or even require drilling on multi-well pads, and rescind or modify the 3-year multi-well drilling deadline.

Community Character Impacts: Section 6:13 Page 6-146

Summary: *The discussion of impacts to community character ignores an entire field of research on the cumulative impacts of natural gas drilling caused by factors such as population change, changes in income and employment, changes in housing costs and other costs of living, changes in local government roles and demands in service, changes in perceived and real amounts of crime, among other factors. There is also evidence that these impacts are already underway in communities in Pennsylvania. While these impacts may be impossible to predict for individual communities at this time, the suite of factors at play and the impacts that have occurred in other areas must be discussed and the failure to do so is indefensible.*

Discussion: The section on Community Character (Sec 6.12) concludes that “It is certain that widespread development of the Marcellus shale as described in this document will have community impacts that will change the quality of life in the affected areas in the short term.” (p. 6-146) but the section does not actually describe nearly any of these impacts in the document, presumably because the “timing, rates, and patterns of development” (p. 6-145) is inherently unpredictable.

These statements are contradictory and the failure to discuss or disclose possible impacts to community character - beyond truck traffic or noise – is indefensible. If it is “certain” that

impacts will occur from widespread development (as is described in the document) , then these impacts are far from unpredictable and must be disclosed.

The dSGEIS ignores an entire field of research dedicated to identifying the types of changes to community character that have occurred due to natural gas drilling or similar types of energy development in other places, such communities near the Barnett Shale in Texas, the Piceance Creek Basin in Colorado, and the Jonah Field in Wyoming. This research first emerged during the 1960's and 1970s, studying the energy boom in the American west, and subsequent research has looked at cumulative community impacts from natural gas drilling. (For a 70-page summary of this research and implications on the Marcellus shale, see Jacquet 2009).

As is stated in the concluding paragraphs of Sec. 6.12, there is “certain” to be a number of impacts that can be expected to occur in communities that are situated near areas of widespread development. These impacts can easily be foreseen to go far beyond simply “noise” or “traffic”.

In many places within New York, the cumulative impacts of large-scale natural gas drilling activity will result in a rapid industrialization of otherwise rural and non-industrialized communities. The possible suite of impacts from this industrialization can be foreseen.

Community character impacts that have been identified in other areas of the country from natural gas drilling have been caused by factors such as population and demographic change, changes in numbers and types of employment, changes in industrial base, changes in housing or other costs of living, changes in types or disparities in income, changes in local government roles and demand for services, changes in crime or perceived changes in crime, and etc.

These impacts typically are greater for smaller communities that are located near large amounts of intensive natural gas activity (For a classic example, see Gilmore 1976). Moreover, local governments are often at a disadvantage to mitigate the impacts from natural gas or other types of energy development. Markussen (1978) discussed an emerging pattern of limitations faced by local governments, including: a) Jurisdictional unevenness: The community bearing the brunt of the growth and change cannot control the development and may not receive mitigation funds; b) New Comers vs. Old Timers: Rapid growth frequently requires major new infrastructure expenditures and new residents may have substantially different expectations and preferences for levels of public service than older residents; c) Insufficient control of land use: decisions about disposition of land prevents the local government from using zoning or siting arrangements to ease adjustment; d) Severity of growth: Sheer numbers of people entering to work, despite adequate housing, may be unassimilatable without significant declines in quality of public services and community life; e) Volatile production patterns: The boom-bust cycle associated with energy development presents the local government with an uneven future path of public service demand; f) Monopoly of information: the industry or regulatory agency exercises tremendous power over the pace of development and the amount of information that is available to planners; sometimes, an incentive to misinform exists; g) Risk: The uncertainty surrounding the future of many energy activities raises the risk premium, often so high that the financial sector is unwilling to lend funds to or buy bonds of local governments.

Types of Community Character impacts that are not discussed in the SGEIS

While increased truck traffic may indeed change the character of a community, a surge of temporary workers that fills up hotels, motels, RV parks, and apartment rentals can also easily be foreseen to change the character of a community. In addition, while this surge of temporary workers may only be “short term” in that they are needed only during the drilling phase, the drilling phase with in community or region may last decades; long-term impacts resulting from dealing with decades of “short term” impacts can be envisioned and indeed have been studied in other areas (see Brown et al. 1989 and 2005). The character of a community can be influenced by new demands placed on a local government, by an increase in arrests, by new types of people in the community, and etc.

It is true that changes in community character will be viewed differently by different residents – however these differences in view have been studied in other areas (for example, see Davidson 1979; Freudenburg 1982, 1984; Coburn 2008; Anderson and Theodori 2009). Viewpoints and perceptions of community change have tended to be stratified by factors such as age, occupation, length of residence in the community, and prior experience with industrial development. Statements, backed by scientific research, can and need to be made about how different types of residents are likely to react to changes in the community from natural gas drilling.

Indications from Pennsylvania.

There are already indications that changes consistent with what has been observed with in other areas are already occurring in communities in Pennsylvania. Such increases have included a possible increase in crime due to gas drilling in Susquehanna County (Lowenstien 2009); as well as a rapid increase in short-term and long-term housing costs and unavailability in places such as Bradford, Susquehanna, and Lycoming Counties, and changes in the feel of the community (Hill 2008).

Many of the largest impacts to community character will, in fact, be cumulative in nature. This fact alone does not appear to be disclosed or discussed in the dSGEIS. Moreover, the scope of potential impacts to community character and cumulative impacts (taken both separately and together) discussed in the dSGEIS are extremely limited and the mechanisms that will create these impacts are ill-defined. The discussions of Community Character and Cumulative Impacts within the dSGEIS are unacceptable.

DEC ability and rationale to regulate cumulative impacts to community character (Sec. 6.13.2.1. p.6-146)

Summary: *There is a clear need for the DEC to devise a cumulative impact monitoring process to determine the future severity and possible regulatory mitigation of cumulative impacts to ecological, noise, aesthetic, and community character.*

The dSGEIS states in the concluding paragraph for the section on “Cumulative Impacts” (Sec. 6.13.2.1 on page 6-146) that due to problems of unpredictability and variability, regarding cumulative impacts from noise, visual, or community character, “For purposes of this review, however, there is no sound basis for an administrative determination limiting the shale development on the basis of those changes at this time.” This statement begs the questions: *When would be the proper time for an administrative determination?* and *Given the stated*

unpredictability and variability towards residents' opinions on noise, visual, and community character impacts, how could DEC ever make an administrative determination?

The next sentence in that same paragraph then appears to broadly confuse the regulatory authority of local governments to regulate natural gas drilling in New York State, specifically those contained in the regulations set forth in New York State's Environmental Conservation Law Article 23, Title 3 (ECL §23-0303(2), known as the "Oil, Gas and Solution Mining Law". The statute, of course, delegates all authority to regulate the gas and oil industry to the New York State Department of Environmental Conservation (NYSDEC). However, the DEC states in the aforementioned paragraph in the dSGEIS "Accordingly, any limitation on development, aside from the mitigation measures discussed in the next chapter, is more appropriately considered in the context of policy making, primarily at the local level, outside of the SGEIS." (p.6-146).

In the dSGEIS, the DEC appears to cast off responsibility for regulating and mitigating cumulative impacts from natural gas drilling to local governments (who have clearly no authority to do so). Alternatively, the DEC appears to claim that they simply cannot regulate cumulative impacts "at this time" because of unpredictability and variability in the location, scope, and resident reaction to the impacts.

It is clear, as inferred in Section 6.13.2.1 "Rate of Development and Thresholds", that the rate of development will determine the scope and severity of many cumulative impacts. The DEC is also correct to state the specific location and intensity of regional and cumulative impacts are impossible to accurately predict at this time. However, as development proceeds, these impacts will no longer be unpredictable, and instead will be measurable as development locations and intensities reveal themselves. As discussed in the previous sections, as well as fleetingly in the dSGEIS, such impacts can be measured by amounts of truck traffic, numbers of visual disturbances, changes in population and employment, etc.

Moreover, as is inferred in the last sentence of the aforementioned paragraph (on page 6-146), it is likely that local governments and other municipal organization will be best able to measure and determine the severity of and public reaction to the various cumulative impacts to community character caused by natural gas drilling, and to "appropriately consider" the correct policy towards mitigating these problems. However there is no process for local governments to relay these considerations to the DEC, the agency who has the sole authority to regulate the rate of development and thus cumulative impacts. The DEC must devise a process for cumulative impacts of this nature to be monitored, and for local governments to relay their considerations to the DEC in this regard, and for rates of development to be mitigated, if impacts to community character deemed to be of an appropriate severity.

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