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The Hon. Gina McCarthy
Administrator, U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460

Attn: Docket ID No. EPA–HQ–OAR–2015-0764

Re: Comments of Environmental Defense Fund on EPA's Proposed Greenhouse Gas Reporting Rule: Leak Detection Methodology Revisions and Confidentiality Determinations for Petroleum and Natural Gas Systems

The Environmental Defense Fund (EDF) appreciates the opportunity to comment on the Environmental Protection Agency's (EPA) January 29, 2016 proposed rule regarding Leak Detection Methodology Revisions and Confidentiality Determinations for Petroleum and Natural Gas Systems (Proposed Rule).[1] EDF is a national non-profit, non-partisan organization that represents over 750,000 members nationwide and is dedicated to protecting human health and the environment by effectively applying science, economics, and the law.

The petroleum and natural gas sector is one of the largest domestic sources of methane emissions—and EPA has just proposed to increase emissions estimates from this source category by almost 27%.[2] Inventories demonstrate that leaking equipment and components are responsible for a large share of these emissions,[3] and recent scientific evidence suggests that methane leaks are very likely underestimated due, in part, to the presence of large, significant

[1] Greenhouse Gas Reporting Rule: Leak Detection Methodology Revisions and Confidentiality Determinations for Petroleum and Natural Gas Systems; Proposed Rule, 81 Fed. Reg. 4,987 (January 29, 2016).
[2] EPA, DRAFT Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014, February 22, 2016, *available at* http://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Main-Text.pdf.
[3] *See, e.g.*, 2011-2014 GHGRP Industrial Profiles: Petroleum and Natural Gas Systems, at 9-10, *available at* https://www.epa.gov/sites/production/files/2015-11/documents/subpart_w_2014_data_summary_10-12-15_508_km.pdf ("The top reported emission sources for onshore production were generally consistent with the top reported emission sources for Petroleum and Natural Gas Systems. Combustion equipment (31.6 MMT CO2e) and pneumatic devices (25.1 MMT CO2e) were the top reported emission sources, followed by associated gas venting and flaring (13.0 MMT CO2e), miscellaneous equipment leaks (8.4 MMT CO2e), atmospheric tanks (7.3 MMT CO2e), and other flare stacks (5.3 MMT CO2e).").

sources—known as "super emitters"—that are not adequately reflected in national inventories.[4]

EPA has recognized that greenhouse gas reporting programs "collect valuable information to inform and implement policies necessary to address climate change," and that "[a]ccurate and timely information on GHG emissions is essential for informing" such decisions.[5] The Administration has likewise underscored the importance of rigorously characterizing emissions from the oil and natural gas sector, noting that "[b]etter data collection and measurement will improve our understanding of methane sources and trends, and enable more effective management of opportunities to reduce methane emissions."[6] To that end, the Administration has directed EPA to "explore potential regulatory opportunities for applying remote sensing technologies and other innovations in measurement and monitoring technology" in the oil and natural gas sector, including as part of the Greenhouse Gas Reporting Program (GHGRP).[7]

EPA has now proposed to enable use of Optical Gas Imaging (OGI) technologies to detect leaks, aligning Subpart W leak detection requirements with leak detection and repair requirements in the proposed NSPS OOOOa. The agency has also proposed to allow other sources, not required to perform LDAR under NSPS OOOOa, to employ these detection methodologies. For operators using these methods, EPA has proposed certain component-specific emission factors to estimate emissions from detected leaks.

We support EPA's proposal, which will provide more rigorous data on methane emissions from equipment leaks, and urge the agency to strengthen the proposal to ensure that all Subpart W sources use these improved methods and that the methods are designed to accurately characterize emissions from equipment leaks. In particular, we respectfully ask that the agency:

- Require Subpart W leak sources to identify equipment leaks using actual detection methods such as OGI. EPA could establish a near-term date by which these requirements would apply to all such sources, including those not subject to NSPS OOOOa or other state or federal requirements;

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[4] *See, e.g.*, Harriss, *et al.*, (2015) "Using Multi-Scale Measurements to Improve Methane Emissions Estimates from Oil and Gas Operations in the Barnett Shale, Texas: Campaign Summary," *Environ. Sci. Technol.*, 49 (13), pp 7524–7526 ("Harriss (2015)"), *available at* http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305 (providing a summary of the 12 studies that were part of the coordinated campaign); Zavala-Araiza, *et al.*, "Reconciling Divergent Estimates of Oil and Gas Methane Emissions," *Proc. Natl. Acad.*, 112 (51) pp 15597–15602 ("Zavala-Araiza (2015)"), *available at* http://www.pnas.org/content/112/51/15597.short. *See also* Clean Air Task Force, *et. al*. Comment on EPA's proposed Emission Standards for New and Modified Sources, Docket ID No. EPA-HQ-OAR-2010-0505-7322, at 26-28, 37-40.

[5] EPA, Mandatory Reporting of Greenhouse Gases, 74 Fed. Reg. 56260, 56264, 65 (Oct. 30, 2009).

[6] Strategy to Reduce Methane Emissions at 3, *available at* https://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf.

[7] 81 Fed. Reg. at 4989, citing FACT SHEET: Administration Takes Steps Forward on Climate Action Plan by Announcing Actions to Cut Methane Emissions. The White House, Office of the Press Secretary, January 14, 2015, *available at* https://www.whitehouse.gov/thepress-office/2015/01/14/fact-sheet-administrationtakes-steps-forward-climate-action-plan-anno-1.

- Ensure that OGI leak survey requirements apply to all fugitive emission components, including those that are potentially significant sources of emissions like controlled storage tanks and gas-liquid separators;

- Enable operators to directly quantify emissions using proven, highly-effective technologies;

- Ensure facilities that choose not to directly quantify emissions use emissions factors that accurately reflect the presence of super-emitters; and

- Develop a pilot program to help accelerate deployment of other advanced monitoring and detection technologies that could further enhance the rigor of Subpart W.

Below, we describe these recommendations in greater detail, and incorporate by reference all studies and materials cited in these comments.

I. RECENT SCIENTIFIC STUDIES UNDERSCORE THE IMPORTANCE OF DIRECTLY DETECTING AND QUANTIFYING METHANE EMISSIONS FROM EQUIPMENT LEAKS.

Recent scientific evidence confirms that methane emissions are significant and that rigorous assessment of these emissions requires direct detection and quantification. In particular, certain characteristics associated with equipment leaks underscore the importance of direct monitoring:

- **Equipment Leaks are a Significant—and Underestimated—Source of Emissions**.[8] ICF has found that leaks are the largest emissions category in the oil and gas industry, estimating that emissions from these sources will account for nearly 2.3 million metric tons of methane in 2018, or 30% of all emissions from the oil and gas sector.[9] Moreover, recent scientific research confirms that these emissions are likely significantly underestimated.[10] For instance, a recent study in Texas' Barnett Shale found oil and gas methane emissions could be 90% higher than estimates based on the GHG Inventory.[11]

- **Leak Distribution is Heterogeneous**. There is considerable evidence that emissions from equipment leaks are heterogeneously distributed—with a small percentage of sources accounting for a large portion of emissions—[12] and that existing inventories do

[8] Fugitive emissions account for 35% of emissions from the natural gas and upstream petroleum sectors. 2013 GHGI, using methodology described in *Waste Not*, Technical Appendix, Section 1. Leaks, at 53, *available at* http://www.catf.us/resources/publications/files/WasteNot.pdf.
[9] ICF International, *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries* B-6 (March 2014) ("ICF (2014)") at 3-9, *available at* https://www.edf.org/energy/icf-methane-cost-curve-report.
[10] *See, e.g.*, Harriss (2015) at 7524.
[11] Zavala-Araiza (2015) at 15599.
[12] *See, e.g.*, Allen, D.T., *et al.*, "Measurements of methane emissions at natural gas production sites in the United States," *Proc. Natl. Acad.*, 110 (44) pp. 17768–17773 ("Allen (2013)"), *available at* http://www.pnas.org/content/110/44/17768.full; ERG and Sage Environmental Consulting, LP, "City of Fort Worth Natural Gas Air Quality Study, Final Report" ("Fort Worth Study") (July 13, 2011), *available*

not accurately reflect the presence of these "super-emitters."[13] The concentration of emissions within a relatively small proportion of sources has been observed both among groups of components within a site and among groups of entire facilities.[14]

- **Equipment Leaks are Unpredictable**. Recent studies have assessed whether well characteristics and configurations can predict super-emitters, concluding that they are only weakly related,[15] and that these emissions are largely stochastic.

- **Super-Emitters Shift in Time and Space**. Abnormal operating conditions, such as improperly functioning equipment, can occur at different points in time across facilities.[16] While it is true that at any one time roughly 90% of emissions come from 10% of sites, these sites shift over time and space—meaning that, at a future time, a different 10% of sources could be responsible for the majority of emissions.[17]

Taken together, these features underscore the importance of strengthening EPA's existing approach to estimating equipment leaks, which is based on default population emission factors and "represent[s] an average emission rate for each equipment component of a certain type."[18] In particular, the heterogeneous, unpredictable, and ever-shifting nature of equipment leaks all suggest that actual detection is essential to help identify the location and type of leaking components. Moreover, the magnitude of these emissions—and inventories' failure to characterize super-emitters—underscore the importance of direct quantification (and, at minimum, the use of emission factors that are designed to address these deficiencies). Below, we recommend several ways in which EPA's proposal should be strengthened to better reflect these scientific findings.

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at http://fortworthtexas.gov/gaswells/default.aspx?id=87074 (finding that the highest 20 percent of emitting sites account for 60–80 percent of total emissions from all sites; the lowest 50 percent of sites account for only 3–10 percent of total emissions); Zavala-Araiza, *et. al.*, "Toward a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites," *Environ. Sci. Technol.*, 49 (13), pp 8167–8174 ("Zavala-Araiza, Super-Emitters (2015)"), *available at* http://pubs.acs.org/doi/abs/10.1021/acs.est.5b00133.

[13] Zavala-Araiza (2015) at 15599.

[14] *See* EPA, "Oil and Natural Gas Sector Leaks: Report for Oil and Natural Gas Sector Leaks" (2014), *available at* http://www3.epa.gov/airquality/oilandgas/2014papers/20140415leaks.pdf.

[15] Lyon, *et al*., "Aerial surveys of elevated hydrocarbon emissions from oil and gas production sites," *Environ. Sci. Technol.* (*in review*). *Expected publication 2016*. *See also* Brantley, H.L., *et. al.*, "Assessment of methane emissions from oil and gas production pads using mobile measurements," Environmental Science & Technology, 48(24), pp.14508-14515, *available at* http://pubs.acs.org/doi/abs/10.1021/es503070q (assessing where well characteristics can predict emissions, concluding that they are weakly related and that emissions are largely stochastic).

[16] Zavala-Araiza (2015) at 15600.

[17] *Id*.

[18] 81 Fed. Reg. at 4992.

II. EPA SHOULD REQUIRE ALL REPORTERS TO DETECT LEAKS USING ADVANCED TECHNOLOGIES LIKE OGI AND SHOULD PROVIDE FOR COMPREHENSIVE LEAK INSPECTION SURVEYS

EPA has proposed to align LDAR requirements under NSPS OOOOa with leak reporting requirements under Subpart W and to allow facilities not subject to the NSPS to nonetheless deploy these methods. We support EPA's proposal and urge the agency to strengthen the scope of detection requirements in two important respects. First, we recommend that EPA require all Subpart W reporters to detect leaks using direct monitoring technologies like OGI and second, we urge EPA to require these sources to comprehensively survey components with potential leaks, including sources like storage tank thief hatches and liquid separators.

A. EPA Should Require All Reporters to Detect Leaks Using Advanced Technologies Like OGI

For sources subject to NSPS OOOOa, EPA has proposed to require Subpart W leak reporting using the same OGI technologies, aligning Subpart W requirements with proposed LDAR requirements under the NSPS.[19] For other sources (those subject to state requirements, voluntarily participating in the Methane Challenge Program, or otherwise), the agency proposes to allow—though not to require—use of OGI technology.

EPA notes that actual detection, using OGI technology, "may provide more accurate estimates than the current method used for . . . equipment leak emissions,"[20] and that deploying OGI has additional, practical benefits, including "reduc[ing] the amount of methane and other atmospheric pollutants that are emitted into our atmosphere, [] reduc[ing] company losses of valuable commodities like methane, and improv[ing] operational and safety practices so that leaks can be identified and fixed more efficiently in the future."[21]

We support EPA's proposal to align Subpart W requirements with NSPS OOOOa LDAR requirements, and we respectfully urge that the agency strengthen its approach by requiring all Subpart W sources to directly detect leaks using technologies such as OGI. As noted above, actual detection can produce more accurate data and such an approach is consistent with both EPA's and the Administration's longstanding commitments to enhance the rigor and transparency of Subpart W data.[22] In addition, applying OGI detection uniformly across Subpart W sources will produce data that is readily comparable across facilities and will allow EPA to assess the benefits of both company commitments and forthcoming standards for new and existing infrastructure.[23]

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[19] 81 Fed. Reg. at 4990.
[20] 81 Fed. Reg. at 4991.
[21] 81 Fed. Reg. at 4989.
[22] *See, e.g.*, EPA, Greenhouse Gas Reporting Program: Subpart W Rulemaking Resources, *available at* https://www.epa.gov/ghgreporting/subpart-w-rulemaking-resources (providing a timeline of EPA's past Subpart W rulemakings).
[23] In addition to existing source standards in Colorado and Wyoming, EPA has committed to expeditiously developing standards for existing sources. *See, e.g.*, EPA Connect, "EPA Taking Steps to Cut Methane Emissions from Existing Oil and Gas Source" (March 10, 2016), *available at*

Such an approach is likewise eminently feasible. There are just over 250 oil and natural gas companies that report production sector emissions under Subpart W.[24] Many of these companies have operations in states like Colorado, Wyoming, Ohio, and Pennsylvania that already contemplate use of OGI-based leak detection surveys.[25] In addition, many will be subject to requirements under the NSPS or the Bureau of Land Management's recent proposed standards to address venting and flaring on federal lands. For instance, we evaluated companies that completed new wells in 2015 and found that a significant number of Subpart W reporters will be required to perform OGI-based surveys on a portion of their wells. Extending Subpart W requirements to non-NSPS sources leverages detection technologies that are already in the field in a way that ensures companies' report using the same, standardized methods.

EPA could implement such an approach by immediately requiring—as EPA has proposed—that sources subject to NSPS OOOOa use aligned OGI inspections to report leaks under Subpart W. For other sources, EPA could add OGI as an acceptable method and simultaneously phase out the availability of less rigorous alternatives. Such an approach could be modeled on EPA's previous action to eliminate non-standardized, best available monitoring methods ("BAMM"). There, the agency recognized a transitional need for BAMM[26] but ultimately established a date-certain by which all facilities were required to deploy more rigorous methodologies. Similarly here, EPA could allow a limited transitional period, during which non-NSPS OOOOa facilities could employ any approved methodology. EPA could ensure, however, that all facilities deploy direct detection methods by a date-certain in the near future.

Finally, we respectfully recommend EPA clarify certain aspects of its proposed approach. In particular, we ask that EPA confirm that reporters monitoring emissions several times each year are required to report data from each respective survey. Doing so will provide additional, helpful data about changes in leak frequency over time and will likewise avoid concerns about the representativeness of any particular survey. We likewise urge EPA to include reporting requirements that document whether a detected leak was repaired, and if so, when that repair

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https://blog.epa.gov/blog/2016/03/epa-taking-steps-to-cut-methane-emissions-from-existing-oil-and-gas-sources/ ("EPA will begin developing regulations for methane emissions from existing oil and gas sources. We will start this work immediately to address methane from existing sources.").

[24] This figure is based on GHGRP reporting data for onshore production reporting facilities.

[25] Co. Dep't of Pub. Health & Env't Reg. No. 7 (5 C.C.R. § 1001-9 XVIII); Pa. Dep't of Envtl. Prot., General Permit for Natural Gas Compression and/or Processing Facilities (GP-5), *available at* http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-94153/2700-FS-DEP4403.pdf; Ohio Envtl. Prot. Agency, General Permit 12.1(C)(5)(c)(2), 12.2(C)(5)(c)(2), *available at* http://epa.ohio.gov/Portals/27/oil%20and%20gas/GP12.1_PTIOA20140403final.pdf; Wyo. Dep't of Envtl. Quality, Oil and Gas Production Facilities: Chapter 6 Section 2 Permitting Guidance (June 1997, Revised Sept. 2013), *available at* http://deq.wyoming.gov/media/attachments/Air%20Quality/New%20Source%20Review/Guidance%20Documents/2013-09_%20AQD_NSR_Oil-and-Gas-Production-Facilities-Chapter-6-Section-2-Permitting-Guidance.pdf.

[26] In November 2014 EPA removed BAMM provisions from subpart W reporting requirements and implemented transitional BAMM provisions which included three months of automatic BAMM to allow reporters to comply with revised monitoring methods. EPA's transitional BAMM provisions also included the opportunity to request an extension for the use of BAMM beyond the three month transition period (for another nine months). 80 Fed. Reg. 64264 (October 22, 2015).

occurred. Reporting whether and when a facility undertook repairs is especially important to assess emissions from sources not otherwise required to fix leaks under the NSPS or other state program.

B. EPA Should Provide for Comprehensive Leak Inspection Surveys

EPA has likewise proposed to align Subpart W equipment components with the proposed NSPS subpart OOOOa definition of "fugitive emissions component," with some exceptions. These exceptions focus on certain fugitive emissions components that fall within the NSPS definition, but for which EPA has determined there is a pre-existing calculation methodology in Subpart W. In particular, EPA has proposed to exclude storage tanks, gas-liquid separators and some compressor sources, though the agency has requested comment on this approach, including whether it may be appropriate to treat controlled and uncontrolled storage tanks differently.

We urge EPA to require operators to include controlled tanks in Subpart W leak inspection surveys. EPA's existing approach to estimating tank emissions is generally based on calculation methodologies without requirement for direct measurement.[27] However, emissions from controlled tanks resulting from failed control devices (e.g. unlit flare, clogged VRU line, or open thief hatch) are unintentional, not reflected in EPA's existing methodologies, and potentially significant.[28] For instance, in a recent study, researchers found substantial venting from liquids storage tanks at approximately 20 percent of sampled gathering facilities, with emission rates at these facilities four times higher on average than rates observed at other facilities.[29]

Similarly, we respectfully urge EPA to include gas-liquid separators in Subpart W leak reporting requirements. As with controlled storage tanks, the existing Subpart W methodologies applicable to separators use population emission factors and certain indirect approaches to characterizing emissions from stuck dump valves.[30] These approaches, however, do not accurately characterize emissions from separator leaks and stuck pressure relief valves, which can be significant.

Accordingly, we urge EPA to ensure both controlled storage tanks and gas-liquid separators are addressed as part of Subpart W leak inspection surveys. Emissions from these sources are not accurately characterized in current calculation methodologies and, as with other fugitive sources, directly monitoring controlled tanks and separators can enhance the rigor of equipment leak data under Subpart W.

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[27] *See, e.g.*, 40 C.F.R. 98.233(j).

[28] EPA, Compliance Alert: EPA Observes Air Emissions from Controlled Storage Vessels at Onshore Oil and Natural Gas Production Facilities (September 2015), *available at* https://www.epa.gov/sites/production/files/2015-09/documents/oilgascompliancealert.pdf.

[29] Mitchell, A.L., *et al.*, (2015), "Measurements of Methane Emissions from Natural Gas Gathering Facilities and Processing Plants: Measurement Results," *Environ. Sci. Technol.*, 49 (5), pp 3219–3227 ("Mitchell (2015)"), *available at* http://pubs.acs.org/doi/abs/10.1021/es5052809.

[30] 40 C.F.R. 98.233(j).

III. EPA SHOULD ALLOW FOR DIRECT QUANTIFICATION AND ENSURE THAT ANY EMISSIONS FACTORS REFLECT THE PRESENCE OF SUPER-EMITTERS

After detecting leaks, EPA proposes to allow reporters to estimate emissions associated with these leaks using component-specific emissions factors.[31] The agency notes that it evaluated more recent studies but ultimately proposed leaker factors based largely on the 1996 EPA/GRI study. EPA identifies, however, several instances in which recent studies suggest higher emissions factors may be appropriate and requests comment on how best to reflect information from those studies and the presence of super-emitters across sources.

We urge EPA to strengthen its proposed approach to quantify emission in several respects:

- Provide for Direct Quantification. EPA should provide for direct quantification of emissions using proven technologies, and require transparent reporting of the measurement method utilized. In particular, EPA should require direct quantification of emissions for sources that elect not to repair detected leaks (for instances, sources not otherwise subject to NSPS OOOOa). Given the important—and likely significant—contribution these sources will have to overall emissions, direct quantification is imperative. For sources that are repaired, EPA should allow for direct quantification, which would enable sources to demonstrate that site-level emissions are either lower or higher than emissions factors would otherwise suggest.

- Ensure Emissions Factors Reflect the Presence of Super-Emitters. EPA proposes to allow sources to use component-specific emissions factors, and we urge the agency to ensure these factors reflect the presence of super-emitters. Due to the positively skewed distribution of equipment leak emission rates, emission factors based on the average of a relatively smaller sample size (like the EPA / GRI Study) will underestimate the average emission rate of the full population. More accurate emission factors that account for super-emitters can be developed by coupling larger sample sizes with advanced statistical methods such as those employed in recent studies.[32] Indeed, California has recently proposed to incorporate super-emitters into its analysis of the effectiveness of leak detection and repair programs.[33] EPA could similarly seek to characterize these emissions through a separate, super-emitter factor. Alternatively, the agency could use directly measured leaks to help better reflect these distributions.

[31] 81 Fed. Reg. at 4992.
[32] *See, e.g.*, Lamb, B.K., *et. al.*, "Direct Measurements Show Decreasing Methane Emissions from Natural Gas Local Distribution Systems in the United States," *Environ. Sci. Technol.*, 2015, 49 (8), pp 5161–5169, *available at* http://pubs.acs.org/doi/abs/10.1021/es505116p; Zavala-Araiza (2015).
[33] Public Workshop Staff Presentation, Revised Draft Regulation for Greenhouse Gas Emissions Standards for Crude Oil and Natural Gas Facilities, February 4, 2016, Slides 42-43, *available at* http://www.arb.ca.gov/cc/oil-gas/meetings/Reg_Workshop_Feb2016.pdf.

IV. EPA SHOULD DEVELOP A PILOT PROGRAM TO INCENTIVIZE DEPLOYMENT OF ADVANCED MONITORING TECHNOLOGIES

EPA has proposed to update Subpart W with any additional, advanced monitoring methods that are incorporated into NSPS OOOOa. As part of our comments on that proposal, we described the swift development of remote sensing technologies and the possibility that those technologies could enable continuous, real-time emissions monitoring.[34] Accordingly, we strongly support EPA's proposal to automatically incorporate advanced technologies in Subpart W contemporaneous with any changes to the NSPS. In addition, we respectfully encourage EPA to undertake pilot projects with operators seeking to deploy these technologies to help further incentivize their development and compare the effectiveness of these approaches to periodic, OGI-based surveys.

V. CONCLUSION

We appreciate the opportunity to submit comments on EPA's Subpart W proposal. Identification of leaks using actual detection and quantification methods is crucial to the collection of rigorous emissions data. EPA's proposal requires use of these methods at certain sites, and we urge EPA to further strengthen its proposal by requiring all sources to rigorously and comprehensively deploy these improved methods.

Respectfully submitted,

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[34] Clean Air Task Force, *et. al*. Comment on EPA's proposed Emission Standards for New and Modified Sources, Docket ID No. EPA-HQ-OAR-2010-0505-7322, at 28-31.