



Erik Milito

Group Director
Upstream and Industry Operations

1220 L Street, NW
Washington, DC 20005-4070
USA

Telephone 202-682-8273
Fax 202-682-8426
Email militoe@api.org
www.api.org

July 21, 2014

Mr. John Anderson
U.S. Department of Energy (FE-34)
Attention: Addendum Comments, Office of Oil and Gas
Global Security & Supply
Office of Fossil Energy
Forrestal Building, Room 3E-042
1000 Independence Avenue
Washington, DC 20585

Re: Comments of the American Petroleum Institute (API) on the Department of Energy's (DOE's) *Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States* [79 Federal Register 32258; June 4, 2014]

Dear Mr. Anderson:

The American Petroleum Institute (API) is a national trade association that represents over 600 companies involved in all aspects of the oil and natural gas industry. API's members include producers, refiners, suppliers, pipeline operators, marine transporters, and service and supply companies. Many are owners and operators of LNG import and export facilities in the United States and around the world, as well as owners and operators of LNG vessels, global LNG traders, and manufacturers of essential technology and equipment used all along the LNG value chain. API and its members are dedicated to protecting the environment while economically developing and supplying energy resources for consumers. API members carry out operations for safe and environmentally responsible exploration and production of natural gas, crude oil, and associated liquids, including production via the use of hydraulic fracturing.

API is also the worldwide leading standards-making body for the oil and natural gas industry. Accredited by the American National Standards Institute (ANSI), API has issued approximately 500 consensus standards governing all segments of the oil and gas industry, including standards and recommended practices on well construction and hydraulic fracturing, which have been incorporated or referenced in numerous regulations and guidance documents by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of the Interior (DOI).

We read with interest DOE's June 4, 2014 Federal Register Notice of Availability of *Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the*

Mr. John Anderson
July 21, 2014
Page Two

United States (hereafter referred to as the draft Addendum). In the end, we remain confused about the Agency's approach and what it hopes to achieve through this public notice.

Specifically, within the Federal Register, DOE states that it has "*prepared this draft Addendum to discuss the potential environmental impacts associated with unconventional natural gas production in the lower-48 states. By including this discussion of natural gas production activities, DOE is going beyond what NEPA requires.*" API questions why the Agency feels compelled to go beyond the requirements of the National Environmental Policy Act at all.¹ From the NEPA website (NEPA.gov), when discussing the origination of the statute, the following is noted

"NEPA did not advocate environmental preservation at all costs. Rather, it sought to balance environmental concerns with the social, economic, and other requirements of present and future generations of Americans. State and local governments, concerned private and public organizations, and individuals encouraged Federal agencies to work in partnership; NEPA endeavored to reconcile the inherent tension between the rapidly changing world and its finite natural resources."

API would argue that in the case of the draft Addendum, a balanced approach is lacking. Specifically, DOE states that the discussions presented within the draft Addendum are based on existing regulations and best management practices. And yet, no mention is made of the work undertaken by API, and released publically in 2011, regarding best practices directly related to hydraulic fracturing. We believe this to be a serious oversight. As stated above, API is the worldwide leading standards-making body for the oil and natural gas industry. In our on-going effort toward continued improvement of oil and natural gas operations, in May of 2011, API completed a series of industry guidance documents specific to hydraulic fracturing:

- HF1, Hydraulic Fracturing Operations—Well Construction and Integrity;
- HF2, Water Management Associated with Hydraulic Fracturing Guidance;
- HF3, Practices for Mitigating Surface Impacts Associated With Hydraulic Fracturing;
- Standard 65-Part 2, Isolating Potential Flow Zones During Well Construction; and
- RP 51R, Environmental Protection for Onshore Oil and Gas production Operations and Leases.²

¹ API has already extensively argued before DOE why it has no legal obligation to consider alleged upstream impacts of natural gas development. *See, e.g.*, API Reply Comments to DOE 2012 LNG Export Study (Feb. 25, 2013), available at http://www.fossil.energy.gov/programs/gasregulation/authorizations/export_study/reply_comments/Erik_G_Milito02_25_13.pdf, at pp. 35-67.

² The "HF Series" (HF1, HF2, HF3) provides an important complement to two other recommended practices – Standard 65 Part 2, which ensure multiple levels of protection between sources of drinking water and the production zone of an oil and gas well and RP 51R, which provides recommendations to reduce the environmental footprint at E&P sites as much as possible.

Mr. John Anderson
July 21, 2014
Page Three

We believe this series provides the blueprint for the environmentally sound development of oil and natural gas. API immediately sent a full set of the series to the state regulators with oil and gas operations oversight in over 20 oil and natural gas producing states. The documents were made available free of charge on the API website. In addition, a succession of workshops was held in 15 locations across the country to educate state legislators, regulators, non API members, and interested stakeholders on the valuable content of the documents. As part of our ANSI accreditation process -- requiring openness, balance, consensus and due process -- API's Standards Program demands that industry specifications, recommended practices, and guidance documents be reviewed and updated on a regular basis to ensure they remain current. In 2013, HF1, HF2, and HF3 underwent a review process. All three documents are expected to be released as revised recommended practices by the fall of 2014. Finally, during this review, a new document, focusing on community engagement, was developed. It will serve as a gold standard for good neighbor policies that address community concerns, enhance the long-term benefits of local development, and ensure a two-way conversation regarding mutual goals for community growth. Released on July 9, 2014, the standard provides a detailed list of steps that oil and natural gas companies can take to help local leaders and residents prepare for energy exploration, minimize interruption to the community, and manage resources.³

Beyond its very one-sided focus, the other major difficulty with the draft Addendum is that it presents literature search results and interpretation of publicly available information in summary fashion, without sufficient context to enable a clear understanding of the risks associated with the topic. It is hard to extract a clear understanding or message in this form. The Addendum runs the risk of leaving an uninformed reader with an impression that all risks are extremely high for all unconventional development. While the information presented is not necessarily incorrect, it does not effectively characterize the associated risk levels or describe the range of issues involved. Given that the DOE indicates that "*The purpose of this Addendum is to provide additional information to the public regarding the potential environmental impacts of unconventional natural gas production activities;*" API would argue strongly that the Addendum falls short of its stated intention.

With regard to the National Energy Technology Laboratory (NETL) report titled *Environmental Impacts of Unconventional Natural Gas Development and Production* (May 29, 2014), which DOE used as a key resource in preparing the draft Addendum, API has similar concerns. It fails to provide a technically sound and fact-based summary to inform the public.

The disclaimer in the front of the report is particularly unusual and disconcerting:

³ The document is available on API's website via this link:
<http://www.api.org/news-and-media/news/newsitems/2014/july-2014/api-issues-good-neighbor-standards-for-oil-and-natural-gas-developers>

Mr. John Anderson
July 21, 2014
Page Four

“This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference therein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed therein do not necessarily state or reflect those of the United States Government or any agency thereof.”

If the DOE is not willing to stand behind the accuracy, completeness, or usefulness of the information in the report API questions the sense of designating it “as a key resource in preparing the draft Addendum.”

Further, the Executive Summary of the NETL report describes the body of work as one that: “summarizes the current state of published descriptions of the potential environmental impacts of unconventional natural gas upstream operations within the Lower 48 United States. As a survey, this report is by no means exhaustive. The goal of this report is to ensure that the predominant concerns about unconventional natural gas development, as covered by current literature, are identified and described. The sources cited are publicly available documents. Multiple publications on similar topics are compared and contrasted based only on their technical and methodological distinctions. No opinion or endorsement of these works is intended or implied.”

In reviewing the content of the report, and the cited references, it is clear the authors have attempted to assemble a listing and discussion of many diverse and publicized studies with a broad range of potential impacts. While we acknowledge the stated intent was not to screen the literature for technical soundness and technical validity, nor was there an intent to provide an “exhaustive” survey of the literature. As a result, API cannot support this document, in its current version, as an adequate summary of the current state of potential environmental impacts.

We would expect that NETL would provide a document that is technically sound; rather than a compilation of information without suitable technical vetting. Without an exhaustive literature assessment, whereby such literature is also screened for technical quality and rigor, the report will continue to drive confusion and misunderstanding by the broad general public and stakeholders. DOE should consider either a more exhaustive review of the literature, that also includes a robust technical screening (performed by appropriate experts in each topic) or substantially reduce the content of the report, whereby the concerns are listed and briefly summarized, but detailed discussion of individual cited references are eliminated.

Mr. John Anderson
July 21, 2014
Page Five

A final option offered to DOE is to follow the approach of the National Renewable Energy Laboratory (NREL). While specific to greenhouse gas emissions, NREL understands that the most comprehensive and accurate information on GHG emissions from various sources of energy is essential to informing policy, planning, and investment decisions. NREL recently led the Life Cycle Assessment (LCA) Harmonization Project, a study that gives decision makers and investors more precise estimates of life cycle GHG emissions for renewable and conventional generation, clarifying inconsistent and conflicting estimates in the published literature, and reducing uncertainty. API strongly urges DOE to review the NREL activity and consider following a similar harmonization approach when looking at the number of studies available on the environmental impacts of unconventional development.

API's more detailed comments on the draft Addendum follow in Attachment 1 to this letter. We urge the DOE to consider this input fully as the agency debates moving forward with any procedural changes to exporting natural gas from the United States. Please do not hesitate to contact us if we can be of further assistance.

Sincerely,

A handwritten signature in black ink, appearing to read 'Erik Milito', with a stylized flourish at the end.

Erik Milito
Group Director and Industry Operations

Detailed Comments on the DOE's Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States

Page 2: DOE recognizes its shortcomings in analyzing natural gas production activities and assessing specific environmental impacts in a NEPA context. API questions the purpose of the draft Addendum.

As DOE explained in *Sabine Pass Liquefaction, LLC*, DOE/FE Order No. 2961-A (Aug. 7, 2012), lacking an understanding of where and when additional gas production will arise, the **environmental impacts resulting from production activity induced by LNG exports to non-FTA countries are not “reasonably foreseeable”** within the meaning of the Council on Environmental Quality's (CEQ) NEPA regulations (40 CFR § 1508.7).”

Pages 3-4: API has additional report-balance concerns with the “examples of representative comments.” Those included are not only anecdotal and pejorative, but all in opposition to natural gas development. This section should be deleted.

Page 12: With regard to the discussion on withdrawals from surface waters and groundwater, more context is needed. As written, the reader is left with the impression that industry only uses drinking water or water of drinking water quality to carry out operations. At a minimum, API recommends that DOE include the following phrasing (red text) to the groundwater withdrawal discussion:

Withdrawals from groundwater could also have potentially adverse impacts. Some smaller, shallower aquifers may be depleted or reduced **over time by cumulative withdrawals from all water users**. Such reductions may render these aquifers unavailable for residential drinking water wells or impact the hydraulic connections between these aquifers and local surface waters. These aquifers may be an important source of cool water in the local ecosystem, particularly in the warmest portion of the year. Deeper aquifers may also be impacted by significant withdrawals, as recharge from precipitation may take an extended period of time.

Page 14: API recommends that DOE delete the unnecessary sentence noted below:

Hydraulic fracturing is generally used to increase the productivity of a well. In addition to increasing permeability and fluid flow rates, fracturing can increase the amount of contact between the well and the formation and the area of drainage within the formation. ~~This process can be used to manage pressure differences between the well and the target formation.~~²

Page 18: API recommends that the first paragraph be rewritten, to include the red text, to more accurately reflect the management of produced water:

Produced water recovered during flowback operations ~~water recovered~~ from a hydraulic fractured well **is returned to the surface and** typically stored, **until reuse or disposal occurs**, onsite in open pits or storage tanks. ~~Flowback water is the fluid returned to the~~

surface after hydraulic fracturing. Estimates on the percentage of original hydraulic fracturing fluids recovered vary widely, and may be from 20 to 80 percent (NETL 2014). Produced water recovered during flowback operations Flowback water may contain elevated levels (as compared to State and Federal water quality standards) of total dissolved solids (TDS), salts, metals, organics, naturally occurring radioactive materials (NORM), and specific chemicals used in the hydraulic fracturing process.

Page 18: API recommends that DOE add a clarification for the acronym use “UIC” as shown below. This acronym should also be added to the abbreviation list on Page V of the draft Addendum.

Wastewater treatment is generally regulated under the NPDES Program for surface water discharges and under the underground injection control (UIC) Program for subsurface discharge.

Page 20: The report states that the oil and natural gas industry is the largest industrial source of VOC emissions according to the U.S. EPA, but no reference is provided for this statement. Based on the 2011 National Emission Inventory for criteria pollutants⁴ EPA is estimating that the nationwide area source VOC emissions from Oil & Gas operations is about 2.7 million tons per year (TPY)⁵ which represents about 21% of nationwide VOC emissions⁶. For Oil and Gas operations non-point sources three sources account for close to 70% of the emissions, including: Condensate Tanks (~ 16% of VOC emissions for a sectoral total of 448,021 TPY); Crude Oil Tanks (over 28% of VOC emissions for a sectoral total of 769,805 TPY); and Pneumatic Devices (over 24% of VOC emissions for a sectoral total of 669,340 TPY)⁵.

Page 21: The report states that oil and natural gas production and processing account for nearly 40% of all U.S. CH₄ emissions, making the industry the nation’s single largest CH₄ source. This statement is not supported by emissions data from EPA’s latest national inventory. As shown in the following table, all oil and natural gas operations combined contribute just over 28% of the total CH₄ emissions. Methane emissions from oil and natural gas production and processing operations are the third highest source, behind enteric fermentation and landfills.

Table 1. U.S. National CH₄ Emissions, 2012

	CH ₄ , Emissions (Million metric tonnes CO ₂ e)	% Contribution to Total
Enteric Fermentation	141	25%
Landfills	102.8	18%
Oil and Gas Production and Processing	91.7	16%
Other Oil and Gas	69.9	12%
Coal Mining	55.8	10%
Manure Management	52.9	9%

⁴ <http://www.epa.gov/ttn/chief/net/2011inventory.html>

⁵ ERG, Estimating Nonpoint Emissions from the Oil and Gas Production Sector, Revised Draft, September 2013

⁶ <http://www.epa.gov/airtrends/aqtrends.html>

Forest Land Remaining Forest Land	15.3	3%
Wastewater Treatment	12.8	2%
Rice Cultivation	7.4	1%
Stationary Combustion	5.7	1%
Other	12	2%
TOTAL	567.3	

Page 21: API recommends that Figure 6: *Flaring a Well in Pennsylvania* be omitted from the report.

Page 21: The sentence needs to be corrected, as flowback is from a well completion, not prior to a well completion:

....flowback that comes from wells being prepared for production. ~~This occurs after well drilling and prior to well completion.~~ The hydrocarbons are then treated....

Page 23: The report states that “Vented emissions originate when natural gas is flared.” This seems to contradict the information in Table 6, which follows immediately below.

Page 24: API suggests that a source be provided for the following statement as a CH₄ has low reactivity and has not been proven to be a contributing factor.

In the lower atmosphere, CH₄ is an ozone precursor, contributing to ground-level ozone pollution.

Page 24: The report states “the oil and natural gas industry is the largest industrial source of CH₄ emissions in the United States (EPA, 2014)”. This is misleading as ‘Enteric fermentation’ is clearly the top source, albeit not an industrial source of CH₄ emissions. The following EPA reference ‘Draft Inventory US GHG Emissions and Sinks: 1990-2012 EPA February 2014’ [LINK](#) on page ES-6 and ES-13 shows the chart and related information. In this latest estimate by EPA, Enteric Fermentation (e.g. agriculture) provides 36% methane versus 23% for natural gas. Landfills provide 18% and Coal mining provides 10%.

Page 24: The last sentence notes “Methane emissions are not currently addressed by federal regulations, but the new federal regulations on the natural gas industry discussed above are expected to indirectly reduce CH₄ emissions as a co-benefit.” Since the EPA rulemaking was finalized and in effect since 2012, this sentence should be reworded to more accurately read: “Methane emissions are not currently directly addressed by federal regulations, but recent 2012 federal VOC regulations on the natural gas industry discussed above are indirectly reducing CH₄ emissions as a co-benefit.”

Page 26: With regard to the discussion on sulfur dioxide, mention should be made that SO₂ levels have been greatly reduced by the use of low sulfur fuels.

Page 27: API recommends that the **red text** be added to discussion on aggregate emissions. As written, the statement is too broad and ignores other contributing sources.

As with short-term impacts, many of the individual sources are regulated by the states, but the impacts resulting from the aggregate of emissions within a region experiencing natural gas development **coupled with emissions from other sources** are not well understood. Air emissions from natural gas development **may create new or expanded ozone non-attainment areas** and possibly complicate state implementation plans for bringing current non-attainment areas into compliance.

Page 27: API recommends that the report be specific to the types of engine emissions in the sentence below and further explain the pollutants considered to be ozone precursors.

Besides CH₄, the largest pollutant emissions associated with natural gas production are VOCs and engine emissions. Many of these pollutants.....

Page 28: With regard to the discussion on nonattainment areas, API offers that states with marginal nonattainment are not required to develop SIPs and operators in nonattainment areas must use LAER only if a designated major source.

Page 31: The analysis fails to report that there has been no proven peer reviewed ‘exposure pathway’ (via air, water, or otherwise) that has been proven to connect the industrial process with any health issues. In addition, the DOE should be aware that on June 13, 2014 the American Council on Science and Health (ACSH) released a report, aimed at a systematic, objective review of documented types and rates of hydrofracturing-fluid-and chemical-related incidents affecting human health, to date, in the region of the Marcellus Shale play. The results show it to be safe (see <http://acsh.org/2014/06/fracking-safe-efficient-path-energy-independence>)!

Page 32: Under the conclusions section, API recommends that the **red text** below be added:

Air emissions from natural gas development **and other sources** may create new or expanded ozone nonattainment areas and possibly complicate state implementation plans for bringing current ozone nonattainment areas into compliance and maintenance.

Page 33: The report indicates the natural gas industry’s emissions of CH₄ account for one-third of all U.S. CH₄ emissions and approximately 3% of the EPA’s U.S. total inventory of GHG emissions on a CO₂e basis. However, this is based on data from the 2010 national GHG inventory. Data from EPA’s latest national GHG inventory indicates that the natural gas systems contribute 23% of the total CH₄ emissions in the U.S., and 2% (129.9 million tonnes CO₂e from natural gas systems out of 6,525.6 million tonnes CO₂e GHG emissions total) of the national GHG emissions.

Page 33: Table 7 presents a summary of the 2012 GHG emissions data for natural gas systems in the U.S., however, this table is based on a draft version of the 2012 national GHG inventory report, and not the final version released in April 2014. The final emissions data are shown in Table 2 below.

Table 2. GHG Emissions from Upstream U.S. Natural Gas Systems in 2012

CH4	2,884	60.5
“non-combustion” CO2	35,132	35.2
Sum	38,016	95.7
Percent of U.S. GHG emissions from all sources (6,525.6 Tg CO2e)		1.47%*

Table 3 below presents GHG emissions from natural gas systems relative to total national natural gas withdrawals, based on 2012 national GHG inventory data from EPA and natural gas production information from EIA.

Table 3. U.S. Natural Gas Systems GHG Emissions as a % of Natural Gas Withdrawals (2012 data)

2012 EPA National GHG Inventory (Final Version) Natural Gas Systems		
CH4 Emissions as Tg CO2e		
Field Production (Gas Only)	41.8	
Processing	18.7	
Transmission and Storage	43.5	
Distribution	25.9	
TOTAL	129.9	CH4 Emissions as Tg CO2e
	322,173	CH4 Emissions as MMscf CH4
		MMscf natural gas withdrawal
Gross Natural Gas Withdrawals	29,542,313	volume
CH4 emissions (scf)/marked production (scf)	1.09%	

Page 36: Different global warming potential values are discussed in this portion of the report. The section on the natural gas industry, beginning on page 37, presents a very simplistic view of GHG emissions associated with the natural gas industry, and of operations associated with natural gas production. In fact, only well drilling, completion, and workovers are discussed in any detail, and much of the background information from these operations is technically incorrect.

Page 39: Figure 11 in the draft Addendum presents GHG emissions from NETL modeling of natural gas operations in the Marcellus Shale. Marcellus Shale is the modeling parameter chosen in the NETL report titled *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States (May 29, 2014)*, as being representative of U.S. natural gas industry operations for comparison to the other scenarios modeled.

- The terminology used in this figure are not defined and not commonly used in the natural gas sector. For example, the figure presents emissions data for “valve fugitive emissions” and “other fugitive emissions.”

- The figure presents emission data for “water delivery” and “water treatment.” These are not GHG emission sources that are accounted for in the national GHG inventory or in EPA’s GHG reporting program for the natural gas sector. Page 42 indicates that water removal is “claimed to be another significant source of CH4 emissions”. While it is true that water management adds to the lifecycle of GHG emissions due to pumping, transportation and processing of water, the use of the word “significant” is unclear and inaccurate.
- The figure presents emissions associated with “transport” operations, but it is not clear if this is activity upstream or downstream of gas processing operations.

Page 40: Table 9 presents CH4 emissions in addition to CH4 “Captured/Combusted” and “non-Combustion” CO2 emissions, referencing the draft 2012 national GHG inventory report, Tables 3.45 and 3.46. The row labeled “CH4 Emissions” in Table 9 appears to be the net CH4 emissions from the national GHG inventory (draft 2012 version). However, Table 9 implies that these emissions are additive, when in fact the CH4 emissions “Captured/Combusted” as presented in the national inventory report are meant to reflect emission reductions and are netted from the calculated potential emissions presented in the inventory report. This row should be removed from the table.

Page 43: The section concludes with the following statements: “Increased unconventional natural gas production will increase GHG emission from upstream activities” and “To the extent that unconventional natural gas production replaces the use of other carbon-based energy sources, there may be a net positive impact in terms of climate change”. API agrees with this statement.

Page 45: The introduction section does a very poor job in providing clear information on the risk level associated with potential induced seismicity associated with unconventional. Specifically, the third sentence “*The National Research Council (NRC) (2013) describes numerous events caused by or likely related to energy development in at least 13 states involving oil and gas extraction, secondary recovery, wastewater injection, geothermal energy extraction, and hydraulic fracturing for shale gas*” implies that induced seismicity is a frequent occurrence. While the sentence is not false; it does not provide the right context that induced seismicity is rare.

Page 45: While “most people” may be aware of the magnitude of a seismic event based on the Richter scale, “most people” do not have a true comprehension of how it works or a clear understanding of the Modified Mercalli Intensity. This sentence should be deleted.

Page 46: In reference to Table 11, it is not scientifically precise or adequately descriptive of the limits of application or appropriate qualifiers. It provides an interpretation of USGS information to correlate Modified Mercalli Scale and Richter Scale without suitable discussion of the qualifiers associated with its use. For example, a distance from hypocenter (or event depth) can have significant influence on felt ground shaking. This fact is not discussed effectively in the report. As a stand-alone table/reference; this will continue to create confusion across the public, where Richter magnitudes may be considered in stoplight systems, without discussion of factors

that affect the actual felt ground shaking for a given magnitude event. The public would be much better informed if the report were edited to clearly emphasize that the use of Richter magnitudes (or other magnitude scales) are not adequately 1) descriptive of ground shaking values or 2) valid for identifying hazardous ground shaking conditions without considering event location and seismic attenuation.

Page 48: DOE includes the data from the NRC 2013 report *Induced Seismicity Potential in Energy Technologies* – showing the low probability of seismic occurrence. API recommends that DOE also include the information from the “Executive Summary” of that same report in this section, which would provide much better context on risk. In addition, DOE misses the opportunity to explicitly state that only a handful of events have been attributed to the 10’s of thousands of injection wells; and hundreds of thousands of hydraulically fractured wells.

Page 50: API recommends adding the **red text** below to the discussion on industry practices:

- 4) Industry practices and resource attributes vary among the unconventional resource plays, **as a direct result of the differing local conditions**, such that the potential for impacts and preventative operational measures may differ from each play (see Table 13 for a comparison of attributes of the major plays).

Page 53: API recommends that the **red text** below be added to the discussion on wastewater disposal via injection wells:

- 1) Wastewater disposal via injection wells presents a relatively low but recognized ~~the highest~~ risk of induced seismicity. In contrast, oil/gas production is expected to be **a very low-risk**. Hydraulic fracturing ~~seems to~~ **causes few felt seismic events**, based on current industry practices and the frequency of reported events.

Page 54: The discussion of relative risks provided is not robust or balanced. The discussion is lacking in a thorough and clear explanation of the 3 key elements to consider when assessing relative risk: (a) whether a critically stressed fault is present; (b) whether a subsurface pathway for hydraulic communication from the injection point to the fault is present; and (c) whether the intended scope of injection operations is likely to result in a sufficient subsurface stress perturbation in sufficiently close proximity to a fault, to cause the fault to slip. The wording provided does not contrast critically-stressed faults to “benign” faults. This may result in the public becoming unnecessarily concerned with the presence of any fault in the area; when, in fact, the key concern should be with larger faults which are critically stressed. The report should be much more descriptive and clear on this matter, thereby enhancing the observation that this combination of factors is only encountered in rare and unique circumstances.

Page 54: Within the seismicity section of the draft Addendum, it is unfortunate that DOE fails to include any discussion on the steps undertaken by industry, particularly in the past few years, to better understand the risks and hazards and design approaches to mitigate those risks. In addition, a discussion on the research being pursued by many universities on the induced seismicity topics is also missing. Through this combined understanding, use of risk assessment and mitigation techniques will help to reduce the likelihood of induced seismicity and mitigate potential consequences should an induced seismic event occur.

Page 56: API recommends omitting Figure 17: Typical Well Pad Development in a Wooded Location. The text with this photo inaccurately depicts the use of very large reservoirs of water as typical for unconventional development across the country.

Page 56: The well pad spacing reference (NETL 2009) is out of date as the reach of horizontal drilling has continually increased.

Page 60: In the discussion on land use impacts, DOE states: “Some lands may revert back to agricultural uses, but soil compaction may be an issue.” API recommends providing a reference for this statement or deleting it.

Page 62: API questions the use of a news article (NPR 4) as an appropriate resource for a “scientific report” such as the draft Addendum.

Page 62: The example of Pennsylvania’s Department of Conservation (DCNR) leasing of state forest lands should be omitted from the report. On May 23, 2014 Governor Corbett issued an Executive Order that prohibits the leasing of state forest and park land which would result in additional surface disturbance on state forest or state park lands. The Executive Order is effective immediately (see: http://www.oa.state.pa.us/portal/server.pt/community/executive_orders/708).

Page 62: API recommends the following changes to the discussion on the associated impacts from development:

Associated impacts from development:

- Increased traffic – Pipeline construction and well development activities require deliveries of various raw materials and ~~an army~~ an increase in workers that **may result in increased** traffic, ~~raise~~ accident rates, and ~~cause increased~~ road wear and tear (see Traffic and Roadway Impacts).
- Invasive species – Pipeline construction and well development activities **may cause** a disturbance of land that can provide access to invasive species. **However, is it important to note that there are strict federal and state regulations governing reclamation efforts to prevent invasive species issues.**
- View shed alteration – Pipeline construction and well development activities cause at least temporary visual changes to the landscape. ~~During the peak of activities, nuisance lighting can also be an issue.~~
- Reflective Light Pollution – During the peak of activities, nuisance lighting can also be an issue.

Page 64: API recommends deleting the Traffic Impacts section. The same points are raised several times in the preceding associated impacts section.

Page 66: It is necessary to provide context on impact fees on the industry provided for by state statutes. These fees finance infrastructure and environmental repairs and upgrades, improve public safety, and provide tax relief. They also help to finance certain state government agencies.