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Next Generation Compliance:

Environmental Regulation for the Modern Era

Part I: Rules with Compliance Built In

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Some environmental regulations achieve widespread and consistent compliance. Most don't. As I explained in the introduction to this series of articles on Next Generation Compliance, the principal explanation for the difference isn't enforcement after the fact. Noncompliance can be common in industries that have received significant enforcement attention and rare even when there have been almost no cases brought against violators. It isn't because some companies have a stronger compliance culture; companies that comply with one rule sometimes ignore another.

The biggest reason for widespread compliance is the structure of the rule. Does the rule make compliance the path of least resistance? Is it designed to make compliance the default? If yes, compliance can be the norm, even with little enforcement effort. If no, violations will be rampant, no matter what enforcement may do.

Enforcement serves an essential role in holding violators accountable. A compliance program can't succeed without it. But a handful of enforcers will never be able to ensure general compliance at millions of facilities. We will only be able to protect the public from serious harms if we write environmental rules with compliance built in.

What rule structures succeed in making compliance the default? What design flaws lead to pervasive violations? The best way to understand what strategies succeed is to learn from our existing rules. Some have worked remarkably well. Most have not. Serious violations are widespread and too often we have no idea what the compliance picture is. In Part 1, I explore four programs that functioned well because they were built to work in the real world, with all its complexity and messiness. I also examine four programs that were compliance failures; they contain design mistakes that resulted in all-too-predictable serious violations.

Every rule is different. There is no one answer for every compliance design challenge. The rules that succeed build in strategies that take the world as it is. The rules that fail rely on hoping for the best. A close examination of these examples shows how rule design makes all the difference.

Programs with strong compliance outcomes: four examples

Some rules achieve amazingly good levels of compliance. Why? The regulations that work blocked the exits and smoothed the path toward compliance. Sometimes the solution is simple and elegant. But most successful rules build a unified whole using an array of structural provisions. This section describes four rules that achieved impressive compliance outcomes.

1. AIR POLLUTION: ACID RAIN PROGRAM

EPA set up the Acid Rain Program in 1995 in response to Congress' direction to do something about the acidic rain that was devastating forests and fresh water in many parts of the country. The principal culprit was sulfur dioxide (SO_2) emissions from coal-fired electric utilities. Those emissions traveled long distances through the air and caused serious damage when they ultimately landed on forests, rivers, and lakes. How best to cut those emissions?

> "The Acid Rain Program was a textbook example of thoughtful and effective program design."

As I described in the introduction to this series, the Acid Rain Program was a textbook example of thoughtful and effective program design. The basic elements of that design were established in the legislation creating the program, showing that Congress knows how to build compliance into laws when it wants to. The Acid Rain Program set a cap on the amount of SO_2 that could be emitted by all of the coal-fired utilities collectively and issued allowances: one allowance per ton of allowable emissions. Utilities could buy and sell allowances. Hence the name: cap and trade. The compliance determination was straightforward: do you have an allowance for every ton of emissions? The pollution reduction goals were achieved on time, and at lower cost than many had predicted. And compliance was reported at over 99% with very little enforcement required. How did they do it?

The beauty of the Acid Rain Program design wasn't any one thing by itself, it was how the pieces worked together. Omit any one of these features, and EPA might have had a very different result. The excellent summary by John Schackenbach describes the elements of the program.[1]

Continuous Emissions Monitoring Systems (CEMS) for SO_2 were the central feature of the program. The CEMS continuously measured the amount of SO_2 being emitted. Companies were required to monitor, and report, SO_2 emissions using the CEMS data. With well-functioning CEMS the utilities and the government would know exactly how much SO_2 was emitted from each utility every quarter, allowing companies and government to track progress and plan ahead. Reliable and accurate data were also the foundation of the market for allowances: everyone knew that one allowance from any company actually equaled a ton of emissions, and everyone had the same data. Companies could trade with confidence and government could know that its pollution reduction goals would be achieved.

How could EPA ensure that the CEMS were functioning well? Here's where an inspired but under-appreciated detail was key: when the monitoring equipment was not working properly, the utility was

1 John Schackenbach et al., *Fundamentals of Successful Monitoring, Reporting, and Verification under a Cap-and-Trade Program,* 56 J. of the Air & Waste Mgmt. Ass'n. 1576 (2006); *see also* Lesley McAllister, *Enforcing Cap-and-Trade: A Tale of Two Programs*, 2 San Diego J. of Climate & Energy Law 1 (2010) (providing an interesting analysis of the Acid Raid Program and The Regional Clean Air Incentives Market (RECLAIM)); *The Invisible Green Hand*, The Economist (July 4, 2002), https://www.economist.com/special-report/2002/07/06/the-invisible-green-hand (providing an over-the-top testimony).

required to report emissions using very conservative assumptions. If CEMS weren't operating reliably the company had to assume emissions that were most likely much higher than its actual emissions.[2] Assumed higher emissions increased the costs of CEMS errors and down time because they required more money to be spent buying allowances. These substitute data requirements provided a powerful incentive for utilities to assure that their CEMS were operating and operating properly.

EPA set up a centralized electronic reporting system to receive quarterly reports. Standardized electronic reporting streamlined recordkeeping and allowed EPA to track performance before the end of year reconciliation. The standardized e-reporting included a data-checking system that flagged inconsistencies and inadvertent omissions, spotting problems before they turned into violations. Much like you can't submit an online order if you leave out your address or credit card information, automated checking for obvious problems reduces errors and improves accuracy. And EPA performed its own electronic audits on the data, comparing companies to each other and checking company data against external information to verify accuracy. Having the data submitted electronically allowed EPA to conduct these audits efficiently from Washington without doing field visits.

At the end of the year, utilities had to "true up," by proving they had purchased enough allowances to equal their emissions. How did EPA avoid the situation we see too often today: sources waiting to be caught and only then doing what's required? Two key provisions helped: 1) Simplicity: did the number in Column A (verified emissions) match the number in Column B (allowances)? Yes or no? Violations were hard to miss. 2) Automatic penalties for companies that didn't have enough allowances to cover their emissions and a reduction in emissions cap the following year. These penalties were deliberately higher than the cost of buying an allowance. Why wait and pay more? It was cheaper to comply. Automatic penalties had the additional advantage of reducing the time to bring and resolve enforcement actions.

These features combined to create one of the most effective and efficient pollution reduction programs in EPA's history. All of the design elements were combined into one elegant program that achieved its goals early, at lower cost, and with compliance rates than most programs can only dream of. It is especially worth noting that while the overall compliance structure embraced simplicity (1 allowance = 1 ton), the underlying technology is complex, which is reflected in the hundreds of pages of EPA guidance on monitoring and reporting.[3] Simplicity of rule design can be entirely consistent with technical complexity.

There are a few caveats that should make us wary of using the Acid Rain Program as an all-purpose model

2 The more data that was missing or that failed quality assurance tests, the more the substitute data provisions required overestimating actual emissions. McAllister, *supra* note 1, at 6; *see also* Missing Data Substitution Procedures, 40 CFR Part 75, Subpart D - Missing Data Substitution Procedures, §§ 75.30 - 75.37.

3 McAllister, *supra* note 1, at 5; *see also Clean Air Markets - ECMPS Reporting Instructions*, EPA Clean Air Markets Division, https://www.epa.gov/airmarkets/clean-air-markets-ecmps-reporting-instructions (last visited Dec. 9, 2019).

and remind us that each program has to be designed to the circumstances of the problem it is addressing. Although the key success of the Acid Rain Program is that it achieved its pollution reduction goals, it is often cited as evidence that markets can get reductions at a much lower cost. The first caveat is that while the market strategy for acid rain had lower costs than projected, much of the reduced cost was likely the result of reduced prices for low sulfur coal as a result of rail deregulation.[4] While markets in the right circumstances do hold promise for improved efficiency, that wasn't the only, or maybe even the main, reason for reduced costs in this case.

Second, the sources being regulated were sophisticated and homogenous. That made use of CEMS and standardized electronic reporting much easier. When oil- and gas-fired units were added to the program, alternative methods for calculating emissions were necessary.[5]

Third, California had a worse experience with a very similar cap and trade program, the Regional Clean Air Incentives Market (RECLAIM).[6] Like the Acid Rain Program, RECLAIM made use of CEMS and electronic reporting as well as tough substitute data provisions to inspire accurate reporting. However, RECLAIM experienced technical malfunctions with monitoring equipment and electronic reporting early on. In addition, RECLAIM struggled with the fact that its regulated sources were not homogenous, which prevented the state from establishing a uniform emissions calculation tool. These difficulties resulted in a state decision to verify emissions through a time consuming and costly field inspection and audit of each facility each year. Adding to the administrative burden, the state did not have automatic penalties like those in the Acid Rain Program. Therefore, not only did the state do detailed facility specific audits, it had to pursue time-intensive enforcement actions to address the violations found. The most common violations were late or missing emissions reports, followed by emissions exceeding allowances.[7] These delays not only put a large administrative burden on government, they led to uncertainty in the market as audits and adjudications stretched well into the next compliance period. The California electricity crisis in 2000 and 2001 exacerbated these problems.

The experience of Congress and EPA with the Acid Rain Program shows that it is possible to hit a home run in rule design by thoughtfully combining elements tailored to the specific circumstances of the sector(s) being regulated. But the comparison to California RECLAIM confirms that solutions that work in one program are not necessarily completely transferable: variation in the types of sources being regulated can make the job much harder. The entire program must be structured to be self-executing; leaving out just one element that results in significant

4 *See* Richard Schmalensee & Robert Stavins, *The SO_2 Allowance Trading System: The Ironic History of a Grand Policy Experiment*, 27 J. of Econ Perspectives, No.1, 103, 110–112 (2013) (noting that rail deregulation was a significant factor in lower costs); *see also* Bradley Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?* 89 Geo. L. J. 257, 276 (2001) (noting that unanticipated advances in scrubber and fuel blending technologies also helped reduce costs).

5 *See* McAllister, *supra* note 1, at 5–6 (noting that over 95% of the emissions were at sources using CEMS).

6 This discussion draws from McAllister, *supra* note 1.

7 *Id.*, at 19-20.

need for continuous government intervention has the potential to derail program effectiveness. It also helps when unexpected events break in your favor, rather than the other way around.

It is worth noting that markets don't spring from the earth fully formed. They are created by tough, prescriptive regulations that dictate outcomes and direct how and when they must be achieved. Like the Acid Rain Program. The market for SO_2 allowances was intended to reduce the costs of the rule. That's a worthy goal, but it isn't what cut emissions. Credit for that remarkable achievement goes to the mandatory use of continuous emissions monitoring, tough substitute data requirements, obligatory electronic reporting, automatic penalties, and the other directives in the Acid Rain Program rule. These are all classic regulatory mandates. Markets are created by and built on the foundation of regulatory command and control, as the Acid Rain Program so powerfully demonstrates. Market strategies require the same hard work and careful Next Gen structure that all rules need.[8]

2. WATER POLLUTION: SECONDARY TREATMENT FOR SEWAGE TREATMENT PLANTS

In the years before the Federal Water Pollution Control Act of 1972,[9] Congress called upon the states to confront the problem of water pollution. Excessive loading of organic matter, nutrients, sediment, and pathogens into the nation's rivers and streams was leading to widespread low dissolved oxygen, fish kills, and bacterial contamination.[10] One of the chief culprits was the large and growing discharge of sewage from municipally owned sewage treatment plants, commonly called publicly-owned treatment plants or POTWs.[11] In 1968 many sewage treatment plants had only primary treatment, in which some of the solids were removed.[12] Pollutant loads were large and increasing. Congress expected states to set water quality standards and to go after the facilities impairing water quality.

It didn't work. States proved unable or unwilling to step to the plate. Acknowledging that the states-first approach "has been inadequate in every vital aspect,"[13] in October 1972 Congress opted instead for something much more directive and centrally controlled: every sewage treatment plant would be

8 Getting markets right is why EPA has benefitted from having a division that specializes in markets: the Clean Air Markets Division in the Office of Air and Radiation. They are responsible for the Acid Rain Program and the Cross State Air Pollution Rule (CASPR) and two other prior air market rules: The NOx Budget Trading Program and the Clean Air Interstate Rule (CAIR). *See Eight Things to Know: Program Highlights, EPA*, https://www.epa.gov/airmarkets/eight-things-know-program-highlights (last visited Dec. 9, 2019).

9 Amendments to the federal water pollution law were later called the Clean Water Act, and that is the term used elsewhere in this series to reference the federal law governing water pollution.

10 US EPA Office of Water, EPA-832-R-00-008, Progress in Water Quality: An Evaluation of the Environmental and Economic Benefits of the 1972 Clean Water Act, at ES-1 (2000); *see also* William L. Andreen, *Success and Backlash: The Remarkable (Continuing) Story of the Clean Water Act*, 4 Geo. Wash. J. Of Energy & Envtl. L. 25 (2013).

11 Andreen, *supra* note 10, at 25.

12 EPA, Progress in Water Quality, *supra* note 10, at ES-1.

13 S. Rep. No. 92–414, at 7 (1972), *as reprinted in* 1972 U.S.C.C.A.N. 3668, 3674.

required to install secondary treatment,[14] and more stringent limits would be imposed on sewage plants where necessary to achieve local water quality standards.

Every POTW was required to have a permit and this mandate was underscored by making any discharge without a permit unlawful. Every permit would specify the pollution limits applicable to that particular plant.[15] And every POTW had to regularly monitor its own wastewater and submit that data to the government. Congress also set aside funding to help POTWs achieve the standards.

> "The rule set unambiguous standards that applied to every plant, making it crystal clear what the rules of the road were."

So how did it go? With impressive alacrity, EPA finalized secondary treatment standards on August 17, 1973, a short 10 months after the law was enacted.[16] Who says agencies can't move fast? The nation now had a federally-mandated and federally-enforceable one two punch: every sewage plant had to meet the minimum technology standards plus more stringent limits where necessary to address local water quality problems.

A little over 20 years later, 99% of the nation's 16,024 POTWs met the requirement for secondary treatment.[17] Discharges of organic pollution were cut by 45%, even though the volume of sewage treated increased by 35%.[18] And water quality improved as a result of this big reduction in loading: 69% of the river reaches saw improvements in dissolved oxygen.[19] What were the keys to success?

The first was clear, uniform, technology-based performance standards. The rule set unambiguous standards that applied to every plant, making it crystal clear what the rules of the road were. Years of attempts to start with water quality and work back to individual limits on dischargers were a failure.[20] Starting with ambient conditions seems logical, and economists praise its economic efficiency. But it didn't work. Why not? Determining the impact of individual sources on water quality is technically complex, subject to endless site by site debate and litigation. And it requires both professional expertise and political backbone at all levels of government. The reality is that pressure on publicly-owned sewage

14 S. 2770, 92nd Cong. § 301(b)(1)(B) (1972) (enacted). The pollution limits for secondary treatment were to be defined in regulation by EPA. See Andreen, *supra* note 10, at 25–26.

15 The name given these permits reflected the ambitions of the Clean Water Act: they are called National Pollutant Discharge Elimination System or "NPDES" permits.

16 38 Fed. Reg. 22298 (August 17, 1973)

17 EPA, Progress in Water Quality, *supra* note 10, at 2-24.

18 *Id*. at ES-5, 2-43 (regarding loading of carbonaceous biochemical oxygen demand (CBOD5)). During the same period industrial BOD pollution, also subject to federally enforceable technology-based standards, fell 40%. Andreen, *supra* note 10, at 28.

19 EPA, Progress in Water Quality, *supra* note 10, at ES-10; Andreen, *supra* note 10, at 26-29.

20 Andreen, *supra* note 10, at 25.

plants to upgrade performance translates directly into increased rates for the local community. That puts huge political pressure on the state and local decision makers. Experience shows that many local and state governments can't find a way to get around politicians who strenuously object. Uniform national standards bypassed much of that debate.[21]

The marriage of uniform performance standards as the floor with more stringent standards when necessary to protect local water quality allowed the best of both worlds. Strong state programs could make a big difference in how well their waters were protected. But whether or not the state had a strong program, its waters and people would be defended by the minimum secondary treatment standards.

Federally-enforceable limits gave the local and state governments a reason to insist on compliance. All the National Pollutant Discharge Elimination System (NPDES) permit limits were federally enforceable, including any more stringent state water quality limits.[22] EPA is usually less subject to the "small p" political pressures that loom large at the local level, so was more likely to follow through with suits to require action.[23] Federal enforceability is essential to the national effectiveness of water pollution controls. The value of federal enforceability isn't just the cases that it allows EPA to bring, it is the knowledge by states and POTWs that EPA could bring such cases. Defiance at the state or local level is therefore unlikely to succeed. Federal enforceability also strengthens the state's hand with the permitted facilities because there is no way around having to meet the standards. We are so used to federal enforceability as a fundamental component of federal environmental laws that we can overlook its structural value.

Compliance also benefitted from clear permits, self-monitoring, and uniform reporting. The law said that any discharge without a permit was a violation. Therefore, every POTW had to apply for a permit. That permit set out in very clear terms what performance limits applied to that individual facility. Under EPA's regulations every POTW had to sample its own discharge and report on that to government under penalty of perjury.[24] Determining who was violating was a very simple matter of comparing the reported discharge to the permitted amount. If the facility was over the limit, it was in violation. This structure established under the Clean Water Act is often

21 Not surprisingly, there were amendments, exceptions and modifications eventually built into the statute and the rules, in response to the problems that emerged after the law was initially passed. See EPA, Progress in Water Quality, *supra* note 10, at 2-20 to 2-25. These changes did insert greater complexity into the rules, but the fundamental structure was not changed: POTWs had individual permits with definite limits and facilities had to monitor and report hard numbers that unambiguously showed whether they were in violation.

22 The permits are concurrently enforceable by EPA and by the state that issued the NPDES permit. State enforcement is always important, and even more so when the federal government's enforcement efforts falter. Andreen, *supra* note 10, at 26.

23 That's why a large portion of the enforcement actions to require big cities to stop discharging raw sewage and contaminated stormwater – a problem that came to the fore after secondary treatment was achieved – have been brought by EPA. Note that the Clean Water Act requires that states participate in federal enforcement cases against municipalities, so states are always a party to the EPA action once initiated. 33 U.S.C. §1319(e). Usually states elect to join as a co-plaintiff, but if they don't EPA must join them as a defendant.

24 William Andreen, *Water Quality Today - Has the Clean Water Act Been a Success?* 55 Ala. L. Rev. 537, 549 (2004).

cited as a model of pollution regulation because it establishes both the limit and the monitoring sufficient to determine if the limit is exceeded and requires the facility to self-identify its discharges as in violation.[25] This clarity and definitiveness make violations much easier to identify and harder to evade, putting increased pressure on sources to comply.

In addition, it helped that Congress provided funding to support the upgrade of POTWs. Between 1970 and 1995 about $61 billion in federal funds were distributed to facilities or to state funding programs to help POTWs install the pollution controls necessary to meet the standards.[26] Achieving pollution reductions from publicly owned facilities can be challenging. Public entities are often boxed in by local laws and approving bodies that make it hard to obtain approval for necessary upgrades. They have less freedom to make investment decisions than do private firms, and they have fewer pathways for obtaining funding and recovering the costs of pollution upgrades. Making public money available therefore smoothed the way for sewage plant upgrades, although the time needed to set up programs and infrastructure for distributing funds meant that the expenditures didn't happen quickly.

Sewage treatment plants upgraded their facilities, pollution was significantly reduced, and water quality improved as a result of Congress' vision back in 1972 and the strong implementing regulations EPA adopted. The program was intended to cut pollution discharged directly from sewage treatment plants, and it did that very effectively.[27] What it didn't do was address the pollution that never got to the treatment plant. Raw sewage that is diverted from the treatment plant and discharged without any treatment causes serious pollution and health problems. Contaminated stormwater that runs off city streets and pollutes local waterways with sediments and toxics continues to be a significant challenge. The structural provisions that worked well for end-of-pipe treatment plant discharges weren't designed for these more dispersed stormwater-related discharges.[28] And so EPA has had to resort to slogging it out with cities one at a time through enforcement cases to attempt to get those additional pollution reductions.[29]

25 Noting the success of the Clean Water Act's permitting, monitoring and reporting structure, Congress attempted to establish a similar structure for the Clean Air Act in the Title V permits required by the CAA amendments of 1990. That effort has been hemmed in by the courts and by administrations that don't support tighter monitoring so has not achieved the goals that were originally envisioned. *See* Adam Babich, *The Unfulfilled Promise of Effective Air Quality and Emissions Monitoring*, 30 Geo. Envtl. L. Rev. 569, 590-596 (2018).

26 Andreen, *supra* note 10, at 28. State and local governments invested in capital improvements of approximately the same magnitude. Andreen, *supra* note 24, at 552.

27 *See* Andreen, *supra* note 10, at 29; Andreen, *supra* note 24, at 546. Nevertheless, there are still many significant violations. Compliance is never "done." Next Gen strategies in rules can help address these issues. And enforcement continues to be an important tool for solving some of the intractable problems.

28 Andreen, *supra* note 10, at 30.

29 Just about every large city (population of over 50,000 or with more than 10 million gallons a day wastewater discharge) with combined sewers (stormwater and sewage water gathered in the same pipes) was eventually the subject of an enforcement case to fix the public health problem of stormwater discharges of raw sewage into the nation's waters. EPA and states have taken actions at 97 percent of large combined sewer systems, 92 percent of large sanitary sewer systems and 79 percent of Phase 1 municipal separate stormwater systems. *See*

The experience with secondary treatment shows the value of directive one-size-fits-all approaches in some circumstances. The nuanced, flexible, local control strategy beloved by economists didn't work here. Congress recognized that a more forceful response was needed to address this urgent public health problem. So, Congress said to sewage treatment plants: you will achieve at least this minimum level of control. Period, full stop. That unambiguous directive was what was needed to overcome the huge political and practical barriers to better water quality. Inefficient? Yes. Effective? Absolutely.

3. CHEMICALS: PARAQUAT

Sometimes the simple answer is the best. Paraquat dichloride – commonly called paraquat – is one of the most widely used herbicides in the US for the control of weeds and as a defoliant in many agricultural settings.[30] It is also extremely dangerous to people. For this reason, all paraquat products registered for use in the US are Restricted Use Pesticides (RUPs), which can only be used by certified applicators.[31]

Since 2000, there have been 17 deaths – three involving children – caused by accidental ingestion of paraquat. These deaths resulted from the pesticide being illegally transferred to beverage containers and later mistaken for a drink and consumed. A single sip can be fatal.[32]

"Sometimes the simple answer is the best."

In one tragic example, an 8-year-old boy drank paraquat that had been put in a Dr. Pepper bottle, which he found on a windowsill in the garage. He died in the hospital 16 days later. His older brother had used the product on weeds around the house and put it in the bottle in the garage. The older brother obtained the product from a family friend who was a certified RUP applicator.[33]

EPA's solution was very simple: require a redesign of the packaging, so that these tragic mistakes could no longer happen. The 2016 EPA decision required new closed-system packaging that would prevent transfer or removal of the pesticide except directly into proper application equipment. No more pouring it into beverage containers because that literally will be impossible.

The regulatory requirement isn't complicated or long. Here's the whole provision on packaging:

> EPA is requiring that all paraquat non-bulk (less

National Compliance Initiative: Keeping Raw Sewage and Contaminated Stormwater Out of Our Nation's Waters, EPA, https://www.epa.gov/enforcement/national-compliance-initiative-keeping-raw-sewage-and-contaminated-stormwater-out-our (last visited Dec. 9, 2019).

30 *EPA Takes Action to Prevent Poisonings from Herbicide*, EPA https://www.epa.gov/pesticides/epa-takes-action-prevent-poisonings-herbicide (last visited Dec. 9, 2019).

31 *Paraquat Dichloride*, EPA, https://www.epa.gov/ingredients-used-pesticide-products/paraquat-dichloride (last visited Dec. 9, 2019).

32 *EPA Takes Action, supra* note 30.

33 *Paraquat Dichloride: One Sip Can Kill*, EPA, https://www.epa.gov/pesticide-worker-safety/paraquat-dichloride-one-sip-can-kill (last visited Dec. 9, 2019).

than 120 gallon) end use product containers comply with EPA-approved closed-system standards. The closed-system packaging for paraquat products must be engineered so that paraquat can only be removed from the container using closed-system technology meeting the following EPA-approved standards:

- The closed system must connect to the container in a way that the closed system is the only feasible way to remove paraquat from the container without destroying the container; therefore, a screw cap for the pourable closure on a typical pesticide container is not sufficient; and
- The closed system must remove the paraquat from its original container and transfer the paraquat to the application equipment through connecting hoses, pipes and couplings that are sufficiently tight to prevent exposure of the mixer or loader to the paraquat (except for the negligible escape associated with normal operation of the system).
- All paraquat closed-system packaging must be approved by EPA.[34]

That's it. Short. To the point. Don't rely on good judgment or attention to warnings to solve a persistent human health threat. EPA already knew that wasn't working. Just make it impossible.

4. REPORTING: GREENHOUSE GAS REPORTING PROGRAM (GHGRP)

The GHGRP collects annual greenhouse gas information from the top emitting sectors of the US economy such as power plants, oil and gas facilities, refineries, chemical manufacturers, and others – about 8,000 facilities in total.[35] This is a reporting rule only; it requires companies to report their emissions, but doesn't set any emission limits.

To achieve its impressive 98% compliance rate, the GHGRP uses many Next Gen strategies. EPA provides a handy online tool for sources to determine if they are required to report.[36] Reporting must be done electronically using a common template, making reporting fast and the information immediately available. EPA makes the most of e-reporting technology to screen electronic reports before they are submitted; reports that are incomplete or contain obvious errors are not accepted.[37] Companies must

34 EPA, Paraquat Dichloride Human Health Mitigation Decision, at 8 (Dec. 14, 2016), https://www.regulations.gov/document?D=EPA-HQ-OPP-2011-0855-0112. Another useful feature of the decision is a requirement that paraquat products intended for handheld and backpack equipment (which also have to meet the closed system packaging requirements) should contain an indicator dye to aid in early detection of paraquat leaks and spills. *Id*.

35 *See GHGRP Reported Data*, EPA, https://www.epa.gov/ghgreporting/ghgrp-reported-data (last visited Dec. 9, 2019).

36 *See Applicability Tool*, EPA, https://www3.epa.gov/ghgreporting/help/tool2014/index.html (last visited Dec. 9, 2019).

37 Note that mandatory e-reporting can spur development of private sector reporting tools, which are sometimes more nimble and responsive to customer needs than government developed reporting tools. *See, e.g.*, Press Release, IHS, IHS Introduces Software that Streamlines Compliance with EPA Mandatory Reporting Rule for GHG, (Sep. 14, 2011) https://news.ihsmarkit.com/press-release/ehs-sustainability/ihs-introduces-software-streamlines-compliance-epa-mandatory-report ("New release saves time and ensures data quality of submissions into EPA's e-GGRT system").

certify their submission as true, accurate, and complete when submitted. EPA then checks the filed report against other data and notes possible inaccuracies for discussion with the company.[38]

That's not all. EPA puts considerable effort into finding all of the facilities that are required to submit reports. It doesn't just wait for the facilities to self-identify. EPA contacts facilities that seem like they should be reporting but aren't. Just in case any facility thought it might avoid detection or let an error slide, EPA announces to the world which facilities – by name and address – aren't complying: either they didn't meet the verification requirements (orange flag) or stopped reporting without a valid reason (red flag). All of that information is public, very easily searchable, and available on EPA's website.[39] Anyone can check to find out if any companies near them have orange or red flags. That's the beauty of transparency strategies; the pain of violations being listed for the world to see inspires many companies to conclude that it is less trouble just to comply.

This combination of Next Gen strategies sets the gold standard for reporting programs. Over the last six years (the years for which violations data is available on the web) this program averaged a noncompliance rate of only 2%.[40]

Programs with pervasive violations: four examples

Rules that have widespread violations provide an opportunity to learn what we did wrong. Seeing how the rules failed to achieve broad compliance can be illuminating, especially when it reveals the flaws of strategies that are still widely used.

Let's take an in-depth look at four rules that didn't get it right, leading to avoidable deaths, significant health issues, and a failure to know what the health impacts really are. The three examples of clean air and drinking water rules are still in effect in the US today, but a South Korean ferry accident provides the first example. While this doesn't involve an environmental issue and it isn't in the US, it helps to illustrate how rules can create the opportunity for criminal violations that cause serious harm. Analyzing a situation not in our backyard also makes it easier to see the regulatory flaws that our emotions might obscure in an example closer to home.

38 *See* EPA,Greenhouse Gas Reporting Program: Report Verification, https://www.epa.gov/sites/production/files/2015-07/documents/ghgrp_verification_factsheet.pdf. EPA verifies annual reports using a combination of electronic checks and manual reviews to identify potential errors. EPA notifies reporters of a potential error and allows them up to 75 days to address it, either by fixing the error and resubmitting their annual report or by providing an acceptable explanation. An annual report has met EPA's verification requirements when it appears not to contain any potential errors based on EPA's checks and review and/or the reporter has provided an acceptable explanation for any potential errors. A facility is given an orange symbol when it has not met EPA's verification requirements. *See Q802. Which facilities are given an orange facility symbol in FLIGHT?*, EPA, https://ccdsupport.com/confluence/pages/viewpage.action?pageId=243139281 (last visited Dec. 9, 2019, 11:15).

39 Facility Level Information on GreenHouse gases Tool (FLIGHT) at https://ghgdata.epa.gov/ghgp/main.do.

40 Most years the noncompliance rate is lower than 2%. The six-year average only rises to 2% as a result of the poor compliance record of the petroleum and natural gas sector in 2018. *See Facility Level Information on GreenHouse gases Tool (FLIGHT)*, EPA https://ghgdata.epa.gov/ghgp/main.do (last visited Dec. 9, 2019). Percentage noncompliance is calculated by comparing the number of violators (red or orange flags) with the total number of reporting facilities.

1. CRIMES: SINKING OF THE SEWOL FERRY

In 2014 the South Korean Sewol Ferry sank, and more than three hundred people died. The investigations that followed revealed that the ferry was carrying too much cargo on the day of its demise, and that an overly sharp turn caused the top-heavy vessel to list. The overloaded cargo then shifted, sinking the ship. Investigators also discovered bribery, falsified documents, lax inspectors, and an insufficient emergency response capability. The disaster led to a huge public outcry. There were criminal convictions and ultimately it contributed to the fall of the national government.

The Sewol Ferry routinely exceeded the amount of cargo it was permitted to carry. On the day it sank, it was carrying over twice the allowed cargo weight. While the public uproar focused on demands for tougher enforcement, less attention was given to the regulatory structure that had failed to prevent this horrific accident.

A key fact, only mentioned in a small number of stories, was that the company running the ferry could not make money if it stayed within the cargo limit.[41] The load that was safe was economically impossible to sustain. News reports and official investigations highlighted the fact that the company made almost $3 million from illegal cargo, citing this as evidence of the company putting profits over safety. Far less noticed was that the Sewol Ferry was operating at a loss of about $750,000 in the year preceding the accident.[42] Coastal ferries in South Korea are small and the profit margins thin.[43] Statements from other ferry owners suggest that it was commonplace for ferries to exceed cargo weight limits.[44] In fact, two other overloaded ferries previously sank in South Korea, resulting in the deaths of over 600 people.[45]

Certainly, people and companies are responsible for their own criminal behavior and it is appropriate to bring criminal charges when criminal conduct results in entirely preventable loss of life. Punishment is important, and it also deters others from violating, but government should design programs that make such criminal behavior far less likely and easier to spot before it harms people. It is predictable, even certain, that some companies will violate safety standards if complying makes it impossible for them to break even financially. This is a no-brainer. When you position a government rule in opposition to a company's survival, you create the circumstances for the unscrupulous to violate. This is not to say that government shouldn't impose rules to protect

41 Jung-yoon Choi, *South Korea Ferry was Routinely Overloaded*, USA Today (May 4, 2014), https://www.usatoday.com/story/news/world/2014/05/04/south-korea-ferry-was-routinely-overloaded/8686733/.

42 In-Soo Nam, *South Korea Ferry Probe: Cargo Was Three Times Recommended Maximum*, Wall Street Journal (April 23, 2014), https://www.wsj.com/articles/south-korea-expands-probe-over-sunken-ferry-1398243668.

43 *The Sewol Tragedy: Part II - Causes and Contributing Factors*, Ask A Korean! (May 2, 2014), http://askakorean.blogspot.com/2014/05/the-sewol-tragedy-part-ii-causes-and.html.

44 Jeyup S. Kwaak, *In South Korea, Lessons from Ferry Disaster Slow to Take Hold*, Wall Street Journal (Apr. 12, 2015) https://www.wsj.com/articles/in-south-korea-lessons-from-ferry-disaster-slow-to-take-hold-1428874202.

45 David A. Tyler, *Sewol Disaster Demonstrates the Danger of Ignoring Cargo Load Limits*, Professional Mariner (Dec. 5, 2014), http://www.professionalmariner.com/December-January-2015/Sewol-disaster-demonstrates-the-danger-of-ignoring-cargo-load-limits/.

the public that interfere with profit-making. That's a central role of government -- advancing the public interest over private gain. But when government decides to take that kind of action, it has to acknowledge that violations will be rampant, and that government must create regulatory structures to prevent violations and catch violators. On this score, the regulatory design for ferry safety in South Korea was a monumental failure. The entities policing compliance had built in conflicts of interest, the limits on cargo weight were known only by the standard setting arm of government, not the compliance arm, and the compliance system was both weak and laughably easy to evade.[46] Here are just a few of the key flaws in the regulatory structure:

- In an effort to allow more passengers, the vessel made modifications that increased the weight and raised the center of gravity of the ship. In response, the government entity responsible for the safety review cut the approved cargo by half and increased ballast requirements by the same amount.[47] Experts said later that the ship never should have been cleared to make modifications and operate under these conditions because it could not make money with the drastically reduced cargo load limits.[48]
- Having approved the operation of the revamped Sewol, albeit with tighter operating restrictions, the regulatory structure then completely collapsed by not requiring the operating restrictions to be communicated to the entity responsible for policing the limits. It was therefore easy for the Sewol owners to lie with impunity about its cargo limits and impossible for inspectors to discover there was a violation.
- The organization responsible for assuring compliance was an industry group funded by the marine companies -- a built-in conflict of interest.[49] Any regulatory structure that puts enforcement in the hands of the regulated should expect widespread violations.
- The incentives created by the method used to check compliance made the safety problem worse. The changes made to the Sewol vessel resulted in a reduction in allowable cargo weight but also required additional ballast to increase the stability of the ship. However, the inspectors "checking" for overloading only looked to see if the vessel was riding low in the water. Cheaters who added illegal cargo could evade detection by decreasing ballast, an outcome that was entirely predictable and exactly what happened in the case of the Sewol.[50] In this way, feeble safety compliance checks made the safety problem worse.

46 *See* Chico Harlan, *Soul-searching in South Korea After a Disaster Waiting to Happen*, The Guardian (May 2, 2014), https://www.theguardian.com/world/2014/may/02/korea-ferry-disaster-economic-growth-safety.

47 *See Sinking of MV Sewol*, Revolvy, https://www.revolvy.com/page/Sinking-of-MV-Sewol (last visited Dec. 9, 2019).

48 Jung-yoon Choi, *South Korea Ferry was Routinely Overloaded*, USA Today (May 4, 2014), https://www.usatoday.com/story/news/world/2014/05/04/south-korea-ferry-was-routinely-overloaded/8686733/.

49 *Id.*

50 Choe Sang-Hun, *Legacy of a South Korean Ferry Sinking*, New York Times (Apr. 11, 2015), https://www.nytimes.com/2015/04/12/world/asia/legacy-of-south-korea-sewol-ferry-sinking.html.

When catastrophes like the Sewol ferry sinking occur, and it turns out that multiple violations contributed to the disaster, it is common to hear calls for tougher enforcement. The same thing happens when environmental disasters occur in the US. That's fine as far as it goes. But what we should learn from this and other calamities is that a failure in regulatory design not only created the opportunity for violations, but virtually ensured they would happen.

> "It is not enough to set a regulatory standard, expect compliance, and prosecute criminal violations."

It is not enough to set a regulatory standard, expect compliance, and prosecute criminal violations. In high stakes settings where lives are on the line, government cannot ignore the pressures that firms subject to regulations will face. When violations are likely all it takes is a confluence of unfortunate circumstances to result in catastrophe. We see the same thing in criminal violations of US environmental laws. Government's obligation is to design stronger countervailing pressures so that the public interest will prevail. The more pressure on the regulated, the stronger and more robust the regulatory design has to be.

It isn't unusual to hear people say, after one of these disasters involving criminal conduct, well they were bad guys, what can you do? No. We can do a lot. We know there will always be unscrupulous people and companies that will break the rules. It's on government to design rules that block the bad guys so that the worst outcomes don't occur.

2. DRINKING WATER: PATHOGENS

Americans care about access to clean drinking water.[51] Public opinion polling finds that over 87% of the public thinks clean drinking water is very important to their daily life, ranking even higher than clean air.[52] Pollution of drinking water is regularly at the top of people's environmental concerns.[53]

Although drinking water in the US is among the safest in the world, it is not as clean as government pronouncements would have the public believe. The rules designed to keep our drinking water safe have serious compliance design flaws, which have resulted in many more violations than are officially claimed. EPA regularly asserts that fewer than 10% of public water suppliers violated one or more drinking water health-based standards each year.[54] Ten percent with

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51 James Conca, *Super Majority Of Americans Worry About Clean Drinking Water*, Forbes (June 29, 2017), https://www.forbes.com/sites/jamesconca/2017/06/29/super-majority-of-americans-worry-about-clean-drinking-water/#685a5c5c41e8.

52 *See* Nestle Waters, Perspectives on America's Water (June 2017), https://www.nestle-watersna.com/content/documents/pdfs/perspectives_on_americas_water-june2017.pdf.

53 *See* Polling on the environment, Gallup https://news.gallup.com/poll/1615/environment.aspx?version=print (last visited Dec. 9, 2019).

54 *See, e.g., Providing Safe Drinking Water in America: National Public Water Systems Compliance Report*, EPA, https://www.epa.gov/compliance/providing-safe-drinking-water-america-national-public-water-systems-compliance-report (last visited Dec. 9, 2019) (2014-2016 national snapshots). Buried in the fine print of prior national reports are caveats revealing that EPA does not stand behind the accuracy of these numbers. For good reason, as the discussion in this section explains. "Health-based" describes violations that are directly about contamination of drinking water and does not include monitoring and reporting

such serious violations is too many. Unfortunately, it's also incorrect; this section explains that the actual number of health-based violators is substantially higher, although flaws in the regulations make it impossible to know the real number.

One vivid illustration of the problem is the rule to protect us from pathogens: the bacteria or viruses that can cause disease and illness. Pathogens can and do contaminate drinking water. Bacteria can be in the source water – the surface or ground water that the system uses as its water supply – or can be introduced in the pipes that convey the drinking water to the consumer. Millions of people in the US are sickened every year from pathogens in their drinking water.

A number of rules adopted under the authority of the Safe Drinking Water Act require drinking water systems to control pathogens. The rules require both treatment of the water before it leaves the drinking water facility and monitoring throughout the distribution system to ensure that the treatment is working to keep the water safe. While those rules have helped, pathogens in drinking water still contribute significantly to illness in the US -- a 2006 EPA report estimated that pathogens in drinking water from community water systems in the US cause 16.4 million cases of acute gastrointestinal illness a year.[55]

> "The rules designed to keep our drinking water safe have serious compliance design flaws, which have resulted in many more violations than are officially claimed."

The principal regulation controlling bacteria in drinking water is the Total Coliform Rule (TCR), finalized in 1989. That rule set standards for total coliform, an indicator that more dangerous kinds of bacteria might be present.[56] And it required sampling of water throughout the distribution system to make sure the water met the standard.

Total coliform has been by far the single biggest cause of reported drinking water violations by community systems.[57] More than 300 million Americans – roughly 94% of the US population –

violations.

55 Michael Messner et al., *An Approach for Developing a National Estimate of Waterborne Disease Due to Drinking Water and a National Estimate Model Application*, 4 J. Of Water and Health Supplement 2, 201–240 (2006). Another study pegged the number at between 4.3 million and 11.7 million cases of acute gastrointestinal illness per year. *See* John M. Colford Jr., et al., *A Review of Household Drinking Water Intervention Trials and an Approach to the Estimation of Endemic Waterborne Gastroenteritis in the United States*, 4 J. of Water and Health, Supplement 2, 71–88, (2006).

56 Total coliform isn't itself proof that dangerous bacteria are in the water; it only suggests that a problem may exist. Under TCR if a sample tested positive for total coliform, it had to be retested for evidence of fecal coliform or e coli. If those more dangerous bacteria were found, that was an "acute" TCR violation. The TCR violation that is discussed in this section is the monthly average total coliform limit, the so-called "chronic" TCR violation.

57 Maura Allaire et al., *National Trends in Drinking Water Quality Violations*, 115 Proceedings of the National Academy of Sciences No. 9, 2078–2083 (2018). Of all the reported violations of health-based standards by community water systems for the period 1997 to 2003, 37% were violations of TCR. *Id.* at 2079.

received at least some of their drinking water from a community water system in 2017.[58] In 2007, the first year of EPA's Report on the Environment, EPA said that 10.6 million people were served by community systems that self-reported a violation of the TCR's health based standards.[59] Between 1993 and 2003, there was an annual average of almost 10,000 TCR self-reported health-based violations a year.[60] Those numbers are high, but the actual levels of noncompliance were far worse. The evidence described in this section shows that violations were significantly under-reported. Why?

The first reason is that the structure of the monitoring requirements allowed drinking water systems to avoid violations. For larger systems, violations of TCR were based on the percentage of samples exceeding the threshold.[61] So if a system were in danger of exceeding the percentage threshold, one option was to take more than the required number of samples and thus bring the percentage exceeding the standard to below violation levels. This strategy is called "sampling out."[62] A study of community drinking water systems in one state found very strong evidence that systems were sampling out to avoid triggering a TCR violation.[63] The researcher estimated that as a result, almost one-third of what otherwise would have been TCR violations in the state went undetected.[64] Although she recommends caution in extrapolating these results to the national data, she estimates that sampling out may have masked an additional 3,000 to 4,000 TCR violations per year.[65]

The second source of under-reporting of pathogen health-based violations is systems that didn't report at all. Self-reporting a TCR violation had significant

58 EPA, Report on the Environment, Drinking Water (2018), https://cfpub.epa.gov/roe/indicators. A word about nomenclature. There are over 150,000 regulated public water systems in the United States. These are systems that are required to follow the rules adopted by EPA for safe drinking water. Within that total there are about 50,000 "community" public water systems, which are public water systems that supply drinking water to the same populations year around. The remainder of the public water systems supply water to facilities like schools or offices ("non-transient non-community" public systems) or to locations used infrequently, like gas stations or campgrounds ("transient non-community" public systems). *Information about Public Water Systems*, EPA https://www.epa.gov/dwreginfo/information-about-public-water-systems.

59 EPA, EPA'S Report on the Environment, at 3–55 (2008), https://cfpub.epa.gov/.roe/documents/EPAROE_FINAL_2008.PDF.

60 EPA, Analysis of Compliance and Characterization of Violations of the Total Coliform Rule, at 17 (2007), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.174.7626&rep=rep1&type=pdf.

61 Systems that were required to take 40 or more samples a month would be in violation if more than 5% of those samples tested positive for total coliform. *See* Lori Bennear et al., *Sampling Out: Regulatory Avoidance and the Total Coliform Rule*, 43 Envtl. Science & Tech. No. 14, 5176, 5177 (2009). Note that states are permitted to have more stringent state rules, and some do.

62 Under the rules, additional samples are supposed to be approved by the state regulator and should be "representative" of the system, but it does not appear that these constraints greatly limited systems' ability to oversample.

63 Lori Bennear et al., *supra* note 61. This study was done in Massachusetts because of the relatively complete data it had on drinking water system compliance. Full disclosure: between 2001 and 2005 I was the Assistant Commissioner for the office in the Massachusetts Department of Environmental Protection that had responsibility for oversight of drinking water systems. My admittedly biased perspective is that Massachusetts had a very robust drinking water program; I think it is unlikely that Massachusetts had more sampling out than other states experienced.

64 *Id*. at 5181.

65 *Id*.

consequences for the drinking water system: among other things, they had to notify the public of the violation within 14 days. A system with a reporting violation doesn't have to disclose that until the summary end-of-year notice to consumers. Therefore, not reporting at all had fewer serious consequences for the water supplier than reporting a health-based violation. These disproportionate incentives caused some systems to take the path of least resistance by not monitoring or not reporting in some months, rather than disclosing a health-based violation.[66] According to data supplied to EPA by the states, for the period between 1997 and 2003 there were over 31,000 TCR monitoring or reporting violations each year.[67] It is unknown how many TCR health-based violations might have occurred in systems that didn't report, however, a GAO investigation found that a monitoring violation was a strong and statistically significant predictor of health-based violations.[68] If you are thinking that 31,000 TCR monitoring and reporting violations revealed to EPA by states each year puts a ceiling on the total possible actual TCR health-based violations, read on.

The third reason for underreporting of TCR violations is the state not informing EPA about them.[69] The rules require states to put all violation information into the national database EPA uses to assess and report on program performance.[70] Nevertheless, state reporting of violations to EPA is notoriously incomplete. One assessment found that about 17% of the TCR health-based violations that the states knew about were not reported to EPA.[71] And states failed to tell EPA about a stunning 71% of the monitoring and reporting violations.[72] Here's the math: states told EPA about 31,000 TCR monitoring and reporting violations per year. If that's only 29% of the violations states knew about, then there may have been over 100,000 TCR monitoring and reporting violations a year.

"State reporting of violations to EPA is notoriously incomplete."

All this evidence shows that the actual number of people consuming water from drinking water systems with violations of the TCR rule was likely many multiples of the 10 million EPA reported.

The TCR regulation made a number of structural

66 *See* EPA, Economic Analysis for the Final Revised Total Coliform Rule, at 4-5 (Sep. 2012), https://nepis.epa.gov/ (search in search bar for "Economic Analysis for the Final Revised Total Coliform Rule, 815R12004") ("Low compliance with monitoring and reporting may occur if systems would rather incur a Monitoring/Reporting violation rather [sic] than risk an MCL violation by sampling.").

67 EPA, Analysis of Compliance and Characterization of Violations of the Total Coliform Rule, *supra* note 60, at 17.

68 GAO, GAO 11-381, Drinking Water: Unreliable State Data Limit EPA's Ability to Target Enforcement Priorities and Communicate Water Systems' Performance, at 16 (2011).

69 This is distinguished from violations that the states themselves don't know about due to sampling out or systems not reporting violations to the state. The statistics in this paragraph are only about violations that appear in the states' files.

70 40 CFR § 142.15(a)(1).

71 EPA, EPA 816-R-07-010, 2006 Drinking Water Data Reliability Analysis and Action Plan, at 19 (March 2008).

72 *Id.*, at 18.

choices that contributed to the gross under-estimate of TCR violations. 1) It defined a violation as a percentage threshold and allowed systems to include in their averaging all samples taken in a month.[73] That created an easy pathway for the strategic behavior of sampling out, and it appears that a substantial number of systems made use of that pathway. 2) It structured consequences so that incurring a monitoring or reporting violation was comparatively better than conceding a health-based violation. Requiring any organization to self-disclose violations creates an uncomfortable dynamic. There must be a strong counterweight, or some organizations will take the easy way out by admitting a monitoring or reporting violation rather than confessing to a pollution standards violation. 3) The third structural choice applies to drinking water rules across the board, not only TCR. Revealing violations to EPA creates hassle and intrusion and aggravation for the state, so many states would rather not. Plus, it takes time and effort to put data into the national database. Beyond the legal requirement, what's the state's motivation to spend time complying? Investigations have repeatedly shown that many states don't divulge information about violations to EPA. There are virtually no consequences to states for not reporting, whereas admitting to violations is likely to bring unwanted attention.

The net effect of these structural problems is that EPA does not know how widespread TCR violations have been, except that they are many times higher than EPA was saying in its public reports. The drinking water program may be helped by the fact that many drinking water system operators know that they are engaged in a public trust and see a direct line between their choices and their own and their neighbors' health.[74] That's an advantage, but the evidence of the TCR rule shows that it is obviously not sufficient. Rules put pressure on the regulated to do things that take time and money. Failure to do them can have negative consequences on the world of course, but also on the regulated entity and the people who run it. If the rule structure gives them an out, many will take it.

EPA recently revised the TCR rule.[75] The new rule makes it much harder to know if systems are

73 As noted above, states are permitted to have more stringent drinking water rules, and some states prohibited using additional samples as part of the compliance determination. Lori Bennear et al., *supra* note 61, at 5181.

74 However, that public spirited attitude is far from universal. For example, an employee of a drinking water system in North Carolina took samples from one location, falsely claiming that they were from multiple locations within the distribution system; he pled guilty to criminal charges in 2016. See Press Release, Department of Justice U.S. Attorney's Office Eastern District of North Carolina, Former Town of Cary Employee Pleads Guilty to Falsifying Drinking Water Sampling Results (Sept. 26, 2016), https://www.justice.gov/usao-ednc/pr/former-town-cary-employee-pleads-guilty-falsifying-drinking-water-sampling-results. Criminal charges were also brought for an employee in Illinois doing the same thing for TCR sampling. See Press Release, Department of Justice U.S. Attorney's Office Northern District of Illinois, Former Dolton Certified Water Operator Charged With Falsifying Drinking Water Sampling Data (June 11, 2015), https://www.justice.gov/usao-ndil/pr/former-dolton-certified-water-operator-charged-falsifying-drinking-water-sampling-data. Leaders in one Chicago suburb secretly used contaminated well water in the drinking water system and lied about it to authorities and the public for over 20 years. See Press Release, Department of Justice U.S. Attorney's Office Northern District of Illinois, Former Crestwood Water Officials Sentenced for Concealing Village's Use of Well In Drinking Water Supply (Nov. 21, 2013), https://www.justice.gov/usao-ndil/pr/former-crestwood-water-officials-sentenced-concealing-village-s-use-well-drinking-water.

75 Since 2016 the country has been operating under the Revised Total Coliform Rule (RTCR).

experiencing pathogen contamination. Having 5% of samples exceed the total coliform threshold is no longer a violation. Instead, exceeding the 5% threshold triggers an obligation to conduct a self-assessment.[76] There is only a violation if a system fails to do a self-assessment or to undertake the corrective measures it selected in its self-assessment. How does the state know if the system triggered the obligation to do a self-assessment and then did one? Systems are supposed to self-disclose violations but if they don't, it is nearly impossible for the state to discover violations on its own. Piled on top of this already feeble compliance structure is an additional incentive not to report: systems with good compliance records can reduce the amount of sampling they must do. Any system that might be inclined to disclose a violation will think twice. Not surprisingly, almost no violations of total coliform requirements were reported by states in FY17.[77]

3. DRINKING WATER: LEAD

As a result of the recent catastrophe in Flint Michigan, almost everyone is aware of the hazards of lead in drinking water. Ingesting high levels of lead can cause liver and kidney damage as well as brain dysfunction and behavioral disorders. Young children are particularly vulnerable.[78] Flint – and more recently, Newark, New Jersey – have re-focused national attention on the important problem of childhood lead exposure and the reality that environmental justice communities are the most affected.[79]

> "The Lead and Copper Rule (LCR) that governs federal standards for lead in drinking water includes multiple places where compliance can go off the rails. And it often does."

The Lead and Copper Rule (LCR) that governs federal standards for lead in drinking water includes multiple places where compliance can go off the rails. And it often does. EPA's data say that about 10% of water systems were in violation of the LCR as of the end of 2016.[80] Is it that bad? As this section will show, it's actually much worse. The rule makes it easy for drinking water systems to miss elevated levels of

76 EPA, Revised Total Coliform Rule: A Quick Reference Guide (Sept. 2013), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100K9MP.txt.

77 EPA Report on the Environment Drinking Water exhibit 3 (2018): https://cfpub.epa.gov/roe/indicator.cfm?i=45#3 (U.S. Population Served by Community Water Systems with Reported Violations of EPA Health-based Standards, By Type of Violation, Fiscal Year 2017).

78 *Basic Information about Lead in Drinking Water*, EPA https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water#health (last visited Dec. 9, 2019).

79 EPA, Lead and Copper Rule Revisions White Paper, at 4 (Oct. 2016), https://www.epa.gov/sites/production/files/2016-10/documents/508_lcr_revisions_white_paper_final_10.26.16.pdf ("Because of disparities in the quality of housing, community economic status, and access to medical care, lead in drinking water (and other media) disproportionately affects lower-income people.").

80 GAO, GAO-17-424, Additional Data and Statistical Analysis May Enhance EPA's Oversight of the Lead and Copper Rule, at 19 (Sept. 2017); *see also* 40 C.F.R. §§ 141.80–141.91 (Lead and Copper Rule).

lead. Most of the violations that systems do admit are never reported to EPA. The incentives set up by the rule encourage unreliable monitoring and failure to report. All these dropped balls result in significant undercounting of lead rule violations. Below, I describe how rule structure creates these problems.

Lead usually isn't in the source water; it leaches into drinking water from lead in underground pipes or fixtures in the home. The chief way to prevent that is by treating the water so that it won't corrode the inside of the pipes. This treatment – referred to as corrosion control – is the main line of defense against lead contamination in drinking water.[81]

Systems are directed to find out if their corrosion control approach is working by checking for elevated lead in homes. They are supposed to check at locations of highest risk: in places with lead pipes.[82] If more than 10% of the samples exceed the action level, additional requirements to address lead contamination kick in.[83]

Rules that direct regulated entities to select sampling sites that are most likely to reveal a violation and giving them considerable discretion in selecting locations may seem fine on the surface but actually invite bad sampling practice. Many systems don't know where the lead pipes are, despite prior instruction to identify them, so aren't able to follow this directive. Of course, knowing where the lead pipes are also allows the unscrupulous to avoid sampling in areas likely to produce a high reading.

These unreliable monitoring requirements are compounded by setting the action level as a percentage of samples over the threshold. A system can take additional cleaner samples, or the state can disqualify the highest readings, to bring the system below the 10% threshold.[84] Whether systems deliberately obfuscate, take advantage of ambiguity in the rules, or just make sampling mistakes, the flexibility in monitoring makes it hard to know if a system has a lead contamination problem.[85]

81 EPA, EPA 816-R-10-004, Lead and Copper Rule Monitoring and Reporting Guidance for Public Water Systems, at 5 (March 2010), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100DP2P.txt. Large water systems (serving populations larger than 50,000) are almost all required to install corrosion control treatment. Medium and small systems must do so if they have elevated levels of lead. GAO, *supra* note 80, at 10.

82 EPA, Lead and Copper Rule Monitoring and Reporting Guidance, *supra* note 81, at 15; *see also id*. at 24–28 (illustrating how complicated the sampling requirements are, and how much discretion exists in selecting sample sites).

83 The action level is more than 10% of samples exceeding 15 parts per billion (ppb) of lead. The 15-ppb number is not a safe level of exposure to lead: the only safe level of lead is zero. The action level is intended as a system wide assessment of the effectiveness of corrosion control and is not a measure of the safety of water in an individual residence. EPA, Lead and Copper Rule Revisions White Paper, *supra* note 79, at 11.

84 The Association of State Drinking Water Administrators (the body that represents state drinking water program managers) itself describes the provision that allows systems to take additional samples to get below the 10% threshold as a "loophole." Association of State Drinking Water Administrators, Comment Letter on Long-term Revisions to the Lead and Copper Rule, at 6 (Mar. 8, 2018), https://www.asdwa.org/2018/03/08/asdwa-submits-detailed-comments-on-lead-and-copper-rule/. Many of these strategies are alleged to have occurred in Flint. See, e.g., Ron Fonger, *Documents show Flint filed false reports about testing for lead in water*, MLive (Nov. 12, 2015) (Flint incorrectly claimed in reports to the state that it only tested tap water from homes with lead pipes); Mark Brush, *Expert says Michigan officials changed a Flint lead report to avoid federal action*, Michigan Radio NPR (Nov. 5, 2015) (the State disqualified two samples submitted by Flint, pulling the city below the action level for lead).

85 GAO, Unreliable State Data Limit EPA's Ability to Target Enforcement

Having created pathways to avoid discovering high lead levels, the rule then adds powerful incentives to use them. Once a system exceeds the lead action level, the rule requires an escalating series of measures to fix the problem.[86] Failing to take those steps is a violation.[87] Each of the required actions costs money and ratchets up public scrutiny. If the problem continues, the drinking water provider must excavate and replace the lead pipes, which can be expensive. Once a system steps on the conveyor belt that starts with exceeding the action level, it might never get off. Fear of what could happen next creates significant pressure to avoid that position. And exceeding the action level doesn't just bring negative consequences, it also puts some benefits out of reach: systems that report being below the action level for a year can reduce monitoring and thereby save money.[88] Strong incentives to avoid finding a problem coupled with lots of ways to accomplish that are a dangerous combination.

Despite all these off-ramps, many systems report that they are in violation. There are "health-based" violations: a system discovers lead above the action level and fails to take the mandatory steps to fix the problem. There are monitoring and reporting violations: a system doesn't sample or samples incorrectly or fails to file the required reports. Health-based violations are obviously concerning but monitoring and reporting violations can be just as serious. If a system violates the law by not sampling, or not telling the state what's going on, serious health issues can be occurring that no one knows about. A GAO study found that monitoring violations were a strong and statistically significant predictor of whether a system had a health-based violation.[89]

What does the official record show regarding violations of the lead rule? EPA's data say that at least 6,567 – about 10% – of public water systems had nearly 13,000 violations of the LCR as of December 2016.[90] A 2016 study by NRDC looking at EPA's data on community water systems found LCR violations at more than 5,300 community systems serving over 18 million people.[91] That's not good,

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Priorities, *supra* note 68, at 12-13: "In addition, numerous stakeholders have criticized the current rule as providing too much discretion in sampling approaches and providing opportunities for systems to implement their sampling procedures to avoid exceeding the action level, even in circumstances where corrosion control has not been optimized."

86 Systems exceeding the action level are required to take action: additional monitoring, corrosion control (start if not already doing it, otherwise optimize the existing system), source water treatment if needed, public notice, including a press release to television, print and radio, public education about reducing exposure to lead, and lead line replacement if treatment does not bring the lead to below action levels. EPA, Lead and Copper Rule Monitoring and Reporting Guidance, *supra* note 81, at 4, 11, 13.

87 An action level exceedance is not a violation. However, a system is in violation if after exceeding the action level it fails to do the required follow up steps, including public notification and commencing corrosion control. *See supra* note 86. If a system does not take the required number of samples or submit the required monitoring information, that is also a violation. EPA, Lead and Copper Rule Monitoring and Reporting Guidance, *supra* note 81, at 46. Systems must report violations to the state within 48 hours and must provide public notification of violations to customers. *Id*. at 47, 53.

88 GAO, Additional Data and Statistical Analysis May Enhance EPA's Oversight, *supra* note 80, at 11 n. 79; *see also* EPA, *supra* note 81, at 17–18.

89 GAO, Unreliable State Data Limit EPA's Ability to Target Enforcement Priorities, *supra* note 68, at 16.

90 GAO, Additional Data and Statistical Analysis May Enhance EPA's Oversight, *supra* note 80, at 19, 23.

91 Erik D. Olson & Kristi Pullen Fedinick, *What's in Your Water? Flint*

but is it the outer boundary of the LCR compliance problem? Sadly, it's nowhere near that. An EPA review discovered that states only told EPA about 8% of the LCR health-based violations.[92] *Eight percent*. EPA's investigation also found that states failed to tell EPA about 71% of the monitoring and reporting violations.[93] A GAO analysis of community systems uncovered even bigger problems, finding that states didn't disclose 84% of the monitoring violations.[94] This is a reporting system in full failure mode.

States are required to tell EPA about violations,[95] but obviously they are seldom doing that. Whatever the reasons, the fact is that the national data about violations of lead standards are grossly understated. EPA continues to issue national reports relying on what it knows is deeply flawed information because that is the only information it has.[96]

The actual number of people potentially affected by lead rule violations is unknown, but it is many times the 18 million people suggested in EPA's official database. Just as with TCR, rule design is the reason: many ways to prevent violations from being discovered, incentives that motivate systems to steer around rule requirements, state failure to report violations to EPA, and almost no way to discover what's really going on.[97]

4. AIR POLLUTION: NEW SOURCE REVIEW FOR COAL-FIRED POWER PLANTS

The 1970 Clean Air Act announced a new day for environmental protection. Congress stated firmly and clearly that it expected to cut the air pollution choking the nation. Congress envisioned a two-part strategy for major stationary sources: EPA would set tough technology-based standards for all *new* plants in listed categories (called "New Source Protection Standards" or NSPS), and states would impose controls on all *existing* plants within their borders as necessary to achieve ambient air quality standards established by EPA.[98]

and Beyond, NRDC, at 5 (June 2016), https://www.nrdc.org/sites/default/files/whats-in-your-water-flint-beyond-report.pdf; *see also* Brady Dennis, *More than 5,300 Water Systems Violated Lead-testing Rules Last Year*, Washington Post (June 28, 2016).

92 EPA, 2006 Drinking Water, Data Reliability Analysis and Action Plan for State Reported Public Water System Data in the EPA Safe Drinking Water Information System/Federal Version (SDWIS/FED), at i, 19 (2008)..

93 *Id*. at 18.

94 GAO, Unreliable State Data Limit EPA's Ability to Target Enforcement Priorities. *supra* note 68, at 16.

95 GAO, Additional Data and Statistical Analysis May Enhance EPA's Oversight, *supra* note 80, at 15.

96 EPA OIG, 2004-P-0008, EPA Claims to Meet Drinking Water Goals Despite Persistent Data Quality Shortcomings (2004) (By reporting performance using a data base that omits a large number of violations, EPA portrayed an incorrect picture of the percentage of people drinking water that met all health-based standards).

97 EPA has recently proposed amendments to the LCR. See National Primary Drinking Water Regulations: Proposed Lead and Copper Rule Revisions, 84 Fed. Reg. 61,684 (Nov. 13, 2019). This proposal attempts to close some of the LCR loopholes and includes some interesting Next Gen strategies, e.g., treating all service lines as containing lead unless shown otherwise. However, the proposal would ratchet up the pressure on systems to avoid going over the action level (or the new "trigger level") while obscuring violations behind newly introduced complexity. Depending on states to report lead violations to EPA has not worked; this gigantic hole in the foundation will only get worse as additional burdens are piled on underfunded states and the incentives to avoid reporting increase.

98 *See* Thomas O. McGarity, *When Strong Enforcement Works Better Than Weak Regulations: The EPA/DOJ New Source Review Enforcement Initiative*, 72 Md. L. Rev. 1204, 1208 (2013); Jonathan Remy Nash &

Allowing existing plants to have less stringent standards than new plants is commonly referred to as "grandfathering."[99] But the Clean Air Act also set up a transition: as existing sources were replaced or modified, they too would be subject to the federal NSPS standard. In this way Congress envisioned that the existing stock of polluting sources would gradually be cleaned up as they were modernized or replaced.[100]

Harmful emissions from the nation's coal-fired power plants was very much on Congress' mind when legislating for clean air.[101] Coal-fired power plants were among the largest sources of SO_2, particulate matter (PM), and oxides of nitrogen (NOx), major contributors to a wide variety of serious diseases.[102]

In 1977, Congress established permit requirements for major new and modified existing sources.[103] Before a major new source of pollution could be built, or an existing source modified, it had to obtain a permit that would impose tough pollution limits. These permits were known as New Source Review, or NSR, permits.[104] New or modified coal-fired power plants were one of the categories of facilities that needed such preconstruction permits.

Whether a source was being "modified" and therefore had to go through NSR and install modern controls was a case-by-case determination that was fiercely contested. Sources claimed that their changes should be classified as "routine maintenance, repair and replacement" and thus exempt from NSR. Facilities argued that the emissions resulting from plant changes didn't trigger NSR and fought over the way to calculate emissions and whether government can challenge the accuracy

Richard L. Revesz *Grandfathering and Environmental Regulation: The Law and Economics of New Source Review*, 101 NW U. L. Rev. 1677, 1681 (2007).

99 McGarity, *supra* note 98, at 1209. This unfortunate term has its origin in voting rights laws after the civil war: people whose ancestors were allowed to vote were exempt from the new literacy requirements. If your grandfather were allowed to vote, so could you. This term came to describe any case where new requirements didn't apply to existing situations. Alan Greenblatt, *The Racial History of the 'Grandfather Clause,'* NPR (Oct. 22, 2013), https://www.npr.org/sections/codeswitch/2013/10/21/239081586/the-racial-history-of-the-grandfather-clause.

100 *See* Nash & Revesz, *supra* note 98, at 1681–82 nn. 18–19; McGarity, *supra* note 98, at 1209.

101 David Spence, *Regulation of Coal-Fired Electric Power Under U.S. Law*, American Bar Association's Section of Environment, Energy, and Resources, at 9 (Jan. 16, 2014), https://www.americanbar.org/content/dam/aba/administrative/environment_energy_resources/resources/spence_coal_electric.pdf; *see also* David Spence, *Coal-fired Power in a Restructured Electricity Market*, 15 Duke Envtl. L. and Pol'y Forum 187, 189 (2005). The discussion of NSR in the Introduction to this series and in this Part as an example of regulatory structure resulting in a compliance break down focuses on coal fired power plants because they were such an important instance of NSR violators and clearly illustrate the point about rule design. NSR applied to many other sectors also, and the design challenges that contributed to violations by coal fired power plants occurred in other sectors as well. *See* McGarity, *supra* note 98, at 1267–68.

102 *See* McGarity, *supra* note 98, at 1209; Bruce Barcott, *Changing all the Rules*, New York Times (Apr. 4, 2004); *see also* GAO, Wider Use of Advanced Technologies Can Improve Emissions Monitoring, at 19 (June 2001) (stating that coal-fired utilities produced 52% of criteria pollutants emitted by large stationary sources in 1998).

103 *See* McGarity, *supra* note 98, at 1213. "Major" was defined as sources that had the potential to emit over a defined threshold of pollution; the threshold varied by type of pollutant.

104 NSR includes both Prevention of Significant Deterioration (PSD) for areas in attainment with national standards and NSR permits for non-attainment areas. *See* Nash & Revesz, supra note 98, at 1683.

of the calculations. Industry attacked the regulations in both the political arena and in the courts. Different EPA administrations changed the regulations, courts struck them down, and EPA changed them again. [105]

What didn't change was the case-by-case determination that was very complicated and deeply fact intensive.[106] The rules also stipulated that, in the first instance, companies themselves decided whether they had "modified" their facilities, and they didn't have to inform government of their decision.[107] If a company thought it shouldn't have to or didn't want to go through NSR, it just did the renovation project and didn't apply for NSR approval.

So far this might seem like normal regulatory tussles. Congress passes a law with a clear directive and leaves it to the agency to figure out the details. Regulated parties try to get the best definition of details that they can. And everyone wrestles over the rules as government and the regulated industries gain experience with applying the rules to specific instances.

Here's where coal-fired power was different: the costs of compliance. The technologies to control SO_2, PM, and NOx were established and known. For example, scrubbers to remove SO_2 cut pollution by 95%.[108] The benefits of modern controls were huge, but the controls were also very expensive. Compliance costs of hundreds of millions to over a billion dollars were not unusual.[109]

It is easy to predict what happened next. Whether the rule applied was extremely complicated and subject to a highly technical debate. The complexity of the rules and the flexibility inherent in the case-by-case decision-making created an opening for utilities to argue – speciously in many cases – that they weren't sure whether the modifications they undertook were subject to NSR.[110] And company decisions about NSR were invisible to government; only an extensive investigation could reveal a violation.[111] EPA might never catch them, but if companies were caught, they

105 For a history of the long regulatory battle over NSR see McGarity, *supra* note 98; Nash & Revesz, *supra* note 98; Barcott, *supra* note 102.

106 McGarity, *supra* note 98, at 1217–1228; GAO, GAO-12-590, EPA Needs Better Information on New Source Review Permits, at 12–16 (June 2012).

107 See McGarity, *supra* note 98, at 1226. Not only did the rules allow the company to make the NSR applicability decision, they didn't even require the company to keep records of the changes to the plant or the resulting emissions. GAO, EPA Needs Better Information on New Source Review Permits, *supra* note 106, at 16-17 (June 2012); McGarity, *supra* note 98, at 1253–54.

108 See Barcott, *supra* note 102.

109 Just to give an idea of the scale of costs we are talking about, here are the amounts that some coal fired utilities spent to come into compliance with NSR after litigation with EPA, in non-inflation adjusted numbers: $1.2 billion (Virginia Electric and Power Company, 2003), $600 million (Wisconsin Electric Power Company, 2003), $400 million (South Carolina Public Service Authority, 2004), $500 million (Illinois Power Company and Dynegy Midwest Generation, 2006), $650 million (East Kentucky Power Cooperative, 2007), $4.6 billion (American Electric Power Service Corporation, 2007), $1.1 billion (Ohio Edison Company, 2009), $500 million (Weststar Energy, 2010), $3-5 billion (Tennessee Valley Authority, 2011), $1 billion (Wisconsin Power and Light, 2013), $1 billion (Consumer's Energy, 2014). For a partial listing of settlements with links to information about each case see *Coal-Fired Power Plant Enforcement*, EPA, https://www.epa.gov/enforcement/coal-fired-power-plant-enforcement (last visited Dec. 9, 2019).

110 See McGarity, *supra* note 98, at 1279, 1286 (citing evidence that many plants knew their projects should have triggered NSR).

111 See GAO, EPA Needs Better Information on New Source Review Permits, *supra* note 106, at 16–17.

could begin time-consuming litigation,[112] after which they probably would have to install the controls. In the meantime, they would save tens, if not hundreds, of millions of dollars by dragging out their compliance obligation. Penalties, which are intended to prevent exactly this kind of thinking by recovering the economic benefit of violating, weren't going to work this time. EPA had never imposed hundreds of millions in penalties against individual stationary source violators, and probably wasn't going to get a federal court to do that now.

The list of companies EPA eventually sued shows how common NSR violations were for coal-fired power plants. It's the "who's who" of coal-fired electric utilities[113] and includes over 70% of the top 25 coal companies.[114] The evidence that emerged in investigations showed that what happened is exactly what should have been predicted: many of the nation's largest power companies had engaged in significant renovations without undergoing NSR.[115] Companies hid behind what they claimed were ambiguities in the regulations to avoid complying. They learned that if you don't want the answer, just don't ask. They were advised to dress up big plant overhauls as routine maintenance.[116] They knew that it would take EPA years and reams of documents and many experts to catch the violators. And the list of violators was long, so that would also slow EPA down. Meanwhile, pollution controls for the nation's largest sources of air pollution would either be years delayed or avoided altogether.

Seeing that the violations were causing huge health impacts and that neither new rules nor general deterrence were going to ride to the rescue, EPA enforcers made a decision. They would go after the violators one at a time. They would do the investigations and when they found violators, they would ask federal judges to order the plants to install the controls, as the rules required. The effort would be enormous, and EPA wouldn't win every case, but the health impacts were too overwhelming to ignore. And thus did armies of lawyers end up fighting over modified: yes or no? The resulting enforcement dominated the docket at EPA and also DOJ for the next two decades.[117] But it generated

112 *See* McGarity, *supra* note 98, at 1243.

113 *See* GAO, EPA Needs Better Information on New Source Review Permits, *supra* note 106, at 20 (stating that EPA has alleged violations at over half of the coal fired units EPA has investigated). One senior EPA official described the mound of evidence of wrongdoing uncovered in EPA NSR coal fired power plant litigation as the environmental equivalent of the tobacco litigation. Barcott, *supra* note 102; McGarity, *supra* note 98, at 1230–31.

114 *See Existing U.S. Coal Plants*, SourceWatch https://www.sourcewatch.org/index.php/Existing_U.S._Coal_Plants#Ownership_of_existing_U.S._coal-fired_generating_stations (last visited Dec. 10, 2019). The table entitled *Ownership of existing U.S. coal-fired generating stations* lists the top 25 coal-fired utilities in 2005. Sixteen were sued by EPA for violating the Clean Air Act. Two others were sued by the Sierra Club for the same kind of violation. For a partial list of EPA cases, *see Coal-Fired Power Plant Enforcement*, EPA, https://www.epa.gov/enforcement/coal-fired-power-plant-enforcement (last visited Dec. 10, 2019). Some of the EPA enforcement cases are still pending in the courts so are not on the settlement list, e.g., DTE Energy, Ameren, and Luminant. Sierra Club sued MidAmerican Energy and Entergy. There many other coal-fired power settlements with companies not on the top 25 list.

115 *See* McGarity, *supra* note 98, at 1230–31.

116 *Id*. at 1224, 1236, 1268, 1279.

117 *Id*. at 1257–58 (describing the notable hiatus on new cases during the Bush administration).

correspondingly huge benefits for public health.[118] The battle isn't over, and there are still violators and important cases not resolved, but many more coal-fired power plants have modern pollution controls today.[119]

There is an expression that the exception proves the rule. That's true here. It is exceedingly rare that states or EPA have the time to individually sue nearly every regulated source. This brute force method of obtaining compliance doesn't make sense except in the unusual circumstance where the benefits to be gained are enormous and the number of identifiable sources is small (enough). Ultimately EPA got what Congress wanted. One at a time was the right decision. But it took two decades (and counting) and an incredible amount of government resources. That is not practical, or even possible, for the vast majority of pollution compliance problems. And while in limited instances EPA can succeed eventually, the health benefits of the rules will be delayed as EPA slogs it out in court.

One more issue makes NSR an unusual case for thinking about regulatory structure. EPA was beset from within during much of the period after the Clean Air Act was passed. Changes in administrations brought in EPA leadership that was hostile to the idea of controls on coal-fired power. Again and again EPA political leadership attempted to change the rules to eviscerate NSR and give utilities a safe harbor (they actually called it that!) from Congress' directive to clean the air.[120] The same thing is aggressively happening today.[121] Not only did EPA enforcers confront the problem of violators trying to get by them, they were being tackled from behind by their own team.

Most of the regulations discussed in this series are included to illustrate how we might learn to

118 *Coal-Fired Power Plants*, Department of Justice, https://www.justice.gov/enrd/coal-fired-power-plants (last updated May 14, 2015) ("As of the end of 2014, we had filed over thirty civil enforcement actions, and entered into 28 judicial settlements requiring installation and operation of billions of dollars in pollution controls that will remove over 2.3 million tons per year of sulfur dioxide and nitrogen oxides from the air."); *see also* McGarity, *supra* note 98, at 1290.

119 The problem is far from fixed: a 2014 study concluded that 80% of coal-fired power plants have emissions higher than would have been allowed had they gone through NSR permitting. *See* Joseph Goffman, Janet McCabe & William Niebling, *EPA's Attack on New Source Review and Other Air Quality Protection Tools*, Harv. L. School Envtl. & Energy L. Program, at 18 (Nov. 2019), http://eelp.law.harvard.edu/wp-content/uploads/NSR-paper-EELP.pdf (referencing Sarah K. Adair, David C. Hoppock, & Jonas J. Monast, *New Source Review and Coal Plant Efficiency Gains: How New and Forthcoming Air Regulations Affect Outcomes*, 70 Energy Pol'y 183, 192 (July 2014), cited in Revisions to New Source Review Program Proposed Rule, 83 Fed. Reg. 44746, 44,776 n. 49 (Aug. 31, 2018)).

120 *See* McGarity, *supra* note 98, at 1244–1256; Barcott, *supra* note 102. The safe harbor regulation has been characterized as giving utilities "perpetual immunity" from NSR rules. *See* Nash & Revesz, *supra* note 98, at 1703. The courts eventually invalidated the safe harbor rule as inconsistent with the Clean Air Act. *Id*. at 1704–05. For a history of the twists and turns of the regulatory proposals, *see* McGarity, *supra* note 98; Nash & Revesz, *supra* note 98.

121 *See*, Joseph Goffman, Janet McCabe & William Niebling, *EPA's Attack on New Source Review and Other Air Quality Protection Tools*, Harvard Law School Environmental & Energy Law Program (Nov. 2019), http://eelp.law.harvard.edu/wp-content/uploads/NSR-paper-EELP.pdf, *see also* Memorandum from Scott Pruitt, Administrator, EPA, to EPA Regional Administrators (Dec. 7, 2017) *re: "New Source Review Preconstruction Permitting Requirements: Enforceability and Use of the Actual-to-Projected-Actual Applicability Test in Determining Major Modification Applicability"*; *EPA's National Compliance Initiatives — Say Goodbye to NSR Enforcement*, Foley Hoag, Law & the Environment Blog (Feb. 19, 2019), https://www.jdsupra.com/legalnews/epa-s-national-compliance-initiatives-31961/

prevent widespread noncompliance. I recognize that regulations *intended* to give the regulated a way out are in a different category. For them, noncompliance is a feature, not a bug. But we can still understand from those examples what types of regulations make violations more likely.

What can we learn from the coal-fired utility NSR experience?

Next Gen thinking needs to apply to grandfathering in legislation too. There are strong arguments against protecting existing sources from pollution rules.[122] Congress didn't protect existing sources when it passed the Clean Water Act, showing that it isn't always a political necessity.[123] If Congress decides to include grandfathering, it likely will be because regulated sources have pushed back hard. That means that existing sources have demonstrated their strong interest in looking for ways to avoid or delay meeting the new requirements. This is exactly when a strong countervailing pressure is needed, as the examples in this series of articles demonstrate. One option is for laws to include a specific expiration date for all grandfather provisions.[124] There may be other strategies too. But grandfathering when large amounts of money are at stake, then not adopting regulations that cut off firms' ability to resist pollution control upgrades, is likely to result in major violations and delay turnover from old polluting plants to modernized and cleaner plants.[125]

As described in the introduction to these articles, coal-fired NSR was the perfect storm of regulatory structure problems. Compliance was expensive so the pressure to evade was strong. And opportunities to evade were everywhere. The rules were very complicated, with many exceptions and exemptions and complex calculations and applications of judgment. All of this was applied case-by-case, so each decision was unique with its own factual complexity. In addition, companies made the choice to comply or not in near complete privacy. Violations would only be found by aggressive and lengthy investigations involving accountants and a wide variety of other specialists. Everyone knew that enforcers would have a tough time finding violators, and even when caught, most companies would pay less in fines than they saved by violating. Looked at in this light, the ensuing extensive violations seem not just likely but inevitable.

Once again, states had the authority and the public health imperative to solve this problem, but they didn't. Some states took strong action – especially against plants located in other states – but

122 *See* Nash & Revesz, *supra* note 98.

123 *See* Environmental Law Institute Dialogue, *Grandfathering Coal: Power Plant Regulation Under the Clean Air Act*, 46 Envtl. L.R. 10,541, 10,544 (2016).

124 Richard Revesz recommends this approach. *Id*. at 10550.

125 The experience of coal-fired power plants is a great illustration. Congress expected in 1970 that the life of a coal fired power plant was 30 to 40 years. Nash & Revesz, *supra* note 98, at 1682 n. 19. However, in 1985, the Congressional Research Service reported that the retirement age for power plants had increased from 30 to as long as 60 years. McGarity, *supra* note 98, at 1220 (citing Larry B. Parker et al., 85-50 ENR, The Clean Air Act and Proposed Acid Rain Legislation: Can We Get There from Here? Cong. Research Serv., at 46 (1985)). Coal-fired power plants built in the 1940s and 1950s were still operating as of 2014. *See* Steve Mufson, *Vintage U.S. Coal-fired Power Plants Now an 'Aging Fleet of Clunkers'*, *Washington Post* (June 13, 2014); *see also* GAO, *supra* note 106, at 2–3 (June 2012).

overall, state regulators didn't take on the biggest polluters.[126] In fact, they allowed sources causing local pollution problems to build high stacks to send the pollution to downwind communities.[127] It is helpful to remember these examples when legislators or regulators get too romantic about the idea that states can be counted on to solve tough pollution problems on their own.[128]

"Coal-fired NSR was the perfect storm of regulatory structure problems."

Many companies violate. Wake up and smell the coffee. All things equal, would companies prefer to comply than to violate? Certainly. But all things are never equal. When government, for solid public policy reasons, requires companies to spend significant money to achieve a public health objective, some, if not most companies will look for a way out. Regulations that have little countervailing pressure and enough of a gray zone around compliance will result in extensive violations. When responsible companies see that violations are rampant, they will understandably question why they should suffer competitive disadvantage from doing the right thing. Ultimately the public bears the brunt of the noncompliance impacts. Regulations shouldn't create the situation where a choice to violate seems like a viable idea. The Acid Rain Program worked well not because it was a market program, but because it created a regulatory box so tight that compliance was the only way out.[129] NSR is the opposite of a tight box.

Conclusion

Tolstoy famously said, "All happy families are alike; each unhappy family is unhappy in its own way."[130] So it is with environmental rules. If they work, it's because all the pieces fit together into a complete whole, resulting in good compliance that brings about the desired action in the real world. But if heavy force is applied to a rule that isn't resilient to that pressure, or a key piece is missing, collapse in compliance inevitably follows. Each poorly designed rule can collapse in a different way. But the lack of structural integrity eventually reveals itself in large numbers of violations.

The rules with excellent compliance records highlighted above were adopted under very different legal regimes and address very different types of compliance obligations. They use different strategies:

126 Environmental Law Institute Dialogue, *supra* note 123, at 10,544 (noting that states had the authority but lacked either the resources or the political will to control their existing sources. A number of states put nominally stringent limits on old power plants, but when the plants didn't comply, the states didn't enforce); *see also* GAO, *supra* note 106, at 17–18 (regarding state implementation of NSR).

127 Environmental Law Institute Dialogue, *supra* note 123, at 10,544.

128 *See* Adam Babich, *Back to the Basics of Anti-Pollution Law*, 32 Tulane Envtl. L. J. 1, 32 (2018).

129 See the beginning of this article for a discussion of the compliance-driving provisions of the Acid Rain Program.

130 Leo Tolstoy, Anna Karenina, at 1 (1873).

performance standards, markets, requirements that apply equally to everyone. One rule is quite short, while the others are technically complex with extensive details on what is required and how it should be done.

They have one thing in common however: their solution is simple, even though the underlying problem is complex. They make the most of advanced monitoring, electronic reporting, and data analytics. They rely on transparency to put pressure on the regulated and make the system operate smoothly. They use the power of uniform commands to overcome political and practical barriers. They make compliance more attractive than noncompliance. Their excellent compliance outcomes were achieved without the need for extensive enforcement pressure. In short, they meet the Next Gen principles for rules with compliance built in.

The programs with dismal compliance records also have some common lessons. A rule with a "hope for the best" compliance theory is doomed. Compliance must be designed in, not assumed. Much can be learned about a rule's weaknesses by hypothetically asking: if regulated parties want to avoid complying, how would they do that? This isn't a moral question, it's a practical one, like observing that water flows downhill. If the rule asks for water to flow uphill, but leaves the downhill path open, guess what?

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AUTHOR NOTES

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For the rest of this series, click here.