January 22, 2023

Regarding EPA's Supplemental Proposal and Natural Gas Industry to Reduce Pollution from the Oil and Natural Gas Industry to Fight the Climate Crisis and Protect Public Health

Docket ID No. EPA-HQ-OAR-2021-0317

At the conclusion of my testimony of January 12, 2023 (included below in case you need to refer to it), **Ms. Jenny Noonan** asked if I could submit any details in writing about the random assignment of inspections of abandoned wells. Such details are immediately below.

The Problem

There are an estimated 3.5 million abandoned oil and gas wells in the US, with the majority concentrated in only four states: Texas, my home state of Pennsylvania, Kansas, and West Virginia.

About 40% of abandoned gas wells have been capped and emit significantly less methane than unplugged ones. This is progress but also represents the potential magnitude of the increase in methane emissions should any of the capping materials (cement, valves, etc.) fail. Thus, random monitoring of capped wells is a wise precaution to protect the climate from this significant source of global warming.

Capping a natural gas well generally means filling it with cement and putting a cap on it. Cement has its failure modes under normal situations due to aging, water intrusion, shrinkage, chemical interactions, improper manufacture or installation of the cement, and so on. This risk is increased where there is still significant pressure from gas leaking underneath the cap. Additionally, any ground instability can result in unexpected tectonic shifts which would increase pressure on the capped well and its new cement fill and capping. This is especially possible around fracked areas, where fossil fuel exploration and exploitation have deliberately destabilized the underground structure.

The types of methane leaks that can occur at orphaned wells include:

1. Gas floating up from any open well hole simply because it is uncapped and there is not enough gas to be economical to capture for use (or prices are too low to make it worthwhile)

2. Gas emerging from the soils around the well hole due to subsurface fractures in the well bore

3. Gas leaking from multiple valves, connectors, or cracks at the legacy well head or other infrastructure associated with the well, including cracks or shrinkage of cement used to fill or cap the well

4. Gas leaking from the well opening after a heavy rainfall event or after snowmelt in spring when the groundwater forces methane that has permeated into the soil back into the well hole

Any or all of factors 2-4 could occur at any capped well site.

Tracking and Exposing Problems through Random Inspection

There is much literature in the field of Industrial Management on the value of randomly inspecting factories to assure high standards for manufactured goods. Sadly, in the area of services there is less research to consider, even though human frailty (including errors, sabotage or corruption) and technical failures exist in creating services such as well inspections just as they do in manufacturing. Whether we speak of goods or services, random inspection of the results is likely to create a better sense of how many problems there are, of how much work is needed to increase the level of integrity of the systems being monitored, to guard against consistent bias introduced by unchanging assignments of inspectors, and to make it harder for anyone (the inspectors or the inspectees) who might be tempted to cheat.

- Random inspection of the results is likely to **create a better sense of how many problems there are**: Wherever randomly assigned inspections are carried out, and consistent standards applied, some of the inspection sites fail or partially fail their inspections while others will pass. Collecting the data from these inspections will give the EPA an ongoing sense of the scope of the problem of uncapped wells. Reliable estimates are helpful in many ways, including educating people about the importance and impact of the work, estimating the US's carbon footprint, defending budget requests and so on.
- Random inspection of the results is likely to **create a better sense of how much work is needed to increase the level of integrity of the systems** being monitored. This more reliable information, gathered via random inspection of abandoned wells, will be useful to owners and operators held accountable for cleaning up sites at the end of their useful economic lives. If the inspection data show, for example, that particular types of valves tend to leak more, or that particular types of cement tend to fail, then systems may be built initially, or retrofitted later with more robust components or redesigned to avoid these problems. Well operators will be better able to calculate the money needed to retire these systems and include that in their budgeting and financing (i.e. helping them carry out their responsibilities.) Inspectors will have a better sense of where to spend the bulk of their time during inspections (helpful for budgeting manpower and making best use of their time.) The agency will develop a better sense of what monitoring equipment is needed for inspectors to take into the field based on better predictions of failure modes (helpful for capitol budgeting purposes and day-to-day logistics.)
- Random inspection of the results coupled with random assignment of inspectors is likely to **guard against consistent bias** introduced by unchanging assignments of inspectors. Example: you have 10 inspectors in Region X of varying levels of expertise and experience. Each inspector tends to cover a particular geographic area to reduce the Agency's transportation costs and make it easier on the inspectors themselves. Perhaps Inspector A is energetic and ambitious; their region is likely to be thoroughly inspected and the abandoned wells in that location may have a higher than average reported failure rate. In contrast, Inspector B is less well trained, has less experience, or is less energetic and so the wells in their location may have a lower than average reported failure rate. If one of those inspectors' territories coincides with a particular company's wells, that company's track record will reflect the inspector's personal characteristics as much as the company's own performance. Random assignment of inspectors will guard against this kind of consistent bias and will enhance the ability of the EPA to withstand criticism about perceived bias. (Please see examples from other sectors, below.)
- Random inspection of the results is likely to increase the difficulty of predicting who will inspect Company A's wells and when, thus **reducing the risk of attempted bribery or cheating**. Hopefully this is rare, but when much money is involved, there is more temptation to cheat and

probably some owners and operators will try. If particular inspectors are assigned either permanently or with some notice in advance, then owners/operators may offer financial or other incentives to an inspector to go easy on them. It is even possible that an inspector might solicit favors or bribes from a well owner or operator. However if assignments are made randomly and with little advance notice, such transactions would be harder to carry out, thus less likely to occur.

Some Academic Research on Random Inspections

In the world of manufacturing there are many academic studies about random inspection; less in the world of services. Here's what I have been able to find (and perhaps an expert in the field could provide even more):

- A report from the World Bank[1] offers lessons from a study of customs inspectors at the ports in Madagascar. They found that their normal semi-random assignment of inspectors was sometimes subverted, resulting in a certain level of bribery. Identifying these transactions was possible via data analysis but it was not simple. The same inspectors who profited by changing their assignments could also manipulate their overall customs revenues to outperform their more honest peers and look like superstars instead of bad guys. How? When they allowed themselves to be bribed, this resulted in lower revenues for the port. But they could balance this by also making sure to take other, more lucrative inspections, thus increasing their overall numbers to cover up their criminal behavior. This case study underlines the value of random assignment of inspectors and the risk of varying from that.

Although this was a study in a different country and line of work, it makes sense that the less advance notice an organization has about being inspected, the less of an opportunity it will have to take shortcuts (bribery, or agreements to accept temporary fixes instead of permanent ones). And the less notice an inspector has, the less opportunity he or she has to signal their availability for corruption. If inspection assignments are handed out the night before an inspection or even the morning of an inspection, the assignments are more likely to be a complete surprise for both parties, who are therefore more likely to carry out an authentic inspection, resulting in a more appropriate outcome (fines, injunctions, etc.)

Additional benefits of random assignment of inspectors:

- A finding from an NBER study of restaurant inspectors in Florida in 2018[2] demonstrates the value of assigning follow-up inspections to a different inspector than the one who did a previous inspection. They found that a new set of eyes on a previously inspected site tends to result in a more thorough and accurate inspection. Why? Because the first time someone sees a situation, they are more aware of every part of it. In contrast, with a repeat visit by the original inspector, there is a certain amount of eye-glazing over parts of it and seeing what they hope or expect to

[1] https://blogs.worldbank.org/developmenttalk/five-operational-lessons-new-research-corruption-customs
[2] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.nber.org/system/files/working_papers/w20596/w20596.pdf

see, as opposed to looking carefully to see precisely what there is to see. This study demonstrates the value of random assignments, which are more likely to bring a new person to the follow-up inspection than using a district approach or something similar. The end result is a **higher rate of compliance to regulations and standards**.

- A 2017 study prepared for the US Department of Labor[3] on OSHA inspections found that when randomized inspections were conducted, there were **spillover safety improvements even with uninspected facilities**. These improvements were strongest for "corporate siblings" – i.e. facilities owned or operated by the same corporation, especially when they were within the same region. Clearly, any bonus improvement in outcomes where EPA doesn't have to spend manpower or money would be helpful in years of tight budgets.

Some Miscellaneous Considerations Regarding Random Inspections

- We understand that random assignment of inspectors may be more costly (i.e. higher travel costs) so that choice would be a choice between cost and integrity. Yet what is the value of an inspection if it is not done well and with integrity? Perhaps there is some value but often, not much.
- We presume that inspections will be carried out as part of an overall inspection strategy including more frequent inspections of problematic sites or areas. The most effective inspection programs do this and still rely on randomization. Problematic sites or areas might be ones where an unusual number of wells are leaking in an area, or an unusual number of wells are leaking which are owned or operated by particular companies or people – these then would require more frequent and fuller inspections. Data driving this might include owner, operator, geology, capping techniques, and age.
- One inexpensive precaution which could be made is to install an inexpensive RFID device at the well site during the initial inspection. If you use a web-based work-order system for your assignments, then subsequent inspectors can hold their tablet up to the RFID device for scanning, which then verify that the inspector arrived at the site for the inspection. This ensures the inspector isn't simply sitting in a restaurant somewhere checking off boxes on their inspection sheet.
- Increasingly methane leaks can be identified through satellite sensing technology which could provide a second opinion about the integrity of these abandoned wells, or even a first opinion which is then verified by inspectors.

In case you would like an overview of some of the issues in setting up and improving inspection programs in general, I have found this resource:

- INSPECTION REFORMS: WHY, HOW, AND WITH WHAT RESULTS by Florentin Blanc (OECD)

[3] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.dol.gov/sites/dolgov/files/OASP/legacy/files/Organizational-and-Geographic-Spillover-Effects-of-Regulatory-Inspections-Evidencce-from-OSHA.pdf

chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.oecd.org/regreform/Inspection%20reforms%20-%20web%20-F.%20Blanc.pdf

The document looks at inspection programs from many European agencies with an eye towards efficiency, thoroughness and other issues, and emphasizes such factors as higher rates of inspection for higher risk facilities but does not specifically address randomization or corruption. Still, if setting up an inspection program is a new task, this might be of use.

I hope all this is helpful for your Office.

Best regards,

Nancy Boxer

Association for Climate Health

Below is my **original testimony** of January 12, 2023 for your convenience:

Good afternoon. Nancy Boxer, Association for Climate Health. Thank you for letting me speak today.

First, I want to thank the EPA for proposing further regulation of dangerous VOC and methane emissions. VOCs create smog which threatens public health; methane is the biggest part of natural gas, and while CO2 is the major cause of climate change, methane is smaller but mightier. It is the Napoleon Bonaparte of greenhouse gases, leaving devastation in its small but potent path.

As with any proposed change, there may be resistance from people who don't want to pay more, or risk losing value in their assets if asked to change how they do business. Yes, jobs and profits may be at risk. Producers may claim they do fine policing themselves, and argue, why would they allow much leakage of this valuable product?

The answer is that it costs more to repair pipelines or refit wells than to lose the gas leaking out right now. It is more profitable to ignore losses, even when they poison drinking water or make children sick at nearby schools, as happened in my home state, Pennsylvania; even when these emissions threaten world food supplies, coastlines and national security due to global warming.

Yes, some jobs may be lost, and dividends may be cut. I'm a shareholder, and I respect the pain this represents. But when a contractor lets their supplies spill into the streets, we make them clean it up. Why? Because it is wrong to let business create a public hazard. (Pause) If a drug company makes medication with life-threatening side effects, we make them take it off the market until they can make the product without sickening people. The oil and gas industry should be no different.

Yes, there will be costs. But we all bear costs for the sake of public safety. Children must be immunized before they start school; homeowners must comply with fire and electric codes even though it costs more. Businesses must maintain safe workplaces and produce products without endangering the public. Even if such requirements make them less profitable or occasionally, drive them out of business.

And so it is with these regs – they should be imposed to protect all of us – employees, shareholders, ordinary citizens. To fail to do so threatens the safety and welfare of our own and future generations.

We support the proposed regulations. But we urge EPA to go even further in writing and administering them:

1. Prioritize going after super-emitters to cap them and shut them down
2. Prioritize getting funds from the owners and operators of wells, pipelines, etc. who should cover the cost for mitigating emissions, and no longer be able to just walk away
3. We propose removing the exemption for sites with no access to electricity, when today any site can install solar panels or windmills to power their equipment
4. We suggest random assignment of inspectors and random audits of monitoring systems to reduce the risk of corruption
5. We suggest requiring follow-up inspections 6 months or a year after the final survey of closed wells to monitor the integrity of closure.

Thank you for your time.