UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

National Emission Standards for Hazardous Air Pollutants: Oil and Natural Gas Sector; Review and Proposed Rule for 40 C.F.R. Part 63	)	**Docket No. EPA-HQ-OAR-2010-0505**
	)	*Via regulations.gov and e-mail*
	)	*November 30, 2011*

INTRODUCTION

These comments focus on the section 112 or hazardous air pollution part of EPA's proposed rules and address limits for emissions of hazardous air pollutants ("HAPS") for the Oil and Natural Gas Production ("Oil and Gas Production") and the Natural Gas Transmission and Storage ("Oil and Gas Transmission and Storage") source categories ("Oil and Gas") under sections 112(d)(6) and 112(f)(2) of the Clean Air Act, 42 U.S.C. § 7412(d)(6), (f)(2). NPRM, 76 Fed. Reg. 52,738 (Aug. 23, 2011).[1]

We appreciate the opportunity to submit these comments on behalf of Sierra Club, Earthjustice, Natural Resources Defense Council, California Communities Against Toxics, Clean Air Task Force, Environmental Defense Fund, Desert Citizens Against Pollution, WildEarth Guardians, Center for Biological Diversity, Clean Air Council, Earthworks, Network for Oil and Gas Accountability and Protection, San Juan Citizens Alliance, West Virginia Surface Owners' Rights Organization, and Wyoming Outdoor Council. Together, our organizations represent thousands of members who live near oil and gas facilities in both urban and rural communities from the west to the east, and many local communities who are extremely concerned about the potential for new oil and gas pollution in their areas. Commenters urge EPA to take decisive action in this rulemaking to protect the health of all local communities who breathe and are exposed to hazardous air pollution from oil and gas facilities.[2]

Under section 112(f)(2), EPA must assess the health risk that remains with the 1999 standards in place, and decide whether additional emission reductions are needed to reach an acceptable level of risk and to provide an "ample margin of safety for public health" in local communities near these sources. EPA's proposed rulemaking contains serious gaps in the emissions, types of pollutants, human exposures, and health risks analyzed, and as a result EPA's proposed standards would not provide sufficient protection for public health or the environment.

[1] EPA's proposed rule for this sector is one of numerous similar rulemakings that EPA is required to perform in the near future for various types of industry sources, pursuant to sections 112(f)(2) and (d)(6) of the Clean Air Act ("CAA"), 42 U.S.C. §§ 7412(f)(2), (d)(6). Commenters support EPA's commitment to complete this and other scheduled CAA § 112(f)(2) and § 112(d)(6) rulemakings without further delay, in view of the fact that these standards have been overdue for many years. For a list, see http://www.epa.gov/ttn/atw/rrisk/rtrpg.html.

[2] These comments build and elaborate on the November 30 letter to Administrator Jackson from a coalition of public health and environmental groups (attached as Addendum D) that contains a specific focus on the section 112 or hazardous air pollution part of EPA's proposed rules.

EPA needs to assess health risk from pollutants not currently controlled by the proposed rule, but shown to be emitted by oil and gas facilities by the scientific literature, by the chemical composition of oil and gas, by air monitoring conducted by community groups and others, including mercury and hydraulic fracturing compounds that are hazardous air pollutants. EPA also needs to address emissions from all points within the source category, including wastewater pits and impoundments, well pads, well completions, and fugitive toxic air emissions. The proposed rule's coverage is more limited for Oil Natural Gas Transmission and Storage than it is for Oil and Natural Gas Production, without any reasoned explanation for this limitation. EPA needs to control all similar emission points for natural gas transmission and storage as it regulates for production, including storage vessels and equipment leaks. EPA must address the risk from and regulate all of the missing hazardous air pollutant ("HAP") emissions.

Further, EPA's assessment of risk relies on out-dated science and policy choices that no longer reflect our nation's values on how much pollution-based risk is acceptable or this Administrator's priorities of protecting children's health and providing environmental justice for local communities facing a disproportionate share of toxic pollution. In this proposal, EPA fails to protect local communities' health because it has not shown that its proposed rule would ensure a safe level of HAP emissions or provide an ample margin of safety for public health, as required under section 112(f)(2). In setting residual risk standards, EPA must assess and then set limits to protect against the full health threat to the most vulnerable populations living near oil and gas facilities. This must include meaningful consideration of health risk to children and cumulative impacts in communities that face many sources of toxic air pollution in addition to oil and gas.

In particular, EPA must follow the lead of the California Office of Environmental Health Hazard Assessment by including early life vulnerability in all cancer assessments and accounting for increased prenatal susceptibility to carcinogens, and by accounting for early life vulnerability to other health risks. EPA also must address the additional health risk to children and overburdened communities by using additional uncertainty factors at appropriate steps in its risk assessment and policy determination. EPA must finalize a rule that protects local communities from cancer risk above 1-in-1 million and from unacceptable levels of acute and chronic non-cancer risk shown in EPA's risk review. EPA is required to ensure that its rule provides an "ample margin of safety to protect public health" for children and overburdened local communities. Yet, EPA's arbitrary analysis barely mentions health in its "ample margin" analysis and focuses almost exclusively on cost considerations, without satisfying its legal duty.

EPA must assess the level of emission reductions needed to provide an "ample" margin of safety for public health – *i.e.*, the reduction amount that provides more than a bare minimum level of protection – explain that analysis, and finalize a rule that provides that level of protection. Although Commenters support the update that EPA proposes under section 112(f)(2) (to remove the alternative 0.9 Mg/yr benzene compliance option) for both source categories, its rule proposal, without further explanation and support, does not go far enough to protect local communities. We urge EPA to develop a standard at a more stringent level that fully safeguards the most vulnerable populations, including children, taking into consideration cumulative toxic exposures and heightened cancer and other acute health risks posed by the oil and gas sector.

Under section 112(d)(6), EPA must review the existing National Emission Standards for Hazardous Air Pollutants ("NESHAP" or "MACT" standards) – originally set over a decade ago – and ensure that they satisfy § 112(d)(2)-(3). Under § 112(d)(3), EPA must ensure, for each HAP the category emits, that its standards reflect the emission levels achieved by the relevant best performing sources, those with the lowest emission levels. And under § 112(d)(2), EPA must ensure – for each HAP the category emits – that its standards reflect the maximum achievable degree of reduction in emissions. Commenters are extremely concerned that EPA fails to propose necessary updates to the existing MACT standards under section 112(d)(6) even though the industry has grown since the last rulemaking, there are substantial new developments in practices, processes and control technologies, and the process used to set the 1999 standards has been found to be unlawful in other contexts. Commenters support EPA's proposal to reduce the leak detection and repair ("LDAR") threshold for fugitive HAP emissions from valves at natural gas plants from 10,000 to 500 ppm, but note that this level is not sufficiently stringent to constitute MACT. Additionally, EPA must similarly reduce this threshold for other equipment. Finally, EPA's proposal must set a numerical emission limit for every HAP emitted in order to satisfy section 112.

For its final rules, EPA must determine the maximum achievable control technology ("MACT") standards based on the emissions performance and control technologies achieved by or available to the industry today and consider all available practices, processes, and technologies that are achieving or can achieve greater HAP reductions than required by the proposed rule. For example, there are stronger leak detection and repair standards in place in California that show the industry has achieved much greater levels of emission reductions – in the Bay Area, South Coast, and Ventura air districts, as well as at a number of facilities operating under Consent Decrees resolving EPA enforcement actions. EPA must not allow 2% of equipment to leak indefinitely, without *any* limit on the amount of pollution that can go into the air in our communities. Desiccant dehydrators are available to achieve substantial emission reductions in benzene and other HAPs. EPA's own enforcement actions at refineries, determinations of the best available control technology ("BACT") in Michigan and California among others, and its own Natural Gas Star program, show that the practices, processes, and technologies have evolved. For storage vessels and dehydrators, EPA must require at least 98 to 99% efficiency control, to match what jurisdictions like Wyoming already require, instead of only 95% as it proposes. In view of all of these developments, and the fact that EPA's original standard did not adequately address the industry, EPA must finalize a rule that accounts for HAP emission reductions currently being achieved and those that are "achievable" based on the best performers in the industry today.

Commenters support the elements of EPA's proposal that would increase health protections from this source category, its proposal to set MACT standards for the first time for previously uncontrolled emission points (*i.e.*, small glycol dehydrators and certain storage vessels), and to require periodic monitoring, through electronic reporting. We urge EPA to finalize the important protections provided by new standards for previously uncontrolled sources expeditiously. However, for reasons summarized here and further explained below, EPA's proposed rules do not go far enough to satisfy its legal responsibilities under section 112(d)(6) and 112(f)(2). Commenters support the removal of the start-up, shut-down, and malfunction exemption as required by the Clean Air Act, but urge EPA not to promulgate the affirmative

defense for malfunctions that EPA has proposed.

In sum, EPA must set robust air toxics limits that provide the required health and environmental protection from the oil and gas sector without further delay. We appreciate EPA addressing the concerns raised in these comments and we will be glad to provide any other information that would be useful. These comments are timely submitted on November 30, 2011.

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ADDENDUM CHART
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APPENDIX

I. BACKGROUND

The oil and gas sector emits hazardous air pollutants throughout the process of extracting, producing, processing, transmitting, storing, and distributing oil and natural gas. 76 Fed. Reg. at 52,744-45. Oil and Natural Gas Production facilities produce 9,000 tons per year of hazardous air pollutants ("HAPs").[3] Natural Gas Transmission and Storage facilities emit 700 tons per year of HAPs.[4] Emissions include organic HAPs such as n-hexane and "BTEX compounds," *i.e.*, benzene, toluene, ethylbenzene, and xylenes, and dozens of other HAPs. 76 Fed. Reg. at 52,745.[5]

In 1992, EPA first listed Oil and Natural Gas Production facilities as a major source category of hazardous air pollutants. 57 Fed. Reg. 31,576 (July 16, 1992). On February 12, 1998, EPA added Natural Gas Transmission and Storage to the list of major source categories. 63 Fed. Reg. 7,155 (Feb. 12, 1998). In 1999, EPA promulgated NESHAP for Oil and Natural Gas Production and the Natural Gas Transmission and Storage source categories ("Oil and Gas") under section 112(d). 40 C.F.R. Part 63 subparts HH and HHH; NESHAP 1999 Final Rule, 64 Fed. Reg. 32,610 (June 17, 1999); NESHAP 1998 Proposed Rule, 63 Fed. Reg. 6,288 (Feb. 6, 1998). Because the section 112(f)(2) and (d)(6) rulemakings were due 8 years after that final rule, by 2007, EPA's action in progress is currently 4 years overdue.

Today, there are 1,311 total sources covered by these rules, including 990 in Oil and Gas Production, and 321 in Natural Gas Transmission and Storage. 76 Fed. Reg. at 52,767. The existing rules address operations involved in extraction and production of oil and natural gas, and processing, transmission, and distribution of natural gas, from the well to a refinery (for oil), and from a well to a customer (for natural gas). *Id.* at 52,744. For Oil and Gas Production, currently regulated emission points include: large glycol dehydrators, some storage vessels, and all ancillary equipment and compressors intended to operate in volatile hazardous air pollutant service (as defined in 40 C.F.R. § 63.761), which are located at natural gas processing plants. 40 C.F.R. § 63.760(b) (2011). For Natural Gas Transmission and Storage, currently regulated emission points include only large glycol dehydrators. 40 C.F.R. § 63.1270(b) (2011).

There are 57 million people living within 50 kilometers (km) of oil and gas facilities, according to EPA data.[6] EPA's risk review shows that the oil and gas sector poses substantial cancer, chronic non-cancer, and acute health threats to people in these local communities who are exposed to toxic air pollution from these sources. Substantial emission reductions are available. The information before EPA shows that it must strengthen its proposed rule to require greater emission reductions from this source category, in order to satisfy both section 112(f)(2) and 112(d)(6) as described in these comments.

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[3] EPA Office of Air and Radiation, *Draft Residual Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories* (July 2011) at 30, EPA-HQ-OAR-2010-0505-0032.

[4] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 24.

[5] *See* Zip File on NEI Emission Data.

[6] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories tbl. 4.2-1, at 34-35.

II. COMMUNITY AIR TOXICS LIMITS – RESIDUAL RISK REVIEW & PROPOSED RULE

Pursuant to Section 112(f)(2), EPA is required to conduct a review of the health and environmental impacts of the source category's emissions to people in the communities surrounding the source category to determine the risk they continue to face even after implementation of the MACT. 42 U.S.C. § 7412(f)(2). It must identify an acceptable or "safe" level of risk and then provide for an ample margin of safety to protect public health and the environment from that risk. *Id.* The flaws in EPA's proposal are especially problematic in light of the fact that years of delay have created unnecessary additional exposure to residents of communities near oil and gas facilities. Although EPA's proposal to increase protection must be finalized, it is incomplete and EPA must issue a stronger final rule. EPA's proposal fails to meet important statutory requirements for all of the reasons discussed below. In particular, the proposal fails to adequately assess the risk to surrounding communities or follow the most current scientific information on health risk. EPA's determination of the emission reductions required to reduce health risks to acceptable levels is arbitrary and does not reduce risk as much as it should. Finally, EPA fails to provide the requisite ample margin of safety to protect public health by focusing more on cost than on the requirement to protect the maximum number of people to the greatest extent possible.

A. Residual Risk Assessment Is Incomplete and Underestimates Risks.

Under section 112(f)(2), EPA is required to assess the residual risk to public health and the environment remaining after the section 112(d) standards have been in place, and then determine at the next step whether this level of risk is "safe" or "acceptable." 42 U.S.C. § 7412(f)(2); *NRDC v. EPA*, 824 F.2d 1146, 1165 (D.C. Cir. 1987). At the first step of its analysis for both source categories, EPA found high source category-specific and high facility-wide levels of cancer and non-cancer health risk. *See* 76 Fed. Reg. at 52,777-79, 52,780-82. However, EPA's analysis failed to consider or assess a number of significant emission points, types of pollutant emissions, exposures, health risk, and the increased vulnerability for particular individuals and communities, including children, as discussed below. EPA must fully assess each of these factors and consider the context of the residual risk posed by exposure to HAP emissions from these sectors, including (1) the communities affected, (2) the greater risk to children who are more vulnerable to harm when exposed to toxic air pollution, and (3) the total cumulative impacts to people and communities who are exposed to multiple sources of toxic air pollution, multiple pollutants, and through multiple pathways, including but not limited to ingestion, dermal, as well as inhalation. EPA's failure to consider, at step one, the full extent of the risk of harm experienced by the most exposed and vulnerable people in local communities is unlawful, arbitrary, and capricious.

1. EPA arbitrarily underestimates risk by underestimating or ignoring HAP emissions.

i. EPA's out-dated emissions inventory lacks data on the vast majority of HAPs and source categories.

The record suggests that EPA's risk assessment is not sufficiently protective of public health due to data flaws that EPA has not adequately explained. In particular, EPA did not collect actual emission test data for this proposal, and provided no reasoned explanation for its decision not to do so. Instead, it used the National Emissions Inventory ("NEI") data as the starting point for its rulemaking analysis. 76 Fed. Reg. at 52,767. EPA must show that the NEI data are representative of the best performers in the sector (when it has information about only 25% of the covered facilities), and provide a rational justification for using the NEI data instead of actual emission test data for these source categories. As EPA has stated in finalizing reporting requirements in a different rule, "EPA must have performance test data to conduct effective reviews of CAA sections 112 and 129 standards, as well as for many other purposes . . . ." 76 Fed. Reg. 22,566, 22,574 (Apr. 21, 2011). EPA has not demonstrated that the data used in this rulemaking is an appropriate substitute for actual emission test data.

Importantly, EPA has not shown that the NEI data adequately represent the industry. EPA's NEI inventory does not have any emission estimates at all for key HAPs for 983 or 75% of the 1,318 Oil and Natural Gas Production and Natural Gas Transmission and Storage facilities.[7] Thus, EPA is basing the rulemaking on emissions estimates for only *one-quarter* of the regulated industry, and doing so for an industry that is rapidly growing, expanding, and using new types of oil and gas extraction processes. Only 25% is sufficiently less than the court considered in *NRDC*, 529 F.3d at 1085. EPA has not explained how it has sufficiently reliable data to satisfy the requirements of section 112(f)(2) in order to make the claim that its proposed rule is protective enough for local communities. EPA must set a stronger limit to protect people exposed to these sources to account for EPA's own lack of representative data in this rulemaking.

Even if EPA's data were more representative, EPA has not shown that the 2005 NEI data are reliable enough to ensure that EPA has fully assessed health risks from these source categories. NEI data are "estimates of annual air pollutant emissions." *Id.* These data, from the 2005 Inventory, are years old and the quality of these data is unclear. Use of recent data is critically important particularly because "there has been continued increase in gas production from onshore nonconventional gas play and new production from emerging unconventional plays," as the Sahu Report discusses.[8] The sudden increases in oil shale development, hydraulic

[7] Memorandum from ERG to EPA, *Documentation for NEI Updates for Oil and Natural Gas Production and Natural Gas Transmission and Storage* 4 (Mar. 15, 2011), EPA-HQ-OAR-2010-0505-0022.

[8] Dr. Ranajit Sahu, *Technical Report and Comments on EPA's Proposed NESHAP Rule for Oil and Natural Gas Production and Natural Gas Transmission and Storage Source Categories*, (Nov. 2011) (attached hereto as Addenda and hereinafter Sahu Report); "Winter 2010-11 U.S. Natural Gas Production and Supply Outlook," prepared for Natural Gas Supply Association by ICF International, Fairfax, Virginia, September, 2010, Exhibit 8a, pp. 12.

fracturing, and related oil and gas exploration and speculation show the need for a full risk review and revision of the existing standards. As the Secretary of Energy Advisory Board found: "The development of shale gas in the United States has been very rapid. . . . Shale gas . . . was less than two percent of total U.S. natural gas production in 2001. Today, it is approaching 30 percent."[9] Although EPA lists various sources, the actual type of data is unclear and likely to be inconsistent depending on the state and source. As Region 8's case study noted, "NEI data may not be the most complete or accurate mechanism."[10] EPA's use of estimates and modeling, instead of actual measured emissions information, threatens to underestimate the full health risk.[11]

For example, relying only on the NEI data are unlikely to provide *estimates* of the actual HAP emissions coming from a facility that has installed control devices and has never measured the amount or types of HAPs coming from those control devices. As EPA is well aware, control devices themselves often produce additional pollutants in the process of controlling other pollutants. Failing to collect actual test data is likely to lead EPA to ignore all HAPs emitted by control devices at these source categories. EPA has not explained how use of the NEI data accounts for emissions created by control devices.

EPA also has not explained how NEI data relates to actual measured data for the oil and gas sector. EPA appears to have done no comparison between its emission estimates and emission test data from these facilities. EPA states that "[t]he NEI was updated with industry supplied data as available," but gives no indication of how much of these data were considered, or what type or quality those data were.[12] Neither has EPA has accounted for the uncertainty created by the use of these data, rather than tested emissions data.

EPA states that its engineers "who were directly involved in the development of the MACT standards for the source category" reviewed these data, but without any test data to which to compare, that check would not resolve the gaps identified.[13] Using actual test data would

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[9] Sec'y of Energy Advisory Board (SEAB), Shale Gas Production Subcomm., 90-Day Report 6 (Aug. 18, 2011), http://www.shalegas.energy.gov/resources/081811_90_day_report_final.pdf; *see also id.* at 3 ("Measures should be taken to reduce emissions of air pollutants, ozone precursors, and methane as quickly as practicable. The Subcommittee supports adoption of rigorous standards for new and existing sources of methane, air toxics, ozone precursors and other air pollutants from shale gas operations.").

[10] U.S. EPA, *An Assessment of the Environmental Implications of Oil and Gas Production: A Regional Case Study, EPA Region 8* C-5 – C-6 (Sept. 2008), EPA-HQ-OAR-2010-0505-0003 (listing "[a]reas where experience with NEI has shown data unreliability").

[11] Commenters also note that instead of using actual, measured emissions data, EPA describes as "actual" emissions numbers that are based on estimates, rather than tests or measurements of actual emission levels. 76 Fed. Reg. at 52,770. It is not accurate to call these "actual" emissions data. In addition, as discussed later in these comments, because EPA has failed to account for the potential for malfunctions and exceedances of the standard, EPA's estimates are not the "actual" level of emissions for this source category including during periods of violation of the existing standard.

[12] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 5.

[13] *Id.*

greatly improve the quality of the rule modeling and EPA's analysis. As an example, in setting the initial standard, EPA previously missed the requirement to set a MACT limit for the uncontrolled emission points that EPA has now recognized require a limit, which left people without the required protection from these emissions for over a decade. 76 Fed. Reg. at 52,746 (explaining that EPA did not propose limits, as required, for all emission points in setting the initial standard and thus proposing new MACT limits for previously uncontrolled emission points). EPA must not make a similar mistake again by failing to set a sufficiently protective standard in the current rulemaking. EPA's residual risk rules need to be based on real, measured data to protect public health.

Finally, EPA has offered no valid justification for not collecting and using reliable, measured emission test data in this rulemaking, when emissions information is the "starting point" for the risk assessment.[14] To know what emissions there are, and thus what people's exposure and health risk are, EPA needs to evaluate actual measured emissions data for all hazardous air pollutants from all emission points at a source. Actual stack or emission point "sampling" or testing is the preferred method for gathering a "snapshot" of emission data from point sources.[15] Through this method: "[s]amples are collected from the stack using probes inserted through a port in the stack wall, and pollutants are collected in or on various media and sent to a laboratory for analysis."[16] There appear to be sources of actual emission test data that EPA could use from some states and regions.[17] Some emission test data are available, for example, from Texas facilities that EPA should collect and consider.[18] EPA has full authority to request these data from states and to collect these data directly from industry facilities or require them to test their emissions under the CAA section 114, 42 U.S.C. § 7414(a)(1), (c) (2006). EPA must do so.

For each of these reasons, EPA has failed to provide a reasoned explanation of why its inventory is representative or why its rule is sufficiently protective in view of these data concerns. It also has not adequately explained its decision not to collect or use actual emission test data in this rulemaking. EPA's choice of data must be rational, supported by a reasoned explanation, and consistent with the statutory requirement to provide an "ample margin" to

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[14] *Id*.

[15] Prepared for EPA Emission Inventory Improvement Program (EIIP) by Eastern Research Group, Preferred and Alternative Methods for Estimating Air Emissions from Oil and Gas Field Production and Processing Operations, at 10.3-7 (Sept. 3, 1999) (stating that "Without considering cost, stack sampling is the preferred emission estimation methodology for NOX, CO, VOC, total hydrocarbons (THC), PM2.5, PM10 , metals, and speciated organics.") (attached in Appendix).

[16] Prepared for EPA Emission Inventory Improvement Program (EIIP) by Eastern Research Group, Preferred and Alternative Methods for Estimating Air Emissions from Oil and Gas Field Production and Processing Operations, at 10.3-1 (Sept. 3, 1999).

[17] *See Environmental Implications of Oil and Gas Production*, *supra* note **Error! Bookmark not defined.** (listing sources of emission data).

[18] *See* Tex. Comm'n on Envtl. Quality, *Emissions from Oil and Gas Production Facilities, Final Report* (2007), EPA-HQ-OAR-2010-0505-0014; *see also* Sharon Wilson, Tex. Oil and Gas Accountability Project, *Tex. Emission Testing Results for Argyle and Bartonville, Texas*, EPA-HQ-OAR-2010-0505-0011 (describing test data by residents and Texas Commission for Environmental Quality).

protect public health. To strengthen and finalize its rule proposal, EPA must set a stronger rule to account for the likelihood that its data concerns have led it to underestimate health risk.

ii. EPA violates section 112(f)(2) by failing to address all HAP emission points from the oil and gas source categories.

EPA's risk assessment does not provide an adequate explanation of what emission points it covered. The record documentation available suggests that EPA has omitted emission points in this sector that it acknowledges contribute significant HAP emissions. EPA must assess risk from all emissions from these points because section 112(f) requires it to analyze and regulate all HAPs in order to ensure the requisite margin of protection for public health.

Section 112(f)(2) requires EPA to conduct a review of health and environmental impacts of the source category's emissions of hazardous air pollutants since the source became covered by an existing MACT in order to ensure emissions are reduced to a safe level and to provide "ample margin of safety to protect public health." 42 U.S.C. § 7412(f)(2) (2006). The statute directs EPA to conduct its residual risk rulemaking "within 8 years after promulgation of standards for each category or subcategory of sources pursuant to subsection (d) of [section 112]." *Id.* § 7412(f)(2)(A). The statute does not say: *only promulgate section 112(f)(2) standards for the already regulated emission points within each such category*. Instead, it says promulgate section 112(f)(2) standards 8 years after promulgation of standards for each source category, period. Thus, the promulgation of *any* section 112(d) standard for a source category is what triggers EPA's obligation to conduct a complete section 112(f)(2) rulemaking for the entire source category (or subcategory), including all HAP emissions and emission points, including but not limited to any emission points that the section 112(d) standard previously covered.

Where EPA fails to set MACT standards as required by the statute – such as by not setting limits on emission points as EPA failed to in 1999 – then EPA's residual risk rulemaking must do even more to make up for the lack of health protection provided by the section 112(d) standard. As the legislative history explains: "A [section 112] program which deliberately and consistently under-regulates in the technology-based phase will lead to more, and more stringent, regulation as the Agency moves to reduce residual risks." S. REP. No. 101-228, at 143 (1989), *reprinted in* 1990 U.S.C.C.A.N. 3385, 3555. Thus, section 112(d) aims to drive the standards forward to match the best available technology, practices, and processes, and section 112(f)(2) exists as an important additional safeguard to ensure protection of public health.

As summed up in the Senate Report, EPA is required during the residual risk rulemaking to compare the existing MACT limit with whatever emissions limitation would eliminate the adverse health and environmental effects caused by a source category. If the section 112(d) standard allows emissions that create adverse effects, then EPA is then required to decide to engage in the residual risk process to set a more stringent standard to aim to eliminate those effects. As stated:

> The Administrator is to compare the emissions limitation which would eliminate the adverse health and environmental effects which may be caused by a source category with the MACT

> emissions limitation which is in place under section 112(d). If the technology standard allows emissions which may be associated with adverse effects, the Administrator has a non-discretionary duty to impose further regulation.

S. REP. No. 101-228, at 151, *reprinted in* 1990 U.S.C.C.A.N. 3385, 3563.

However, EPA has not adequately performed this comparison, and thus has not assessed or addressed the full health risk from the oil and gas sector source categories in the current rulemaking. Instead, in its risk review, the record suggests that EPA assessed health risk resulting from the HAP emissions from *only* the currently regulated emission points at each source category. EPA has not provided a rational explanation for this approach. For example, to assess so-called "allowable" emissions, the record suggests that EPA considered only the "allowable emissions for specific emission points," *i.e.*, those emission points already regulated by section 112(d).[19] The existing MACT does not currently cover numerous other emission points from these sources. It is therefore unclear why EPA's risk analysis apparently ignored all of the emissions coming from currently uncontrolled points and from fugitive emissions from this sector, as those are all currently "allowed" by the existing standard.

If indeed EPA has limited its residual risk rulemaking analysis only to the HAP emissions from previously regulated emission points, as the record suggests, then it has violated section 112(f)(2). Carving source categories down into only the currently regulated emission points is likely to underestimate the health risk created by these source categories. This approach completely ignores all other HAP emissions coming from these sources categories, which EPA is legally required to consider regulating. For example:

1. EPA already requires control of emissions from storage vessels and equipment leaks in the Oil and Natural Gas Production source category. EPA could have no rational justification for failing to assess risk from these emission points and consider proposing a limit for storage vessels and equipment leaks in the Natural Gas Transmission and Storage category as well.

2. EPA also has acknowledged other sources of HAPs from this sector, without explaining its failure to assess or consider regulating these. Specifically, EPA states that, for the Oil and Natural Gas Production source category, "[o]ther potential HAP emission points include process vents along the systems handling the tail gas stream from amine treating processes and sulfur recovery units."[20] For the Natural Gas Transmission and Storage source category, EPA states that "[o]ther possible emission points include process vents, storage vessels with flash emissions, pipeline pigging and storage of pipeline pigging wastes, combustion sources, and equipment leaks."[21]

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[19] Memorandum from EC/R Incorporated to EPA at 3-4 (July 28, 2011), EPA-HQ-OAR-2010-0505-0055.

[20] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 30.

[21] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 24.

3. In addition, the record shows that there are also other major sources of HAPs in both parts of the sector that EPA must assess and consider regulating.

- Data from the State of Colorado suggest that there may be more than 26 individual sources of HAPs in the oil and gas sector, including: "venting, dehydration, gas processing, compression, leaks from equipment (fugitive emissions), open-pit waste ponds, and land application of volatile wastes."22

- Produced water or condensate tanks and wastewater impoundments have been estimated to emit a large amount HAPs.
    - Colorado data shows over 100 tons per year (tpy) of VOCs, including benzene and HAPs emitted from condensate tanks, suggesting that EPA investigate the health risk and consider regulating these sources.[23]
    - The State of New York in its first Draft Generic Environmental Impact Statement on Hydraulic Fracturing concluded in Section 6.5.1.8 of the DSGEIS ("Potential Emission of Fracturing Water Additives from Surface Impoundments") that, assuming 10 wells per wellsite per year: "annual methanol air emission [estimate] of 32.5 tons (i.e., "major" quantity of HAP) is theoretically possible at a central impoundment."[24]
- Condensate tanks. A 2009 study of pollutant emissions from natural gas development in the Barnett Shale Area of Texas, identified condensate tanks followed by engine exhausts as the largest sources of HAP emissions.[25]
- Well completion has been identified by numerous studies as a source of emissions of hazardous air pollutants.[26]
    - Published estimates of natural gas venting during typical well completion range from 1,000 – 24,000 mcf per well.[27] Depending on drilling technology utilized and the number of wells completed per year, these emissions can represent a

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[22] Amy Mall et al., NRDC, *Drilling Down: Protecting Western Communities from the Health and Environmental Effects of Oil and Gas Production* 8 (Oct. 2007), *available at* http://www.nrdc.org/land/use/down/down.pdf (citing CDPHE data) (attached in Appendix).

[23] *Id.* (citing CDPHE 2006 emission data) ("In Colorado alone, there are more than 5,500 condensate storage tanks, some of which can release in excess of 100 tons of VOCs annually—including benzene and other hazardous air pollutants.")

[24] Comments prepared by Harvey on behalf of NRDC, Review of DSGEIS and Identification of Best Technology and Best Practice Recommendations (Dec. 28, 2009) (quoting *2009 NY Draft Supplemental Generic Environmental Impact Statement On the Oil, Gas & Solution Mining Regulatory Program* 6-56, *available at* ftp://ftp.dec.state.ny.us/dmn/download/OGdSGEISFull.pdf) (attached in Appendix).

[25] Armendariz. *Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements* A1 (2009), http://www.edf.org/sites/default/files/9235_Barnett_Shale_Report.pdf (attached in Appendix).

[26] *See* Armendariz, *supra* note 26.

[27] *Id*.

significant source of HAPs. For example, it was estimated that Well Drilling and Well Completion activities resulted in 128 tons of HAP emissions per year in the Dallas Fort Worth Metro Area in 2009.[28]

- A study of HAP emissions from natural gas related sources within the city of Fort Worth Texas documented the following additional HAP emissions:[29]
    - Well pads: emissions from equipment leaks, produced water and condensate storage and loading, and lift compressors. Average HAP emissions 0.02 tons/yr and maximum HAP emissions 2 tons/yr.
    - Well pad with compressor. Average HAP emissions 0.9 tons/yr and maximum HAP emissions 8.8 tons/yr.
    - Compressor Station: emissions from combustion at the compressor engines or turbines, equipment leaks, storage tanks, glycol dehydrators, flares, and condensate and/or wastewater loading. Average HAP emissions 10 tons/yr and maximum HAP emissions 25 tons/yr.
    - Processing facilities: emissions from equipment leaks, storage tanks, separator vents, glycol dehydrators, flares, condensate and wastewater loading, compressors, amine treatment and sulfur recovery units. Average HAP emissions 47 tons/yr.
    - Saltwater Treatment Facility: emissions from equipment leaks, storage tanks and generators. Average HAP emissions 0.4 tons/yr.

- Fugitive emissions are a major source that EPA's analysis fails to assess or address.
    - In a 2009 study of pollutant emissions from natural gas development in the Barnett Share Area of Texas, Armendariz estimated that fugitive emissions from the entire natural gas network were equal to 1.4% of overall production. 20% of these fugitive emissions originated from natural gas production processes equaling 0.28% of overall natural gas production.[30]

For an expanded list of emission points that are potentially missing, see Sahu Report at 9-14 attached as Addendum A.

4. In addition, it is unclear why EPA is re-promulgating exemptions from its rules for black oil facilities and for facilities with certain levels of natural gas throughput and hydrocarbon liquid throughput. 40 C.F.R. § 63.760(e). EPA has not assessed the health risk associated with these sources. EPA previously exempted these sources from the standard after determining that "the MACT floor for black oil facilities was no control. This determination was not made based on the health risks associated with black oil." NESHAP 1999 Final Rule, 64 Fed. Reg. 32,610, 32,620 (June 17, 1999). Since the residual risk rulemaking is based precisely on these health considerations, EPA's unexplained decisions to maintain exemptions is arbitrary and capricious. EPA must revisit those exemptions in this rulemaking, and, as the D.C. Circuit has

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[28] *Id*.

[29] ERG (Eastern Research Group), *Fort Worth Natural Gas Air Quality Study Final Report* (2011), http://fortworthtexas.gov/gaswells/?id=87074. (attached in Appendix).

[30] *See* Armendariz, *supra* note 26.

recognized that "no control" MACT floors are unlawful, EPA must establish limits for these sources. *Sierra Club v. EPA*, 479 F.3d 875, 883 (D.C. Cir. 2007).

5. EPA also has recognized that there are previously uncontrolled emission points – small glycol dehydrators for both source categories, and certain storage vessels for Oil and Natural Gas Production. Although EPA will be required to perform a section 112(f)(2) review 8 years after setting the MACT limits that EPA proposes, it also must fully review the health risk from this source category, including these emission points, now because they are included in the sector.

For the above emission points and types of emissions, EPA provides no assessment of the risk and appears to have not considered proposing a section 112(f)(2) limit even though these uncontrolled emission points may well pose a significant health threat. EPA is required to review the full health risk from this source category based on *all* HAPs that it emits and commenters urge EPA to do so and set appropriately protective standards under section 112(f)(2).

In addition, section 112(n)(4) does not preclude EPA from looking at the cumulative emissions from associated equipment sources that are significant contributors of HAPs. To do so, EPA need only revise its definition of "associated equipment," to exclude those emission points, as EPA has done in the past.

EPA has long recognized that section 112(n)(4) does not prohibit it from controlling significant sources of HAPs from the oil and gas sector. Under this provision, EPA has authority to define "associated equipment," 40 C.F.R. § 63.761 (2011), and to exclude from this definition all emission points (associated with wells) which emit hazardous air pollutants ("HAPs") in quantities comparable to other sources like glycol dehydrators and storage vessels. EPA has appropriately excluded these particular sources from the definition of that term and in the proposed rule it proposes to exclude additional types of such sources from the definition. 76 Fed. Reg. at 52,770. Excluding all significant contributors of HAPs is consistent with the language of the statute and with the criteria EPA has previously employed to determine which sources fall under the term "associated equipment." *See* 64 Fed. Reg. at 32,619; NESHAP 1998 Proposed Rule, 63 Fed. Reg. 6,288, 6,302 (Feb. 6, 1998).[31] As EPA has recognized, Congress did not intend to prevent EPA from regulating "significant sources of HAP emissions," when it enacted the aggregation ban. 63 Fed. Reg. at 6,300-02; *see also* 64 Fed. Reg. at 32,620 (recognizing Congress intended to "preclude the aggregation of small emitting sources over vast distances" that "generally have low HAP emissions, and are typically located in widely dispersed geographic areas, rather than being concentrated in a single area"). Under EPA's interpretation, each of these sources that emits "several" mg/year of HAPs may be regulated, even if they alone would not trigger the major source threshold. 76 Fed. Reg. at 52,770 (providing example of a storage vessel with emissions of 9.91 Mg/yr, including 9.45 Mg/yr of n-hexane).

[31] EPA has defined the term "associated equipment" to (1) provide substantive meaning consistent with congressional intent; (2) prevent the aggregation of small, scattered HAP emission points in major source determinations; (3) be easily implementable; and (4) not preclude the aggregation of significant HAP emission points in the source category. 1999 Final Rule, 64 Fed. Reg. at 32,619; 1998 Proposed Rule, 63 Fed. Reg. at 6,302.

Moreover, section 112(n)(4) does not bar broad regulation of fugitive HAP emissions from the oil and gas sector. EPA must consider fugitives broadly from the sector as a source of health risk and for potential control, including all fugitive emissions it may consider under the most health-protective interpretation of section 112(n)(4). EPA must consider fugitive emissions from emission points that lead to wells, but are not defined as "associated equipment." To the extent such emission points are defined as "associated equipment," EPA should consider revising the definition of "associated equipment" as described above. As Armendariz stated, fugitive and intermittent sources may include production equipment fugitives, well drilling fugitives, well completions, gas processing, and transmission fugitives.[32] These can occur from routine use, improper maintenance, or overpressure. In addition, "[n]atural gas wells, processing plants, and pipelines often contain large numbers of these kinds of pneumatic valves, and the accumulated emissions from all the valves in a system can be significant."[33] EPA could and must regulate fugitive or leak emissions more broadly throughout the sector, and may do so by regulating the piping and pneumatic valves, without aggregating well emissions. EPA must ensure that all valves that are potential sources of fugitive emissions, including pneumatic valves, are regulated under the proposed rule, and, if particular kinds of valves are not included in the proposed rule, EPA must explain the exclusion. In addition, the action of well completion itself, with all equipment used to create the wellbore (such as the piping, separator, and tanks) creates significant levels of emissions that EPA could regulate independently from the well itself as leaks from these separate pieces of equipment. Even if EPA determines that it cannot require emission reductions at well heads it might nonetheless be obliged to develop sufficient additional emission reductions elsewhere (such as compressor stations) to minimize the risk. Currently, EPA's equipment leak standard for oil and natural gas production only covers the sources regulated by subpart HH, ancillary equipment (defined as pumps, pressure relief devices, sampling connection systems, open-ended valves, or lines, valves, flanges, or other connectors, 40 C.F.R. § 63.761), and compressors. 40 C.F.R. § 63.769 (2011). EPA must recognize the significant fugitive emissions escaping from this sector, assess the health risk they cause, and regulate them accordingly as fugitives (or non-point source emissions) not affected by section 112(n)(4).

iii. EPA fails to address all HAPs that are emitted, including new types of emissions from hydraulic fracturing facilities.

EPA fails to analyze all HAPs emitted. EPA's failure to analyze all emitted HAPs means that its risk assessment fails to assess key elements of the health risk of this sector, and is therefore unlawful and arbitrary.

In the Residual Risk Analysis, cancer and non-cancer risks are based on exposure levels to HAPs emitted from the source category. These exposure levels were derived using a dispersion model and estimates of emissions from facilities included in the 2005 National

[32] *See* Armendariz, *supra* note 26, at 6.

[33] *Id.*

Emission Inventory database. However, no evidence of the accuracy or completeness of this inventory was provided in the material supporting the Residual Risk Analysis. The record also provides no listing of the individual HAPs emitted by each emission point at each facility, so that commenters were unable to evaluate these data or understand how EPA calculated its total emission numbers for this sector. The lack of this information presents a difficulty in trying to submit informed comments under section 307 of the Clean Air Act. Accurate estimation of the health risks associated with the emissions from this source category necessitates a complete evaluation of pollutants emitted that have the potential to impact public health. Studies and measurements of the source category (as cited below) suggest that the inventory did not include all of the HAP emissions and therefore underestimates risk by failing to calculate the health risks associated with the missing pollutants.

Potential health risks from emissions of heavy metals from the source category are largely ignored. According to the technical support materials, emissions of cadmium, chromium, cobalt, lead, manganese, nickel and selenium were removed from the emissions inventory and dose-response values were not identified for emissions of these metals from the source categories.[34] EPA does not provide sufficient explanation or justification for the removal of these emissions from the inventory nor the failure to assess the health risks associated with exposure to these metals. These metals are hazardous to human and ecological health and due to their persistence in the environment, even small amounts of emissions can endanger human or ecosystem health. Lead is a potent neurotoxin, particularly for children, and for which there is no safe level of exposure.[35] Manganese is also toxic to the nervous system and cadmium harms kidney function.[36] Cadmium and hexavalent chromium are known carcinogens.[37] Cobalt, nickel and selenium are particularly hazardous to aquatic ecosystems. Therefore, the removal of these metals from the emission inventory would result in an underestimate of risk to public health and the environment from the source categories.

Mercury is a potent neurotoxin which is particularly hazardous to the developing brain. Once released into the environment in elemental form, it is converted to methylmercury which bioaccumulates in the food chain. Therefore, even low emission levels can pose significant harm to human health. Health risks from mercury emissions associated with the source category were not evaluated despite evidence of the presence of mercury in oil and gas.

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[34] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories; *id.* at 25-26, 31-32.

[35] *National Ambient Air Quality Standards for Lead*, 73 Fed. Reg. 66,964, 66,972, 66,975-96 (Nov. 12, 2008) (describing health impacts to children and adults from lead exposure).

[36] Agency for Toxic Substances and Disease Registry (ATSDR). *ToxFAQs for Manganese* (2008), http://www.atsdr.cdc.gov/toxfaqs/TF.asp?id=101&tid=23; ATSDR, *ToxFAQs for Cadmium* (2008), http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=47&tid=15.

[37] ATSDR, *ToxFAQs for Cadmium* (2008), http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=47&tid=15; ATSDR, *ToxFAQs for Chromium* (2008) http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=61&tid=17.

Mercury content in natural gas has been reported between 1-5,000μg/m^3, but concentrations are highly variable among specific regions and deposits.[38] Most authors agree that all natural gas deposits contain some mercury, although for many fields concentrations remain below 0.01μg/m^3.[39] A figure for "typical" mercury concentrations in natural gas that is often cited is 1-200μg/m^3.[40] Although the geochemical distribution of mercury in hydrocarbon deposits is not well characterized, it is understood that the presence of mercury in oil or coal deposits is suggestive of its presence in associated gas fields.[41] Mercury contamination of oil deposits in the cymeric oil fields of California and the coal deposits of Pennsylvania have been well documented suggesting that the associated gas fields may also be high in mercury because the geological processes which resulted in the mercury contamination are likely to be present for both hydrocarbon reservoirs.[42] Further research is needed to confirm the mercury range of Appalachian/Marcellus natural gas. Drilling muds used in oil and gas development also are known to contain barite which contains mercury.[43] Disposal of these materials on-site presents an opportunity for releases into the environment, including air.

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[38] Olsen, S.D., *Literature Study Concerning Mercury and Arsenic Distribution in Petroleum and Geothermal Systems, Rogaland Research. Report RF-98/032Olson*, Tbl. 1 (1998). (attached in Appendix).

[39] Bingham, M.D., *Field Detection and Implications of Mercury in Natural G*as, SPE PRODUCTION ENGINEERING, vol. 5 no. 2, 120-124 (1990) (attached in Appendix); Gildert, G. et al., Johnson Matthey, *Mercury Removal from Liquid Hydrocarbons in Ethylene Plants*, AIChE Paper 135c, American Institute of Chemical Engineers Spring National Meeting, San Antonio (Mar. 24, 2010).

[40] Bingham 1990 at 120-24; Abu El Ela, M., et al., *Egyptian Gas Plant Employs Absorbents for Hg removal*, OIL & GAS J., vol. 104 no. 46: 52–58 (Dec. 11, 2006). (attached in Appendix).

[41] Pongsiri, N, *Thailand's Initiatives on Mercury*, Society of Petroleum Engineers Asia Pacific Oil and Gas Conference, Kuala Lumpur, Malaysia, 14-16 April (1997).

[42] Wilhelm & Kirchgessner, U.S. EPA, Ofc. Research & Devel., *Mercury in Petroleum and Natural Gas: Estimation of Emissions from Production, Processing, and Combustion* (2001) (attached in Appendix); Yudovich, Y.E. & Ketris M.P., *Mercury in coal: a review, Part 1. Geochemistry*, INT'L J. OF COAL GEOLOGY, vol 62: 107-34 (2005).

[43] Crecelius, E., J. Trefry, J. McKinley, B. Lasorsa, and R. Trocine, U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, *Study of barite solubility and the release of trace components to the marine environment*. OC5 Study MMS 2007-06 (2007), www.gomr.boemre.gov/PI/PDFImages/ESPIS/4/4289.pdf.

Table A. Estimates of mercury in US natural gas fields include the following:[40,41,44,45]

Location	Hg Concentration (µg/m^3)	Citation
North America	0.001 - 0.05	Mussig & Rothmann, 1997
Eastern Pipeline US	0.019 - 0.44	Bingham, 1990
Midwest Pipeline US	0.001 - 0.1	Bingham, 1990
Wyoming (Anschutz Ranch East)	8 - 24	Lund, 1996
Gulf of Mexico (US)	0.02 - 0.40	Abu, 2006
Overthrust Belt (US)	5 - 15	Abu, 2006

The emission inventory used in the Residual Risk Assessment also omitted emissions of organic hazardous air pollutants documented in the literature. A study conducted in Fort Worth, Texas of emissions from well pads, well pads with compressors, compressor stations, processing facilities and a saltwater treatment facility associated with natural gas facilities documented emissions of the following HAPs not included in EPA's inventory: chloromethane, 1,3 butadiene, vinyl chloride, vinyl acetate, bromomethane, 1,1-dichlorethane, vinyl bromide, 1,3 dichloropropene, propylene dichloride, carbon tetrachloride.[46]

In addition, EPA must investigate the potential for emissions of HAPs detected in studies of ambient air near oil and gas facilities. This must include the following HAPs found by the Sublette County Air Toxics Project in Wyoming (May 2010): 1,1,2 trichloroethane, 1,1, dichloroethane, 1,2, dichloroethane, 1,2 butanone, chloroethane, chloromethane, and vinyl chloride.[47] EPA does not include these in its residual risk assessment.

Other HAPs are also likely to be emitted that EPA did not capture due to its lack of emission test data. Both EPA and the public need more information about oil and gas chemicals used in the United States today for hydraulic fracturing, because many are either not disclosed, or the public has limited or no information about the health risks associated with them.[48] There is information showing that hydraulic fracturing compounds in use include at least 25 HAPs

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[44] Mussig S., & Rothmann, B., *Mercury in Natural Gas- Problems and technical solutions for its removal*, Society of Petroleum Engineers Asia Pacific Oil and Gas Conference, Kuala Lumpur, Malaysia, 14-16 April (1997). (attached in Appendix).

[45] Lund, D.L., *Wyoming Operator Solves Mercury Exposure Problems*, OIL & GAS J., vol 94 no. 20: 70-76 (May 13, 1996). (attached in Appendix).

[46] *See* ERG, *supra* note 29.

[47] Air Resource Specialists Inc, *Sublette County Air Toxics Inhalation Project*, Prepared for the Sublette County Commissioners, the Wyoming Department Of Environmental Quality, and the Wyoming Department of Health (2010), http://deq.state.wy.us/aqd/Ozone/Sublette_Final_Report.pdf (attached in Appendix).

[48] *See* Earthjustice et al., *Citizen Petition under TSCA Regarding the Chemical Substances and Mixtures Used in Oil and Gas Exploration or Production* (Aug. 4, 2011) (attached in Appendix).

found by the 2011 House Minority Report.[49] There are also other disclosure sources of this information that EPA must consult and evaluate as part of its health risk assessment for this industry, such as the Frac Focus Chemical Disclosure Registry and the Endocrine Disruptor Exchange database.[50] EPA appears to have failed even to attempt to characterize the new and different types of HAP emissions that may be occurring from this source category due to the new types of drilling and chemicals being used in the hydraulic fracturing industry. EPA must account for the types of chemicals used, volatilization potential, quantities of emissions, and potential for health impacts both individually and through exposures to a mixture. The agency's failure to do so, and its failure to explain why it did not collect emission test data from hydraulic fracturing operations effectively ignore HAP emissions that threaten public health. These failures are arbitrary and capricious, unsupported, and unlawful.

iv. EPA must address health risk from hydrogen sulfide emissions.

Production and processing plants that handle "sour gas" (a type of natural gas with high hydrogen sulfide (H_2S) levels) release significant levels of H_2S. 76 Fed. Reg. at 52,745. Hydrogen sulfide is an impurity in natural gas and oil and has been documented in oil and gas reserves around the country.[51] Although it smells like rotten eggs and can irritate the eyes, cause breathing problems (particularly in individuals vulnerable due to asthma), and result in nausea, dizziness, confusion, and headaches,[52] it is not currently a listed HAP under section 112.

However, EPA has a petition pending before it to list this pollutant as hazardous under the CAA § 112 that it must act on.[53] In addition, EPA has recently recognized the need for hydrogen sulfide emissions to be reported as part of the Toxic Release Inventory under EPCRA due to EPA's finding that the science "shows that it can reasonably be anticipated to cause chronic health effects in humans" and threatens "significant adverse effects in aquatic

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[49] U.S. House of Rep., Comm. on Energy & Comm. Minority Staff, 112th Cong., *Chemicals Used in Hydraulic Fracturing* 8 (Apr. 2011), *available at* http://democrats.energycommerce.house.gov/sites/default/files/documents/Hydraulic%20Fracturing%20Report%204.18.11.pdf (attached in Appendix).

[50] *See* Frac Focus, *Chemical Disclosure Registry*, http://fracfocus.org/chemical-use/what-chemicals-are-used (last accessed Sept. 23, 2011) (listing chemicals); The Endocrine Disruptor Exchange (TDEX) List, *Chemicals in Natural Gas Operations, Health Effects Spreadsheet and Summary*, (Mar. 29, 2011), http://www.endocrinedisruption.com/chemicals.multistate.php (attached in Appendix); TDEX, *Natural Gas Operations from a Public Health Perspective* (Mar. 2011 manuscript to be published) (attached in Appendix).

[51] EPA Report to Congress on Hydrogen Sulfide (1993) (attached in Appendix).

[52] ATSDR, Toxicological Profile for Hydrogen Sulfide (July 2006) (attached in Appendix).

[53] Letter from Sierra Club et al. to U.S. EPA Administrator Jackson, *Hydrogen Sulfide Needs Hazardous Air Pollutant listing under CAA Title III*, (Mar. 25, 2009), *available at* http://www.texas.sierraclub.org/press/newsreleases/H2SLetterToEPA.pdf (attached in Appendix).

organisms."[54] EPA has sufficient toxicity data on this pollutant to list and regulate this HAP for oil and gas facilities in this rulemaking.

2. EPA underestimates risk by underestimating or ignoring exposures.

i. EPA fails to consider or address the scientific information available on the health impacts linked to oil and gas emissions.

EPA must collect, consider and address available information about community health impacts and analyze this as part of its residual risk assessment.

Local, state and national health agencies have expressed concerns about health impacts of HAP emissions from oil and gas facilities including: the Center for Disease Control and Prevention (CDC) Agency for Toxic Substances and Disease Registry (ATSDR), Association of Occupational and Environmental Clinics (AOEC), Pediatric Environmental Health Specialty Unit (PEHSU), Colorado Health Department, the Town of Dish, Texas and the City of Fort Worth Texas.[55] Community groups and concerned residents have also conducted their own testing studies.[56]

In particular, the ATSDR 2008 investigation was spurred by health complaints including:

> Some Garfield County residents are experiencing health effects that they believe may have environmental causes. Community concerns range from mild complaints such as dizziness, nausea, respiratory problems, and eye and skin irritation to more severe concerns including cancer.[57]

This investigation found elevated cancer risk at one site and recommended further investigation into HAP emissions and risks. Similarly, elevated levels of HAP emissions detected in the other studies resulted in concerns about elevated health risks, including cancer, respiratory and

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[54] U.S. EPA, *Lifting of Administrative Stay for Hydrogen Sulfide*, 76 Fed. Reg. 64,022, 64,024 (Oct. 17, 2011), *see also* http://www.epa.gov/tri/lawsandregs/hydrogensulfide/indexf.html (last accessed Sept. 23, 2011).

[55] ATSDR, *Health Consultation: Public Health Implications of Ambient Air Exposures to Volatile Organic Compounds as Measured in Rural, Urban, and Oil & Gas Development Areas Garfield County, Colorado* (2008) (attached in Appendix); PEHSU, *Information on Natural Gas Extraction and Hydraulic Fracturing for Health Professionals* (2011) (attached in Appendix); Witter R, McKenzie L, Towle M, Stinson K, Scott K, Newman L, Adgate J, *Draft Health Impact Assessment for Battlement Mesa, Garfield County Colorado* (2010), http://www.garfield-county.com/public-health/documents/1%20%20%20Complete%20HIA%20without%20Appendix%20D.pdf (attached in Appendix); Wolf Eagle Environmental, Town of DISH, *Texas Ambient Air Monitoring Analysis Final Report* (2009) (attached in Appendix).

[56] *See, e.g.*, ERG, *City of Fort Worth Natural Gas Air Quality Study* (2011).

[57] ATSDR 2008, *supra* note 56.

neurological toxicity, for residents living near oil and gas facilities.[58] This and other research provides important information that EPA must evaluate as part of this residual risk rulemaking.

ii. EPA fails to assess cancer or chronic risk exposure for the maximum exposed person at the fence line of a facility.

EPA's modeling understates cancer and other chronic health risk by assuming that chronic exposure to hazardous air pollutants from this source occurs at the census block centroid and *not* at the facility fence or property line. According to the rulemaking proposal, to assess chronic health risk: "The air concentrations at each nearby census block centroid were used as a surrogate for the chronic inhalation exposure concentration for all the people who reside in that census block." 76 Fed. Reg. at 52,771. To assess cancer risk from this source, EPA then "calculated the MIR for each facility as the cancer risk associated with a continuous lifetime . . . exposure to the maximum concentration at the centroid of an inhabited census block." *Id.* For these risks from HAP emissions, EPA did not assess chronic or cancer risk at the closest or maximum point of exposure, even in those instances where local residents live nearer to a facility than the geographic centroid of the census block. This conflicts with the recommendation of the SAB, which has urged EPA to consider "specific locations of residences."[59]

By failing to assess cancer and chronic non-cancer risk at the fence line, EPA's analysis fails to consider the actual level of risk for the "individual most exposed to emissions" as required by section 112(f). Estimating the annual average concentrations at the area-weighted centers of census blocks artificially underestimates the risk estimated for people at the fence line, since the center of a census block will almost always be further away from the facility than its fence line. Census blocks vary greatly in size, especially in more rural areas where many oil and gas facilities are located. As EPA admits, area-weighted centers of census blocks are likely to underestimate exposure in some cases because they "under-predict exposures for people in the census block who live closer to the facility." 76 Fed. Reg. at 52,775.

EPA's failure to adjust receptor points for residents living on the fence line is particularly inexcusable given that the HEM-AERMOD system allows for such an adjustment, and that such an adjustment was appropriately made for the estimation of acute health risks. 76 Fed. Reg. at 52,772 (stating that EPA evaluated acute exposures and risks "at the point of highest off-site exposure for each facility (*i.e.*, not just the census block centroids)"). EPA has recognized that the maximum exposed individual for acute risks is likely present closer to or at the fence line. It therefore cannot justify failing to analyze cancer and other chronic health effects in a similar manner.

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[58] *See, e.g.*, Global Community Monitor, GASSED! *Citizen Investigation of Toxic Air Pollution from Natural Gas Development* (2011), http://www.gcmonitor.org/downloads/gassedreport.pdf (attached in Appendix).

[59] Sci. Adv. Bd., Review of EPA's draft entitled, "Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA's Science Advisory Board with Case Studies – MACT I Petroleum Refining Sources and Portland Cement Manufacturing, EPA-SAB-10-007, at 4 (May 2010) (attached in Appendix) ("SAB May 2010").

iii. By ignoring risk from malfunctions and other violations, EPA's proposal fails to consider the full cancer and chronic non-cancer health risk from this source category.

EPA's risk review fails to assess the health risk from malfunctions or violations of the MACT standard. Commenters support EPA's recognition that it is essential to consider the potential amount of emissions and risk with the initial MACT standard in place, rather than relying on EPA's estimate of "actual" emissions.[60] However, the Act also specifically requires EPA to base its risk analysis on the highest potential risk "to the individual most exposed to emissions from a source in the category or subcategory." 42 U.S.C. § 7412(f)(2)(A); § 7412(f)(1)(C). To do this, it is necessary for EPA to perform the analysis of risk based on what emissions may indeed occur during a malfunction and other types of violations, even with the MACT standard in place. These events increase HAP emissions and thereby pose increased health risks which EPA must consider.

The amount of "allowable" emissions represents the maximum level of emissions to which an individual may *legally* be exposed from a given facility under the existing MACT. 76 Fed. Reg. at 52,770. The agency's analysis of risk using the "allowable" emissions number is incomplete because facilities may violate that standard and emit HAPs at a level *beyond* what is "allowable" under the rule. EPA must consider the full potential for health risk that will occur should sources emit at the level the section 112(d) standard allows, not just the risk based on the number of emissions that standard would allow. Ignoring the potential for non-compliance is equivalent to treating additional health risk caused by exceedances as zero. EPA knows that there is additional risk from malfunctions and violations and it cannot ignore that risk.

The reality is that malfunctions and violations occur. EPA acknowledges that malfunctions are inevitable. 76 Fed. Reg. at 52,788 (stating that "EPA recognizes that even equipment that is properly designed and maintained can sometimes fail and that such failure can sometimes cause or contribute to an exceedance of the relevant emission standard"). Moreover, EPA's own proposal creates a loophole that reduces the incentive to comply and may make malfunction-violations more likely. While EPA appropriately proposes to remove the malfunction exemption from the MACT standard, it also proposes to create a new loophole in the form of an "affirmative defense to civil penalties" for malfunctions. 76 Fed. Reg. at 52,787-78. The affirmative defense allows facilities to escape penalties due to malfunctions if they meet factors that EPA defines. This would reduce the deterrent value of the MACT standard and undermine the ability of people living near facilities that violate the standard to receive effective relief from unlawful emissions. *See* Pt. IV.A, *infra* (explaining why the affirmative defense is unlawful and unjust). This new loophole reinforces the need to recognize the additional risk that would occur from malfunctions. The new "affirmative defense" may make it more likely that

[60] EPA assesses cancer and non-cancer chronic health risk by looking both at the total emissions allowed under the existing MACT standard, i.e., "MACT-allowable" emissions, and the total emissions it estimates occur, which it calls "actual" (even though these numbers are based on NEI emission estimates). 76 Fed. Reg. at 52,770-71. Commenters support EPA's recognition of the need to consider not just the risk from emissions reported by industry, but the risk from emissions beyond the reported number that may occur under the existing standard (*i.e.*, the MACT-allowable emissions).

malfunctions happen, by giving industry a way to evade penalties if they can show a violation was due to a malfunction.

EPA has information available or can collect information on major sources' malfunction and violation history. In the preamble to the proposed rule, EPA cites some of this information from a Texas study.[61] Additional research by the Environmental Integrity Project ("EIP") found that significant emission exceedances occur routinely across a range of industries and that "releases from upsets actually dwarf a facility's routine emissions."[62]

By failing to account for the heightened risk from exceedances of the MACT in its calculation, EPA fails to consider the full risk to public health and the environment from this source, especially for the maximum exposed individual and most-affected communities. In addition, EPA's LDAR proposal for HAPs is based on an earlier New Source Performance Standard LDAR and carries over a number of exemptions without consideration of the impact of those exemptions on emissions of hazardous air pollutants from sources subject to regulation.[63] Although as discussed in the 112(d)(6) comments below those exemptions are themselves arbitrary and capricious, the fact that they currently exist shows the additional need for EPA to fully assess all emissions due to unrepaired leaks and other types of malfunctions for this source category.

Importantly, the proposed equipment leak provisions do not reflect the practices employed by the best performing source(s) in the categories, have not been updated in many years and carry over a number of exemptions from early New Source Performance Standards, without evaluation of the propriety of these exemptions under the 1990 Clean Air Act Amendments to the NESHAP program and without consideration of the impact of these exemptions on emissions of hazardous air pollutants ("HAP") from sources subject to the regulation.

Instead, EPA must assess public health risk based on the likelihood of such incidents, in combination with its use of the "MACT-allowable" emissions number. To determine the appropriate number to use for this calculation, EPA must consult data regarding the use of the malfunction (or "SSM") exemption and enforcement actions in the past and other information it has regarding the history or likelihood of malfunctions or other violations. To quantify risk,

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[61] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 7.

[62] Envtl. Integrity Project, *Gaming the System: How Off-the-Books Industrial Upset Emissions Cheat the Public Out of Clean Air* 1-2 (Aug. 2004), http://www.environmentalintegrity.org/news_reports/Report_Gaming_System.php (attached in Appendix) (finding significant likelihood of an upset at refineries, chemical plants, gas plants and a carbon black plant, and finding that the resulting emissions release is many times higher than the amount of otherwise-reported annual emissions) (attached in Appendix).

[63] *See* Bruce Buckheit, *Report: EPA's Eight-year Review of the National Emissions Standards for Hazardous Air Pollutants ("NESHAP") for Oil and Natural Gas Production Facilities and for Natural Gas Transmission and Storage Facilities*, (Nov. 2011) at 15-16 (attached hereto as Addenda and hereinafter Buckheit Report).

EPA regularly uses statistical methods and probability factors in the MACT process and is well-versed in these available tools. It can have no rational justification for ignoring the additional health risk from malfunctions and other violations of the MACT standard that it acknowledges inevitably occur.

Indeed, in its acute health risk assessment, EPA has accounted for some risk beyond the "MACT allowable" emission level. To calculate acute health risk, EPA is using what it calls a "worst-case" scenario approach that appears to include some accounting for additional health risk due to upsets, malfunctions or other exceedances of the standard. For acute health risk, in its Draft Residual Risk Assessment, EPA stated that it was using a factor of ten multiplier to assess risk from a higher than average hourly emissions rate. EPA stated that this factor of ten "is intended to cover routinely-variable emissions as well as startup, shutdown, and malfunction (SSM) emissions."[64] As explained in the next section, that factor is not high enough to assess the true risk to the most-exposed individual and community, but it shows EPA's recognition that an additional factor is needed.

EPA's use of a factor that accounts for risk beyond the "MACT allowable" emissions number for acute risk in the proposed rule demonstrates that EPA has found a method to account for risk from higher than allowable emissions that occur from malfunctions and violations. However, EPA did not choose to apply a higher emissions factor to assess chronic health risk, including cancer, due to malfunctions or other violations. For example, EPA's MIR (maximum individual risk of cancer) is based on the assumption that exposure is constant for a lifetime. Failing to look at the true potential for spikes in emissions over a person's lifetime may underestimate the amount of chronic risk based on pollutants that persist in the environment. The failure to do so violates § 112(f)(2) and is arbitrary and capricious. The fact that EPA has done this for acute health risk shows that it is possible to do and must also be done for the other health risks that EPA must address in this rulemaking.

iv. EPA's estimate of peak exposure level of emissions (1-hour maximum) for its acute health risk assessment is flawed and likely underestimated.

EPA's methodology for estimating acute exposures to HAP emissions from the source categories is flawed and potentially underestimates exposures. EPA provides an inadequate justification for the method by which it determined acute exposures. EPA provides no rational explanation for its assumption that the maximum 1-hour emission of a chemical is only 10 times the yearly average rate, rather than higher. EPA's assumption that the findings of one study of industrial sources would apply to this source is not scientifically justifiable. This calculation fails to account adequately for variation in emission rates and does not constitute the "worst case scenario" EPA claims.

The residual risk assessment also underestimates the magnitude of acute exposures by only assessing health risks associated with the estimated "actual" emissions and not considering

[64] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 7.

what exposure levels might be at the MACT allowable levels. EPA recognizes that the MACT allowable levels of benzene emissions exceed the estimates of "actual" emissions and therefore could result in increased levels of exposure.[65] These increased levels of exposures may also result in spikes of benzene experienced as acute exposure risk. Failure to include the additional potential exposure due to benzene emitted at the allowable level therefore results in a significant underestimate of acute risk levels.

v. EPA fails to assess risk from exposure at all for some HAPs.

To add to the problem that some emitted HAPs are missing completely from its analysis, EPA's risk assessment acknowledges the emission of other HAPs, but fails to assess risk at all for these pollutants. EPA states that it performed *no* risk assessment for some hazardous air pollutants emitted by this source. 76 Fed. Reg. at 52,777. Specifically, EPA states:

> Although every effort is made to identify peer-reviewed reference values for cancer and noncancer effects for all pollutants emitted by the sources included in this assessment, some HAP continue to have no reference values for cancer or chronic noncancer or acute effects. Since exposures to these pollutants cannot be included in a quantitative risk estimate, an understatement of risk for these pollutants at environmental exposure levels is possible.

Id. Furthermore, EPA did not even carry out a qualitative assessment of these HAPs, in effect assuming that risk from the HAPs is zero which is not justified. EPA recognizes that its approach creates a potential understatement of health risk. It further states that "the lack of short-term dose-response values at different levels of severity should be factored into the risk characterization as potential uncertainties." *Id.* It fails to explain, however, whether and how it has "factored" this in. As EPA itself recognizes that this uncertainty should be factored in, it must do so using an uncertainty factor to account for the underestimation of risk.[66]

Further, EPA's charts on pollutants and reference values in the draft risk assessment document have many gaps in them. EPA does not provide information on why there are gaps and whether each of these gaps means there is a missing reference value. It also fails to consider what other information EPA could use to try to conduct a quantitative risk analysis for these

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[65] EPA-HQ-OAR-2010-0505-0055 at 4.

[66] EPA has addressed uncertainty in regard to benzene by using the highest risk number in the range it has created. Benzene is classified as a known human carcinogen for all routes of exposure. EPA's IRIS assessment – last assessed in 2000 – created a range of risk estimates for exposure to 1 µg/m3 of benzene in the air. A range is used because, as EPA explained, "[a]t present, the true cancer risk from exposure to benzene cannot be ascertained, even though dose-response data are used in the quantitative cancer risk analysis, because of uncertainties in the low-dose exposure scenarios and *lack of clear understanding of the mode of action*. A range of estimates of risk is recommended." IRIS, Benzene. In every step of this rulemaking, commenters support EPA's use of and urge EPA to continue to use the high end of the estimated risk range for benzene and to take a similar approach to account for uncertainty in regard to other HAPs.

HAPs, based on the best scientific data that are available. EPA has not provided a transparent discussion that could inform public comment in a meaningful way on this issue, as required. *See* 42 U.S.C. § 7607(d).

EPA's inventory of HAP emissions shows that there are emissions of some compounds that EPA did not assess in the health risk assessment. This inventory included 30 tons per year of 2,2,4 trimethylpentane and 1 ton per year of dibenzofuran from the Oil and Gas Natural Gas Production source category. It also included 5 tons per year of 2,2,4 trimethylpentane from the Natural Gas Transmission and Storage. Although EPA and ATSDR have not developed dose-response values for these compounds, that does not signify that there is no risk associated with exposure to these compounds.

These have been listed as hazardous air pollutants under the Clean Air Act since 1990 because Congress recognized that they are toxic to human health. 42 U.S.C. § 7412(b)(1). There is available, scientific information that EPA could use to assess risk from these pollutants. For example, the Michigan Department of Natural Resources Air Quality Division has developed a screening level for 2,2,4 trimethylpentane of 3,500 ug/m3 averaged over 8 hours for non-cancer impacts.[67] In fact, there is precedent for the use of this screening level by the US EPA in that it was cited in the EPA table of screening values used to assess health risks from VOCs following the Enbridge Oil Spill.[68]

For these reasons EPA may not simply *ignore* health risks associated with these pollutants completely in its analysis by hiding behind uncertainty. EPA may not treat risk as zero for a HAP simply because it has no reference value for the health risk from that HAP. Section 112 requires EPA to address all emitted HAPs in its regulation. In the absence of an available reference dose, EPA must, at minimum, add an uncertainty factor to account for the additional risk that a HAP likely causes, until such time as EPA does have a reference value to use. EPA states that "an understatement of risk for these pollutants at environmental exposure levels is *possible*," in this rulemaking due to the lack of reference values, 76 Fed. Reg. at 52,777 (emphasis added). In fact, an understatement of risk for pollutants that are excluded from the analysis is *certain* because EPA has performed no quantitative assessment of health risk for those pollutants *at all*. The absence of a reference value means that EPA does not know by how much it is *underestimating* risk to human health, it merely knows that its assessment is an underestimation. EPA must address this uncertainty by selecting a health-protective value based on the information it does have, so that it may consider the potential risk and find an appropriate way to address that risk in this rulemaking.

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[67] Mich. Dep't of Envtl. Quality, *Mich. Air Toxics System Initial Threshold Screening Level/Initial Risk Screening Level (ITSL/IRSL) Toxics Screening Level Query Results*, http://www.deq.state.mi.us/itslirsl/results.asp?Chemical_Name=&CASNumber=540-84-1&cmdSubmit=Submit (last accessed Sept. 28, 2011) (attached in Appendix).

[68] U.S. EPA, *Enbridge Oil Spill Human Health Air Screening Levels* (Aug. 13, 2010), http://www.epa.gov/enbridgespill/data/enbridge_voc_screening_levels_20100813.pdf.

vi. IRIS reviews

Section 112(f)(2) of the CAA creates a critical duty and opportunity for EPA to conduct a comprehensive and protective analysis of residual risk to public health and the environment. In view of this, it is a serious problem for EPA's analysis that some HAPs continue to have no reference values. 76 Fed. Reg. at 52,777. Even over twenty years after the Clean Air Act was amended, sufficient studies for some HAPs have not been conducted to allow calculation of reference doses, reference concentrations, or potency values. Moreover, the Integrated Risk Information System ("IRIS") review process has bogged down for many pollutants. As the Center for Progressive Reform has recognized, EPA should prevent the delay in this process from undermining its residual risk analysis for oil and gas and other source categories.[69]

IRIS reviews are currently in process to update EPA's toxicity information for naphthalene and formaldehyde. EPA's own NEI data showed a substantial amount of both naphthalene and formaldehyde emissions from these source categories.[70] Formaldehyde was last assessed in 1991. Human studies have linked exposure to formaldehyde with increased lung, nasopharyngeal, and other respiratory cancer deaths. Additional studies have suggested that leukemia and neoplasms of the human brain and colon may be associated with formaldehyde exposure. EPA's last IRIS review of naphthalene was in 1998. For these and any other pollutants currently under IRIS reassessment, EPA must use the best available scientific information from the IRIS review during the current rulemaking. If EPA determines that it must wait until these reassessments are complete to use the newly available scientific information, then EPA must take a more protective approach due to the out-dated health risk reference information that it is using.

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[69] *See* Rena Steinzor et al., Center for Progressive Reform (CPR), *Setting Priorities for IRIS: 47 Chemicals that Should Move to the Head of the Risk-Assessment Line* (Dec. 2010), http://www.progressivereform.org/articles/IRIS_Priorities_1010.pdf (attached in Appendix). CPR's analysis of IRIS offers a critical expose of these problems. CPR, *EPA's IRIS: A Database With Blind Spots*, http://www.progressivereform.org/iris.cfm (last accessed Sept. 28, 2011). *See also* Gov't Accountability Office (GAO), *High Risk Series: An Update, GAO 11-278* (Feb. 2011), http://www.gao.gov/new.items/d11278.pdf (attached in Appendix); GAO, *EPA Chemical Assessments: Process Reforms Offer the Potential to Address Key Problems, GAO-09-774T* (June 11, 2009), http://www.gao.gov/new.items/d09774t.pdf (attached in Appendix); GAO, *Toxic Chemicals: EPA's New Assessment Process Will Increase Challenges EPA Faces in Evaluating and Regulating Chemicals, GAO-08-743T* (Apr. 29, 2008), http://www.gao.gov/new.items/d08743t.pdf (attached in Appendix); GAO, *Chemical Assessments: Low Productivity and New Interagency Review Process Limit the Usefulness and Credibility of EPA's Integrated Risk Information System, GAO-08-440* (Mar. 2008), http://www.gao.gov/new.items/d08440.pdf (attached in Appendix).

[70] EPA's NEI emissions inventory showed total ONG emissions of formaldehyde of 29.2 tons per year, and naphthalene of 26.2 tpy, well above the individual HAP threshold (10 tpy) for coverage as a major source under 42 U.S.C. § 7412(a)(1). Greg Nizich, EPA, *RTR Review File for Oil and Gas Production*, http://www.epa.gov/ttn/atw/rrisk/rtrpg.html (last accessed Sept. 23, 2011). For NGTS, these formaldehyde is 3.9 tpy and naphthalene is 0.53 tpy, which are significant amounts that may threaten public health and the environment, and may trigger listing if these combine with other emissions to reach 25 tpy or more. Greg Nizich, EPA, *RTR Review File for Natural Gas Transmission and Storage*, http://www.epa.gov/ttn/atw/rrisk/rtrpg.html (last accessed Sept. 23, 2011).

To account for the delay and lack of reference values for some pollutants, and the fact that it is still updating the toxicity information for other pollutants, EPA must set a regulatory deadline no later than eight years from the finalization of these rules, to review the current residual risk analysis and again perform a residual risk rulemaking once additional data on reference values become available.

vii. EPA fails to adequately address non-inhalation or "multipathway" risk.

Commenters support the fact that EPA has recognized the need to perform a multipathway risk assessment as part of the residual risk assessment for this source category, but are concerned that EPA failed to do so in a complete manner here. EPA's multipathway risk assessment falls short in assessing health risk from this source because it fails to include all relevant HAPs, it is not based on "allowable" emissions, and it inadequately assesses exposure routes – particularly for children. It is also problematic that EPA failed to use the information it found from the multipathway analysis – i.e., what it calls a more than "de minimis" level of health risk – in its overall risk analysis, because for POM it did not add the multipathway risk to the inhalation risk.

(a) EPA's multipathway analysis is arbitrary.

In this rulemaking, EPA simply performed a screening analysis, and did not perform a multipathway risk assessment.[71] It determined that POM was emitted at levels that exceed EPA's so-called "*de minimis*" threshold by *six time*s, thus triggering the need for a full multipathway risk assessment. However, EPA decided not to perform this analysis because it found one facility with this level of emissions and it found that this facility "is located in a highly industrialized area," such that EPA concluded "the exposure pathways driving human exposure are unlikely."[72] EPA failed to provide a reasoned explanation for not performing a full multipathway risk assessment. There is no discussion in this analysis of how many people are indeed exposed, or whether EPA even considered the most-exposed person in reaching this conclusion.

EPA must conduct a full multipathway risk assessment for oil and gas that includes consideration of a child's multipathway exposure, in urban and rural residential scenarios. EPA's 2003 Guidance specifically states the following:

> In urban areas, toxic air pollutants are of particular concern because people and sources of emissions are concentrated in the same geographic area. Since most people live in urban areas, this

[71] Draft Residual Risk Assessment at 10-11 (stating that due to its POM analysis "multi-pathway exposures . . . were deemed negligible and no further analysis was performed").

[72] Draft Residual Risk Assessment at 11.

> proximity leads to the potential for large numbers of people to be exposed to numerous air pollutants.[73]

It further explains:

> Urban air toxics also have a potential to elevate health risks among particular urban subpopulations, including children, the elderly, and persons with existing illnesses. In addition, the prevalence of minority and low-income communities in urban industrial and commercial areas, where concentrations of air toxics may be greatest, increases the likelihood of elevated exposures among these subpopulations.[74]

While the risks due to bioaccumulative HAPs may be lower in an urban setting, the combined exposures from multiple sources and multiple persistent chemicals could potentially be much greater. Soil contaminants are a particular risk to children due to play activities and behaviors, such as increased hand to mouth and object to mouth frequency, which increase their exposures via incidental ingestion.[75] In addition, as recognized by the 2003 Guidance, the urban environment is often characterized by exposures to multiple HAPs from multiple sources. The failure of EPA to assess an exposed child scenario as part of the cumulative risk assessment ignores the exposures that may pose the most significant risk from this source category.

Past risk assessments have relied on outdated estimates of incidental soil ingestion exposures and EPA must update these values. The 2011 update to EPA's Exposure Factors Handbook includes more recent studies and estimates of hand to mouth behavior, which must be used to assess risks from exposures to contaminated soils.[76] EPA also has a final 2008 child-specific exposure factor handbook that it has failed to consider or address in past rulemakings, and must do so.[77] In addition, risks from exposure to soil contaminants should evaluate both direct exposure, hand-to-mouth, and indirect, object-to-mouth, exposure. Indirect hand-to-mouth activity is the exposure from toddlers/children who touch an object or food with soil contaminated hands and then put that object or food into their mouths. Published studies show that there is actually noticeable indirect hand to mouth activity in infants and children. In fact, one study found that, on average, a toddler will touch an object and then put that object into his or her mouth 15 times in one hour. At the high end of the study's distribution (90th percentile),

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[73] EPA, RISK ASSESSMENT AND MODELING - AIR TOXICS RISK ASSESSMENT REFERENCE LIBRARY VOL. 1 – TECH. RES. MANUAL, Part I Background, at 1-2 (2003).

[74] *Id.*

[75] U.S. EPA. *Exposure Factors Handbook* at 1-11 (2011), EPA/600/R-09/052A (attached in Appendix). EPA, 2011 Exposure Factors Handbook at 1-11.

[76] *Id*.

[77] U.S. EPA. *Child-Specific Exposure Factors Handbook* (Sept. 2008), EPA/600/R-06/096F, http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=199243 (attached in Appendix).

that rate rises to 66 times per hour.[78] This same study found a statistically significant positive correlation between the frequency of object or food in mouth activity and blood lead levels.

EPA must perform a full multipathway risk assessment for the oil and gas sector that fully accounts for the greater multipathway exposure and risk for children, particularly in urban settings such as Los Angeles where drilling is occurring.

(b) HAPs are missing from EPA's multipathway risk analysis.

The multipathway risk assessment for oil and gas was restricted to only those contaminants identified in the 2003 Risk Assessment Guidance as being both persistent and bioaccumulative in the environment (*i.e.*, PB-HAPs). This list of PB-HAPs is both inaccurate and ignores other HAPs which present a multipathway risk.

EPA's choice to restrict this analysis to only contaminants that bioaccumulate is not supported by the 2003 Guidance which states, "multipathway risk assessment may be appropriate generally when air toxics that persist and which also may bioaccumulate and/or biomagnify are present in releases."[79] This guidance does not direct that the multipathway assessment be limited to only those contaminants listed as PB-HAPs. The choice to exclude those contaminants which persist and accumulate in soils underestimates risks from HAPs emitted by this source category. The deposition of persistent HAPs is recognized by the 2003 guidance document as a source of soil contamination presenting a potentially significant route of exposure, particularly for children.[80]

1. Beryllium and arsenic are both persistent chemicals and releases of these metals by natural gas transmission and storage facilities would be expected to result in soil contamination in the surrounding vicinity. The risk posed by exposures to both of these chemicals in contaminated soils is documented in EPA's resource for cumulative risk assessments.[81] According to a 2003 evaluation conducted by the EPA Office of Water, "[a]rsenic, and/or its metabolites, is a chemical that bioaccumulates in tissues of aquatic organisms."[82] Therefore, the assessment of risk solely from inhalation, as was conducted in the residual risk assessment for oil and gas, is an underestimate and ignores the risks associated with ingestion of arsenic-contaminated soil and fish. EPA simply may not assume that the ingestion

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[78] Ko, S., Schaefer, P.D., Vicario, C.M., and Binns, H.J. 2007. *Relationships of Video Assessments of Touching and Mouthing Behaviors During Outdoor Play in Urban Residential Yards to Parental Perceptions of Child Behaviors and Blood Lead Levels.* J. OF EXPOSURE SCIENCE AND ENVIRONMENTAL EPIDEMIOLOGY 17:47-57 (attached in Appendix).

[79] U.S. EPA, RISK ASSESSMENT AND MODELING - AIR TOXICS RISK ASSESSMENT REFERENCE LIBRARY VOL. 1 TECH. RES. MANUAL, *Part III Human Health Risk Assessment: Multipathway*, at 14-1 (2003) (emphasis added).

[80] *Id.* ch. 20.

[81] U.S. EPA. 2007, ch. 3.3.2 at 3-24.

[82] U.S. EPA, *Technical Summary of Information Available on the Bioaccumulation of Arsenic in Aquatic Organisms* (2003), EPA-822-R-03-032, at 2 (attached in Appendix).

risks are zero for arsenic. Doing so when science shows otherwise is arbitrary and capricious. The failure to assess multipathway risk from exposure to both of these HAPs via incidental ingestion, both individually and cumulatively, results in an underestimate of the risks of HAP emissions from this source category.

2. Naphthalene is a polycyclic aromatic hydrocarbon (PAH) and as such must be considered in the POM category which is listed as a PB HAP. Naphthalene has been demonstrated to be persistent and bioaccumulate in biota, particularly shellfish.[83]

3. The multipathway risk assessment is also missing chemicals such as mercury. Mercury is a persistent and bioaccumulative HAP which, despite evidence of emissions from oil and natural gas production source category, was omitted from the emission inventory, as further discussed above.

(c) EPA's multipathway assessment fails to assess risk based on "allowable" emissions of all HAPs.

EPA fails to justify why the circumstances which would allow a facility to potentially emit a greater amount of benzene (*i.e.*, allowable emissions) would not result also in concurrent, additional emissions of other HAPs. This oversight means that EPA's determination of no potential for significant health impacts via a multipathway route of exposure is premature and incomplete. EPA has not assessed the full potential for persistent and bioaccumulative emissions by failing to assess the potential for greater amounts of other PB-HAP emissions. Intermittent or short spikes of PB-HAPs can represent a significant health risk because the contaminants stay in the environment and small amounts can accumulate into larger amounts over time. For this reason, EPA's analysis likely underestimates the health risks from multipathway routes of exposure.

(d) EPA fails to add multipathway risk to the inhalation risk.

The purpose of the multipathway assessment is to allow EPA to look at the overall view of a person's exposure – not just inhalation, and not just other exposure pathways, in isolation. Failing to add each type of risk in order to come up with a *total* risk number that EPA and the public can analyze makes EPA's overall risk assessment incomplete. EPA must use the multipathway assessment appropriately, by adding the risk found there to the inhalation risks found, and then proceed with the required § 112(f)(2) analysis to determine whether or not that total level of risk is acceptable, and what standards are needed to reach an acceptable level and also provide an ample margin of safety.

EPA prematurely dismissed the relevance of multipathway exposures to contaminants from the natural gas transmission and storage and oil and natural gas production source

[83] Yender, R,J. Michel, and C. Lord. *Managing Seafood Safety after an Oil Spill.* Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration (2002).

categories as described above. As result, EPA failed to adequately assess cumulative exposures by assessing risks from both inhalation and ingestion.

viii. EPA fails to assess or account for increased exposure and vulnerability of children and pregnant women.

The residual risk assessment underestimates risk to the most vulnerable populations by failing to account for the increased susceptibility of children and the developing fetus to HAP exposure. It is well-established that biological differences in the developing child and fetus can result in increased cancer and non-cancer risk due to both increased exposure and increased vulnerability.[84] The most recent review of EPA risk assessment practices by the National Academy of Sciences (NAS) highlights the need to expand this requirement to other EPA risk assessments.[85] EPA must account for the increased susceptibility of children to HAP emissions from this source category in the risk assessment. For example, the NAS review explicitly advises EPA to include in utero exposures as a period of increased sensitivity to carcinogens.[86] In addition, comprehensive analysis of differential susceptibility to carcinogens by the Office of Environmental Health Hazard Assessment (OEHHA) of the California Environmental Protection Agency (CalEPA) indicates an increased risk from early life exposures for carcinogens not acting by mutagenic mode of action.[87] Increased susceptibility during early life exposures has also been demonstrated for non-cancer effects, where physiological differences in the developing organism result in increased risks.[88] Therefore, as part of this rulemaking, EPA must evaluate health risks to children and pregnant women and set standards that account for early life exposures.

EPA's analysis fails to do so for a number of reasons. Commenters support EPA's implementation of the 2005 *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* in the assessment of cancer risk from POM emissions from oil and gas.[89] However, EPA restricted its application of the 2005 Supplemental Guidance to those HAPs included in EPA's list of carcinogenic HAPs that act by a mutagenic mode of action. This list was generated in 2006 and must be updated to incorporate more recent evaluations of

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[84] *See* American Academy of Pediatrics, *Policy Statement—Chemical-Management Policy: Prioritizing Children's Health*, 127 Pediatrics 983, 983 (2011). *See generally* National Academy of Sciences, *Science and Decisions: Advancing Risk Assessment* (2008) (attached in Appendix); National Academy of Sciences, *Pesticides in the Diets of Infants and Children* (1993) (attached in Appendix).

[85] National Academy of Sciences, *Science and Decisions: Advancing Risk Assessment* 187 (2008) (attached in Appendix).

[86] National Academy of Sciences, *Science and Decisions: Advancing Risk Assessment* 112 (2008) (attached in Appendix).

[87] *Id.*

[88] Cal. EPA, OEHHA, *Development of Health Criteria for School Site Risk Assessment Pursuant to Health and Safety Code 901(g): Identification of Potential Chemical Contaminants of Concern at California School Sites* (2002).

[89] *Id.*

carcinogenic modes of action. The 2005 Supplemental Guidance also does not account for increased cancer risk resulting from prenatal exposures.

Instead of taking the approach of the 2005 *Supplemental Guidance* regarding other HAPs, EPA must follow the lead of OEHHA by using age-dependent adjustment factors for all carcinogens.[90] CalEPA has developed methods and adjustment factors to account for prenatal exposures to carcinogens.[91]

(a) EPA fails to assess increased vulnerability of children and the developing fetus to particular HAPs.

EPA's failure to include an adequate evaluation of increased early life susceptibility to HAP emissions from the oil and gas sector systematically underestimates risk from the following HAPs, each of which its own inventory shows are emitted.[92]

1. Benzene

Benzene is a known carcinogen and has also been listed by the state of California to cause developmental toxicity. A 2001 CalEPA review of the literature concluded that, "there is evidence that benzene exposure early in life elicits a stronger carcinogenic response than equivalent exposures of working-age adults."[93] They also note that this increased susceptibility is not accounted for in the dose-response values used by the US EPA or CalEPA and thus concludes that standards or assessments based on these values "may underpredict the risk from early life exposures" and "would not be adequately protective of children."[94] Studies of human biological tissues which found benzene detected in fetal cord blood, at levels equal to or greater than that of maternal blood, and breast milk[95] indicate the potential for increased exposures during prenatal development

[90] Cal. EPA, Office of Envtl. Health Hazard Assessment (OEHHA), *Technical Support Document for Cancer Potency Factors: Methodologies for Derivation, Listing of Available Values, and Adjustments to Allow for Early Life Stage Exposures* 3, 50 (May 2009), http://www.oehha.ca.gov/air/hot_spots/2009/TSDCancerPotency.pdf (attached in Appendix); Cal. EPA, OEHHA, *In Utero and Early Life Susceptibility to Carcinogens: The Derivation of Age-at-Exposure Sensitivity Measures* (May 2009) (attached in Appendix).

[91] Cal. EPA, OEHHA, *In Utero and Early Life Susceptibility to Carcinogens: The Derivation of Age-at-Exposure Sensitivity Measures* (May 2009) (attached in Appendix).

[92] *See NEI Emissions Inventory ("RTR Review File for Oil and Gas Production*") (July 25, 2011), *available at* http://www.epa.gov/ttn/atw/rrisk/rtrpg.html (showing industry emissions of benzene, formaldehyde, POM, arsenic, methylene chloride, acrolein, and other HAPs at levels that can threaten public health).

[93] Cal. EPA, OEHHA, *Chemical Summary: Benzene. Prioritization of Toxic Air Contaminants – Children's Environmental Health Protection Act* (2008). (attached in Appendix).

[94] *Id.*

[95] U.S. EPA, *Benzene: TEACH Chemical Summary: U.S. EPA Toxicity and Exposure Assessments for Children's Health* 4 (Feb. 27, 2009), http://www.epa.gov/teach/chem_summ/BENZ_summary.pdf.

and infancy. Based on this evidence and the findings of increased early life susceptibility to non-mutagenic carcinogens, the assessment of risks due to benzene from Oil and Gas Production and Natural Gas Transmission and Storage sources must be adjusted to account for the increased risks from prenatal and childhood exposures.

2. Formaldehyde

Formaldehyde is a carcinogen and potent respiratory irritant that is "associated with decrements in lung function and elevated respiratory symptoms in children."[96] Due to studies finding increased sensitivity of children to respiratory toxicity of formaldehyde, the CalEPA has prioritized it as a toxic air contaminant of particular concern for children.[97] Based on this evidence, and the findings of increased early life susceptibility to non-mutagenic carcinogens, the residual risk assessment should have adjusted the dose-response values for both the cancer and non-cancer effects of formaldehyde exposure from the source categories.

3. POM

Commenters support EPA's use of age-dependent adjustment factors to account for increased cancer susceptibility to POM emissions during childhood exposures. However, evaluations by the California EPA and the published literature suggest that adjustment is also needed for prenatal exposures to polycyclic aromatic hydrocarbons (PAHs), one of the more toxic components of POM. Animal studies have found that ingestion of PAHs during pregnancy results in much greater genetic damage in the fetus compared to the mother.[98] Human children exposed prenatally to PAHs have statistically significant increases in DNA aberrations in specific chromosomes, low birth weight, and intrauterine growth restriction.[99] [100] [101] [102]

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[96] Cal. EPA, OEHHA. *Chemical Summary: Formaldyde. Prioritization of Toxic Air Contaminants – Children's Environmental Health Protection Act* (2001).

[97] *Id.*

[98] Harper BL, Sadagopa Ramanujam VM, Legator MS. 1989. *Micronucleus Formation by Benzene, Cyclophosphamide, Benzo(a)pyrene, and Benzidine in Male, Female, Pregnant Female, and Fetal Mice. Teratogenesis, Carcinogenisis, and Mutagenenisis* 9(4):239-252 (attached in Appendix).

[99] Choi H, Jedrychowski W, Spengler J, Camann DE, Whyatt RM, Rauh V et al. 2006. *International studies of prenatal exposure to polycyclic aromatic hydrocarbons and fetal growth.* Environ. Health Perspect. 114(11):1744-1750 (attached in Appendix).

[100] Dejmek J, Solansky I, Benes I, Lenicek J, Sram RJ. 2000. *The impact of polycyclic aromatic hydrocarbons and fine particles on pregnancy outcome.* Environ. Health Perspect. 108(12):1159-1164 (attached in Appendix).

[101] Orjuela MA, Liu X, Warburton D, Siebert AL, Cujar C, Tang D et al. 2010. *Prenatal PAH exposure is associated with chromosome-specific aberrations in cord blood.* Mutat Res 703(2):108-114; doi: 10.1016/j.mrgentox.2010.08.004 (attached in Appendix).

4. Arsenic

Arsenic is a known carcinogen and has also been listed by the state of California as known to cause developmental toxicity.[103] A 2001 CalEPA review of the literature concluded that, "there is evidence that infants and children may be more susceptible to arsenic exposure than adults."[104] Based on this evidence and the findings of increased early life susceptibility to non-mutagenic carcinogens, the assessment of risks due to arsenic exposure from the oil and gas sector must be adjusted to account for the increased risks from prenatal and childhood exposures.

5. Methylene Chloride

Methylene chloride is a carcinogen and can also have cardiovascular and neurological impacts. A 2001 CalEPA review determined that through its metabolism to carbon monoxide in the body methylene chloride can have an increased toxicity for infants which is not accounted for in the dose-response values.[105] Based on this evidence, and the findings of increased early life susceptibility to non-mutagenic carcinogens, the assessment of risks due to methylene chloride from Oil and Gas Production and Natural Gas Transmission and Storage sources must be adjusted to account for the increased risks from prenatal and childhood exposures.

6. Acrolein

Acrolein is a powerful respiratory irritant and there is substantial evidence that it exacerbates asthma. Due to the high rates of asthma among children, the CalEPA has prioritized acrolein as a toxic air contaminant of particular concern for children and added a 10 fold factor to the derivation of dose-response values to account for this increased vulnerability.[106] This same approach must be incorporated for EPA's assessment of health risks associated with exposure to acrolein from Oil and Gas Production and Natural Gas Transmission and Storage sources.

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[102] Perera F, D Tang, Whyatt R, Lederman SA, Jedrychowski W. 2009. *DNA Damage from Polycyclic Aromatic Hydrocarbons Measured by Benzo[a]pyrene-DNA Adducts in Mothers and Newborns from Northern Manhattan, The World Trade Center Area, Poland, and China*. Cancer Epidemiol. Biomarkers & Prev. 14:709-714 (attached in Appendix).

[103] Cal. EPA 2011. Safe Drinking Water And Toxic Enforcement Act of 1986 Chemicals Known To The State To Cause Cancer Or Reproductive Toxicity, http://www.oehha.ca.gov/prop65/prop65_list/files/P65single052011.pdf (attached in Appendix).

[104] Cal. EPA, OEHHA, *Prioritization of Toxic Air Contaminants - Children's Environmental Health Protection Act: Arsenic and Arsenic Compounds*, 7 (2001) (attached in Appendix).

[105] Cal. EPA, OEHHA, *Chemical Summary: Methylene Chloride. Prioritization of Toxic Air Contaminants – Children's Environmental Health Protection Act* (2001).

[106] Cal. EPA, OEHHA, *Acrolein Reference Exposure Levels* (2008).

(b) *EPA must adopt the OEHHA child-protective scientific approach and use a 10-fold uncertainty factor to protect children.*

EPA's analysis recognizes the need to protect children's health and address early exposure through the use of the old 2005 Guidelines. Because its approach is out-dated and not based on current scientific information, however, EPA fails to follow through to do so.

To satisfy its duty to protect children, EPA must follow the best available science, at minimum, EPA must adopt the following:

1. OEHHA Cancer Guidelines (Age-Dependent Adjustment Factors) for all carcinogens and include pre-natal susceptibility, *and*

2. Child-Specific Reference Doses (for Non-Cancer Impacts), *and*

3. Children's Default Safety Factor of Ten (for Non-Cancer Chronic & Acute Impacts), where specific information on children's vulnerability is unavailable.

First, for cancer, EPA must apply the OEHHA cancer guidelines, and use the age-dependent adjustment factors for all carcinogens. As explained above, EPA currently refuses to apply these factors except to a very limited set of pollutants, and EPA should change this policy to apply the age-dependent adjustment factors to *all* carcinogens and to include pre-natal susceptibility.[107]

Second, EPA must also use the OEHHA child-specific reference doses to assess chronic noncancer and acute health risk, where they are available.[108] OEHHA has created these dose values to take into account children's greater exposure and greater vulnerability. EPA has the scientific ability to translate these reference doses for oral, inhalation, and other pathway assessments.

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[107] Cal. EPA, OEHHA, *Technical Support Document for Cancer Potency Factors: Methodologies For Derivation, Listing of Available Values, and Adjustments to Allow For Early Life Stage Exposures* 3, 50 (May 2009), http://www.oehha.ca.gov/air/hot_spots/2009/TSDCancerPotency.pdf (attached in Appendix); Cal. EPA, OEHHA, *In Utero and Early Life Susceptibility to Carcinogens: The Derivation of Age-at-Exposure Sensitivity Measures* (May 2009) (attached in Appendix).

[108] For example, OEHHA has developed a child-specific reference dose for cadmium, manganese, and nickel. Cadmium child-specific reference dose is 1.1 x 10-5 Mg/kg-day. Cadmium child-specific reference dose is 1.1 x 10-5 Mg/kg-day. Cal. EPA, OEHHA, *Child-Specific Reference Doses (Chrds) For School Site Risk Assessment – Cadmium, Chlordane, Heptachlor, Heptachlor Epoxide, Methoxychlor, and Nickel* (Dec. 2005), http://oehha.ca.gov/public_info/public/kids/schools1205.html (attached in Appendix). Manganese child-specific reference dose is 3 x 10-2 Mg/kg-day. Cal. EPA, OEHHA, *Child-Specific Reference Doses (Chrds) For School Site Risk Assessment Manganese and Pentachlorophenol* (June 2006), http://oehha.ca.gov/public_info/public/kids/schools070306.html (attached in Appendix). Nickel child-specific reference dose is 0.11 Mg/kg-day. Cal. EPA, OEHHA, *Child-Specific Reference Doses (Chrds) For School Site Risk Assessment – Cadmium, Chlordane, Heptachlor, Heptachlor Epoxide, Methoxychlor, and Nickel* (Dec. 2005), http://oehha.ca.gov/public_info/public/kids/schools1205.html (attached in Appendix).

Third, and importantly, where a child-specific reference value or vulnerability information is not available, which is true for most HAPs, EPA must apply at least a Ten-fold Margin of Safety Factor to protect children in these rulemakings, in addition to the uncertainty factors it already uses. For chronic (non-cancer) and acute health risk, EPA must simply apply this as an additional uncertainty factor. Children cannot wait for the IRIS process to catch up to the current science on children's health. Children near oil and gas facilities need protection now, in this rulemaking, and using a greater margin of safety factor is an appropriate way to provide such protection under section 112(f)(2).

EPA has a strong scientific basis to make these policy decisions. The science on the greater vulnerability and exposure of children to toxic air pollution and the need to better protect minority and low-income children from pollution is robust. It is available from the National Academy of Sciences, the Office of Children's Health Protection, the Children's Health Protection Advisory Committee, and scientists in the Office of Research and Development who focus on children's and community health (such as experts in the National Center for Environmental Research). EPA rule-writers must consult with these experts in this rulemaking. EPA must also consider and follow its 2008 handbook on child-specific exposure factors in this rulemaking.[109] Commenters have attached significant information on these issues in the record.

Adopting the OEHHA guidelines on age-dependent adjustment factors and on child-specific reference doses, and accounting for the greater exposure and vulnerability of children would be consistent with the Science Advisory Board's recommendations. The Science Advisory Board has urged EPA to correct its failure to adequately address the greater risk to children from hazardous air pollution.[110] As the SAB explained: "California's Office of Environmental Health Hazard Assessment (OEHHA) has very recently updated its methodology in ways that could affect the development of RfC and URE values. EPA should examine these developments to make sure that the RTR process adequately covers children's risks."[111] The report elaborated:

> California EPA/OEHHA has determined that inhalation dosimetry for children is sufficiently different from adults to warrant a full 10-fold intra-individual pharmacokinetic uncertainty factor (i.e., an extra 3-fold PK uncertainty for children relative to the IRIS method) as a default approach. In setting non-cancer reference exposure levels (RELs), Cal EPA/OEHHA also considers that children may be outliers in terms of chemical susceptibility and on a case-specific basis adds a children's pharmacodynamic factor of

[109] U.S. EPA, *Child-Specific Exposure Factors Handbook* (Sept. 2008), EPA/600/R-06/096F, http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=199243 (attached in Appendix).

[110] SAB May 2010 at 7 (stating that "an overarching concern with the Agency's chronic inhalation exposure estimates is that children's exposures do not appear to have been adequately addressed").

[111] SAB May 2010 at 34.

> 3-fold, making the inhalation risk for children as much as 10 times greater than adults) [sic].[112]

EPA needs to use the OEHHA approach and an uncertainty factor to protect children's health.

In addition, Congress has recognized this science in its unanimous vote on toxics legislation passed in 1996 – the Food Quality Protection Act (FQPA) – in which Congress found the need to use a Ten-fold Margin of Safety or "10X factor" in order to "take into account pre- and post-natal toxicity and completeness of the data with respect to exposure and toxicity to infants and children." 21 U.S.C. § 346a(b)(2)(C) (requiring that, in establishing, modifying, leaving in effect, or revoking a tolerance or exemption for a pesticide chemical residue, "for purposes of clause (ii)(I) an additional tenfold margin of safety for the pesticide chemical residue and other sources of exposure shall be applied" to protect infants and children). Congress's recognition of the need to use this uncertainty factor provides a model that EPA may consider and incorporate into this residual risk assessment. *Id.* It would be appropriate and within EPA's authority under the Clean Air Act section 112(f)(2) to determine that EPA must similarly use a Kids' Ten-fold Margin of Safety here. EPA must do this to satisfy the Clean Air Act's "margin of safety" requirement. 42 U.S.C. § 7412(f)(2). In doing so, EPA may rely directly on the science itself, and also on the unanimous guidance from Congress, provided in the FQPA, that the existing evidence of increased harm to children requires significant action to protect children from toxic exposure.

In addition, the child-specific reference doses that OEHHA has created provide support for the use of the Ten-fold Margin of Safety Factor. EPA's current reference values are generally one order of magnitude weaker (*i.e.*, larger) than the values that California has recognized are needed to protect children, based on the currently available science and a specific assessment of research relevant to early life exposures, as shown in the Addendum Chart attached.

ix. EPA fails to adequately assess the cumulative impact of exposure to this source category in combination with other HAP emissions.

Both the EPA and the National Academy of Sciences have highlighted the importance of including cumulative impacts and risk in risk assessments and risk-based decision making. In EPA's most recent report on the subject, titled *Concepts, Methods and Data Sources for Cumulative Health Risk Assessment of Multiple Chemicals, Exposures and Effects: A Resource Document,* cumulative risk assessments are defined as including "aggregate exposures by multiple pathways, media and routes over time, plus combined exposures to multiple contaminants from multiple sources."[113] The most recent NAS report on risk assessment, *Science and Decisions: Advancing Risk Assessment*, states "that it is difficult to imagine any risk

[112] SAB May 2010 at 34 (citing Cal. EPA, OEHHA, *Technical Support Document for the Derivation of Noncancer Reference Exposure Levels* (June 2008), http://www.oehha.ca.gov/air/hot_spots/2008/NoncancerTSD_final.pdf (attached in Appendix)).

[113] U.S. EPA, *Concepts, Methods and Data Sources for Cumulative Health Risk Assessment of Multiple Chemicals, Exposures and Effects: A Resource Document,* at xxxii (2007), EPA/600/R-06/013F (attached in Appendix).

assessment in which it would not be important to understand the effects of coexposures to agents or stressors that have similar [Modes of Action]."[114]

The Scientific Advisory Board has urged EPA to incorporate cumulative risks into its residual risk analysis. The SAB stated that "RTR assessments will be most useful to decision makers and communities if results are presented in the broader context of aggregate and cumulative risks, including background concentrations and contributions from other sources in the area."[115] Further, as the Science Advisory Board recommended, EPA must include an analysis of both background and incremental risk, as part of a full cumulative impacts analysis. As it also explained: "[a] residual risk analysis that does not add exposures to baseline contamination to the estimates of on-going contamination may vastly underestimate the hazard quotient at the site and incorrectly conclude that the on-going releases pose risks at less than threshold levels."[116]

However, EPA has failed to follow these recommendations or the best available science on the full, cumulative impact of HAP exposure for affected local communities. EPA's residual risk assessment underestimates risk from exposure to HAPs emitted from the oil and gas sector by inadequately assessing the cumulative risk from multiple sources, multiple HAPs, and multiple pathways of exposure.

EPA must perform a cumulative impacts analysis on multiple source exposure in order to satisfy section 112(f)(2). Although it does not state that in this preamble, EPA has previously recognized the importance of cumulative impacts, by stating that it "understands the potential importance of considering an individual's total exposure to HAP," and that it is "interested in placing source category and facility-wide HAP risks in the context of total HAP risks from all sources combined in the vicinity of each source." Secondary Lead Smelters NESHAP Proposed Rule, 76 Fed. Reg. 29,032, 29,047 (May 19, 2011). Commenters support EPA's recognition of the need to assess whether the maximum exposed individual is exposed to emissions from more than one source *within* this source category, as it does using the AERMOD modeling tool. Commenters also support EPA's consideration of facility-wide risk, although EPA needs to provide appropriate documentation for this, including the sources considered for this analysis, as discussed in the Sahu Report at 17. However, these approaches are only part of the picture. Each of these analyses by EPA only demonstrates why it is also necessary for EPA to assess the *full* HAP emissions to which the maximum exposed individual is exposed in a local community with an oil and gas facility. EPA's refusal to assess cumulative impacts or risk here from multiple types or source categories of HAP emissions conflicts with its own recognition that considering the most-exposed person's full health risk is an important part of the section 112(f)(2) analysis.

EPA's failure to assess the combined, cumulative impacts from multiple HAP source categories also conflicts with the recommendation from the Scientific Advisory Board that in

[114] NAS 2008 at 202.

[115] SAB May 2010 at 10.

[116] SAB May 2010 at 41.

May 2010 urged EPA to incorporate cumulative risks into its residual risk analysis. The SAB stated that "RTR assessments will be most useful to decision makers and communities if results are presented in the broader context of aggregate and cumulative risks, including background concentrations and contributions from other sources in the area."[117]

Because EPA has not assessed the full HAP emissions to which local communities are exposed (beyond those coming from this source category), EPA underestimates the total risk that maximum exposed people face due, in part, to emissions from the oil and gas sector. EPA has also failed to account for the increased risk caused by a person's exposure to multiple types of HAPs.

EPA has given no reason for failing to analyze the full HAP exposure of the people most-exposed to oil and gas facilities, including from the baseline level of exposure that is present in the environment, from sources outside of the source category and not located at the same facility as an oil and gas facility. If EPA were to try to rely on uncertainty, uncertainty could not be a rational explanation for failing to address this important element of health risk. Where public health is concerned, uncertainties require more conservative assessment and more protective action, rather than inaction. Instead of trying to use "uncertainties" as an excuse, EPA must follow the SAB recommendations. The SAB Report stated that: "the Panel recommends that the Agency perform a sensitivity analysis to identify the major uncertainties in both the human health and ecological risk assessments. The Agency should then proceed to: (1) explain them clearly in the risk characterization section and (2) take steps to reduce them."[118] Yet, EPA has failed to follow this recommendation.

In considering whether this sector's emission contribution causes the community to experience an unacceptable level of public health risk, when combined with the existing baseline from past emissions, other HAP emissions, and the community's health status, EPA can describe and manage uncertainties, as it does for many other analyses. This type of cumulative impacts analysis is a routine consideration that is also required under other provisions of the Clean Air Act and other environmental statutes. *See, e.g.*, Clean Air Act New Source Review program, 42 U.S.C. §§ 7475, 7503 (requiring a localized, cumulative assessment of whether or not a new or modified source's additional emissions will cause an attainment area to deteriorate, or will make it difficult for a nonattainment area to make progress toward achieving the national ambient air quality standards); *New York v. EPA*, 443 F.3d 880, 883 n.1 (D.C. Cir. 2006) (citing *New York I*, 413 F.3d 3, 11-14 (D.C. Cir. 2005)). In addition, EPA is well aware of the cumulative impacts analysis required by the National Environmental Policy Act. *See, e.g.*, 40 C.F.R. § 1508.27(b)(7) (2011) (requiring a consideration of "[w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component

[117] SAB May 2010 at 10.

[118] SAB May 2010 at 10.

parts").[119] Even the Endangered Species Act duty to ensure against jeopardy includes the requirement to assess a newly proposed action in the context of all other impacts, and determine whether or not the specific action will "tip a species from a state of precarious survival into a state of likely extinction," or, where baseline conditions already jeopardize a species, whether it will "deepen[] the jeopardy by causing additional harm." *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 524 F.3d 917, 930 (9th Cir. 2008) (applying 16 U.S.C. § 1536(a)(2)). As these myriad examples show, uncertainties do not justify failing to assess and address the severe cumulative harm and risk to local communities from the source category at issue in this rulemaking.

To perform this analysis, EPA must assess cumulative impacts by combining current baseline emissions, exposures, and health impacts in addition to those of the specific source category EPA is reviewing. As part of this analysis, EPA should aggregate or add the emissions for the most-exposed communities coming from: (1) the source category (including all individual sources within it); and (2) all other sources of toxic air pollution in the area. Virtually all of the existing MACT standards (under section 112(d)) require periodic testing and monitoring, and this is something EPA must ensure is included in all rules as it updates them. Using these data, EPA can aggregate the community's exposure and assess the full health threats faced by the affected community, including from the source under review. To perform this step, EPA must also draw on the OEHHA community assessment approach, Cumulative Impacts – Building A Scientific Foundation (2010) (attached in Appendix).

Without a full cumulative risk and impacts assessment, EPA fails to gather the necessary information to determine whether stronger standards are needed for the oil and gas sector, in order to prevent unacceptable health risk and provide the legally required ample margin of safety.

B. EPA's Determination of the Emissions Reduction Required to Reduce Health Risks to an Acceptable Level Violates § 112(f)(2) and Is Arbitrary.

Commenters challenge EPA's proposed determination not to ensure a greater reduction in cancer, chronic non-cancer, and acute health risk. At this step, EPA must consider the information it has gathered in the risk review and relevant factors to decide whether or not the amount of existing harm to public health is safe or acceptable. This determination must be based purely on the question of how much health risk is "acceptable in the world in which we live." *NRDC v. EPA*, 824 F.2d 1146, 1165 (D.C. Cir. 1987). If EPA finds the level of health risk to be unacceptable, EPA must set a stronger limit on toxic air pollution from the source category.

In its acceptability determination for Oil and Natural Gas Production, EPA proposes to find the risk unacceptable "in large part" because the cancer risk (400-in-1 million) was higher

[119] The term "cumulative impact" is defined under NEPA as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." 40 C.F.R. § 1508.7 (2011).

than the presumptive limit of acceptability (100-in-1 million). It then proposes to eliminate the alternative compliance option for glycol dehydrators – the limit of 0.9 Mg/yr benzene. Without that option, EPA concluded that the cancer risk would become acceptable. 76 Fed. Reg. at 52,780. For Natural Gas Transmission and Storage, at step two, EPA proposes to find the health risk acceptable because the risk was 90-in-1 million which is "approaching, but still less than 100-in-1 million risk" and EPA believes that "a number of other factors indicate relatively low risk concern." 76 Fed. Reg. at 52,783. To reach these acceptability determinations, EPA relies on out-dated presumptions about what level of risk is acceptable and fails to recognize the need to provide greater protection from health risk for children and for people exposed to multiple sources, and to serve environmental justice.

EPA's acceptability conclusions are arbitrary and capricious, first, because they are based on an incomplete and flawed risk assessment (discussed above). Second, EPA's acceptability determinations are based on outdated presumptions about risk that EPA cannot rationally rely on in this rulemaking. EPA arbitrarily assumes that the lifetime cancer risk is safe if it is no higher than 100-in-1 million. This is a number EPA set as presumptively unacceptable based on 1980s data (e.g., a lifetime cancer risk of 100-in-1 million) in the Benzene Rule. *See* 54 Fed. Reg. 38,044, 38,045 (Sept. 14, 1989). There are significant reasons for EPA to change its outdated presumptions on risk based on the needs of U.S. communities today, and, based on this record – *e.g.*, the uncertainties EPA has identified, its failure to fully assess cumulative risk or risk to children, disproportionate socioeconomic impacts – to require further risk reductions from this source category. Yet, EPA fails either to consider reducing the presumptive acceptability level, or to provide any rational explanation, based on science and values in the U.S. today, for continuing to use its outdated presumption, rather than deciding that a greater emissions reduction is needed in order to reduce each type of risk to a lower, "acceptable" level.

1. <u>EPA's acceptability determination is unlawful because it fails to consider or address the full health risk for the most exposed individuals and communities.</u>

Because EPA's acceptability determination fails to address or consider important elements of the emissions, exposure, and health risk discussed above in Part II.B, EPA's analysis is incomplete, unlawful, and arbitrary and capricious.

2. <u>EPA must protect the most-exposed person from unacceptable levels of cumulative impacts that include HAP exposure from both the source category and other HAPs.</u>

In these rulemakings, EPA is required to assess a community's total exposure to toxic air pollution, in context, to decide how much additional pollution protection is needed from each source category, *i.e.*, the source category's necessary amount of reduction. Because of people's exposure to multiple sources of pollution, EPA must aggregate people's risk when deciding how much additional risk is acceptable for a single source category. EPA also needs to recognize that local communities are not starting with a clean slate when it comes to toxic air emissions. Where there are existing facilities people have already experienced past pollution impacts, often at unacceptable levels.

To protect local communities, particularly children, EPA must adopt the following approach to cumulative impacts from a source category's toxic air emissions combined with other HAP emissions. EPA must account for the history of exposure to toxic air pollution, and for ongoing exposure to multiple sources of toxic air pollution, by applying additional safety factors in its acceptability determination.

EPA must incorporate a Margin of Safety (or uncertainty) Factor to account for a history of exposure or exposure to additional emissions beyond the source category under review.

- Where there is evidence that the source category is contributing HAPs on top of a history of other exposures (i.e., historical emissions from this source exist – such as a history of 3 years or more – or there are multiple sources of exposure beyond this source category), then EPA must incorporate a safety, or uncertainty, factor to adjust the degree to which the source category is contributing to the total risk experienced by exposed individuals. For example, the "acceptable" level of cancer, non-cancer chronic, and acute risk from the source category would be adjusted (divided by the UF) based on the number of other facilities contributing HAP exposure risks. For a source category in an area with up to 10 other HAP-emitting facilities, this UF would equal 10. For areas with more facilities, the UF would be adjusted accordingly, *i.e.*, 11-20 facilities would result in an UF of 20, and more than 20 would result in an UF of 100, so the source category's contribution is no higher than 1/100 of the threshold.
- In addition, for each source category, even if the risk is below the listed contribution or threshold levels, EPA still needs to determine case-by-case whether stronger limits are needed (based on the types of pollutants emitted, and each of the scientific factors relevant to protect public health, especially for children and other vulnerable individuals).

This approach offers a reasonable manner in which EPA can account for and address a source category's contribution, as one of many contributors of toxic air emissions, without ignoring the public health context in which that source's emissions occur. Under this approach, EPA would consider whether a source category's health risk is acceptable not just in isolation, but also based in the context of that source category's contribution to the total risk faced by the most-exposed individual and community. A source in isolation may appear to contribute an "acceptable" level of toxic air pollution. However, if a source is contributing toxic air pollution in a community where high HAP emissions have already occurred and where people have already been exposed at this high level, in significant part due to this source category, the additional increment of pollution becomes unacceptable. These circumstances require EPA to set a stronger limit.

As a scientific and policy matter, where there is exposure to air toxic emissions beyond the individual source category, then the level of total risk that is occurring, including the baseline health risk and the risk from other sources, is greater. Thus, the total risk that is acceptable for the most-exposed person must be less for each source category that person is exposed to. The purpose of the acceptability threshold under section 112 is to try to prevent a person's risk from going above the safe level, by regulating the source category under review. If that number is 100-in-1 million, and a person is exposed to multiple sources, EPA must not assume that it is acceptable to set a standard at 100-in-1 million for the source category under review. Doing so

would be equivalent to ignoring the facts and pretending other health risks are not occurring. It would be equivalent to deciding that it is okay for a person to be exposed at a higher than acceptable level, simply because they live in a community where they are exposed to multiple sources of air pollution. That is the opposite of what EPA is required to do in these rulemakings – protecting the people in local communities who are most exposed and most vulnerable to air pollution.

Although EPA must set a limit in this rulemaking that applies only to the specific source category, EPA has full authority to address the full public health risk faced by the affected individuals and community before deciding what limit to set. Under section 112(f)(2), EPA is required to decide whether to set a standard for a given source category if the cancer risk from that specific source category is 1-in-1 million or more. 42 U.S.C. § 7412(f)(2). If that source category's emissions are between 1-in-1 million and the presumptive limit on acceptability (currently 100-in-1 million), and that source category is contributing risk along with numerous other source categories, then EPA has the authority under section 112(f)(2) to decide both that the total, cumulative risk is unacceptable, and that the specific risk contributed by the source category is unacceptable. This is an important precursor to EPA's ultimate determination of what "ample margin of safety" is needed "to protect public health." EPA also may fully address and set a limit to account for increased community exposure at the final stage of its "ample margin of safety" determination, as it explained in the Coke Ovens Rule.

Here is an example that applies the contribution-based safety approach using EPA's current out-dated safety threshold for cancer. (As also discussed, that threshold is out-dated and must be reduced.) EPA's current safety threshold is 100-in-1 million (maximum individual lifetime risk or MIR). As shown above, if a source category has contributed pollution into any local community for 3 years or more, or if there are multiple source categories of exposure in a community, up to 10 total, then EPA would be required to limit the individual source category's contribution to cancer risk to be no higher than 10-in-1 million (1/10 of the current acceptability limit). If 11-20 source categories, EPA would limit cancer risk from the individual source category to be no more than 5-in-1 million (or 1/20 of the current acceptability limit). If over 20, EPA would apply an additional safety factor, to limit cancer risk from the individual source category to 1-in-1 million (1/100 of the current acceptability limit). To implement this contribution-based approach, EPA could draw on its experience with a similar (though more complex), contribution-based approach in the Clean Air Act's prevention of significant deterioration program, where a source's contribution or increment of new pollution is analyzed to see whether it would cause too much deterioration of air quality based on national ambient air quality standards.

EPA recently released the Plan EJ 2014 to outline ways the agency intends to address environmental justice impacts, and it includes the development of scientific tools on cumulative impacts. EPA may use this and other similar rulemakings to inform the implementation of Plan EJ 2014. However, EPA must not wait to employ the best available science now, in this rulemaking, to protect local communities that face disproportionate impacts from these and other sources of toxic air emissions.

Finally, as further discussed below, EPA must also reduce the presumed acceptable level of risk to be below its out-dated limit of 100-in-1 million for cancer and below the reference value of 1 for other types of health risk. The fact that so many local communities are exposed to higher levels of risk from the baseline and multiple source exposure shows the need to reduce EPA's presumptive limit of acceptable risk. EPA *knows* there is a greater risk than it has calculated. This gives EPA reason to find a *lower* cancer, chronic non-cancer, and acute health threshold to be "acceptable." The next section also fully incorporates the comment raised here as additional reason for EPA to reduce the presumed acceptable level of risk.

3. EPA's determination of what emissions reduction is needed to reduce risks from oil and gas emissions to an acceptable level is arbitrary and capricious.

i. EPA fails to justify relying on the out-dated presumption of 100-in-1 million as the benchmark for cancer risk acceptability, rather than ensuring a greater reduction of cancer risk.

a. EPA has failed to provide a reasoned explanation for why the cancer risk from this sector is acceptable.

Thousands of people are exposed to a lifetime cancer risk of 1-in-1 million or more based on inhalation alone, because they live near oil and gas facilities, according to EPA's analysis. 76 Fed. Reg. at 52,777-78 & tbl. 2 (ONG MIR is 100 to 400-in-million; 160,000 people face lifetime cancer risk of 1-in-1 million or more); *id.* at 52,781 & tbl. 5 (for NGTS, MIR is 30- to 90-in-1 million, with 2,500 people facing a cancer risk of 1-in-1 million or more). Facility-wide cancer risk is also significant and 140 oil and natural gas production facilities and 74 natural gas transmission and storage facilities create a lifetime cancer risk (MIR) of 1-in-1 million or more. *Id.* at 52,778 tbl. 3 (maximum is 100-in-1 million because EPA is not basing this on allowable emissions, and at 85% of facilities with cancer risk of 1-in-1 million or more, source category is contributing at least 50% of the facility-wide risk); *id.* at 52,781 tbl. 6 (NGTS contributing significantly to facility-wide risk, and MIR is 200-in-1 million).

Section 112(f)(2)(A) requires the Administrator to make an initial determination of what is "safe" or "acceptable," without consideration of costs. *NRDC v. EPA*, 824 F.2d 1146, 1165 (D.C. Cir. 1987) (quoting 40 Fed. Reg. 59,532, 59,534 (1975)). As part of this, EPA must decide whether the risk from a source category is "acceptable in the world in which we live," *id.*, which EPA has recognized requires an understanding of the context of risk. 53 Fed. Reg. 28,496 (1988). In this rulemaking, EPA must consider and address the level of risk that is acceptable today, for this particular source category. It can no longer presume that the level of risk that is acceptable has remained the same since 1988. The risk that was acceptable in the world of the 1980s is no longer acceptable in today's world.

Yet, EPA does not propose to reduce cancer risk far enough, to reach a truly safe or acceptable level, because it is basing its acceptability determination primarily on the out-dated presumptive limit of what level of cancer risk is acceptable. EPA does not consider or address

how much risk may need to be reduced to be "acceptable" today for these source categories, beyond simply relying on the 1989 Benzene presumption.

For Oil and Natural Gas Production, EPA appropriately finds that the cancer risk from HAP emissions under the existing MACT (400-in-1 million based on allowable emissions) is unacceptable, and that additional emission reductions are needed to reduce risk below the level of the current MACT standard for these pollutants. 76 Fed. Reg. at 52,779-80. Commenters support that preliminary conclusion. However, EPA reached that conclusion "in large part, because the MIR is 400-in-1 million due to MACT-allowable emissions, which greatly exceeds the 'presumptive limit on maximum individual lifetime risk of approximately 1-in-10 thousand [100-in-1 million] recognized in the Benzene NESHAP.'" *Id.* at 52,780 (citation omitted). As a result, EPA merely aims to reduce cancer risk below 100-in-1 million by removing the glycol dehydrator alternative compliance option (0.9 Mg/yr), but does not even consider further reducing this cancer risk. Commenters support that proposed rule change as a step forward but believe it does not go far enough. EPA has not adequately explained why it is not requiring additional emission reductions that would further reduce cancer risk. This proposed change would reduce the MIR to 40-in-1 million which EPA says "we find acceptable in light of all the other factors considered." *Id.* at 52,780. EPA does not discuss any factors in reaching this determination other than the presumptive limit, except to note that there is also high acute health risk which should weigh *against* not in *favor* of acceptability. *Id.* So, EPA's decision that the health risk is acceptable, with the glycol dehydrator compliance option alternative removed, appears to be based primarily on the presumptive limit.

For Natural Gas Transmission and Storage, EPA similarly also determined that no additional risk reduction was needed primarily because the cancer risk was "approaching, but still less than 100-in-1 million risk." *Id.* at 52,783. EPA also notes that "a number of other factors indicate relatively low risk concern," with an "e.g.," parenthetical list, but its analysis shows that it is primarily relying on the presumptive limit. *Id.*

Thus, for each source category, EPA based its determination of what risk and emission reductions were needed to reach an "acceptable" level of risk based on an out-dated presumption about what level of cancer risk is acceptable. In each instance, EPA's reference to 100-in-1 million refers to "the presumptive limit of acceptability" that EPA created in the 1989 Benzene Rule. 76 Fed. Reg. at 52,779, 52,783; *see id.* at 52,742 (citing Benzene Rule, 54 Fed. Reg. at 38,044 (Sept. 14, 1989)).

It is not reasonable for EPA to continue to presume that any lifetime cancer risk lower than 100-in-1 million is acceptable today. EPA does not explain why any risk below the outdated Benzene Rule level remains acceptable today. EPA set its presumptive threshold of safety or acceptability in the 1989 Benzene Rule at 100-in-1 million lifetime cancer risk based on 1980s information and values. It is arbitrary and capricious for EPA to continue to rely on that presumption as a basis for its determination that the risk due to emissions from this source category is "acceptable." Significant reasons exist for EPA to set a lower presumptive level of risk acceptability, including the need to better protect children, the grave health risks at stake for local communities, and the need for environmental justice. Science, pollution controls, and

societal values and standards of fairness – including a new commitment to environmental justice – have all advanced dramatically in recent years and since the 1980s.

Instead of continuing to assume that the cancer risk below 100-in-1 million is acceptable for the oil and gas sector, EPA must consider significant new developments that make the level of cancer risk from this sector unacceptable.

b. EPA must update and reduce its presumption that 100-in-1 million lifetime cancer risk is acceptable based on new circumstances and evolving values since the 1980s.

EPA's presumption that any lifetime cancer risk below 100-in-1 million would be acceptable is based on an outdated, decades-old analysis from the Benzene rulemaking. To address the court's direction to consider context and what is "acceptable in the world in which we live," at the time of the Benzene rule, EPA performed a *Survey of Societal Risk* (July 1988) to consider various types of health risks at that time. 53 Fed. Reg. at 28,512-13. It relied on this document to set a presumptive limit on maximum individual lifetime risk (MIR) of approximately 1-in-10 thousand, or 100-in-1 million people, as a benchmark (but not a "rigid line"). 54 Fed. Reg. at 38,045. EPA thus bases its current presumption on a 1988 document that is out-dated, that can no longer be considered valid science, and that is not contained in this rulemaking record, and therefore has not been subject to public notice and comment in this rulemaking, in violation of 42 U.S.C. § 7607(d)(3). Commenters requested the 1988 document cited from the EPA Docket Library and have attached the document from EPA to these comments.[120] The document appears to be a virtually unreadable summary of outdated information that has little or no relevance to today's circumstances. The document is essentially devoid of analysis, and both its methodology and key findings are unclear. EPA can have no rational basis for continuing to rely on this document today as the basis for its presumption.

In establishing this presumptive benchmark, EPA omitted several important aspects of risk. For example, it appears that the agency assumed that the maximum exposed individual was a person not exposed to any other hazardous air pollution. It did not consider cumulative risk, or properly assess multipathway risk, as discussed above. To choose the 1988 benchmark, EPA looked at an assortment of different risks for comparison, such as driving a car and breathing air, and found that "the presumptive level established for MIR [maximum individual risk of cancer] of approximately 1 in 10 thousand is *within the range for individual risk in the survey*, and provides health protection *at a level lower than many other risks common 'in the world in which we live.*'" 54 Fed. Reg. at 38,046 (emphasis added). Even in setting this presumption, EPA recognized that it could not easily compare the risk from hazardous air pollution with the risk from other activities studied because of numerous differences. Specifically, EPA stated that the consideration of the acceptability of a specific level of risk depends on factors including:

> [1] [t]he certainty and severity of the risk; [2] the reversibility of the health effect; [3] the knowledge or familiarity of the risk; [4]

[120] The study is listed in the Benzene Rule as Benzene Rule Docket No. OAQPS 79-3, Part I, Docket Item X-B-1, EPA Air Docket (attached in Appendix).

> whether the risk is voluntarily accepted or involuntarily imposed; [5] whether individuals are compensated for their exposure to the risk; [6] the advantages of the activity; and [7] the risks and advantages for any alternatives.

53 Fed. Reg. at 28,513. Although this is not a comprehensive list of factors that EPA must consider, significant new information has been discovered and major circumstances have changed that each should affect how EPA applies these factors to a source category in a rulemaking today, as further discussed below.

During the more than two decades since EPA established that presumption, dramatic scientific and societal advances have occurred that EPA must take into account in its risk analysis. Since EPA set the presumptive acceptability limit for cancer, each of the following milestones occurred, among others:

1990 Clean Air Act Amendments required technology-based control for hazardous air pollutants and 8-year review of residual health risk to ensure protection of communities.

1993 National Research Council published *Pesticides in the Diets of Infants and Children*, finding that children are not little adults, and have greater exposures and susceptibility.

1994 President Clinton signed Executive Order 12898 on Environmental Justice.

1996 Food Quality Protection Act passed unanimously with a 10-Fold Children's Safety Factor.

Safe Drinking Water Act amendments required attention to susceptibility of children.

EPA announced a new National Agenda to Protect Children's Health.

1997 President Clinton signed the Children's Environmental Health Executive Order 13045.

2000 EPA first published *America's Children and the Environment.*

2008 National Academy of Science published *Science and Decisions: Advancing Risk Assessment*.

2009 Administrator Jackson declared environmental justice and children's health priorities.

2011 Administrator Jackson announced Plan EJ 2014 including rulemaking and science goals.

Even in the face of all of these developments, EPA still applies the acceptability presumption developed from the 1988 document in this proposal to determine that the level of risk for this source category is "acceptable." 76 Fed. Reg. at 29,035, 29,055. The ongoing use

of the 1988-89 presumption, that any risk below 100-in-1 million is acceptable, today, in 2011, is arbitrary and capricious for the following reasons.

First, the Clean Air Act requires an up-to-date, contemporary assessment. Relying on an out-dated presumption conflicts with the very purpose of the residual risk analysis. Section 112(f)(2) explicitly directs EPA to assess and address risk remaining to public health and the environment 8 years after the MACT standard is in place. Doing this based on a stale concept of what level of risk was "acceptable" years ago contravenes the requirement for a fresh, current determination of whether a stronger standard is "required" today. By requiring the 8-year review, Congress inherently directed EPA to act based on and to take account of new circumstances that EPA had not considered in promulgating the initial standard. If EPA were allowed to go back in time to a single snapshot view of what was "acceptable" from 1988, forever, this would undermine the Act's goal of ensuring an evolving, improved approach to pollution control through the review and revision process.

Second, even within the framework EPA initially created, there is significant new information on the factors EPA discussed in its old rulemaking that must influence its analysis of what level of risk is currently "acceptable" today. *See* 54 Fed. Reg. at 38,046. EPA cannot ignore the dramatically changed circumstances, which require EPA to revisit its out-dated presumption.

Third, scientific research has evolved dramatically since EPA set that presumption. Partly as a result of federal investment in research to improve health, there has been a vast increase in understanding of the relationship between the environment and public health in the years since the 1990 Clean Air Act amendments. The interpretation of what is acceptable and what is protective must be seen in the context of this expansion of scientific knowledge and understanding. In particular, there is a much greater appreciation for the importance of assessing environmental hazards and exposures as they are experienced by individuals who live in communities. Here are some examples (citing the list of sources included in the Appendix).

1. The Risk Assessment Guidance for Superfund provides for consideration of the net burden of exposures to Superfund chemicals. It is not limited to consideration of one chemical at a time. These guidelines have been implemented for more than a decade.[121]

2. EPA has recognized that it needs to be able to consider mixtures of chemical agents when looking at public health concerns because no one is exposed only to single agents. This has given rise to research about how to better understand and model dose-response relationships for chemical mixtures and adoption of related guidelines by EPA.[122]

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[121] EPA, *Ofc. of Solid Waste and Emergency Response, Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (Part A), Interim Final* (Oct. 1989), http://www.epa.gov/oswer/riskassessment/ragsa/index.htm (attached in Appendix).

122 Linda K. Teuschler and Richard C. Hertzberg, *Current and future risk assessment guidelines, policy, and methods development for chemical mixtures,* Toxicology, Vol. 105, Issues 2-3, at 137-44 (Dec. 28, 1995) (attached in Appendix).

3. EPA, the National Academy of Sciences (including in its 2008 report on Science and Decisions, attached), and various Science Advisory Boards and EPA Committees have recognized the need to address cumulative impacts and community-based risks to public health. EPA itself has produced a Framework for Cumulative Risk Assessment.[123] EPA has also begun evaluating risk from a community health perspective.[124]

4. Scientific breakthroughs have occurred that demonstrate that "children are not little adults" and that greater attention is needed to address the greater health risks created by early exposure to toxic pollution, as discussed in Part II.A.5.[125] Consequently, the EPA's Children's Health Protection Advisory Committee has recommended addressing the developmental origins of adult disease that come from childhood exposure to air pollution and other environmental contaminants.[126] Science now shows that "[e]nvironmental contaminants can affect children quite differently than adults, both because children may be more highly exposed to contaminants and because they may be more vulnerable to the toxic effects of contaminants."[127] Similarly, the Committee has recommended that EPA incorporate a more robust analysis of childhood and prenatal

[123] EPA, *Framework for Cumulative Risk Assessment* 1-3, EPA/630/P-02/001F (May 2003) (attached in Appendix); National Research Council of the National Academies, *Committee on Improving Risk Analysis Approaches Used by the EPA, Science and Decisions: Advancing Risk Assessment* (2008), (attached in Appendix); National Research Council, *Phthalates and Cumulative Risk Assessment: The Task Ahead, Executive Summary* (2008) (attached in Appendix).

[124] EPA, National Center for Environmental Research, Office of Research and Development, *Proceedings of the EPA Workshop on Research Needs for Community-Based Risk Assessment.* Research Triangle Park (2007), www.epa.gov/ncerqa/cbra/presentations/11_18_07/proceedings.pdf (attached in Appendix); EPA, National Center for Environmental Assessment, Office of Research and Development, *Concepts, Methods, and Data Sources for Cumulative Risk Assessment of Multiple Chemicals, Exposures, and Effects: A Resource Document* (Aug. 2007), http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=190187 (attached in Appendix).

[125] National Research Council, *Pesticides in the Diets of Infants and Children* (1993) (attached in Appendix); EPA, America's Children and the Env't (2d ed. 2003), available at http://www.epa.gov/opeedweb/children/publications/index.html (attached in Appendix); see also SAB May 2010 at 34 n.13 (citing EPA, 2005. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003; Barton HA, Cogliano J, Flowers L, Valcovic L, Setzer RW, Woodruff TJ. 2005. *Assessing Susceptibility from Early-Life Exposure to Carcinogens.* Environ. Health Perspectives 113:1125-1133; Hattis D, Goble R, Russ A, Chu M, Ericson J. 2004. *Age-related differences in susceptibility to carcinogenesis: a quantitative analysis of empirical animal bioassay data.* Environ Health Perspectives 112:1152-1158 (attached in Appendix).

[126] *Report of the Task Group of the Children's Health Protection Advisory Comm. on America's Children & the Env't*, 3d Ed. (2010), http://yosemite.epa.gov/ochp/ochpweb.nsf/content/ACETask.htm/$file/ACE%20Task%20Group%20Report.pdf (attached in Appendix).

127 Id. at 7.

exposure to environmental contaminants into its risk assessment method.[128] As a result of these developments, California has developed child-specific reference doses to address the greater risks affecting children.[129] At the federal level, in 1997 the President issued an Executive Order on the need to address risks to children.[130] In 2006, EPA issued additional guidance on protecting children from environmental health risks as part of the rulemaking process.[131] Among other things, this Guide, at 8, recognizes the problem of disproportionate risk to children either because they may be more sensitive to pollution or because they may be exposed at a rate much higher than the level adults are because of their developmental stage. This Guide also recognized the need "to think in terms of the broad range of early life, pre-natal and post-natal, environmental exposures that may affect the incidence of disease or alter development."[132] In view of this new science and policy commitment to address it, EPA cannot continue relying on a presumption developed years before these developments that therefore fails to account for the greater risk from early exposure.

5. Today there is also much greater scientific understanding of the toxic body burden of healthy adults. In the most recent 2010 national biomonitoring report, the Center for Disease Control stated that it had found 212 chemicals present in people's bodies, including 75 chemicals *never before found* in human beings.[133] This new information has led to changes in behavior and calls for reform ranging from demands for greater protection from toxics in kitchen products, water, and baby bottles, to changes in eating habits and increased demand in the market to avoid contaminants like mercury in fish and pesticides in food.

Fourth, EPA's commitment to environmental justice must inform its consideration of what level of risk is "acceptable." During the last two decades, American values have evolved to consider the issue of environmental justice and to acknowledge and address disproportionate environmental health impacts. It is a shameful, longstanding reality that many more toxic polluting facilities have been sited in or near communities and urban neighborhoods that have

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[128] Letter from Pamela Shubat, CHPAC to Lisa Jackson Re: Upcoming EPA staff discussions of the NRC report Science and Decisions: Advancing Risk Assessment 1 (Oct. 21, 2010) ("CHPAC recommends that EPA staff scientists participating in the upcoming discussions bring the concern of early life stage exposure and sensitivity to the conversations that will take place concerning optimizing risk assessment practice."), http://yosemite.epa.gov/ochp/ochpweb.nsf/content/CHPAC_NRC_Report.htm (attached in Appendix).

[129] SAB May 2010 at 6, 34; see http://www.oehha.ca.gov/public_info/public/kids/chrds.html (describing process and all child-specific reference doses developed to date).

[130] E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks, 62 Fed. Reg. 19,885 (Apr. 21, 1997).

[131] EPA, *Guide to Considering Children's Health When Developing EPA Actions: Implementing Executive Order 13045 and EPA's Policy on Evaluating Health Risks to Children* (2006), http://yosemite.epa.gov/ochp/ochpweb.nsf/content/ADPguide.htm/$File/EPA_ADP_Guide_508.pdf (attached in Appendix).

[132] *Id.* at 8.

[133] See, e.g., CDC, *Fourth National Report on Human Exposure to Environmental Chemicals* (July 2009) (providing data on National Health and Nutrition Examination Survey), http://www.cdc.gov/exposurereport (attached in Appendix).

higher minority and lower-income populations. As a result, residents of these communities have higher rates of health problems that are linked to greater rates of pollution, including toxic air emissions. A significant body of scientific research demonstrates this and discusses the need to address cumulative risk, as discussed in Part II.A.2.ix.[134] As this information grew over the years, in 1994, the President issued an Environmental Justice Executive Order to direct all federal agencies to take environmental justice into consideration.[135]

Administrator Jackson has established an important focus on environmental justice as a key component of public health, to renew the 1994 commitment. In new 2010 Guidance, EPA defined "environmental justice" as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[136] As explained by this Guidance, "fair treatment" means that "no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental, and commercial operations or programs and policies." In the new EJ Guidance (at 1), the Administrator also states that "[a]chieving environmental justice (EJ) is an Agency priority and should be factored into every decision," and discusses EPA's "commitment to ensuring that all Americans, regardless of age, race, economic status, or ethnicity, have access to clean water, clean air, and healthy communities." These important concerns must factor into the question of what level of risk is "acceptable" today. EPA is convening a new Scientific Advisory Board to address cumulative impacts and environmental justice and this new entity's work must factor into EPA's assessment of risk.[137] EPA has also recently released Plan EJ 2014, including EPA's intention to apply environmental justice in rulemaking. It must apply that plan here.

Fifth, American values and policies have evolved to tolerate less health risk from industrial pollution. Rather than accepting the levels of risks for other types of environmental and safety concerns considered in the 1988 *Survey* that existed at that time, civil society and federal and state governments have worked hard to decrease numerous risks discussed in that survey. Indeed, Congress amended the Clean Air Act in 1990 – after the 1988 study – in part to *reduce* the deaths and human health risks from air pollution, presumably because it did not consider the risk of death from air pollution at that time to be acceptable. As a result, EPA's

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[134] Cal. EPA, *Cumulative Impacts: Building a Scientific Foundation* (Dec. 31, 2010), http://oehha.ca.gov/ej/pdf/CIReport123110.pdf (citing numerous research studies showing that exposure to pollution-emitting facilities, hazardous waste facilities and disposal, of toxic releases, non-attainment air areas, high motor vehicle air pollution areas, and other types of pollution is more likely to be concentrated in communities with higher minority and low-income populations) (attached in Appendix).

[135] Exec.Order 12898, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*, 59 Fed. Reg. 7629 (Feb. 11, 1994).

[136] *EPA's Action Development Process: Interim Guidance on Considering Environmental Justice During the Development of an Action* 3 (July 2010) ("EPA EJ Guidance") (attached in Appendix).

[137] EPA, *Symposium on the Science of Disproportionate Environmental Health Impacts*, March 2010. Washington DC, http://www.epa.gov/compliance/ej/multimedia/albums/epa/disproportionate-impacts-symposium.html; Stephen H. Linder and Ken Sexton, *The Importance of Rigorous Analytical Strategies for Elucidating Cumulative Risk Burdens and Disproportionate Effects* (Abstract for paper presented at the Symposium on the Science of Disproportionate Impacts held by EPA) March 2010 (attached in Appendix).

own research has found that the very controls that Congress put into place with the 1990 Clean Air Act Amendments are leading to a "substantial" reduction in the level of premature mortality that the 1988 survey documented.[138] These reductions in public health risks occurred, in part, because of the public's concern that the levels of risk from air pollution present around the time of the 1988 *Survey* were not acceptable.[139] As pollution-control technology and industrial practices have evolved to be able to better protect human health, their evolution has also changed the "world in which we live" and with it, the public's views on what level of risk may be acceptable (or not).

Over 20 years after adopting the presumptive limit in the Benzene Rule, EPA has full authority and significant reason to reduce this limit. Indeed, the statutory goal is to limit lifetime cancer risk to be no higher than 1-in-1 million. 42 U.S.C. § 7412(f)(2). EPA's current threshold is 100 times greater than that. Commenters contend that a lifetime cancer risk below the level of 100-in-1 million can no longer be presumed "safe" or "acceptable" in "the world in which we live" due to the dramatic evolution of science, technology, and social values that have occurred in recent decades. Instead, due to these changed circumstances, EPA must reassess whether a level of 1-in-1 million or a level closer to this level provided in section 112(f) itself, should be adopted as a more stringent, presumptive upper limit for what is considered "acceptable."

In view of all of the scientific and technological developments and the development and expanded understanding of social values on environmental justice and environmental health since EPA established the Benzene presumption, EPA cannot rationally justify continuing to assume that any lifetime cancer risk below 100-in-1 million is acceptable for Americans today (even assuming it once was). This is an especially baseless assumption for environmental exposure that is completely out of a person's control and is most likely to affect people who have the least ability to avoid exposure to pollution due to socioeconomic factors. Instead EPA must make its acceptability determination "in the world in which we live" today, both by addressing evolving science and performing an updated assessment of contemporary values. Further, EPA must take its policy inquiry to the local level, and assess what a community living next to a facility in this source category would consider to be "acceptable," which is likely to be a level below 100-in-1 million.

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[138] See, e.g., EPA, Ofc. of Air & Radiation, *The Benefits and Costs of the Clean Air Act from 1990 to 2020, Final Report* (Mar. 2011) at 5-25 tbl. 5-6 (finding that, from regulatory reductions in PM and ozone alone, by 2020 more than 230,000 lives will be saved from premature mortality, and that as of 2010, 164,000 lives were saved) (attached in Appendix).

[139] Another example that EPA considered in the 1988 Survey was risk from car-crash mortality. This seems inappropriate as a comparison with environmental pollution, because of the lack of personal control in the exposure to air pollution, and should not be used as a comparison. Yet, even for this type of risk, during the last 20 years the federal government has taken action to try to reduce risks and strengthen protections from car accidents, including changes in legal and regulatory requirements for air bags, enforcement of seat belts, booster seats, motorcycle helmets, drunk driving standards, and teen licensing requirements, and also driving numerous safety-focused automotive innovations, such as electronic stability control, side impact, and reflective tape for better visibility at night. *Advocates for Highway and Auto Safety, Advocacy for Safe Cars, Safe Driving and Safe Roads: 20 Years of Saving Lives and Reducing Costs from Traffic Crashes* (May 2010), http://www.saferoads.org/files/file/PressKit052610(1).pdf (report starts at p. 17) (attached in Appendix).

c. EPA has both full authority and a responsibility to update its approach and reduce the presumptive level of what cancer risk is acceptable under section 112(f)(2).

EPA must not evade its responsibility to strive to further reduce lifetime cancer risk below 100-in-1 million by assuming everything it did in the Benzene Rule will remain *per se* lawful for all time, all persons and communities, and all source categories.

Although the HON decision found that EPA was not required to achieve a lifetime cancer risk of 1-in-1 million, that decision recognizes EPA has full authority to protect public health by reducing risk to a lower level. That decision also does not authorize EPA to continue presuming forever that *any* lifetime cancer risk between 1-in-1 million and 100-in-1 million is "acceptable." The HON petitioners argued that subsection 112(f)(2)(A) required EPA, as a matter of law, to revise standards to reduce lifetime excess cancer risk to 1-in-1 million. *NRDC v. EPA*, 529 F.3d 1077, 1081 (D.C. Cir. 2008). The court held that this was not then required under the statute, finding that "the *Benzene* standard established a maximum excess risk of 100-in-one million, while adopting the one-in-one million standard as an aspirational goal." *Id.* at 1082. However, the court did not decide that 100-in-1 million would remain a presumptively acceptable level of risk, as time went on, for years to come, even as circumstances changed. It did not hold that EPA could freeze its analysis of what risk is acceptable at the time of the Benzene or HON Rule or that EPA would never again need to consider the factual question, based on a contemporary record, of what level of risk is "acceptable." Instead, EPA must aspire to reduce risk below 100-in-1 million, in particular to protect the maximum number of people from a lifetime cancer risk of 1-in-1 million or more, as the court discussed. EPA's decision to ignore the substantial new information and changed circumstances and continue to presume that any risk level below 100-in-1 million is still safe is arbitrary and capricious in view of the statutory "aspirational goal" of 1-in-1 million.

Moreover, the references to the Benzene Rule in section 112(f) do not give EPA blanket authorization to avoid updating the Benzene Rule approach ever. *See* 42 U.S.C. § 7412(f)(2)(B) (stating that 112 provision shall not "be construed as affecting, or applying to" EPA's interpretation of the statute as set forth in the Benzene Rule, 54 Fed. Reg. 38,044 (Sept. 14, 1989)); *id.* § 7412(f)(2)(A) (referring to the Benzene Rule in regard to the ample margin of safety). The Clean Air Act Amendments set a protective *floor* for EPA's residual risk approach, but in no way prevent EPA from *strengthening* its approach. The legislative history makes clear that the Amendments had a core purpose of strengthening EPA's regulation of hazardous air pollutants, and requiring it to do more than it had been doing. As of 1990, EPA had virtually failed to complete important duties under the prior version of the law. S. REP. NO. 101-228, at 4 (1989), *as reprinted in* 1990 U.S.C.C.A.N. 3385, 3389 (Senate Report) ("Very little has been done since the passage of the 1970 [CAA] to identify and control hazardous air pollutants."). Twenty years after enactment of the Act, EPA had listed only eight HAPs, and had set emission standards for only seven of them. *Id*. As the legislative history shows, Congress intended to ensure that EPA *at minimum* did what it had been doing, and achieve much greater protection for public health than it had done before 1990. As the D.C. Circuit has explained, "[i]n 1990, concerned about the slow pace of EPA's regulation of HAPs, Congress altered section 112 by eliminating much of EPA's discretion in the process." *Sierra Club v. EPA*, 551 F.3d 1019, 1028

(2008) (quoting *New Jersey v. EPA*, 517 F.3d 574, 578 (D.C. Cir. 2008)). Any reading of section 112(f)(2)(B) as prohibiting EPA from strengthening its residual risk approach after the Benzene Rule, or authorizing its refusal to do so ever, even where circumstances show the need to do so, would be inconsistent with the purpose of the 1990 Clean Air Act amendments.

If EPA intends to follow the HON decision, then it should recognize that a lifetime cancer risk below 1-in-1 million is the statutory "aspirational goal" to which EPA is required to strive. 42 U.S.C. § 7412(f)(2). For oil and gas, EPA proposes to allow cancer risk levels substantially above 1-in-1 million. EPA has failed to explain, beyond its reference to the Benzene Rule, why EPA is not requiring any further reduction of cancer risk for these source categories currently under review. EPA must require further emission reductions in order to ensure risk is reduced below 1-in-1 million and to ensure an "acceptable" level of risk "in the world in which we live" for the maximum exposed individuals in affected communities. A more protective policy determination on acceptable risk is especially needed because EPA's risk assessment underestimates risk, for reasons explained earlier in these comments.

ii. After finding a level of acute risk that is 5 and 9 times its threshold, EPA has failed to justify not requiring the reduction of acute health risk below 1.

EPA fails to provide any reasoned explanation for not requiring a greater reduction in acute health risk when the risk it has calculated (even with all of the flaws outlined above), is substantially higher than the hazard quotient ("HQ") threshold of 1. EPA has stated that "a HQ less than or equal to one indicates that adverse noncancer effects are not likely to occur," suggesting that EPA assumes exposure below that threshold is safe.[140]

Specifically, for Oil and Natural Gas Production, EPA found that the maximum individual acute health risk is a hazard quotient ("HQ") of 9, based on benzene, and 3 based on glycol ethers.[141] For Natural Gas Transmission and Storage, EPA found that the maximum acute health risk was 5 based on benzene.[142] EPA did not consider the combined acute health risk for multiple pollutants, as it did for both cancer and chronic non-cancer health risk. Instead, it only considered the maximum hazard quotient for acute risk for each individual pollutant.[143] EPA also did not assess the acute health risk based on allowable emissions. Instead, it assessed this risk based on EPA's estimated "actual" emissions, specifically, by assuming that "the maximum one-hour emission rate from any source is ten times the average annual hourly emission rate for that

[140] U.S. EPA, AIR TOXICS RISK ASSESSMENT REFERENCE LIBRARY VOL. 2, FACILITY-SPECIFIC ASSESSMENT, EPA-453-K-04-001B (2004).

[141] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 33, 35 tbl. 4.2-2.

[142] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 27, 29 tbl. 3.2-2.

[143] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 23.

source."[144] EPA did not provide information on facility-wide acute health risk. 76 Fed. Reg. at 52,778, 52,781. EPA fails adequately to explain how such high acute health risk numbers could be safe or acceptable. The numbers at issue here are *nine times* and *five times* the hazard quotient of 1.

For Oil and Natural Gas Production, EPA states that "[a]lthough the REL (which indicates the level below which adverse effects are not anticipated) is exceeded in this case, we believe the potential for acute effects is low for several reasons." 76 Fed. Reg. at 52,779. EPA's reasons are: (1) this is a "worst-case" scenario based on peak emission rates and dispersion conditions; (2) the benzene REL is based on a 6-hour instead of 1-hour exposure, and is thus more protective; (3) the highest estimated 1-hour exposure is less than 10 percent of the AEGL-1 value; and (4) there are "generally sparse populations near these facilities," that "make it less likely that a person would be near the plant to be exposed." *Id.*

For Natural Gas Transmission and Storage, EPA's acceptability determination barely addresses the high acute health risk (HQ of 5). 76 Fed. Reg. at 52,783. All EPA says is that "[w]e conclude that acute noncancer health impacts are unlikely for reasons similar to those described [for Oil and Natural Gas Production]." *Id.*

Each reason EPA offers for finding these levels of acute health risk acceptable is unsupported. First, as already discussed above, EPA's acute health risk number is not actually the "worst-case" scenario. EPA is only using a factor of 10 and is not adequately accounting for emissions from malfunctions or violations. Second, benzene is such a harmful pollutant that a more precautionary approach is appropriate to protect people from this type of exposure. The numerous problems outlined in EPA's analysis show that its analysis is not actually sufficiently protective.

Third, EPA cannot justify relying at all on the Acute Exposure Guideline Levels ("AEGL"). The AEGL values (and Emergency Response Planning Guidelines ("ERPG") values, which EPA also should not use) were created for emergency exposure scenarios. Levels defined for "once-in-a-lifetime, short-term exposures" and "emergency" chemical releases or accidents, 76 Fed. Reg. at 52,772, are not appropriate tools to measure long-term, lifetime acute exposure risk. As the Science Advisory Board has explained:

> The incorporation of the available California Reference Exposure Levels (RELs) for the assessment of acute effects is a conservative and acceptable approach to characterize acute risks. . . . The Panel has some concern with the use of the Acute Exposure Guidelines Limits (AEGLs) and Emergency Response Planning Guidelines (ERPGs) . . . . AEGL-2 and ERPG-2 values should *never* be used

[144] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 7.

> in residual risk assessments because they represent levels that if exceeded could cause serious or irreversible health effects.[145]

The AEGL and ERPG numbers would be expected to underestimate risk. Using these numbers is likely to discount or cloak the level of risk to the maximum exposed individual. These values are therefore not appropriate for use in the section 112(f)(2) residual risk analysis. They simply do not provide sufficient protection for health.

Fourth and finally, at the acceptability determination stage, EPA must not engage in triage, where it finds a high health risk but discounts that risk because it considers only a small number of people to be affected. EPA states that impacts are "unlikely," but its own analysis concludes that the most-exposed individuals may experience a high acute health risk from oil and gas emissions. There are people living within 2 miles of the highest risk Oil and Natural Gas Production facilities. 76 Fed. Reg. at 52,780 (EPA counts 30 people). If those people are the most-exposed individuals and they would face an unacceptable level of health risk, EPA has a legal duty to require pollution reductions that would protect them. Further, EPA has given no justification for limiting its acute health risk analysis to a 2-mile area. Expanding the analysis to a larger radius will also better protect the many thousands of other people who may face slightly lower acute health risks, but also deserve protection from the emissions of these source categories.

For acute health risk, EPA uses the same presumption challenged above for chronic health risk, that a hazard quotient below 1 indicates no potential for acute risk.[146] EPA must reduce that threshold below 1 for similar reasons already explained below, and Commenters incorporate that comment to challenge EPA's approach on the same grounds for acute health risk.

Because EPA has not summed the acute health risk as it did for chronic non-cancer health risk, *i.e.*, it did not create a "TOSHI" for acute health risk, EPA's analysis is even more problematic. EPA has not even added up the acute health risk for the same organ systems from this source category. It also has failed to consider potential risks from outside of this source category. EPA's analysis of acute health risk is therefore arbitrary and unsupported.

EPA notes various occupational short-term exposure limits ("STEL") for benzene and seeks comment on their use in interpreting acute health risk. 76 Fed. Reg. at 52,773. Occupational exposure levels can help demonstrate additional reason why the AEGL is not protective enough, as EPA notes, and give additional reason not to rely on the AEGL or ERPG values. However, EPA must also not use the occupational levels in place of the reference exposure level (REL) values created for the purpose of community resident exposure near a facility. The occupational levels are not protective enough for people living near a facility and

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[145] Sci. Adv. Bd., Review of EPA's draft entitled, "Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA's Science Advisory Board with Case Studies – MACT I Petroleum Refining Sources and Portland Cement Manufacturing," EPA-SAB-10-007 at 6 (May 07, 2010)) ("SAB May 2010") (attached in Appendix) (emphasis added).

[146] Draft Residual Risk Assessment, at 23.

exposed throughout their lifetime. Commenters also note that EPA cites an out-dated standard for benzene for the Occupational Safety and Health Administration ("OSHA"). Currently, the maximum exposure level for workers over an 8-hour period is 1 ppm, and over a 15-minute period is 5 ppm (not 16 as EPA states in the proposed rule). *See* 29 C.F.R. § 1910.1028(c), promulgated at 76 Fed. Reg. 33,608 (June 8, 2011).

iii. EPA must recognize that the chronic non-cancer health risk found is unacceptable and reduce emissions accordingly.

EPA must also find chronic non-cancer risk to be unacceptable from both source categories.

In its acceptability determination, EPA appears to ignore the calculated amounts of chronic non-cancer risk specific to each source category. 76 Fed. Reg. at 52,780 (ONG); *id.* At 52,783 (NGTS). To assess chronic non-cancer risk, EPA created an aggregate risk number, that combined health risk to a single target organ or organ system from multiple HAPs. This combined number is known as the target organ-specific hazard index or "TOSHI." For Oil and Natural Gas Production, EPA found that the chronic non-cancer health risk indicator or TOSHI is 0.7 based on allowable emissions and that the greatest risk is to the respiratory system. 76 Fed. Reg. at 52,777-78 tbl. 2 & n.4. For Natural Gas Transmission and Storage, EPA found a TOSHI of 0.8 based on allowable emissions and that the immune system has the highest TOSHI. 76 Fed. Reg. at 52,781 tbl. 5 & n.4. Facility-wide, EPA found that the maximum TOSHI is 9 for Oil and Natural Gas Production, and is 80 for Natural Gas Transmission and Storage. 76 Fed. Reg. at 52,778 tbl. 3, 52,781 tbl. 6. EPA has failed to provide any explanation for ignoring the chronic non-cancer risk in its acceptability determination.

EPA appears not to have addressed these chronic non-cancer risk levels in making its acceptability determination apparently because the TOSHI is not "greater than 1," which is its presumption of a safe threshold. EPA must not use 1 as the presumptive level of acceptability for chronic non-cancer risk. EPA has failed to justify why chronic non-cancer risk below 1 is necessarily safe. The Hazard Quotient is the estimated exposure divided by the chronic reference level, which creates a number EPA considers to present no "appreciable risk of deleterious effects during a lifetime," or for a specified exposure duration. *Id.* At 52,772.[147] Where this number is below 1 for a given HAP, EPA finds that chronic exposures are safe, or "not likely to cause adverse health effects."[148] If it finds that the HQ is above 1, this does not necessarily indicate adverse effects in EPA's view, but it does require consideration of the likelihood that harm may occur.[149] EPA's presumption that an HQ of 1 or below is safe is not explained or supported in the record.

In finding that a non-cancer TOSHI of 1 or below is not a human health concern, EPA has arbitrarily ignored its staff's past scientific assessment of this issue. In an internal memo

[147] Draft Residual Risk Assessment, at 22-23.

[148] Draft Residual Risk Assessment, at 22-23.

[149] Draft Residual Risk Assessment, at 22-23.

from 2002, Residual Risk Program: Selection of Hazard Index Limits, EPA stated that the default HI limit for chronic non-cancer risks should be *well under 1.0* for individual sources—specifically, staff then recommended that it should be no higher than 0.2.[150] The rationale for a maximum non-cancer below 1, as expressed in the 2002 EPA memo, is based on the need to protect people from exposure to multiple sources of toxic air emissions. As the staff memo explained:

> The default HI limit of 0.2 would allow an individual source to account for 20 percent of the contribution to total exposure in its vicinity . . . . An HI limit of 0.2 attempts to provide a de minimis fraction below which contributions are considered insignificant to total exposure while not allowing a single source to dominate the total exposures to similar noncarcinogens in its vicinity.[151]

EPA must reduce the TOSHI presumptive acceptability threshold to 0.2 or below which, per EPA's own staff's 2002 recommendation, would be much more appropriate to ensure that EPA is fully protecting the most-exposed people in local communities.

EPA has acknowledged "the potential importance of considering an individual's total exposure to HAP in addition to considering exposure to HAP emissions from the source category and facility." Secondary Lead Smelters, Proposed Rule, 76 Fed. Reg. at 29,047. According to EPA:

> *This is particularly important when assessing non-cancer risks*, where pollutant-specific exposure health reference levels (*e.g.*, Reference Concentrations (RfCs)) are based on the assumption that thresholds exist for adverse health effects. For example, the Agency recognizes that, although exposures attributable to emissions from a source category or facility alone may not indicate the potential for increased risk of adverse non-cancer health effects in a population, the exposures resulting from emissions from the facility in combination with emissions from all of the other sources (e.g., other facilities) to which an individual is exposed may be sufficient to result in increased risk of adverse non-cancer health effects.

Id. (emphasis added). Yet, to create the TOSHI or its acceptability determination, EPA has not evaluated other nearby sources of HAPs (beyond this source category) (except in its facility-wide risk assessment), and has failed to consider the interaction of multiple health risks found for affected communities, as discussed in the section on cumulative impacts. Therefore, EPA's analysis provides only one piece of the chronic non-cancer health risk. To protect the most exposed individuals from an unacceptable level of risk, EPA must ensure they are not exposed at a level above 0.2 to this particular source category.

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[150] Memorandum, Residual Risk Program: Selection of Hazard Index Limits (dated Oct. 4, 2002), EPA-HQ-OAR-2003-0048-0203 (attached in Appendix).

[151] *Id*. at 3.

Setting a presumptive limit of chronic non-cancer health risk that would be no higher than 0.2 from these source categories for purposes of section 112(f)(2) would be a more defensible approach than continuing to assume that 1 is safe. EPA may not permit a single source covered by this rulemaking to consume the entire non-cancer risk safety factor. Further, even a 0.2 contribution should not be assumed to be protective, when many local communities have already experienced a long history of air emissions and continue to be exposed to emissions from many sources. Where source categories are emitting HAPs into local communities that are exposed to many other sources, as with oil and gas, EPA must assume that any risk above 0.1 is unacceptable.

Finally, EPA also recognized extremely high facility-wide chronic non-cancer risks but did not find risk unacceptable for either source category on this basis. 76 Fed. Reg. at 52,781 (ONG TOSHI is 9); *id.* At 52,783 (NGTS TOSHI is 80). As discussed in the Sahu Report at 17, it is unclear what sources or emissions EPA considered in creating this analysis, which does not seem to be available for public review in the docket. It did so apparently based on an arbitrary, unexplained, and unsupported cut-off percentage as EPA's determination of how much the source must contribute to be considered significant or to "drive these risks." *Id*. EPA's determination of whether the source category "drives" the facility-wide risk is based on its arbitrary assessment of whether the source category "contributes 50 percent or more to the facility-wide maximum noncancer TOSHI of 1 or more." *Id.* At 52,778 tbl. 3, 52,781 tbl. 6. EPA fails to justify ignoring this high facility-wide risk based on a 50% cut-off. Fifty percent is half of the emissions. Lower percentages than 50% would also be significant contributions to the facility-wide risk. Even a low percentage may be significant enough to set a limit in order to provide additional protection for public health.

EPA is addressing the source category before it now and these are major HAP sources under section 112. The record shows that these source categories are contributing a significant amount of emissions (9,000 tons of HAPs from the Oil and Natural Gas Production source category, and 700 tons per year of HAPs from the Natural Gas Transmission and Storage category).[152] As long as the source category is contributing a significant amount to the facility-wide risk, EPA must set a limit for that source category. As discussed above for cumulative impacts, EPA must do so not only by considering how much a source contributes, but based on the public health impact of the emissions it has in the context of a community's total HAP exposure. The more additional emissions a community is exposed to, the greater the need to reduce emissions from each source category, even if that source category's emissions are smaller than other sources. EPA has not provided information regarding the actual amount or percentage that the source category contributes. Commenters are therefore unable to comment in an informed manner on whether the precise amount each source category contributes is significant or not. This is a violation of notice and comment under section 307(d). 42 U.S.C. § 7607(d). EPA must recognize that the facility-wide chronic non-cancer risk from these source categories is unacceptable and propose appropriate regulation to reduce this risk. Communities should not be required to wait for protection they need until EPA performs rulemaking for other sources, as EPA states it plans to do eventually for other source categories.

[152] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 24, 30.

4. Socioeconomic disparity in health risk from this source category makes the risk EPA has found unacceptable and EPA must finalize a rule that is consistent with the principle of environmental justice.

EPA recognizes that the Oil and Gas sector exposes people of color, including Hispanic Americans or Latinos, and people living below the poverty level disproportionately to a high level of cancer risk both at the source category-specific and at the facility-wide levels. 76 Fed. Reg. at 52,778-79, 52,782-83. EPA does not assess the disproportionate impact of chronic non-cancer and acute health risk, but its demographic analysis suggests that the disproportionate nature of these risks would be similar.

Because EPA's own demographic analysis shows that the cancer, chronic, and acute health risks from the oil and gas sector disproportionately affect people of color and low-income people, it is unclear how it can state otherwise in its statement on Executive Order 12898. 76 Fed. Reg. at 52,798 ("The EPA has determined that, although there may be an existing disparity in HAP risks from these sources between some demographic groups, no demographic group is exposed to an unacceptable level of risk."). Because EPA's assessment of risk and its out-dated presumption of how much risk is acceptable are each fundamentally flawed for the reasons discussed above, EPA cannot rationally ignore the disproportionate impact of the oil and gas sector's toxic air emissions on minority and low-income individuals and communities.

In particular, EPA found that the following people currently face a cancer risk at or above 1-in-1 million from each of these source categories, respectively, 76 Fed. Reg. at 52,78-79, 52,782:

Oil & Natural Gas Production:

Total facility-wide: 597,000 people.
Total for the source category: 160,000 people.

	Facility-wide	Source	Compared to % of U.S. population
Minority (non-white)	39%	38%	25%
Other/multi-racial	30%	25%	12%
Hispanic	34%	22%	14%
Below the poverty level	19%	14%	13%
Ages 0-18	*	*	27%

* EPA's docket does not seem to include the underlying documentation for the socioeconomic analysis for Oil and Natural Gas Production, so these numbers are not currently available in the record.

Natural Gas Transmission and Storage:
Total facility-wide: 99,000 people.
Total for the source category: 2,500 people.

	Facility-wide	Source	Compared to % of U.S. population
Minority (non-white)	42%		25%
African American	40%		12%
Below the poverty level	20%	17%	13%
Over 25 and without H.S.	15%	20%	13%
Ages 0-18	29%	26%	27%

EPA's demographic analysis provides more information about the "maximum exposed individual" for this source category. For this source category, EPA's data show that the maximum exposed individual is more likely to be a person who may be more vulnerable to the impacts of pollution, such as due to socioeconomic status. Commenters appreciate that EPA has recognized the need to look at population data, including on the socioeconomic impact, in order to consider the actual people affected by pollution from the oil and gas sector, to assess the community impacts in context, and to consider environmental justice as part of this rulemaking. Indeed, oil and gas facilities are located in both urban areas like Los Angeles, California, and Dallas-Fort Worth, Texas, and in smaller towns and rural communities in many states.[153] Considering these data is consistent with EPA's 1999 Residual Risk Report (at 42), which recognized that EPA should consider population level impacts and impacts to sensitive subpopulations that "consist of a specific set of individuals who are particularly susceptible to adverse health effects because of physiological (e.g., age, gender, pre-existing conditions), socioeconomic (e.g., nutrition), or demographic variables, or significantly greater levels of exposure," including based on age, race, gender, income levels, and other factors relevant to the individual's or community's history and amount of exposure, and vulnerability to impacts from that exposure.[154]

In addition to looking at this demographic census data, however, EPA must also assess the starting point or baseline of "overall health" status of the affected individuals and communities using the best available data at a local and national level. The 1999 Residual Risk Report supports this.[155]

It is problematic that EPA is not looking more closely at the disproportionate impacts. In addition to assessing the demographics of the communities within 50 km of the sources, EPA

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[153] *See, e.g.*, Armendariz at 2-3 (explaining oil and gas facilities are located in the following counties near Dallas-Fort Worth, TX: Tarrant, Denton, Wise, Parker, Hood, and Johnson Counties); Agreement Reached to Reduce Urban Oil Drilling in Los Angeles - Settlement Provides Greater Protections to Residents, Drilling Restrictions (July 6, 2011), *available at* http://www.cityprojectca.org/ourwork/baldwinhills.html#settlement; Frack Action - Fracking in Pennsylvania, http://frackaction.com/fracking-in-pennsylvania (last visited Sept. 28, 2011).

[154] U.S. EPA, *Residual Risk Report to Congress*, EPA-453/R-99-00, at 42, 67 (Mar. 1999).

[155] U.S. EPA, *Residual Risk Report to Congress*, EPA-453/R-99-00, at 42 (Mar. 1999).

must particularly analyze those who are the most exposed, within 5 km. of oil and gas facilities. EPA did this in the chrome plating proposal and must similarly add this analysis to this rulemaking. *See* NESHAP 2010 Proposed Rule, 75 Fed. Reg. 65,068, 65,089 (Oct. 21, 2010).

EPA must also incorporate this environmental justice assessment fully into the policy decision it chooses in the final rule, by recognizing that it is not fair or acceptable for particular individuals or communities to have this type of disproportionate impact. After finding that the risk is disproportionately falling on certain communities and individuals, EPA does not consider or address whether this would provide reason to reduce the health risk further than its proposal would do. The legislative history shows that Congress considered equity to be a major driving force of the 1990 Clean Air Act Amendments on air toxics.

> Cancer incidence for the general population is only one aspect of the problem. *There is also an equity concern, the very high risk of health problems experienced by individuals living near large industrial facilities or in highly developed urban corridors*. EPA has examined cancer risks at more than 2600 industrial facilities across the U.S. as part of its effort to promulgate air toxics regulations. At more than one-quarter of these facilities, toxic emissions produced cancer risks greater than 1-in-10,000 for people living nearest these plants (that is 1 additional cancer for each 10,000 persons exposed). If these sites were abandoned waste dumps, risks of that magnitude would qualify them for cleanup under the federal Superfund program.

S. REP. NO. 101-228, at 112 (1989), *reprinted in* 1990 U.S.C.C.A.N. 3385, 3514 (emphasis added).

Notwithstanding the demographic information gathered, EPA fails to recognize that this record evidence shows that the level of risk from this source category is unacceptable. Because of a lower income, individuals below the poverty line are likely both to have less ability to escape the hazardous air pollution from the facilities in this source category and likely to have less access to necessary health care. Historically, communities with greater minority populations have faced a disproportionate burden of pollution, which has led to longer term and cross-generational health impacts. EPA must protect people in these communities, including children, from being exposed disproportionately to cancer and other health risk. As EPA has recognized in the recently issued Environmental Justice Guidance (cited above), the principle of environmental justice directs that it is unfair and unjust for individuals to experience disproportionate exposure to emissions associated with higher cancer and other devastating health impacts, simply because of their race or income level. A level of risk that might otherwise be "acceptable" becomes unacceptable when, as here, minority or lower income people are disproportionately affected.

To fulfill its commitment to make progress toward environmental justice, EPA must do more than merely look at the numbers. EPA must actually use these data in its decisionmaking process and reduce risk to local communities beyond what is proposed.

Finally, as part of providing sufficient information to affected local communities, commenters also urge EPA to publish a plain-language statement of the health risks and benefits from EPA's final action, and in future rule proposals. Although it provides the MIR and chronic and risk numbers, these are not easily understandable by the general public. For example, EPA does not discuss the actual types of cancer or the nature of the health disorders or other adverse effects that this sector's HAP emissions present to the public. As another example, although it states that the respiratory and immune systems are the target organs at particular risk, it does not describe, analyze, or explain this in a manner that could facilitate community understanding and comment. 76 Fed. Reg. at 52,777, 52,781. EPA fails to describe the other health impacts at stake in this rulemaking. As the Science Advisory Board ("SAB") has explained, this type of "[e]xpanded discussion is important to understanding the 'real-world' risk, including dealing with health disparities."[156]

Without a full discussion of health impacts and risks, it is difficult for the public to provide meaningful comment on the impact this proposal will have on their lives. Providing a meaningful opportunity for comment, particularly where disproportionate health impacts are concerned, is an environmental justice issue. EPA must provide a statement and analysis in this residual risk rulemaking (and all others) on the real world impacts of EPA's rulemaking, so that the public has a clear understanding of what the risk is, and precisely what types of harm to public health EPA is determining are "acceptable" and "unacceptable." This is needed to inform EPA's and the public's consideration of what level of risk is acceptable or unacceptable, and what standard is required to provide an ample margin of safety.

Environmental justice concerns should also lead EPA to take a more protective policy approach, as discussed above, on a number of issues, including the need to strengthen protection for local communities exposed to cumulative source impacts, the need to ensure protection for children (who face the disproportionate impact discussed in this section), and the need to reduce EPA's presumptive level of what risk is acceptable, because a disproportionate impact like the one found for this sector must not be considered acceptable in U.S. society today.

C. EPA Fails to Provide an Ample Margin of Safety to Protect Public Health.

At the final step of its section 112(f)(2) rulemaking, EPA fails to set an appropriate residual risk standard that provides the requisite "ample margin of safety to protect public health," pursuant to CAA § 112(f)(2). 76 Fed. Reg. at 52,780, 52,783.

For Oil and Natural Gas Production, EPA added no additional protections for local communities from toxic air emissions even though EPA stated that "we are concerned about the estimated facility-wide risks identified." 76 Fed. Reg. at 52,780. EPA did not consider any other additional emission or health risk reductions at this step for this source category. *Id.* For

[156] Sci. Adv. Bd., Review of EPA's draft entitled, "Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA's Science Advisory Board with Case Studies – MACT I Petroleum Refining Sources and Portland Cement Manufacturing, EPA-SAB-10-007, at 50 ("SAB May 2010") (attached in Appendix).

Natural Gas Transmission and Storage, EPA proposed at this step to eliminate the 0.9 Mg/year benzene limit so that it may no longer be used as an alternative compliance option for glycol dehydrators. *Id.* At 52,783. With removal of that option, EPA concludes that cancer risk from this source category would be reduced to 20-in-1 million.[157] *Id.* EPA did not consider any other additional emission or health risk reductions at this step for this source category. *Id.*

Instead of providing an "ample margin of safety to protect public health" as the statute dictates, EPA fails even to consider health in its ample margin analysis. EPA fails to explain how it is ensuring that the proposed standards are sufficient to provide an "ample margin" of safety, beyond the bare-minimum protection from health risks. And at this step EPA fails to address the full spectrum of risks faced by communities near these facilities, limiting its "ample margin" analysis to cancer risks.

1. EPA must set an "ample margin of safety to protect public health."

The "ample margin" determination assumes that EPA has already reduced risk to an "acceptable" level (whatever that may be), and requires EPA to consider *additional* reductions to provide an "ample margin" not just the bare minimum amount of protection for public health. The requirement for an "ample margin" is designed to protect public health in light of the fact that there is likely to be some scientific uncertainty regarding what precise level of risk is "safe." *NRDC*, 824 F.2d at 1165. As the D.C. Circuit has explained, EPA may consider cost and technological feasibility in addition to public health factors in determining the requisite "ample margin of safety." *Id.* However, as the statute refers broadly to "public health," EPA has no choice but to consider health. EPA must set a standard that provides an ample margin of safety for public health in regard to both cancer and non-cancer risks.

The plain text of section 112(f)(2), by using the term "ample margin," requires a higher level of protection than the bare minimum. According to Webster's, the term "ample" means:

> 1. generous or more than adequate in size, scope, or capacity: copious. 2.a: enough to satisfy: abundant. B: more than enough. Syn see PLENTIFUL."

WEBSTER'S 7TH NEW COLLEGIATE DICTIONARY 31 (1971 ed.). The statutory term "ample" means "more than adequate." *Id.* At 11. Using the term "ample" demonstrates that EPA is required to do more than just set an "adequate" or bare minimum level of protection. Instead, EPA must take a "generous," health-protective approach to setting a margin of safety that is "copious" and "abundant." *See Envtl. Def. Fund("EDF") v. EPA*, 598 F.2d 62, 81 (D.C. Cir. 1978) (interpreting identical standard in Clean Water Act and stating that under the standard, "the public and the environment were not to be exposed to anything resembling the maximum risk. Not only was EPA to provide a 'margin of safety,' but the margin was to be greater than 'normal' or 'adequate': the margin was to be 'ample'"); *see also NRDC v. EPA*, 824 F.2d 1146, 1153 (D.C. Cir. 1987) (in finding that risk level was not required to be set at zero where there was uncertainty, stating that "Congress used the modifier 'ample' to exhort the Administrator not to

[157] For more detailed comments on this conclusion, see below.

allow 'the public [or] the environment . . . to be exposed to anything resembling the maximum risk' and, therefore, to set a margin 'greater than normal or adequate.'") (quoting *EDF v. EPA*, 598 F.2d at 81) (quotation marks omitted)).

EPA has interpreted Section 112(f)(2) as requiring EPA "to provide maximum feasible protection against risks to health from hazardous air pollutants," both by protecting the greatest number of persons possible from an individual lifetime risk level no higher than 1-in-1 million and by protecting the most-exposed person from a cancer risk of 100-in-1 million. 76 Fed. Reg. at 52,742 (quoting 54 Fed. Reg. 38,044 (Sept. 14, 1989)); *see NRDC v. EPA*, 529 F.3d 1077, 1081-82 (D.C. Cir. 2008) ("ample margin" is met "if as many people as possible face[] excess lifetime cancer risks no greater than one-in-one million, and . . . no person face[s] a risk greater than 100-in-one million (one-in-ten thousand)").

As discussed below, EPA has failed to satisfy this standard, even as described in its own preamble, in this rulemaking.

2. EPA fails to analyze the emission reductions needed to provide an ample margin of safety for public health and fails to assess whether its proposed standard sufficiently protects public health.

For all types of health risk (including cancer and non-cancer chronic and acute), EPA fails to consider whether its proposed rule provides the maximum feasible protection against risks to the greatest number of people. *See* 76 Fed. Reg. 52,780, 52,783; *NRDC v. EPA*, 529 F.3d at 1081-82. EPA includes no discussion or analysis regarding what the maximum feasible protection would be, or how many people could be protected from a greater level of risk. EPA also fails to consider or address what margin would be "ample" to protect people from these risks.

For non-cancer risks, EPA does not even discuss at all whether the rules provide an "ample margin of safety" in protecting against such risks, *see* 76 Fed. Reg. 52,780, 52,783, as it must pursuant to the statute. The "ample margin" analysis is simply missing. EPA includes no discussion of the additional reductions in non-cancer health risks that are feasible or that are the "maximum feasible" reductions. It also includes no discussion of how the technologies discussed might affect non-cancer risks.

Even for cancer risks, EPA's analysis does not center on health protection but on cost. For each category, EPA discusses the expected cancer risk reductions from the removal of the benzene limit compliance alternative from the existing glycol dehydrator MACT requirements (0.9 Mg/yr alternative). For Oil and Natural Gas Production, EPA determines that no additional standard beyond that change (which it has proposed under the acceptability determination), is needed to provide an ample margin of safety. For Natural Gas Transmission and Storage, EPA proposes to remove this compliance alternative in order to provide an ample margin of safety. EPA then discusses some other options to further reduce emissions and health risks, but determines they are not cost-effective. EPA bases its conclusion that the rules provide an ample margin of safety primarily on its cost analysis. *See* 76 Fed. Reg. 52,780, 52,783. EPA's analysis and determination are flawed.

First, while cost is one of the factors that EPA may consider in an "ample margin" analysis, EPA's proposal does not provide any analysis of what is, by definition, the central question in the inquiry into the "ample margin of safety to protect public health." 42 U.S.C. § 7412(f)(2). The key question EPA must address is public health – specifically, whether the proposed rules provide a plentiful or ample margin of safety from health risks for the communities near these facilities, or whether additional emission and health risk reductions are needed to do so. *Id.* (residual risk standards must "provide an ample margin of safety to protect public health . . . taking into consideration" other factors); *NRDC v. EPA*, 824 F.2d 1146, 1163 (D.C. Cir. 1987) (noting that every action in setting an emission standard is to be taken "to protect the public health," and that it seems "beyond dispute that Congress was primarily concerned with health in promulgating section 112").

This neglect of health criteria is illustrated in EPA's approach to its cost-effectiveness analysis in which EPA uses a ton-based metric. For hazardous air pollutants, small amounts of emissions in mass can have a significant health effect. One ton of a HAP like benzene is a tremendous amount in terms of the health risk. EPA's own decision to remove the nearly 1-ton benzene compliance option from the rule itself demonstrates this. 76 Fed. Reg. at 52,780, 52,783. If EPA uses a metric of HAP reduction, EPA must take account of the greater health benefit associated with smaller HAP reductions.

For EPA's ample margin analysis, it is important for EPA to assess the health risk reduction (and thus the greater health protection) that would occur through the use of each option assessed, rather than simply the HAP emission reduction. As an alternative, EPA could measure cost-effectiveness on a dollars per amount of cancer risk reduced basis. Comparing cost to health protection would allow EPA to decide whether the additional cost is warranted in order to provide greater, measurable protection for public health. It would also allow the public to comment meaningfully on the health-cost trade-off that EPA is proposing to make. This comparison would squarely present the question of how much cost is reasonable to ensure an ample margin of protection against cancer and other health risk. But EPA did not conduct such an assessment. It failed to consider the margin of safety for health risks at all in determining "an ample margin of safety to protect public health."

To set the standard without finding or explaining how its proposal provides more than bare minimum protection would render the phrase "ample margin of safety" superfluous and violate section 112(f)(2). EPA does not discuss a "margin" of safety at all. *See* 76 Fed. Reg. at 52,780, 52,783. In particular, it does not attempt to assess what emission reductions are needed to provide an ample margin of safety, *i.e.* what additional emissions beyond the "acceptable" level are necessary to provide more than the bare minimum level of protection. *See id.* At 52,780, 52,783. EPA claims that it determined that the proposal provides an ample margin of safety "[c]onsidering the health risk information and the high cost effectiveness of the options identified." *Id.* At 52,780; *see id.* At 52,783. However, EPA does not discuss how the health risk information shows that an ample margin of safety is provided by the proposed rule or what that ample margin is, and EPA does not explain how it follows that because EPA has been unable to identify less expensive or more cost-effective options, the margin of safety is "ample." The margin of safety achieved and whether that is indeed "ample" must play the primary role in EPA's analysis.

Second, EPA needs to provide appropriate support for the risk reductions posited in the proposed rule for natural gas transmission and storage. EPA proposes to remove the alternative compliance option (0.9 Mg/yr) for NGTS as part of its ample margin determination. 76 Fed. Reg. at 52,783. Specifically, EPA states in the proposed rule that the elimination of the compliance alternative for the Natural Gas Transmission and Storage category would reduce cancer risks from 90-in-1 million to 20-in-1 million. 76 Fed. Reg. at 52,783. However, it is not clear from EPA's own documentation that this change would indeed reduce cancer risks by this amount for the Natural Gas Transmission and Storage category.[158] The supporting documentation states that the simple removal of the compliance alternative "would not reduce the maximum cancer risk from this category."[159] This Memorandum states instead that the reduction in risk to 20-in-1 million is "expected" based on "the requirement for small glycol dehydrators proposed under CAA section 112(d)(2)" which was "not investigated specifically as a risk reduction option."[160]

EPA appears to be relying on the proposed change to the existing MACT under section 112(d)(2), where EPA is proposing to set a MACT limit for the first time for small glycol dehydrators. 76 Fed. Reg. at 52,767-69. That is a separately proposed (but not yet finalized) requirement. EPA must finalize that change in the proposal on the existing MACT (and must do more), as discussed later in these comments. However, EPA cannot rely on the section 112(d) change under section 112(f)(2). If EPA believes that the additional limit established for small glycol dehydrators is an appropriate way to set an "ample margin of safety" for the Natural Gas Transmission and Storage source category, then it needs to propose, analyze, and explain this under section 112(f)(2). EPA must propose this as a new limit under section 112(f)(2), so that small glycol dehydrators are sure to receive this limit, whether finalized under section 112(d)(2)-(3) or under (f)(2), and local communities can be sure to receive this additional health protection. EPA's documentation on this suggests, at least, confusion that it must clear up before finalizing the rule, and at worst, that its action is inconsistent with section 112(f)(2).

Under section 112(f)(2), EPA needs to provide a reasoned explanation for how the removal of the benzene compliance alternative for natural gas transmission and storage achieves the cancer risk reduction that EPA discusses. 42 U.S.C. § 7412(f)(2). If indeed the removal of that exception provides the risk reduction EPA states, commenters support its removal and also urge EPA to do more (for reasons already discussed above). However, EPA's analysis may demonstrate that this removal is not sufficient and that more is needed to provide an ample margin of safety even under EPA's current ample margin approach.

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[158] Memorandum from Heather Brown & Lesley Stobert, EC/R Inc., to Bruce Moore, EPA, *Impacts for Control Options for the Oil and Natural Gas Production and the Natural Gas Transmission and Storage Source Categories as a Result of the Residual Risk and Technology Review* 6, Table 3, EPA-HQ-OAR-2010-0505-0077 ("Impacts for Control Options").

[159] Impacts for Control Options at 6.

[160] *Id.*

3. EPA does not fully or rationally account for cumulative impacts.

EPA's ample margin analysis also suffers from a failure to adequately and rationally account for cumulative impacts, which it has authority to do both at the acceptability determination stage and at the ample margin stage. As discussed above and again incorporated here by reference, EPA has failed to assess or address the full health risk that local communities face from these source categories. *See* Part II.A.2.ix. EPA expresses concern about the estimated facility-wide risks, but takes no account of risks from other toxic air emissions in the vicinity, and the combined impact for nearby communities, as it must. *See* 76 Fed. Reg. at 52,780, 72,783; 42 U.S.C. § 7412(f)(1)© (EPA recommendations to Congress from which residual risk determinations follow must include "risks presented by background concentrations of hazardous air pollutants").

Moreover, as discussed earlier, EPA's analysis of facility-wide risk is skewed by its irrational decision not to consider a source to be a significant contributor to risk unless it contributes more than 50% of the facility-wide risk. *See* 76 Fed. Reg. at 52,778, 52,781. EPA never explains why it uses 50% as the cutoff and why source contributions to facility-wide risk of anything below 50% are not significant. EPA also fails to account for risks from other toxic air emissions. These failures exaggerate the margin of safety provided by the proposed rule. EPA has failed to establish that its proposed rule would provide the requisite "ample margin" of safety.

4. EPA's ample margin of safety determination does not consider the full range of control options available and arbitrarily relies on unsupported assumptions for the options it does consider.

i. EPA did not consider the full range of control options available.

EPA's analysis of the ample margin determination relies almost exclusively on the consideration of the cost-effectiveness of very limited control options, without adequate explanation of why other control options were rejected. EPA considered only three options beyond the removal of the benzene alternative compliance option for the Oil and Natural Gas Production category—the addition of a second control device for glycol dehydrators, the addition of a second control device to the required MACT floor control device, and strengthened LDAR programs for leak detection. 76 Fed. Reg. at 52,780. Even more egregiously, EPA only considered the cost-effectiveness of one option, that of requiring controls on previously unregulated small glycol hydrators, for the Natural Gas Transmission and Storage category. *Id.* at 52,783.

However, EPA nowhere explains why it limited its analysis on the control options considered under the 112(f) analysis to only these options. It does not explain what other searches it conducted for control options. It does not discuss any other options it did actually consider beyond these options. It fails to provide a reasoned explanation for rejecting any additional options it considered. Without more, EPA's analysis is cursory, arbitrary, and capricious.

To the extent EPA relies on the technology review conducted for the 112(d)(6) analysis, that too suffers from a number of flaws, as detailed further below in Part III, not the least of which are its failure to cast a wide enough net in evaluating control options – including practices, processes, and technologies that have achieved greater emission reductions – and its dismissal of options with little or no analysis or grounds. As we discuss further below, EPA could and should have: considered the use of desiccant dehydrators for at least some portion of the source categories; considered the use of control options demonstrated by the Natural Gas Star program; considered technologies and practices in BACT determinations, including greater control efficiency levels; considered technologies and practices used in EPA's own refinery enforcement actions including more stringent leak detection and repair; researched vendor literature and discussed options with vendors regarding newer technologies and improvements to old technologies that make them more cost-effective and more efficient; evaluated the requirements and programs to address such emissions in various states such as California, Colorado, and Wyoming, including stronger leak detection and repair requirements and improved control technology efficiency; and considered the additional and similar options outlined in the Paranhos summary (EPA-HQ-OAR-0505-0016). EPA's failure to consider these options is arbitrary and capricious. Additional information is provided by the Buckheit and Sahu Reports that are fully incorporated into these comments and provided as Addenda.

Moreover, EPA relies on a number of unsupported assumptions in evaluating the limited options it does consider and analyze under the 112(f) analysis.

In relation to small glycol dehydrators, EPA notes that:

> [T]he estimated cost effectiveness of the controls to reduce HAP emissions by 95% for small glycol dehydrators in the Oil and Natural Gas Production source category is $7,000/Mg HAP reduced and is $1,650/Mg HAP reduced for the Natural Gas Transmission and Storage source category. While control methodologies are similar for large and small dehydrators, the gas flow being processed and the amount of HAP reductions achieved for large glycol dehydrators are expected to be equal to or greater than those for small glycol dehydrators. However, we would expect the cost effectiveness for large units not to exceed twice the cost effectiveness of small units. Therefore, we would assume the cost effectiveness for large units not to exceed $14,000/Mg HAP reduced for the Oil and Natural Gas Production source category and $3,300/Mg HAP reduced for the Natural Gas Transmission and Storage source category."[161]

EPA provides no basis for the assumption that the cost effectiveness of large dehydrators will not "exceed twice the cost effectiveness of small units…." *Id.* Typically, the cost effectiveness of larger units is smaller than that of smaller units because of the advantage of scaling. EPA must support this assumption with further explanation.

[161] -0505-0077.pdf

Regarding control efficiency of control devices to which glycol hydrators are routed, EPA notes that, "for sources achieving the MACT level of control, it is assumed that for most glycol dehydrators required to reduce emissions, the emissions are routed to a condenser or a combustion device, which achieve at least a 95% HAP reduction."[162] It is not clear why EPA assumed that the HAP control efficiency of the second control device (i.e., condenser or combustion device) is only 95% as opposed to, say 98% or 99%. EPA did not investigate the cost effectiveness impact of these greater efficiencies.

Still regarding dehydrators, EPA notes that, "the costs for the second device were assumed to be equal to the costs of the first device…"[163] Since the cost of a control device depends on it process size (i.e., volume of waste gas to be handled and concentration of contaminants in the waste gas etc.), EPA's basis for this assumption is not clear. EPA must fully explain the basis for this assumption.

Regarding storage vessels, EPA notes:

> [F]or sources achieving the MACT level of control, it is assumed that storage vessels required to reduce emissions are equipped with a cover vented through a closed vent system to a control device, which achieves at least a 95% HAP reduction. To reduce the emissions remaining after the use of this control device, the option of requiring an additional add-on control device, most likely a combustion device that would also achieve a 95% emission reduction, was investigated. The costs for the second device were assumed to be equal to the costs of the first device…"[164]

Here again, just as with dehydrators, EPA does not explain the basis for the assumption that the first control device will achieve only 95% control of emissions (cover + closed vent). Similarly, it fails to explain the basis for the assumption that the second control device has only a 95% efficiency. EPA also again fails to explain why the cost of the second device is assumed to be the same as the first device.

In relation to fugitive emissions, EPA states:

> [T]he costs of these options were examined under the review of the NSPS for the oil and gas sector based on reductions of VOC. Since the HAP present is approximately 1/20 the VOC present in material handled by regulated equipment, the cost effectiveness of these LDAR programs is approximately 20 times greater for HAP reduction than for VOC reduction."[165]

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[162] -0505-0077.pdf

[163] -0505-0077.pdf. Context is discussion on glycol dehydrators.

[164] -0505-0077.pdf. Context is the second control device for storage vessels.

[165] -0505-0077.pdf

Given the poor data support for HAPs contained in various fugitive emissions sources in both of these sectors, it is not clear what the basis is for EPA's assertion that, at most, only 5% of the VOCs are HAPs. EPA must provide an explanation for its assumptions.

Without adequate support or a reasoned rationale for its assumptions, EPA's analysis of the control measures it does evaluate is arbitrary and capricious.

D. EPA Must Reduce the Benzene Limit for Glycol Dehydrator Area Sources.

Currently, EPA has in place a benzene limit of 0.9 Mg for glycol dehydrator area sources. 76 Fed. Reg. at 52,815. This limit is the same as the alternative compliance option for major sources. EPA has recognized that removing this compliance option for major sources would significantly reduce public health risk. 76 Fed. Reg. at 52,780, 52,783. In view of that recognition, EPA cannot justify keeping this compliance option for area sources. Doing so would be arbitrary and capricious.

E. EPA May Not Refuse Now to Perform the Review of the Proposed MACT Limit for Small Glycol Dehydrators That Is Required in 8 Years.

EPA is proposing to set a new MACT limit for small glycol dehydrators that were previously uncontrolled in the Oil and Natural Gas and the Natural Gas Transmission and Storage categories. 76 Fed. Reg. at 52,769. It is also proposing that for currently controlled sources, the existing standard, without the 1-ton (0.9 Mg/yr) alternative compliance option, provides an ample margin of safety. In addition, EPA states that "we do not believe it will be necessary to conduct another residual risk review under CAA section 112(f) for these two source categories 8 years following promulgation of the small dehydrator standards merely due to the addition of these new MACT requirements." 76 Fed. Reg. at 52,769.

This analysis is unlawful, premature, and unsupported. EPA may not decide now that it need not fulfill its statutory duty to review and consider updating these standards in 8 years. This is a legal duty required by section 112(f)(2) that EPA cannot change or evade. Eight years after finalizing a section 112(d) or MACT limit, section 112(f)(2) requires EPA to review and set a residual risk standard if required to protect public health or prevent an adverse environmental effect. 42 U.S.C. § 7412(f)(2). EPA cannot rely on its conclusions in the current proposed rule to evade the statutory requirement to conduct the review every eight years. EPA's analysis will need to be based on factual circumstances at that future time, not based on EPA's analysis of the facts now. The 8-year review is designed to ensure that EPA fully considers and addresses public health risk that remains after seeing the actual impact of a section 112(d) technology-based standard. So, it would also violate the purpose of the provision for EPA to decide now not to perform the statutory review, before actually assessing the impact of the new limit in practice. Moreover, as explained above in Parts B-D, EPA's determinations are flawed and inadequate and form a poor basis for a decision on conditions eight years into the future. For each of these reasons, EPA cannot lawfully decide now to avoid satisfying this legal requirement.

F. EPA May Not Rationally or Lawfully Assume There Is No Potential for Environmental Risks from This Source Category.

EPA fails to fulfill its duty to consider or address whether a more stringent limit than the existing MACT is required to protect the environment.

Section 112(f)(2) requires EPA to determine whether to set a standard to "prevent an adverse environmental effect." 42 U.S.C. § 7412(f)(2). "Adverse environmental effect" is defined as "any significant and widespread adverse effect, which may reasonably be anticipated to wildlife, aquatic life, or other natural resources, including adverse impacts on populations of endangered or threatened species or significant degradation of environmental quality over broad areas." *Id.* § 7412(a)(7). As the D.C. Circuit has explained, the residual risk review is the proper time for EPA to consider these effects, including the need to engage in Endangered Species Act consultation under 16 U.S.C. § 1536. *Sierra Club v. EPA*, 353 F.3d 976, 992 (D.C. Cir. 2004) ("Congress, therefore, expressly channeled consideration of endangered species to the second phase of CAA standard promulgation.").

EPA states that it is "proposing that the MACT for these two oil and gas source categories, as revised per above, provide an ample margin of safety to protect public health and prevent adverse environmental effects." 76 Fed. Reg. at 52,747. EPA provides a conclusory statement as the sole analysis of environmental risk from this source category. The preamble to the proposed rule states:

> We generally assume that when exposure levels are not anticipated to adversely affect human health, they also are not anticipated to adversely affect the environment. For each source category, we generally rely on the site-specific levels of PB–HAP emissions to determine whether a full assessment of the multi-pathway and environmental effects is necessary. As discussed above, we conclude that the potential for these types of impacts is low for these source categories.

Id. at 52,777. EPA later states that its analysis shows "low potential for adverse environmental effects" from both oil and gas source categories. *Id.* at 52,779, 52,783.

However, EPA provides no reasoned explanation for why this is true. EPA's multipathway risk assessment is the only place where it discusses ecological exposure, in a single paragraph.[166] There it states that the reference doses it is using are more protective than EPA believes is necessary to protect laboratory animals such as rodents. However, it provides no basis for why this is a sufficient way to prevent an adverse environmental effect for more sensitive wildlife or other environmental receptors. Further, EPA states that "in isolated cases" it has "data indicating potential adverse impacts on plants, birds, or other wildlife," but does not

[166] Draft Risk Assessment for the Oil and Gas Production and Natural Gas Transmission and Storage Source Categories at 11.

discuss or explain what these data are or how it has addressed these in this rulemaking.[167] EPA says nothing at all about ESA consultation, which provides further evidence that it has not considered or addressed its duty to prevent adverse environmental effects, as recognized by the D.C. Circuit. *See Sierra Club v. EPA*, 353 F.3d at 992 (explaining that ESA consultation is required to occur as part of the section 112(f)(2) rulemaking).

At minimum, each of the significant flaws described above in EPA's human health risk assessment (Part II.A) provides an additional reason why EPA's environmental risk assessment is not reliable. EPA itself discounts risk that occurs in areas with low human population. Those are areas where wildlife and natural resources are even more likely to suffer harmful effects. EPA must perform an ecological risk assessment for the oil and gas sector, and may not simply rely solely on the human health assessment without a reasoned explanation for doing so that is not supported by scientific evidence in the record. EPA has neither carried out the required ecological risk assessment nor presented a reasoned explanation supported by science in the record.

As the SAB has stated: "The assumption that ecological receptors will be protected if human health is protected is incorrect."[168] In addition to inhalation risk for wildlife and air impacts to plants, chemicals that are persistent in the environment or bioaccumulative in living tissue will remain or increase over time, particularly in areas of high emissions. Accordingly, any additional exposure from current activities would thus be added to a background that is likely unsafe already for wildlife and other environmental resources. EPA must perform an appropriate ecological assessment.

III. Eight-Year MACT Review and 112(d) Rulemaking

A. Background

Commenters support EPA's proposal to set a MACT standard for the first time for small glycol dehydrators and previously uncontrolled storage vessels. However, EPA's proposal misses the opportunity and fails to fulfill the agency's responsibility to properly calculate the MACT for all sources in this sector based on current, reliable, and representative emission test data. EPA must correct these errors and finalize a stronger MACT standard under section 112(d)(2)-(3) and section 112(d)(6).

Commenters also support EPA's proposal to reduce the leak detection and repair (LDAR) threshold for fugitive hazardous air pollutant ("HAP") emissions from valves located at natural gas plants from 10,000 to 500 ppm. However, EPA's proposed standard is not strong enough. For example, EPA does not extend lower leak detection thresholds to other equipment at natural gas processing plants, as it does under the NSPS proposal, nor does it propose to adopt leak detection and repair practices employed by the best performing source(s) in the category.

Commenters have above outlined numerous concerns with the data inventory EPA uses

[167] *Id*.

[168] SAB May 2010 at 48.

in its residual risk rulemaking that are incorporated herein and also fully apply to the section 112(d) proposal. *See* Part II.A.1.i, above. EPA has apparently not used or analyzed *any* current emission test data in its section 112(d) proposal. This approach raises serious questions regarding how EPA could have satisfied its responsibility to assess developments in current industry practices, processes, and technologies under section 112(d)(6), without actually looking at industry emission levels or reductions achieved since 1999. In addition to the inventory issue, Commenters also have raised other concerns regarding missing emission points and missing HAPs discussed above that are fully incorporated and relied upon in this section, as comments also fully applicable to the section 112(d) proposal. *See* Part II.A.1, above.

B. EPA's CAA § 112(d)(6) Review of the Existing Section 112(d) Standards Is Unlawful and Incomplete.

After setting a section 112(d) standard, at least every eight years, the Administrator is required to "review and revise as necessary" the technology-based standards. This review must "tak[e] into account developments in practices, processes, and control technologies" for each source category. 42 U.S.C. § 7412(d)(6). EPA also has full authority at any time to recalculate MACT levels to ensure standards are set to reflect the emission reductions of the best performing technology.[169]

Section § 112(d)(6) requires EPA to revise its standards in accordance with CAA § 112(d)(2)-(3), (6), 42 U.S.C. § 7412(d)(2)-(3), (6). EPA must update the technology standards to meet the CAA § 112(d)(6) requirements in the final rule. Yet, EPA has failed to update the existing MACT standards for both the Oil and Gas Production and Transmission and Storage source categories to meet the CAA § 112(d)(6) requirement by, at minimum, matching the emissions levels that sources are achieving, and considering setting an appropriate beyond-the-floor standard of what is achievable. This is especially problematic because the original MACT calculation was flawed, because there are "developments" in technology, practices, and processes, and sources have achieved lower levels of emissions "in practice" than the current MACT standards, as described below.

1. EPA's CAA § 112(d)(6) Eight-Year MACT Review Fails to Satisfy CAA §§ 112(d)(2)-(3).

There is ample evidence, including evidence in the record from the 1999 MACT determination for these source categories, that, due to improvements in technology, many sources have "achieved" a level of "actual" HAP emissions that is not only below the existing MACT standard, but also below the standards proposed by EPA in the proposed rule. EPA's analysis of its emissions inventory for oil and gas facilities indicates that the amount of emissions that are "allowable" under the existing MACT standard far exceed estimated (what EPA calls "actual") emissions and may be "up to 50 times greater than actual emission levels" because many oil and gas facilities have achieved greater emission reductions than EPA's prior standard anticipated. 76 Fed. Reg. at 52,778, 52,781; *see also id.* at 52,770 (explaining that

[169] *Med. Waste Inst. & Energy Recovery Council v. E.P.A.,* 645 F.3d 420, 424-426 (D.C. Cir. 2011).

"MACT allowable" means "the highest emissions level that could be emitted by the facility without violating the MACT standards"). Under section 112(d)(6), this information should lead EPA to revise the existing MACT for the categories to meet the requirements of section 112(d)(2)-(3), thus setting standards lower than what EPA has proposed in this rulemaking.

Section 112(d)(6) requires that at least every 8 years, EPA must review all "emission standards promulgated under this section [*i.e.*, section 112]," and must revise such standards "as necessary (taking into account developments in practices, processes, and control technologies)." 42 U.S.C. § 7412(d)(6). The existing standards are set under section 112(d)(2)-(3), *id.* § 7412(d)(2)-(3). The text therefore plainly requires that EPA review and revise as necessary the existing section 112(d)(2) MACT standards. It also explicitly requires that EPA take account of new technological or industrial developments.

To give meaning to the ultimate test for this review and revision, *i.e.*, the meaning of "as necessary," section 112(d)(6) must be read in the context of the rest of section 112(d). Section 112(d)(2) by its plain language applies to "emission standards promulgated under this subsection," *i.e.* section 112(d). *Id.* § 7412(d)(2). The statute thus explicitly requires *any* section 112(d) standard to meet the section 112(d)(2) requirements, including those standards set under section 112(d)(6).

The essential thrust of section 112(d)(2) is to require technology-based standards that reflect the maximum achievable degree of emission reduction, 42 U.S.C. § 7412(d)(2), as further defined in 42 U.S.C. § 7412(d)(3). The test provided by section 112(d)(2) is as follows:

> Emission standards promulgated under this subsection [*i.e.*, section 112(d)] and applicable to new or existing sources of hazardous air pollutants *shall require the maximum degree of reduction in emissions* of the hazardous air pollutants subject to this section . . . that the Administrator . . . determines is achievable.

Id. § 7412(d)(2) (emphasis added). Section 112(d)(3) then defines "[t]he maximum degree of reduction in emissions that is deemed achievable" for both new and existing sources. At a minimum, it deems achievable and requires that "[e]mission standards promulgated under this subsection for existing sources . . . shall not be less stringent" than either the average emission limitation achieved for the best performing 12 percent of sources, or the average emission limitation achieved by the best performing five sources (for categories with fewer than 30 sources). *Id.* § 7412(d)(3). It then requires EPA to consider whether to set more stringent beyond-the-floor standards taking into account various factors, including cost.

All national emission standards for hazardous air pollutants must satisfy the requirements of section 112(d)(2) and (3), both when set initially and when they are revised. The Act does not invite EPA to improvise in determining what revisions, if any, are "necessary" under section 112(d)(6). Rather, the substantive provisions in section 112(d)(2)-(3) (and section 112(d)(5), if applicable) continue to govern. For example, if as a result of "developments in practices, processes and control technologies" EPA's old MACT standards no longer comport with section 112(d)(2)-(3), the agency must revise them "as necessary" to bring them into compliance. *Id.* §

7412(d)(6). Read together with these provisions, section 112(d)(6) requires EPA to ensure its standards continue to satisfy section 112(d)(2)-(3) as practices, processes and control technologies develop.

Importantly, section 112(d)(6) serves as an ongoing ratchet to continually require EPA to update standards to keep pace with new technology in order to decrease emissions. The Clean Air Act is intended to be a technology-forcing statute that drives industry to continue finding new ways to reduce air pollution. *See, e.g.*, *Husqvarna AB v. EPA*, 254 F.3d 195, 201 (D.C. Cir. 2001) (citing cases). In particular, the MACT regulatory regime is structured to push polluting industries to control emissions to the greatest degree possible. The review and revision provision is a key method of implementing the Act's technology-forcing objective. Where there are "developments" in technology, practices, and processes demonstrating that greater emissions reductions are "achievable" and sources have achieved significantly lower level of emissions "in practice" than the current MACT standards, section 112(d)(6) requires EPA to revise its standards in accordance with CAA §112(d)(2)-(3), (6), 42 U.S.C. § 7412(d)(2)-(3), (6).

A revision to the existing standard is especially necessary under section 112(d)(6) if that prior standard was not established in a manner that complies with the requirements of the Clean Air Act. Since the adoption of the Oil and Natural Gas Production MACT, the D.C. Circuit has specifically rejected a number of practices employed by EPA to set MACT limits; including but not limited to: (1) requiring that MACT limits be achievable by all sources; (2) basing the standard on an evaluation of control technology performance rather than plant performance; (3) adopting "no control" MACT limits where active pollution controls were not in use in a subcategory; (4) employing regulatory limits where actual performance data are available; and (5) rejecting MACT floor technologies and limits based on cost or feasibility.[170] EPA has recognized its obligation to reconsider earlier-set standards where its prior approach resulted in "no control" MACT floors. Similarly, because EPA employed improper analysis in setting the initial MACT standards for oil and gas source categories, as discussed in the Buckheit Report, this demonstrates a particular need to update the standards in this rulemaking.

Moreover, the D.C. Circuit has affirmed EPA's approach in other rulemakings to "reset[] the MACT floors in order to correct its own errors." *Med. Waste Inst. & Energy Recovery Council v. E.P.A.*, 645 F.3d 420, 424 (D.C. Cir. 2011) (hereinafter *HMIWI*). In *HMIWI*, the court disagreed with Petitioner's arguments that (1) the "CAA only authorizes a one-time establishment of floors based on the level of emission control 'achieved in practice by the best controlled similar unit' for new units, and at 'the average emissions limitation achieved by the best performing 12 percent of units in the category' for existing units;" (2) that if EPA sets standards more stringent than those set during the original MACT, it must "consider cost and

[170] *See*, *e.g., 875 Mossville Environmental Action Now v. EPA, 370 F.3d 1232* (D.C. Cir. 2004); *Ne. Md. Waste Disposal Auth. v. EPA,* 358 F. 3d 936 (D.C. Cir. 2004) (*per curiam*) (municipal waste combustors); *Sierra Club v. EPA,* 353 F. 3d 976 (D.C. Cir. 2004) (copper smelters); *Cement Kiln Recycling Coal. v. EPA,* 255 F. 3d 855 (D.C. Cir. 2001) (hazardous waste combustors); *Nat'l Lime Ass'n v. EPA,* 233 F. 3d 625 (D.C. Cir. 2000) (portland cement manufacturing facilities); *Sierra Club v. EPA,* 167 F. 3d 658 (D.C. Cir. 1999) (medical waste incinerators); *Appalachian Power Co. v. EPA,* 135 F. 3d 791(D.C. Cir. 1998) (*per curiam*) (electric utility boilers).

other factors listed in the statute—either as part of an initial standard-setting process or as part of the five-year review;" and (3) that in resetting the MACT floor, EPA cannot rely on data collected after the original MACT was set. *Id.* at 424-25. Instead, the court concluded that EPA was not required to "proceed from the data set it had employed in the initial setting of the floors" because its approach was "unsupportable," *e.g.*, it "did not reliably approximate the emissions levels achieved in practice by best performing units." *Id.* at 425-26. As explained in *HMIWI*, emissions levels set in a new rule, in which EPA resets the floor, are "properly characterized not as 'beyond-the-floor,' or as a revision conducted as part of the five-year review, but as the floor-setting that is the initial step in establishing emissions standards. *See* 42 U.S.C. § 7429(a)(2), (5). The former requires consideration of the costs of compliance, but the latter does not." *HMIWI*, 645 F.3d at 426. As described in detail below, there is significant evidence demonstrating that EPA's original MACT calculation for both oil and gas subcategories is unsupported and that sufficient information exists demonstrating that facilities are achieving greater reductions in HAPs than in the existing and proposed rule.

The situation here is distinguishable from the facts in *NRDC v. EPA*, 529 F.3d 1077, 1084 (D.C. Cir. 2008) (hereinafter *HON*), in which the court explained that recalculating the floors was not necessary because "petitioners have not identified any post-1994 technological innovations that EPA has overlooked." *NRDC*, 529 F.3d at 1084. The HON Court expressly declined to decide whether EPA was required to recalculate floors where, as here, there have been developments in practices, processes, and control technologies. As noted below and discussed further in the attached Reports by Sahu and Buckheit, for these source categories, there are such "developments." Therefore, EPA cannot rely on the HON case to evade its duty to satisfy section 112(d)(6).

However, consistent with the HON decision – assuming *arguendo* that its section 112(d)(6) holding were relevant here – section 112(d)(6) requires EPA to recalculate the MACT floor when there have been advances in technology, practices, and processes, and when there is information showing that greater emission reductions have been "actually achieved." *Sierra Club v. EPA*, 479 F.3d 875, 880-81 (D.C. Cir. 2007) (explaining the requirements of section 112(d)(3)). And even the HON case acknowledges in *dicta* that EPA must set floors under the section 112(d)(6) revision. *See NRDC*, 529 F.3d at 1084 (consideration of cost in setting section 112(d)(6) standards is "troublesome" and potentially "in tension" with cases holding that costs may not be considered in setting floors). That case also does not suggest that EPA may evade the requirement to review and revise the beyond-the-floor standard, even if the initial floor remains valid. Commenters contend that, based on the information EPA has and that Commenters have placed in the record, it is therefore "necessary" for EPA to strengthen the existing MACT floor and to appropriately set a beyond-the-floor standard to ensure that the oil and gas standards comply with sections 112(d)(2)-(3) and 112(d)(6).[171]

[171] If EPA were not required at the very least to address and update the standard when significant improvements are made in practice, consistent with the overall purpose and requirements of section 112(d)(2)-(3), it would be unclear what the standard of review actually is for an action taken under section 112(d)(6). The court's only job in reviewing this action cannot be to see whether or not EPA looked at "significant developments in practices, processes, and control technologies." It must also determine whether the Administrator has made a lawful determination of whether or not it is "necessary" to update the MACT established pursuant to section 112(d). This inherently requires the court to decide whether,

In view of this statutory scheme, as part of the required section 112(d)(6) rulemaking, EPA has no justification for failing to recalculate the MACT floor and appropriately set a beyond-the-floor standard for both source categories. Here, given significant industry "developments" in pollution control practices, processes, and control technology that make it possible to achieve greater emission reductions, and EPA's failure to appropriately calculate the original MACT standards, EPA, must for the first time, properly calculate and finalize standards that satisfy section 112(d)(2) and (3) based on the status of the industry today. More information on this matter is discussed in the below sections and in the Buckheit Report to these comments, which is relied upon and incorporated fully herein.

EPA must both "look back" and "look around" in performing its section 112(d)(6) review, as the Buckheit Report explains at 2-5, and these comments fully incorporate. However, EPA fails to do so properly for reasons discussed below. In addition, contrary to statutory requirement to do a comprehensive 8-year MACT review, EPA interprets the term "developments" too narrowly, as the Buckheit Report explains throughout, *see, e.g.* p. 14. EPA simply may not limit its analysis under section 112(d)(6) as it proposes to do, but instead must take an expansive full look at the question of whether it is "necessary" to revise the section 112(d) standard in this review.

By relying on an incomplete and outdated dataset (as discussed above, in Part II.A.1.i) to set MACT floors and limits, EPA has ignored data demonstrating trends in practices, processes and technologies and the resulting improved performance that section 112(d) mandates. EPA overlooks the potential lower emissions that sources are achieving by failing to use more recent existing data. EPA ignores the potential HAP emissions that the control devices themselves emit by failing to collect such emissions data from facilities that have installed control devices. Commenters have earlier demonstrated that the 2005 NEI data have not been shown to be representative of the emissions profile of the sector. However, these data encompass a greater percentage of the sector than the 1997 data and are of a quality that is at least as credible (and indeed, less biased) than the 1997 data. Since section 112(d) states that MACT floors must be based on the performance of the best sources for which the Administrator has emissions data, EPA must now determine whether the 2005 data is sufficient for the purpose of setting MACT floors. If it is not, for all the reasons discussed above suggesting that those data are unreliable and unrepresentative, then EPA must collect the emission test data needed in order to recalculate and set a proper MACT for glycol dehydrators, storage vessels, and equipment leaks.

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after consideration of the required factors and relevant information in the record, the Administrator has made a decision consistent with section 112(d)(3). Further, EPA seems to concede that it has to engage in a beyond-the-floor analysis to determine what degree of reduction is achievable through the use of any additional reduction measures. *See* 76 Fed. Reg. at 52768-69. Just as section 112(d)(6) requires EPA to satisfy section 112(d)(2), it also requires the agency to satisfy section 112(d)(3), which gives definition to section 112(d)(2).

i. EPA Must Update the MACT Floor and Consider Setting a Beyond-the-Floor-Standard for Large Glycol Dehydrators.

As detailed in the Buckheit Report at 5-8, EPA's basis for the 1999 MACT standard for glycol dehydrators was the same as that employed in other MACT standards of that era and that subsequently have been invalidated in court. Specifically, EPA's 1997 survey of emission sources failed to capture the best performing facilities and made no effort to quantify the emissions achieved in practice of even those facilities reported in the survey results. Instead, to set the standard, EPA made a simple judgment call, concluding that "in general, the types of controls used on glycol dehydration units should be able to achieve a minimum of 95 percent HAP emission reduction." *See* Buckheit Report at 6 (citing 1997 MACT Floor Memo at 8). EPA's conclusion ignored data in the 1999 rulemaking record demonstrating facilities had achieved HAP control efficiencies of up to 99 percent. Had EPA considered those control efficiencies in its MACT analysis, a different existing source MACT floor and limit would have been required. Buckheit Report at 6-7. In the present rulemaking, EPA improperly relies on the 1999 MACT conclusion and the deficient 1997 survey of facilities' control efficiencies. EPA now must resolve the information gaps that exist and revise the existing standards for emissions from large glycol dehydrators to reflect the level of performance that is being achieved today. *See* Buckheit Report at 8-9.

EPA has made no attempt to correct the deficiencies of the 1999 rulemaking identified in the detailed Buckheit Report, nor has it fully considered the more robust control efficiencies achieved by available control technologies and emissions systems that were known to EPA at the time of the 2011 review. See Buckheit Report at 8-12. To fix these flaws, EPA now must calculate the MACT floor for each HAP emitted by large glycol dehydrators and set MACT standards for these HAP sources that accurately reflect the emissions levels of the most efficient performers as required by 112(d).

In addition and partly as a consequence of its unlawful reliance on the prior standards, EPA also has failed to fulfill the beyond-the-floor requirement of section 112(d)(2). Absent an up-to-date analysis based on current emission controls, an appropriate beyond-the-floor determination cannot be made. Only after the MACT floor has been properly determined, can EPA conduct a meaningful beyond-the-floor analysis in accordance with 112(d)(2).

When it recalculates the MACT for large glycol dehydrators, EPA must update this standard so it is not based solely on the performance of EPA's identified control technology, but on the emission level achieved by the best performing sources; EPA's rule (after the proposed removal of the benzene alternative compliance option) simply requires these sources to reduce all HAP emissions by 95 percent instead of setting numeric limits for each HAP emitted. 76 Fed. Reg. 52,769, 52,783; 40 C.F.R. § 63.1275(c)(2). EPA has not shown that this will actually reduce each emitted HAP in a manner that satisfies the "MACT" requirement, to set a standard based on what emission reductions have been "achieved" in practice and based on the "maximum achievable" emissions reduction. 42 U.S.C. § 7412(d)(2)-(3). Section 112(d)(6) and 112(d)(3) each require EPA to set a numeric limit for each HAP emitted by the source category. It is "necessary" under section 112(d)(6) for EPA to close inherently unlawful gaps in the original MACT, by setting a standard for an uncontrolled HAP. Under CAA § 112(d), EPA has

a "clear statutory obligation to set emission standards for each listed HAP." *Nat'l Lime Ass'n v. EPA*, 233 F.3d 625, 634 (D.C. Cir. 2000). Therefore, EPA must set an emission standard for each HAP on the section 112(b)(1) list that this source category emits, including BTEX and other individual HAPs emitted by glycol dehydrators. It is unlawful, arbitrary, and capricious that EPA has failed to set numeric limits for each HAP emitted by large glycol dehydrators. Such standards can and should be issued in terms of pounds of the specific HAP emitted per unit of natural gas throughput (lb/MMScf).

ii. EPA Must Update the MACT Floor and Consider Setting a Beyond-the-Floor Standard for Storage Vessels with the Potential for Flash Emissions (PFE).

In its 1999 rulemaking, EPA did not identify the best performing units, nor did it ascertain the performance achieved by those units. EPA made no attempt to determine the performance of the top performing 12 percent of the category for which it had data or, for new sources, the performance of the best performing facilities. Buckheit Report at 13. EPA asserted that the data in its possession at that time were inadequate and simply assigned an efficiency of its chosen control technology. Because this method has been found to be unlawful and substantially more data are available at this time, EPA must now recalculate the MACT floor and MACT limits for tanks with the potential for flash emissions. *Cement Kiln Recycling Coalition, et. al. v. U.S. EPA*, 255 F.3d 855, 863-64 (D.C. Cir. 2001). Moreover, without explanation, the 1999 rule failed to set a MACT limit for the entire universe of storage vessel units, even though they were identified as major contributors of HAP emissions at that time. EPA appropriately chooses to propose new rules for these unregulated sources of HAP emissions, but fails to conduct a sufficient MACT determination as described in Part III.C.3.

EPA's 2011 review does not attempt to correct the deficiencies of the 1999 rulemaking and instead simply relies on the 1997 survey results to affirm the existing MACT for PFE vessels and to set the MACT floor for previously unregulated storage vessels. Importantly, the 1997 data are not representative of the current emissions profile of the categories at issue. Again, EPA has failed to identify the best performing 12 percent of existing sources and does not correct the new source MACT floor. EPA must use the most comprehensive and accurate available data concerning the performance of the sources within the categories. EPA must now conduct a separate examination of the appropriate new source MACT floor and new source MACT limits for storage tanks with flash potential.

In addition and partly as a consequence of its unlawful reliance on the prior standards, EPA also has failed to fulfill the beyond-the-floor requirement of section 112(d)(2). As stated above, absent an up-to-date analysis based on current emission controls, an appropriate beyond-the-floor determination cannot be made.

iii. EPA Failed to Set an Adequate MACT Standard for Leak Detection and Must Do So.

In establishing the 1999 Subpart V NESHAP for equipment leaks, EPA unlawfully identified the worst expected performance of those plants that employed a broadly defined class

of equipment leak prevention, detection and repair processes, rather than the performance achieved by the best performing facilities. *Cement Kiln*, 255 F.3d at 863-64. Without analysis or an attempt to identify the top performers, EPA simply recommended use of the existing Subpart KKK NSPS. EPA ignored more stringent leak detection and prevention programs that existed in California. Indeed, the new source MACT floor should have been at least as stringent as the most stringent California programs in place at that time, yet EPA's MACT Floor Memo provided no rationale for failing to consider more stringent programs. Furthermore, as described in the Buckheit Report, EPA did not set the MACT floor at the level of the Subpart KKK program in several important respects. Most notable is the fact that the Subpart KKK NSPS leak detection program applies to all components in VOC service, thus exempting components servicing streams with less than 10 percent VOC content, while the Subpart V rule adopted by EPA provides an exemption for all components servicing streams with less than 10 percent volatile HAP content. This exemption is provided without any evaluation of the impact on emissions, level of control, or rule effectiveness.

EPA also carried over from Subpart V a number of exemptions and deferred monitoring and repair options that are artifacts of the NSPS program that, unlike the MACT floor, is permitted to consider cost. These exemptions include deferrals for equipment that is unsafe or difficult to monitor, or deferral if the repair would require a shutdown of the process. EPA also provided an option for sources to agree to more frequent monitoring in exchange for an acceptable 2 percent leak rate. This exemption does not contain any cap on the amount of HAP emissions which may result, and appears to have been done as a matter of routine, without any consideration of the public health impacts, or any determination of how 2 percent compares to the leak rates achieved by the best performing facilities. Notably, this exemption applies to the new source MACT limits as well as those for existing facilities. See Buckheit Report at 16-17.

If EPA chooses to continue to use only a work practice standard to address equipment leaks, EPA also needs to explain why a work practice standard, as opposed to a numeric emission limit, is lawful under section 112(h)(4), 42 U.S.C. § 7412(h)(4), which generally requires a numeric standard. It has failed to do so here.

In addition and partly as a consequence of its unlawful reliance on the prior standards, EPA also has failed to fulfill the beyond-the-floor requirement of section 112(d)(2). As stated previously, absent an up-to-date analysis based on current emission controls, an appropriate beyond-the-floor determination cannot be made.

2. EPA's Eight-Year MACT Review Fails to Consider Emission Reduction Developments in the Oil and Gas Industry

i. Technology/Practices/Processes Developments for Glycol Dehydrators.

EPA's 112(d)(6) eight-year MACT review fails to consider control practices, processes, and technologies that are achieving HAP emission levels well below the existing and proposed standards for glycol dehydrators. In addition, in setting a federal standard, EPA must look to

jurisdictions with the most stringent standards for HAP emissions to gather data from facilities and information about control systems that are attaining the highest control efficiencies.

Specifically, Wyoming offers regulated entities two options for compliance with state emissions standards from glycol dehydrators ranging from 98 percent to 100 percent HAP control efficiency. Under "Scenario 1," new facilities in the Pinedale Anticline Development (PAD) area must achieve a 98 percent reduction in VOC and HAP emissions. Single well facilities in other areas must install reboiler still vent condensers. If VOC emissions at any of these facilities are still at least 6 tons per year (tpy), then the technology-neutral requirement of a 98 percent reduction of all emissions is triggered.[172] "Scenario 2" is technology-specific, and requires that all new and modified facilities install glycol flash separators and reboiler still vent condensers. If VOC emissions are still at least 8 TPY, then the technology-neutral requirement of a 98 percent reduction of all emissions is triggered.[173] If glycol flash separators or reboiler still vent condensers do not achieve a 98 percent reduction, then a combustion device must be used to destroy HAPs and VOCs.[174] In Texas, New Source Review compliance requires combustion units for glycol dehydrators and claims that dehydrators so equipped can achieve 98 percent destruction of VOCs.[175]

Moreover, EPA's review for glycol dehydrators failed to consider control technologies that are achieving significantly greater HAP emission reductions than the existing and proposed rule. For example:

1) Oxidation units can achieve total emissions reductions of up to 99 percent. These units capture vapors from the still column before they are vented to the atmosphere. Either a low pressure flare system or a thermal incinerator may be used. While similar, a thermal incinerator is distinguishable by its use of a refractory lined chamber to contain flame heat and promote additional combustion. The flare system can destroy up to 98 percent of emissions, while incinerators may destroy up to 99 percent.[176] The Wyoming Department of Environmental Quality (DEQ) recommends using enclosed smokeless combustion devices or smokeless flares to comply with state standards.[177]

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[172] Wyo. Air Quality Division, *Oil and Gas Production Facilities Permitting Guidance* (March 2010), *available at* http://deq.state.wy.us/aqd/Oil%20and%20Gas/March%202010%20FINAL%20O&G%20GUIDANCE.pdf (attached in Appendix).

[173] *Id.*

[174] *Id.*

[175] Tex. Comm'n on Envtl. Quality, *TCEQ Chemical Sources Current BACT Requirements* (Oct. 2006), *available at* http://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/bact/bact_glycoldehyd.pdf (attached in Appendix).

[176] Methane-to-Markets, *Glycol Dehydrators*, http://tinyurl.com/797oymq (last accessed Nov. 13, 2011).

[177] Wyo. Permitting Guidance 2007, *supra* note 172.

2) Condensation units used in conjunction with a flash tank upstream of the reboiler and a combustion unit can destroy nearly all emissions, including all HAPs.[178] Importantly, condensers are inadequate to meet even the proposed federal NESHAP standard, but used in conjunction with these other devices, they can achieve HAP reductions well above the proposed and existing rule.
3) Zero emissions dehydrators, as described by EPA, are achievable by reusing vapors for fuel prior to their release to the atmosphere, and by using electric power instead of gas to power pumps.[179]
4) Desiccant dehydrators are an alternative to glycol dehydrators. Desiccant dehydrating salts remove water from the gas without emitting much methane, VOCs, or HAPs. Deliquescent salts, such as calcium, potassium and lithium chlorides, attract and absorb moisture. Calcium chloride, the most common and cheapest desiccant, can achieve pipeline-quality moisture contents at temperatures below 59ºF and pressures above 250 pounds per square inch (psig). Lithium chloride, which costs more, has a wider operating range: up to 70ºF and above 100 psig.[180] Unlike glycol dehydrators, which continuously vent gas, desiccant dehydrators only release emissions during desiccant vessel depressurizing for salt refilling, typically one vessel-volume per week. The exact amount of emissions is unclear.[181] A drawback to desiccant dehydrators is limited functionality. Nonetheless, EPA must evaluate desiccant dehydrators because of their reduced HAP emissions.

ii. Technology Developments for Storage Vessels.

EPA failed to conduct a comprehensive evaluation of advances in control technologies for storage vessels. EPA must examine advances in vapor recovery unit technology and reconsideration of floating roof technology for tanks containing liquids that do not have the potential for flash emissions. See Buckheit Report at 10-12. As described in the Buckheit Report, EPA improperly rejected technology advances and developments in pollution prevention systems found in its own RBLC database and employed by its own Natural Gas Star partners. See Buckheit Report at 14. Specifically, EPA failed to evaluate the performance achieved by systems that use thermal or catalytic oxidizers, either alone or in combination with condensers. EPA also must evaluate the use of combustion devices and vapor recovery units that capture vent steam from the tank and turn it into a saleable product by recompressing the hydrocarbon vapors.[182] EPA simply rejects other technology advances by asserting that those technologies were considered in the 1999 rulemaking, but fails to provide support for its decision in either the

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[178] Glycol Dehydrators Fact Sheet, *supra* note 172.

[179] EPA Gas Star, *Zero Emissions Dehydrators* (Oct. 2004), *available at* http://epa.gov/gasstar/documents/zeroemissionsdehy.pdf (attached in Appendix).

[180] EPA Gas Star, *Replacing Glycol Dehydrators with Desiccant Dehydrators* (Oct. 2006), *available at* http://www.epa.gov/gasstar/documents/ll_desde.pdf (attached in Appendix).

[181] *Id.*

[182] Colo. Guidance for Oil and Gas MACT Standard, *supra* note 202.

record of the 1999 rulemaking or the current record. Indeed, EPA must provide a basis for its decisions and conclusions.

In addition, EPA must look to jurisdictions like Wyoming, which impose more stringent reductions in emissions from storage vessels, to ascertain information about control devices and systems achieving 98 percent or greater reductions in HAP emissions.[183]

iii. Developments in LDAR.

EPA proposes to employ the 500 ppm leak detection threshold of Subpart VVa rather than the 10,000 ppm leak detection threshold of Subpart VV as the work practice standard for equipment leaks, a significant improvement that has been shown to be feasible in other sectors. However, EPA has not shown that Subpart VVa LDAR practices represent the existing source MACT floor and it is clear, based on a review of the rules in several California jurisdictions, that Subpart VVa does not represent the new source MACT floor. EPA needs to conduct a far more comprehensive evaluation of the LDAR practices employed in the sector and the level of performance achieved by the best facilities. Additionally, the proposed regulation retains a number of exemptions and deferred repair options, which appear to be artifacts of 1980s' NSPS regulations, where, unlike in the context of the MACT floor analysis, cost may be considered.[184] EPA has not attempted to justify these exemptions or quantify their impact on HAP emissions. A careful review of the current LDAR procedures will, in all likelihood, establish that the better performing facilities do not avail themselves of these exemptions and that these exemptions do not belong in the MACT floor determination for either existing or new sources. It is important to note that EPA may rely on the established regulatory thresholds only where it does not have actual performance data available. EPA must review the compliance reports filed by the industry over the years and determine the "best performers" on the basis of the sources that consistently have the lowest leak detection levels, the fewest leaks, and the smallest percentage of "unrepairable leaks."

New sources within the category must be required to employ advanced "zero emissions technologies" where technically feasible, and, at a minimum, as demonstrated by the best performing source.[185] EPA must review more carefully the list of available technologies, including, but not limited to leakless valve technology improvements and improvements in practices that reduce the number of leaks by using a greater percentage of leakless devices. At a minimum, the new source MACT LDAR program must not be less stringent than the BAAQMD rules that currently cover 5 refineries with over 200,000 components. Further, there is no reason

[183] Wyo. Permitting Guidance 2010, *supra* note 172.

[184] For this reason, sources must be required to comply with the most stringent LDAR requirements applicable and must not be allowed to choose the least effective requirement, as is currently permitted.

[185] Encana – a natural gas firm – promotes a product for its pilot valves that it claims eliminates all leaks from those valves. The leak rate on a conventional pilot valve is 7.9 liters per minute, which calculates to 147 mcf (or 147,000 cubic feet) per year. According to Encana, a WellMark Mizer Low Bleed Level Control has a leak rate of 0 liters per minute. EPA Gas Star, *Encana Presentation*, http://www.epa.gov/gasstar/documents/workshops/2008-tech-transfer/rocksprings3.pdf (last accessed Nov. 13, 2011) (attached in Appendix).

to exempt new compressors at the wellhead from the requirement to utilize best technology for seals.

The best technical approach to provide for prevention, detection and repair of BTEX, n-hexane, mercury and other HAPs that are present in natural gas leaks in a gas stream that is largely methane is to prevent, detect and repair leaks of the largest and thus most easily detectable portion of the gas stream (*i.e.,* methane leaks). By way of analogy, if one were attempting to detect and repair leaks of a dangerous neurotoxin present at parts per million levels in an aqueous solution, looking for water leaks would be far more effective than attempting to detect trace amounts of the neurotoxin, even though the toxin is the regulated pollutant at issue. The ability of the devices employed to detect a leak of VHAP at oil and natural gas processing plants is enhanced, especially at the lower leak detection limits that should be employed, if one calibrates those detection devices and sets the applicable leak thresholds to include the entire stream of organics that is being processed. Many existing programs already require that the Method 21 monitors be calibrated by using methane, and the existence of programs, such as BAAQMD, that specifically require tracking of methane as part of their overall control of organic chemical emissions demonstrates that such programs are feasible and must be considered MACT for control of HAPs. EPA has already recognized that an improved LDAR program is MACT for natural gas processing plants, but has not taken the steps necessary to identify and provide for a MACT level LDAR program. See Buckheit Report at 26.

The LDAR program must include all components that are in hydrocarbon service. The exemptions for components that come in contact with streams that are less than 5 percent HAP or less than 10 percent are based on cost and must not be imported into MACT floor determinations, especially where, as here, EPA has not quantified the exemption's impact on public health. Such an exemption cannot be authorized for new sources since sources within the BAAQMD, where this exemption is not available, comply with more stringent equipment leak monitoring requirements.

Certain monitoring deferrals at existing facilities should be conditioned on the replacement of equipment with leakless technology at the next facility turnaround. For example, replacement must be required when deferrals are given to equipment designated unsafe (including equipment that is more than 2 meters above a support surface), difficult to monitor or repair (up to 3 percent of total valves), or to equipment that requires process shutdown.[186] The option for sources to agree to more frequent monitoring in exchange for not having to repair all leaking equipment[187] must be reviewed in light of the experience in California and elsewhere. See Buckheit Report at 24. EPA must determine whether exemptions at these levels are consistent with the notion of "maximum achievable control technology" and the requirement that MACT floors be established based on the performance of the best performing facilities.

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[186] Not to exceed a period of five years.

[187]Under this option a 2 percent leak rate is acceptable- forever. In calculating the leak rate sources are allowed to exclude an additional 1 percent "unrepairable" leaks from this rate after the first quarter. This practice must also be eliminated.

Gross emitters (above a specified emission rate) must not be allowed to continue to emit until the next facility turnaround and should not be made eligible for deferred repair times. Allowable repair deferral limits must be restricted to those components that leak below the specified limit. The new source NESHAP must require the use of leakless designs, where such equipment is commercially available, for those leaking components that would require a plant shutdown to repair and for equipment that is "unsafe to monitor" and "difficult to monitor." For new sources EPA must limit its "nonrepairable" exemption to a failure of leakless design components.

Specific components have been found to be more prone to leaks and to require more frequent repairs. Since the purpose of the rule is to prevent leaks rather than to simply chase existing leaks in a game of Whac-A-Mole, the MACT standard for new and existing units must require a component to be replaced with upgraded technology if the number of leaks within a specified time period exceeds a threshold specified in the rule. For example, South Coast Air Quality Management District rules require that components subject to repair more than 5 times within a year be replaced with BACT/BARCT or be vented to an approved air pollution control device. Ventura County Air Pollution Control District ("Ventura County APCD") rules are similar, except that Ventura County also lists the improved control options that may be employed.[188]

In the late 1990's, EPA discovered flagrant, industry-wide violations of several CAA requirements at the nation's refineries.[189] Among the most significant violations were LDAR rule violations where refiners, and independent contractors hired by refiners, routinely underreported by up to 10 times the number of leaking valves, which resulted in significant excess emissions. The ensuing enforcement actions led to 29 settlements with operators, comprising over 90 percent of the refining capacity in the country. These settlements required improved LDAR practices, including lower leak detection limits, $82 million in fines and $75 million in Supplemental Environmental Projects. This experience[190] demonstrates a need for detailed independent oversight of LDAR activities. In the absence of a sustained Federal focus on this issue and recognizing the likely lack of state resources in the near future, it would seem

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[188] See, SCAQMD Rule 1173(g)(3) and Ventura County APCD Rule 74.7. Under the Ventura County rule, for example, if a valve is found to have suffered 5 major leaks in a year it shall be replaced by a valve with a bellows seal, or with graphite, PTE or PTFE stack chevron seal rings, or with BACT technology level components. The South Coast Air Quality District requires that natural gas facilities be maintained in a leak-free condition, as determined in accordance with EPA Method 21 procedures, but with tighter timelines for repairs. Light liquid, gas, and vapor component leaks of more than 1,000 and up to 10,000 ppm must be repaired in 14 calendar days. Leaks of more than 10,000 ppm and up to 50,000 ppm must be repaired within 5 calendar days. Leaks greater than 50,000 ppm, and leaks of light liquid at greater than 3 drops per minute must be repaired within 1 calendar day. These are more stringent repair schedules than the maximum 15 days permitted under Method 21. 40 CFR Part 60, App. A.

[189] http://www.epa.gov/compliance/resources/cases/civil/caa/oil/index.html; http://www.epa.gov/compliance/resources/newsletters/civil/enfalert/emissions.pdf (attached in Appendix).

[190] As does the recent Pelican refinery criminal prosecution in Louisiana.

that MACT should include some form of independent auditing of LDAR programs. EPA could require an independent audit of sources with a large number of components, perhaps once every five years. Smaller sources could be exempt from the obligation to conduct their own audits if they participated in an industry-sponsored "random audit program" where a certain percentage of smaller sources were occasionally audited.

In three of its four options, EPA considered the use of optical scanning devices as a means of reducing LDAR inspection frequencies. Current and even advanced LDAR programs have been shown to be cost-effective MACT and EPA is correct that optical scanning devices have not been shown to be as effective as LDAR programs, and cannot quantify emissions. EPA also has identified ultrasound detection as a potential LDAR tool. Ultrasound and optical scanning programs can, however, be a part of an overall improved LDAR program.[191] Use of these devices involves some modest level of investment. However, once purchased, these devices can provide an extremely low cost means of filling LDAR program gaps. Daily or weekly scans can identify plant areas containing gross emitters for targeted LDAR inspections. Such inspections could replace scheduled inspections and save operators money by detecting leaks early, while improving the environmental performance of the facility. In addition, even well designed LDAR programs do not require monitoring of all devices at a facility (e.g., leakless valves). Anticipating all potential or likely sources of leaks at the complex facilities in this sector, which may have 50,000 components or more, is likely impossible. Remote scanning devices can serve to identify problem areas that may require more frequent monitoring and areas which, though not currently monitored, are significant sources of organic HAP emissions.

C. EPA Fails to Establish Appropriate MACT Standards for Small Glycol Dehydrators and Storage Vessels.

Commenters applaud EPA's action to control previously unregulated sources of emissions in this proposed rule, including subcategories of glycol dehydrators (i.e. small dehydrators) and storage vessels that do not have the potential for flash emissions. *See* 76 Fed. Reg. 52,767-68. While EPA must expeditiously promulgate the vitally important standards for these previously uncovered sources, EPA's failure to use recent data for analysis and to calculate the MACT floor based on data reflective of recent industry trends is unacceptable and is a violation of § 112(d).

[191] EPA also must evaluate the effectiveness of Smart LDAR Infrared cameras. See Rob Ferry, *CELE Update: Status of Research Projects*, http://www.api.org/meetings/proceedings/upload/CELE_Update.pdf (last accessed Nov. 13, 2011) (Attached in Appendix). Infrared cameras can detect leaks from distances of up to 10 meters, and can detect, among other gases, BTEX, butane, hexane, methane, methanol, octane, and propane. RasGas, *The Leak Detectives*, http://www.rasgas.com/magazine_articles.cfm?news_id=143 (last accessed Nov. 13, 2011) (Attached in Appendix).

1. EPA must properly calculate and set a MACT under Section 112(d)(2)-(3) for small glycol dehydrators rather than relying on the incomplete and outdated data.

Clean Air Act section 112 requires EPA to set a NESHAP for each category or subcategory of "major sources" of HAP emissions. 42 U.S.C. § 7412(d)(1). EPA must set section 112(d) emission standards based on "maximum achievable control technology" or "MACT." EPA has settled on a two-step process. First, the EPA Administrator identifies a MACT "floor" for each pollutant and source category, which is the minimum required reduction in emissions for a new or existing source. For "new sources" of HAP emissions, the MACT "floor" is "the emission control that is achieved in practice by the best controlled similar source." For "existing sources," the MACT floor is "the average emission limitation achieved by the best performing 12 percent of the existing sources" or, if there are fewer than 30 sources in a given category, "the average emission limitation achieved by the best performing five sources." 42 U.S.C. § 7412(d)(3).[192] To satisfy the "floor" requirement, "EPA must 'demonstrate with substantial evidence - not mere assertions' that the chosen floors represent 'a reasonable estimate of the performance of the [best-performing] units.' "[193] In simple terms, the section 112(d) technology-based approach "require[s] all sources in a category to at least clean up their emissions to the level that their best performing peers have shown can be achieved."[194] Then, in the second step, known as the "beyond-the-floor" analysis, the EPA Administrator determines whether a limitation more stringent than the MACT floor is "achievable," taking into account the "cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements." 42 U.S.C. § 7412(d)(2).[195]

The proposed NESHAP includes MACT standards for "small" glycol dehydrators, for which the emissions are not controlled under the existing standards. In the Oil and Natural Gas Production source category, the subcategory consists of glycol dehydrators with an actual annual average natural gas flowrate less than 85,000 standard cubic meters per day (scmd) or actual average benzene emissions less than 0.9 megagrams per year (Mg/yr). The proposed MACT standards would require that existing affected sources meet a unit-specific BTEX limit of 1.10 x 10^{-4} grams BTEX/standard cubic meters (scm)-parts per million by volume (ppmv) and that new

[192] Control technology is only one factor in determining emissions levels of the best performing similar sources. As such, EPA cannot base floors exclusively on technology; other factors, such as fuel inputs and raw materials, also must be part of the best performing similar source determination. *National Lime Association v. U.S. EPA*, 233 F.3d 625, 633 (D.C. Cir. 2000).

[193] *Ne. Md. Waste Disposal Authority v. U.S. E.P.A.*, 358 F.3d 936, 954 (D.C. Cir. 2004) (*quoting Cement Kiln Recycling Coal. v. EPA,* 255 F.3d 855, 866 (D.C. Cir. 2001) and *Sierra Club v. EPA,* 167 F.3d 658, 662 (D.C. Cir. 1999)).

[194] *Sierra Club v. U.S. EPA*, 353 F.3d 976, 980 (D.C. Cir. 2004).

[195] The MACT "floor" must be determined "without regard to costs or other factors and methods listed in section 7412(d)(2)." *See Nat'l Lime Ass'n v. EPA,*233 F.3d 625, 640 (D.C. Cir. 2000); *see also NRDC v. EPA*, 489 F.3d 1364, 1375-76 (D.C. Cir. 2007).

affected sources meet a BTEX limit of 4.66 x 10^{-6} grams BTEX/scm-ppmv.[196] In the Natural Gas Transmission and Storage source category, the subcategory consists of glycol dehydrators with an actual annual average natural gas flowrate less than 283,000 scmd or actual average benzene emissions less than 0.9 Mg/yr. The proposed MACT standard for the subcategory of small dehydrators would require that existing affected sources meet a unit-specific BTEX emission limit of 6.42 x 10^{-5} grams BTEX/scm-ppmv and that new affected sources meet a BTEX limit of 1.10 x 10^{-5} grams BTEX/scm-ppmv.[197]

EPA largely bases its MACT proposal for small glycol dehydrators on emissions data collected from the industry during the development of the original MACT standards. 76 Fed. Reg. 52,768. The data was collected prior to 1997 and did not adequately represent the emissions profile at that time, and does not reflect the significant changes in the industry and other technological developments that have occurred during the past 13 years. Consequently, EPA has not provided a reasoned explanation of how those data could be representative of currently operating glycol dehydrators and associated emission reductions, and how proposals based on those data can currently meet the MACT requirements for new and existing sources.[198] This is especially critical in light of the fact that the 2005 NEI data reveal that improvements in the environmental performance of the category have progressed such that there are far more units in service with lower emissions than what is reflected in the 1997 data.[199] Where recent actual emissions data of higher quality than the legacy data are readily available to the agency, the use of legacy data, that fail to reflect industry developments, for calculating a numeric standard at both the floor and beyond-the-floor stages of the MACT analysis is arbitrary and capricious, and not in accordance with law.[200]

EPA asserts that the 1997 data are adequate because they represent data from a varied group of sources, such as units owned by different companies, and because processes have not changed significantly for glycol dehydrators since the data were collected. 76 Fed. Reg. at 52,768. This assertion is flawed; in fact, dehydrator technology performance in 1997 was not accurately reflected in the legacy EPA dataset and has advanced significantly in the past thirteen years. An assessment today of the controls and emission rates from the top performing dehydration units would result in more accurate estimates for potential emissions reductions.[201]

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[196] 76 Fed. Reg. at 52,746.

[197] *Id.*

[198] See Sahu Report; Buckheit Report at 9-11.

[199] See Buckheit Report at 10.

[200] See *supra,* note 50; see Sahu Report at 23-28; Copeland and Williams, *Methane Related Comments on EPA's "Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews," Proposed Rule, August 23, 2011* (attached in Appendix).

[201] Copeland and Williams, *Methane Related Comments on EPA's "Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews," Proposed Rule* at p. 43.

While we support EPA's efforts to reduce harmful pollution from previously uncontrolled sources, EPA's attempt to calculate a MACT floor standard for these unregulated sources using outdated data fails to meet the statutory requirements that new facilities limit their emissions to a level achieved by the "best controlled similar source" and, for existing facilities, to "the average emission limitation achieved by the best performing 12 percent of the existing sources." 42 U.S.C. § 7412(d)(3).

2. EPA must determine a MACT floor for all HAPs emitted by small glycol dehydrators.

EPA's failure to extend HAP standards for small glycol dehydrators to HAPs other than BTEX violates 112(d)(2),(3) and (6). Under the proposed rule, BTEX are the only HAPs that EPA proposes to control with any specificity despite the agency's obligation to regulate each listed HAP emitted by the source categories. 42 U.S.C. § 7412(d)(1); *see also Nat'l Lime Ass'n v. E.P.A.*, 233 F.3d 625, 634 (D.C. Cir. 2000). Commenters assume that EPA does not intend to regulate additional HAPs through the use of surrogates because EPA has not identified any surrogates or provided any explanation for the use of surrogates in this rulemaking. *See Nat'l Lime Ass'n,* 233 F.3d at 639; *see also Mossville Envtl. Action Now v. E.P.A.*, 370 F.3d 1232, 1243 (D.C. Cir. 2004) (EPA must demonstrate that a "correlation exists" between two pollutants when deciding to use a surrogate, and EPA must memorialize that correlation in "a fashion that commenters, interested members of the public, regulated entities, or … a reviewing court, can assess."). Pursuant to 112(d)(2)-(3) and (6), when setting MACT for the first time for small glycol dehydrators, EPA must set a numerical limit both on BTEX pollutants and on other HAPs emitted by these sources. For example, there is information available from Colorado showing that glycol dehydrators emit other HAPs such as n-hexane, 2,2,40-trimethylpentane, ethylene glycol, and possibly others.[202]

As proposed, EPA's BTEX MACT standard for small glycol dehydrators relies on emission factors. 76 Fed. Reg. at 52,768-69. Importantly, emission factors are based on the average results of limited testing of some sources within the sector; as such, they cannot be relied on to determine the emissions profile of the category or to identify the best performing sources within the category.

If using emission factors, EPA must require robust monitoring to ensure transparency and effective enforcement. EPA must adopt numeric standards for the individual pollutants and adopt monitoring and enforcement measures that require facilities to accurately and clearly report their emissions reductions of all HAPs. Monitoring requirements must include continuous measurement from a sufficient number of monitors and regular verification and oversight by the permitting agency. The Clean Air Act provides for citizen enforcement so that citizens can enforce the work of EPA and ensure that public health is adequately protected. Absent clear monitoring and reporting, citizens will not have the confidence and ability to enforce the rule.

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[202] Colo. Dep't of Pub. Health & Env't, *Guidance for 40 CFR 63 Subpart HH Oil and Natural Gas Production MACT Standard* at 19 (July 15, 1999), *available at* http://www.cdphe.state.co.us/ap/down/ongmact.pdf (attached in Appendix).

3. EPA Must Properly Calculate the MACT Floor for Previously Uncontrolled Storage Vessels.

EPA is correct in recognizing that, under the statute, a MACT limit is needed for previously uncontrolled sources that emit HAPs in significant quantities, including all storage vessels in the Oil and Natural Gas Production source category. Commenters fully support EPA's efforts to adopt MACT limits for these sources. However, EPA fails to follow the required steps to set this floor. Instead, EPA simply proposes to set the MACT floor at the level reached by the EPA in its MACT analysis during its original 1997 rulemaking. 76 Fed. Reg. at 52,769. EPA fails to provide adequate justification for using the existing rule, based on old data, as the primary basis for its proposed revisions; nor does it describe how that dataset reflects changed industry conditions and increases in HAP emission reductions of the best performing sources within the Oil and Gas Production category.[203]

Although EPA's original MACT analysis covered all storage vessels, it issued a MACT standard at that time that applied to storage vessels with the potential for flash emissions (PFE) only. While we support EPA's effort to correct this omission, the initial analysis for the tanks that the agency did regulate in 1999 was seriously flawed, and the proposed rule provides no justification for continuing to rely on a 13-year old analysis to propose a MACT standard for an entirely new universe of storage vessel sources. Importantly, EPA fails to demonstrate, as required, how emissions data collected for a 13-year old rulemaking is representative of today's best performing similar sources especially given the sector's significant technological developments. *See, e.g.*, *Mossville Envtl. Action Now v. E.P.A.*, 370 F.3d at 1241. When EPA develops MACT standards for a source for the first time, it must calculate the MACT floor in accordance with statutory requirements. *Nat'l Lime Ass'n v. E.P.A.,* 233 F.3d 625 (D.C. Cir. 2000). Thus, EPA's failure to calculate the MACT floor in setting the MACT standard for storage vessels violates section 112(d)(2)-(3).

In addition, as described in detail above, EPA's technology review for storage vessel control technologies is limited and makes incorrect assumptions. Without further support, the public cannot understand and EPA cannot justify its proposed decision; therefore, EPA's proposal is arbitrary and capricious.

4. EPA Must Conduct an Updated Beyond-the-Floor Analysis for Both Newly Controlled Emission Points

EPA must determine a proper beyond-the-floor MACT level for both small glycol dehydrators and storage vessels, by determining the "maximum degree of reduction in emissions" that is achievable, as required under section 112(d)(2). 42 U.S.C. § 7412(d)(2). The proposed rule fails to provide any discussion of a beyond-the-floor determination for storage vessels.

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[203] *Mossville Envtl. Action Now v. E.P.A.*, 370 F.3d 1232, 1241 (D.C. Cir. 2004) (summarizing § 112 case law establishing that EPA must provide evidence showing the data and estimates it relies on are "reasonable" in assessing what the best performers are actually achieving).

For the same reasons it cannot rely on the outdated analyses in establishing the MACT floors, described above, EPA must now perform an up-to-date analysis based on current emission controls. Absent this analysis, EPA's beyond-the-floor determination for the proposed rule is arbitrary and capricious. Once the MACT floor has been properly determined, EPA must conduct beyond-the-floor analyses in accordance with 112(d)(2). *Nat'l Lime Ass'n v. E.P.A.*, 233 F.3d 625, 634 (D.C. Cir. 2000) (requiring EPA to reassess beyond-the-floor levels for mercury and total hydrocarbons because its floor analysis was flawed).

D. EPA must set a MACT limit for all currently uncontrolled HAP emissions for these source categories.

Commenters urge EPA to set a standard to control all HAP emissions, including those that the existing MACT standard does not already control.[204] EPA recognizes that additional sources of HAP emissions from these source categories exist; yet it inexplicably fails to propose an emission reduction limit.

EPA is legally required to set a MACT limit for the emissions from all of the emission points listed in Part II.A.1.ii. above in the oil and gas sector. Its duty to do so now is not extinguished by the fact that it initially failed to regulate other emission points. EPA must regulate all major HAP emission sources in this sector under both section 112(d)(2)-(3) and section 112(d)(6). Importantly, EPA's 112(d)(6) review of the existing MACT reopens that standard for review and revision in full. Because the existing standards are set under section 112(d)(2)-(3), EPA must review and revise as necessary the existing standards to ensure compliance with those provisions, and EPA must take account of new technological or industrial developments. Because of developments in the industry, EPA has no excuse for not recognizing that revisions are "necessary." As part of its MACT review under section 112(d)(6), EPA discovered various uncontrolled emission points, and it is therefore "necessary" and legally required that EPA set a limit for HAPs from these points.

Also, EPA must provide a reasoned analysis of sources that it chooses not to control under the proposed rules because it believes NESHAPs for other source categories will adequately control HAP emissions from those sources, e.g., combustion sources. That discussion must describe the characteristics of those sources and how their emissions are controlled by other NESHAPs, including whether control measures under other NESHAPs have been updated pursuant to section 112(d)(6) such that they address recent trends in control technology and emission reductions. Accordingly, EPA must evaluate a comprehensive set of emissions points at major sources and, based on technical arguments and current data, select the range of HAP sources within the two sectors to be covered by this rulemaking.

EPA's failure to identify and analyze numerous HAP emission sources within the sectors makes it difficult, if not impossible, to identify all the HAPs that are emitted from the various sources in these sectors. Commenters fully incorporate and add comments in Part II.A.1.ii,iii on

[204] 76 Fed. Reg. at 51767-78; *Nat'l Lime Ass'n v. E.P.A.,* 233 F.3d 625, 637 (D.C. Cir. 2000)(requiring emissions standards for each HAP, but can use a surrogate if EPA has demonstrated that it is reasonable to do so).

EPA's section 112(d) proposal. Indeed, EPA notes that emission estimates for key HAPs were not available for 75% of the source facilities in the NEI data on which it relied. 76 Fed. Reg. 52,767. Therefore, EPA does not have a rational basis for its assertion that "emissions of eight HAPs make up 99 percent of the total emissions by mass."[205] EPA must ensure that it is regulating and setting a limit for every HAP emitted.

EPA must close inherently unlawful gaps in the original MACT, by setting a standard for uncontrolled VHAPs. This is a revision that is "necessary" to comply with the law. The proposed rule fails to do this by continuing to set only a total percent reduction in VHAPs for large glycol dehydrators and storage vessels based on the performance of a single device, and by setting a limit on BTEX for small glycol dehydrators that also is based on the performance of a single control device, rather than the performance of the entire system used in the process. In setting these standards, EPA used estimates that were largely based on unsubstantiated assumptions rather than representative emissions data. As such, EPA's failure to capture the universe of HAPs emitted by the source categories in the proposed rule violates its clear statutory duty to set emission standards for each listed HAP. 42 U.S.C. § 7412(d)(1); *Nat'l Lime Ass'n v. EPA*, 233 F.3d 625, 634 (D.C. Cir. 2000).

As discussed in Part II.A.1.ii above, the aggregation provision in CAA section 112(n)(4), 42 U.S.C. § 7412(n)(4), does not bar EPA from conducting a comprehensive assessment of HAP emission sources from the Oil and Gas Production source category and taking the necessary steps to control emission points that are significant HAP emitters. In the existing and proposed rules, EPA has demonstrated its authority to identify and regulate significant sources of HAP emissions and appropriately recognize that 112(n)(4) is a narrow provision that does not prevent it from addressing hazardous emissions from this sector. In the existing rule, EPA identified glycol dehydrators and storage vessels with flash emissions as significant HAP emitters, and excluded these emissions points from the definition of "associated equipment" to allow their emissions to be included in determining a facility's major source status.

Similarly, in this rulemaking, EPA proposes to amend the definition of "associated equipment" to exclude all storage vessels and glycol dehydrators because they are significant sources of HAP emissions that must be controlled and therefore must be part of the major source aggregation equation. 76 Fed. Reg. at 52,769-70. Commenters support EPA's proposal on that and also urge EPA to exclude all other similarly situated components. EPA does not explain whether it considered other components in its assessment of unregulated emission points beyond storage vessels and small glycol dehydrators. *Id.* If it did consider them, EPA does not explain why it excluded them; and if it did not consider them, EPA offers no explanation for excluding them from consideration. Importantly, by leaving the definition of "associated equipment" up to EPA, Congress intended that the agency identify and control substantial HAP emitters that pose a threat to human health and the environment. *Id*. As such, EPA must analyze each of the significant HAP emission points in the Oil and Natural Gas Production and Natural Gas Transmission and Storage source categories to consider excluding them from the definition of associated equipment. This analysis also is a critical component of

[205] *See* -0505-0032.pdf, pp. 25. (The eight HAPs include: toluene, hexane, benzene, xylenes (mixed), ethylene glycol, methanol, ethyl benzene, and 2,2,4-trimethylpentane.)

the public's understanding of the scope and quantity of HAP emissions and the associated risks to human health.

Commenters urge EPA to conduct an assessment of HAP emission points using current data that accounts for recent industry expansion and changes. Based on this assessment, Commenters further request that EPA take the necessary steps to ensure that the rule applies to major contributors of HAP emissions in a way that adequately protects human health and the environment.

IV. COMPLIANCE PROVISIONS

A. The Proposed Affirmative Defense from Civil Penalties Is Unlawful and Harmful.

Commenters support EPA's proposed removal of the start-up, shut-down, and malfunction ("SSM") exemption that the D.C. Circuit has struck down as a violation of section 112 of the Clean Air Act, 42 U.S.C. § 7412. 76 Fed. Reg. at 52,787-88; *see Sierra Club v. EPA*, 551 F.3d at 1027-28 (holding that section 302(k), 42 U.S.C. § 7602(k), defines an emission standard as requiring "continuous" control of pollution). However, although EPA states that it is removing all SSM exceptions from the standard, EPA proposes to keep a provision allowing "one excused excursion" for control devices. *See* 76 Fed. Reg. at 52,824 (40 C.F.R. § 63.773(d)(8)(ii)), 52,839 (40 C.F.R. § 63.1283(d)(8)(ii)). This appears to allow sources to violate the section 112 standards once "per semiannual period for any reason." Section 112 requires the standards to apply at all times. *Sierra Club v. EPA*, 551 F.3d at 1027-28. Therefore, EPA may not lawfully include any "excused excursion" provision. EPA must remove all SSM exemptions from the rules.

As a major new problem, EPA unlawfully proposes to promulgate an "affirmative defense" to penalties due to a malfunction. *See* 76 Fed. Reg. at 52,787-88 (proposing 40 C.F.R. §§ 63.761-62, §§ 63.1271-72). This would create a new loophole in the standards and is unlawful. It also would have harmful consequences for local communities affected by oil and gas facilities, and will greatly reduce the deterrent impact of the proposed standards.

The statute makes clear how the courts are to assess civil penalties, whether a case is brought by EPA or a citizen. 42 U.S.C. § 7413(e). Congress plainly intended citizens to be able to enforce emission standards under the CAA using the full range of civil enforcement mechanisms available to the government, and, in the HAP context, subject only to the limitation that government not be "diligently prosecuting" its own civil enforcement action, CAA § 304(b)(1)(B), 42 U.S.C. § 7604(b)(1)(B). EPA's rule proposal, by shifting this careful balance and contravening these mandates, violates the CAA.

The affirmative defense that EPA proposes to allow in case of malfunctions goes directly against congressional intent in two ways. First, Congress expressed a clear intent as to how judges should determine the size of civil penalties whenever they are sought and thus Congress flatly barred EPA from limiting when civil penalties can be assessed. *See Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc*., 467 U.S. 837, 842-43 (1984). In this proposal, EPA acts outside of its delegated authority to limit civil penalties available in citizen suits or its own

enforcement actions. Second, the proposal will impermissibly chill citizen participation, and the ability to win an effective, deterrent remedy, in CAA enforcement actions.

The affirmative defense is fatally flawed because EPA does not have the authority to decide when civil penalties will not be allowed. The CAA itself spells out the only limits that Congress intended to impose on citizens' ability to seek and recover penalties in enforcement suits under CAA § 304, 42 U.S.C. § 7604. *See* 42 U.S.C. § 7413(e). By attempting to impose additional agency-created limits, EPA exceeds its authority.

Congressional intent on civil penalties is clear—they are a remedy available for enforcement by citizen plaintiffs when the agency has failed to do so, and the Act gives judges a list of factors to consider in assessing them. As such, EPA cannot interpret the statute to contravene that intent.[206] By attempting to rewrite this provision, via regulation, EPA has done just that.

The CAA grants EPA minimal discretion that only applies to administrative penalties, allowing EPA to "compromise, modify, or remit, with or without conditions, *any administrative penalty* which may be imposed under [subsection 113(d)]." 42 U.S.C. § 7413(d)(2)(B) (emphasis added). However, there is no similar grant of authority to EPA to compromise, modify or limit civil penalties that a court may impose under section 113(e) or section 304. Section 304(a), 42 U.S.C. § 7604(a), grants courts the sole authority "to apply any appropriate civil penalties" in citizen suits. The explicit reference to EPA's ability to modify penalties in one subsection and its absence in the other subsection of the same provision can only be understood as an intentional decision by Congress that EPA may not contravene by rule.

If a local community group sued a covered facility for a violation of the emission standards, the owner might argue that it is exempt from paying civil penalties so long as the owner satisfied the requirements set forth in EPA's proposed affirmative defense regulations. *See* 76 Fed. Reg. at 52,787-88 (proposing 40 C.F.R. §§ 63.761-62, §§ 63.1271-72). The owner must not be able to evade civil penalties that apply when the congressionally mandated factors in the

[206] *See Chevron*, 467 U.S. at 842-43; *see also Barnhart v. Sigmon Coal Co.*, 534 U.S. 438, 462 (2002) ("We will not alter the text in order to satisfy the policy preferences of the Commissioner."); *North Carolina v. EPA*, 531 F.3d 896, 910 (D.C. Cir. 2008) ("All the policy reasons in the world cannot justify an agency reading a substantive provision out of a statute.").

statute are met.[207] *See* 42 U.S.C. § 7413(e) (listing factors). It is improper for a court to fail to consider these factors, or to fail to make its own determination of what civil penalties are "appropriate" under CAA § 304(a), and EPA should not ask a court to ignore its legal duty.[208] *A fortiori* it is impermissible for EPA to attempt to displace those factors or in any way alter their significance by creating a bar to penalties if certain agency-defined considerations are met instead.

Citizen participation in CAA enforcement also will be hindered, in violation of citizens' rights to protect themselves from pollution and in direct conflict with congressional intent. The affirmative defense would likely be used on a routine basis by polluters seeking to avoid penalties, just as the malfunction exemption was. As a result, citizens who seek the assessment of civil penalties against polluters in order to protect themselves and achieve the Act's goals may be forced to engage in fact-intensive disputes over the cause of emission violations and adequacy of responsive measures – an outcome Congress intended to prevent with the simple straightforward enforcement and penalty provisions in the Clean Air Act. As a result, enforcement of the Act could suffer, for civil penalties provide a powerful deterrent to violators as Congress intended. As the Supreme Court explained: "To the extent that they [civil penalties] encourage defendants to discontinue current violations and deter them from committing future ones, they afford redress to citizen plaintiffs who are injured or threatened with injury as a consequence of ongoing unlawful conduct." *Friends of the Earth, Inc. v. Laidlaw Envtl. Servs.*, 528 U.S. 167, 186 (2000).[209]

Thus, the affirmative defense also runs counter to two clearly expressed intentions of Congress: (1) the burden it places on citizens makes it less likely that they will enforce the Act, *see, e.g.*, *Pennsylvania v. Del. Valley Citizens' Council for Clean Air*, 478 U.S. 546, 560 (1986); and (2) several of the factors at issue in the affirmative defense undercut Congress's intent that

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[207] Note that the proposed exemption would also be barred under *Chevron* step two or found to be arbitrary and capricious since, even if there exists some slight ambiguity, it is unreasonable to construe the statute as permitting EPA to short-circuit the consideration of specifically listed factors. *See Chevron*, 467 U.S. at 843 (explaining that if the statute does not answer the question at issue, "the question for the court is whether the agency's answer is based on a permissible construction of the statute"); *S. Coast Air Quality Mgmt. Dist. v. EP*A, 472 F.3d 882, 895 (D.C. Cir. 2006) ("We further hold that EPA's interpretation of the Act in a manner to maximize its own discretion is unreasonable because the clear intent of Congress in enacting the 1990 Amendments was to the contrary."); *see also Gen. Instrument Corp. v. F.C.C.*, 213 F.3d 724, 732 (D.C. Cir. 2000) (explaining that "an arbitrary and capricious claim and a *Chevron* step two argument overlap"); *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (explaining that agency acts in arbitrary and capricious manner if it fails to consider "relevant factors" or "entirely fail[s] to consider an important aspect of the problem"). By "upset[ting] the statutory balance struck by Congress," as discussed above, the affirmative defense is unreasonable under *Chevron* step two. *Int'l Alliance of Theatrical & Stage Employees v. N.L.R.B*, 334 F.3d 27, 35 (D.C. Cir. 2003).

[208] It is also improper for EPA to fail to consider the section 113(e)(1) factors in situations in which it is setting the penalty. CAA § 113(e)(1), 42 U.S.C. § 7413(e)(1); *see also N.Y. Cross Harbor R.R. v. Surface Transp. Bd.*, 374 F.3d 1177, 1184 (D.C. Cir. 2004) (holding that "Board's failure to balance the competing interests . . . requires" vacatur of agency action).

[209] S. REP. No. 101-228, at 373 (1989), *as reprinted in* 1990 U.S.C.C.A.N. 3385, 3756.

citizen suit enforcement should avoid re-delving into "technological or other considerations." *NRDC v. Train*, 510 F.2d 692, 724 (D.C. Cir. 1974). Both result from the technical burden EPA imposes on citizens with the affirmative defense, and both render the defense impermissible.

In addition to these problems, EPA has failed to demonstrate any need or rational justification for an affirmative defense to penalties to be written into the regulations and cause the harm that will result. EPA has discretion to decide what cases to prosecute, to consider settlements, and to request civil penalties in a case-by-case manner, as long as it acts consistent with the Clean Air Act to protect clean air as its top priority, *see* 42 U.S.C. § 7401. Promulgating this affirmative defense is equivalent to giving polluters "get out of jail free" cards for serious emission exceedances and MACT violations. Polluters are likely to claim that any violation of the standard is due to a malfunction in order to evade the requirements. Allowing polluters to evade financial penalties – which are the real teeth of the standards – through this type of measure is likely to lead to polluters simply ignoring or factoring potential standard violations into their cost of doing business, rather than actually trying to prevent malfunctions and violations of the standards as a way to avoid financial losses from the application of penalties. EPA has provided no evidence that an affirmative defense for malfunctions would serve the purpose of section 112, to protect people from toxic air pollution.

Assuming *arguendo* that EPA had authority to promulgate any type of affirmative defense to penalties for malfunctions, EPA should also promulgate the following provisions:

1. A specific amount of compensatory penalties should apply to each reported malfunction (consistent with the Act). These funds should be dedicated to enforcement, inspections, and monitoring in the local community around the specific facility, to create greater assurance that malfunctions will not happen again.

2. EPA must modify the regulations so that the affirmative defense cannot be used by a specific facility or company more than once within a set period of time, such as 10 years. The affirmative defense should become automatically unavailable to a facility that has previously had a malfunction within the last 10 years, to ensure that this defense does not swallow the value of the standards.

3. EPA must promulgate specific public reporting and notification requirements for malfunctions, or any emission exceedance that occurs of which an operator is aware. Specifically, EPA must require that when a facility provides EPA with a notification of a malfunction or emission standard exceedance under the regulations, this notice will be made publicly available on EPA's website within 14 days. In addition, EPA must promulgate the requirement that when such notification is made, the facility must also provide for community notification of the malfunction or emission standard exceedance within 2 business days, through an appropriate public forum that is designed to reach residents who live near the facility, including but not limited to a notice on the facility's own website (if it has one), a written notice to the local municipality and local school district, a press release to the local newspaper, radio, and TV news station that contains information community members may need to protect themselves and their families from the additional air pollution. Commenters support EPA's proposal to

require reporting of malfunctions, as a proposed revision to 40 C.F.R. § 63.1285, but it is important that this information be electronically reported, and made publicly available as soon as possible, and that it include all known information on emissions so that the public can evaluate associated health risks.

Commenters urge EPA not to adopt an affirmative defense that undermines citizen rights and remedies under the Clean Air Act. People living near oil and gas facilities are exposed to unacceptably high levels of hazardous air pollution that no one should have to face simply because of where they live. Attempting to take away a right granted to citizens by Congress through an agency regulation sets a dangerous precedent. EPA must work to expand and protect the ability of people harmed by air pollution to seek all appropriate and available forms of relief in court. EPA must not retract or weaken citizen rights and remedies, as this proposal does, by making it more difficult for people to win meaningful relief from facilities that have released toxic air pollution into their communities for years.

B. Combustion Control Device Testing

EPA should not allow a manufacturer-only test for combustion devices. 76 Fed. Reg. at 52,785. Such testing cannot anticipate local conditions that may adversely affect the performance of such devices. In addition, EPA, state regulatory agencies, and people who live near these sources need a way to verify ongoing compliance.

C. Monitoring, Recordkeeping, and Reporting

Commenters support EPA's proposal for electronic reporting as vital to strengthen EPA, state, and citizen enforcement, and provide prompt information transparency for local communities near oil and gas facilities. 76 Fed. Reg. at 52,748, 52,825, 52,840. As the public has a right to all collected reports under the Clean Air Act, 42 U.S.C. § 7414(c), EPA must require immediate disclosure to the public on the Internet, without the need for any person to submit a FOIA request for such a report.

Commenters support periodic testing requirements proposed for all non-condenser control devices (and elimination of design evaluation alternative). 76 Fed. Reg. 52,786. However, EPA must apply these requirements to all devices, including condensers. EPA fails to justify not doing so. Commenters also support the requirement for electronic reporting of all initial and periodic test results. It is vital for EPA to require prompt public reporting on the Internet of test results.

EPA must also require continuous monitoring of glycol dehydrators. EPA proposes not to do so due to practical concerns for some facilities. 76 Fed. Reg. at 52,787. EPA could find a way to address those on a case-by-case basis, if they arise, rather than weakening the national rule for all sources.

CONCLUSION

For the reasons explained above, Commenters urge EPA to fully satisfy all legal requirements and protect public health in this important rulemaking for the Oil and Gas Sector. EPA must address and incorporate each issue discussed in these comments, including by considering new science and taking a health-protective approach where there is uncertainty, in order to fulfill the important regulatory duties of CAA §§ 112(f)(2) and 112(d)(6).

Commenters appreciate EPA's time and consideration of these comments. For more information regarding the section 112 rule proposal comments, please contact Emma Cheuse or Jim Pew at (202) 667-4500, echeuse@earthjustice.org, Avinash Kar, (415) 875-6122, akar@nrdc.org, Miriam Rotkin-Ellman, (415) 875-6128, mrotkinellman@nrdc.org, or Devorah Ancel at (415) 977-5721, devorah.ancel@sierraclub.org.

These comments attach sources cited as Addenda, herein and in an accompanying appendix.

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ADDENDUM CHART

Non-Cancer Health Risk
Comparison of OEHHA Child-specific health reference values
to US EPA reference values

Chemical	OEHHA Child-health Reference Dose (chRD) or value*	US EPA Chronic Oral Reference Dose (RfD)	Difference Between OEHHA and US	Order of Magnitude Difference between OEHHA and US
Atrazine	0.006	0.035	6	1
Cadmium	0.000011	0.0005 (water)	45	1
		0.001(food)	91	2
Chlordane	0.000033	0.0005	15	1
Chlorpyrifos	0.0001	0.0003	3	-
Deltamethrin	0.0001	0.01	100	2
Heptachlor	0.00003	0.0005	17	1
Heptachlor epoxide	0.000013	0.000013	1	-
Manganese	0.03	0.14	5	1
Methoxychlor	0.00002	0.005	250	2
Nickel	0.011	0.02	2	-
Pentachlorophenol	0.001	0.005	5	-
Lead	OEHHA action level	EPA Uses CDC action level		
	1	10	10	1

* All units are in mg/kg-day except lead which is in µg/dL blood. The lead value is not a dose. For lead this is a health benchmark indicating the increase in a child's blood lead concentration showing protective action is needed.

Source: Office of Environmental Health Hazard Assessment (OEHHA), Cal. EPA
(Table of all child-specific reference doses finalized as of 06/22/09, http://oehha.ca.gov/public_info/public/kids/chrdtable.html)

Addenda

Report: EPA's Eight-year Review of the National Emission Standards for Hazardous Air Pollutants ("NESHAP") for Oil and Natural Gas Production Facilities and for Natural Gas Transmission and Storage Facilities

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November, 2011

Prepared for the Sierra Club, et al.

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INTRODUCTION AND SUMMARY

As required by section 112(d)(6) of the Clean Air Act ("CAA"), EPA is conducting a review of the 1999 NESHAP (commonly known as "MACT" standards) applicable to Oil and Natural Gas Production Facilities (40 CFR Part 63, Subpart HH) and Natural Gas Transmission and Storage Facilities (40 CFR Part 63, Subpart HHH). EPA has proposed to make several revisions to the existing standards that will improve the effectiveness of the standards:

(1) establish MACT limits for "small" ethylene glycol dehydrator vents, including vents at "large" dehydrator vents with emissions of less than 0.9 tons per year ("tpy") of benzene, ethyl benzene, toluene and xylenes ("BTEX");
(2) establish MACT limits for storage tanks that store volatile organic compounds, but do not have the potential for flash emissions; and
(3) reduce the detection limit in the equipment leak standards from 10,000 parts per million ("ppm") to 500 ppm in certain applications.

Except for these revisions, EPA has proposed to retain the 1999 standards.

This report first examines the scope of review that EPA should conduct in the course of an eight-year MACT review. For each subject area addressed by the rules under review (storage tanks, ethylene glycol dehydrator process vents and equipment leak prevention, detection and repair), this report "looks back" at the 1999 rulemaking record to determine (1) whether the process employed was consistent with the law; (2) whether EPA had sufficient information to identify the best performers in the category; and (3) whether EPA properly used that information to determine the MACT floors and the MACT standards. The report then "looks around" to see whether there have been developments in the effectiveness and deployment of practices, processes and technologies such that the initial determination of the MACT floors or MACT standards should be revisited. Where deficiencies are identified, the report sets out the steps EPA should take to properly review the earlier standard and remedy those shortcomings.

EPA's proposed revisions to the standards will provide significant reductions in HAP emissions from the sector. The technical requirements and cost implications of the proposal are relatively modest and should not be difficult for the sector to meet. In a number of important areas, however, EPA's proposals fall short of the very rigorous requirements of section 112 of the CAA. EPA's proposed revisions to the MACT standards fail to remedy errors in the process used to identify the best performing units in the 1999 rulemaking, as that process has subsequently been defined by the courts. The 2011 proposals do not comply with section 112's requirements that (1) the standards for existing sources be no less stringent than the emission limitation achieved by the average of the best performing 12 percent of sources in the category and (2) the standards for new sources be no less stringent than the emission limitation achieved by the best performing source in the category. Importantly, the proposed equipment leak provisions do not reflect the practices employed by the best performing source(s) in the categories, have not been updated in many years and carry over a number of exemptions from

early New Source Performance Standards, without evaluation of the propriety of these exemptions under the 1990 Clean Air Act Amendments to the NESHAP program and without consideration of the impact of these exemptions on emissions of hazardous air pollutants ("HAP") from sources subject to the regulation.

SCOPE OF EPA's EIGHT-YEAR REVIEW

Section 112(d)(6) of the CAA requires that EPA review each promulgated MACT at least once every eight years and revise the standard as necessary. In conducting its review EPA is obliged to take into account developments[2] in practices, processes, and control technologies. However, the scope of its review is not statutorily limited to those elements. If developments in practices, processes or control technologies would occasion a revision of those floors in accordance with the mandatory MACT floor requirements of the Act, a change to the existing standard is clearly required[3]. A change is also required if interim developments warrant a revision in the MACT ("beyond the floor") standard based on an objective consideration of the statutory factors for establishing such limits.[4] A change is required if the earlier MACT standard was not properly set, either in terms of the floor or beyond-the-floor requirements.[5]

EPA sets out its view of its obligation to review MACT standards as follows:

> "[f]or the purpose of reviewing the MACT standards, EPA considered a "development" in practices, processes, and control technologies to be:
> - any add-on control technology or other equipment (e.g., floating roofs for storage vessels) that was not identified and considered during MACT development,
> - any improvements in add-on control technology or other equipment (that was identified and considered during MACT development) that could result in significant additional emission reduction,
> - any work practice or operational procedure that was not identified and considered during MACT development, and
> - any process change or pollution prevention alternative that could be broadly applied that was not identified and considered during MACT development."[6]

[2] Since EPA's MACT floor determinations are to be based on the information in its possession, an earlier decision based on lack of information should also be revisited at the time of the eight-year review if the agency has subsequently acquired the necessary information.

[3] Section 112(d)(3) requires that the existing source MACT limit be no less stringent than the average emission limitation achieved by best performing 12 percent of existing sources and that the new source MACT limit be no less stringent than that achieved by the best controlled similar source.

[4] Section 112(d)(2) requires that MACT limits for new and existing sources require the maximum achievable degree of reduction in emissions of hazardous air pollutants, based on consideration of listed statutory factors.

[5] See, e.g., *Med. Waste Inst. & Energy Recovery Council v. E.P.A.*, 645 F.3d 420, 424 (D.C. Cir. 2011)

[6] Memorandum, Brown, EC/R to Moore, EPA "*Impacts for Control Options for the Oil and Natural Gas Production and the Natural Gas Transmission and Storage Source Categories as a Result of the Residual Risk and Technology Review,"* August 19, 2011 ("2011 Control Options memo") p.4.

Significantly, EPA does not seem to consider an increase in acceptance and utilization of a technology or process within a category as a "development" warranting consideration during a review. Nor did EPA consider revising existing standards where the initial standard setting process was flawed, either because inappropriate methods were employed or because EPA did not possess sufficient information to properly identify the best performing units. In one document in the record EPA asserts that it need not consider a technology at all if it had done so in establishing the earlier standard.[7] Each such assertion and assumption is clearly wrong. First, all standards issued under § 112(d) must meet all the requirements in § 112(d). Thus, by directing EPA to review and revise its MACT standards "as necessary" in § 112(d)(6), Congress mandated that, every eight years, EPA assure that its MACT standards continue to satisfy the substantive requirements of Clean Air Act § 112(d)(2)-(3). Under § 112(d)(2), the agency must assure that its standards continue to reflect the emission level actually achieved by the relevant best performing sources (those with the lowest emissions). And under § 112(d)(3), the agency must assure that they continue to reflect the maximum achievable degree of reduction in emissions. Second, assuming *arguendo* that EPA's obligation to review and revise emission standards under § 112(d)(6) is conditional on "development[s]" at all, the Act requires EPA to determine whether developments in practices, processes and control technologies since the prior rulemaking warrant a change. Thus, for example, where EPA had determined that the effectiveness of a particular control device was 90 percent or that a device was not commercially demonstrated to be effective, a revision to the MACT standard would be warranted if the subsequent review revealed that the control technology at issue had advanced so that 98 percent control had been achieved in practice or that a control device, that had been considered experimental, was now commercially demonstrated.

Where EPA has considered and rejected application of a technology or has assessed the effectiveness of a technology in the initial rulemaking, EPA is obliged during the eight-year review to determine whether the facts underlying those earlier assessments have changed and to revise the limit accordingly. Merely noting the existence of a technology or practice in the initial rulemaking can hardly form the basis for declining to evaluate it during the eight-year review. At the completion of its review EPA must be able to demonstrate that, based on the information available to it, the existing source MACT limit is no less stringent than the average emission limitation achieved by the best performing 12 percent of existing sources, that the new source MACT limit is no less stringent than that achieved by the best controlled similar source and that its final standards reflect the maximum degree of reduction considering cost and other factors.

[7] "As shown in Table 2, the practices, processes, and control technologies are all examples of the types of emission reduction techniques that were considered in the development of the Oil and Natural Gas Production and Gas Transmission and Storage MACT Development. Therefore, this exercise did not reveal any developments in practices, processes, or control technologies." 2011 Control Options memo supra, p.6.

Finally, while EPA does act to correct instances where it has failed to establish limits at all, the agency appears to believe that it is not obliged to revisit the existing and new source MACT floor determinations in the earlier rules. Much of the agency's analysis of new technologies involves the cost effectiveness of those technologies. This is both irrelevant for purposes of establishing the MACT floor for new and existing sources and incorrect under the statute. Nothing in the statute suggests that the MACT floor and MACT standard setting requirements of section 112(d) expire after the first rulemaking. To the contrary, section 112(d)(2) and (d)(3) plainly apply to "[e]mission standards promulgated under this subsection," without exception. 42 U.S.C. § 7412(d)(2); *id.* § 7412(d)(3).

Importantly, section 112(d)(6) does not limit EPA's obligation and authority to make revisions to those changes required by advances in practices, processes and control technologies. A revision to the existing standard is also necessary, if that prior standard was not established in a manner that complies with the requirements of the Clean Air Act. Since the adoption of the 1999 MACT Standards the Court has specifically *rejected* a number of practices employed by EPA[8] to set MACT limits; including but not limited to: (1) requiring that MACT limits be achievable by all sources; (2) basing the standard on an evaluation of control technology performance rather than plant performance; (3) adopting "no control" MACT limits where active pollution controls were not in use in a subcategory; (4) employing regulatory limits where actual performance data is available and (5) rejecting MACT floor technologies and limits based on cost or feasibility. Although EPA has recognized its obligation to reconsider earlier standards *ab initio* where the agency's earlier approach resulted in "no control" MACT floors, it has yet to recognize its obligation to reconsider earlier standards where its approach resulted in more lenient MACT floors that fail to meet the statutory requirements.

In the course of conducting an eight-year review EPA is obliged to **look back** at the earlier standard and ascertain whether:

1) the standard was adopted using procedures that comply with the law as it has come to be interpreted by the courts;
2) EPA had sufficiently accurate and comprehensive data at the time of the initial standard setting respecting the emissions profile of the category and properly identified the best performing unit(s); and
3) EPA had properly used the available data.

EPA is then obliged to **look around** using currently available data and determine whether:

1) the emissions profile of the industry has changed in a way that would substantially affect the MACT floor calculations. This includes consideration of any increase in the number of good performing units available for use in the

[8] See, *e.g., Mossville Environmental Action Now v. EPA*, 370 F.3d 1232 (D.C. Cir. 2004); *Northeast Md. Waste Disposal Auth. v. EPA*, 358 F.3d 936 (D.C. Cir. 2004) (*per curiam*) (municipal waste combustors); *Sierra Club v. EPA*, 353 F.3d 976 (D.C. Cir.2004) (copper smelters); *Cement Kiln Recycling Coalition v. EPA*, 255 F.3d 855 (D.C. Cir. 2001) (hazardous waste combustors); *Nat'l Lime Ass'n v. EPA*, 233 F.3d 625 (D.C. Cir.2000) (portland cement manufacturing facilities); *Sierra Club v. EPA*, 167 F.3d 658 (D.C. Cir. 1999) (medical waste incinerators); *Appalachian Power Co. v. EPA*, 135 F.3d 791(D.C. Cir. 1998) (*per curiam*) (electric utility boilers).

existing source MACT floor calculation and in the performance of the best performing unit;

2) data gaps or uncertainties that affected the earlier decision have been resolved in the interim or can be resolved using new information available to the agency;
3) costs or other factors have changed in a way that would substantially affect the "beyond the floor" determination;
4) the use of improved practices, processes or technologies (including improvements in the performance of existing technologies) have become more prevalent than at the time of the initial standard setting; or
5) whether newer regulatory requirements, work practices or emission limitations, (including state and local jurisdiction air pollution standards and federal enforcement actions) which are more stringent than the existing 112(d) standard, have shown the achievement or achievability of greater emission reductions than the existing standard requires.

ETHYLENE GLYCOL DEHYDRATOR AND FLASH TANK PROCESS VENTS

Basis for the 1999 Standard for Dehydration Process Vents

On June 17, 1999 (64 FR 32610), the EPA promulgated MACT standards for the Oil and Natural Gas Production and Natural Gas Transmission and Storage major source categories. The Oil and Natural Gas Production NESHAP (40 CFR part 63, subpart HH) contains standards for HAP emissions from glycol dehydration process vents, storage vessels and natural gas processing plant equipment leaks. The Natural Gas Transmission and Storage NESHAP (40 CFR part 63, subpart HHH) contains standards for glycol dehydration process vents. A review of the record for the rulemakings that culminated in the 1999 Oil and Gas NESHAP demonstrates that the process used to identify MACT floors was the same as that employed in other MACT standards of that era – and subsequently invalidated by the Courts.

EPA commenced the rulemaking process in 1997 by sending questionnaires to selected sources. In those questionnaires EPA did not seek emissions information on all units within the categories at issue, or employ a statistical approach to develop a scientifically reliable emissions profile that would enable it to determine the average emission limitation achieved by the best performing 12 percent (for purposes of determining the existing source MACT floor) or to identify the best performing unit (to establish the new source MACT floor). Indeed, EPA made no effort to identify the better performing units in the relevant categories. Rather, EPA sent its questionnaire to a limited number of sources and asked those sources to report information on a "representative" unit at their facility – **not the best performing unit at the facility.** Based on the survey results, EPA determined that more than 12 percent of Triethylene Glycol ("TEG") Dehydration Units were controlled – some were controlled with condensers and others were

controlled with a system of condensers and exhaust redirection to the reboiler.[9] EPA did not attempt to quantify the average performance of the best performing 12 percent asserting:

> "[R]esponses to the survey provided limited data on emission reduction efficiencies associated with controls present. Efficiencies that were provided generally appear to be best estimates and not based on emission testing.[10] Further, averaging times over which the reduction efficiencies are being achieved were not provided. Therefore, a detailed site-specific assessment of the performance of the controls is not possible based on the survey data."

The MACT floor recommendation for the required minimum control device efficiency is not based on the efficiencies reported in the survey results, but instead on the following engineering judgment regarding the expected performance:

> "[a]s stated earlier, there is limited available information on the emission reduction efficiencies being achieved by the controls reported to be in place. The various types of controls reported on glycol dehydration units have, in other applications, typically been demonstrated to achieve varying degrees of reduction (e.g. from 95 to 98 percent or greater). However, without more detailed technical information on the operation of their controls, it is not possible [to]conclusively[11] distinguish between the performance levels achieved by the controls reported to be in place on glycol dehydration process vents….
>
> * * * *
>
> In general, the types of controls used on glycol dehydration units should be able to achieve a minimum of 95 percent HAP emission reduction." 1997 MACT Floor Memo, p. 8.

A similar conclusion is reached for units that have a flash tank in the unit's design – "[p]roperly operated condensers used at glycol dehydration units that have a flash tank in the dehydration system design, have a typical HAP/volatile organic compound (VOC) control efficiency of 95 percent."[12]

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[9] Fitzsimons and Viconovic, EC/R to Smith, EPA, *Recommendation of MACT Floor Levels for HAP Emission Points at Major Sources in the Natural Gas Transmission and Storage Source Category*, September 23, 1997, EPA Docket A-94-04, II- A-6 and Fitzsimons and Viconovic, EC/R to Smith, EPA, *Recommendation of MACT Floor Levels for HAP Emission Points at Major Sources in the Oil and Natural Gas Production Source Category*, September 23, 1997, EPA Docket A-94-04, II- A-7. ("1997 MACT Floor memo") Most of the content of these memoranda is identical.

[10] EPA did not require sources to conduct testing in order to respond to its questionnaire.

[11] EPA is not barred from acting if it does not have "conclusive" information. Rather, the Act requires EPA to set MACT floors on the basis of the information available at the time.

[12] 1997 MACT Floor Memo, supra, p.8.

EPA's 1997 analysis is the same as that specifically rejected by the D.C. Circuit Court as cited above – EPA employed the lowest reported control efficiency of a control technology rather than the performance of the best performing units.[13] More importantly, in 1997, EPA did not actively "consider" technologies that could be expected to have better performance than the technology it did examine. Of the 200 glycol dehydration units in its database, 13 (6.5%) were reported to employ condensers plus redirection of the exhaust to the boiler and 14 (7%) employed thermal destruction techniques.[14] The existence of these data is noted, but there is no discussion or consideration of the technologies or consideration of the performance of these systems in the determination of the minimum required control efficiency. Thus, rather than factoring better performing units into its decision-making, EPA ignored them. Had either of those technologies been factored into the calculation of (or engineering judgment respecting) the average performance of the top 12 percent, or had the better performing "condenser only" units been identified, a different existing source MACT floor and MACT limit would have been required. The Background Information Document for the 1999 rulemaking supports this obvious engineering conclusion and contradicts EPA's MACT floor determination:

> "Flares may achieve greater than a 98 percent **HAP/VOC** reduction efficiency. Based on an emission reduction efficiency of 95 percent for a condenser and a 98 percent emission reduction efficiency for the combustion device, directing the noncondensable stream through a closed-vent system to a combustion device in conjunction with a condenser can achieve a HAP emission reduction of ***99*** percent or greater."[15] (emphasis provided)

Despite this clear understanding of the underlying engineering associated with the control device combinations in practice at the time, EPA asserted that there was lack of reliable information that precluded making more definitive determinations as to the control device efficiencies that had been achieved in practice.[16] EPA should now resolve whatever information gap existed in 1999 and correct the MACT standards. Notably, the 1997 analysis concludes that the new source MACT floor is the same 95 percent control efficiency assigned to existing units. No justification is offered for the failure to consider the technology employed by the best performing units, or for failing to set the new source MACT floor at the level demonstrated by

[13] "The EPA could not identify a technical basis for the variation in the performance levels achieved by the controls reported to be used to control process vents on glycol dehydration units. In order to account for the variability in HAP emission reduction efficiencies, the EPA selected 95.0 percent as the required emission reduction (i.e., the MACT floor) for large glycol dehydration units in the oil and natural gas production source category." 64 FR 32610, 32613; June 17, 1999. EPA made no attempt to determine the variability in performance that would be expected of the best performing sources.

[14] 1997 MACT Floor Memo, supra, Table 1.

[15] Background Information Document, EPA Docket No. A-94-04, II-A-5 at 3-3.

[16] 1997 MACT Floor Memo, supra, p. 8.

the best performing unit. Under section 112(d), it does not matter whether EPA knew of these efficiencies in 1999 and improperly ignored them in its calculation process or whether the improvements beyond 95 percent represent advances in the performance of that control technology. In either event, the agency should now revise the MACT standards for emissions from dehydrator process vents to reflect the level of emissions that is being achieved today.

EPA's process for determining the averaging period for the 1999 standard was similar to the process used to select the numerical limitation. At proposal, in 1998, the agency advised that it did not have information sufficient to determine the appropriate averaging period and solicited comment. In its final rulemaking, EPA accepted theoretical arguments about the warm weather performance of condensers rather than examining the performance of the best performing systems and selected the less stringent of the available options – thus again failing to set the standard on the basis of the performance of the top 12 percent (for existing sources) or the best performing source (for new sources). Significantly, no attempt was made in 1999 to document that the alternate performance standard of 0.9 Mg/yr of benzene met MACT floor requirements.

2011 EPA Review of the 1999 Standard for Dehydration Process Vents

Large Dehydrators

EPA has not attempted to correct the deficiencies in the 1999 rulemaking identified above. It did not attempt to identify the best performing 12 percent of existing sources in 1999 and has not attempted to correct that error in its 2011 review. Similarly, in 1999, EPA made no attempt to identify the best performing source for purposes of establishing a new source MACT floor and has not attempted to correct that error in its 2011 review. As will be explained in detail below, data examined by EPA in the course of its 2011 review demonstrate that the 1997 survey results did not and do not represent the emissions profile of the categories subject to the rule. EPA is obliged to review the information in its possession, including National Emissions Inventory ("NEI") data discussed below, to ascertain whether the 1997 data employed in the 1999 rulemaking accurately identified the best performing sources at the time and whether that level of performance has substantially changed since 1999. The gross disparities in the data for small dehydrators provide a strong basis to conclude that the existing and new source MACT floors were not properly set in 1999 and do not represent the performance of the categories today.

In the course of its 2011 review EPA identified eight different technical developments from the Natural Gas Star program and concluded:

> "the optimization of the glycol circulation rates and the flash tank separator options were used in the MACT technology analysis from the Natural Gas STAR options. The other options were considered

to be new or emerging technologies and have not been proven to work for all glycol dehydrators in the production or transmission source categories."[17]

There is no evidence in the record to support the assertion that reductions based on requiring optimization of glycol circulation rates and the use of flash tank separators were seriously considered. EPA provides no data or analysis of these developments, merely concluding that the emissions from facilities that employ these developments are "comparable"[18] to what is required under the current standard. EPA provides no discussion of why these developments do not represent the new source MACT floor, and does not address the decision of the Courts that the fact that a particular technology may not be applicable for all sources is irrelevant to the MACT floor process. EPA rejects the use of the "zero emission" desiccant dehydrator technology, because it cannot be used for natural gas operations that operate at high temperature, high volume, or low pressure, but does not set out a rationale for failing to require it for those processes that operate within the performance envelope of this technology. It is not lawful or reasonable for EPA to ignore the emission reductions available from this technology for many sources. EPA can address the issue it raises by establishing a subcategory of dehydrators that operate within the envelope of the available technology.

The 2011 Control Options memo concludes that the RACT, BACT, LAER Clearinghouse ("RBLC") results did not identify any practices, processes, and control technologies applicable to the emission sources in these categories that were not identified and evaluated during the original MACT development. Here, the conclusion is simply wrong, as the agency's RBLC review[19] identified a BACT determination for dehydrator efficiency of 98 percent (Michigan, Consumer's Energy).

Small Dehydrators

In its 1999 rulemakings, EPA did not establish limits for what it styled "small" dehydrators, but proposes to do so now. In the course of its recent ICI Boiler and Electric Generating Unit MACT rulemakings, EPA observed that data collected at an earlier time were outdated and sent a new questionnaire to selected sources. Here, EPA did not follow this precedent and, not surprisingly (but incorrectly), concludes that "new emissions data for small dehydrators were not available."[20] EPA attempts to justify its decision to not gather current data

[17] See, 2011 Control Options memo, p.8.
[18] Id., p. 10. EPA's conclusion is essentially meaningless as any two numbers can be "compared" to each other. EPA presents no information to support its counterintuitive conclusion that setting limits at levels achieved by advanced technologies demonstrated to be successful in the Natural Gas Star program will lead to no emission reductions.
[19] Id., p.8.
[20] Memorandum, Brown, EC/R, to Moore and Nizich, EPA, *Oil and Natural Gas Production MACT and Natural Gas Transmission and Storage MACT - Glycol Dehydrators: Impacts of MACT Review Options* July 28, 2011 (2011 MACT Floor Analysis), p.3

by asserting that it "believes that processes have not changed significantly since the data were collected."[21] However, information in the record demonstrates that these claims are incorrect. As discussed in detail below, new emissions data for small dehydrators are available to EPA and these data show that the processes emit far less HAP than the 1997 data set would suggest.

To develop the 2011 proposed existing source MACT floor EPA used the 1997 data[22] and calculated the average performance of the top 12 percent. The agency then prepared an analysis of the cost impact of its proposed standard using 2005 National Emissions Inventory ("NEI") data in its possession.[23] The NEI data reveal that improvements in the environmental performance of the category had progressed by 2005 to the point that only 115 of the 495 glycol dehydration units would have to do anything to comply with the proposed standard. The NEI data may also show that the 1999 standard was improperly set at a level less stringent than the performance demonstrated by the top 12 percent. The MACT floor nominally reflects the performance of the unit that is the top 6th percentile performer (that is, the average of the top 12 percent of the units for which EPA has data).[24] Even with a reasonable allowance of a compliance margin to reflect variability in the performance of the best performing units, a significant majority of the units in a category should have to take steps to comply with such a standard. An error in the MACT floor calculation is demonstrated in this case because 77 percent of the units in the category currently meet the proposed MACT floor level.[25] Thus, instead of the floor calculation approximating the performance of the top 6th percentile performer, it approximates that of the worst quartile of performers in the 2005 data set. The NEI data also show that annual BTEX emissions from the units in the subcategory are far lower than they were reported to be in the 1997 survey responses. At that time more than half of the sources in the best performing 12 percent were uncontrolled. The NEI data also show that today, a substantial number of sources are currently emitting at levels that suggest they are now controlled; clearly, a significant change in practices within this category has occurred since 1999 that is not reflected in the earlier emissions data.[26]

The 2011 MACT Floor Analysis contains both the 1997 emissions data used to set the MACT floor and the 2005 NEI emissions data. The comparisons of those data sets in Tables 1 and 2, below, reveal striking differences in the emissions profile of the categories. While there is a significant difference in the mean emission rates of the two data sets, the difference in the median emission rates and the rate of emissions of the top 12 percent is far larger and more

[21] Id.
[22] These data included a mix of measured emission data and estimates of emissions calculated on the basis of system operating parameters.
[23] See, ftp://ftp.epa.gov/EmisInventory/2005_nei/point_sector/2005_v2_all_nei_hap.zip.
[24] Assuming a normal distribution, the unit whose performance represents the top 6th percentile will emit at a rate that approximates the average emissions of the top 12 percent of the units in the data set.
[25] It should be recognized that the EPA calculation assumes a nominal throughput and is not sufficient to establish the MACT floor. It is sufficient, however, to demonstrate that the use of the 1997 data is inappropriate.
[26] 2011 MACT Floor Analysis, supra.

relevant to the MACT standard setting process. The 2005 data reflect the fact that, while there still are a number of "gross emitters" in service, there are far more units in service with lower emissions than what is reflected in the 1997 data. Here, it is relevant to note again that in 1997 EPA surveyed a limited number of facilities and did not ask those facilities to provide emissions data for all units, just for what the facility decided was a "representative unit." And again, it does not matter whether the 1997 data was inappropriately biased at the time it was created or whether there has been a change in the emissions profile of the subcategory. The 1997 data clearly are not representative of the emissions profile of the categories and cannot be relied on to establish MACT floors or emission limits for those categories.

Table 1. Comparison between 1997 and 2005 emissions data for glycol dehydrators in the production category

Glycol dehydrators (Production)	**1997 data**	**2005 data**
Number of units	91	489
Mean annual emission rate (tpy)	5.4	0.60
Median annual emission rate (tpy)	4.8	0.012
Average of top 12 percent (tpy)	0.11/0.13[27]	0.00020[28]
Listed as "controlled" (no. of units)	5	80

Table 2. Comparison between 1997 and 2005 emissions data for glycol dehydrators in the transmission category

Glycol dehydrators (Transmission)	**1997 data**	**2005 data**
Number of units	16	109
Mean annual emission rate (tpy)	2.9	2.0
Median annual emission rate (tpy)	2.3	0.018
Average of top 12 percent[29] (tpy)	0.85	0.00082
Listed as "controlled" (no. of units)	0	19

It should be noted that this information, standing alone, is insufficient to establish a MACT floor or standard, since the rate of flow from the exhaust stack is not identified. However, the stack flow rate information is contained on a unit-by-unit basis in the EPA NEI data set and can be

[27] One value in the data set may be an error or outlier. The second listed figure excludes that data point.
[28] Three reported values of zero are ignored for this calculation. These values are not necessarily incorrect if dehydrator process vent emissions are routed to the reboiler.
[29] Because of the limitations in the data, the existing source MACT floor was based on the average of 5 units.

used to set MACT floors and emission limits (on a lb/MMscf basis) without sending an additional questionnaire to industry.

In addition, the process employed by EPA improperly looks at the expected performance of a single control device rather than the performance demonstrated by the source. EPA acknowledges that where a flash tank is incorporated in the design of the dehydrator system, potential emissions are captured by that device, leading to lower inlet concentrations at the condenser and lower overall emissions[30]. Rather than recognizing the superior environmental performance of the entire system, EPA has devised a complex scheme that removes the effect of this part of the control system from the calculation of the MACT floor. EPA accomplishes this task by inventing a new metric. EPA proposes to measure performance in terms of a **gram of BTEX per standard cubic meter (measured at the outlet of the device), per part per million intake concentration to the device,** thereby normalizing the output limit in terms of the intake concentration. In the past emission limits have been set in units comparable to pounds of the relevant pollutant per million standard cubic feet of exhaust gas (lb/MMscf) or the concentration of that pollutant in the exhaust gas stream in terms of parts of the relevant pollutant per million parts of the overall exhaust stream ("ppm"). Here, EPA combines the two metrics (although the parts per million is the concentration of the gas stream coming into the condenser, not the concentration of the exhaust stream). EPA explains that it must do so because in its data there is a wide variation in input concentrations to the condenser at different facilities,[31] ignoring the fact that this is to be expected because some sources had installed flash tanks or had taken other measures to reduce intake concentrations upstream of the condenser, while others had not done so. Normalizing for inlet concentrations directly defeats the purpose of identifying (and focusing) on just the better performers within the category and improperly focuses on the performance of a control device rather than the emissions limitation achieved by the better performing sources. EPA should recalculate the MACT floors using current data (which will show that more sources are achieving very low levels) and follow the D.C. Circuit Court's instruction to examine the performance of the system, rather than an individual control device and to set standards that reflect the emission levels that the best performing sources achieve.[32]

STORAGE VESSELS

Basis for the 1999 Standard for Storage Vessels

The 1997 MACT Floor analysis for storage vessels found that emission controls were in place on 32 percent of the surveyed tanks. Consistent with its approach at the time, the agency did not attempt to determine the performance of the top 12 percent of the category for which it

[30] This memo also shows that EPA is aware that control efficiencies of 99.75 percent are achievable.
[31] EPA has not asserted that there is a wide variation in the inlet concentrations at the individual unit.
[32] *Cement Kiln Recycling Coalition v. EPA*, 255 F.3d 855 (D.C. Cir. 2001) (per curiam)

had data (or, for new sources the performance of the best performing source), but simply set a limit based on the minimum performance that it *believed* was being achieved by the various control technologies[33] that were in place at the top 32 percent of the category (for which it had information).

At the time of initial rule development, EPA had determined that the significant HAP emission points within the oil and gas production sector were (1) glycol dehydration units; (2) tank batteries and (3) natural gas processing plants. Accordingly, a questionnaire was sent to operators of major sources requesting information about controls on storage tanks, **not just storage tanks with a potential for flash emissions.** The 1997 MACT Floor memo reports that:

> "[s]ignificant HAP emissions can occur due to flashing, **and due to breathing and working losses from tanks containing volatile organic liquids such as condensates or volatile oils." [34]** (emphasis added)

In the 1998 rulemaking proposal, EPA identified the primary HAP emission points at natural gas processing plants as:

> "(1) the glycol dehydration unit reboiler vent, (2) storage tanks, particularly those tanks that handle volatile oils and condensates that may be significant contributors to overall HAP emissions due to flash emissions, and (3) equipment leaks from those components handling hydrocarbon streams that contain HAP constituents."[35]

In the 1999 final rule, EPA failed to set a MACT limit for the entire category of units that had been identified as primary HAP emission points. Rather, it defined "facility" to include only tanks that had the potential for flash emissions. No data was provided to support the notion that breathing and working losses from the tanks that had been surveyed were *de minimus* and no rationale was offered in support of the change.

2011 EPA Review of the 1999 Standards Applicable to Storage Vessels

In its 2011 review, EPA did not attempt to correct the deficiencies in the 1999 rulemaking identified above, as that rulemaking relates to tanks that store materials with the potential for flash emissions. It did not attempt to identify the best performing 12 percent of such existing sources and did not correct the new source MACT floor. EPA reports that its

[33] EPA discussed the group of technologies in a general manner and did not distinguish between tanks where emissions from a condenser are then routed to thermal devices or back into the process stream (or other technologies).
[34] 1997 MACT Floor Memo
[35] 63 FR 6288, 6282; February 6, 1988. The NPRM also identified comment on "potential" HAP emission streams and solicited comment.

review of the RBLC revealed the use of thermal oxidizers, catalytic oxidizers, condensers, enclosed flares and pollution prevention practices within the regulated category in addition to the condenser technology that formed the basis of the 1999 rules. Contrary to its representation that its 2011 review considered improvements in existing technology, EPA did not evaluate the performance that was achieved by systems that employed thermal or catalytic oxidizers, either alone or in combination with condensers, noting that:

> "[a]s shown in Table 2, the practices, processes, and control technologies are all examples of the types of emission reduction techniques that were considered in the development of the Oil and Natural Gas Production and Gas Transmission and Storage MACT Development. Therefore, this exercise did not reveal any developments in practices, processes, or control technologies."[36]

Here, EPA improperly declines to examine whether advances in technology, that are significant enough to be listed in the RBLC, are "developments" relevant to MACT limits because they fall within broadly defined classes of technology. In clear contravention of the statute's requirements relating to pollution prevention, the 2011 review also did not consider pollution prevention requirements revealed in its RBLC search, asserting "[t]hese options are process modifications or operating limitations and were not considered under MACT."[37] The 2011 review also rejected two specifically identified developments from the Natural Gas Star Program – the use of pressurized condensate tanks and improved vapor recovery units asserting that these technologies had been considered under the original MACT.[38] This assertion is unsupported in either the record of the 1999 rulemaking or the current record and is inconsistent with the identification of these developments as significant advances under the Natural Gas Star Program.

In the current NSPS rulemaking proposal, EPA reaffirms that tank emissions associated with breathing due to temperature variations and working losses associated with filling the tank are significant.[39] To its credit, the agency is now proposing to correct its prior error in excluding certain tanks and to establish MACT standards as recommended in the 1999 MACT floor analysis.[40] EPA is proposing to correct this error, notwithstanding the fact that this issue was "considered" in the earlier rulemaking and comment that EPA's decision is proper and well within the bounds of what must be considered in an eight year review. EPA concludes that 95 percent effective vapor control units were considered in 1999 and implies that there has been no improvement in performance since then.[41] EPA also concludes, without providing any support or analysis, that new low emission equipment has not been shown to be effective in reducing emissions.

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[36] 2011 Control Options memo, p.6
[37] Id, Table 2.
[38] This comment is not intended to endorse a requirement to employ pressurized condensate tanks. However, EPA should clearly describe the improvements in vapor recovery units that it is rejecting and set forth a rationale for doing so.
[39] 76 Fed. Reg. 52738, 52763.
[40] 76 Fed. Reg. at 52747.
[41] Or that it need not consider an increase in the effectiveness in control technologies.

EQUIPMENT LEAKS

Basis for the 1999 Standard for Equipment Leaks

In establishing the Subpart HH NESHAP for equipment leaks EPA again identified the worst expected performance of those plants that employed a broadly defined class of equipment leak prevention, detection and repair processes, rather than the performance achieved by the best performing facilities. A questionnaire was sent to 126 plants. Half of the plants surveyed reported that they had LDAR programs, mostly because they were required under Subpart KKK of the NSPS. The 1997 MACT Floor Memo reports that:

> "[a]ll of the LDAR programs were not like the [Subpart KKK] NSPS and the overall control efficiency of the California Air Pollution Control District (APCD) programs were deemed more stringent than the NSPS based on criteria such as frequency of monitoring and leak definition."

The MACT Floor Memo does not evaluate the 60 reporting plants to identify the top 5 performers. Instead it simply recommends use of the existing Subpart KKK NSPS. The more stringent California programs were not factored into the "average of the top 12 percent"; they were simply ignored. Had EPA included these facilities in the determination of the MACT floors, the existing source MACT floor would have been more stringent than the NSPS KKK level selected as the floor. In addition, there is no discussion in the MACT Floor Memo of the new source MACT floor or a rationale as to why the more stringent programs were not considered the new source MACT floor. Clearly, the new source MACT floor should have been at least as stringent[42] as the most stringent California programs in place at that time.

In several important respects, however, EPA failed to set the MACT floor at a level as stringent as that set by the Subpart KKK program. Most notable is the fact that the Subpart KKK NSPS leak detection program applies to all components in VOC service, thus exempting components servicing streams with less than 10 percent VOC content, while the Subpart HH rule adopted by EPA provides an exemption for all components servicing streams with less than 10 percent volatile **HAP** content. This exemption, just as the VOC exemption in the NSPS rules, is provided without any evaluation of the impact on emissions, level of control, or rule effectiveness. EPA explained this change as follows:

> "The MACT floor for equipment leaks at natural gas processing plants was determined to be at the level of control required under the onshore natural gas processing plants NSPS (40 CFR part 60, subpart KKK). The control requirements of 40 CFR part 60, subpart KKK are equivalent to those in 40 CFR part 61, subpart V. Since subpart V is a HAP rule, the oil and natural gas production NESHAP cross references subpart V.

[42] The new source MACT floor should reflect the actual performance of the best performing source, not just the regulatory limit that defines the minimum acceptable performance of that source.

> The requirements in subpart V state that, for a piece of equipment to be considered not in volatile HAP (VHAP) service, it must be determined that the percent VHAP can be expected never to exceed 10 percent by weight."[43]

The flaw in this argument is that since Part 60, subpart KKK theoretically applies to more streams at regulated facilities and has a more stringent leak detection standard (based on preventing, detecting and repairing leaks of all VOC rather than just HAP VOC), Part 61, Subpart V, on its face at least, is not equivalent to Part 60, Subpart KKK.

EPA also carried over to Part 61, Subpart V (and thereafter to Part 63, Subpart HH) a number of exemptions and deferred monitoring and repair options that are artifacts of the Part 60 NSPS program that is permitted to consider cost, while the MACT floors may not. These include deferrals of repair for equipment that is unsafe to monitor (including equipment that is more than 2 meters above a support surface), and for equipment (up to 3 percent of total valves) that is difficult to monitor, or if the repair would require a shutdown of the process. EPA also provided an option for sources to agree to more frequent (weekly vs. monthly) monitoring in exchange for an acceptable 2 percent leak rate. This exemption does not contain any cap on the amount of HAP emissions which may result and appears to have been done as a matter of routine, without any consideration of the public health impacts or any determination of how 2 percent compares to the leak rates achieved by the best performing facilities. Notably this exemption applies to the new source MACT limits as well as those for existing facilities.

Relative Stringency of Current and Proposed Equipment Leak Rules

The proposed NESHAP rule retains many of the leak detection and repair provisions of the existing Part 63, Subpart HH NESHAP and the Part 60, Subpart KKK NSPS. It would increase the stringency as compared to those earlier rules in some instances to adopt some provisions found in Part 60, Subpart VVa, the 2006 NSPS applicable to the synthetic organic chemical manufacturing sector. The most notable improvements are for pumps in light liquid service, where the detection limit is lowered from 10,000 ppm to 2,000 ppm and, importantly, valves in gas/vapor and light liquid service, where the detection limit is lowered from 10,000 ppm to 500 ppm.[44] Monitoring frequency and repair times are unchanged. The nominal improvement for valves in gas/vapor service may not provide any meaningful environmental benefit, especially at natural gas processing plants, if the exemption for low VHAP content (see above) gas streams is retained. Detection limits, monitoring frequencies and repair obligations for leaks from compressors and pressure relief valves are unchanged from the current rules.

[43] EPA, *BACKGROUND INFORMATION FOR FINAL STANDARDS: SUMMARY OF PUBLIC COMMENTS AND RESPONSES* 1999, at 2-63.

[44] It should be noted that the 10,000 ppm limit is an absolute limit; while the limit of 500 ppm is "500 ppm above background." Reportedly, background concentrations can be expected to be approximately 100 ppm.

The Bay Area Air Quality Management District ("BAAQMD") supervises LDAR programs at 5 refineries with over 200,000 regulated components. BAAQMD's Regulation 8, ORGANIC COMPOUNDS, Equipment Leaks[45] is substantially more stringent than the proposed rule, both in terms of detection limits, allowable repair times and permitted number of non-repairable components. Unlike the Federal rules, the BAAQMD rule does not provide an exemption for streams with less than 10 percent VOC content. EPA has not attempted to quantify the impact of its exemption on source wide emission rates.

Importantly, **Regulation 8 applies to leaks of total organic compounds, including methane, whereas the proposed Federal rule excludes methane.** As a result, the difference in stringency between the existing BAAQMD rule and the proposed Federal rule is quite significant. If one assumes that the gas stream at a natural gas processing plant is 95 percent methane, then a detection limit of 500 ppm, excluding methane, is equivalent to a detection limit of 10,000 ppm, including methane. In this example, the BAAQMD LDAR rules effectively detect HAP at 5 ppm. Thus, in terms of detecting leaks of VHAP, the proposed Federal detection limit is approximately 100 times higher than the existing BAAQMD detection limit because the Federal detection limit does not require detection of the entire emission stream in order to find potential HAP leaks.

In addition, the BAAQMD limit on the number of components awaiting repairs is 0.3 percent for valves, 0.025 percent for valves with major leaks (leaks greater than 10,000 ppm, including methane) and 1.0 percent for pumps and compressors. It also requires mass emission testing for non-repairable components with high leak rates and places an emission limit of 15 pounds per day on non-repairable components. By comparison, the South Coast Air Quality Management District ("SCAQMD") limit is 0.5 percent for valves and 1.0 percent for pumps.

In contrast, the current and proposed Federal equipment leaks rules provide an option that overrides the requirement to fix leaking valves within 15 days and permits up to 2 percent of leaking valves to be "unrepaired" at one time, and provide that an additional one percent of **"unrepairable" valves may be counted as "leaking" only in the tally for the first quarter after their discovery.**[46] Importantly, the Federal rules do not require quantification of ongoing leaks or impose a cap on the amount of HAP that may be allowed to leak.

[45] http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Rules%20and%20Regs/reg%2008/rg0818.ashx?la=en

[46] See, 40 CFR 63.168(e)(1).

	Current Rule	Proposed Rule	BAAQMD Rule 8-18
Leak definition – valves in gas/vapor/light liquid services	10,000 ppm VHAP[47]	500 ppm VHAP	100 ppm methane + VOC
Leak definition – pumps in light liquid service	10,000 ppm VHAP	2,000 ppm VHAP	500 ppm methane + VOC
Applies to	VHAP >10 percent	VHAP >10 percent	Methane + VOC
Inspection frequency	Monthly/quarterly[48]	Monthly/quarterly	Quarterly/annual[49]
Repair schedule	15 days[50]	15 days	7 days[51]
"Not repaired" list	2%	2%	0.025%/0.3%/1.0%
Difficult to monitor list[52]	3 %	3%	No limit
Unsafe to monitor valves	No limit[53]	No limit	No exemption

2011 EPA Review of the 1999 Standards Applicable to Equipment Leaks

EPA's review of options for LDAR programs for the proposed MACT rule paralleled its review of the LDAR NSPS rules, and focused on four options for limiting VOC emissions only: (1) Subpart VVa level of LDAR monitoring in lieu of the currently applicable regulation; (2) apply the currently available alternative to Subpart VVa (monthly optical gas imaging and annual Subpart VVa level of LDAR monitoring); (3) monthly optical gas imaging without annual LDAR monitoring and (4) annual optical gas imaging. In the course of examining the first option, EPA asserts that it also examined (and rejected) requiring "leakless" technology for all new valves, pumps and compressors installed after the proposal date of the regulation. EPA is correct in its conclusions that applying the Subpart VVa leak detection requirements is feasible and cost effective and that it represents an improvement over the currently applicable regulation. As explained below, however, Subpart VVa does not constitute MACT for the categories under review.

[47] "*Volatile hazardous air pollutant concentration* or *VHAP concentration* means the fraction by weight of all HAP contained in a material as determined in accordance with procedures specified in 40 CFR 63.772(a)". Note that there is no definition of "volatile" associated with this definition, that the alternate testing procedure (ASTM D6420-99(2004) has been superseded and that there is no definition of "target compounds." A definition of "target compounds" would appear to be needed to implement the alternate test procedure as n-hexane is not among the compounds ordinarily quantified by the ASTM Method.

[48] If a component is not found to be leaking in two consecutive months, the inspection frequency is reduced to once per quarter. Thus, the majority of components are inspected quarterly

[49] Pumps are subject to daily visual inspection. If a valve has not been found to be leaking during five quarterly inspections, the inspection frequency is reduced to once per year.

[50] An initial attempt to repair must be made within 5 days.

[51] If the leak is detected by BAAQMD personnel during an inspection it must be repaired within 24 hours. The BAAQMD rules also require that leaks detected by the source be minimized within 24 hours.

[52] Difficult to monitor/inaccessible components are inspected annually.

[53] These valves are to be monitored when it is safe to do so, which may be never.

EPA's 2011 Control Options memo discusses four additional developments from EPA's Natural Gas Star program – ultrasound leak detection, directed inspection and maintenance, increased frequency of reciprocating compressor rod packing systems and replacement of wet seals with dry seals at centrifugal compressors. The agency is correct in concluding that directed inspection and maintenance programs, where leaks are repaired only if it is cost effective to do so, do not represent an advance over current regulation. However, EPA has failed to ascertain whether ultrasound leak detection used in combination with current leak detection, more frequent rod packing replacement and the use of dry seals is now the MACT floor for existing sources, and has not explained why these developments are not the new source MACT floor or the new and existing source MACT standards. The memo offers the following rationale for EPA's decision not to pursue MACT limits or work practice standards for these technologies:

> "[t]he ultrasonic leak detection provides the magnitude of the leak, but does not quantify the leak. Therefore, this option was not considered for MACT technology review. The compressor rod packing and dry seal replacement options reduce leaking emissions from compressors. These options were not considered as options for equipment leaks because of the low HAP content of the leaking gas." 2011 Control Options memo, pp 9, 10.

EPA's rationale does not support the resulting decisions because: (1) neither the current nor the proposed LDAR requirements quantify the leak rate[54] and (2) the HAP content of the gas leaking from compressors is the same as gas leaking from nearby valves and connectors that are presumably subject to the NESHAP – the current and proposed EPA rules only apply to components in VHAP service.[55] EPA clearly should require the use of these technologies, and either ultrasonic or optical scanning, in addition to the use of traditional sensing devices, as part of the new source MACT floor work practice standards. EPA should also make a reasoned determination as to whether the performance of existing units leads to lower MACT floor determinations and whether facilities that employ these technologies perform at levels that represent the maximum achievable emission reductions under the statute.

The EPA review concludes that the RACT, BACT, LAER Clearinghouse results did not identify any practices applicable to the emission sources in these categories that were not identified and evaluated during the original MACT development.[56] Here, the conclusion is simply wrong, as the RBLC identifies a BACT determination made after the 1999 rulemaking that is more stringent than the current or proposed rules and that was known to EPA at the time

[54] The monitoring devices measure the concentration of a compound in the air in the vicinity of a leak and can provide a sense of the magnitude of one leak compared to another. The devices do not report the quantity of the compound that is leaking.

[55] Volatile HAP content must be greater than 10 percent for a component to be in VHAP service. See, e.g., 40 CFR 63.760, 63.761.

[56] The record is not clear as to whether EPA reviewed information online from state and local permitting authorities such as California Air Resources Board, South Coast Air Quality Management District, national and regional organizations such as NACAA and NESCAUM and industry associations such as ICAC.

of its 2011 review. EPA's 2011 Control Technology Memo references a California (Breitburn Energy) BACT determination for equipment leaks that contains a long list of technological and practice advances including a number of leakless components and a 100 ppm THC[57] LDAR monitoring level.[58]

EPA reports that there has been but one development in practices, processes, and control technologies since 1997-1999 when it last considered these issues – the promulgation of Subpart VVa. However, since EPA's last full review of the LDAR standards applicable to this sector much has been learned about what it takes to have an effective leak detection program. Notably, investigations by EPA HQ, Regional and National Enforcement Investigations Center personnel detected massive fraud in the conduct of LDAR inspections and in the reporting of results. Enforcement action-induced negotiations with operators of most of the nation's refineries led to consent decrees that substantially improved the real-world effectiveness of those programs and the development of Best Practice Guidelines.[59] In the course of its 2011 review EPA did not examine those activities and implement the lessons learned from that experience. Importantly, EPA did not examine the leading state-designed and implemented LDAR programs[60] to consider the improvements in techniques that facilities have been complying with for several years. Finally, EPA did not review a number of drafting flaws and ill-considered exemptions from the past to reduce uncertainty, eliminate ambiguity and close loopholes for which no clear justification can be made.

The 2011 EPA review also rejected unspecified advances that arose out of the Natural Gas STAR program because **most** (but not all) of these practices are considered to be new and unproven practices that may not be applicable to all production or transmission facilities. Here, the agency paints with too broad a brush[61] and sets an impossible and contradictory standard:

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[57] Total hydrocarbons, including methane.

[58] The RBLC summary for the Breitburn Energy decision is as follows: "LOW-EMISSION DESIGN VALVES, CONNECTIONS AND SEALS, MFR: VARIOUS, TYPE: VALVES, FLANGES, PUMP SEALS, COMPRESSOR SEALS, ETC, MODEL: VARIOUS, FUNC EQUIP: PIPING COMPONENTS IN OILFIELD OPERATIONS, FUEL_TYPE: , SCHEDULE: CONTINUOUS, H/D: 24, D/W: 7, W/Y: 365, NOTES: VALVES: BELLOWS, DIAPHRAGM SEAL, SPRING-LOADED PACKING, EXPANDABLE PACKING, GRAPHITE PACKING, PTE-COATED PACKING, PRECISION MACHINED STEM, SEALANT INJECTION AND LDAR: 100 PPMV THC. FLANGES/CONNECTORS/OTHER: WELDED, NEW GASKET RATED TO 150% OF PROCESS PRESSURE AT PROCESS TEMPERATURE. LDAR: 100 PPMV THC COMPRESSOR SEALS (ROTARY DRIVE): VENTED TO VAPOR RECOVERY OR CLOSED VENT, DUAL/TANDEM MECHANICAL SEALS, LEAKLESS DESIGN (E.G. MAGNETIC DRIVE). LDAR: 100 PPMV THC COMPRESSOR SEALS (RECIPROCATING DRIVE): VENTED TO VAPOR RECOVERY, ELASTOMER BELLOWS, O-RING SEALS, DRY RUNNING SECONDARY CONTAINMENT SEALS. LDAR: 100 PPMV THC PUMP SEALS: VENTED TO VAPOR RECOVERY OR CLOSED VENT, DUAL/TANDEM MECHANICAL SEALS. LDAR: 500 PPMV THC PRDS: VENTED TO VAPOR RECOVERY OR CLOSED VENT, SOFT-SEAT DESIGN. LDAR: 100 PPMV THC SOURCE TEST RESULTS"

[59] See, e.g., http://www.epa.gov/compliance/resources/publications/assistance/ldarguide.pdf.

[60] One such program requires electronic monitoring of pressure relief valves so plant operators can determine when a valve has actuated.

[61] EPA's choice of language suggests that some technologies from the Natural Gas Star program were rejected that were not "new" and that were broadly applicable.

EPA must only consider revising existing standards if there are new technologies; those technologies, however, cannot be considered in that review because they are "new."

EPA also suggests that these advances should not be considered because "[o]nly one of the technologies identified in the Natural Gas STAR literature, glycol dehydrator with a desiccant dehydrator, would result in zero HAP emissions."[62] While zero HAP emissions are an appropriate goal of the program, they are not a test for new or existing MACT limits. The fact that a technology merely reduces emissions, but fails to eliminate them entirely, is not a lawful basis for failing to consider those improvements in the MACT review process. Moreover, EPA unlawfully fails to propose an updated MACT based on the use of desiccant dehydrators for *any* part of the source categories, even though this is a technology that plainly achieves greater reductions.

RECOMMENDATIONS:

GLYCOL DEHYDRATION PROCESS VENTS

EPA's proposed limits on ethylene glycol process vents will require very significant reductions from the "gross emitters" in the sector and will substantially reduce emissions of HAPs. These reductions are highly cost-effective and are based on the use of technology that has been in common service for several decades. However, EPA's methodology, both in 1999 and in its 2011 review does not satisfy the very rigorous requirements of section 112 of the CAA. Because the method used to set the 1999 MACT floors for large ethylene glycol process vents has been found to be unlawful, EPA should recompute the MACT floor and MACT limits for those vents using currently available data concerning the performance of the sources within the categories. In 1999 EPA improperly ignored the performance of what was likely the best performing units – those equipped with condensers and a second treatment option (either redirecting the condenser vent gases to the reboiler or flaring those gases) even though these technologies were in use by more than 12 percent of the category. In establishing the new source MACT floor, EPA failed to employ data in its possession concerning the performance of the best performing unit.

EPA should now also conduct a separate examination of the appropriate new source MACT floor and new source MACT limits for "small" glycol dehydrators that it correctly proposes to regulate. As EPA's NEI data show, the 1997 data set that EPA proposes to employ in the 2011 rulemaking does not reflect the emission profile of the categories and should not be used. The agency's attempt to "normalize" the emissions data is unlawful and should be abandoned. The most recent NEI data are likely sufficient for purposes of establishing both

[62] 2011 Control Options memo, p.10.

existing and new source MACT floors. A proper review of these data will likely lead to MACT floor determinations and MACT emission limitations for existing sources that are at least 40 to 60 percent more stringent and limitations for new sources that are at least 80 percent more stringent than EPA's proposal.[63]

STORAGE TANKS

In its 1999 rulemaking EPA did not identify the best performing units, nor did it ascertain the performance achieved by those units. The agency asserted that the data in its possession at that time was inadequate and simply assigned an efficiency of its chosen control technology. Because this method has been found to be unlawful and substantially more data is available at this time, EPA should now recompute the MACT floor and MACT limits for those tanks. The 1997 survey results have been shown not to be representative of the current emissions profile of the categories at issue. Accordingly, EPA should use the most comprehensive and accurate available data concerning the performance of the sources within the categories. The agency should now also conduct a separate examination of the appropriate new source MACT floor and new source MACT limits for storage tanks with flash potential as well as the new category of tanks that it correctly proposes to regulate. This examination should include a more comprehensive evaluation of advances in vapor recovery unit technology and reconsideration of floating roof technology for tanks containing liquids that do not have the potential for flash emissions. EPA must now determine lawful floors reflecting the emission levels achieved by the relevant best performing units, those with the lowest emissions, and set MACT standards that reflect the maximum achievable degree of reduction of HAP.

EQUIPMENT LEAKS

EPA proposes to employ the 500 ppm leak detection threshold of Subpart VVa rather than the 10,000 ppm leak detection threshold of Subpart VV as the work practice standard for equipment leaks, a significant improvement that has been shown to be feasible in other sectors. However, EPA has not shown that Subpart VVa LDAR practices represent the existing source MACT floor and it is clear, based on a review of the rules in several California jurisdictions, that Subpart VVa does not represent the new source MACT floor. EPA needs to conduct a far more comprehensive evaluation of the LDAR practices employed in the sector and the level of performance achieved by the best facilities. Additionally, the proposed regulation retains a number of exemptions and deferred repair options which appear to be artifacts of 1980's NSPS regulations, where cost may be considered and are inappropriate or unlawful in the context of MACT floors, where cost may not be considered.[64] The proposal has not attempted to justify

[63] The NEI data, discussed above, suggest that the MACT floor may be an order of magnitude more stringent that current and proposed levels (or more).

[64] For this reason, sources should be required to comply with the most stringent LDAR requirements applicable and should not be allowed to choose the least effective requirement, as is currently permitted.

these exemptions or quantify their impact on HAP emissions. This is especially important in view of the D.C. Circuit's recognition that MACT standards must apply "at all times" under section 302(k) of the Clean Air Act.[65] A careful review of the current LDAR procedures will in all likelihood establish that the better performing facilities do not avail themselves of these exemptions and that these exemptions do not belong in the MACT floor determination for either existing or new sources. It is important to note that EPA may rely on the established regulatory thresholds only where it does not have actual performance data available. EPA should review the compliance reports filed by the industry over the years and determine the "best performers" on the basis of the sources that consistently have the lowest leak detection levels, the fewest leaks, and the smallest percentage of "unrepairable leaks."

New sources within the category should be required to employ advanced "zero emissions technologies" where technically feasible, and, at a minimum, as demonstrated by the best performing source. EPA should review more carefully the list of available technologies, including, but not limited to leakless valve technology improvements and improvements in practices that reduce the number of leaks by using a greater percentage of leakless devices. At a minimum, the new source MACT LDAR program should not be less stringent than the BAAQMD rules that currently cover 5 refineries with over 200,000 components. Further, there is no reason to exempt new compressors at the wellhead from the requirement to utilize best technology for seals.

The best technical approach to provide for prevention, detection and repair of BTEX, n-hexane, mercury and other HAP that are present in natural gas leaks in a gas stream that is largely methane is to prevent, detect and repair the largest and thus most easily detectable portion of the gas stream (i.e., the methane leaks). By way of analogy, if one were attempting to detect and repair leaks of a dangerous neurotoxin present at parts per million levels in an aqueous solution, looking for water leaks would be far more effective than attempting to detect trace amounts of the neurotoxin. The ability of the devices employed to detect a leak of VHAP at oil and natural gas processing plants is enhanced, especially at the lower leak detection limits that should be employed, if one calibrates those detection devices and sets the applicable leak thresholds to include the entire stream of organics that is being processed. Many existing programs already require that the Method 21 monitors be calibrated solely by using methane and the existence of programs, such BAAQMD, that specifically require tracking of methane as part of their overall control of organic chemical emissions, demonstrates that such programs are feasible and should be considered MACT for control of VOC. EPA has already recognized that

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[65] See, *Sierra Club v. EPA*, supra

an improved LDAR program is MACT for natural gas processing plants, but has not taken the steps necessary to identify and provide for a MACT level LDAR program. [66]

The LDAR program should include all components that are in hydrocarbon service. The exemptions for components that come in contact with streams that are less than 5 percent HAP or less than 10 percent are based on cost and should not be imported into MACT floor determinations, especially where, as here, EPA has not quantified the impact on public health of the exemption. Such an exemption cannot be authorized for new sources since sources within the BAAQMD comply with more stringent equipment leak monitoring requirements where this exemption is not available.

Monitoring deferrals for equipment at existing facilities designated unsafe to monitor (including equipment that is more than 2 meters above a support surface), for equipment (up to 3 percent of total valves) that is difficult to monitor, or if the repair would require a shutdown of the process should be conditioned on replacement of equipment receiving the deferral with leakless technology at the next facility turnaround.[67] The option for sources to agree to more frequent monitoring in exchange for not having to repair all leaking equipment should be reviewed in light of the experience in California and elsewhere. Under this option a 2 percent leak rate is acceptable – forever. In calculating the leak rate sources are allowed to exclude up to an additional 1 percent of "unrepairable" leaks from this rate after the first quarter. Exemptions at these levels are inconsistent with the requirement of "maximum achievable control technology" and with the requirement that MACT floors be established based on the performance of the best performing facilities.

Gross emitters (above a specified emission rate) should not be allowed to continue to emit until the next facility turnaround and should not be eligible for deferred repair times. Allowable repair deferral limits should be limited to those components that leak below the specified limit. The new source NESHAP should require the use of leakless designs for those components that, if they leaked, would require a plant shutdown to repair and for "unsafe to monitor" and "difficult to monitor" equipment, where such equipment is commercially available. For new sources, EPA should limit its "nonrepairable" exemption to a failure of leakless design components. For all sources EPA should establish an emission rate threshold that limits the continued use of leaking components.

Specific components have been found to be more prone to leaks and to require more frequent repairs. Since the purpose of the rule is to prevent leaks rather than to simply chase existing leaks in a game of Whac-A-Mole, the MACT standard for new and existing units should require a component to be replaced with upgraded technology if the number of leaks within a specified time period exceeds a threshold specified in the rule. Such a requirement can be found in South Coast Air Quality Management District rules, which require that components that have

[66] Detecting, repairing and preventing leaks of the entire process stream should also reduce the cost to industry associated with loss of product.
[67] Not to exceed a period of five years.

been subject to repair more than 5 times within a year be replaced with BACT/BARCT or be vented to an approved air pollution control device. Ventura County Air Pollution Control District ("Ventura County APCD") rules are similar, except that Ventura County also lists the improved control options that may be employed.[68]

In three of its four options, EPA considered the use of optical scanning devices as a means of reducing LDAR inspection frequencies. Current and even advanced LDAR programs have been shown to be cost-effective MACT, and EPA is correct that optical scanning devices have not been shown to be as effective as LDAR programs, and, as pointed out, cannot quantify emissions. EPA has also identified ultrasound detection as a potential LDAR tool. Ultrasound and optical scanning programs can be a part of an overall improved LDAR program. Use of these devices involves some modest level of investment. However, once purchased, these devices can provide an extremely low cost means of filling the gaps in the LDAR program. Daily or weekly scans can identify plant areas containing gross emitters for targeted LDAR inspections. Such inspections could replace scheduled inspections and save operators money by detecting leaks early, while improving the environmental performance of the facility. In addition, even well designed LDAR programs do not require monitoring of all devices at a facility (e.g., leakless valves). Anticipating all potential or likely sources of leaks at the complex of facilities in this sector, which may have 50,000 components or more, is likely impossible. Remote scanning devices can serve to identify problem areas that may require more frequent monitoring and areas, which, though not currently monitored, are significant sources of organic HAP emissions.

In the late 1990's EPA discovered flagrant, industry-wide violations of several CAA requirements at the nation's refineries.[69] Among the most significant violations were LDAR rule violations where refiners, and independent contractors hired by refiners, routinely underreported by up to a factor of 10 the number of leaking valves, leading to significant excess emissions. The ensuing enforcement actions led to 29 settlements with operators comprising over 90 percent of the refining capacity in the country. These settlements required improved LDAR practices (including lower leak detection thresholds and external audits), $82 million in fines and $75 million in Supplemental Environmental Projects. This experience demonstrates a need for detailed, independent oversight of LDAR activities, as does the recent Pelican refinery criminal prosecution. In the absence of a sustained Federal focus on this issue and recognizing the likely lack of state resources in the near future, some form of independent auditing of LDAR programs would be prudent. EPA could require an independent audit of sources with a large number of components, perhaps once every five years. Smaller sources could be exempt from the obligation to conduct their own audits if they participated in an industry-sponsored "random audit program" where a certain percentage of smaller sources were occasionally audited.

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[68] See, SCAQMD Rule 1173(g)(3) and Ventura County APCD Rule 74.7. Under the Ventura County rule, for example, if a valve is found to have suffered 5 major leaks in a year is shall be replaced by a valve with a bellows seal, or with graphite, PTE or PTFE stack chevron seal rings, or with BACT technology level components.

[69] http://www.epa.gov/compliance/resources/cases/civil/caa/oil/index.html; http://www.epa.gov/compliance/resources/newsletters/civil/enfalert/emissions.pdf

Addenda

Technical Report and Comments on
EPA's Proposed NESHAP Rule for Oil and Natural Gas Production and Natural Gas Transmission and Storage Source Categories

Dr. Ranajit (Ron) Sahu, Consultant[1]

[1] Dr. Sahu's resume is provided as Attachment 1. Dr. Sahu has provided technical consulting services to a wide variety of clients over the last two decades, involving projects in the oil and gas as well as refining sectors. This work includes projects involving emissions estimations of various pollutants, including HAPs, projects involving control technology determinations, projects dealing with flare emissions, storage tank emissions, and emissions from numerous fugitive emission sources, of the type at issue in the current rulemaking.

This technical report responds to EPA's proposal for the oil and gas sector[2] as published in the Federal Register on August 23, 2011.[3] After a brief introduction, this report focuses on some problematic aspects of the proposed NESHAP changes for these Clean Air Act source categories.

This report will address EPA's coverage of sources and pollutants under the NESHAP, its basis for the proposed changes under Clean Air Act sections 112(f)(2) and 112(d) with regard to emission data and other relevant information, its explanations and support for the proposed changes under each section, including EPA's residual risk review, and a brief summary of technologies that can and should be considered for the reduction of hazardous air pollutants (HAPs) from various sources in these sectors to ensure an "ample margin of safety to protect public health" as required by Section 112 of the Clean Air Act.

Introduction

On June 17, 1999 (64 FR 32610), the EPA promulgated MACT standards for the Oil and Natural Gas Production and Natural Gas Transmission and Storage major source categories. The Oil and Natural Gas Production NESHAP (40 CFR part 63, subpart HH) currently contains standards for HAP emissions from large glycol dehydration process vents, certain storage vessels and natural gas processing plant equipment leaks. The Natural Gas Transmission and Storage NESHAP (40 CFR part 63, subpart HHH) currently contains standards for large glycol dehydration process vents. In addition to these NESHAP for major sources, the EPA also promulgated NESHAP for the Oil and Natural Gas Production area source category on January 3, 2007 (72 FR 26). These area source standards, which are based on generally available control technology, are also contained in 40 CFR part 63, subpart HH.[4]

[2] EPA's definition of sources covered by these source categories is not entirely clear. This report presumes that the sectors include not just shale gas but also shale oil, or so-called tight oil from many of the shale/tight sands formations and plays that are under development throughout various parts of the country, which use many of the same extraction techniques used in shale gas.
[3] 76 FR 72738 (August 23, 2011).
[4] 76 FR 52743, August 23, 2011.

I. New Limits Currently Proposed

First, regarding currently unregulated sources, under section 112(d), EPA is proposing MACT limits for small glycol dehydrator units for both parts of the oil and gas major source categories as follows. In the Oil and Natural Gas Production source category, these sources consist of glycol dehydrators with an actual annual average natural gas flowrate less than 85,000 standard cubic meters per day (scmd) or actual average benzene emissions less than 0.9 megagrams per year (Mg/yr). In the Natural Gas Transmission and Storage source category, these sources consist of glycol dehydrators with an actual annual average natural gas flowrate less than 283,000 scmd or actual average benzene emissions less than 0.9 Mg/yr.

The proposed MACT standards for the subcategory of small dehydrators at oil and gas production facilities would require that existing affected sources meet a unit-specific BTEX limit of 1.10E-04 grams BTEX/standard cubic meters (scm)-parts per million by volume (ppmv) and that new affected sources meet a BTEX limit of 4.66E-06 grams BTEX/scm-ppmv. At natural gas transmission and storage affected sources, the proposed MACT standard for the subcategory of small dehydrators would require that existing affected sources meet a unit-specific BTEX emission limit of 6.42E-05 grams BTEX/scm-ppmv and that new affected sources meet a BTEX limit of 1.10E-05 grams BTEX/scm-ppmv.[5]

As discussed below, EPA did not collect recent data regarding emissions of HAPs, including BTEX, from small glycol dehydrators in either source sector in support of this rulemaking. Instead, EPA appears to have relied on data collected in the prior MACT rulemaking, going back to 1998 or prior.[6] Thus, EPA's analysis is flawed and questionable because it simply relies on the best-performing sources that existed a decade ago and fails to identify the best controlled sources *today*. EPA is required to set a MACT floor based on what the best performing sources have "achieved," and perform a beyond-the-floor analysis to determine what is "achievable." *See* 42 U.S.C. § 7412(d)(2)-(3). As a result, it is unlikely that these MACT standards reflect either the current best controlled similar source emissions (which is the statutory and regulatory basis for the MACT limit for new sources) or the average of the top 12% (or top 5 out of 30 sources, for source categories that have only 30 or fewer units) of the

[5] 76 FR 52746, August 23, 2011.
[6] 76 FR 52768, 69, August 23, 2011.

currently best controlled sources (which is the statutory and regulatory basis for the MACT limit for existing sources). While EPA appropriately proposes to set a MACT limit for these sources for the first time, EPA's use of out-dated data fails to demonstrate that its proposed limit is stringent enough in light of significant developments in emission control technologies and practices that have occurred since 1998.

As additional evidence that EPA's proposal may not be sufficiently stringent, EPA proposes a lower emission limit for natural gas transmission and storage than for production. However, the industrial processes at issue suggest that these limits should either be equally stringent, or that upstream sources should be able to achieve even greater HAP emission reductions than downstream sources. Specifically, one should expect, given the underlying processes, that the HAP content of the exhaust or fugitive gas streams, including those from glycol dehydrator vents or flash tank vents etc., should be lower in the natural gas transmission and storage sector as opposed to in the oil and gas production sector. After all, the gas that is recovered from the ground and treated at the well-head or at the gas processing plant should contain more impurities, such as HAP, that are removed before the resultant cleaner (but not entirely HAP-free) gas enters the transmission and storage portions of the distribution network. However, EPA's proposed MACT limit for new dehydrators in the oil and gas production sector (4.66E-06 grams BTEX/scm-ppmv) is lower than the proposed limit for similar new dehydrators in the downstream natural gas transmission and storage sector (1.10E-05 grams BTEX/scm-ppmv). This is a counter-intuitive result because EPA did not have emissions data for an adequate number of representative units for such sources from either sector. Thus, while EPA took appropriate steps by bringing these small dehydrators into the NESHAP, it has not gone far enough; EPA should base its MACT limits on a more robust dataset, reflecting current emissions from sources in both source categories.

Second, EPA proposes MACT standards for storage vessels that are currently not regulated under the Oil and Natural Gas Production NESHAP. The current MACT standards in this sector apply only to storage vessels with the potential for flash emissions (PFE). EPA now proposes to apply the current MACT standard of 95-percent emissions reduction to every storage vessel at major source oil and natural gas production facilities.

EPA's proposal to bring all storage vessels, not just those with PFE, into the NESHAP is an appropriate and necessary step, but EPA provides no basis of its assumption that a 95 percent HAP reduction MACT standard for storage vessels is sufficient. The docket fails to include any discussion of EPA's analysis and rejection of higher levels of HAP reductions (such as 98% or 99%) that could be achieved. Thus, EPA should increase the required HAP reduction from storage tanks to 98%[7] or 99%. If EPA chooses not to do so, it needs to provide a technical explanation in light of evidence demonstrating that sources have achieved higher levels of control. The difference is non-trivial. For example, reducing emissions by 98% versus 95% means a 60% reduction in the mass of emissions to the atmosphere. This should apply both to new and existing storage vessels in the production sector.

Third, as a result of its residual risk review, EPA proposes to eliminate the current alternative compliance option (i.e., reducing benzene emissions to less than 0.9 Mg/yr in lieu of the MACT standard of 95-percent control) for large glycol dehydrators at sources in both the Oil and Natural Gas Production and the Natural Gas Transmission and Storage source categories.[8]

EPA's proposal to eliminate this alternative compliance option is an important and necessary step in light of EPA's important conclusion that it would reduce lifetime cancer risk. However, EPA's statement for the natural gas transmission and storage source category that "…current levels of emissions allowed by the MACT reflect acceptable levels of risk"[9] is flawed. As discussed below, there are significant technical flaws and omissions in the risk assessment that EPA has conducted as part of the residual risk review suggesting that the remaining risk, even after removing this option, may still be unacceptable. EPA should strengthen its assessment to ensure that the results of the risk assessment lead to a sufficiently protective new standard.

Fourth, EPA was required to conduct an 8-year section 112(d) or MACT review pursuant to section 112(d)(6) of the Clean Air Act. EPA's MACT review was not thorough or comprehensive. EPA concludes generally that "for both the Oil and Natural Gas Production and the Natural Gas Transmission and Storage source categories, we are proposing no revisions to

[7] See discussion below addressing state requirements of 98% efficiency.
[8] 76 FR 52747, August 23, 2011.
[9] 76 FR 52747, August 23, 2011.

the existing NESHAP pursuant to section 112(d)(6) of the CAA."[10] EPA goes on to propose one revision for oil and natural gas production – to lower the leak definition for valves to an instrument reading of at least 500 ppm, 76 Fed. Reg. at 52,785, which is an improvement, but could be stronger for reasons discussed in the Buckheit Report. However, as discussed below, EPA's proposal to make no other revisions to the existing NESHAP is unsupported by the record. Its conclusion is inconsistent with evidence suggesting that, through the use of currently available technologies, processes, and practices, emission reductions beyond the level of the existing section 112(d) standard are indeed now being achieved and are achievable.

II. Comments on Data and Sources Covered

1. The 2005 NEI is not a sufficient data source for EPA's review.

EPA notes that "To perform the technology review and residual risk analysis for the two NESHAP, we created a comprehensive dataset (*i.e.*, the MACT dataset). This dataset was based on the EPA's 2005 National Emissions Inventory (NEI)."[11] Elsewhere, EPA reiterates: "To perform the technology review and residual risk analysis for the two NESHAP, the MACT dataset was based on the EPA's 2005 National Emissions Inventory (NEI)."[12] EPA also notes that "The EPA collects information about sources and releases an updated version of the NEI database every 3 years."[13]

Since the proposal is dated August 23, 2011, it is perplexing that EPA failed to use more recent emission data than the 2005 NEI (which, likely reflects data that is even older) for both the section 112(f)(2) and section 112(d)(6) proposed actions. First, EPA could have collected more recent data from the source categories. It is unclear why EPA did not do so. Even for the 2005 NEI, EPA does not have HAP data for most of the facilities in this source category that were present at that time. This is particularly troubling in light of increases in the number and type of sources in these categories.

[10] 76 FR 52747, August 23, 2011.
[11] 76 FR 52767, August 23, 2011.
[12] -0505-0031.pdf, pp. 2. For simplicity, this truncated form will be used when referencing items in the docket for this rulemaking. For example, the full docket number for this document is EPA-HQ-OAR-2010-0505-0031.pdf.
[13] 76 FR 52767, August 23, 2011.

As an additional example, EPA fails to consider the most recent available NEI, namely the 2008 NEI, as opposed to relying on the older 2005 NEI for these important analyses. Using the 2005 NEI does not reflect current conditions in either of these two source categories given the significant changes, particularly in on-shore gas production due to shale and other gas plays as discussed below. It is concerning that EPA uses the 2005 NEI, which likely reflects data from prior to 2005 and is not representative of current industry conditions, including sources, emissions, and technology. EPA's use of the 2005 NEI is also inconsistent with other aspects of the present rulemaking. For example, EPA appears to use the 2008 NEI in its Regulatory Impact Analysis.[14] Thus, the 2008 NEI was available to EPA but it is unclear why EPA did not use this more recent version as a starting point for its analyses.

In recent years, changes in the industry have been and are occurring at a rapid pace. As noted in its RIA, it appears that EPA would agree.[15] The reasons for the likely obsolescence of the 2005 NEI data are simple. As a recent report prepared by an EPA and industry consultant notes:

> There has been a continued increase in gas production from onshore nonconventional gas plays and new production from emerging unconventional plays. Shale and tight gas development continues to dominate activity onshore. Unconventional drilling and completion activity in the U.S. has been largely focused on the following plays:
>
> • Barnett Shale in the Fort Worth Basin
> • Marcellus Shale in Appalachia
> • Haynesville and Bossier Shales in North Louisiana and East Texas
> • Fayetteville Shale in Arkansas
> • Woodford Shale in Oklahoma
> • Eagle Ford Shale in South Texas
> • Bossier Tight Sand in East Texas and North Louisiana
> • Lance Tight Sand in the Green River Basin (Jonah-Pinedale)
> • Mesaverde Tight Sand in the Uinta and Piceance Basins

[14] "To estimate VOC emissions from the oil and gas sector, we modified the emissions estimate for the crude oil and natural gas sector in the 2008 National Emissions Inventory (NEI)." See -0505-0075.pdf, pp. 3-1.

[15] "During this review, EPA identified VOC emissions from natural gas sources which are likely relatively under-represented in the (2008) NEI, natural gas well completions primarily. Crude oil and natural gas sector VOC emissions estimated in the 2008 NEI total approximately 1.76 million tons. Of these emissions, the NEI identifies about 21 thousand tons emitted from natural gas well completion processes. We substituted the estimates of VOC emissions from natural gas well completions estimated as part of the engineering analysis (510,000 tons, which is discussed in more detail in the next section), bringing the total estimated VOC emissions from the crude oil and natural gas sector to about 2.24 million tons VOC." See -0505-0075.pdf, pp. 3-1.

• Anadarko Basin Tight Cleveland and Granite Wash Sands
• Powder River Basin Coalbed Methane
• San Juan Basin Coalbed Methane and Tight Gas.[16]

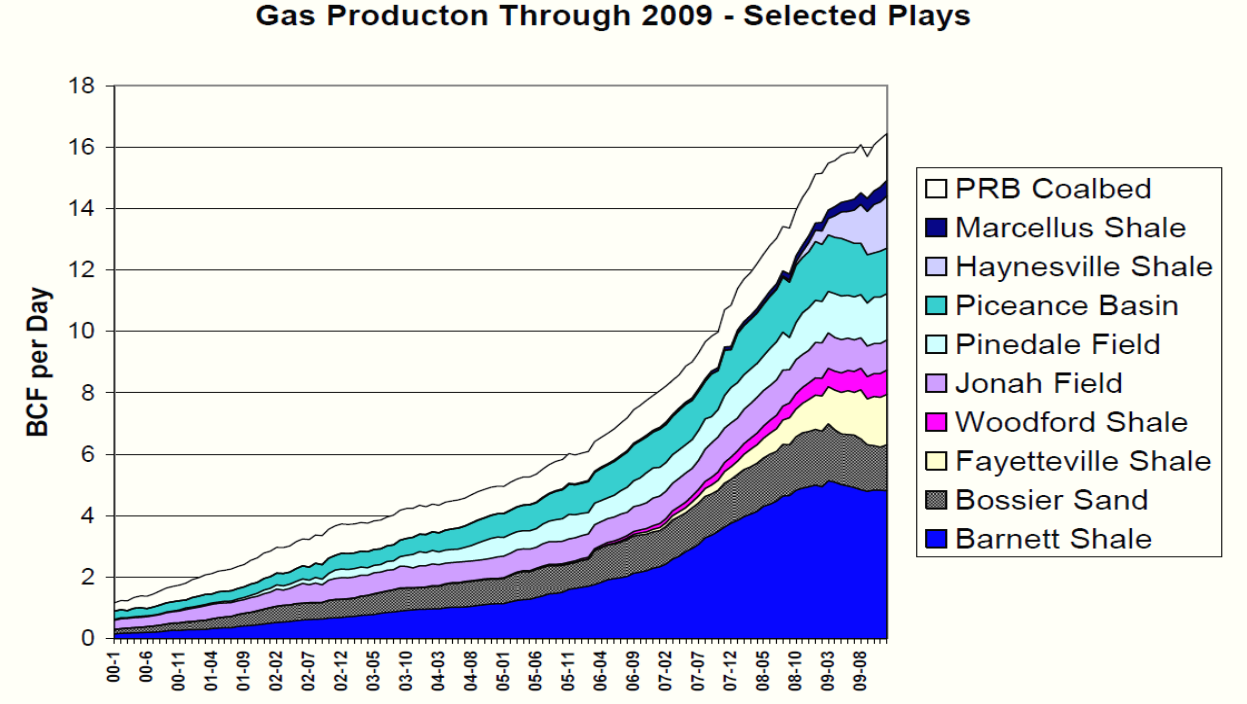

Table above, is reproduced from: "Winter 2010-11 U.S. Natural Gas Production and Supply Outlook," prepared for Natural Gas Supply Association by ICF International, Fairfax, Virginia, September, 2010, Exhibit 8a, pp. 12.

Looking at the growth in gas production since 2005 from these selected "plays,"[17] it is obvious that using 2005 NEI as a basis for the residual risk and MACT reviews is insufficient and flawed.

Notably, EPA's attempt to address the representativeness of its 2005 NEI by cross-checking with an EPA enforcement database[18] is not a sufficient way to update data or ensure

[16] "Winter 2010-11 U.S. Natural Gas Production and Supply Outlook," prepared for Natural Gas Supply Association by ICF International, Fairfax, Virginia, September, 2010 (attached to this report for the docket).
[17] The term "play" is used in the oil and gas industry to refer to a geographic area which has been targeted for exploration due to favorable geoseismic survey results, well logs or production results from a new or "wildcat well" in the area. An area comes into play when it is generally recognized that there is an economic quantity of oil or gas to be found. *See* http://eaglefordshaleblog.com/2010/03/03/what-is-a-shale-gas-play.
[18] "The final dataset contained a total of 1,311 major sources in the oil and natural gas sector; 990 in Oil and Natural Gas Production, and 321 in Natural Gas Transmission and Storage. To assess how representative this number of facilities was, information on the number of subject facilities for both MACT standards was obtained from the Enforcement and Compliance History Online (ECHO) database. The ECHO database is a web-based tool

that it is complete enough to provide a full look at the current state of the industry. It is not clear that EPA's ECHO database contains "compliance and enforcement" information on the numerous new sources that are currently operating as a result of the explosive growth in the shale plays noted above. In fact, it appears that the ECHO database is inadequate as a benchmark, because, as EPA notes, ECHO actually contains even fewer facilities than the 2005 NEI for both source categories.[19] While EPA attempts to gloss over this discrepancy, the more obvious explanation is that likely both databases inadequately capture the number (and location) of sources and their emissions in these source categories.

2. EPA used very old data in determining MACT standards for small glycol dehydrators and also for the newly covered storage vessels.

A technical memorandum from an EPA contractor discusses how the MACT standards were set for small glycol dehydrators.[20] In the memorandum, the contractors note that

> New emissions data concerning the small glycol dehydration unit emission points in the Oil and Natural Gas Production source category were not available; therefore, we evaluated the dataset collected from industry during the development of the original MACT standards (legacy docket A-94-04, item II-B-01, disk 1). We believe this dataset is representative of currently operating glycol dehydrators because it contains information for a varied group of sources (i.e., units owned by different companies, located in different states, representing a range of gas compositions and emission controls) and that the processes have not changed significantly since the data were collected.[21]

It is clear from a review of this memorandum and its references (i.e., all references numbered 1-6 dealing with data) that all of the data used in the analysis was from the 1998 legacy docket, and thus reflects data from an even older time period. The rationale put forth by

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(http://www.epa-echo.gov/echo/index.html) that provides public access to compliance and enforcement information for approximately 800,000 EPA-regulated facilities." See -0505-0031.pdf, pp. 3.

[19] "As shown in Table 1, the number of facilities identified in the ECHO database (286) is close to the number found in the NEI (321). Therefore it can be concluded that, for the Natural Gas Transmission and Storage segment, the NEI database is representative of the number of sources subject to the rule. For the Oil and Natural Gas Production source category, the number of facilities in the NEI (990) is more than 3 times that in the ECHO database (269)." See -0505-0031.pdf, pp. 3.

[20] See -0505-0047.pdf

[21] See -0505-0047.pdf, pp. 3.

the contractor and EPA that these data are still "representative of currently operating glycol dehydrators…" and that "…processes have not changed significantly…" is specious without further support. Specifically, these data (from before 1998) pre-date the significant changes that are reflected in the shale plays noted above. As one example, there is no reason to believe, *prima facie*, that the BTEX composition of the dehydrator exhausts from wells located at the shale plays is similar to more conventional oil and gas wells since the formations from which these wells extract hydrocarbons are quite different.

EPA similarly relied on outdated data in setting new standards for storage vessel tanks; EPA simply relied on its 1998/1999 MACT analysis for PFE storage vessels and concluded that not much has changed since.

III. Missing Sources

It is not clear why EPA chose to propose standards for the first time for small dehydrators and non-PFE storage vessels only. Based on actual emissions from the industry, EPA's focus on these two sources appears too limited. EPA provides no explanation as to why the proposed rule fails to cover numerous other HAP emitting sources within the two source categories.

EPA should begin with a comprehensive set of HAP emitting sources at "major source" facilities in these two source categories and, based on technical arguments and current data, select all of the HAP sources that should be covered under the NESHAP. Examples of sources that are not properly addressed or missing from the proposed rule and/or EPA's analysis altogether include:

- Sources located at off-shore major sources (i.e., production platforms) – includes both point and fugitive sources;
- Combustion sources (which emit numerous combustion HAP such as PAHs, formaldehyde, 1.3-butadiene, etc.) such as engines that power compressors and turbines (using either diesel or natural gas) and heater treaters at sources in both sectors. To the extent that EPA believes that such sources are already covered by other NESHAP, EPA should provide a thorough discussion of the characteristics of such combustion sources in these sectors and how they are covered in other NESHAP, including whether those

NESHAPs have been updated in accordance with section 112(d).[22] No such discussion exists in the record and, therefore, it is not clear that such sources are sufficiently covered;

- Process vents at processing plants (could be either point sources or fugitive sources);
- Fugitive emissions from all types of wells such as oil production wells, associated gas and oil wells, steam enhanced oil recovery wells, etc. Specifically venting of casing head gas[23] as well as emissions associated with well completions and recompletions;[24]
- Fugitive emissions from drilling such as gas seepage into drilling mud and subsequent separation in the mud degasser; Notably, the use of oil-based drilling mud may result in HAP emissions;
- Fugitive emissions from pipeline pigging and storage of pipeline pigging;
- Fugitive emissions from waste pits storing drill cuttings;
- Other VOC and HAP emissions sources at oil and gas production facilities (such as well drill rigs, leaks from reciprocating compressor rod packing,[25] leaks from centrifugal compressor seals,[26] fugitive sources such as valves, pumps, etc., chemical injection pumps, gas-driven pneumatic devices,[27] pneumatic pumps and controllers, well deliquefaction processes such as plunger lift emissions, produced water[28] sources such as open pits and sumps, produced water ponds,[29] etc.). EPA's argument that HAP emissions from these sources are covered simply because VOC emissions from some of these sources are covered by the NSPS does not hold in three important aspects. First, the NSPS, to the extent that it covers these sources at all, is only limited to new and modified sources and may not cover existing sources of HAPs. Second, the NSPS do not cover all

[22] For example, EPA agreed to check into the issue of "whether drilling engines that are left stationary for over a year would be covered…" See -0505-0035.pdf.
[23] See -0505-0056.pdf, numbered slide 14. This is an example of a source that EPA itself recognized as not being covered under current regulations and yet there is no discussion of these source;
[24] We also note that throughout the proposed rules EPA uses the undefined term "workovers" for wells but we are not sure what it means. EPA should either eliminate or define this term.
[25] See -0505-0056.pdf, numbered slide 16.
[26] See -0505-0056.pdf, numbered slide 16.
[27] See -0505-0056.pdf, numbered slides 14 and 16.
[28] "…produced water contains many organic and inorganic compounds… Some of these are naturally occurring in the produced water while others are related to chemicals that have been added for well-control purposes." See -0505-0023.pdf, pp. v. "Produced waters from gas production have higher contents of low molecular-weight aromatic hydrocarbons such as benzene, toluene, ethylbenzene, and xylene (BTEX) than those from oil operations…" See -0505-0023.pdf, pp. 4.
[29] See -0505-0056.pdf, numbered slide 15.

sources, as made clear in the separate technical report on the NSPS proposal. Third, EPA has a duty to regulate HAPs under section 112 and it cannot rely on an NSPS section 111 standard to fulfill that responsibility.;

- Flares at all locations;
- Compressor station blow downs at shutdown;[30]
- Storage vessels associated with transmission and storage facilities, including those with flashing emissions and non-flashing (i.e., breathing and working losses);
- Produced water ponds and storage tanks;
- Vapors from truck unloading;[31]
- Landfarming;[32]
- Leaks from pipelines and compressor stations;[33]
- Venting of gas for maintenance or repair of pipelines or compressors;[34] other VOC and HAP emissions at production facilities such as due to well blow-outs. While EPA's proposed elimination of the startup, shutdown, and malfunction (SSM) emissions exemption is a necessary and appropriate step,[35] it is not clear how health risk from HAP emissions during malfunctions such as blow-outs, for example, are specifically addressed;
- HAP emissions from any operational malfunctions, such as pressure relief device releases due to overpressure.[36]
- The entire sector relating to distribution of gas to the end customer including emission sources and activities such as leaks from unprotected steel mains and service lines, leaks from pipelines and compressors, leaks at metering and regulating stations, gas-driven pneumatic devices, and pipeline blowdowns[37] – these are all sources that EPA identifies, but fails to address in the NESHAP analysis. Absent thorough analysis of the distribution sector, it is not clear that there are no additional major sources of HAPs.

[30] -0505-0059.pdf
[31] See -0505-0056.pdf, numbered slide 14.
[32] See -0505-0056.pdf, numbered slide 14.
[33] See -0505-0056.pdf, numbered slide 16.
[34] See -0505-0056.pdf, numbered slide 16.
[35] 76 FR 52747, August 23, 2011.
[36] -0505-0013.pdf
[37] See -0505-0056.pdf, numbered slide 17.

As noted above, most of the emissions from these sources are fugitive. In addition significant HAPs are released during malfunctions.

Based on the above, it is clear that EPA's residual risk and MACT reviews in the proposed NESHAP contains significant gaps in HAP emissions. EPA's proposal fails to cover numerous sources of HAP emissions associated within the two source categories. Before finalizing the rules, EPA should conduct a comprehensive assessment of all HAP emission points.

IV. Missing Pollutants

It is impossible to determine if EPA considered all of the HAPs emitted from the various sources within these source categories, in light of EPA's omission of numerous sources of HAPs and the accompanying lack of HAP emissions characterization data from these sources. It is likely that EPA failed to consider all pollutants. Although EPA has taken very necessary and appropriate steps in this rulemaking, the proposed rule has significant omissions that EPA must address to ensure that it is sufficiently protective of community air quality.

First, EPA itself notes,

> For 983 of the 1,318 Oil and Natural Gas Production and Natural Gas Transmission and Storage facilities (75%), emission estimates for key HAPs were not available in the NEI. In order to model the most complete data set possible, EPA developed emission estimates for the missing HAPs shown in Table 2 based on the reported VOC emission estimates and the VOC percent ratios shown in Table 2. Surrogate emissions based on these ratios were assigned to 724 facilities in the Oil and Natural Gas Production source category, and 259 facilities in the Natural Gas Transmission and Storage source category.[38]

This clearly shows that EPA's HAP estimates for the vast majority of the sources that it did consider were based on assumptions (such as surrogacy) and not on actual test data. Moreover, EPA provides no analysis or data to support its surrogacy assumption.

[38] -0505-0022.pdf, pp. 4.

Therefore, it is not realistic to rely on EPA's assertion that "[b]ased on these data, the HAP emitted in the largest quantities are: toluene, hexane, benzene, xylenes (mixed), ethylene glycol, methanol, ethyl benzene, and 2,2,4-trimethylpentane. Emissions of these eight HAP make up 99 percent of the total emissions by mass."[39] EPA does not provide sufficient evidence to demonstrate that additional HAPs are not also emitted in significant amounts.

EPA also does not appear to have considered additional HAP information available in the docket. For example, data from the Sublette County Air Toxics Inhalation Project in Wyoming reported in May 2010[40] noted that "…the following HAPs (with CAS numbers) are present at the Pinedale monitoring site: 1,1,2-Trichloroethane; 1,1-Dichloroethane (75-34-3); 1,2,4-Trimethylbenzene (95-63-6); 1,2-Dichloroethane (107-06-2); 1,3,5-Trimethylbenzene (108-67-8); 2,2,4-Trimethylpentane (540-84-1); 2-Butanone (Methyl Ethyl Ketone) (78-93-3); 2-Propanol (67-63-0); 4-Ethyltoluene (622-96-8); 4-Methyl-2-pentanone (108-10-1); Acetone (67-64-1); Benzene (71-43-2); Chloroethane (75-00-3); Chloromethane (74-87-3); Cyclohexane (110-82-7); Ethanol (64-17-5); Ethyl Benzene (100-41-4); Freon 11 (75-69-4); Freon 12 (75-71-8); Heptane (142-82-5); Hexane (110-54-3); m,p-Xylene (108-38-3/106-42-3); Methylene Chloride (75-09-2); o-Xylene (95-47-6); Tetrachloroethene (127-18-4); Toluene (108-88-3); and Vinyl Chloride (75-01-4)."[41]

In Texas, it was reported that "[a]ir samples collected as part of a study by residents of the town of DISH, Texas located within the Barnett Shale, confirmed the presence of certain HAPs including benzene, carbon disulfide, carbonyl sulfide, naphthalene, and xylene at concentrations in excess of TCEQ short-term and long-term effects screening levels."[42]

Studies of HAP emissions from "produced" water, which were not considered in EPA's analysis, reported that "hydrocarbons that occur naturally in produced water include organic acids, polycyclic aromatic hydrocarbons (PAHs), phenols, and volatiles."[43] Also, "Volatile hydrocarbons can occur naturally in produced water. Concentrations of these compounds are

[39] -0505-0032.pdf, pp. 25.
[40] -0505-0006.pdf referencing a report found at http://deq.state.wy.us/aqd/Ozone/5-2810%20%20Sublette%20County%20Air%20Toxics%201st%20Quarter%202010%20Report.pdf.
[41] -0505-0006.pdf
[42] -0505-0016.pdf, pp. 26-27 citing to Earthworks' Oil and Gas Accountability Project, Health Survey Results of Current and Former DISH/Clark, Texas Residents, 13 (December 2009), http://townofdish.com/objects/DishTXHealthSurvey_FINAL_hi.pdf.
[43] -0505-0023.pdf, pp. 6.

usually higher in produced water from gas-condensate-producing platforms than in produced water from oil-producing platforms (citation in original, omitted). …Organic components that are very soluble in produced water consist of low molecular weight (C2-C5) carboxylic acids (fatty acids), ketones, and alcohols. They include acetic and propionic acid, acetone, and methanol. In some produced waters, the concentration of these components is greater than 5,000 ppm….".[44] Several of these compounds are HAPs. In addition, there is significant evidence that produced water can contain significant quantities of radionuclide compounds, depending on the formation.[45]

In sum, given EPA's reliance on old data, its failure to systematically gather any recent HAP data, and the omission of so many HAP sources (discussed above), it is irrational for EPA not to have considered regulating HAPs emitted by numerous sources in both the production and the transmission/storage sectors.

V. Risk Review

There are numerous flaws and omissions in EPA's residual risk review, in addition to those discussed above which affect EPA's risk assessment. As such, it is impossible to have confidence that EPA's residual risk analysis has led to a proposed rule that will sufficiently protect public health.

First, as noted earlier the risk review relies on older data that is based on emission estimates (not test data) that are not representative of the industry today. It notes that "[t]he 2005 National-Scale Air Toxics Assessment (NATA) National Emissions Inventory (NEI) served as the starting point for this assessment. The 2005 NEI contains information on actual emissions during the entire 2005 base year."[46] As discussed earlier, these data cannot be assumed to be representative of emissions from the source categories today. Recognizing its own unease[47] with

[44] -0505-0023.pdf, pp. 6-7.
[45] See for example, the analysis of produced water from the Marcellus shale, which contains significant concentrations of radium-226 (concentrations of 3,000-5,000 picocuries/liter, as compared to the drinking water standard of 5 picocuries/liter). Available at http://www.nicholas.duke.edu/thegreengrok/frackingwater.
[46] -0505-0032.pdf, pp. 5.
[47] For example, EPA notes that, "While the NEI contains information on whether an emission point is controlled or not, we do not have information on the type of control measure in place. Therefore, we cannot determine how many controlled dehydrators are complying with the 95% reduction alternative or how many are using less effective controls to meet the 0.9 Mg/yr benzene alternative limit."

the use of older data, EPA states that "the NEI was updated with industry supplied data as available. The goal of the engineering review was to identify readily-apparent limitations and issues with the emissions data (particularly those that would have the potential to influence risk estimates) and to make changes to the data set where possible to address these issues and decrease the uncertainties associated with the assessment."[48] Yet the record does not indicate where such "updated industry-supplied data" was used or even what was updated or what industry sources supplied updated data. Nor does the record indicate what changes were made. Thus, it appears that the data used was incomplete and outdated.

Second, there are flaws in how the dispersion modeling was conducted in order to predict concentrations near and far from the sources. As EPA notes:

> In HEM-AERMOD, meteorological data are ordinarily selected from a list of over 200 National Weather Service (NWS) surface observation stations across the continental United States, Alaska, Hawaii, and Puerto Rico. In most cases the nearest station is selected as representative of the conditions at the subject facility. Ideally, when considering off-site meteorological data most site-specific dispersion modeling efforts will employ up to five years of data to capture variability in weather patterns from year to year. However, because we had an insufficient number of appropriately formatted model input files derived from available meteorological data, we modeled only a single year, typically 1991. While the selection of a single year may result in under-prediction of long-term ambient levels at some locations, likewise it may result in over-prediction at others……The average distance between a modeled facility and the applicable meteorological station was 40 miles (72 km).[49]

There are two problems with EPA's analysis described above. First, even if the meteorological station associated with a source was representative of the source, one year of meteorological data is not sufficient to satisfy EPA's regulatory evaluation of health risk today, in 2011. EPA does not justify why 1991 should be a representative meteorological year for all sources modeled. Second, EPA has not explained how it is reasonable to assume that the "nearest" station is representative of meteorological conditions at a source, without regard to

[48] -0505-0032.pdf, pp. 5
[49] -0505-0032.pdf, pp. 6.

terrain. It is obvious that meteorological data will be influenced by terrain (such as hills and valleys, or the presence of water bodies or coastlines near the source) at the source location and in the surrounding area. Simply using distance between the source and the nearest meteorological station as the metric for representativeness is an obvious error that likely would result in underestimates of health risk in many instances. As EPA notes, the average distance between the meteorological station and a modeled source facility is 40 miles. This means that in many instances, the distance is considerably greater. (EPA does not provide information regarding how large the distance may be.) Thus, it is quite plausible that for a given source, meteorological data that was not representative of the source location was used to model emissions from the sources. This suggests that EPA's estimates of predicted concentration are unlikely to be representative of actual concentrations in a number of instances. EPA should provide additional support for its approach and data to demonstrate how its modeling provides an accurate portrayal of the air concentration for particular pollutants.

Third, EPA relies on this flawed modeling to justify not considering the impacts of acute pollutant concentrations. EPA notes,

> In contrast to the development of ambient concentrations for evaluating long-term exposures, which was performed only for occupied census blocks, worst-case short-term (one-hour) concentrations were estimated both at the census block centroids and at points nearer the facility that represent locations where people may be present for short periods, but generally no nearer than 100 meters from the center of the facility (note that for large facilities, this 100-meter ring could still contain locations inside the facility property). Since short-term emission rates were needed to screen for the potential for hazard via acute exposures, and since the NEI contains only annual emission totals, we generally apply the assumption to all source categories that the maximum one-hour emission rate from any source is ten times the average annual hourly emission rate for that source.[50]

Even if all other factors were correct, estimating concentrations near the facility fenceline using meteorological data that was collected, on average, 40 miles away introduces a high degree of variability not accounted for in EPA's analysis. For those facilities without nearby

[50] -0505-0032.pdf, pp. 7.

meteorological stations, EPA should have evaluated the degree to which the available data was likely to represent conditions at the fenceline of the facility and adjusted the estimates accordingly. This suggests that, although EPA says that it was analyzing acute health risk at the fenceline, in fact it has not properly assessed even acute health risk for the most-exposed person at the fenceline.

Fourth, there is no basis for assuming that the one-hour emission rate is 10 times the average annual emission rate and that this assumption is conservative. EPA provides some analysis of data from Texas collected in 2001 as support for this assumption. EPA notes that "based on these results, EPA chose the factor of ten for all initial screening; it is intended to cover routinely-variable emissions as well as startup, shutdown, and malfunction (SSM) emissions."[51] However, it is not clear if the data set used included events such as well blowouts which are the types of events that can cause very high short-term emissions and impacts near facilities. Similarly, other events such as well development can have far greater short-term emissions.

Fifth, EPA notes that "[t]he HEM-AERMOD system estimates ambient concentrations at the geographic centroids of census blocks (using the 2000 Census)…"[52] There is no discussion of the sensitivity of this assumption given the availability of more recent 2010 census data. EPA should use data from the 2010 census.

Sixth, it is not clear what sources outside of this source category were used in EPA's analysis of facility-wide risk. Although EPA notes that "for the facilities in these source categories, we estimated the maximum inhalation cancer and chronic non-cancer risks associated with all HAP emissions sources at the facility, including emissions sources that are not part of the source categories but that are located within a contiguous area and are under common control….,"[53] it is not clear, for example, if combustion sources were also modeled for the baseline risk assessment for these facilities. Or, if other emission sources that EPA itself has identified, such as "…pipeline pigging and storage of pipeline pigging wastes,"[54] were included, much less the large number of sources discussed previously. EPA should provide a full

[51] -0505-0032.pdf, pp. 7.
[52] -0505-0032.pdf, pp. 6.
[53] -0505-0032.pdf, pp. 24
[54] -0505-0032.pdf, pp. 24.

accounting of the emission data it used for its facility-wide risk analysis, including information on other types of HAP sources and facilities it analyzed.

It appears that combustion emissions were not included. For example, Table 3.1-1 of the residual risk report contains PAH emissions from just one natural gas transmission and storage facility. Yet most sources in this category would have combustion sources. Similarly, Table 4.1-1 of the residual risk report contains PAH emissions from just a few production source category facilities. In reality, almost all production facilities will have sources of these HAPs due to the use of equipment such as engines, heaters, etc.

Based on the above, EPA has not shown that its EPA's residual risk assessment is sufficiently protective of public health. EPA should address these technical issues and omissions in order to ensure that its risk assessment can adequately and accurately inform EPA's rule proposal and provide information to affected communities of the health risks posed by these sectors.

VI. EPA's Cost-Based Analyses Include Additional Unsupported Assumptions

The record includes numerous additional examples of unsupported assumptions that EPA uses as the basis for its cost of pollution control analyses.

In relation to small glycol dehydrators, EPA notes that,

> [T]he estimated cost effectiveness of the controls to reduce HAP emissions by 95% for small glycol dehydrators in the Oil and Natural Gas Production source category is $7,000/Mg HAP reduced and is $1,650/Mg HAP reduced for the Natural Gas Transmission and Storage source category. While control methodologies are similar for large and small dehydrators, the gas flow being processed and the amount of HAP reductions achieved for large glycol dehydrators are expected to be equal to or greater than those for small glycol dehydrators. However, I would expect the cost effectiveness for large units not to exceed twice the cost effectiveness of small units. Therefore, I would assume the cost effectiveness for large units not to exceed $14,000/Mg HAP reduced for the Oil and Natural Gas Production source category

> and $3,300/Mg HAP reduced for the Natural Gas Transmission and Storage source category.[55]

The record provides no basis to assume that the cost effectiveness of large dehydrators will not "exceed twice the cost effectiveness of small units…" In fact it is quite common for the cost effectiveness of larger units to be smaller than that of smaller units because they operate with the advantage of scaling. Thus, EPA must support its assumption in this regard.

Regarding control efficiency, EPA notes that "for sources achieving the MACT level of control, it is assumed that for most glycol dehydrators required to reduce emissions, the emissions are routed to a condenser or a combustion device, which achieve at least a 95% HAP reduction."[56] It is not clear why EPA assumed that the HAP control efficiency of the second control device (i.e., condenser or combustion device) is only 95% as opposed to 98% or 99%. EPA did not investigate the cost effectiveness impact of these greater efficiencies.

EPA also notes with regard to dehydrators that "the costs for the second device were assumed to be equal to the costs of the first device…"[57] Since the cost of a control device depends on it process size (i.e., volume of waste gas to be handled and concentration of contaminants in the waste gas etc.), it is difficult to understand EPA's basis for this assumption. EPA provides no support for this assumption.

With regard to storage vessels, EPA notes that

> [F]or sources achieving the MACT level of control, it is assumed that storage vessels required to reduce emissions are equipped with a cover vented through a closed vent system to a control device, which achieves at least a 95% HAP reduction. To reduce the emissions remaining after the use of this control device, the option of requiring an additional add-on control device, most likely a combustion device that would also achieve a 95% emission reduction, was investigated. The costs for the second device were assumed to be equal to the costs of the first device…58

EPA's conclusion raises several unanswered questions:

- What is the basis of the 95% control for the first device (cover + closed vent)?

[55] -0505-0077.pdf
[56] -0505-0077.pdf
[57] -0505-0077.pdf. Context is discussion on glycol dehydrators.
[58] -0505-0077.pdf. Context is the second control device for storage vessels.

- What is the basis of the 95% efficiency of the second device?
- Why is the cost of the second device assumed to be the same as the first device?

Examples of additional control approaches that EPA should have considered for storage tank emissions reductions include: fixed-roof tanks with vents routed to carbon adsorbers; fixed roof tanks with vents routed to controlled combustion devices (such as thermal or catalytic oxidizers) assuring 99% or greater destruction of HAPs, internal floating-roof tanks with vents routed to carbon adsorbers or oxidizers. While these types of control strategies or devices may not be appropriate under all circumstances, they are valid approaches for emissions reduction that have been applied in other related sectors, such as refineries.

With regard to fugitive emissions, EPA notes that, "the costs of these options were examined under the review of the NSPS for the oil and gas sector based on reductions of VOC. Since the HAP present is approximately 1/20 the VOC present in material handled by regulated equipment, the cost effectiveness of these LDAR programs is approximately 20 times greater for HAP reduction than for VOC reduction."[59] Given the poor data support for HAPs contained in various fugitive emissions sources for both source categories, it is impossible to determine EPA's basis for concluding that, at most, only 5% of VOCs are HAPs.

VII. Section 112(d)(6) MACT Review

The explanation of EPA's required MACT review is contained in several memoranda from its contractors available in the docket.[60] It appears that EPA's technology review evaluating new developments focused only on a few sources – dehydrators, storage vessels, and fugitive emissions. As discussed above, EPA failed to analyze HAP emissions from several other sources. The shortcomings of EPA's technology review are as follows.

As EPA notes, the two reasons that control options are identified and evaluated are to reduce risks in accordance with section 112(f) and to increase control standard stringency in light of developments in practices, processes, and control techniques in accordance with section 112(d)(6).

[59] -0505-0077.pdf
[60] See, for example. -0505-0062.pdf, and documents referenced therein.

In general, like the NSPS technology review, EPA defines what it considered to be "development" for the purposes of this review. For the purpose of reviewing the MACT standards, EPA considered a "development" in practices, processes, and control technologies to be: any add-on control technology or other equipment (e.g., floating roofs for storage vessels) that was not identified and considered during MACT development; any improvements in add-on control technology or other equipment (that was identified and considered during MACT development) that could result in significant additional emission reduction; any work practice or operational procedure that was not identified and considered during MACT development; and any process change or pollution prevention alternative that could be broadly applied that was not identified and considered during MACT development.[61]

EPA then applies this term quite narrowly. For example, EPA appears to have only looked at the RACT/BACT/LAER Clearinghouse (RBLC) and the Natural Gas Star documents for "developments" as defined above. It is not clear how the goal of uncovering "any" new practices, processes, and control technologies could be met by limiting its review to just these two sources. EPA made no attempt to conduct a broader technology review, engage in discussions with vendors, or evaluate pollution control activities in states and local jurisdictions. The RBLC search did not uncover any new developments that EPA determined would require a new proposed standard.[62]

The results of EPA's reviews were as follows:

> 112(f) Risk Reduction Options Identified:
>
> Oil and Natural Gas Production
> - Eliminate the glycol dehydrator alternative compliance option of 0.9 Mg/yr benzene
> - Require a second control device on glycol dehydrators
> - Require a second control device on storage tanks
> - Require more stringent LDAR programs for leak detection
> - Require compliance with 40 CFR part 60 subpart VVa rather than subpart VV plant-wide
> - Require compliance with 40 CFR part 60 VVa rather than subpart VV for certain components
> - Require the use of an optical gas imaging camera monthly with an annual EPA Method 21 check

[61] -0505-0062.pdf, pp.4.
[62] -0505-0062.pdf, pp. 6.

Natural Gas Transmission and Storage

- Eliminate the glycol dehydrator alternative compliance option of 0.9 Mg/yr benzene

112(d)(6) Technology Review Options Identified:

Oil and Natural Gas Production

- Require more stringent LDAR programs for leak detection
- Require compliance with 40 CFR part 60 subpart VVa rather than subpart VV plant-wide
- Require compliance with 40 CFR part 60 VVa rather than subpart VV for certain components
- Require the use of an optical gas imaging camera monthly with an annual EPA Method 21 check

Natural Gas Transmission and Storage

- No control options identified.[63]

EPA's analysis overlooked a significant number of new developments that can achieve greater emission reductions.

The most obvious flaw in EPA's determination was the manner in which these options and only these options were identified under either program. Indeed, there is extensive reporting of various control technologies and options that have been implemented and are in use voluntarily by EPA partners under the Natural Gas Star program.[64] Yet EPA provides no summary or analysis of Natural Gas Star developments that should inform the rule proposal. EPA's docket memoranda on the technology reviews state[65] that "[n]ew practices, processes, and control technologies were reviewed from the Natural Gas STAR program…" but no further analysis appears in the docket. EPA's docket memo contains a summary of the RBLC data but no summary of NG Star. There is no indication when the RBLC was searched. Attachment A to this report includes a Table providing a summary of Natural Gas Star found on EPA's own website. EPA's conclusory assertion that the Natural Gas Star was "reviewed," is not supported

[63] -0505-0037.pdf

[64] "The Natural Gas STAR Program is a flexible, voluntary partnership that encourages oil and natural gas companies—both domestically and abroad—to adopt cost-effective technologies and practices that improve operational efficiency and reduce emissions…." See http://www.epa.gov/gasstar/.

[65] see -0505-0060.pdf, pp. 5.

by the record. If indeed EPA did review this, it should have required additional emission reductions based on the Natural Gas Star program as further discussed below.

As noted earlier, EPA did not attempt to collect data reflecting the best practices at various facilities in each source category. Although EPA mentions that there was "direct correspondence with industry"[66] this appears to refer to a few sporadic summaries of Natural Gas Star information. In this instance, none of the four Natural Gas Star reports referenced in the footnote are dated after 2006. See discussion below providing examples of sources that EPA should consider.

Nor did EPA discuss or consider pollution control activities and regulation in states such as California, Colorado, Wyoming, and others which have long regulated many sources in these sectors at more stringent levels than proposed by EPA. See Buckheit report for a more in depth discussion.

Finally, EPA and its contractors failed to conduct a broad based search of vendor literature addressing control methods and approaches. For example, the literature search should include: state permits and technology reviews in each state where shale gas or shale oil plays have been identified and where the number of fracking well permits are increasingly being issued; any and all rulemakings that are current in these states; all technology support documents supporting state rulemaking; a review of vendor literature from all major vendors supplying equipment such as compressor seals, pneumatic devices, storage tanks, combustion control devices such as after-burners and flares, and components such as values, flanges, etc., which can cause fugitive emissions; a review of LDAR programs from states such as CA as noted above.

In some instances EPA appears to identify potentially promising emissions reduction options but these are dismissed without discussion. For example, Table 2 identifies "Low Emission Equipment Design" for controlling equipment leaks but no further detail is provided. This entire category is dismissed on the bases that "[t]his technology has not yet been proven to be effective for reducing emissions."[67]

Even when EPA identifies promising HAP reduction options that have yielded benefits in practice, it does not discuss why they were not included as reduction options in the final analysis.

[66] -0505-0060.pdf, pp. 3.
[67] -0505-0060.pdf, Table 2.

In reference to glycol dehydrators, EPA correctly notes that "the Natural Gas STAR program listed the following control techniques for glycol dehydrators (citations and discussions omitted):

- Optimize Glycol Circulation Rates
- Flash Tank Separator (FTS) Installation
- Electric Pump Installation
- Re-route Glycol Skimmer Gas
- Replace Glycol Dehydrators with Methanol Injection
- Replace Glycol Dehydrators with Desiccant Dehydrators
- Replace Glycol Dehydrator with Separators and In-line Heaters"[68]

However, while EPA provides a description of these approaches, and related limitations in particular cases, it broadly dismisses these options from further consideration. It states: "[T]he optimization of the glycol circulation rates and the flash tank separator options were used in the MACT technology analysis from the Natural Gas STAR options. The other options were considered to be new or emerging technologies and have not been proven to work for all glycol dehydrators in the production or transmission source categories."[69]

First, it is unclear how EPA "considered" the optimization of glycol circulation rates in the prior MACT review since it did not appear to be a MACT requirement at that time, even though many operators are using this approach. Review of the prior rulemaking and its supporting documents did not provide any indication that this was considered. Similarly, it is unclear how EPA considered the flash tank separator option in the MACT technology analysis. Since EPA is relying on its prior rulemaking, it should make all of the documents from that rulemaking available as part of the current rulemaking docket.

In addition, it is clear that EPA recognizes that its prior rulemaking could not have included examples of emissions reduction approaches that have been demonstrated via the Natural Gas Star program. In fact, EPA notes that "for glycol dehydrators, many of the practices,

[68] -0505-0062.pdf, pp. 8.
[69] -0505-0062.pdf, pp. 8.

processes, or control technologies listed by the Natural Gas STAR program were not identified and evaluated during the original MACT development."[70] Instead of evaluating these approaches, however, EPA improperly seeks to minimize their relevance. As stated:

> However, most of these practices are considered to be new and unproven practices that may not be applicable to all production or transmission facilities. (emphasis added) Only one of the technologies identified in the Natural Gas STAR literature, glycol dehydrator with a desiccant dehydrator, would result in zero HAP emissions. However, this technology cannot be used for natural gas operations that operate at high temperature, high volume, or low pressure. Therefore, this technology was not considered as MACT (emphasis added) for the natural gas and oil production or natural gas transmission and storage source categories.[71]

Second, in any case, given the passage of time since the prior MACT review, it would be appropriate to revisit and update any prior analysis, particularly in view of the accumulated evidence that these technologies can be effective. Significantly, most of the Natural Gas Star experience in reducing emissions post dates EPA's prior analysis. These demonstrations not only include case studies of specific emission reduction methods, they also include new developments (such as higher control efficiencies, better leak-reduction methods, etc.) in approaches that EPA may have considered in past reviews.

Finally, EPA's emphasis on the potential limitation of control device applicability for dehydrators is irrelevant and contrary to the goals and requirements of Clean Air Act section 112. EPA cannot reject a technology development because it fails to "work for all glycol dehydrators…" The purpose of section 112(d) is to drive technology forward, and to advance the standards by following developments in technology. For example, the use of optimized glycol circulation rates, the use of flash separators, and even the replacement of glycol dehydrators with desiccant dehydrators will not be carefully evaluated by sources as control options unless the current rule properly evaluates their application. It is quite likely that the use of these technologies would result in far lower emissions than what EPA has proposed, and that the performance of these technologies will help set the MACT standards for new sources.

[70] -0505-0062.pdf, pp.10.
[71] -0505-0062.pdf, pp. 10.

With regard to emissions leaks, EPA noted several options for emissions reductions including ultrasound leak detection, directed inspection and maintenance, increasing the frequency of replacing compressor rod packing systems, and replacing wet seals with dry seals in centrifugal compressors. Yet, EPA also notes that:

> [T]hese control options were not considered to be appropriate for MACT. (emphasis added) The directed inspection and maintenance program was not considered because it is based on the criteria of cost of repair versus emission reductions. The ultrasonic leak detection provides the magnitude of the leak, but does not quantify the leak. Therefore, this option was not considered for MACT technology review. The compressor rod packing and dry seal replacement options reduce leaking emissions from compressors. These options were not considered as options for equipment leaks because of the low HAP content of the leaking gas. (emphasis added).

EPA does not provide adequate support for rejecting these approaches. For example, it is not clear why leaks cannot be quantified using ultrasonic leak detection. Also, it is not clear what EPA means by "low HAP content" in rejecting the compressor options.

With regard to storage tanks, EPA noted that

> [T]he applicable technologies for storage vessels with the potential for flash emissions identified in the Natural Gas STAR program are comparable to the cover and control technologies currently required under the existing MACT. (emphasis added) Therefore, these Natural Gas STAR technologies would not result in any additional HAP reductions than what is achieved under the current MACT.[72]

It is unclear what EPA means by "comparable" in this instance.

Collectively, based on the above, one could easily form the impression that EPA was focused not on identifying new or even proven approaches that could be used to reduce emissions. Rather, EPA simply discounted control techniques that have already achieved emissions reductions in practice by using unsupported assumptions and assertions.

[72] -0505-0062.pdf, pp. 10.

Of course, there are numerous other means that could be used to reduce HAP emissions from other sources that EPA did not even discuss as part of its NESHAP proposal. See examples below taken from materials available in the docket.

In particular, there are two summaries[73] of control approaches that EPA should carefully consider. They include examples of controls and approaches that are currently in use by the industry and more stringent regulations required by states such as Colorado and Wyoming.[74] In addition, regulations from several California air districts, like the Bay Area Air Quality Management District (BAAQMD), controlling fugitive emissions should be considered by the EPA, as further discussed in the Buckheit report.[75]

Several control approaches discussed in the Paranhos summary (submitted into the docket) are highlighted below.

> **Use of Low or No-bleed Pneumatic Devices**.
> Pneumatic devices are used throughout the production, processing and transmission of natural gas, and the production of crude oil, to automatically operate valves and control pressure, gas flow, temperature or liquid levels.[] Pneumatic devices are designed to vent natural gas. However, some bleed or vent at rates significantly lower than others yet still achieve the same overall performance. Replacing high with low or no-bleed pneumatic devices results in significant gas savings and has a payback period of less than one year. []
>
> Colorado requires that all new, replaced or repaired pneumatic devices at production facilities must be low or no-bleed.[] In addition, all pneumatic controllers at exploration and production sites, upstream natural gas compressor stations, natural gas drip stations and gas processing plants located in an ozone nonattainment or attainment/maintenance areas must have VOC emissions equal to or less than a low-bleed controller.[] All new pneumatic controllers and existing pneumatic controllers located at a modified facility in the state of Wyoming must be low or no-bleed or route discharge streams to a closed loop system.[][76]

Notably, reductions of VOCs also imply reductions of organic HAPs. As stated in the same cited Paranhos report:

[73] See -0505-0016.pdf for a summary by Paranhos. See also the summary of control options identified in the Four Corners Study, -0505-0010.pdf
[74] See -0505-0016.pdf
[75] See http://hank.baaqmd.gov/dst/regulations/index.htm. In particular see, Reg. 8, Rule 18, for example.
[76] See -0505-0016.pdf, various pages (citations omitted).

Well Completions

Well completion activities are another significant source of methane, VOCs and HAPs including benzene.[] One cost-effective way to significantly decrease well emissions is to use portable or permanent equipment to recover, rather than release through venting or flaring, natural gas during the final well drilling process ("green or reduced emission completions").

Colorado currently requires the use of green completions on all oil and gas production wells unless not technically and economically feasible. [] Wyoming has required the use of green completions in the Jonah-Pinedale Anticline Development Area ("JPAD") since 2007 and has recently expanded this requirement to all areas of concentrated oil and gas development (concentrated development areas or "CDA"s) in the state.[] Montana requires that VOC vapors greater than 200 British thermal units per cubic foot from wellhead equipment with the potential to emit 15 tpy or greater be routed to a capture or control device such as a pipeline or flare.[]

Glycol Dehydrators

Wyoming requires control of HAPs and VOCs by at least 98% at all new and existing dehydration units operating in the Jonah-Pinedale Anticline Development Area regardless of total actual or potential emissions.[]

Crude Oil, Condensate and Produced Water Tanks

Wyoming requires that VOC emissions from condensate, oil and produced water tanks located at new or modified facilities in the Jonah-Pinedale Anticline Development Area and concentrated areas of development must control flash emissions upon the first date of production regardless of the amount of emissions. Statewide, new and modified facilities must control VOC flash emissions equal to or greater than 10 Tpy by 98% ….[]

Production Fugitive Emissions

There are a large number of uncontrolled fugitive sources in the production sector. California's Climate Change Scoping Plan proposes to address fugitive emissions from the extraction process of the state's large oil and gas industry, including on and off-shore sources. These emissions are from well and process equipment venting: leaks of flanges, valves and other fittings on the wells and equipment; and from separation and storage units such as sumps and storage tanks. Controls for the fugitive sources range from applying simple fixes to existing technologies to deploying new technologies to replace inefficient equipment and detect leaks and would include: improving operating practices to reduce emissions when compressors are taken off-line; installing compressor rod packing systems; substituting high bleed with low bleed pneumatic devices;

improving leak detection; installing electronic flare ignition devices; replacing older equipment (flanges, valves, and fittings); and installing vapor recovery devices.

Plunger Lifts and "Smart" Well Automation during Well Unloading

Operators often remove unwanted fluids from mature gas wells through "well unloading"- practices that lead to venting of methane, HAPs and VOCs. One way to remove unwanted fluids without venting while also improving well productivity is to install a plunger lift system and "smart" well automation system. Plunger lifts use gas pressure buildup in the well casing-tubing annulus to operate a steel plunger that pushes liquids to the surface.[] Smart well automation maximizes the efficiency of plunger lifts by routinely varying plunger well cycles to match key reservoir performance indices. []

Installation of BASO Valves on All Gas-fired Heaters

Crude oil heater-treaters, gas dehydrators and gas heaters located at exploration and development sites have pilot flames which can be extinguished by strong winds, causing the venting of natural gas. BASO valves automatically shut off the flow of natural gas upon the extinguishment of the pilot flame, thereby preventing unnecessary pollutant and methane losses. BASO valves are operated by a thermocouple that senses the pilot flame temperature and do not require electricity or manual operation. They are therefore ideal for remote locations.[][77]

In addition, numerous other control options are discussed in the Four Corners Study available in the docket.[78]

[77] See -0505-0016.pdf, various pages (citations omitted).
[78] See -0505-0010.pdf, various pages.

Attachment A

Resume for Dr. Ranajit (Ron) Sahu

RANAJIT (RON) SAHU, PH.D, QEP, CEM (NEVADA)

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EXPERIENCE SUMMARY

Dr. Sahu has over twenty one years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment; soils and groundwater remediation; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

He has over nineteen years of project management experience and has successfully managed and executed numerous projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public. Notably, he has successfully managed a complex soils and groundwater remediation project with a value of over $140 million involving soils characterization, development and implementation of the remediation strategy, regulatory and public interactions and other challenges.

He has provided consulting services to numerous private sector, public sector and public interest group clients. His major clients over the past seventeen years include various steel mills, petroleum refineries, cement companies, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, and various entities in the public sector including EPA, the US Dept. of Justice, California DTSC, various municipalities, etc.). Dr. Sahu has performed projects in over 44 states, numerous local jurisdictions and internationally.

Dr. Sahu's experience includes various projects in relation to industrial waste water as well as storm water pollution compliance include obtaining appropriate permits (such as point source NPDES permits) as well development of plans, assessment of remediation technologies, development of monitoring reports, and regulatory interactions.

In addition to consulting, Dr. Sahu has taught and continues to teach numerous courses in several Southern California universities including UCLA (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management) for the past seventeen years. In this time period he has also taught at Caltech, his alma mater and at USC (air pollution) and Cal State Fullerton (transportation and air quality).

Dr. Sahu has and continues to provide expert witness services in a number of environmental areas discussed above in both state and Federal courts as well as before administrative bodies (please see Annex A).

EXPERIENCE RECORD

2000-present **Independent Consultant.** Providing a variety of private sector (industrial companies, land development companies, law firms, etc.) public sector (such as the US Department of Justice) and public interest group clients with project management, air quality consulting, waste remediation and management consulting, as well as regulatory and engineering support consulting services.

1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for** Air Quality/Geosciences/Hazardous Waste Groups, Pasadena. Responsible for the management of a group of approximately 24 air quality and environmental professionals, 15 geoscience, and 10 hazardous waste professionals providing full-service consulting, project management, regulatory compliance and A/E design assistance in all areas.

Parsons ES, **Manager for Air Source Testing Services**. Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.

1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department. Responsibilities included multimedia regulatory compliance and permitting (including hazardous and nuclear materials), air pollution engineering (emissions from stationary and mobile sources, control of criteria and air toxics, dispersion modeling, risk assessment, visibility analysis, odor analysis), supervisory functions and project management.

1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department. Responsibilities included permitting, tracking regulatory issues, technical analysis, and supervisory functions on numerous air, water, and hazardous waste projects. Responsibilities also include client and agency interfacing, project cost and schedule control, and reporting to internal and external upper management regarding project status.

1989-1990 Kinetics Technology International, Corp. **Development Engineer.** Involved in thermal engineering R&D and project work related to low-NOx ceramic radiant burners, fired heater NOx reduction, SCR design, and fired heater retrofitting.

1988-1989 Heat Transfer Research, Inc. **Research Engineer**. Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

EDUCATION

1984-1988 Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.

1984 M. S., Mechanical Engineering, Caltech, Pasadena, CA.

1978-1983 B. Tech (Honors), Mechanical Engineering, Indian Institute of Technology (IIT) Kharagpur, India

TEACHING EXPERIENCE

Caltech

"Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.

"Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.

"Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.

"Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.

“Thermodynamics and Heat Transfer,” Fall and Winter Terms of 1996-1997.

U.C. Riverside, Extension

"Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Various years since 1992.

"Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Various years since 1992.

"Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.

"Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.

"Process Safety Management," University of California Extension Program, Riverside, California. Various years since 1992-2010.

"Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.

"Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.

“Advanced Hazardous Waste Management” University of California Extension Program, Riverside, California. 2005.

Loyola Marymount University

"Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1993.

"Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.

“Environmental Risk Assessment,” Loyola Marymount University, Dept. of Civil Engineering. Various years since 1998.

“Hazardous Waste Remediation” Loyola Marymount University, Dept. of Civil Engineering. Various years since 2006.

University of Southern California

"Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.

"Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

University of California, Los Angeles

"Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000, Spring 2003, Spring 2006, Spring 2007, Spring 2008, Spring 2009.

International Programs

"Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.

"Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.

"Air Pollution Planning and Management," IEP, UCR, Spring 1996.

"Environmental Issues and Air Pollution," IEP, UCR, October 1996.

PROFESSIONAL AFFILIATIONS AND HONORS

President of India Gold Medal, IIT Kharagpur, India, 1983.

Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992-present.

American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-present.

Air and Waste Management Association, West Coast Section, 1989-present.

PROFESSIONAL CERTIFICATIONS

EIT, California (# XE088305), 1993.

REA I, California (#07438), 2000.

Certified Permitting Professional, South Coast AQMD (#C8320), since 1993.

QEP, Institute of Professional Environmental Practice, since 2000.

CEM, State of Nevada (#EM-1699). Expiration 10/07/2011.

PUBLICATIONS (PARTIAL LIST)

"Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).

"Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).

"On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).

"Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).

"Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C.Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).

"A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).

"Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R.Gavalas, *Combust. Flame*, **77**, 337-346 (1989).

"Particle Measurements in Coal Combustion," with R.C. Flagan, in "**Combustion Measurements**" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).

"Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.

"Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).

"HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NOx Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

“From Puchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada,” with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

“The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants,” with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

Annex A

Expert Litigation Support

1. Matters for which Dr. Sahu has have provided depositions and affidavits/expert reports include:

(a) Deposition on behalf of Rocky Mountain Steel Mills, Inc. located in Pueblo, Colorado – dealing with the manufacture of steel in mini-mills including methods of air pollution control and BACT in steel mini-mills and opacity issues at this steel mini-mill

(b) Affidavit for Rocky Mountain Steel Mills, Inc. located in Pueblo Colorado – dealing with the technical uncertainties associated with night-time opacity measurements in general and at this steel mini-mill.

(c) Expert reports and depositions (2/28/2002 and 3/1/2002; 12/2/2003 and 12/3/2003; 5/24/2004) on behalf of the US Department of Justice in connection with the Ohio Edison NSR Cases. *United States, et al. v. Ohio Edison Co., et al.,* C2-99-1181 (S.D. Ohio).

(d) Expert reports and depositions (5/23/2002 and 5/24/2002) on behalf of the US Department of Justice in connection with the Illinois Power NSR Case. *United States v. Illinois Power Co., et al.*, 99-833-MJR (S.D. Ill.).

(e) Expert reports and depositions (11/25/2002 and 11/26/2002) on behalf of the US Department of Justice in connection with the Duke Power NSR Case. *United States, et al. v. Duke Energy Corp.*, 1:00-CV-1262 (M.D.N.C.).

(f) Expert reports and depositions (10/6/2004 and 10/7/2004; 7/10/2006) on behalf of the US Department of Justice in connection with the American Electric Power NSR Cases. *United States, et al. v. American Electric Power Service Corp., et al.,* C2-99-1182, C2-99-1250 (S.D. Ohio).

(g) Affidavit (March 2005) on behalf of the Minnesota Center for Environmental Advocacy and others in the matter of the Application of Heron Lake BioEnergy LLC to construct and operate an ethanol production facility – submitted to the Minnesota Pollution Control Agency.

(h) Expert reports and depositions (10/31/2005 and 11/1/2005) on behalf of the US Department of Justice in connection with the East Kentucky Power Cooperative NSR Case. *United States v. East Kentucky Power Cooperative, Inc*., 5:04-cv-00034-KSF (E.D. KY).

(i) Deposition (10/20/2005) on behalf of the US Department of Justice in connection with the Cinergy NSR Case. *United States, et* al. *v. Cinergy Corp., et al.*, IP 99-1693-C-M/S (S.D. Ind.).

(j) Affidavits and deposition on behalf of Basic Management Inc. (BMI) Companies in connection with the BMI vs. USA remediation cost recovery Case.

(k) Expert report on behalf of Penn Future and others in the Cambria Coke plant permit challenge in Pennsylvania.

(l) Expert report on behalf of the Appalachian Center for the Economy and the Environment and others in the Western Greenbrier permit challenge in West Virginia.

(m) Expert report, deposition (via telephone on January 26, 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) in the Thompson River Cogeneration LLC Permit No. 3175-04 challenge.

(n) Expert report and deposition (2/2/07) on behalf of the Texas Clean Air Cities Coalition at the Texas State Office of Administrative Hearings (SOAH) in the matter of the permit challenges to TXU Project Apollo's eight new proposed PRB-fired PC boilers located at seven TX sites.

(o) Expert testimony (July 2007) on behalf of the Izaak Walton League of America and others in connection with the acquisition of power by Xcel Energy from the proposed Gascoyne Power Plant – at the State of Minnesota, Office of Administrative Hearings for the Minnesota PUC (MPUC No. E002/CN-06-1518; OAH No. 12-2500-17857-2).

(p) Affidavit (July 2007) Comments on the Big Cajun I Draft Permit on behalf of the Sierra Club – submitted to the Louisiana DEQ.

(q) Expert reports and deposition (12/13/2007) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case. *Plaintiffs v. Allegheny Energy Inc., et al.,* 2:05cv0885 (W.D. Pennsylvania).

(r) Expert reports and pre-filed testimony before the Utah Air Quality Board on behalf of Sierra Club in the Sevier Power Plant permit challenge.

(s) Expert reports and deposition (October 2007) on behalf of MTD Products Inc., in connection with General Power Products, LLC v MTD Products Inc., 1:06 CVA 0143 (S.D. Ohio, Western Division)

(t) Experts report and deposition (June 2008) on behalf of Sierra Club and others in the matter of permit challenges (Title V: 28.0801-29 and PSD: 28.0803-PSD) for the Big Stone II unit, proposed to be located near Milbank, South Dakota.

(u) Expert reports, affidavit, and deposition (August 15, 2008) on behalf of Earthjustice in the matter of air permit challenge (CT-4631) for the Basin Electric Dry Fork station, under construction near Gillette, Wyoming before the Environmental Quality Council of the State of Wyoming.

(v) Affidavit/Declaration and Expert Report on behalf of NRDC and the Southern Environmental Law Center in the matter of the air permit challenge for Duke Cliffside Unit 6, under construction in North Carolina.

(w) Dominion Wise County MACT Declaration (August 2008)

(x) Expert Report on behalf of Sierra Club for the Green Energy Resource Recovery Project, MACT Analysis (June 13, 2008).

(y) Expert Report on behalf of Sierra Club and the Environmental Integrity Project in the matter of the air permit challenge for NRG Limestone's proposed Unit 3 in Texas (February 2009).

(z) Expert Report and deposition on behalf of MTD Products, Inc., in the matter of Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al. (June 2009, July 2009).

(aa) Expert Report on behalf of Sierra Club and the Southern Environmental Law Center in the matter of the air permit challenge for Santee Cooper's proposed Pee Dee plant in South Carolina (August 2009).

(bb) Statements (May 2008 and September 2009) on behalf of the Minnesota Center for Environmental Advocacy to the Minnesota Pollution Control Agency in the matter of the Minnesota Haze State Implementation Plans.

(cc) Expert Report (August 2009) and Deposition (October 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(dd) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Coleto Creek coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (October 2009).

(ee) Expert Report, Rebuttal Report (September 2009) and Deposition (October 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(ff) Expert report (December 2009), Rebuttal reports (May 2010 and June 2010) and depositions (June 2010) on behalf of the US Department of Justice in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(gg) Prefiled testimony (October 2009) and Deposition (December 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(hh) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Tenaska coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (April 2010).

(ii) Written Direct Testimony (July 2010) and Written Rebuttal Testimony (August 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(jj) Expert report (August 2010) and Rebuttal Expert Report (October 2010) on behalf of the US Department of Justice in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(kk) Declaration (August 2010) on behalf of the US EPA and US Department of Justice in the matter of DTE Energy Company, Detroit, MI (Monroe Unit 2).

(ll) Expert Report and Deposition (August 2010) as well as Affidavit (September 2010) on behalf of Kentucky Waterways Alliance, Sierra Club, and Valley Watch in the matter of challenges to the NPDES permit issued for the Trimble County power plant by the Kentucky Energy and Environment Cabinet to Louisville Gas and Electric, File No. DOW-41106-047.

(mm) Expert Report (August 2010) and Rebuttal Expert Report (September 2010) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(nn) Written Direct Expert Testimony (August 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(oo) Deposition (August 2010) on behalf of Environmental Defense, in the matter of the remanded permit challenge to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(pp) Expert Report, Supplemental/Rebuttal Expert Report, and Declarations (October 2010) on behalf of New Mexico Environment Department (Plaintiff-Intervenor), Grand Canyon Trust and Sierra Club (Plaintiffs) in the matter of Public Service Company of New Mexico (PNM)'s Mercury Report for the San Juan Generating Station, CIVIL NO. 1:02-CV-0552 BB/ATC (ACE). US District Court for the District of New Mexico.

(qq) Comment Report (October 2010) on the Draft Permit Issued by the Kansas DHE to Sunflower Electric for Holcomb Unit 2. Prepared on behalf of the Sierra Club and Earthjustice.

(rr) Expert Report (October 2010) and Rebuttal Expert Report (November 2010) (BART Determinations for PSCo Hayden and CSU Martin Drake units) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(ss) Expert Report (November 2010) (BART Determinations for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(tt) Comment Report (December 2010) on the Pennsylvania Department of Environmental Protection (PADEP)'s Proposal to grant Plan Approval for the Wellington Green Energy Resource Recovery Facility on behalf of the Chesapeake Bay Foundation, Group Against Smog and Pollution (GASP), National Park Conservation Association (NPCA), and the Sierra Club.

(uu) Written Expert Testimony (January 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

2. Occasions where Dr. Sahu has provided oral testimony at trial or in similar proceedings include the following:

(vv) In February, 2002, provided expert witness testimony on emissions data on behalf of Rocky Mountain Steel Mills, Inc. in Denver District Court.

(ww) In February 2003, provided expert witness testimony on regulatory framework and emissions calculation methodology issues on behalf of the US Department of Justice in the Ohio Edison NSR Case in the US District Court for the Southern District of Ohio.

(xx) In June 2003, provided expert witness testimony on regulatory framework, emissions calculation methodology, and emissions calculations on behalf of the US Department of Justice in the Illinois Power NSR Case in the US District Court for the Southern District of Illinois.

(yy) In August 2006, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Western Greenbrier) on behalf of the Appalachian Center for the Economy and the Environment in West Virginia.

(zz) In May 2007, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Thompson River Cogeneration) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) before the Montana Board of Environmental Review.

(aaa) In October 2007, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Sevier Power Plant) on behalf of the Sierra Club before the Utah Air Quality Board.

(bbb) In August 2008, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Big Stone Unit II) on behalf of the Sierra Club and Clean Water before the South Dakota Board of Minerals and the Environment.

(ccc) In February 2009, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Santee Cooper Pee Dee units) on behalf of the Sierra Club and the Southern Environmental Law Center before the South Carolina Board of Health and Environmental Control.

(ddd) In February 2009, provided expert witness testimony regarding power plant emissions, BACT issues and MACT issues on a permit challenge (NRG Limestone Unit 3) on behalf of the Sierra Club and the Environmental Integrity Project before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(eee) In November 2009, provided expert witness testimony regarding power plant emissions, BACT issues and MACT issues on a permit challenge (Las Brisas Energy Center) on behalf of the Environmental Defense Fund before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(fff) In February 2010, provided expert witness testimony regarding power plant emissions, BACT issues and MACT issues on a permit challenge (White Stallion Energy Center) on behalf of the Environmental Defense Fund before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(ggg) In September 2010 provided oral trial testimony on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, State of Maryland, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case in US District Court in the Western District of Pennsylvania. *Plaintiffs v. Allegheny Energy Inc., et al.,* 2:05cv0885 (W.D. Pennsylvania).

(hhh) Oral Direct and Rebuttal Expert Testimony (September 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(iii) Oral Testimony (September 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(jjj) Oral Testimony (October 2010) regarding mercury and total PM/PM10 emissions and other issues on a remanded permit challenge (Las Brisas Energy Center) on behalf of the Environmental Defense Fund before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(kkk) Oral Testimony (November 2010) regarding BART for PSCo Hayden, CSU Martin Drake units before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(lll) Oral Testimony (December 2010) regarding BART for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(mmm) Deposition (December 2010) on behalf of the US Department of Justice in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(nnn) Deposition (February 2011) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(ooo) Oral Expert Testimony (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

Attachment B

Natural Gas Star Summary of Emission Reduction Methods/Approaches

Attachment B - Natural Gas Star Summary of Emission Reduction Methods/Approaches

Document Title	Capital Costs	Production	Gathering and Processing	Transmission & Distribution
Compressors/Engines				
Estimated Payback: 0-1 year				
Convert Engine Starting to Nitrogen PRO Fact Sheet #101 (PDF) (2 pp., 60K)	< $1,000	X	X	X
Reduce the Frequency of Engine Starts with Gas PRO Fact Sheet #102 (PDF) (2 pp., 61K)	< $1,000	X	X	X
Replace Gas Starters with Air PRO Fact Sheet #103 (PDF) (2 pp., 63K)	< $1,000	X	X	X
Replace Ignition - Reduce False Starts PRO Fact Sheet #104 (PDF) (2 pp., 61K)	$1,000-$10,000	X	X	X
Automate Systems Operation to Reduce Venting PRO Fact Sheet #106 (PDF, 2 pp., 65K)	$1,000-$10,000			X
Replace Compressor Cylinder Unloaders PRO Fact Sheet #110 (PDF) (2 pp., 61K)	> $10,000			X
Reducing Methane Emissions from Compressor Rod Packing Systems Lessons Learned (PDF) (12 pp., 145K) Presentation (PDF, 15 pp., 875K)	< $1,000	X	X	X
Reducing Emissions When Taking Compressors Off-Line Lessons Learned (PDF) (11 pp., 113K) Presentation (PPT) (19 pp., 590K, About PPT EXIT Disclaimer	$0-$10,000	X	X	X
Estimated Payback: 1-3 years				
Redesign Blowdown Systems and Alter ESD Practices PRO Fact Sheet #107 (PDF) (2 pp., 61K) Partner Update, Summer 2004, Page 1 (PDF) (9 pp., 660K)	< $1,000	X	X	X
Install Electric Starters PRO Fact Sheet #108 (PDF) (2 pp., 61K)	$1,000-$10,000	X	X	X
Automated Air/Fuel Ratio Controls PRO Fact Sheet #111 (PDF) (2 pp., 53K)	> $10,000	X	X	X
Replacing Wet Seals with Dry Seals in Centrifugal Compressors Lessons Learned (PDF) (13 pp., 296K) Presentation (PPT) (24 pp., 1.4M, About PPT EXIT Disclaimer	> $10,000	X		X
Estimated Payback: 3-10 years				
Lower Purge Pressure for Shutdown Controls PRO Fact Sheet #109 (PDF) (2 pp., 62K)	$1,000-$10,000		X	X

See attachment titled "Attachment B (NG Star Summary)" in MS Excel format for direct links to documents listed herein

Estimated Payback: > 10 years				
Install Electric Compressors PRO Fact Sheet #105 (PDF) (2 pp., 59K)	> $10,000	X	X	X
Dehydrators				
Solar Power Applications for Methane Emissions Mitigation Presentation (PDF) (14 pp., 371K)	N/A	X	X	X
Estimated Payback: 0-1 year				
Reroute Glycol Skimmer Gas PRO Fact Sheet #201 (PDF) (2 pp., 62K)	< $1,000	X	X	X
Convert Gas-Driven Chemical Pumps to Instrument Air PRO Fact Sheet #202 (PDF) (2 pp., 58K)	$1,000-$10,000	X	X	X
Optimize Glycol Circulation and Install Flash Tank Separators in Dehydrators Lessons Learned (PDF) (16 pp., 110K)	$1,000-$10,000	X	X	
Pipe Glycol Dehydrator to Vapor Recovery Unit PRO Fact Sheet #203 (PDF) (2 pp., 61K)	$1,000-$10,000	X	X	X
Replace Glycol Dehydration Units with Methanol Injection PRO Fact Sheet #205 (PDF) (2 pp., 76K)	$1,000-$10,000	X	X	
Zero Emissions Dehydrators PRO Fact Sheet #206 (PDF) (2 pp., 54K)	> $10,000	X	X	X
Estimated Payback: 1-3 years				
Portable Desiccant Dehydrators PRO Fact Sheet #207 (PDF) (2 pp., 54K)	$1,000-$10,000	X		
Replacing Gas-Assisted Glycol Pumps with Electric Pumps Lessons Learned (PDF) (17 pp., 197K)	$1,000-$10,000	X	X	
Replacing Glycol Dehydrators with Desiccant Dehydrators Lessons Learned (PDF) (22 pp., 748K) Presentation (PPT) (21 pp., 1.7M, About PPT EXIT Disclaimer	> $10,000	X	X	
Replace Glycol Dehydrator With Separators and In-line Heaters PRO Fact Sheet #204 (PDF) (2 pp., 59K)	> $10,000			X
Pneumatics/Controls				
Estimated Payback: N/A				
Solar Power Applications for Methane Emissions Mitigation Presentation (PDF) (14 pp., 371K) Presentation (PDF) (19 pp., 1.8MB)	N/A	X	X	X
Estimated Payback: 0-1 year				
Convert Pneumatics to Mechanical Controls PRO Fact Sheet #301 (PDF) (2 pp., 58K)	< $1,000	X	X	X

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Reduce Frequency of Replacing Modules in Turbine Meters PRO Fact Sheet #302 (PDF) (2 pp., 62K)	< $1,000			X
Options for Reducing Methane Emissions From Pneumatic Devices in the Natural Gas Industry Lessons Learned (PDF) (17 pp., 121K) Presentation (PDF) (11 pp., 160K)	< $1,000	X	X	X
Convert Gas Pneumatic Controls to Instrument Air Lessons Learned (PDF) (18 pp., 144K)	> $10,000	X	X	X
Estimated Payback: 1-3 years				
Install Electronic Flare Ignition Devices PRO Fact Sheet #303 (PDF) (2 pp., 60K)	$1,000-$10,000	X	X	X
Replace Bi-Directional Orifice Metering with Ultrasonic Meters PRO Fact Sheet #304 (PDF) (2 pp., 64K)	> $10,000			X
Pipelines				
Estimated Payback: N/A				
Reducing Distribution System Pressure Presentation - Part I (PPT) (14 pp., 892K, About PPT EXIT Disclaimer Presentation - Part II (PPT) (17 pp., 825K, About PPT EXIT Disclaimer	N/A			X
Estimated Payback: 0-1 year				
Inject Blowdown Gas into Low Pressure Mains PRO Fact Sheet #401 (PDF) (2 pp., 59K)	< $1,000			X
Composite Wrap for Non-Leaking Pipeline Defects Lessons Learned (PDF) (19 pp., 189K) Presentation (PPT) (18 pp., 810K, About PPT EXIT Disclaimer	$1,000-$10,000		X	X
Insert Gas Main Flexible Liners PRO Fact Sheet #403 (PDF) (2 pp., 52K)	$1,000-$10,000			X
Using Pipeline Pump-Down Techniques to Lower Gas Line Pressure Before Maintenance Lessons Learned (PDF) (15 pp., 161K) Partner Update, Fall 2010 Partner Update, Fall 2009	> $10,000		X	X
Estimated Payback: 1-3 years				
Install Ejector PRO Fact Sheet #404 (PDF) (2 pp., 59K)	$1,000-$10,000	X		X
Using Hot Taps for In Service Pipeline Connections Lessons Learned (PDF) (19 pp., 157K)	> $10,000			X
Estimated Payback: > 10 years				

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Inspect Flowlines Annually PRO Fact Sheet #407 (PDF) (2 pp., 63K)	< $1,000	X		
Use of Improved Protective Coating at Pipeline Canal Crossings PRO Fact Sheet #406 (PDF) (2 pp., 64K)	> $10,000	X	X	X
Use Inert Gases & Pigs to Perform Pipeline Purges PRO Fact Sheet #405 (PDF) (2 pp., 62K)	< $1,000		X	X
Tanks				
Estimated Payback: N/A				
Purge and Retire Low Pressure Gasholders PRO Fact Sheet #501 (PDF) (2 pp., 51K)	< $1,000			X
Estimated Payback: 1-3 years				
Convert Water Tank Blanket from Natural Gas to Produced CO_2 Gas PRO Fact Sheet #505 (PDF) (2 pp., 107K)	$1,000-$10,000	X		
Consolidate Crude Oil Production and Water Storage Tanks PRO Fact Sheet #506 (PDF) (2 pp., 106K)	> $10,000	X		
Install Pressurized Storage of Condensate PRO Fact Sheet #502 (PDF) (2 pp., 106K)	> $10,000	X	X	X
Installing Vapor Recovery Units on Crude Oil Storage Tanks Lessons Learned (PDF) (13 pp., 170K) Presentation (PDF) (21 pp., 798K) Presentation (PDF) (15 pp., 1MB) Partner Update, Spring 2010	> $10,000	X		
Recover Gas from Pipeline Pigging Operations PRO Fact Sheet #507 (PDF) (2 pp., 56K) Presentation (PPT) (18 pp., 547K, About PPT EXIT Disclaimer	> $10,000	X	X	X
Estimated Payback: 3-10 years				
Recycle Line Recovers Gas During Condensate Loading PRO Fact Sheet #503 (PDF) (2 pp., 108K)	$1,000-$10,000	X	X	X
Estimated Payback: > 10 years				
Capture Methane Released from Pipeline Liquid Storage Tanks PRO Fact Sheet #504 (PDF) (2 pp., 100K)	< $1,000			X
Valves (fugitives)				
Estimated Payback: 0-1 year				
Inspect and Repair Compressor Station Blowdown Valves PRO Fact Sheet #601 (PDF) (2 pp., 59K)	< $1,000	X	X	X
Install BASO® Valves PRO Fact Sheet #611 (PDF) (2 pp., 59K)	< $1,000	X		

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Install Flow Valves Partner Update, Summer 2005, Page 5 (PDF) (10 pp., 853K)	< $1,000			X
Replace Burst Plates with Secondary Relief Valves PRO Fact Sheet #612 (PDF) (2 pp., 60K)	$1,000-$10,000	X	X	X
Use Ultrasound to Identify Leaks PRO Fact Sheet #602 (PDF) (2 pp., 50K)	< $1,000	X	X	X
Scrubber Dump Valves Partner Update, Spring 2006, Page 2 (PDF) (9 pp., 639K) Presentation (PDF) (17 pp., 439K)	$1,000-$10,000		X	X
Close Main and Unit Valves Prior to Blowdown PRO Fact Sheet #603 (PDF) (2 pp., 60K)	< $1,000			X
Rupture Pin Shutoff Devices Technology Spotlight (PDF) (2 pp., 65K)				X
Estimated Payback: 1-3 years				
Use YALE® Closures for ESD Testing PRO Fact Sheet #605 (PDF) (2 pp., 69K)	$1,000-$10,000		X	X
Perform Leak Repair During Pipeline Replacement PRO Fact Sheet #604 (PDF) (2 pp., 63K)	< $1,000			X
Estimated Payback: 3-10 years				
Test and Repair Pressure Safety Valves PRO Fact Sheet #607 (PDF) (2 pp., 61K)	< $1,000	X	X	X
Design Isolation Valves to Minimize Gas Blowdown Volumes PRO Fact Sheet #606 (PDF) (2 pp., 59K)	$1,000-$10,000			X
Move Fire Gates In to Reduce Venting at Compressor Station PRO Fact Sheet #608 (PDF) (2 pp., 58K)	> $10,000			X
Estimated Payback: > 10 years				
Test Gate Station Pressure Relief Valves with Nitrogen PRO Fact Sheet #609 (PDF) (2 pp., 63K)	< $1,000	X	X	X
Install Excess Flow Valves PRO Fact Sheet #610 (PDF) (2 pp., 61K) Partner Update, Winter 2005, Page 2 (PDF) (9 pp., 623K)	> $10,000			X
Wells				
Estimated Payback: 0-1 year				
Connect Casing to Vapor Recovery Unit PRO Fact Sheet #701 (PDF) (2 pp., 105K) Partner Update, Winter 2010	$1,000-$10,000	X		
Gas Well Unloading Time Optimization PRO Fact Sheet #708 (PDF) (2 pp., 67K)	$1,000-$10,000	X		
Installing Plunger Lift Systems in Gas Wells				

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Lessons Learned (PDF) (23 pp., 117K)				
Presentation (PDF) (18 pp., 211K)	$1,000-$10,000	X		
Install Compressors to Capture Casinghead Gas				
PRO Fact Sheet #702 (PDF) (2 pp., 105K)				
Partner Update, Winter 2010	> $10,000	X		
Lower Heater - Treater Temperature				
PRO Fact Sheet #906 (PDF) (2 pp., 108K)	< $1,000	X		
Estimated Payback: 1-3 years				
Reduce Emission Completions for Hydraulically Fractured Wells				
Lessons Learned (11 pp., 400K)				
PRO Fact Sheet #703 (PDF) (2 pp., 106K)				
Presentation (PDF) (18 pp., 1.2M)				
Presentation (PDF) (8 pp., 412K)				
Presentation (PDF) (12 pp., 214K)	$1,000-$10,000	X		
Install Velocity Tubing Strings				
PRO Fact Sheet #704 (PDF) (2 pp., 105K)	> $10,000	X		
Estimated Payback: 3-10 years				
Install Downhole Separator Pumps				
PRO Fact Sheet #705 (PDF) (2 pp., 105K)	> $10,000	X		
Use Foaming Agents				
PRO Fact Sheet #706 (PDF) (2 pp., 105K)	> $10,000	X		
Estimated Payback: > 10 years				
Install Pumpjacks on Low Water Production Gas Wells				
PRO Fact Sheet #707 (PDF) (2 pp., 72K)	> $10,000	X		
Gas Well “Smart” Automation System				
PRO Fact Sheet #709 (PDF) (2 pp., 82K)				
Partner Update, Spring 2004, Page 2 (PDF) (9 pp., 481K)				
Presentation (PDF) (15 pp., 258K)	> $10,000	X		
Other/Miscellaneous				
Estimated Payback: N/A				
Install Flares				
PRO Fact Sheet #905 (PDF) (2 pp., 106K)	> $10,000	X		X
Process Optimization				
Partner Update, Spring 2005, Page 1 (PDF) (9 pp., 614K)				
Presentation (PDF) (7 pp., 436K)	N/A	X		
Acid Gas Removal				
Presentation (PDF) (25 pp., 424K)	N/A		X	
Micro Turbine Generators				
Partner Update, Fall 2004, Page 8 (PDF) (12 pp., 757K)	N/A	X		

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Liquefied Natural Gas Emissions Reduction Opportunities Presentation (PDF) (9 pp., 1.4M)	N/A		X	X
Estimated Payback: 0-1 year				
Directed Inspection and Maintenance at Gate Stations and Surface Facilities Lessons Learned (PDF) (18 pp., 203K) Partner Update, Summer 2010	< $1,000			X
Directed Inspection and Maintenance with Optical Imaging Partner Update, Fall 2005, page 1 (PDF) (8 pp., 328K) Presentation (PDF) (15 pp., 371K) Partner Update, Spring 2006, Page 1 (PDF) (9 pp., 639K) Presentation (PDF) (9 pp., 965K) Video | PDF version (PDF) (2 pp., 14 KB)	N/A	X	X	X
Eliminate Unnecessary Equipment and/or Systems PRO Fact Sheet #901 (PDF) (2 pp., 109K)	< $1,000	X	X	X
Optimizing Operating Pressures *Partner Update* , Fall 2004, Page 2 (PDF) (12 pp., 757K) Presentation (PPT) (13 pp., 598K, About PPT 	$1,000-$10,000	X	X	X
Directed Inspection and Maintenance at Compressor Stations Lessons Learned (PDF) (18 pp., 322K) Partner Update, Summer 2010	> $10,000			X
Nitrogen Rejection Unit Optimization Systems PRO Fact Sheet #907 (PDF) (2 pp., 55K) Presentation (PPT) (16 pp., 236K, About PPT 	> $10,000		X	
Estimated Payback: 1-3 years				
Conduct DI&M at Remote Sites PRO Fact Sheet #902 (PDF) (2 pp., 108K)	< $1,000			X
Increase Walking Survey from a 5-to 3-Year Basis PRO Fact Sheet #903 (PDF) (2 pp., 106K)	$1,000-$10,000			X
Directed Inspection and Maintenance at Gas Processing Plants and Booster Stations Lessons Learned (PDF) (18 pp., 324K) Presentation (PDF) (36 pp., 530K)	> $10,000		X	
Estimated Payback: 3-10 years				
Require Improvements in the Quality of Gas Received from Producers PRO Fact Sheet #904 (PDF) (2 pp., 104K)	< $1,000			X

http://www.epa.gov/gasstar/tools/recommended.html#other

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Addenda

Berks Gas Truth * Biodiversity Conservation Alliance * Californians for Western Wilderness * Center for Biological Diversity * Center for Health, Environment and Justice * Clean Water Action * Colorado Environmental Coalition * Delaware Riverkeeper Network * Drilling Mora County * Earthjustice * Earthworks * EcoFlight * Environmental Defense Fund * National Parks Conservation Association * National Wildlife Federation * Natural Resources Defense Council * Pennsylvania Environmental Defense Foundation * Pennsylvania Forest Coalition * Powder River Basin Resource Council * Protecting Our Waters * Riverkeeper, Inc. * San Juan Citizens Alliance * Sierra Club * Southern Utah Wilderness Alliance * Upper Green River Alliance * Western Environmental Law Center * Western Organization of Resource Councils * Western Resource Advocates * WildEarth Guardians * Wilderness Workshop * WV Surface Owners' Rights Organization

November 30, 2011

Lisa Jackson, Administrator
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Ave., NW
Washington, D.C. 20460

Re: Docket ID Number EPA–HQ–OAR–2010–0505

Dear Administrator Jackson:

Thank you for the opportunity to provide comments on this important Clean Air Act rulemaking to revise EPA's New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) for the oil and gas industry. The organizations signing this letter submit these comments on behalf of their members and supporters, many of whom live in communities throughout the United States that are facing critical health threats as a result of pollution from the oil and gas industry.

Oil and gas development is rapidly expanding across the United States and polluting the air in major metropolitan areas such as Dallas-Fort Worth, Denver, and Pittsburgh, as well as in rural communities in many states, including Wyoming, New Mexico, Colorado, Pennsylvania, and New York. Oil and gas development threatens local communities by emitting smog-forming compounds that can lead to serious respiratory illness as well as toxic chemicals that cause cancer. Drilling and development also pose a threat nationally and globally by emitting substantial amounts of methane, a potent greenhouse gas that causes global warming. In this rulemaking, EPA has an important opportunity to protect the public from these significant threats under the Clean Air Act.

With respect to EPA's two new proposed rules, we appreciate that EPA has taken significant steps to reduce smog-forming pollution and toxic air emissions from oil and gas operations. As a result, EPA's proposed rules will provide critical protections to local communities from the current oil and gas development boom happening throughout the country. However, the proposed rules do not go far enough to protect the public health and welfare. As discussed in more detail below, we urge EPA to strengthen these rules to reduce the oil and gas

industry's substantial contribution to global warming and to provide local communities with the vital safeguards that they need from harmful air pollution.

I. New Source Performance Standards

A. Background

EPA's proposed New Source Performance Standards for the oil and natural gas industry are a long-awaited and much-needed update for a rapidly growing industry. EPA originally listed crude oil and natural gas production on the list of air pollution sources that required promulgation of new source performance standards in 1979. 44 Fed. Reg. 49,222 (Aug. 21, 1979). In 1985, EPA promulgated standards for emissions of volatile organic compounds (VOCs) and sulfur dioxide (SO_2) from natural gas processing plants, an extremely limited subset of facilities within the industry. *See* 40 C.F.R. Part 60, Subparts KKK and LLL. EPA failed to regulate other oil and gas facilities that emit substantial amounts of air pollution, such as wells, compressors, pneumatic devices, and storage tanks.

Although EPA is required to "review, and, if appropriate, revise" its new source performance standards for each regulated sector every eight years, 42 U.S.C. § 7411(b)(1)(B), it has been 26 years since EPA reviewed the oil and gas standards. Not only were the standards overly narrow from the beginning, but also much has changed in those 26 years. In particular, the improvement of hydraulic fracturing and directional and horizontal drilling techniques has changed the nature of the industry and led to the expansion of oil and gas development into new areas. The air pollution from this new development, along with emissions from existing development in established oil and gas producing regions, has substantial negative impacts to public health and the environment.

For example, numerous areas of the country with heavy concentrations of drilling are now suffering from serious ozone problems. Oil and gas development is a major source of ozone pollution in the Dallas-Fort Worth area, where many counties are violating federal standards for ozone.[1] A drilling boom has also brought serious ozone pollution problems to rural areas, such as western Wyoming and eastern Utah. In Wyoming's Upper Green River Basin, for thirteen days last winter alone residents suffered "unhealthy" ozone concentrations under EPA's current standards, including days when the ozone pollution levels exceeded the worst days of smog pollution in Los Angeles.[2] Northeastern Utah also recorded unprecedented ozone levels in the Uintah Basin in 2010 and 2011. There were numerous days when ozone levels exceeded federal standards designed to protect public health and the environment. Indeed, on many days, the levels were almost twice the federal standard.[3]

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[1] *See* Al Armendariz, Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements 1, 3, 25–26 (2009).

[2] *See* Wendy Koch, *Wyoming's Smog Exceeds Los Angeles' Due to Gas Drilling*, USA Today, Mar. 9, 2011, http://content.usatoday.com/communities/greenhouse/post/2011/03/wyomings-smog-exceeds-los-angeles-due-to-gas-drilling/1; *see also* Wyo. Dep't of Envtl. Quality, Technical Support Document I for Recommended 8-hour Ozone Designation of the Upper Green River Basin vi–viii, 23–26, 94–105 (Mar. 26, 2009) ("Wyoming Nonattainment Analysis"), http://deq.state.wy.us/out/downloads/Ozone%20TSD_final_rev%203-30-09_jl.pdf.

[3] *See* Scott Streater, *Air Quality Concerns May Dictate Uintah Basin's Natural Gas Drilling Future*, N.Y. Times, Oct. 1, 2010, http://www.nytimes.com/gwire/2010/10/01/01greenwire-air-quality-concerns-may-dictate-uintah-

As oil and gas development moves into new areas, particularly as a result of rapid development of shale resources, air quality problems are likely to follow. For example, models predict that gas development in the Haynesville shale will increase ozone pollution in northeast Texas and northwest Louisiana and may lead to violations of ozone standards.[4] Experts also anticipate air quality problems associated with development of the Marcellus shale in the Mid-Atlantic Region.[5]

Concern over the environmental impacts of shale gas development, including air pollution, led President Obama in 2011 to direct the Secretary of Energy Advisory Board (SEAB) to create a subcommittee of experts to address issues related to hydraulic fracturing and make recommendations to protect public health and the environment.[6] In its first 90-Day Report, released on August 18, 2011, the SEAB Shale Gas Production Subcommittee recommended that EPA and other regulators "immediately expand efforts to reduce air emissions using proven technologies and practices."[7] The Subcommittee recommended emission standards for "both new and existing sources for methane, air toxics, ozone-forming pollutants, and other major airborne contaminants resulting from natural gas explorations, production, transportation, and distribution activities."[8] In its second 90-Day Report, released November 18, 2011, the Subcommittee recognized that EPA's proposed rules are a "critical step forward in reducing emissions of smog-forming pollutants and air toxics."[9] The Subcommittee also found, however, that the rules "fall short" because they fail to directly regulate methane emissions and fail to address pollution from existing infrastructure.[10]

B. Specific Comments on EPA's Proposal

We strongly support EPA's proposed New Source Performance Standards. In particular, we support EPA's proposal to regulate hydraulic fracturing at well sites by requiring "reduced emission" or "green" completions for fracked or refracked wells. We also support EPA's proposal to expand the rules to include controls on sources that are significant sources of air pollution but are not currently regulated, such as centrifugal and reciprocating compressors,

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basins-30342.html?pagewanted=1; EPA, AirExplorer, Query Concentrations (query "Ozone," "Uintah County," "2011"), http://www.epa.gov/cgi-bin/htmSQL/mxplorer/query_daily.hsql?msaorcountyName=countycode&msaorcountyValue=49047&poll=44201&county=49047&site=-1&msa=-1&state=-1&sy=2011&flag=Y&query=download&_debug=2&_service=data&_program=dataprog.query_daily3P_dm.sas.

[4] *See* Susan Kemball-Cook et al., *Ozone Impacts of Natural Gas development in the Haynesville Shale*, 44 Envtl. Sci. Tech. 9357, 9362 (2010).

[5] *See* Elizabeth Shogren, *Air Quality Concerns Threaten Natural Gas's Image*, Nat'l Public Radio (June 21, 2011), http://www.npr.org/2011/06/21/137197991/air-quality-concerns-threaten-natural-gas-image.

[6] The White House, Blueprint for a Secure Energy Future 13 (Mar. 30, 2011), http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf.

[7] Sec'y of Energy Advisory Bd., Shale Gas Production Subcommittee 90-Day Report 18 (Aug. 18, 2011) (hereinafter "SEAB 90-Day Report"), http://www.shalegas.energy.gov/resources/081811_90_day_report_final.pdf.

[8] *Id.* at 16.

[9] Sec'y of Energy Advisory Bd., Shale Gas Production Subcommittee Second Ninety Day Report 5 (Nov. 18, 2011) (hereinafter "SEAB Second 90-Day Report"), http://www.shalegas.energy.gov/resources/111811_final_report.pdf.

[10] *Id.*

pneumatic devices, and storage tanks. Additionally, we support EPA's decision to tighten the standards for leak detection and sulfur dioxide emissions at natural gas processing plants.

There are, however, a number of aspects of the proposed rule that EPA must strengthen. Specifically, EPA has failed to regulate all air pollutants and sources of air pollutants from the oil and gas industry that pose a threat to public health and welfare. The proposed rule also includes loopholes that undermine the purpose of the rule. Our primary concerns are detailed below.

First, EPA must regulate methane emissions. Methane is the dominant pollutant emitted from the oil and gas industry and, as a potent greenhouse gas, poses a significant threat to public health and welfare. Yet, EPA has not proposed any control measures to directly reduce methane pollution or even attempted to justify its failure to do so. EPA's failure to address methane pollution violates Section 111 of the Clean Air Act and EPA's own longstanding practice for determining whether to regulate dangerous air pollutants, and is simply bad policy. Indeed, EPA's failure to regulate methane conflicts with the specific recommendations of the President's SEAB Shale Gas Production Subcommittee.[11]

As EPA itself explains in the proposed rule, methane emissions from the oil and gas industry contribute significantly to global warming. EPA has identified the oil and gas industry as the "single largest contributor to United States anthropogenic methane emissions."[12] The industry is responsible for over 40% of total domestic methane emissions, which amounts to 5% of all carbon dioxide equivalent (CO_2e) emissions in the country.[13]

Methane is a potent greenhouse gas that has 25 times the global warming potential of carbon dioxide over a 100-year time frame and 72 times the global warming potential of carbon dioxide over a 20-year time frame.[14] EPA has explicitly found that six greenhouse gases, including methane, constitute an air pollutant that endangers public health and welfare within the meaning of the Clean Air Act.[15] Global warming is expected to have dire consequences on human health, such as increased heat-related mortalities, spread of infectious disease, greater air and water pollution, and increased malnutrition.[16] Moreover, global warming is expected to exacerbate existing air quality problems that already impact human health, including high levels of ozone and particulate matter.[17] The impacts of global warming will be worse for the most vulnerable populations, such as those with existing health problems, children, and the elderly.[18]

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[11] SEAB Second 90-Day Report, at 4, 5; SEAB 90-Day Report, at 18.
[12] 76 Fed. Reg. 52,792 (Aug. 23, 2011).
[13] *See id.* at 52,756, 52,791–92; *see also* EPA, *Methane*, http://www.epa.gov/outreach/sources.html (last visited Nov. 28, 2011).
[14] Piers Forster et al., *Changes in Atmospheric Constituents and in Radiative Forcing*, *in* Climate Change 2007: The Physical Science Basis: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change 211, 211–14 (Susan Solomon et al., eds., 2007).
[15] Endangerment and Cause or Contribute Findings for Greenhouse Gases, 74 Fed. Reg. 66,496 (Dec. 15, 2009) ("Endangerment Finding").
[16] EPA, *Climate Change – Health and Environmental Effects*, http://www.epa.gov/climatechange/effects/health.html (last visited Nov. 28, 2011).
[17] *Id.*
[18] *Id.*

Methane also reacts in the atmosphere to form ozone, which is harmful to human health and reduces crop yields.[19]

As EPA recognizes, there are numerous pollution control technologies available to reduce the substantial methane emissions from the oil and gas industry.[20] EPA has already endorsed many of these technologies through its Natural Gas STAR and Methane to Markets programs. Not only will these control technologies reduce emissions, but in many cases they will also produce profits for industry by keeping additional natural gas in the system for sale. For example, EPA estimates that industry will make $30 million annually by implementing the control technologies in the proposed rule, which EPA predicts will indirectly reduce baseline methane emissions by 26%. Moreover, according to EPA, the climate co-benefits of these methane reductions amount to as much as $1.6 billion by 2015. However, EPA's proposed rule leaves approximately 74% of the methane emissions from this industry still on the table. There are many other cost-effective control measures available to reduce these methane emissions and create substantial financial and public health benefits.

In sum, given the (1) significant methane emissions from the oil and gas industry, (2) the resulting threat to public health and welfare, and (3) the numerous available cost-effective control technologies for reducing methane emissions, there is no excuse for EPA's failure to regulate this pollutant.

Second, with the exception of refracked wells, EPA's proposed rule fails to control the substantial emissions from existing sources. Section 111(d) of the Clean Air Act requires EPA to work with the states to control emissions of pollutants like methane from existing sources. 42 U.S.C. § 7411(d). Without mandated controls on existing sources, such as compressors and pneumatic devices, these outdated devices will continue to spew unchecked pollution for years to come. For this reason, the SEAB Shale Gas Production Subcommittee specifically recommended that EPA adopt standards for existing sources.[21] Because a large amount of the pollution from existing sources can be controlled using the same or similar technologies that EPA is proposing for new and modified sources, EPA could quickly and efficiently develop and implement such standards.

Third, EPA has proposed exemptions, asked for comment on possible exemptions, or simply neglected to address emissions from a number of types of wells and other devices that emit substantial air pollution. EPA must eliminate or greatly limit these exemptions and address the unregulated sources of emissions.

For example, the proposed rule provides a blanket exemption for "wildcat" and "delineation" wells because they are not likely to be near an existing gathering line to get the recovered gas to market. Wildcat wells are the first wells drilled in a field, while delineation wells are wells drilled to determine the extent of the field. Much like producing wells, drilling and completion activities at wildcat and delineation wells emit substantial amounts of methane and VOCs, which, in many cases, could be economically captured and put to use. Indeed, the

[19] 76 Fed. Reg. 52,971; EPA, *Ground-level Ozone*, http://www.epa.gov/glo/health.html (last visited Nov. 28, 2011).
[20] 76 Fed. Reg. 52,791–92.
[21] SEAB Second 90-Day Report, at 4, 5; SEAB 90-Day Report, at 18.

State of Wyoming only allows an exemption for the very first well drilled in a field, and not for delineation wells, demonstrating that a narrower exemption is feasible.[22] Moreover, even for the first well drilled in a field, EPA should provide no exemption if the well is, in fact, near a gathering line.

Additionally, the proposed rules do not apply to oil wells, which may have substantial deposits of natural gas that are produced along with the oil. Much like gas wells, hydraulic fracturing of oil wells results in a period of "flowback" with large emissions of natural gas and VOCs. When this natural gas is flared, or burned, it results in carbon dioxide emissions, the most significant driver of global warming. This is a growing problem as a result of the rush to develop new oil shale deposits. The *New York Times* recently reported that 30% of the natural gas produced in North Dakota is simply being burned off as waste by oil companies rushing to drill oil wells in the Bakken Shale before pipelines are in place for the natural gas.[23] According to the *Times*, each day the oil companies are burning enough gas to heat half a million homes.[24] Rather than providing a blanket exemption for these wells, EPA must ensure that this waste is prevented where it is feasible to do so.

While the proposed rules will reduce pollution from fracking and refracking wells—an important step forward—they fail to address emissions from "conventional" wells where fracking is not used. These wells are left unregulated, despite the fact that liquids unloading and other well cleanup activities are the single worst source of methane emissions according to EPA's most recent greenhouse gas inventory. Because VOCs are generally co-emitted with methane, these activities are major sources of VOCs as well. Cost-effective technologies, including plunger lifts, are available to control these emissions, and investments in such measures can be recouped within a year. EPA's failure to propose standards requiring these effective and widely used measures is not consistent with EPA's obligations under the Clean Air Act.

EPA has also specifically asked for comment on whether to exclude some coal bed methane wells from the reduced emission completion requirements. There is no justification for such an exclusion. Coal bed methane wells are significant sources of methane, and reduced emission completions have been used successfully to control emissions from these wells in some areas of the country for many years.

The proposed rules allow operators to avoid using low-bleed or no-bleed pneumatic devices when their use is not "predicated"—a term EPA does not define. Because pneumatic devices are a major source of VOC and methane emissions, EPA must not undermine its own rule with a vague exception. If it is ever appropriate to waive compliance, EPA must carefully define the circumstances where it will grant a waiver, and allow members of the public to comment upon, and challenge, such exemptions.

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[22] *See, e.g.*, EPA, Oil and Natural Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution: Background Technical Support Document for Proposed Standards 4–13.
[23] *See* Clifford Kraus, *In North Dakota, Flames of Wasted Gas Light the Prairie*, N.Y. Times (Sept. 26, 2011), http://www.nytimes.com/2011/09/27/business/energy-environment/in-north-dakota-wasted-natural-gas-flickers-against-the-sky.html?pagewanted=all.
[24] *See id.*

EPA must also regulate air pollution from produced water tanks and ponds. Much like storage tanks for oil and condensate, cost-effective measures are available to control emissions from produced water tanks. Indeed, Wyoming mandates 98% emission control from new produced water tanks. With respect to storage ponds, EPA should consider eliminating them altogether with a standard requiring all produced water to be kept in tanks. Such a requirement would not only reduce air emissions, but would also have significant "non-air quality health and environmental" benefits because surface spills and leaks from waste pits pose a significant threat to groundwater. At a minimum, EPA should require operators to cover all pits, as many California air districts already require.

Fourth, EPA has failed to regulate significant air pollutants emitted by the oil and gas industry, including hydrogen sulfide and particulate matter. Hydrogen sulfide is a highly toxic gas that smells like rotten eggs and can lead to neurological impairment or death at relatively low concentrations. According to EPA, there are 14 major areas found in 20 different states where hydrogen sulfide is commonly found in natural gas deposits.[25] As a result of drilling in these areas, "the potential for routine [hydrogen sulfide] emissions is significant."[26] Ultimately, hydrogen sulfide must be listed as a hazardous air pollutant under section 112 of the Act and regulated under those standards. Petitions to regulate hydrogen sulfide under section 112 are currently pending before EPA. Until hydrogen sulfide is regulated as a hazardous air pollutant, however, EPA must take action under section 111. There are numerous control technologies available for controlling hydrogen sulfide emissions from the oil and gas industry.

Particulate matter (PM_{10} and $PM_{2.5}$) has been linked to respiratory and cardiovascular problems, including aggravated asthma attacks, chronic bronchitis, decreased lung function, heart attacks, and premature death. Sensitive populations, including the elderly, children, and people with existing heart or lung problems, are most at risk from particulate matter pollution.[27] Every phase of a drilling project produces particulate matter. During road and well-pad construction, heavy equipment moving dirt and leveling the ground and vehicles traveling back and forth on access roads generate particulate matter. Drilling and completion activities also require a significant number of truck trips (e.g., trucks transporting hydraulic fracturing fluids and produced condensate and water), which generates additional particulate matter. There are numerous methods for controlling these emissions, such as using water for dust suppression, reduced speed limits, and planning to minimize road networks. Given the significant emissions and available methods of control, EPA must regulate both hydrogen sulfide and particulate matter pollution from the oil and gas sector.

Finally, with respect to the new source performance standards, EPA's analyses of control costs and cost-effectiveness, as well as the agency's cost-benefit analysis, tend to overstate costs and underestimate benefits. Correcting issues in these analyses will show that even the proposed rule has significantly lower costs, and will provide much higher benefits, than EPA concludes.

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[25] EPA, Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas, at ii (Oct. 1993).
[26] *Id.* at III-35; *see also id.* at ii, II-5 to II-11 (listing sources of hydrogen sulfide).
[27] EPA, Proposed Rule, Regulatory Impact Analysis (RIA) at 4–19; EPA, *Particulate Matter*, http://www.epa.gov/pm/health.html (last visited Nov. 28, 2011).

In addition, in some instances a proper accounting of control costs shows that EPA could have gone further to adopt more stringent standards.

II. National Emission Standards for Hazardous Air Pollutants

A. Background

EPA originally listed oil and natural gas production as a major source of toxic air pollution in 1992 and added natural gas transmission and storage in 1998. 57 Fed. Reg. 31,576 (July 16, 1992); 63 Fed. Reg. 7155-02 (Feb. 12, 1998). In 1999, EPA first promulgated National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production and the Natural Gas Transmission and Storage source categories under section 112(d) of the Clean Air Act. 40 C.F.R. Part 63, Subparts HH and HHH; Final Rule, 64 Fed. Reg. 32,609 (June 17, 1999); Proposed Rule, 63 Fed. Reg. 6288 (Feb. 6, 1998).

Eight years after setting a section 112(d) standard, under section 112(f)(2), EPA must assess the health risk that remains with that initial standard in place and decide whether additional emission reductions are needed to reach an "acceptable" or safe level of health risk and to provide an "ample margin of safety for public health and the environment" in local communities near these sources. 42 U.S.C. § 7412(f)(2). In addition, under section 112(d)(6), EPA must review the existing section 112(d) standard and decide whether it should be updated based on new technology or emission reduction developments that have occurred since the initial standard was set and to ensure the maximum level of control now achievable. *Id.* § 7412(d)(6). Although it has now been more than 12 years since EPA set the 112(d) standard for oil and gas facilities, EPA has not assessed the remaining health risk or updated the existing standard until now. As the current review reveals, EPA must take immediate additional steps to adequately protect local communities from toxic air pollution.

Today, 57 million people live within 50 kilometers (km) of oil and gas facilities, according to EPA data. EPA's risk review shows that the oil and gas sector poses substantial cancer, chronic non-cancer, and acute health threats to people in these local communities who are exposed to toxic air pollution from these sources. However, significant emission reductions are possible from new practices, processes, and control technologies.

B. Specific Comments on EPA's Proposal

We strongly support EPA's proposed update to the National Emission Standards for Hazardous Air Pollutants, which will strengthen control of toxic air pollution from the oil and gas sector and provide local communities with long overdue health protections. We are pleased that EPA is proposing to set air toxics limits for previously uncontrolled emission points within the oil and gas sector, including small glycol dehydrators and certain storage vessels, and that EPA has proposed to remove the unlawful start-up, shut-down, and malfunction exemption from the standards. We agree with EPA's determination that the level of health risk from the oil and gas production source category is currently unacceptable, and that stronger controls are needed to provide an ample margin of safety from the natural gas transmission and storage sector. Therefore, we support the removal of the 1-ton benzene allowance for glycol dehydrators in the

entire sector. It is also important that EPA finalize the updated leak threshold (reducing the threshold to 500 parts per million (ppm) from 10,000 ppm for valves at natural gas plants). We also support EPA's proposal to require periodic monitoring, through electronic reporting, and urge EPA to ensure that those data become publicly available.

Although it is critical for EPA to finalize the new limits that it has proposed, EPA must also take additional steps to fulfill its legal duty to protect our communities from unacceptable levels of toxic air pollution and provide the ample margin of safety for public health that the Clean Air Act requires. As detailed below, the current proposed rule allows the oil and gas industry to continue to pose an unacceptable risk to public health.

First, EPA's proposed rule under both section 112(f)(2) and (d)(6) contains gaps in the pollutants, human exposures, and health risks analyzed. EPA needs to assess the health risks from all dangerous pollutants emitted by oil and gas facilities, as shown by the scientific literature, known to be part of the chemical composition of oil and gas, or detected in air monitoring conducted by community groups and others near oil and gas facilities. In particular, EPA's current assessment leaves out pollutants like the carcinogen 1,3 butadiene, the neurotoxin mercury, and many chemicals used in the hydraulic fracturing process that are listed as hazardous air pollutants.

Second, EPA's proposed rule under sections 112(f)(2) and (d)(6) contains significant gaps in the sources of emissions covered. EPA must address all significant sources of hazardous air pollutants that the current standards do not control, including wastewater pits and impoundments, well pads, well completions, and fugitive toxic air emissions. EPA must also consider the same controls for natural gas transmission and storage that it is proposing for oil and natural gas production. For example, EPA is proposing controls for storage vessels and equipment leaks in the production sector, but not for the same sources found in the transmission and storage sector (where EPA is only proposing to regulate glycol dehydrators). Although we are pleased that EPA has recognized the need to regulate previously uncontrolled sources, EPA needs to take this important opportunity to fully assess and address health risks from all emissions in this sector and remove all major gaps in the existing standard.

Third, in setting residual risk standards under section 112(f)(2), EPA must assess and then set limits to protect the most vulnerable populations living near oil and gas facilities from the health threats caused by toxic air pollution. In particular, EPA must give meaningful consideration to the health risk to children and cumulative impacts in communities that face many sources of toxic air pollution in addition to oil and gas. EPA should follow the lead of the California Office of Environmental Health Hazard Assessment by including early life vulnerability in all cancer assessments and accounting for increased prenatal susceptibility to carcinogens, and by accounting for early life vulnerability to other health risks. To address the additional health risk to children and overburdened communities, EPA should use an additional 10-fold uncertainty factor. EPA is required to ensure that its rule provides an "ample margin of safety to protect public health" for the most-exposed people, including children and overburdened local communities. 42 U.S.C. § 7412(f)(2). Yet, EPA barely mentions health in its "ample margin" analysis and focuses almost exclusively on cost considerations. EPA must correct this error by assessing the level of emissions needed to provide an "ample" margin of

safety for public health, explaining that analysis, and finalizing a rule that provides that level of protection.

Fourth, to satisfy its duty to review and update the section 112(d) standard, EPA must require greater emission reductions based on improvements in practices, processes, and technologies that have occurred in recent years, especially as the industry has changed due to shale gas and oil development and hydraulic fracturing booms. For example, California has stronger leak detection and repair standards than what EPA has proposed—specifically in the Bay Area, South Coast, and Ventura air districts. Furthermore, while local standards in California require facilities to fix leaks, EPA's standard allows 2% of equipment to leak *forever*, *no matter how much toxic air pollution goes into the air as a result*. EPA must remove this harmful loophole. Additionally, EPA should require emission limits based on available, no-emission technologies such as desiccant dehydrators, which would result in substantial emission reductions of benzene and other toxic pollutants. EPA could also set a stronger emission standard for hazardous pollutants emitted from storage tanks and dehydrators, as demonstrated by EPA's own enforcement actions at refineries, determinations of the best available control technology (BACT) in Michigan, Wyoming, and California among others, and the Natural Gas Star program. For storage tanks and dehydrators, EPA should require at least 98% to 99% efficiency control, to match what some jurisdictions already require, instead of only 95% as it proposes.

Finally, to meet its legal obligations under section 112(d) of the Act, EPA must update the maximum achievable control technology (MACT) standard based on current data and information. EPA cannot simply rely on the analysis it conducted on the control technologies evaluated in 1999, not only because its original standard was not based on the best-performing sources, but also because doing so ignores the considerable developments that have occurred since 1999. EPA must require emission reductions based on the maximum achievable level of control *today* and set a numeric limit on each toxic air pollutant emitted from the oil and gas sector. EPA must both expeditiously promulgate the vitally important standards for previously uncovered sources and update the now stale 1999 standards to remedy the deficiencies set forth above.

CONCLUSION

In conclusion, we support EPA's efforts to reduce pollution from the oil and gas industry through its proposed New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants. We commend EPA for the significant first steps it has taken and urge EPA to finalize and strengthen the proposed rules without delay. As oil and gas operations move closer to more people in more regions of the country, the health of local communities, including children and other vulnerable populations, are increasingly at risk. Putting sensible controls in place for the oil and gas industry as soon as possible will help to protect against these threats.

Thank you very much for your leadership and hard work to protect all Americans from harmful oil and gas pollution, and thank you for your careful consideration of our comments.

Sincerely,

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