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U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
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SUBJECT: BP America Inc. Comments on the U.S. Environmental Protection Agency Proposed Regulation Titled "Oil and Natural Gas Sector: Emission Standards for New and Modified Sources; Amendments to the new source performance standards (NSPS) for the oil and natural gas source category by setting standards for both methane and volatile organic compounds (VOCs) for certain equipment, processes and activities across this source category. (Docket ID Number: EPA-HQ-OAR-2010-0505)

Dear Sir/Madam:

BP America Inc. (BP) appreciates the opportunity to provide written comments to the U.S. Environmental Protection Agency (EPA or the Agency) on the above-referenced proposed rule (the Proposed Rule) on behalf of two of its U.S. businesses, U.S. Lower 48 Onshore (L 48) and BP XP (Alaska) (BP Alaska). Over the past decade, BP has been America's largest energy investor. It employs about 17,000 people across the country and supports some 170,000 other U.S. jobs along the supply chain. In 2014, BP produced 673,000 barrels of oil equivalent per day in the U.S. It is also a U.S. producer of fuels, lubricants and petrochemicals and buys, sells and markets energy products throughout the country. BP is the largest marketer of natural gas in North America.

The L 48 onshore oil and gas production company is one of the largest producers of natural gas in the U.S. Indeed, seventy percent of BP's global well count is comprised of gas wells in L 48. Operating across a vast U.S. geography, from the onshore U.S. Gulf Coast, north through the Rocky Mountains, BP's L 48 business has a presence in six of the country's top basins. Headquartered in Houston, Texas, L 48 employs about 1,300 people in five states. It operates more than 9,600 producing wells, and has approximately 70,000 royalty owners. Wyoming operations are anchored on the giant Wamsutter tight gas field in the south central part of the state. In the San Juan area of Colorado and New Mexico, it operates the largest coal-bed methane field in the U.S. and produces natural gas from tight gas sands. Midcontinent operations cover the prolific Anadarko basin, along with the Arkoma basin and Woodford unconventional gas plays. The business is also home to the East Texas basin. L 48 also has non-operating

interests in over 10,000 wells across the country, with substantial positions in both the Eagle Ford and Fayetteville shale plays.

BP has also been an Alaska arctic operator for 38 years and currently operates the Prudhoe Bay Field, which has produced over 12 billion barrels of oil since 1977 and has a goal to produce at least another 2 billion barrels by 2025 when it expects to commence natural gas production.

Over the past several years, BP has made significant strides in reducing its methane emissions including in the United States. This includes participation in the EPA Natural Gas Star program and voluntary actions, including the elimination of many high-bleed pneumatic controllers, that have been reported to EPA Natural Gas Star. Also, BP Alaska employs a rigorous leak detection program in its north slope operations, spending about $1 million annually to protect enclosed wells and processing facilities from process safety risks. [Please note that BP Alaska is a member of the Alaska Oil and Gas Association (AOGA) that is developing separate comments for EPA in connection with this rule on the technical implementation issues of the Proposed Rule and the specific problems in implementing the Proposed Rule in the Arctic.]

Introduction and Summary: The Need for Regulatory Flexibility Permitting Rapid Adoption of New, More Efficient, and Cost-Effective Methane Leak Detection and Repair Technologies as They Become Commercially Available

In its Proposed Rule, the Agency seeks to require oil and gas producers to implement leak detection and repair (LDAR) programs to reduce methane and VOC fugitive emissions at well pads and compressor stations. These programs would entail a periodic survey of all components with the potential for fugitive emissions followed by repair and resurvey of components where leaks are detected. The Proposed Rule would require operators to use optical gas imaging (OGI) to detect leaks.

As EPA is aware, these LDAR requirements are not flexible and will be very costly and labor-intensive to implement. Application of conventional LDAR approaches to onshore natural gas production wells is particularly difficult, cumbersome and expensive. Unlike refineries or other plant environments where LDAR requirements have more traditionally been applied, the proposed rule would now mandate the testing of literally tens of thousands of well components at many thousands of wells, widely dispersed and often located at remote sites across thousands of miles. Costs include the up-front investment in OGI cameras and related equipment but, even more significantly, the training of staff in the proper operation of the equipment (to avoid the false negatives and positives that can easily occur) and the implementation of the program across the wide span of natural gas production sites. The time and resources required to conduct this monitoring will be significant and the training and recordkeeping burdens will be substantial, as will the enforcement burden to the Agency.

With the dramatic scale-up of LDAR activities under EPA's Proposed Rule, there are strong incentives to develop technologies that can bring down costs and conserve resources while maintaining and even enhancing leak detection

effectiveness. We believe these technologies not only have the potential to benefit the regulated community, but can offer a more efficient and effective way of pinpointing and fixing leaks to achieve the widely shared goal of mitigating the most significant sources of methane emissions.

Mindful of these considerations, the Agency has asked for comment on "criteria we can use to determine whether and under what conditions well sites operating under corporate fugitive monitoring programs can be deemed to be meeting the equivalent of the NSPS standards for well site fugitive emissions such that we can define those regimes as constituting alternative methods of compliance or otherwise provide appropriate regulatory streamlining."

EPA is also "requesting comment on whether there are other fugitive emission detection technologies for fugitive emissions monitoring, since this is a field of emerging technology and major advances are expected in the near future."

In response and as these requests demonstrate, while periodic surveys of oil and gas well pads using OGI may represent today's technology for methane leak detection, rapid development of new technologies with different and better detection capability may soon make possible less costly, more efficient LDAR programs that achieve equal or greater methane emission reductions. We applaud EPA for recognizing the potential benefits of emerging technologies and seeking to stay abreast of work underway within and outside government to bring these technologies to fruition.

So that these technologies can be quickly deployed, EPA should build into its final rule an "on-ramp" mechanism for rapid introduction of new detection equipment and monitoring strategies once they are validated and shown to be effective. This should include a streamlined, fast-track review process, with firm deadlines for decision-making written into the rule, assuring that alternatives to the current LDAR requirements can be approved without time-consuming amendments to the NSPS or other potentially complex and cumbersome processes that could inhibit the rapid development and deployment of such technologies.

To support assessment of alternative LDAR strategies, we urge EPA to stay abreast of technological developments and closely track the results of research and testing through an open dialogue with experts in the private sector and government. Consideration should be given to formation of a technical review committee open to all interested parties for this purpose.

I. Ongoing Research and Development Activities

The demand for improvements in monitoring technology and methods is already stimulating a substantial increase in R&D investment, as EPA notes in its proposal. We call to the Agency's attention two ongoing initiatives that aim to develop improved LDAR technologies for use by companies as they seek to comply with methane emissions reduction requirements: a public-private initiative and a partnership between a number of corporate actors and an environmental non-governmental organization. These initiatives appear to hold considerable promise in demonstrating, within the next few years, and potentially even sooner,

the commercial availability of substitute technologies, equipment and approaches that are (i) more efficient and cost-effective than the OGI-based survey approach mandated in the proposed rule and (ii) will lead to methane reductions that are at least as great or greater.

Department of Energy (DOE)/ Advanced Research Projects Agency – Energy (ARPA-E)

As of December 16, 2014, ARPA-E had selected eleven private sector projects involving methane observation networks with innovative technologies to obtain methane emissions reductions to receive awards totaling some $35,000,000 (MONITOR Program). The objective is to catalyze and support the development of transformational, high-impact energy technologies that can effectively promote methane emissions reduction. As the Agency is aware, ARPA-E has been in regular communication with EPA regarding the MONITOR Program including throughout the inter-agency process leading up to public release of the Proposed Rule.

DOE's aim is to lower the cost of compliance through the development of low-cost detection systems coupled with advanced modeling capabilities to pinpoint major leaks and then prioritize mitigation, with a focus on larger emitters. The Proposed Rule's approach, consistent with current technology, relies on detection alone as the criterion to define the need for repair, without any prioritization based on the size of the leak. Generally the thrust of the work being supported by ARPA-E is to develop technologies that allow for examination of larger areas, continuous in some instances, to identify significant leaks which can then be specifically identified and repaired.

ARPA-E is planning within 6-7 months to set up a facility where technologies will be tested in a standardized, realistic environment outside of the laboratory. This would be followed by a second round of testing to assess previously undemonstrated capabilities and further technical gains. ARPA-E believes some of these technologies could become commercially available within 2-3 years. The goal is to demonstrate one or more technologies that do not require the manpower, fleets of trucks and other equipment and surveys necessary for component-by-component LDAR using OGI. This would greatly reduce the time and manpower required for compliance, a cost driver that dwarfs the costs of acquiring an expensive FLIR camera ($90,000). Each of ARPA-E's partners will need to demonstrate it can bring the costs down to $3,000 per site per year (many of which have multiple wells). The hope and expectation is that costs will be significantly lower and perhaps as small as $1,000 per site.

EDF Methane "Detectors Challenge" (MDC)

In June, 2014, the Environmental Defense Fund (EDF) along with five corporate partners, issued a request for a proposal aimed at innovators from universities, start-up companies, instrumentation firms, and diversified technology companies with the capability to develop continuous methane leak detection monitoring for the oil and gas industry. They also sought expressions of interest in becoming part of the lab and field tests that would lead to pilot purchases and testing at oil

and gas facilities. The MDC is intended to catalyze and expedite development and commercialization of low-cost, methane detection technologies that will improve methane emission reduction in the oil and gas industry. MDC is based upon the belief that shifting the methane emission detection paradigm from periodic to continuous will allow leaks to be found and fixed, more readily decreasing methane emissions significantly. The ideal system would serve as a "smart" alarm sending an alert to an operator when an increase in ambient methane is detected that reflects emissions beyond what one would normally expect to see. The MDC identifies cost as a critically important factor and EDF and its partners have sought out technologies that could reasonably be expected to be sold for roughly $1,000 or less per well pad (or compressor site) when produced at scale over the following 2-5 years.

The MDC commenced with a set of laboratory tests of five different sensor technologies in 2014, called "Phase 1". Four of these five technologies were selected for further development and assessment in a follow-up effort referred to as "Phase 2", which tested each technology developer's entire system in controlled laboratory and outdoor settings in order to ensure that the systems performed as required. The primary objective of Phase 2 was to determine the readiness of technologies for pilot testing in the field and to identify continuous improvement opportunities. A major focus was whether the systems could detect leaks in a dynamic environment with minimal false alarms and little or no maintenance or user interaction. With the completion of Phase 2, the best performing technologies will proceed to an industry purchase and trial deployment phase, which will determine whether the technologies are ready for commercial deployment.

II. Creating an On-Ramp for Alternative Monitoring Equipment and Strategies

Under the LDAR strategies described in §60.5397a of EPA's Proposed Rule, leaks are to be detected through periodic monitoring surveys, beginning 30 days after well completion and repeated semi-annually or at longer or shorter intervals depending on the monitoring results. These surveys must "observe" each component capable of fugitive emissions using OGI, based on a "defined walking path" that "must ensure that all fugitive emissions components are within sight of the path."

This paradigm – which requires direct manual inspection and measurement of all well site components with leakage potential at specified intervals using hand-held detection equipment—could be replaced by an entirely new approach if some of the technologies under development are demonstrated and validated.

For example, the focus of the EDF's Methane Detectors Challenge, discussed above, is "shifting the methane emission detection paradigm from periodic to continuous." This might be achieved through a sensor device installed at a single location or series of locations that, as described by EDF, "will serve as a 'smart' alarm, sending an alert to the operator when an increase in ambient methane is detected." The detection could occur at any time, not during a periodic survey. It would result in direct follow-up at the general location where methane was

detected, including use of OGI to pinpoint the leak and then manual repair of the leak. However, the time-consuming manual observation of every component necessary during a survey would no longer be required, greatly reducing cost and manpower. At the same time, continuous automatic monitoring would enable significant leaks to be detected that would not be found until a periodic survey is conducted and hence would shorten the time between occurrence of a leak and its detection and repair.

It would be unfortunate if deployment of these new strategies were blocked or inhibited by the more prescriptive LDAR requirements in EPA's rule. To avoid this and to create a path toward rapid acceptance of new LDAR strategies, we propose that the rule establish a streamlined, fast-track process for approving new detection technology and monitoring methods that can be easily substituted for the OGI-based survey protocol in EPA's Proposed Rule. Where a new technology has been adequately field tested and validated through the ARPA-E MONITOR, EDF MDC or other programs and meets performance specifications outlined by EPA, the rule should authorize its deployment following a review by the Agency that should not exceed 180 days from submission of a complete data package by the technology developer or an oil or gas company. This firm deadline should be included in the rule itself to assure expedited action so the same or higher methane emissions reductions can be realized while the cost of doing so is reduced.

A potential precedent for this approach is the guidance issued by the Colorado Air Pollution Control Division (CAPCD) under AQCC Regulation No. 7, the state's LDAR requirements for methane and other pollutants emitted during oil and gas production. The regulation lays the groundwork for approving alternative technologies by defining "approved instrument monitoring method" (AIMM) as an infra-red camera, EPA Reference Method 21 or "other Division approved instrument based monitoring device or method." The implementing guidance then outlines minimum criteria for approval of such a device or method, including:

- whether it has "repeatable proven or demonstrated success in the field for hydrocarbon leak detection;"
- "its leak detection capability and reliability;"
- "how leaks and venting events are tracked and recorded;"
- "how effective it is under different types of weather conditions;"
- the "proven lower detection limit of the AIMM;"
- the ideal and maximum "distance for the lower detection limit;" and
- whether the AIMM is "capable of identifying specific leak/vent locations... or only within a general area."

Under the guidance, the CAPCD will review applications on a quarterly basis and issue an approval letter after the applicant conducts a field test attended by Agency staff and the adequacy of the technology has been verified.

EPA should include in its rule an approval mechanism for alternative monitoring equipment and methods patterned closely on the Colorado approach and incorporating similar approval criteria. Once equipment and methods have been

approved for use at oil and gas well sites, all companies should be free to deploy them or to continue to implement the OGI-based approach in the rule.

Importantly, there should **not** be a requirement to demonstrate that alternative monitoring equipment is "equivalent" in performance to Method 21 or OGI on a component-by-component basis. This demonstration could require extensive data and create obstacles to approval. Instead, the focus of the approval process should be on overall leak detection effectiveness, as determined by considerations of leak detection capability and reliability and successful deployment in the field.

We would like to discuss with EPA, in support of timely review and approval of new technologies, mechanisms through which the final NSPS rule could periodically take account of new LDAR technologies as these become commercially available. We think the Agency and the industry should reap any cost-saving and other benefits from the ARPA-E MONITOR and EDF MDC programs, and from other efforts, as these begin to yield an array of validated and field tested new sensing technologies and revised monitoring protocols after the final rule is promulgated. Reviews of existing technology would help to assess the capabilities and reliability of new sensing devices and related changes in the procedures and schedule for leak identification and repair. The Agency has a chance to write a more flexible rule that can achieve equal or greater methane emissions reductions at significantly lower cost.

There are precedents for building into final emission control regulations "look back" mechanisms to assess whether changes in technology warrant alternative approaches to complying with rule provisions. A leading example is EPA's light-duty vehicle greenhouse gas emission standards for MY 2018-2025. The goal of that technology review is to determine whether the MY 2022-2025 emission limits in the rule are feasible given the pace of technology development since the rule was promulgated. The timetable and process for the technology review are formalized in the rule itself (§ 86.1818-12(h)).

BP appreciates EPA's efforts to solicit stakeholder input to this rulemaking. Should you have any questions, please contact me at (202) 346-8566, or via e-mail at robert.stout@bp.com.

Thank you for considering these comments.

Respectfully submitted,

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