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NOTE

ANOTHER RECYCLING SHAM: PENNSYLVANIA OIL AND GAS INDUSTRIES' WASTEWATER

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ABSTRACT

Dust from roads is likely not a pressing concern for many Americans living in urban areas with paved roads, but for rural communities in Pennsylvania, dust suppression for unpaved roads and the chemicals used for this process create serious health and environmental issues of imminent concern. One cheap or sometimes free method of dust suppression used in these communities is to spread produced water—wastewater from the oil and gas industry—on unpaved roads. Despite a moratorium on this practice after studies revealed the toxic nature of produced water, including its radioactivity, a loophole in Pennsylvania's regulations allows the practice to continue.

This loophole allows the oil and gas industry to spread its produced water on roads if it is no more harmful than a commercial product the waste is replacing. The regulations' reliance on industry self-regulation with practically nonexistent governmental oversight has allowed

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for widespread noncompliance. Even if the industry fully complied with the regulations, since the commercial product used as a comparison is also toxic and virtually unregulated, the produced water does not have to be safe.

Closing this loophole would prevent the oil and gas industry from spreading toxic waste through regulations that rely on an inherently unsafe "safety" standard. Although this solution would not address the toxic commercial products that are used for dust suppression, it treats one symptom of the larger problem of environmental regulation in the United States that prioritizes convenience over safety and forces marginalized communities to bear the consequences of this prioritization.

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INTRODUCTION

In 2011, Siri Lawson, a resident of rural Farmington Township in Northeastern Pennsylvania, began noticing a mysterious liquid being dumped onto the dirt road outside her home.[1] Lawson was understandably concerned after learning that this

1. Siri Lawson, *Op-Ed: The Story Behind Stopping Conventional Oil & Gas Brine Spreading on Dirt Words*, PA. ENV'T DIG. (July 2, 2018), http://www.paenvironmentdigest.com/newsletter/default.asp?NewsletterArticleID=43911&SubjectID=58 [https://perma.cc/V3C7-RYPP]; *Personal Narrative: Siri Lawson (Part Two)*, ENV'T HEALTH PROJECT (Aug. 5, 2021), https://www.environmentalhealthproject.org/post/spotlight-siri-lawson-part-two [https://perma.cc/DLJ4-XW4R] [hereinafter *Personal Narrative*].

mysterious liquid was wastewater from oil and gas companies, also known as brine or produced water,[2] and that it was being spread on dirt roads to suppress dust.[3] As the trucks continued dumping produced water on roads in Farmington Township, the Lawsons and other residents began noticing health problems, runoff from the roads entering streams and ponds where local children played, increased dust from the roads, and destabilized roads that required four-wheel drive to navigate.[4] Soon, Lawson began experiencing health problems, something she had dealt with before because of environmental pollution from the oil and gas industry.[5] Eventually the Lawsons, represented by Fair Shake Legal Services, filed a complaint against the Pennsylvania Department of Environmental Protection[6] ("DEP") with the Environmental Hearing Board[7] ("EHB").[8] The case was dismissed as moot after the DEP conceded that spreading the produced water violated Pennsylvania's Solid Waste

2. Brine is a byproduct of oil and gas production and is also called produced water. MIRANDA MEEHAN, THOMAS DESUTTER, KEVIN SEDIVEC, CHRIS AUGUSTIN, & ANNALIE PETERSON, ENVIRONMENTAL IMPACTS OF BRINE (PRODUCED WATER) 1 (2023). Throughout this note, the term "produced water" will be used, but produced water is also referred to as brine or wastewater. *Id.*

3. Lawson, *supra* note 1; *see also Personal Narrative*, *supra* note 1 (Siri Lawson "felt horror, fear, and anger" once she learned that trucks outside her home were dumping wastewater from the oil and gas industry on unpaved roads in her community).

4. Lawson, *supra* note 1; *see also Personal Narrative*, *supra* note 1 (explaining some of the issues the Lawsons began noticing after trucks began spreading produced water on unpaved roads near their house).

5. *See Personal Narrative*, *supra* note 1; *see also* Lawson, *supra* note 1 (explaining that Lawson began experiencing "new and serious illnesses" after the start of road spreading of produced water outside her home, similar to previous experiences when Lawson has been forced to move because of health impacts from oil and gas industry activity).

6. Lawson, *supra* note 1; *see Mission Statement*, PA. DEP'T OF ENV'T PROT., https://www.dep.pa.gov/About/Pages/default.aspx [https://perma.cc/H8Y9-KWL6] ("The Department of Environmental Protection's mission is to protect Pennsylvania's air, land and water from pollution and to provide for the health and safety of its citizens through a cleaner environment.").

7. Lawson, supra note 1; *see Welcome,* THE PA. ENV'T HEARING BD., https://ehb.courtapps.com/public/index.php [https://perma.cc/49T3-A5V8] (noting that the Environmental Hearing Board "hears appeals from actions of the Pennsylvania Department of Environmental Protection" and "issues [a]djudications, [o]pinions, and [o]rders").

8. *See Oil and Gas Waste Water Does Not Belong on Our Roads: Siri Lawson v. DEP and Hydro Transport*, FAIR SHAKE ENV'T LEGAL SERVS., https://www.fairshake-els.org/cases-siri-v-dep [https://perma.cc/5RX6-TERU]; *see also* Lawson v. Dep't Env't Prot., 2018 EHB 513.

Management Act ("SWMA").[9] Subsequently, the DEP stopped approving plans for the spreading of conventional oil and gas[10] produced water on roads in 2018.[11] The DEP admitted that it should not have allowed thousands of gallons of produced water to be spread on dirt roads in Farmington Township and that it would reclassify produced water as residual waste under Pennsylvania's SWMA.[12] The DEP also suggested it would create a stricter permitting process before the residual waste could be spread on roadways.[13]

The DEP's decision stopped the utilization of produced water as a dust suppressant under "beneficial use" permits,[14] but the

9. *See Lawson*, 2018 EHB at 515–18 (finding Lawson's appeal moot because not only had the specific plan approval of brine spreading in Farmington Township to Hydro Transport expired on December 31, 2017, but the DEP had also conceded that the specific brine described in the plan would not be approved again under a beneficial use permit because it would violate the SWMA, meaning the Board could not provide Lawson with the relief she sought on an expired plan or on a plan that would not be approved again); *see also* Lawson, *supra* note 1.

10. Conventional oil and gas refers to oil and gas that comes from wells that are "drilled vertically into shallow, more easily accessible geologic formations," while unconventional oil and gas refers to oil and gas that is forced out of previously inaccessible geologic formations with horizontal drilling and fluid at high pressure and volume. *Oil and Natural Gas Production Health Concerns*, PA. DEP'T OF HEALTH, https://www.health.pa.gov/topics/environhealth/Pages/OilGas.aspx [https://perma.cc/XDG7-GG2Y]. Unconventional oil and gas drilling is commonly known as hydraulic fracturing or fracking. *See Hydraulic Fracturing & Health*, NAT'L INST. OF ENV'T HEALTH SCIS., https://www.niehs.nih.gov/health/topics/agents/fracking/index.cfm [https://perma.cc/3TX7-X2EM] (Nov. 15, 2022).

11. Rachel McDevitt, *Researchers Find Spreading Drilling Wastewater on Pa. Roads Can Lead to Harmful Runoff*, STATE IMPACT PA. (Aug. 8, 2022, 11:31 AM), https://stateimpact.npr.org/pennsylvania/2022/08/08/researchers-find-spreading-drilling-wastewater-on-pa-roads-can-be-harmful/ [https://perma.cc/4WXU-QQHV]; *see Lawson*, 2018 EHB 513.

12. *Lawson*, 2018 EHB at 518; *see* 25 PA. CODE § 287.1 (2023) (defining residual waste as "[g]arbage, refuse, other discarded material or other waste, including solid, liquid, semisolid or contained gaseous materials resulting from industrial, mining and agricultural operations); *see also* 35 PA. CONS. STAT. § 6018.103 (2023); *Waste Requirements and Information for the Oil and Gas Industry*, PA. DEP'T OF ENV'T PROT., https://www.dep.pa.gov/Business/Energy/OilandGasPrograms/OilandGasMgmt/Oil-and-Gas-Related-Topics/Pages/Waste.aspx [https://perma.cc/3HD7-3R3K]; *Residual Waste Generators*, PA. DEP'T OF ENV'T PROT., https://www.dep.pa.gov/Business/Land/Waste/SolidWaste/Residual/Pages/Generators.aspx [https://perma.cc/8T7L-QYCD] (defining residual waste).

13. Kristina Marusic, *Radium Has Been Widely Spread on Pennsylvania Roadways Without Regulation: Study*, ENV'T HEALTH NEWS (May 30, 2018), https://www.ehn.org/fracking-wastewater-spread-on-roads-2573426742.html [https://perma.cc/9DZN-XZ22].

14. *See* McDevitt, *supra* note 11; *see also* 25 PA. CODE § 287.1 (2023) (describing a beneficial use as the "[u]se or reuse of residual waste or residual material derived from residual waste for commercial, industrial or governmental purposes, if the use does not harm or threaten public

produced water can still be spread through a loophole in the regulations that allows oil and gas producers to spread the water if they can prove that it is a "coproduct."[15] A waste becomes a coproduct when the waste producer determines that the waste is no more harmful to human health and the environment than a comparable commercial product.[16]

This Note argues that the coproduct loophole in Pennsylvania's environmental regulations should be abolished because it allows industries like the oil and gas industry to engage in sham recycling through the coproduct regulations' inherent dependency on industry self-regulation and a safety standard that is not necessarily safe. Moreover, this Note argues that even without the coproduct regulations, beneficial use permits are adequate to allow for the recycling of waste because they contain safeguards to prevent sham recycling that the coproduct regulations lack. This Note explains how the oil and gas industry uses the coproduct regulations to compare harmful waste, produced water, with a harmful commercial product, commercial dust suppressant, to declare the produced water safe for use in the environment.

Part I explains what produced water is, how it was traditionally treated by the oil and gas industry, and the current uses of produced water, including as a dust suppressant. Part II explains the use of produced water as a dust suppressant, its efficacy, and its effects on human health and the environment. Part III explains the regulation of produced water federally and in Pennsylvania. Part IV examines the use of produced water as a dust suppressant as sham recycling within environmental law. Part V assesses the coproduct determination's reliance on the good faith of industry to self-regulate and how this reliance fails to protect the environment. Part VI explores the lack of regulation of chemicals in the United States and how the coproduct

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health, safety, welfare or the environment"); *Id.* § 287.7 (listing the requirements for a beneficial use permit).

15. *See* 25 PA. CODE § 287.8; *see also id.* § 287.1 (defining that "[a] coproduct determination . . . applies to materials that will be applied to the land or used to produce products that are applied to the land").

16. *See id.* § 287.8(a)–(c).

determination's comparison to a commercial product allows produced water to be considered "safe" for the environment because the comparable commercial products are toxic and minimally regulated. Finally, Part VII argues that the coproduct loophole should be closed to only allow industry to use beneficial use permits which contain safeguards to prevent sham recycling that the coproduct regulations completely lack.

I. PRODUCED WATER IN THE OIL AND GAS INDUSTRY

Despite increased public and political interest in decreasing or even eliminating fossil fuel reliance to avoid climate disaster,[17] fossil fuels still accounted for around 60% of electricity generated in the United States in 2022.[18] The United States has been the largest global producer of one fossil fuel—oil—since 2018.[19] According to the United States Energy Information Administration, the United States produced an average of 20.079 million barrels of petroleum, including oil and natural gas, per day in 2022.[20]

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17. *See* Justin McCarthy, *Most Americans Support Reducing Fossil Fuel Use,* GALLUP (Mar. 22, 2019), https://news.gallup.com/poll/248006/americans-support-reducing-fossil-fuel.aspx [https://perma.cc/DTH7-QHGB]; Alec Tyson, Cary Funk & Brian Kennedy, *What the Data Says About Americans' Views of Climate Change*, PEW RSCH. CTR. (Aug. 9, 2023), https://www.pewresearch.org/short-reads/2023/04/18/for-earth-day-key-facts-about-americans-views-of-climate-change-and-renewable-energy/ [https://perma.cc/4A4H-2WFJ]. Fossil fuels are non-renewable energy sources formed over millions of years from the remains of prehistoric life buried underneath layers of rock, such as oil, coal, and natural gas. *Fossil*, DEP'T OF ENERGY, https://www.energy.gov/fossil [https://perma.cc/WM6U-E59X]. The burning of fossil fuels for energy releases greenhouse gases into the atmosphere which traps heat from the sun and causes the Earth's climate to change. *See What Is Climate Change?*, UNITED NATIONS: CLIMATE ACTION, https://www.un.org/en/climatechange/what-is-climate-change [https://perma.cc/44NR-CSXR]. Climate change has had destructive impacts on humans, plants, and animals and is predicted to have even more catastrophic consequences if humans do not reduce greenhouse gas emissions, including those from burning fossil fuels. *See id.*

18. *What is U.S. Electricity Generation by Energy Source?*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.php?id=427&t=3 [https://perma.cc/SBR7-CV3C] (Oct. 20, 2023).

19. Lindsay Maizland & Anshu Siripurapu, *How the U.S. Oil and Gas Industry Works*, COUNCIL ON FOREIGN RELS. (Aug. 11, 2022, 10:20 AM), https://www.cfr.org/backgrounder/how-us-oil-and-gas-industry-works [https://perma.cc/H96T-R7DD].

20. *How Much of the Crude Oil Produced in the United States Is Consumed in the United States?*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.php?id=268 [https://perma.cc/K3G4-FUVB] (Sept. 26, 2023).

Water occurs naturally with oil and natural gas stored underground, so when it is extracted, this water—called produced water—is extracted alongside the oil and natural gas.[21] For every barrel of crude oil produced, about 280 to 400 gallons of produced water are generated.[22] The oil and gas industry typically treats produced water as a waste for disposal.[23] The most common methods of produced water disposal in the oil and natural gas industry are land discharge for high quality produced water that is unlikely to contaminate the environment,[24] subsurface injection back into the ground,[25] and transportation of the produced water to be reinjected off-site in a geologic formation that is capable of accommodating the additional water.[26]

The composition of produced water varies depending on the environment of the reservoir that the water came from.[27] Generally, produced water contains a high concentration of total dissolved solids and has high salinity, often five to ten times higher than the concentration in seawater.[28] Produced water

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21. *See* KATIE GUERRA, KATHARINE DAHM & STEVE DUNDORF, U.S. DEP'T OF THE INTERIOR BUREAU OF RECLAMATION, OIL AND GAS PRODUCED WATER MANAGEMENT AND BENEFICIAL USE IN THE WESTERN UNITED STATES 5 (2011).

22. *Id.* Oil reservoirs usually contain more water in comparison to natural gas reservoirs, and thus produce more produced water. *See id.*

23. *Id.* at 7.

24. *Id.* Land discharge is an inexpensive form of disposal for produced water but only produced water that is high quality—meaning it does not contain a high number of contaminants—can be disposed of in this way without the risk of harming the environment. *See id.*

25. *Id.* Injection of produced water into deep wells underground is the primary disposal method of produced water because it often contains chemicals that could cause environmental harm if disposed of aboveground. *See* Wenbin Jiang, Lu Lin, Xuesong Xu, Huiyao Wang & Pei Xu, *Analysis of Regulatory Framework for Produced Water Management and Reuse in Major Oil- and Gas-Producing Regions in the United States*, 14 WATER 1, 2 (2022).

26. GUERRA ET AL., *supra* note 21, at 7. Some areas lack geologic formations that can accommodate produced water injection underground, such as Pennsylvania, causing oil and gas producers in those areas to engage in the costly transportation of their produced water offsite where it can be disposed of in geologic formations that can hold the produced water. *See* GROUND WATER PROT. COUNCIL, PRODUCED WATER REPORT: REGULATIONS, CURRENT PRACTICES, AND RESEARCH NEEDS 67 (2019).

27. *See* GROUND WATER PROT. COUNCIL, *supra* note 26, at 167 (explaining how the composition of produced water depends on the geology from which the produced water was taken, among other things); *see also* GUERRA ET AL., *supra* note 21, at 5; John Pichtel, *Oil and Gas Production Wastewater: Soil Contamination and Pollution Prevention*, 2016 APPLIED AND ENV'T SOIL SCI. 1, 5 (2016).

28. Pichtel, *supra* note 27, at 5.

often contains inorganic ions and radioactive materials like radium.[29]

In recent years, many in the oil and gas industry have begun to see produced water as a product that can be put to beneficial use rather than disposed of as a waste.[30] As technology improves and the availability of fresh water decreases, using produced water as a product rather than as a waste is becoming more attractive for multiple reasons, including improving the environment through water conservation, reducing the volume of liquid that requires disposal, and minimizing the costs of transport and disposal.[31] The most prevalent beneficial use of produced water is underground injection into oil wells for enhanced oil recovery,[32] a process through which water is injected into the oil well after oil has already been extracted from it in order to force any remaining oil out of the well.[33] Produced water is also used for agriculture[34] and wildlife,[35] producing fluids for new drilling and fracking operations,[36] and industrial uses like dust suppressant on roads.[37]

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29. *See* GROUND WATER PROT. COUNCIL, *supra* note 26, at 114 (discussing studies finding radium in soil near railways in Pennsylvania). Inorganic ions in produced water include metals like barium, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, aluminum, boron, iron, lithium, manganese, selenium, and strontium. Pichtel, *supra* note 27, at 6.

30. *See* Keith Burron & Gage Hart Zobell, *How Industry and Regulators Are Responding to Challenges and Opportunities in Management, Reuse, and Beneficial Use of Produced Water*, 63 ROCKY MT. MIN. L. INST. 12-1, 1 (2017).

31. *See id.*

32. *See id.* at 3.

33. *Enhanced Oil Recovery*, U.S. DEP'T OF ENERGY: OFF. OF FOSSIL ENERGY AND CARBON MGMT., https://www.energy.gov/fecm/science-innovation/oil-gas-research/enhanced-oil-recovery [https://perma.cc/J8MV-CYEZ].

34. Burron & Zobell, *supra* note 30, at 4–5 (explaining the use of produced water for irrigation of crops, especially in areas with water scarcity).

35. *See* GUERRA ET AL., *supra* note 21, at 26–29, 33, 37 (describing the potential use of produced water as a water source for livestock and to combat wildfires).

36. *Id.* at 33, 36–37 (explaining the multiple uses of produced water in the oil and gas industry, including to fracture the rock formations in hydraulically fractured wells, to enhance oil recovery, and to sustain aquifer pressure). Hydraulic fracturing, often called fracking, is a technique used to obtain previously inaccessible oil and natural gas that involves injecting water, sand, and chemicals underground to break up rock formations that contain trapped oil and natural gas. *Hydraulic Fracturing*, U.S. GEOLOGICAL SURV.: WATER RESS. MISSION AREA (Mar. 2, 2019), https://www.usgs.gov/mission-areas/water-resources/science/hydraulic-fracturing#overview [https://perma.cc/HE3A-RLPM].

37. GUERRA ET AL., *supra* note 21, at 37 (describing the potential use of produced water as a dust suppressant and as a coolant in powerplants).

The over one million miles of unpaved roads in the United States account for 47% of fugitive emissions of particulate matter smaller than ten microns, which negatively impacts human health and increases mortality.[38] Dust suppression on unpaved roads can improve public health, but commercially available dust suppressants like calcium chloride and magnesium chloride are often too expensive for rural areas with unpaved roads.[39] As produced water is often a much cheaper or free alternative to commercial dust suppressant, at least thirteen states—including Pennsylvania—allow oil and gas produced water to be spread as a dust suppressant.[40] Pennsylvania has over 25,000 miles of unpaved roads, with municipalities owning about 17,500 miles of these roads.[41] Commercial dust suppressant can cost around a dollar per gallon, while oil and gas produced water costs much less or is completely free.[42] Produced water has been spread on rural Pennsylvania roads since at least 1988 as a dust suppressant and/or deicer.[43] In 2021, conventional oil and gas drillers reported spreading 977,671 gallons of wastewater on Pennsylvania roads.[44] Although

38. Audrey M. Stallworth, Eric H. Chase, Bonnie McDevitt, Katherine K. Marak, Miriam Arak Freedman, Robin Taylor Wilson, William D. Burgos & Nathaniel R. Warner, *Efficacy of Oil and Gas Produced Water as a Dust Suppressant*, 799 SCI. OF THE TOTAL ENV'T 1, 1–2 (2021). Dust from roads can contain various harmful chemicals like lead, exposure to which can cause respiratory tract inflammation and increase the possibility of respiratory tract cancer, reproductive dysfunction, anemia, and cognitive deficits in young children. Raihan K. Khan & Mark A. Strand, *Road Dust and Its Effects on Human Health: A Literature Review*, 40 EPIDEMIOLOGY & HEALTH 1, 4 (2018). Particulate matter less than ten micrometers in diameter can be inhaled deep into the lungs, where they can even pass into the bloodstream, causing harm to the lungs and heart. U.S. ENV'T PROT. AGENCY, PARTICLE POLLUTION AND YOUR HEALTH 2 (2003).

39. Stallworth et al., *supra* note 38, at 2.

40. *See id.*

41. *Dirt, Gravel & Low Volume Road Maintenance Program*, PA. DEP'T OF AGRIC., https://www.agriculture.pa.gov/Plants_Land_Water/StateConservationCommission/DGRMP/Pages/default.aspx [https://perma.cc/L3BX-XCKU].

42. Marusic, *supra* note 13.

43. Karla Lant, *Toxic Potential: Oil and Gas Wastewater on Roads*, ENV'T MONITOR (Aug. 30, 2018), https://www.fondriest.com/news/toxic-potential-oil-and-gas-wastewater-on-roads.htm [https://perma.cc/KLB5-UJNN]. Deicers are materials, like salt, used to remove ice on surfaces such as roads, often by lowering the temperature at which ice melts. JOSEPH LILEK, AM. GEOSCIENCES INST., ROADWAY DEICING IN THE UNITED STATES 1 (2017).

44. David E. Hess, *Conventional Oil & Gas Drillers Reported Spreading 977,671 Gallons of Untreated Drilling Wastewater On PA Roads In 2021*, PA ENV'T DIG. BLOG (Aug. 31, 2022, 6:01 PM),

hundreds of thousands of gallons of produced water have been spread on roads in Pennsylvania for decades, recent studies suggest that produced water is neither safe for use in the environment nor effective as a dust suppressant.

II. EFFICACY AND EFFECTS OF OIL AND GAS PRODUCED WATER AS A DUST SUPPRESSANT

Although produced water may appear to be a cheap and convenient dust suppressant alternative, scientific studies show that produced water is no more effective as a dust suppressant than synthetic rainwater and that it can even harm roads in the long-term, increasing road maintenance costs.[45] A May 2022 Pennsylvania State University study involving a series of laboratory experiments comparing the efficacy of produced water with commercially available dust suppressant and synthetic rainwater explained that produced water was likely ineffective as a dust suppressant because of its high concentration of sodium.[46] Unlike calcium and magnesium, common components of commercial dust suppressants, which bind together the clay particles of unpaved roads and prevent them from becoming road dust, sodium does not effectively bind clay particles together, and thus does not ultimately prevent dust generation.[47] In addition to being an ineffective dust suppressant, sodium can destabilize dirt and gravel roads.[48] Excess sodium on unpaved roads can cause clay particles in the roadbed to disperse,

http://paenvironmentdaily.blogspot.com/2022/08/conventional-oil-gas-drillers-reported.html [https://perma.cc/A8XA-TMEU].

45. *See* WILLIAM BURGOS, NATHANIEL WARNER, XIAOFENG LIU, ERIC CHASE, ANDREW KEARNEY, JAMES FARNAN, ANDREW ECK & HASSAN ISMAIL, EVALUATION OF ENVIRONMENTAL IMPACTS FROM DUST SUPPRESSANTS USED ON GRAVEL ROADS 12, 15, 88 (2022). Synthetic rainwater is designed to mimic the chemistry of real rainfall and in this study, it was designed to match the rainfall chemistry of northwestern Pennsylvania through a mix of distilled water and sulfuric or nitric acid. *Id.* at 12, 15.

46. *Id.* at 88.

47. *Id.*

48. *Id.*

causing potholes and other structural problems that can impact the integrity of the road.[49]

Besides functioning as an ineffective dust suppressant, the spreading of produced water on roads has harmful impacts on human health and the environment.[50] Many harmful components of produced water such as chloride, bromide, sodium, magnesium, calcium, strontium, and radium leach[51] into runoff from roads after rain events.[52] The high concentration of salts in produced water spread on roads poses a significant risk to aquatic life.[53] When the concentration of salts in freshwater increases, aquatic organisms can experience reduced feeding efficiency, malformations, and even death because of cellular death and damage caused by the changes in the osmotic pressures of their cells and the surrounding water.[54] High concentrations of sodium in the soil from road runoff can cause plants to desiccate

49. Bryce F. Payne, Jr., *Oil and Gas Well Brines for Dust Control on Unpaved Roads – Part 1: Ineffectiveness*, 14 EUR. SCI. J. 398, 418–20 (2018). When an unpaved road has been treated with high amounts of sodium, such as the amounts of sodium found in produced water, rainfall can lower the concentration of sodium ions, reducing the ability of the sodium to attract water. *Id.* Normally, the attraction of water to the sodium ions would push the clay particles toward each other and stabilize the road, but when these sodium ions lose their ability to attract water, the clay particles bond with sodium instead, destabilizing the road. *Id.* This prohibits the clay particles from bonding with each other and eventually causes the road to destabilize because the clay particles are no longer bonded together. *Id.*

50. *See* BURGOS ET AL., *supra* note 45, at 45–49, 88.

51. Leaching occurs when materials like metals and chemicals are dissolved in water, often rainwater. U.S. ENV'T PROT. AGENCY, PERMEATION AND LEACHING 1 (2002).

52. T.L. Tasker, W.D. Burgos, P. Piotrowski, L. Castillo-Meza, T.A. Blewett, K.B. Ganow, A. Stallworth, P.L.M. Delompré, G.G. Goss, L. B. Fowler, J.P. Vanden Heuvel, F. Dorman & N.R. Warner, *Environmental and Human Health Impacts of Spreading Oil and Gas Wastewater on Roads*, 52 ENV'T SCI. & TECH. 7081, 7086 (2018).

53. *Id.* at 7089.

54. Miguel Cañedo-Argüelles, Ben Kefford & Ralf Schäfer, *Salt in Freshwaters: Causes, Effects and Prospects – Introduction to the Theme Issue*, 374 PHIL. TRANSACTIONS ROYAL SOC'Y B 1, 2 (2018). Water naturally moves from areas of low concentration of salts to areas of high concentration of salts until it reaches an equilibrium in a process called osmosis. *See* CHARLES MOLNAR & JANE GAIR, CONCEPTS OF BIOLOGY 123–24 (1st ed. 2015). Freshwater organisms have adapted to maintain the appropriate levels of water and salts in their cells. *See* D.L. Nielsen, M.A. Brock, G.N. Rees & D.S. Baldwin, *Effects of Increasing Salinity on Freshwater Ecosystems in Australia*, 51 AUSTL. J. BOTANY 655, 658 (2003). If the salinity of their environment increases, freshwater organisms will use more energy trying to keep water from flowing out of their cells and into the environment as it naturally would, causing negative health impacts and even death. *See* Cañedo-Argüelles et al., *supra*, at 2–3; *see also* Nielsen et al., *supra*, at 658.

and die.[55] Increased sodium in the soil can also decrease the permeability of soil to air and water.[56] According to a 2018 study, produced water spread on roads in Northwest Pennsylvania had a median concentration of radium, a known carcinogen, hundreds of times higher than the national drinking water standards.[57] In fact, between 2008 and 2014, spreading of produced water on Pennsylvania roads likely released over four times as much radium into the environment as oil and gas wastewater treatment facilities and over 200 times more radium than spills in Pennsylvania.[58] Produced water has complex interactions with the environment, the roads it is spread on, and human, plant, and animal health. It has an equally complex history in federal and Pennsylvania state regulations that helps explain why it is regulated the way it is today.

III. HISTORY AND CURRENT REGULATION OF OIL AND GAS PRODUCED WATER

Despite its hazardous components,[59] produced water is not regulated as a hazardous waste under federal[60] or Pennsylvania state statutes.[61] When the Resource Conservation and Recovery Act ("RCRA") was enacted in 1978,[62] the United States Environmental Protection Agency ("EPA") delayed determining if six categories of waste produced in large volumes, including oil and gas waste, would be regulated as hazardous until the

55. Pichtel, *supra* note 27, at 7.

56. *See generally id.* (explaining how high levels of sodium in soil can cause dispersion of clay particles, reducing the permeability of soil to air and water).

57. Tasker et al., *supra* note 52, at 7082, 7087. The study used produced water collected from storage tanks in townships across Northwestern Pennsylvania that was stored for the purpose of road spreading in the summer of 2017. *Id.* at 7082.

58. *Id.* at 7087.

59. *See id.*

60. *See Special Wastes*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/hw/special-wastes [https://perma.cc/S8M5-VWZ7] (June 19, 2023); *see also* 42 U.S.C. § 6921(b)(2)(A).

61. *See generally Solid Waste Programs,* PA. DEP'T OF ENV'T PROT., https://www.dep.pa.gov/Business/Land/Waste/SolidWaste/Pages/default.aspx [https://perma.cc/SM8L-RF54].

62. RCRA is the comprehensive federal law enacted to manage the safe disposal of wastes while encouraging their conservation and reuse. *See* 42 U.S.C. § 6902.

agency had an opportunity to conduct further studies.[63] In 1980, the Bentsen Amendment to RCRA "exempted drilling fluids, produced waters, and other wastes associated with the exploration, development, and production of crude oil or natural gas" from regulation as hazardous waste.[64] Furthermore, the EPA published a regulatory determination that specifically exempted produced water from regulation as a hazardous waste under RCRA.[65] Although produced water is not subject to regulation as a hazardous waste under Subtitle C of RCRA, it is not precluded from federal regulation under the less stringent Subtitle D of RCRA concerning solid waste or any state regulations.[66] Subtitle C of RCRA contains comprehensive regulations for management of hazardous wastes from creation to disposal while Subtitle D regulates the management of non-hazardous solid waste.[67]

Pennsylvania's SWMA, which the coproduct regulations were promulgated under, was enacted in 1980 to address the health, environmental, and economic risks of inadequate management of solid waste.[68] One of the several purposes of SWMA is to "require permits for the operation of municipal and residual waste processing and disposal systems."[69] Residual waste refers to "[a]ny garbage, refuse, other discarded material or other waste . . . resulting from industrial, mining, and agricultural operations."[70] Residual waste includes produced water

63. *See Special Wastes*, *supra* note 60.

64. *Id.*

65. U.S. ENV'T PROT. AGENCY, OFF. OF SOLID WASTE, EPA530-K-01-004, EXEMPTION OF OIL AND GAS EXPLORATION AND PRODUCTION WASTES FROM FEDERAL HAZARDOUS WASTE REGULATIONS, EXHIBIT 28, at 10 (2002).

66. *Id.* at 5.

67. *Resource Conservation and Recovery Act (RCRA) Overview*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-overview [https://perma.cc/53SK-SD3G] (June 19, 2023); *see* 42 U.S.C. §§ 6921–6939g, 6941-6949a.

68. *See* Michael D. Beck, Tire Jockey Service, Inc. v. Commonwealth*: If a Used Tire Falls into Pennsylvania and No One is There to Regulate it, Will the Courts Make a Sound,* 20 VILL. ENV'T. L.J. 139, 139 (2009).

69. 35 PA. CONS. STAT. § 6018.102(3) (2023).

70. *Id.* § 6018.103.

from oil and gas operations.[71] Article III of SWMA prohibits the storage, transportation, processing, or disposal of residual waste within the state unless it complies with the rules and regulations of the DEP.[72]

The storage, transportation, processing, and disposal of residual waste is regulated under Chapter 287 of the Pennsylvania Code.[73] In 1992, the Environmental Quality Board ("EQB") added Chapter 287 to fill a gap in the existing solid waste regulations and create "a comprehensive set of new residual waste regulations."[74] Chapter 287 contains provisions for determining when a residual waste is no longer a waste but a "beneficial use."[75] Chapter 287 defines beneficial use as the "use or reuse of residual waste or residual material derived from residual waste . . . if the use does not harm or threaten public health, safety, welfare or the environment."[76] Generators of residual waste can apply to the DEP for beneficial use permits for a category of residual waste.[77] To obtain a permit, the DEP requires the generator to describe their waste, the proposed beneficial use, and the proposed concentration limits of contaminants in the waste among other requirements.[78]

Prior to 2016, the use of conventional and unconventional produced water as a dust suppressant was considered a "beneficial use" under 25 Pennsylvania Code section 287.7.[79] In 2016, Pennsylvania prohibited road spreading of produced water from hydraulically fractured, also known as unconventional, oil

71. *See* 25 PA. CODE § 287.1 (2023) (defining residual waste as "[g]arbage, refuse, other discarded material or other waste, including solid, liquid, semisolid or contained gaseous materials resulting from industrial, mining and agricultural operations").

72. *See* 35 PA. CONS. STAT. § 6018.301.

73. 25 PA. CODE § 287.

74. 22 Pa. Bull. 3389 (July 4, 1992).

75. *See* 25 PA. CODE § 287.601.

76. *Id.* § 287.1.

77. *Id.* § 287.621.

78. *Id.*

79. *See* David E. Hess, *Millions of Gallons of Conventional Oil & Gas Wastewater Spread Illegally on Dirt Roads, Companies Fail to Comply with DEP Waste Regulations*, PA ENV'T DIGEST (Dec. 20, 2021), http://www.paenvironmentdigest.com/newsletter/default.asp?NewsletterArticleID=54394&SubjectID=220 [https://perma.cc/63XQ-UFQL] [hereinafter Hess, *Millions of Gallons*].

and gas wells, but the spreading of conventional oil and gas produced water on roads was still allowed.[80] After Lawson complained to the EHB about the practice, the DEP stopped approving plans for spreading conventional oil and gas produced water on roads in 2018.[81]

Although the DEP stopped approving plans for spreading conventional oil and gas produced water as a beneficial use,[82] produced water could still be spread as a coproduct, another term developed in the 1992 regulations creating Chapter 287 of the Pennsylvania Code.[83] The EQB explained that the regulated community would be responsible for making determinations regarding whether their residual waste is a coproduct "without review or approval by the Department."[84] Essentially, the coproduct determination was intended to allow the regulated industries to determine whether their waste could be exempt from regulation through comparison to another intentionally manufactured product, with very little oversight by the DEP.[85]

The EQB amended Pennsylvania's residual waste regulations again in 2001 in response to the Regulatory Basics Initiative and the Governor's Executive Order 1996-1.[86] The EQB noted that there were no comprehensive federal regulations covering the management of nonhazardous industrial, mining, and agricultural wastes (residual waste), but one of the stated goals of the Regulatory Basics Initiative was to ensure that Pennsylvania's regulations were "no more stringent than standards imposed by Federal law unless justified by a compelling and articulable Pennsylvania interest or authorized by State law."[87] To comport with RCRA, the EQB recognized "the need to preserve opportunities for the land application and energy recovery of

80. *See id.*; *see also supra* note 10 (explaining the difference between conventional and unconventional oil and gas).

81. McDevitt, *supra* note 11; *see* Lawson v. Dep't Env't Prot., 2018 EHB 513

82. McDevitt, *supra* note 11.

83. 22 Pa. Bull. 3391–92 (July 4, 1992).

84. *Id.* at 3392.

85. *See id.* at 3391–92.

86. 31 Pa. Bull. 235–36 (Jan. 13, 2001).

87. *Id.* at 236.

materials generated from industry, *without regulation*, as long as sufficient safeguards exist to prohibit sham recycling."[88] The Board explained that under the modified regulations, certain materials used offsite as ingredients in manufacturing would no longer need to undergo the coproduct determination because these materials would simply not be regulated.[89]

Waste, such as conventional produced water, is not currently regulated as a waste if it is considered a "coproduct," defined as:

> A material generated by a manufacturing or production process . . . [of] the physical character and chemical composition of an intentionally manufactured product or produced raw material, if the use of the material presents no greater threat of harm to human health and the environment than the use of the product or raw material.[90]

Under Pennsylvania's regulations, "a person performing a coproduct determination shall evaluate chemical composition and threat of harm to the environment and public health" by ensuring the proposed coproduct does not present "a greater threat of harm to human health and the environment than use of an intentionally manufactured product or produced raw material."[91] The regulations describe the evaluations a person must undertake when comparing a proposed coproduct to an intentionally manufactured product or produced raw material.[92] These evaluations include determining: (1) if "hazardous or toxic constituents are present in the proposed coproduct at levels exceeding those found in the material it is replacing"; (2) "the total levels of hazardous or toxic constituents, including the constituents in 40 CFR Part 261"; (3) "whether the levels of leaching from the proposed coproduct exceed the levels of leaching from the manufactured product or produced raw

88. *Id.* at 238 (emphasis added).

89. *Id.*

90. 25 PA. CODE § 287.1 (2023).

91. *Id.* § 287.8(a).

92. *See id.* § 287.8(b).

material it is replacing"; and (4) "[t]he routes of exposure to humans and ecological receptors . . . includ[ing] ingestion, inhalation, dermal contact, leaching to the groundwater, plant uptake and surface runoff potential."[93] Coproduct evaluations only need to be performed for the total levels of hazardous constituents and the leaching of hazardous constituents that the waste generator is aware of.[94] The comparisons of the proposed coproduct and the intentionally manufactured product or produced raw material it is replacing may be performed using the EPA's "Test Methods for Evaluating Solid Waste."[95] Additionally, "a person who completes a coproduct determination shall maintain documentation supporting the determination" that is given to "persons selling, transferring, possessing or using the material" and must "be available to the Department upon request."[96] Essentially, if a producer of oil and gas produced water determines that their waste is physically and chemically comparable to an intentionally manufactured product or raw material, then they are allowed to market the waste as if it were an intentionally produced product.[97]

In 2018, the DEP said it could not authorize conventional oil and gas produced water to be beneficially used under SWMA without a permit, but the DEP could still allow the practice if the produced water met certain criteria (the coproduct criteria).[98] The coproduct regulations are effectively a loophole

93. *Id.* § 287.8(b)(1)–(4); *see id.* § 261a.1 (incorporating 40 C.F.R. § 261 for the definition of hazardous waste). *See generally* 40 C.F.R. § 261 (2023) (identifying solid wastes that are considered hazardous wastes under the RCRA).

94. 25 PA. CODE § 287.8(b)(2)–(3).

95. *Id.* § 287.8(b)(5). *See generally Hazardous Waste Test Methods / SW-846*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/hw-sw846 [https://perma.cc/TV34-EAYV] (providing resources for the test methods for evaluating solid waste).

96. 25 PA. CODE § 287.8(d)–(e).

97. *See id.* § 287.8; *see also* Fair Shake Env't Legal Servs., *Fracking Wastewater Concerns Resurface on Pennsylvania Roads as the DEP Undergoes an Evaluation of Coproduct Determinations*, FRACTRACKER ALL. (Nov. 10, 2021), https://www.fractracker.org/2021/11/fracking-wastewater-concerns-resurface-on-pennsylvania-roads-as-the-dep-undergoes-an-evaluation-of-coproduct-determinations/ [https://perma.cc/3HZ3-T5XX] (explaining how Pennsylvania's coproduct regulations allow producers of oil and gas produced water to use the waste "in place of another commercial product").

98. McDevitt, *supra* note 11; *see also* 25 PA. CODE § 287.8 (describing the requirements for a waste to be considered a coproduct).

allowing produced water to be spread on roads that would otherwise constitute unlawful disposal of a waste.[99] The DEP records show that oil and gas producers still dump produced water without permits.[100] The DEP maintains reports on how and where oil and gas producers in Pennsylvania are disposing of their produced water.[101] These reports list road spreading as a disposal method for oil and gas wastewater, with dozens of townships in several counties listed as the facilities for disposal through road spreading.[102] The townships themselves are considered the facilities of disposal because the produced water is disposed of on the roads of those townships.[103]

On April 13, 2022, the DEP sent letters to eighteen municipalities in four counties advising them that the spreading of oil and gas produced water by conventional drillers on their roads was "unlawful conduct under the Solid Waste Management Act."[104] The letters explained to the municipalities that the DEP had not agreed with the coproduct determinations of the companies who had spread the produced water on the municipalities' roads, meaning the produced water was still considered a waste.[105] According to the DEP, because the oil and gas produced water constituted a waste, spreading it on roads would constitute unlawful disposal, but the DEP concluded that the

99. BETTER PATH COAL., THE MORATORIUM MORASS: HOW THE HALT TO ROAD SPREADING TOXIC OIL & GAS WASTEWATER MADE PENNSYLVANIANS LESS SAFE 2 (2021).

100. McDevitt, *supra* note 11*; see also DEP Office of Oil and Gas Management Waste Facilities*, PA. DEP'T OF ENV'T PROT., http://cedatareporting.pa.gov/Reportserver/Pages/ReportViewer.aspx?/Public/DEP/OG/SSRS/OGRE_Waste_Facilities [https://perma.cc/W8J3-7Z7D] (providing the DEP records).

101. *See DEP Office of Oil and Gas Management Waste Facilities*, *supra* note 100.

102. *See id.*

103. *See id.* According to the DEP's report on produced water disposal, eighty-four municipalities across Pennsylvania are listed as waste facilities where producers report spreading their produced water. McDevitt, *supra* note 11.

104. David E. Hess, *DEP Advises 18 Municipalities Where Road Dumping of Conventional Oil & Gas Drilling Wastewater Is Occurring the Practice Is Illegal and Considered Waste Disposal*, PA ENV'T DIGEST BLOG (May 31, 2022, 10:50 AM), http://paenvironmentdaily.blogspot.com/2022/05/dep-advises-18-municipalities-where.html [https://perma.cc/B397-UF3K].

105. *Id.*

letters were informational only and were "neither an order nor any other final action of DEP."[106]

The DEP has suggested it will create a stricter permitting process before the waste can be spread on roadways,[107] but as of August 2023, the DEP was still in the process of reviewing and updating regulations of conventional oil and gas wastewater.[108] In April 2021, the Pennsylvania House of Representatives introduced House Bill Number 1144 to allow oil and gas produced water to be spread on both unpaved and paved roads.[109] The bill was passed by the House in May 2021 and referred to the Senate Environmental Resources and Energy Committee.[110] As of October 2023, the bill had not made any progress in the Senate,[111] and former Governor Tom Wolf opposed it.[112] Organizations like the Pennsylvania Independent Oil and Gas Association support this legislation because it would allow conventional oil and gas drillers to spread produced water legally again.[113] These organizations have also disputed studies that have shown that oil and gas produced water is ineffective as a dust suppressant.[114] This legislation is pending while the DEP considers new regulations for oil and gas produced water.[115]

In response to former Governor Tom Wolf's instructions to the DEP to review the conventional oil and gas industry's compliance with environmental laws, the DEP produced a report

106. *Id.*

107. Marusic, *supra* note 13.

108. David E. Hess, *New Penn State Study: Brine Water Pumped From Played-Out Conventional Oil & Gas Wells and Used as Dust Suppressants, Winter Road Treatments Exceed Environmental, Health Standards, Just Like Conventional Oil & Gas Brine Water*, PA ENV'T DIG. BLOG (August 2, 2023, 6:02 AM), http://paenvironmentdaily.blogspot.com/2023/08/new-penn-state-study-brine-water-pumped.html [https://perma.cc/HX43-TETR] [hereinafter Hess, *New Penn State Study: Brine Water Pumped From Played-Out Conventional Oil & Gas Wells*].

109. *Tell PA DEP: Ban Road Spreading of Drilling Waste*, DAMASCUS CITIZENS FOR SUSTAINABILITY (Sept. 8, 2021), https://www.damascuscitizensforsustainability.org/2021/09/08/tell-pa-dep-ban-road-spreading-of-drilling-waste/ [https://perma.cc/QW63-Y664]; *see* H.B. 1144, 2021 Gen. Assemb., Reg. Sess. (Pa. 2021).

110. *Tell PA DEP: Ban Road Spreading of Drilling Waste*, *supra* note 109.

111. *See* 2021 BILL TRACKING PA H.B. 1144, LEXIS (database updated Dec. 8, 2022).

112. McDevitt, *supra* note 11.

113. *Id.*

114. *Id.*

115. *Tell PA DEP: Ban Road Spreading of Drilling Waste*, *supra* note 109.

providing evaluations and recommendations concerning their oversight of the conventional oil and gas industry in Pennsylvania.[116] While the DEP is currently in the process of drafting two proposed rulemakings concerning regulation of the conventional oil and gas industry, the DEP explicitly stated that it "anticipates this proposed rulemaking will be silent as to the practice of roadspreading of conventional oil and gas well brine, but . . . could potentially be addressed through this rulemaking."[117] Likely, the DEP is leaving the decision on new regulations regarding road spreading of produced water from the conventional oil and gas industry to current Governor Josh Shapiro.[118] During the presentation of the 2023-2024 budget for the DEP to the Senate Appropriations Committee in March and April 2023, the Acting DEP Executive Secretary, Jessica Shirley, stated that the DEP currently does not allow "any road spreading of brine for dust suppression or de-icing."[119] She explained that the coproduct determination process is still in place but that the DEP has not approved the coproduct determination for the produced water of any conventional oil and gas well producers because their documentation for the coproduct determination has been insufficient.[120] Despite this statement, conventional oil and gas producers still reported disposing of oil and

116. PA. DEP'T OF ENV'T PROT., GOVERNOR'S LAPSING STATEMENT REPORT 1 (2022), https://files.dep.state.pa.us/Oil-Gas/BOGM/BOGMPortalFiles/Governor's_Lapsing_Statement_Report_2022-12-29.pdf [https://perma.cc/4NRW-5W5N] [hereinafter GOVERNOR'S LAPSING STATEMENT].

117. *Id.* at 20–21.

118. David E. Hess, *DEP Report Finds: Conventional Oil & Gas Drillers Routinely Abandon Wells; Fail To Report How Millions of Gallons Of Waste Is Disposed: And Non-Compliance Is An 'Acceptable Norm'*, PA ENV'T DIGEST: BLOG (Dec. 29, 2022, 6:54 PM), http://paenvironmentdaily.blogspot.com/2022/12/dep-report-finds-conventional-oil-gas.html [https://perma.cc/3QJP-VKHJ].

119. David E. Hess, *DEP Offers 10 Point Plan to Improve Permit Reviews; Climate/Energy Work Group Co-Chairs Announced; Work Group Formed to Prevent New Oil & Gas Well Abandonments*, PA. ENV'T DIG. (Mar. 22, 2023), http://www.paenvironmentdigest.com/newsletter/default.asp?NewsletterArticleID=57677 [https://perma.cc/7NR9-ERFV] [hereinafter Hess, *DEP Offers 10 Point Plan*].

120. *Id.*

gas wastewater through road spreading in 2022 according to the DEP records.[121]

IV. SHAM RECYCLING

Regardless of any potential changes from pending legislation and DEP regulations, the coproduct loophole allows the oil and gas industry to dispose of their wastewater conveniently and cheaply under the guise of reusing the waste,[122] a process often termed "sham recycling."[123] Sham recycling occurs when companies disguise their disposal of waste behind activities they claim recycle or reuse the waste.[124] Under RCRA, the EPA enacted regulations to address the problem of distinguishing between legitimate and sham recycling.[125] According to the EPA, to constitute legitimate recycling:

> (1) the recycling must provide a "useful contribution to the recycling process or to a product or intermediate of the recycling process"; (2) "produce a valuable product or intermediate"; (3) involve treating the waste being recycled as a valuable commodity, and; (4) produce a product that is similar to "a legitimate product or an intermediate."[126]

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121. PA. DEP'T OF ENV'T PROT., OIL AND GAS WELL WASTE REPORT JAN – DEC 2022 (CONVENTIONAL WELLS), https://greenport.pa.gov/ReportExtracts/OG/OilGasWellWasteReport [https://perma.cc/TVK3-2XZE] (exported on Oct. 4, 2023) (from "Reporting Period" dropdown, choose "Jan – Dec 2022 (Conventional Wells)"); *see also* Hess, *New Penn State Study: Brine Water Pumped From Played-Out Conventional Oil & Gas Wells*, *supra* note 112 (noting that despite the DEP's statement "that road spreading of conventional oil and gas wastewater is illegal . . . reports from oil and gas areas say road spreading is continuing unabated").

122. *See* BETTER PATH COAL., *supra* note 99, at 2; Timothy D. Hoffman, *Recent Decision Strikes Down Parts of Sham Recycling Rules*, DINSMORE (July 17, 2017), https://www.dinsmore.com/publications/recent-decision-strikes-down-parts-of-sham-recycling-rules/ [https://perma.cc/YN7C-4UH5].

123. Hoffman, *supra* note 122.

124. *See id.*

125. ROBERT V. PERCIVAL, CHRISTOPHER H. SCHROEDER, ALAN S. MILLER & JAMES P. LEAPE, ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 327 (9th ed. 2021).

126. *Legitimate Hazardous Waste Recycling Versus Sham Recycling*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/hw/legitimate-hazardous-waste-recycling-versus-sham-recycling [https://perma.cc/8GBG-5DD7]; *see also* 40 C.F.R. § 260.43 (2023).

Recycling is a valid goal considering how much waste modern society generates and the host of problems associated with excess waste, such as environmental pollution, climate change caused by gases produced from decomposing waste, human health conditions and diseases, and harm to wildlife.[127] Pennsylvania conventional oil and gas producers reported 960,453 barrels[128] or 40,339,026 gallons[129] of produced water in 2021 according to the DEP's oil and gas well waste reports.[130] Of the total amount of produced water conventional oil and gas producers reported in 2021, they disposed of 18,120 barrels, or 761,040 gallons, of produced water through road spreading in Pennsylvania.[131] Road spreading prevented thousands of

127. *See* Austin Downs & Richard Acevedo, *How Our Trash Impacts the Environment*, EARTH DAY (Feb. 28, 2019), https://www.earthday.org/how-our-trash-impacts-the-environment/ [https://perma.cc/SDQ7-KWQE].

128. *See* PA. DEP'T OF ENV'T PROT., OIL AND GAS WELL WASTE REPORT JAN–DEC 2021 (CONVENTIONAL WELLS), https://greenport.pa.gov/ReportExtracts/OG/OilGasWellWasteReport (exported on Sept. 23, 2023) (from "Reporting Period" dropdown, choose "Jan – Dec 2021 (Conventional Wells)") [hereinafter OIL AND GAS WELL WASTE REPORT JAN – DEC 2021]. Barrels of produced water reported by conventional oil and gas wells in 2021 total 960,452.51 barrels of oil ("bbl"). *Id.* To produce 960,452.5 barrels, first sort the spreadsheet by alphabetical order using the "PRODUCT_TYPE" column and delete all of the rows that are not "Produced Fluid" in the "PRODUCT_TYPE" column. *See id.* Some of the entries are measured in tons instead of bbl. *See id.* To convert the rows measured in tons to bbl, cut and paste all the rows measured in tons to a new sheet. *See id.* In each sheet (one with the rows measured in bbl and one with the rows measured in tons) sum the quantity column for each sheet. *See id.* The sum of the quantity column in the sheet measured in bbls should be 866,384.01 bbls. *See id.* The sum of the quantity column in the sheet measured in tons should be 12,609.72 tons. *See id.* One ton equals 7.46 bbl. *See Energy Conversions*, Indep. Petrol. Ass'n of Am., https://www.ipaa.org/reference-tools/ [https://perma.cc/7ZXU-C97S]. At 7.46 bbl per ton, the sum of the quantity column in the sheet measured in tons is 94,068.51 bbl. *See* OIL AND GAS WELL WASTE REPORT JAN – DEC 2021, *supra*. The sum of 94,068.51 bbls and 866,384.01 bbls is 960,453 bbls when rounded up to a whole number. *See id.* In the oil and gas industry, bbl is equivalent to forty-two gallons of oil. *Barrels of Oil Equivalent*, UNIV. OF CALGARY https://energyeducation.ca/encyclopedia/Barrels_of_oil_equivalent [https://perma.cc/J3G3-5NY2].

129. 960,453 barrels of produced water were reported in 2021; at 42 gallons per barrel, this equals 40,339,026 gallons of produced water. *See* OIL AND GAS WELL WASTE REPORT JAN – DEC 2021, *supra* note 128; *see also Barrels of Oil Equivalent*, *supra* note 128.

130. OIL AND GAS WELL WASTE REPORT JAN – DEC 2021, *supra* note 128.

131. 18,120 barrels of produced water were reported to be disposed of through road spreading in 2021; at 42 gallons per barrel, this equals 761,040 gallons of produced water that were disposed of through road spreading in 2021. *See id*.; *see also Barrels of Oil Equivalent*, *supra* note 128. To reach this number, sort the sheet measured in bbl alphabetically in the "DISPOSAL_METHOD" column and delete the rows above and below any rows with "ROAD SPREADING" as the disposal method. *See* OIL AND GAS WELL WASTE REPORT JAN – DEC 2021, *supra* note 128. Paste these rows into a separate sheet and then sum the quantity column; the

gallons of produced water from disposal through waste treatment facilities, underground injection, or transportation to disposal sites in neighboring states.[132] At first glance, road spreading for dust suppression may appear to be a better use of produced water than disposal, because it at least attempts to reuse the produced water. However, road spreading of produced water is essentially disposal in another form because produced water is ineffective as a dust suppressant, and its toxicity can have detrimental impacts on human and environmental health. While recycling and reuse is necessary as modern society strives to develop a more sustainable relationship with the Earth,[133] industries can take advantage of regulations designed to encourage recycling to escape compliance with waste disposal regulations, turning legitimate recycling into sham recycling,[134] especially when these regulations rely on good faith self-regulation.[135]

Sham recycling can occur when: a waste is "[i]neffective or only marginally effective for the claimed use," the amount of the waste used is higher than the amount necessary, the waste is used in a way that is inconsistent with how it would be used as the raw material or commercial product it is substituting, or

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total should be 18,119.93 bbls of produced water disposed of by road spreading. *See id.* This number rounded up should be 18,120 bbls; at 42 barrels per gallon, this equals 761,040 gallons of produced water disposed of by roadspreading. *See Barrels of Oil Equivalent*, *supra* note 128.

132. *See also* Jiang et al., *supra* note 25, at 6–7 (explaining methods of disposal for produced water).

133. *See generally* Raoul Meys, Felicitas Frick, Stefan Westhues, André Sternberg, Jürgen Klankermayer & André Bardow, *Towards a Circular Economy for Plastic Packaging Wastes – the Environmental Potential of Chemical Recycling*, 162 RES., CONSERVATION & RECYCLING 1, 1–2 (2020) (explaining a possible recycling model to help improve environmental sustainability); *see also The U.S. Recycling System*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/recyclingstrategy/us-recycling-system [perma.cc/S573-S6JR] (Nov. 15, 2022).

134. *See, e.g.*, PERCIVAL ET AL., *supra* note 125, at 327 (providing an example of sham recycling as Marine Shale Processors, a Louisiana company that burned hazardous waste between 1985 and 1996, which claimed this was recycling because it mixed the ash residue with construction materials).

135. *See, e.g.*, Tom Mounteer, Lisa Widawsky Hallowell & Douglas H. Green, *EPA's Coal Ash Rule: Implications for Regulated Entities, Results for the Environment*, 45 ENV'T L. REP. NEWS & ANALYSIS 11089, 11096–97 (2015) (explaining how the EPA's coal ash rule allows regulated industries to use their own qualified professional engineer to certify compliance with the beneficial use exemption for disposal of coal ash under the RCRA, often contributing to cases where the use of coal ash results in environmental harms); *see also* discussion *infra* Part V.

the waste is not comparable to the raw material or commercial product it is substituting.[136] Produced water road spreading is sham recycling because the produced water is ineffective for the claimed use—as a dust suppressant.[137] Indeed, the muddy, practically undriveable conditions of roads after spreading of produced water indicates that produced water is being spread at much higher rates than is actually necessary to suppress dust.[138] If the goal of spreading produced water on roads was solely to suppress dust and make unpaved roads more drivable, an excessive amount of produced water would not be spread, implying that the real goal of spreading produced water on roads is likely to dispose of the produced water.[139] Pennsylvania conventional oil and gas producers have an even greater

136. *Legitimate Hazardous Waste Recycling Versus Sham Recycling*, *supra* note 126.

137. BURGOS ET AL., *supra* note 45, at 88; *see also Legitimate Hazardous Waste Recycling Versus Sham Recycling*, *supra* note 126.

138. *See e.g.*, Lawson, *supra* note 1. A resident of Farmington Township, Pennsylvania described the spreading of produced water in their town, explaining:

> [o]ver-brining causes gravel to sink and sediment fines to rise to the surface and get blown away. In summer, these heavily brined roads become so "de-stablized" that potholes make the roads nearly impassable. . . . Frequently in the summer, roads are so de-stabilized by fresh brine that it becomes necessary to use 4-wheel drive. Anyone living on a brined dirt road is a 24-hour a day, 7-days a week hostage to over-brining.

Id.

139. *See Legitimate Hazardous Waste Recycling Versus Sham Recycling, supra* note 126; *see*, *e.g.*, Mounteer et al., *supra* note 135, at 11093–94 (providing coal ash as an example of sham recycling that occurs when industry uses excessive amounts of coal ash that is "more than is needed for the beneficial use"). Coal ash, a waste produced by coal-fired power plants in large amounts, is an often-cited example of sham recycling that still occurs today. *See* James Bruggers & Amy Green, *In Orlando, A Mountain of Coal Ash Evades EPA Rules. It's Not the Only One.*, NAT'L PUB. RADIO (Jan. 12, 2022, 9:43 AM), https://www.npr.org/2022/01/12/1065214649/in-orlando-a-mountain-of-coal-ash-evades-epa-rules-its-not-the-only-one [http://perma.cc/3JH8-G3G9]. Under the EPA's Disposal of Coal Combustion Residuals from Electric Utilities rule, coal ash is not treated as a hazardous waste, despite its hazardous properties, allowing it to be "beneficially used" as an ingredient in concrete, to make drywall, and is even spread on icy roads as a substitute for road salt. *See* Brittany L. Daniels, *Comment: Caution: Hazards Ahead! How the EPA's Refusal to Classify Coal Ash as Hazardous Waste Fuels Environmental and Public Health Concerns,* 27 VILL. ENV'T L.J. 93, 95 (2016); *see also* Jeff Turrentine, *Coal Ash Is Hazardous. Coal Ash Is Waste. But According to the EPA, Coal Ash Is Not "Hazardous Waste."*, NAT'L RES. DEF. COUNCIL (Sept. 6, 2019), https://www.nrdc.org/stories/coal-ash-hazardous-coal-ash-waste-according-epa-coal-ash-not-hazardous-waste [https://perma.cc/M2WJ-WTLD]; PHYSICIANS FOR SOC. RESP., COAL ASH: HAZARDOUS TO HUMAN HEALTH 1 (2010), https://psr.org/wp-content/uploads/2018/05/coal-ash-hazardous-to-human-health.pdf [perma.cc/3KY2-4BDU].

incentive to engage in sham recycling of produced water when the producers are responsible for ensuring that their produced water meets the coproduct determination that allows it to be spread on roads.

V. SELF-REGULATION

The coproduct determination in Pennsylvania's regulations is a version of industry self-regulation within environmental law.[140] Traditionally, many countries—including the United States—have relied on a command-and-control regime of environmental regulation that relies on mandatory compliance with regulations developed by legislatures and implementing agencies.[141] This regime of environmental regulation has been largely successful in the United States, with significant improvements in the environment since many of the large environmental laws like the Clean Air Act, Clean Water Act, and others were enacted.[142] Despite this success, critics of command-and-control environmental regulation argue that it does not encourage improvements in the environment beyond what the law mandates, is inflexible, contains numerous loopholes that reflect the compromises that went into the making of the laws, is costly and inefficient, and is difficult to enforce.[143] In contrast, industry self-regulation relies on voluntary compliance from

140. *See* 25 PA. CODE § 287.8 (2023) (requiring the person performing a coproduct determination to decide when their waste meets the standards of a coproduct and only to maintain documentation of such determination for the DEP upon request, meaning industry is responsible for deciding if their waste can no longer be considered waste with very little oversight from the DEP).

141. *See* PUJA SINGHAL, DIW ROUNDUP, ENVIRONMENTAL REGULATIONS: LESSONS FROM THE COMMAND-AND-CONTROL APPROACH 1–4 (2018), https://www.diw.de/documents/publikationen/73/diw_01.c.597525.de/diw_roundup_124_en.pdf [https://perma.cc/LL5P-CLZ4].

142. *See, e.g.*, ENV'T PROT. AGENCY, PUB. NO. 170K20001, CELEBRATING 50 YEARS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY (2020) (providing a list of environmental laws and EPA accomplishments between 1970 and 2020); *Clean Water Act*, THE NAT'L WILDLIFE FED., https://www.nwf.org/Our-Work/Waters/Clean-Water-Act [https://perma.cc/AYR9-KZKE] (giving a brief explanation of the Clean Water Act).

143. *See* Darren Sinclair, *Self-Regulation Versus Command and Control? Beyond False Dichotomies*, 19 L. & POL'Y 529, 530 (1997).

the industries and standards set by industries instead of the government, but this system poses its own challenges as well.[144]

Pennsylvania's coproduct regulations do not fit neatly into the command-and-control regime of environmental law nor are they pure self-regulation.[145] Rather, they are a mix between the two, with government mandating requirements for a coproduct determination but industry determining when it has met these requirements.[146] Essentially, the coproduct regulations rely on industry self-reporting its compliance with the standards in order for its waste to qualify as a coproduct.[147] As the EQB explained when creating the coproduct regulations, the regulations were intended to allow industry to determine when its waste could be a coproduct "without review or approval by [the DEP]."[148] Within Pennsylvania's coproduct regulations, the generator of residual waste only has to conduct evaluations of hazardous or toxic constituent levels contained in their residual waste that they are aware of to ensure they are no greater than the hazardous or toxic constituent levels contained in the intentionally manufactured product to which the residual waste is compared.[149] Similarly, the evaluations of leaching of hazardous or toxic constituents in comparison to the leaching from the intentionally manufactured product also depend on the generator's knowledge of hazardous or toxic constituents in the

144. *Id.*

145. *See* 25 PA. CODE § 287.8 (2023); *see also* Marius Aalders, *Self-Regulation and Compliance with Environmental Law from a Global Perspective*, *in* TOWARDS INTEGRATED ENVIRONMENTAL LAW IN INDONESIA? 1–2 (Adriaan Bedner & Nicole Niessen eds., 2003) (describing most forms of self-regulation as matters of degree on a continuum with pure self-regulation on one end and government regulation at the opposite end).

146. *See* Andrew A. King & Michael J. Lenox, *Industry Self-Regulation Without Sanctions: The Chemical Industry's Responsible Care Program*, 43 ACAD. MGMT. J. 698, 698 (2000) (explaining that a combination of government regulation and industry self-regulation may provide an effective compromise for mitigating the environmental effects of economic activity).

147. *See* Anthony Heyes, *Implementing Environmental Regulation: Enforcement and Compliance*, 17 J. REGUL. ECON. 107, 114 (2000) (explaining the prevalence of self-reporting in environmental regulations).

148. 22 Pa. Bull. 3392 (July 4, 1992).

149. *See* 25 PA. CODE § 287.8(b)(2) ("Based on generator knowledge, if a hazardous or toxic constituent is not present evaluation of total levels is not required.").

residual waste.[150] If a generator of residual waste is unaware of hazardous or toxic constituents in their residual waste or the leaching of those constituents, the generator is not legally required to perform evaluations for those constituents or the leaching of those constituents.[151] This type of self-determination depends on the good faith of the oil and gas industry to actually conduct evaluations for the hazardous and toxic constituents it knows are present in its residual waste and for the industry to have the knowledge of what is in its residual waste to begin with.[152]

While reliance on self-reporting as opposed to government inspections and analyses can save governmental resources,[153] self-reporting depends on the good faith of industry actors.[154] Self-regulation can be successful when public interests in regulation of the industry coincide with the private interests of industry in regulating itself.[155] Moreover, self-regulation tends to work best in situations where members of the regulated group have incentives to police each other and enforce violations of standards against one another.[156] Two often cited examples of industry self-regulation are the Responsible Care Program within the chemical industry and the Institute of Nuclear Power

150. *See id.* § 287.8(b)(3) ("Based on generator knowledge, if a hazardous or toxic constituent is not present[,] evaluation of leaching levels is not required.").

151. *See id*. § 287.8(b)(2)–(3). For example, if generators of produced water are unaware of components present in the produced water and the commercial product it is compared to, such as radium or other harmful substances, the generators are not required to perform evaluations for radium under the coproduct requirements. *See id.*; *see also* BURGOS ET AL., *supra* note 45, at 9–10, 13, 35–37 (explaining the toxicity of radium and its presence in oil and gas produced waters and commercial dust suppressants).

152. *See* BETTER PATH COAL., *supra* note 99, at 2 (explaining how the DEP's lack of oversight over the conventional oil and gas industry after the moratorium on conventional road spreading allowed industry to take advantage of the coproduct loophole because "the program is one that generally operates in good faith").

153. *See* Heyes, *supra* note 147, at 114–15.

154. *See* Neil Gunningham & Joseph Rees, *Industry Self-Regulation: An Institutional Perspective*, 19 L. & POL'Y 363, 389 (1997).

155. *Id.* at 390.

156. *See* King & Lenox, *supra* note 146, at 701.

Operations ("INPO") within the nuclear industry.[157] In both programs, members have incentives to ensure other members act responsibly in order to avoid regulatory costs that could be placed on the entire industry if one member acts irresponsibly.[158] Furthermore, because both programs began after disasters that prompted public scrutiny, members are incentivized to police each other to prevent poor public opinion of the industries.[159] In the case of regulating produced water, however, the incentives are exactly the opposite. The oil and gas industry does not have an incentive to police and enforce compliance with the coproduct regulations.[160] Instead, it has an incentive to collude to avoid enforcement.[161]

Most oil and gas produced water in Pennsylvania is reused in the oil and gas field since Pennsylvania's geology is not conducive to underground injection and storage of produced water.[162] Alternatively, produced water in Pennsylvania is treated through centralized waste treatment facilities or transported to neighboring states for disposal in underground injection wells.[163] Proper disposal of produced water can be very expensive.[164] For example, in the Permian Basin in Texas, oil and gas producers spend an estimated $2,000 on produced water disposal for every 1,000 barrels of oil produced per day.[165] Pennsylvania oil and gas producers reuse their produced water at a much higher percentage than producers in other states, mainly

157. Cary Coglianese & Evan Mendelson, *Meta-Regulation and Self-Regulation*, *in* THE OXFORD HANDBOOK OF REGULATION 146, 154 (Robert Baldwin, Martin Cave & Martin Lodge eds., 2010).

158. *Id.* at 160.

159. *Id.*

160. *See* GOVERNOR'S LAPSING STATEMENT, *supra* note 116, at 1–4.

161. *See id.*

162. Jiang et al., *supra* note 25, at 6–7.

163. *Id.*

164. *See id.* at 7; *see also Produced Water from Onshore US Oil and Gas Activities to Decline to Nearly 20 Billion Barrels Annually; Reach $28 Billion in Value by 2022, IHS Market Says*, S&P GLOB., (Apr. 2, 2020), https://news.ihsmarkit.com/prviewer/release_only/slug/2020-04-02-produced-water-from-onshore-us-oil-and-gas-activities-to-decline-to-nearly-20-billion-barrels-annually-reach-28-billion-in-value-by-2022-ihs-markit-says [https://perma.cc/J4FA-HTFV] ("Water disposal is the second largest segment in the oilfield water management market and can represent up to one-quarter of total lifting costs.").

165. Burron & Zobell, *supra* note 30, at 5.

because beneficially reusing the produced water is often much cheaper than any other management method.[166] Instead of spending money on disposal of produced water, producers can give it to municipalities for free or sell it for a profit as a dust suppressant.[167]

The oil and gas industry is incentivized to determine that its produced water qualifies as a coproduct because without a coproduct determination, the produced water would be treated as a waste that would require proper disposal under the residual waste regulations.[168] If oil and gas produced water could not be exempted from classification as a residual waste through the coproduct determination, and oil and gas companies wanted to spread it on roads as a dust suppressant, they would be required to undergo an application process for the land application of residual waste.[169] This would require several steps, including documenting site characteristics of the soil, groundwater, and surface water; taking measures to control erosion; protecting water quality; minimizing nuisances; monitoring water quality; monitoring soil; and keeping detailed records.[170]

Just as industries are economically incentivized to spread produced water as a dust suppressant, municipalities often have economic incentives as well.[171] With many other expenses besides dust suppression,[172] reducing or eliminating the cost of dust suppression for roads can create significant savings for

166. *See* GROUND WATER PROT. COUNCIL, *supra* note 26, at 82 (explaining Pennsylvania's high produced water reuse rates as a result of the limited underground disposal options that make produced water reuse a cheaper option than other methods of disposal like transportation out of state).

167. *See* Marusic, *supra* note 13.

168. *See* 25 PA. CODE § 287.1 (2023).

169. *See id.* § 291.201.

170. *See id.* § 291.102–05.

171. *See* Marusic, *supra* note 13.

172. *State and Local Government*, THE WHITE HOUSE, https://www.whitehouse.gov/about-the-white-house/our-government/state-local-government/ [https://perma.cc/FBX7-K86K] (explaining the general responsibilities of municipalities including providing emergency medical services, housing services, transportation services, public works, municipal courts, and police and fire departments).

municipalities.[173] Meanwhile, the oil and gas industry has every incentive to give its produced water to municipalities as a dust suppressant as it saves the industry money and helps strengthen their image in communities by "donating" a useful product.[174] In this case, it is in the best interests of all members of the community to use produced water as a dust suppressant.[175] Under these conditions, there is no incentive for one industry member to remove itself from the process.[176]

Although the oil and gas industry and municipalities have overlapping interests in the management and use of produced water, these interests directly contradict the public's interest in regulating the industry's waste because of health and environmental concerns.[177] Industry self-regulation can be less effective in protecting the environment in situations where the interests of industry and the public are at odds with each other.[178] The disincentive to protect the environment is exacerbated by the fact that government oversight is almost non-existent.[179]

Self-regulation can also be successful when there are strong external pressures, such as the threat of government regulation or a desire to maintain credibility and legitimacy with

173. *See* Marusic, *supra* note 13.

174. Deirdre Lockwood, *Oil and Gas Wastewater Is a Cheap Fix for Road Dust but Comes at a Toxic Cost* (June 21, 2018), https://cen.acs.org/environment/pollution/Oil-gas-wastewater-cheap-fix/96/web/2018/06 [https://perma.cc/DV7Y-PPFU].

175. *See, e.g.*, GROUND WATER PROT. COUNCIL, *supra* note 26, at 45, 82 (explaining Pennsylvania's high produced water reuse rates as a result of the limited disposal options underground that make produced water reuse a cheaper option than other methods of disposal like transportation out of state); Letter from Chad Wise, Jack Post & Clay Doolittle, Athens Township Supervisors, to Glen Weaver and Son LLC (March 28, 2019) (retrieved from Hess, *Millions of Gallons, supra* note 79) [hereinafter Township Letters] (demonstrating Pennsylvania townships' support of oil and gas produced water as a dust suppressant and their explicit authorization to producers to spread it on their roads).

176. Gunningham & Rees, *supra* note 161, at 390–91 (explaining that self-regulation succeeds when public and private interests coincide or when external pressures incentivize self-regulation).

177. *See, e.g.*, Lawson, *supra* note 1 (explaining a Pennsylvania resident's concerns about oil and gas wastewater spread on roads, leading her to challenge one of the DEP's authorizations of wastewater spreading on roads in her community).

178. *See* Gunningham & Rees, *supra* note 161, at 390.

179. *See id.* at 391; *see also* GOVERNOR'S LAPSING STATEMENT, *supra* note 116, at 11 (noting that the conventional oil and gas industry has developed a culture of noncompliance with environmental regulations without strong enforcement from the DEP).

consumers.[180] The coproduct regulations are technically mandatory, but there is not a significant threat of governmental regulation in the absence of the industry adequately regulating itself.[181] Before oil and gas producers can spread their produced water on roads as a coproduct, they must complete a coproduct determination and maintain documentation supporting the determination that can be given to the DEP upon request.[182] The coproduct determination process is essentially a self-certification process allowing the oil and gas industry to determine if their waste product is harmful.[183] Under Pennsylvania's regulations, the DEP can request documentation regarding the coproduct determination from oil and gas wastewater producers but prior approval from the DEP for coproduct determination is not required.[184] According to Ali Tarquino Morris, Director of the DEP's Bureau of Waste Management, the DEP's compliance review of coproduct determinations from oil and gas producers consists of ensuring the evaluations required by the regulations are present, identifying missing or incomplete information, requiring the producers to submit the information, and then determining if the coproduct determination meets the regulations of Chapter 287.8.[185]

In a right-to-know request,[186] Better Path Coalition, an environmental group, discovered that eight coproduct determinations of produced water submitted to the DEP by Pennsylvania

180. Gunningham & Rees, *supra* note 161, at 391 (noting other external pressures include the market and public pressure).

181. *See* 25 PA. CODE § 287.8(d) (2023) ("A person who completes a coproduct determination shall maintain documentation supporting the determination. This documentation shall be available to the Department *upon request*." (emphasis added)); *see also* BETTER PATH COAL., *supra* note 99, at 2 (explaining that the coproduct determinations usually operate on good faith, meaning that the Pennsylvania government provided "no oversight" after the moratorium on spreading conventional oil and gas wastewater roads began in 2018).

182. *See* § 287.8(d).

183. *See* BETTER PATH COAL., *supra* note 99, at 1 (explaining that owners of a waste product get to decide whether it can be beneficially used).

184. *See* § 287.8(c)–(d).

185. Hess, *Millions of Gallons*, *supra* note 79.

186. *See* 65 PA. CONS. STAT. § 67.101 (2023); *see also* 2008 Pa. Laws 3. Pennsylvania's Right-to-Know Law ensures access to public information of state agencies, local agencies, judicial agencies, and legislative agencies in the state. *Id.*

oil and gas producers in spring of 2021 were seriously deficient in meeting the Chapter 287 regulations.[187] None of the companies had completed the analyses required by Chapter 287, many of the laboratory analyses were outdated, many of the samples were significantly diluted, and many of the detection limits for toxic metals like arsenic, cadmium, and lead were set much higher than the EPA's standards, allowing the samples to appear as if the levels of metals they contained were not problematic.[188] Additionally, the database the DEP uses to track oil and gas wastewater disposal is flawed, preventing accurate reporting of when, where, and how much produced water is spread on roads.[189] Some oil and gas companies that produce oil according to the DEP's Oil and Gas Well Production reports do not even report any wastewater disposal, indicating that a lot of disposal like road spreading is likely occurring unreported.[190] In a 2022 report, the DEP found that one of the most significant violations by conventional oil and gas operators between 2017 and 2021 was a violation of 25 Pennsylvania Code section 78.121, which requires operators to submit production reports about how much oil and gas they produce.[191] According to the same report, 56.6% of conventional oil and gas operators with eleven or more wells failed to submit production and waste disposal data as required by regulations.[192] Within the same time frame, the DEP documented a total of 608 violations by conventional oil and gas operators of SWMA section 301 concerning the management of residual wastes.[193]

Government oversight can strengthen industry self-regulation to combat some of the risks associated with self-regulation such as bad faith actors,[194] but with flawed and incomplete data from industry self-reporting, an adequate government response

187. BETTER PATH COAL., *supra* note 99, at 3, 5.
188. *See id.* at 5–7.
189. *Id.* at 7–8.
190. *Id.* at 8.
191. GOVERNOR'S LAPSING STATEMENT, *supra* note 116, at 2–3; 25 PA. CODE § 78.121 (2023).
192. GOVERNOR'S LAPSING STATEMENT, *supra* note 116, at 5.
193. *Id.* at 8.
194. *See* Gunningham & Rees, *supra* note 161, at 389.

to correct environmental violations is difficult.[195] While the DEP claims that, provided it receives more resources, it could correct these environmental violations using its current authority and tools, the DEP admits that "[a] significant change in the culture of non-compliance as an acceptable norm in the conventional oil and gas industry will need to occur before meaningful improvement can happen."[196] The coproduct regulations depend on industry to act in good faith[197] and the DEP has relied on the conventional oil and gas industry to develop its own "culture of [compliance]."[198] As self-monitoring and reporting are essential to compliance with the coproduct regulations, when the industry does not adequately monitor and/or report its activities, as with many oil and gas producers in Pennsylvania, and the DEP does not provide sufficient oversight, serious pollution problems can result.[199]

VI. LARGELY UNREGULATED CHEMICALS

Even if the oil and gas industry voluntarily achieved perfect compliance with the coproduct regulations or the DEP adequately oversaw the oil and gas industry to ensure the industry's compliance, a separate issue with the regulations is that the safety standard for dust suppressants is based on harmful, largely unregulated chemicals.[200]

In the United States, many chemicals used in everyday items—like the chemicals in commercial dust suppressants—

195. *See* King & Lenox, *supra* note 146, at 713–14 (explaining that for industry self-regulation with governmental oversight to protect the environment, robust data and self-reporting from industry is necessary); Lily Leibu, *Transparency in Regulatory Science—For Whom?* (June 3, 2021), https://www.nyuelj.org/2021/06/transparency-in-regulatory-science-for-whom/ [https://perma.cc/6YKT-Q7DP]; GOVERNOR'S LAPSING STATEMENT, *supra* note 116, at 5.

196. GOVERNOR'S LAPSING STATEMENT, *supra* note 116, at 1.

197. *See* 25 PA. CODE § 287.8(b)(2)–(3) (2023); BETTER PATH COAL., *supra* note 99, at 2.

198. GOVERNOR'S LAPSING STATEMENT, *supra* note 116, at 1.

199. *See* CYNTHIA GILES, NEXT GENERATION COMPLIANCE: ENVIRONMENTAL REGULATION FOR THE MODERN ERA 4 (2022).

200. *See* Mark Scialla, *It Could Take Centuries for EPA to Test All the Unregulated Chemicals Under a New Landmark Bill*, PBS (June 22, 2016, 11:58 AM), https://www.pbs.org/newshour/science/it-could-take-centuries-for-epa-to-test-all-the-unregulated-chemicals-under-a-new-landmark-bill [https://perma.cc/M8PG-2J9U].

are minimally regulated with very little toxicity data and scant information available about how they impact the environment and public health.[201] The Toxic Substances Control Act ("TSCA") is the main federal law for managing industrial chemicals.[202] Congress enacted TSCA in 1976 to regulate chemicals other than pesticides, foods, drugs, and cosmetics.[203] TSCA has been recognized by many as failing to adequately regulate the use of chemicals in the United States.[204] In fact, "TSCA grandfathered the 62,000 chemical substances that were in commercial circulation at that time; that is, except on a case-by-case basis, chemical producers were not required to generate and disclose any information about the uses or hazard traits of these products."[205]

After years of criticism, the Lautenberg Chemical Safety for the 21st Century Act ("LCSA") amended the TSCA in 2016.[206] Under LCSA, the EPA can "regulate new chemicals before they go to market and issue orders to restrict production, obtain safety information, and require testing."[207] This is a positive step towards a more protective chemical regulatory scheme, but it is based on the idea that once a new chemical or a significant new chemical use has been approved for commercialization, there will be minimal or no subsequent regulation.[208] Once the EPA approves a chemical for commercialization, if later information

201. *See* Noah M. Sachs, *Rescuing the Strong Precautionary Principle from Its Critics*, 2011 U. ILL. L. REV. 1286–87 (2011); DEP'T OF HEALTH & HUM. SERVS., FOURTH NATIONAL REPORT ON HUMAN EXPOSURE TO ENVIRONMENTAL CHEMICALS (2009).

202. Michael P. Wilson & Megan R. Schwarzman, *Toward a New U.S. Chemicals Policy: Rebuilding the Foundation to Advance New Science, Green Chemistry, and Environmental Health*, 117 ENV'T HEALTH PERSPS. 1202, 1202 (2009).

203. 15 U.S.C. § 2602(2)(B).

204. Wilson & Schwarzman, *supra* note 202, at 1202.

205. *Id.* at 1205.

206. "In 2016, the Frank R. Lautenberg Chemical Safety for the 21st Century Act (LCSA; P.L. 114–182) amended Title I of the Toxic Substances Control Act (TSCA; 15 U.S. § 2601 et seq.) to direct the U.S. Environmental Protection Agency (EPA) to systematically prioritize chemicals for risk evaluation." JERRY H. YEN, CONG. RSCH. SERV., IN12016, BACKGROUND ON RISK EVALUATION UNDER THE TOXIC SUBSTANCES CONTROL ACT (TSCA): PERCHLOROETHYLENE 1–2 (2022); Valerie J. Watnick, *The Lautenberg Chemical Safety Act of 2016: Cancer, Industry Pressure, and a Proactive Approach*, 43 HARV. ENV'T L. REV. 373, 389 (2019).

207. Watnick, *supra* note 206, at 397–98.

208. *Id.* at 403.

reveals that the chemical might pose an unreasonable risk to humans or the environment, the manufacturer can simply claim that the chemical is now an existing chemical, subject to a much slower process of prioritization and review.[209] Although LCSA allows the EPA to review existing chemicals, within three and half years of its enactment, it only *requested* the EPA to review twenty existing high-priority chemicals.[210] In its annual report to Congress in October 2022, the EPA reported that it has only managed to complete ten agency-initiated chemical risk evaluations required by LCSA.[211] Of these evaluations, the EPA only completed one within the statutory deadline of three years plus a six-month extension.[212] Even if the EPA were able to evaluate existing chemicals within the statutory deadlines at a rate of ten chemicals per three years, given the amount of unreviewed existing chemicals grandfathered into TSCA, it would take the EPA approximately 18,597 years to review the safety of all of these chemicals.[213] The EPA blames its inability to meet the statutory deadlines set by LCSA for review of existing chemicals on inadequate funding that has remained relatively level since before the LCSA amendment.[214] At the statutory rate established by LCSA for review of existing chemicals, it seems impossible for the EPA to ever complete safety reviews for chemicals widely used in the United States.[215] Given its current resources, the EPA does not anticipate completing the twenty current risk evaluations within the statutory deadline, highlighting the

209. 15 U.S.C. §§ 2604(3)(C), 2605(b)(1)(B)(2); Watnick, *supra* note 206, at 403.

210. U.S. ENV'T PROT. AGENCY, REPORT TO CONGRESS ON THE EPA'S CAPACITY TO IMPLEMENT CERTAIN PROVISIONS OF THE FRANK R. LAUTENBERG CHEMICAL SAFETY FOR THE 21ST CENTURY ACT 8 (2022).

211. *Id.* at 6. This report was prepared for the Committees on Energy and Commerce and Appropriations of the U.S. House of Representatives and the Committees on Environment and Public Works and Appropriations of the U.S. Senate. *Id.*

212. *Id.*

213. *See id.* The 62,000 chemicals grandfathered into the TSCA minus ten chemicals that have been reviewed equals 61,990 chemicals. *See id.* The 61,990 chemicals divided by the amount of chemicals reviewed in a period of three years (ten), equals 6,199 groups of ten chemicals. *See id.* The 6,199 groups of ten chemicals multiplied by three years equals 18,597 years. *See id.*; Wilson & Schwarzman, *supra* note 202, at 1205.

214. U.S. ENV'T PROT. AGENCY, *supra* note 210, at 1, 5.

215. *See id.* at 5.

likely lack of current and future regulation of many chemicals frequently used—for example, in commercial dust suppressants—in the United States today. [216]

Most coproduct determinations of produced water as a dust suppressant compare produced water with a commercially available brine taken from wells drilled into underground rock formations that are not associated with oil and gas drilling.[217] According to the DEP, products commonly used for this coproduct determination include mixtures (water and sodium chloride, calcium chloride, or magnesium chloride) and commercial dust suppressants like salt brine LS-25 and LIQUIDOW.[218] LS-25 is made of calcium chloride, sodium chloride, potassium chloride, magnesium chloride, and water.[219] LIQUIDOW is made of calcium chloride and water, with small percentages of potassium chloride and sodium chloride as a result of "impurities from the naturally-occurring source material, brine solution."[220] Information about these dust suppressants comes from safety data sheets, documents required by the Occupational Health and Safety Administration ("OSHA"), that detail the chemical and physical properties, environmental health hazards, and safety precautions for the chemicals.[221] These safety data sheets are required to be kept by manufacturers and distributors of chemicals so they can be conveyed to downstream customers.[222] Furthermore, according to the LS-25 safety data sheet, "[a]ll ingredients are on the TSCA inventory

216. *See id.* at 8.

217. *See* Hess, *Millions of Gallons*, *supra* note 79.

218. *See id.*; *see also* SENECA MINERAL, SAFETY DATA SHEET: LS25 (2015), http://irp-cdn.multiscreensite.com/f67df0c1/files/uploaded/LS25-SDS.docx, [https://perma.cc/ACR2-CYSD] (describing LS-25); OCCIDENTAL CHEM. CORP., SAFETY DATA SHEET: LIQUIDOW TECHNICAL GRADE CALCIUM CHLORIDE SOLUTION (2021), https://sds.oxy.com/private/document.aspx?prd=M48009~~PDF~~MTR~~ANSI~~EN~~01-01-0001~~~~ [https://perma.cc/KY97-4CMQ] (describing LIQUIDOW).

219. SENECA MINERAL, *supra* note 218, at 1.

220. OCCIDENTAL CHEM. CORP., *supra* note 218, at 3.

221. *See* OCCUPATIONAL SAFETY AND HEALTH ADMIN., HAZARD COMMUNICATION STANDARD: SAFETY DATA SHEETS 1 (2012); *see also Hazard Communication*, U.S. DEP'T OF LAB., https://www.osha.gov/hazcom [https://perma.cc/C8ZF-V78D].

222. *Hazard Communication*, *supra* note 221.

or are not required to be listed on the TSCA inventory."[223] Sodium chloride, calcium chloride, magnesium chloride, and potassium chloride are on the non-confidential TSCA inventory, meaning they are subject to regulation under TSCA.[224] The non-confidential TSCA inventory is available to the public, but it is not entirely complete or accurate because it does not include chemicals that are claimed as confidential.[225] These confidential chemicals are listed in the TSCA Master Inventory File maintained by the EPA's Office of Pollution Prevention and Toxics.[226]

Although the TSCA inventory now contains 86,718 chemicals,[227] the original 62,000 chemicals that were grandfathered comprise over 99% of the production volume of chemicals subject to TSCA.[228] In other words, only less than 1% of the volume of chemicals produced in the United States are chemicals that were not grandfathered into TSCA and thus the manufacturers of these chemicals were required to produce and distribute the minimal safety data required by TSCA.[229]

Even with the LCSA amendment, there are still significant inadequacies with the way TSCA regulates the safety of chemicals.[230] LCSA "grandfathered in all existing state requirements" and technically preempts state action on chemicals approved by the EPA, but "[o]nce a chemical is registered under TSCA," states can "superimpose more stringent rules" than those provided by TSCA and LCSA.[231] According to a list of chemical

223. SENECA MINERAL, *supra* note 218, at 3.

224. *See About the TSCA Chemical Substance Inventory*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/tsca-inventory/about-tsca-chemical-substance-inventory [https://perma.cc/XYN2-PMZT] (June 9, 2023); *How to Access the TSCA Inventory*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/tsca-inventory/how-access-tsca-inventory [https://perma.cc/YUJ8-Q5HX] (Aug. 16, 2023) (providing instructions to access the non-confidential Inventory).

225. *About the TSCA Chemical Substance Inventory*, *supra* note 224.

226. *Id.*

227. *How to Access the TSCA Inventory*, *supra* note 224.

228. Wilson & Schwarzman, *supra* note 202, at 1205.

229. *See id.*; 15 U.S.C. § 2607(d)–(e).

230. *See generally* Watnick, *supra* note 206, at 373–74 (explaining the inadequacies of the TSCA).

231. *TSCA and US State Legislation: Navigating Your Chemical or Agrochemical Through the Federal and State Regulatory Landscape in the USA*, LABCORP, https://ddblog.labcorp.com/2022/02/tsca-and-us-state-legislation-navigating-your-chemical-or-agrochemical-

safety statutes maintained by Safer States,[232] Pennsylvania has adopted several policies regulating the presence of certain chemicals for certain products like food containers and baby food, but there is no comprehensive chemical safety statute or anything comparable to TSCA.[233]

Five states, California, Maine, Minnesota, Oregon, and Washington, have enacted statutes that allow them to develop comprehensive chemical regulatory programs.[234] California was the first state to enact a proactive chemical regulatory system with requirements for manufacturers to provide safety data before chemicals can be approved by the state for marketing and a comprehensive labeling statute for any product known to cause cancer, birth defects, or reproductive harm.[235] Unlike TSCA, which creates an inventory of hazardous chemicals that is only partially available to the public because of excluded information resulting from corporate confidentiality claims,[236] California's regulatory program creates a publicly available, easily accessible list of hazardous chemicals that can subject manufacturers to public pressure to keep their products off this list.[237]

The European Union's chemical regulation program—Registration, Evaluation, Authorization, and Restriction of Chemicals ("REACH")—which took effect in June 2007,[238] is another example of an approach to chemical regulation that places the burden on industry, not the regulatory agency, to provide

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through-the-federal-and-state-regulatory-landscape-in-the-usa/ [https://perma.cc/NMD6-NKZF] (Nov. 21, 2022) [hereinafter *TSCA and US State Legislation*].

232. "Safer States is an alliance of diverse environmental health organizations and coalitions from across the nation" that advocates for policies that protect public health and the environment from toxic chemicals. *Our Vision*, SAFER STATES, https://www.saferstates.org/vision/ [https://perma.cc/DZ2Z-ATGQ].

233. *See Bill Tracker*, SAFER STATES, https://www.saferstates.org/bill-tracker/ [https://perma.cc/5GV4-RSX2].

234. *TSCA and US State Legislation supra* note 231.

235. Watnick, *supra* note 206, at 412; *see* CALIFORNIA GREEN CHEMISTRY INITIATIVE 1–3 (2018); *see also* DEP'T OF INDUSTRIAL RELATIONS, THE CAL/OSHA HAZARD COMMUNICATION REGULATION—A GUIDE FOR EMPLOYERS THAT USE HAZARDOUS CHEMICALS 1 (2020) (providing an overview of Proposition 65 implementation).

236. *About the TSCA Chemical Substance Inventory*, *supra* note 224.

237. Watnick, *supra* note 206, at 412.

238. *Understanding REACH*, EUR. CHEM. AGENCY, https://echa.europa.eu/regulations/reach/understanding-reach [https://perma.cc/Z4P2-KLYY].

safety data on their products before those products can be sold on the market.[239] REACH applies to all chemical substances imported, manufactured, and sold within the European Union.[240] After chemical manufacturers and importers submit data, the European Chemicals Agency ("ECHA") reviews these submissions for compliance with REACH.[241] For chemicals classified as "very high concern" because of their "intrinsic properties and hazards" (for example carcinogenic chemicals), REACH sets a default date, after which the chemical "cannot be marketed in the [European Union]" unless, among other requirements, the manufacturer or importer demonstrates "that the socioeconomic benefits of the chemical exceed potential costs."[242] REACH represents a fundamentally different approach to chemical regulation that assumes harm unless proven otherwise, and values safety—unlike TSCA which assumes safety until proven otherwise, and instead prioritizes function, low price, and performance.[243]

Unlike REACH's approach, the United States federal regulatory system and that of most states still operate with largely reactionary regulatory systems that do not prioritize safety and precaution, allowing many products, like commercial dust suppressants, to enter the market despite their inherently dangerous properties.[244] The manufacturer of LS-25—Seneca Mineral, located in Erie, Pennsylvania—calls LS-25 a "naturally occurring brine that is pumped from the ground."[245] According to Seneca Mineral, they began distributing LS-25 to nearby

239. *See* Sachs, *supra* note 201, at 1302. *But see* David Bailey, *Out of Reach? EU Ditches Chemical Regulation Reforms*, ENCOMPASS (Nov. 2022) https://encompass-europe.com/comment/out-of-reach-eu-ditches-chemical-regulation-reforms [https://perma.cc/3QLL-PFCV] (explaining an ongoing overhaul of REACH, stating "[e]ffectively it is game over for revised Reach").

240. *See Understanding REACH*, *supra* note 238.

241. *Id.*

242. Sachs, *supra* note 201, at 1324.

243. *See* Wilson & Schwarzman, *supra* note 202, at 1207; Sachs, *supra* note 201, at 1303–04; Watnick, *supra* note 206, at 379–80.

244. *See* Watnick, *supra* note 206, at 404-08; *see, e.g.*, *Seneca LS25 Dust Control*, SENECA MINERAL, https://www.senecamineral.com/ls-25-dust-control [https://perma.cc/ACR2-CYSD] (LS-25 is an example of a commercial dust suppressant that has been sold to townships for decades).

245. *Seneca LS25 Dust Control*, *supra* note 244.

townships in 1957 for dust suppression.[246] On their website, Seneca Mineral states that LS-25 "does not contain any harmful chemicals or oil often found in gas-well brine,"[247] but recent studies have shown that naturally occurring brine can and often does contain harmful components like radium because of the underground rock formation the brine comes from.[248] Occidental Chemical Corporation, the manufacturer of LIQUIDOW, characterizes the product as "a purified inorganic salt solution produced by removing water from a naturally occurring brine solution."[249] The corporation credits "the abundant supply of naturally occurring brine" it uses at its production facility in Michigan for its place as the "world's largest producer of calcium chloride."[250] In fact, Occidental Chemical Corporation is a subsidiary of Occidental Petroleum Corporation,[251] one of the largest oil and gas producers in the United States.[252] Naturally occurring brine and produced water often share the same origin in underground rock formations that contain harmful elements like radium, meaning they both can contain these harmful components.[253] Pennsylvania, along with parts of Canada and surrounding states, sits on the Appalachian Basin, a vast expanse of sedimentary rock west of the Appalachian Mountains.[254]

246. *Id.*

247. *Id.*

248. David E. Hess, *17 Conventional Oil & Gas Drilling Operators Under Review by DEP to Determine if They Comply With Program Allowing Road Dumping of Drilling Wastewater*, PA ENV'T DIG. (Oct. 8, 2021), http://www.paenvironmentdigest.com/newsletter/default.asp?NewsletterArticleID=53863&SubjectID=&SearchWord=17+conventional+oil+&+gas [https://perma.cc/PR4W-N2HZ] [hereinafter Hess, *17 Conventional Oil & Gas*]; *see* BURGOS ET AL., *supra* note 45, at 36, 45; E.L. ROWAN, M.A. ENGLE, C.S. KIRBY & T.F. KRAEMER, U.S. GEOLOGICAL SURVEY, RADIUM CONTENT OF OIL- AND GAS-FIELD PRODUCED WATERS IN THE NORTHERN APPALACHIAN BASIN (USA): SUMMARY AND DISCUSSION DATA 1 (2011).

249. OCCIDENTAL CHEM. CORP., PRODUCT INFORMATION: LIQUIDOW CALCIUM CHLORIDE, https://www.oxy.com/siteassets/documents/chemicals/products/other-essentials/173-01532-LIQUIDOW-Prod-Info-Sheet.pdf [https://perma.cc/7GYT-BL4W].

250. *About Us*, OCCIDENTAL CHEM. CORP., https://www.oxycalciumchloride.com/about-us [https://perma.cc/6MPA-497W].

251. *Id.*

252. *Performance Production: Producing Energy Efficiently, Reliability and Responsibly Worldwide*, OCCIDENTAL CHEM. CORP., https://www.oxy.com/operations/performance-production/ [https://perma.cc/HL6B-2VR9].

253. BURGOS ET AL., *supra* note 45, at 36, 45; ROWAN ET AL., *supra* note 248, at 2.

254. ROWAN ET AL., *supra* note 248, at 2.

Radium has been documented in produced waters that occur alongside oil and gas from reservoirs of Cambrian-Mississippian age in the Northern Appalachian Basin.[255] Uranium and thorium, elements that commonly occur in sandstones and shale in sedimentary formations like the Northern Appalachian Basin, naturally decay to form radium.[256] Although this radium is naturally occurring, normally it is stored deep underground where humans, plants, and animals are not exposed to it.[257] When humans extract naturally occurring brine containing radium or extract oil and gas along with the naturally occurring radium-filled brine and spread it in the environment, it causes humans, plants, and animals to be exposed to harmful materials they never would have been exposed to had the oil and gas, and associated produced water, not been removed from underground.[258]

Since commercial dust suppressants and produced water from the oil and gas industry often contain the same components that make them both toxic, neither option is a completely safe choice to suppress dust on unpaved roads. If neither option is safe for the environment and public health, it would seem logical to choose the option that at minimum creates other benefits, such as saving municipalities money and reusing a waste that would otherwise be disposed. Therefore, produced water seems to be a better option than commercial dust suppressants because its use, unlike commercial dust suppressants, saves money and reduces waste. Moreover, if the commercial dust suppressant and produced water have similar origins and

255. *Id.* at 1.

256. *Id.*

257. *See* Hess, *17 Conventional Oil & Gas*, *supra* note 248; David Hess, *65+ Groups Ask Biden Administration to Reclassify Oil & Gas Drilling Waste as 'Hazardous' to Prevent Road Dumping of Wastewater and Other Practices,* PA. ENV'T DIG. BLOG (Oct. 4, 2021), https://paenvironmentdaily.blogspot.com/2021/10/65-groups-ask-biden-administration-to.html [https://perma.cc/68XS-S363].

258. Justin Nobel, *America's Radioactive Secret*, ROLLING STONE (Jan. 21, 2020), https://www.rollingstone.com/politics/politics-features/oil-gas-fracking-radioactive-investigation-937389/ [https://perma.cc/D4AS-NU6B] ("Essentially what you are doing is taking an underground radioactive reservoir and bringing it to the surface where it can interact with people and the environment,' says Marco Kaltofen, a nuclear-forensics scientist at Worcester Polytechnic Institute."); MEEHAN ET AL., *supra* note 2 (explaining effects of brine on plant life).

components, the commercial products are likely just as ineffective at dust suppression as the produced water. Perhaps the best option would be to stop the use of dust suppressants of any kind on unpaved roads. However, this choice disregards the negative health impacts that surrounding communities experience because of exposure to fugitive dust particles from unpaved roads. Determining which alternative is the safest choice regarding dust from unpaved roads is beyond the scope of this Note.

More importantly, focusing on the best alternative for dust suppression obscures the fact that the coproduct regulations that allow produced water to be a choice at all for dust suppression rely on a "safety" standard based on commercial products that are not required to be safe. The lack of regulation of commercial products and chemicals in the United States is largely a result of legislation that does not prioritize safety of commercial products before they enter the market. Enacting legislation to reflect the more cautionary approach embodied in REACH or California's chemical regulatory scheme is also beyond the scope of this Note. The intention of this Note is to propose a regulatory solution for the gap left by the current coproduct determination that allows the oil and gas industry to spread a waste product in the environment that is neither useful nor safe for environmental and human health.

VII. CLOSING THE COPRODUCT LOOPHOLE

The coproduct loophole leaves an opening in Pennsylvania's residual waste regulations that the oil and gas industry abuses to market its produced water as a beneficial recycled product instead of following the proper waste disposal guidelines. Because the coproduct regulations allow industries to self-determine the safety of their waste through a standard that is not necessarily safe for public health and the environment, closing the coproduct loophole completely could prevent the oil and gas industry and other industries from exploiting this

regulatory gap.[259] Section 287 of the Pennsylvania Code, which governs coproduct determinations, contains regulations for a coproduct determination that does not rely on comparisons with an intentionally manufactured product or produced raw material.[260]

Under title 25 section 287.8(c) of the Pennsylvania Code, a person can perform a coproduct determination without an intentionally manufactured product or produced raw material as a standard, by performing various safety tests to ensure the waste "does not present a threat of harm to human health and the environment."[261] This provision still allows waste producers to determine their waste is a coproduct that can be recycled in useful ways instead of disposing of it, but removes the potentially harmful commercial product safety standard that is present in section 287.8(b).[262] However, coproduct determinations under section 287.8(c) still rely on industry to self-determine when its waste meets the coproduct standards without any prior approval or mandatory oversight from the DEP. This provision is still vulnerable to the industry taking advantage of the ability to self-regulate without any mandatory governmental oversight like section 287.8(b).

It is unsurprising that the coproduct regulations create a loophole that allows the industry to "recycle" its waste without governmental oversight considering that the EQB explicitly stated that the purpose of the regulations was to allow the industry to decide when its waste could be considered a coproduct without

259. *See* BETTER PATH COAL., *supra* note 99, at 2, 9; *see also* Hess, *17 Conventional Oil & Gas*, *supra* note 248.

260. *Compare* 25 PA. CODE § 287.8(b) (2023) (providing requirements for a coproduct determination based on an intentionally manufactured product or produced raw material), *with* § 287.8(c) (providing requirements for a coproduct determination without an intentionally manufactured product or produced raw material for comparison).

261. *Id.* § 287.8(c) (providing requirements for a coproduct determination including an evaluation of total levels of hazardous or toxic constituents, an evaluation of levels of leaching of these constituents, and a determination of routes of exposure to human and ecological receptors).

262. *Compare id.* § 287.8(b) (requiring a proposed coproduct to be *no more harmful* than the intentionally manufactured product or produced raw material it is replacing), *with* § 287.8(c) (requiring a proposed coproduct to not present a danger to public health or the environment).

oversight from the DEP.[263] The coproduct loophole functions the way it was designed to: allowing industry to make the decision of when its waste is safe for use in the environment without interference from regulators.[264] Even if the intended result of the regulations was to decrease regulatory resources spent on issuing permits, decrease the amount of waste being disposed of, and allow for a more efficient recycling process; in practice, the regulations allow the oil and gas industry to spread harmful waste under the guise of recycling. With insufficient governmental oversight and a safety standard based on harmful, largely unregulated chemicals, the coproduct regulations do little to ensure that the waste is not presenting a threat of harm to the public and the environment.

Instead of allowing industry to utilize the coproduct determinations in section 287.8, industry should have to use the beneficial use determination detailed in section 287.7.[265] Section 287.7 allows a producer of residual waste to apply to the DEP for a permit "for the beneficial use of residual waste."[266] To grant a beneficial use permit, the DEP must determine that "[t]he waste will be used as an ingredient in a manufacturing or production process or as a substitute for a commercial product," the waste will not "[h]arm or present a threat of harm to the . . . people or environment . . . through exposure to constituents of the waste," and the waste will not "[p]resent a greater harm or threat of harm than the use of the product or ingredient which the waste is replacing."[267] An additional requirement under the beneficial use permit is that, "[t]he physical character and chemical composition of the residual waste contributes to the usefulness of the product, and nothing in the physical character or chemical composition of the waste interferes with the usefulness of the product."[268] Finally, section 287.7 gives the DEP the authority to revoke a beneficial use determination if the DEP

263. *See* 22 Pa. Bull. 3392 (July 4, 1992); discussion *supra* Part IV.
264. *See* 22 Pa. Bull. 3392 (July 4, 1992).
265. *See* 25 PA. CODE § 287.7 (2023).
266. *Id.* § 287.7(a).
267. *Id.* § 287.7(b)(2)(i)–(ii).
268. *Id.* § 287.7(b)(2)(iii).

concludes that the use of the residual waste does not meet the requirements of section 287.7.[269]

In some ways, the beneficial use regulations are fairly similar to the coproduct regulations, in that both require the residual waste to present an equal or lesser threat of harm to the environment and the public health than the commercial product it is replacing.[270] However, the beneficial use regulations contain additional requirements, which provide greater protection of public health and the environment than the coproduct regulations.[271] While the coproduct regulations rely on industry to self-determine when it has met the coproduct requirements with the possibility that the DEP may request documentation of the coproduct determination *after* the residual waste has been used, the beneficial use regulations require the DEP to issue a permit *before* residual waste producers can use their waste in the environment.[272] Instead of relying on the good faith of industry with minimal if any governmental oversight like the coproduct regulations, the beneficial use regulations require governmental approval in the form of permits.[273] Moreover, the residual waste must be "useful" with "nothing in the physical character or chemical composition of the waste interfer[ing] with the

269. *Id.* § 287.7(c) (explaining that "[t]he Department may revoke a determination under this section if the use of the material does not meet the requirements of this section").

270. *Compare id.* § 287.8(a) ("A proposed coproduct may not present a greater threat of harm to human health and the environment than the use of an intentionally manufactured product or produced raw material."), *with* § 287.7(b)(2)(ii)(B) (requiring the residual waste to not "[p]resent a greater harm or threat of harm than the use of the product or ingredient which the waste is replacing").

271. *Compare id.* § 287.8(a), (c) (requiring a proposed coproduct to either present a lesser threat than the intentionally manufactured product or produced raw material it is replacing, *or* if the proposed requirement does not have a product as a comparison, requiring the proposed coproduct to not present a threat of harm to human health and the environment), *with* § 287.7(b)(2)(ii)(A), (B) (requiring "at a minimum" that the waste will not "[p]resent a greater harm or threat of harm than the use of the product or ingredient which the waste is replacing" *and* that the waste will not "[h]arm or present a threat of harm to the health, safety or welfare of the people or environment").

272. *Compare id.* § 287.8(d) (requiring a person who completes a coproduct determination to maintain documentation of the determination to be given to the DEP "upon request"), *with* § 287.7(a), (c) (mandating the DEP to determine if a residual waste meets the beneficial use requirements before issuing a permit and allowing the DEP to revoke the permit if necessary).

273. *See* § 287.7(a).

usefulness of the product," to qualify for a beneficial use permit.[274] This requirement provides a more sufficient safeguard to prevent sham recycling than the coproduct regulations because the coproduct regulations are silent as to the required usefulness of the residual waste.[275] Under the coproduct regulations, residual waste does not have to be remotely useful to qualify as a coproduct, creating more opportunities for sham recycling.[276] In contrast, the beneficial use regulations require residual waste to be useful before it can be recycled under the permit.[277]

Requiring the oil and gas industry to apply for beneficial use permits to spread its produced water as a dust suppressant instead of using the coproduct regulations would effectively stop the practice of spreading produced water as a dust suppressant.[278] The DEP stopped road spreading of oil and gas produced water under beneficial use permits in 2016 for produced water from unconventional wells and in 2018 for produced water from conventional wells.[279] The fact that oil and gas produced water does not meet the requirements under section 287.7 for beneficial use permits suggests that using the produced water as a dust suppressant is neither beneficial nor safe.[280] Eliminating Pennsylvania's coproduct loophole and relying on the already existing beneficial use regulations would allow industry to continue to recycle residual waste when it is beneficial and safe while preventing sham recycling that can and has occurred under the coproduct regulations with oil and gas produced water.

274. *Id.* § 287.7(b)(2)(iii).

275. *See id.* §§ 287.7(b)(2)(iii), 287.8; 31 Pa. Bull. 238 (Jan. 13, 2001).

276. *See* § 287.8 (excluding any usefulness requirement for a proposed coproduct); *see also* BURGOS ET AL., *supra* note 45, at 88 (explaining that oil and gas produced water, which has been spread by the oil and gas industry as a dust suppressant, is ineffective in suppressing dust on roads).

277. *See* § 287.7(b)(2)(iii).

278. *See* McDevitt, *supra* note 11; Hess, *Millions of Gallons*, *supra* note 79.

279. Hess, *Millions of Gallons*, *supra* note 79; *see also* McDevitt, *supra* note 11.

280. *See* McDevitt, *supra* note 11.

CONCLUSION

Produced water is a high-volume waste product of the oil and gas industry that requires costly disposal,[281] prompting the industry and others interested in various goals such as conserving water and reducing waste to consider produced water for uses beyond disposal.[282] One of these uses is spreading produced water as a dust suppressant on unpaved roads to reduce dust that can lead to public health issues.[283] Since oil and gas produced water is often much cheaper than commercial alternatives, Pennsylvania used produced water as a dust suppressant under its beneficial use regulations until the DEP stopped approving the permits because of environmental and public health concerns.[284] Recent studies have demonstrated that produced water contains harmful components that can harm the environment and public health.[285]

Still, the oil and gas industry has continued to sell its produced water at very low prices or freely give it to municipalities through the use of the coproduct designation in Pennsylvania's regulations.[286] The coproduct regulations create a loophole through which the oil and gas industry can declare its waste as safe for use in the environment by demonstrating that the waste is no more harmful than a commercial product. The problem is that the commercial product the industry often uses as a safety standard is just as harmful and toxic as the produced water itself since it often comes from the same radioactive rock formations the produced water comes from. Although commercial dust suppressant is often harmful, the lack of regulation of

281. *See* GUERRA ET AL., *supra* note 21, at 7–8.

282. *See* Burron & Zobell, *supra* note 30, at 11.

283. *Id.* at 4; *see supra* notes 38–43 and accompanying text; Stallworth et al., *supra* note 38, at 1–2.

284. *See* Hess, *Millions of Gallons*, *supra* note 79; *see also* McDevitt, *supra* note 11 (explaining that the "DEP said it could not authorize [produced water] be disposed or beneficially used under the Solid Waste Management Act without a permit" in 2018); *supra* notes 83–85 and accompanying text.

285. *See generally* BURGOS ET AL., *supra* note 45 (evaluating the environmental impact of dust suppressants used on gravel roads).

286. *See* Hess, *Millions of Gallons*, *supra* note 79; *supra* note 174 and accompanying text.

chemicals in the United States, under a standard that presumes safety, allows products like commercial dust suppressants to be widely used without much regulation. A safety standard of a harmful commercial product, in combination with the fact that the oil and gas industry is allowed to make coproduct determinations itself with little if any oversight from the DEP, allows the industry to engage in the sham recycling of its produced water.

The coproduct regulations contain an inherent dependency on industry self-regulation and the presumption that commercial products are safe. Although the coproduct regulations may have been enacted with the legitimate purposes of reducing waste volumes and creating efficient recycling,[287] the coproduct regulations cannot adequately protect the environment and public health. Requiring industry to use the beneficial use regulations instead of the coproduct regulations would prevent the kind of sham recycling the oil and gas industry has been able to effectuate under the coproduct regulations. The beneficial use regulations require the DEP approval for permits, contain more comprehensive safety standards, and require the waste to be useful.

Eliminating the coproduct regulations would halt the ability of the oil and gas industry to spread produced water on unpaved roads in Pennsylvania since the DEP has stopped approving beneficial use permits for produced water as a dust suppressant. Prohibiting the oil and gas industry from utilizing the coproduct regulations to spread produced water on roads, the same thing the DEP has already determined is detrimental to the environment and public health, is logical. Moreover, closing the coproduct loophole completely ensures that other industries cannot take advantage of regulations that depend on the good faith of industry and the presumptive safety of largely unregulated chemical products.

This Note solely focuses on Pennsylvania's coproduct regulations and how they allow the oil and gas industry to engage in

287. *See* 31 Pa. Bull. 238 (Jan. 13, 2001).

sham recycling of produced water because of two flaws within the regulations: dependence on industry self-regulation and reliance on an inherently unsafe "safety" standard. Although closing the coproduct loophole does not address the use of toxic commercial dust suppressants, it does prevent the oil and gas industry from being able to spread toxic waste in the environment through regulations that contain a safety standard based on largely unregulated, unsafe commercial products. The coproduct regulations are a symptom of the larger problem of the lack of chemical regulation and prioritization of convenience over safety in the United States. Still, treating this one symptom is a positive and necessary step towards improved environmental and public health, especially for those who are often marginalized and bear the brunt of environmental pollution, like Siri Lawson and her rural community in Farmington Township, Pennsylvania.