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# Back to the Farm: A Call to Re-Invigorate New York City's Biosolid Program

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## INTRODUCTION

From late January until April of 2018, Parrish, a small town of 982 residents in Alabama, gained national media attention for being caught in a legal battle over New York City's ("NYC") sewage sludge,[1] "the solid byproduct of wastewater treatment."[2] The situation goes as follows: beginning in early 2017, NYC contracted with a company called Big Sky Environmental ("Big Sky"), which disposed of NYC's sewage sludge at its landfill site[3] in Adamsville, Alabama.[4] The Big Sky landfill is approximately twenty miles east of Parrish. However, another town called West Jefferson, located in between Parrish and the Big Sky landfill, gained an injunction in federal court to keep the sewage sludge from passing through its township.[5] As a result, the "federal court decision stranded roughly 250 containers full of treated" NYC sewage sludge in Parrish.[6] According to Parrish Mayor Heather

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[1] Associated Press, *Small Alabama Town Raises a Big Stink About Abandoned New York City 'poop train'*, U.S.A. TODAY (Apr. 18, 2018), https://www.usatoday.com/story/news/nation/ 2018/04/18/ small-alabama-town-raises-big-stink-abandoned-new-york-city-poop-train/527364002/.

[2] *Wastewater Treatment System*, N.Y.C. ENVTL. PROT., https://www1.nyc.gov/site/dep/water/wastewater-treatment-system.page (last visited Jan. 21, 2019).

[3] Associated Press, *supra* note 1.

[4] Elaine Jones, *Council Denies Business License for Big Sky*, DAILY MOUNTAIN EAGLE (Mar. 1, 2018), http://mountaineagle.com/stories/council-denies-business-license-for-big-sky,15008. According to its website, "Big Sky Environmental owns and operates a 1,525-acre disposal site with an excess of 125 million cubic yards of capacity." *About Big Sky Environmental*, BIG SKY ENVTL., https://www.bigskyenv.com/about_us (last visited Jan. 21, 2019).

[5] Associated Press, *supra* note 1. In a written complaint, West Jefferson's attorney wrote that the sewage sludge "smells of dead rotting animals as well as human waste," and the trains caused the town to become "infested with flies." *Id*.

[6] Nigel Duara, *How New York City's Shit Ended up Stuck on a Train in Alabama*, VICE NEWS (Apr. 16, 2018), https://news.vice.com/en_us/article/ywxeag/how-new-york-citys-shit-ended-up-stuck-on-a-train-in-alabama.

Hall, the smell was "unbearable" in Alabama's humid climate and "it was a nightmare for everybody, especially for those who have breathing problems."[7]

On February 28, 2018, Parrish's town council cast a unanimous vote denying Big Sky the business license to continue operating its shipment of sewage sludge.[8] Finally, in mid-April of 2018, the "poop trains," as they became known through national media coverage, left Parrish.[9] As a result of the Parrish media storm, NYC ended its contract with Big Sky[10] and "has discontinued shipping [its sewage sludge] to Alabama's landfills for the time being."[11]

The controversy in Parrish is illustrative of the historical challenges that NYC has faced in managing its immense, daily deposits of sewage sludge. Part I of this Note will begin by defining sewage sludge and then catalogue how NYC relied on dumping its untreated sewage sludge into the ocean as its primary disposal method until the early 1990s. Part I will also describe the federal legislation that attempted to curtail the widespread dumping of sewage sludge into the ocean. Further, Part I will highlight the legal battle that ensued over NYC's ocean dumping of sewage sludge, which ultimately rallied Congress to pass the Ocean Dumping Ban Act ("ODBA"). Finally, Part I will conclude by describing how the ODBA officially barred NYC from utilizing its coastal dumping method.

Part II of this Note will begin by weighing the disposal options that NYC needed to consider following the passage of the ODBA's federal ban on dumping sewage sludge into the ocean. In lieu of ocean dumping, NYC discovered that it had two primary disposal options for its sewage sludge: the first involved land spreading its sewage sludge in the form of biosolids and the second involved placing its sewage sludge in landfills. Part II will also define biosolids and describe the scientific process of turning sewage sludge into a marketable product for agricultural use. Part II will further discuss the rise and decline of New York's Sludge Management Program, through which NYC sold its treated sewage sludge as biosolids to farmers primarily in the Midwest as a form of fertilizer. Part II will close by discussing NYC's expansion of its landfill contracts—particularly in southern states like Alabama—in order to reduce sewage sludge disposal costs.

Part III of this Note will advocate for NYC to return to using biosolids as the primary method for the disposal of its sewage sludge. Part III will begin by discussing the legal dilemmas facing the landfilling method, as evidenced by the litigation and local governance backlash in Alabama in the spring of 2018. Next, Part III will compare and contrast the public and legal backlash NYC received from landfilling to the positive reaction NYC received when it began selling its sewage

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[7] Jones, *supra* note 4.

[8] *Id*.

[9] Colin Dwyer, *The Poop Train's Reign of Terror in Small-Town Alabama Has Ended*, NAT'L. PUB. RADIO, INC. (Apr. 18, 2018), https://www.npr.org/sections/thetwo-way/2018/04/18/603718526/the-poop-trains-reign-of-terror-in-small-town-alabama-has-ended.

[10] Duara, *supra* note 6; *see also* Dennis Pillion, *New York Stops Sewage Trains to Alabama Landfill*, AL.COM (Mar. 12, 2018), https://www.al.com/news/index.ssf/2018/03/new_york_halts_sewage_trains_t.html.

[11] Associated Press, *supra* note 1.

sludge as biosolids to farmers in states like Colorado in the early 1990s. Unlike the landfill backlash in Alabama, NYC's biosolids gained traction largely due to advocacy from the agricultural community. Finally, Part III will advocate for NYC to return to using biosolids because they are more environmentally sustainable. This portion of Part III will discuss how the finite amount of land that is usable for purposes of landfilling is shrinking, while in contrast, biosolids are environmentally beneficial because they have the capability of restoring the natural phosphorus cycle.

This Note will conclude by summarizing how biosolids avoid the legal pitfalls of landfilling, and instead, offer a way for cities to market their waste to an enthusiastic agricultural consumer with an environmentally sustainable product. The conclusion will also emphasize how NYC can serve as a model for other cities interested in developing sustainable waste management systems for their sewage sludge.

## I. THE HISTORICAL PRACTICE OF OCEAN DUMPING

### A. THE EVOLUTION OF OCEAN DUMPING

Before discussing NYC's solutions to sewage sludge management, it is important to define two important terms. The first is "sewage sludge" and the second is "ocean dumping." Sewage sludge is the by-product that comes from municipal wastewater treatment, which often contains a variety of toxic materials such as "PCBs, petroleum hydrocarbons, heavy metals, and pathogenic bacteria and viruses."[12] Ocean dumping, broadly speaking, involves the deliberate disposing of wastes, including sewage sludge, at sea.[13]

NYC's sewage sludge story began in 1884, when NYC first took steps to deal with its growing sewage problem by directing its sewage into stream banks flowing out of NYC.[14] However, this redirection of the sewage into the stream banks deteriorated the NYC Harbor, so in 1938, NYC began dumping its sewage sludge into the ocean.[15] NYC dumped its sewage sludge twelve miles off the coast of New York and New Jersey[16] in a waterway known as the New York Bight Apex.[17]

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[12] Charles B. Anderson, *Ocean Dumping and the Marine Protection, Research and Sanctuaries Act*, 1 LOY. MAR. L.J. 79, 80 (2002). The term "PCBs" refers to "a group of man-made organic chemicals consisting of carbon, hydrogen and chlorine atoms." PCBs were used "in hundreds of industrial and commercial applications" until they were banned for their cancer-causing effects and for negatively impacting the "immune system, reproductive system, nervous system, endocrine system" in 1979. *Learn about Polychlorinated Biphenyls (PCBs)*, ENVTL. PROT. AGENCY, https://www.epa.gov/pcbs/learn-about-polychlorinated-biphenyls-pcbs (last visited Jan. 22, 2019).

[13] Anderson, *supra* note 12, at 80.

[14] Marla Weinstein, From Waste to Plate: Examining the Role of Urban Biosolids in Recycling Phosphorus (May 2013) (unpublished M.S. thesis, Columbia University).

[15] *Id.*

[16] U.S. v. N.Y., 972 F.2d 464, 466 (2d Cir. 1992).

[17] Anderson, *supra* note 12, at 86.

By 1970, there was a growing, national concern about the environmental impact of ocean dumping,[18] which was largely unregulated.[19] At that point in time, regulation of ocean dumping was "piecemeal" with no federal agency authorized to comprehensively regulate it, so states were limited to regulate only within three miles off their respective shores.[20] The first major step against ocean dumping came in October of 1970 when President Nixon commissioned the Council on Environmental Quality (CEQ) to research and report on the environmental impact of ocean dumping on the ocean's overall health.[21] The CEQ's report advocated for Congressional action to prevent "consequential" environmental harm.[22] The report found the waste being dumped into the ocean to be toxic to humans and marine wildlife.[23] Further, continued dumping would lead to a depletion of the oxygen necessary "to maintain the marine ecosystem," a negative economic impact from a reduction in healthy fish populations, and lasting damage to the ocean's aesthetic values.[24]

### B. THE FIGHT FOR A FEDERAL BAN ON OCEAN DUMPING

Congress responded to the CEQ's alarming report by passing the Marine Protection, Research and Sanctuaries Act ("MPRSA") on October 23, 1972, which had the primary purpose "(1) to regulate, as much as possible, all disposal of wastes in ocean waters; and (2) to limit strictly the dumping into ocean waters of any material which would adversely affect human health and the environment."[25] Although Title I of the MPRSA prohibited most kinds of dumping, it still allowed ocean dumping in the limited circumstances pursuant to a permit issued jointly by the Environmental Protection Agency ("EPA") and the U.S. Army Corps of Engineers.[26]

In 1977, Congress was dissatisfied "with the EPA's progress in curtailing the ocean dumping of sewage sludge," which largely continued under the MPRSA's permit system, and so it amended the MPRSA.[27] This amendment banned "the

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[18] *Id*. at 81-82.

[19] John A. Guarascio, *The Regulation of Ocean Dumping After City of New York v. Environmental Protection Agency*, 12 B.C. ENVTL. AFF. L. REV. 701, 702 (1985).

[20] *Id*. at 710-11.

[21] Anderson, *supra* note 12, at 82.

[22] Guarascio, *supra* note 19, at 710.

[23] *Id*.

[24] *Id*.

[25] Guarascio, *supra* note 19, at 711; *see also* Anderson, *supra* note 12, at 84. The MPRSA includes three titles: Title I prohibited the transport of certain materials to be dumped in the ocean and created a system to gain permit to ocean that is jointly regulated by the EPA and the Corps of Engineers. 33 U.S.C. § 1412(a) (2018); 33 U.S.C. §§ 1411-1440 (2018); 33 U.S.C. §§ 1413(a)-(b) (2018). Title II of the MPRSA authorizes research on the environmental impact of ocean dumping on the oceanic and coastal ecosystems and the investigation of alternative disposal methods as a replacement of ocean dumping. 3 U.S.C. §§ 1441-1443 (2018). Title III authorizes the Secretary of Commerce to designate conservation sites. 16 U.S.C. § 1432 (2000).

[26] Anderson, *supra* note 12, at 84.

[27] *Id*. at 85. The EPA developed a pattern of "issuing interim permits to municipalities which were

dumping of all sewage sludge which did not meet EPA criteria by December 31, 1981."[28] However, the 1977 amendment left an unintended loophole for ocean dumping by defining sewage sludge as waste that "unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, and economic potentialities."[29]

While the federal government attempted to crack down on ocean dumping, NYC found itself unable to dispose of its waste through means of land disposal and sued the EPA to gain an interim permit to continue to dump its sewage sludge into the ocean past the 1981 deadline.[30] At the time of the lawsuit, NYC was dumping 260 dry tons of sewage sludge into the New York Bight Apex on a daily basis.[31] The EPA defended its termination of the interim permits by claiming the "1977 amendment was an absolute ban on ocean dumping after the 1981 deadline" and it no longer needed to consider the reasonableness or feasibility of NYC's dumping.[32] The United States District Court for the Southern District of New York analyzed the 1977 amendment's statutory language and held that NYC was entitled to summary judgment.[33] The court held the "1981 deadline remains intact, but only for dumping that EPA determines . . . will unreasonably degrade the environment," and the EPA must allow NYC to apply for an interim permit.[34]

Congress responded to the decision in *New York v. U.S. Environmental Protection Agency* by passing the ODBA in 1988.[35] The ODBA "amend[ed] the MPRSA to make it unlawful to dispose of *all* sewage sludge and (except on an emergency basis) industrial waste after December 31, 1991."[36] Along with its

unable to obtain general or special permits to dump sewage sludge because the sewage sludge contained concentrations of prohibited toxic materials." *Id*. The justification for these interim permits was that there were "no economically feasible alternatives." *Id*. These interim permits conditioned on promises of phasing out of ocean dumping and replacing it with "the development of acceptable land-based disposal alternatives." *Id*.

[28] *Id*. at 85; *see also* Pub. L. No. 95-153, § 4, 91 Stat. 1255 (1977) (codified as amended at 33 U.S.C. § 1412(a) (2018)).).

[29] Anderson, *supra* note 12, at 84 (citing Pub. L. No. 95-153, § 4, 91 Stat. 1255 (1977) (codified as amended at 33 U.S.C. § 1412(a) (1977))).

[30] *Id*. at 86; *see also* New York v. U.S. Envtl. Prot. Agency, 543 F. Supp. 1084, 1085 (S.D.N.Y. 1981).

[31] New York v. U. S. Envtl. Prot. Agency, 543 F. Supp. at 1085.

[32] Guarascio, *supra* note 19, at 722; *see also* New York v. U. S. Envtl. Prot. Agency, 543 F. Supp. at 1086.

[33] New York v. U. S. Envtl. Prot. Agency, 543 F. Supp. at 1115.

[34] *Id*.

[35] Anderson, *supra* note 12, at 88. The ODBA works in conjunction with the Clean Water Act to regulate all discharges into navigable waters. CLAUDIA COPELAND, CONG. RES. SERV., OCEAN DUMPING ACT: A SUMMARY OF THE LAW 4 (2016), https://fas.org/sgp/crs/misc/RS20028.pdf. These include territorial seas. *Id*. To avoid regulatory overlap between the two statutes, the EPA promulgated a uniform set of regulatory standards under 40 CFR Parts 220-229 where the ODBA preempts the CWA for control of coastal waters and open oceans, while the CWA retains controls over estuaries. *Id*. States are left the ability to control ocean dumping in the waters that fall within their jurisdictions under limited circumstances. *Id*.

[36] Anderson, *supra* note 12, at 88. Public criticism of sewage sludge ocean dumping arose after the summer of 1988, when the New York and New Jersey coasts experienced significant pollution. Edward McCann, *Terminating Ocean Dumping of Municipal Sewage Sludge: A Political Solution to an Environmental Problem*, 9 TEMP. ENVTL. L. & TECH. J. 69, 100 (1990). The mounting public outcry led to

prohibition on dumping by the end of 1991, the ODBA also included court orders that required NYC and other ocean dumpers to follow schedules for when their dumping practices would cease.[37]

With ocean dumping effectively banned, NYC was suddenly left with a major dilemma: what to do with all of its sewage sludge?

## II. WEIGHING OPTIONS

Following the passage of the ODBA, NYC considered "three commercially feasible alternatives to disposing waste in the medium of ocean water: landfilling, land spreading, and incineration."[38] The first option, landfilling, "is a process which involves impounding waste in storage lagoons, basins[,] or pits."[39] The second option, land spreading, involves using the sewage sludge as biosolids, which are defined as treated sewage sludge that can be applied to soil as a fertilizer.[40] The third option is incineration, or burning sewage sludge.[41]

Despite being an effective mode of destruction, the incineration method releases a variety of atmospheric gases, which are barred by environmental legislation, like the Clean Air Act, because of the negative environmental impact that results from the particulates entering the atmosphere during the burning.[42] With the incineration option off the table, NYC was essentially left with two options to deal with its sewage sludge problem: land spreading its sewage sludge as biosolids or relying on landfills to store the sewage sludge. The subsequent portion of this Part will discuss how NYC developed a system for disposing of sewage sludge.

### A. WHAT ARE BIOSOLIDS?

As previously mentioned, sewage sludge "is the solid byproduct of wastewater treatment."[43] According to the New York State Department of Environmental Conservation Division of Materials Management Bureau of Waste Reduction & Recycling, biosolids are the recyclable byproduct that are created as a result of

pressure for state legislation and to promises by NYC to cease sewage sludge dumping in the ocean by 1998. *Id*. Congress was skeptical of this promise and pushed ahead with the ODBA to end ocean dumping of sewage sludge by 1992. *Id*. at 101-02.

[37] *Reilly in New York to Mark End of Sewage Sludge Dumping*, ENVTL. PROTECTION AGENCY, https://archive.epa.gov/epa/aboutepa/reilly-new-york-mark-end-sewage-sludge-dumping.html (last visited Mar. 8, 2019). The ODBA required NYC to work closely with the EPA to draw terms for their ocean dumping cessation. *Id*. The ODBA also imposed a $600 penalty (which would rise every subsequent year) for every dry ton dumped in the ocean beyond the allotted grace period. Anderson, *supra* note 12, at 89.

[38] Guarascio, *supra* note 19, at 707.

[39] *Id*.

[40] Weinstein, *supra* note 14, at 13.

[41] Guarascio, *supra* note 19, at 707.

[42] *Id*. at 708. The ash that is produced during the incineration process is problematic because it tends to "concentrate heavy metals and disperse them into the atmosphere." *Id*.

[43] N.Y.C. ENVTL. PROT., *supra* note 2.

sewage treatment at a Publicly Owned Treatment Works ("POTWs").[44] When sewage sludge gets treated, there are two residual byproducts. The first byproduct is the treated liquid, effluent, which "is typically discharged to a nearby stream."[45] The second byproduct is the "solid or semi-solid organic" materials which gets removed from the sewage sludge during treatment.[46]

Turning sewage into biosolids is a multi-step process. First, the raw sewage enters a POTWs,[47] where it flows through a series of pools and pumps designed to separate the effluent from the sewage sludge.[48] The first step is to skim the fats, greases, and oils from the flowing sewage off the surface.[49] The sewage is pooled, and the solid sewage sludge collects in the bottom of the pool where it is then separated from the effluent.[50]

The next step in further separating the effluent from the sewage sludge is known as the digestion process.[51] The digestion process works in the same way that the human body digests food.[52] The pool of sewage sludge gets heated to ninety-eight degrees, like the human body, and then POTW employees introduce a variety of bacteria into the sewage sludge.[53] The digestion process is a "form of processing that improves the quality of the material" and is an important step in the creation of biogas.[54]

Following the digestion process, the sewage enters a centrifuge where the fluid is rapidly spun.[55] This process, known as the "dewatering process," separates the effluent from the solid material in the sewage.[56] This remaining solid material is sewage sludge and has the consistency of "moist soil."[57] After undergoing the dewatering process, "the leftover solid product of the processed sludge is generally referred to as 'biosolids.'"[58] Every day, NYC generates approximately 1,200 tons of biosolids.[59]

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[44] N.Y. STATE DEP'T OF ENVTL. CONSERVATION DIV. OF MATERIALS MGMT. BUREAU OF WASTE REDUCTION & RECYCLING ("NYSDEC"), NYSDEC SOLID WASTE FACTS 1 (1999). POTWs are sewage treatment plants that are frequently publicly owned and operated by government agencies.

[45] *Id*.

[46] *Id*.

[47] *Id*. at 7.

[48] Radiolab, *Poop Train*, WNYCSTUDIOS.ORG, https://www.wnycstudios.org/story/poop-train (Sept. 24, 2013).

[49] *Id*.

[50] *Id*.

[51] N.Y.C. ENVTL. PROT., *supra* note 2.

[52] Radiolab, *supra* note 48.

[53] *Id*.

[54] N.Y.C. ENVTL. PROT., *supra* note 2.

[55] Radiolab, *supra* note 48.

[56] N.Y.C. ENVTL. PROT., *supra* note 2.

[57] Radiolab, *supra* note 48.

[58] N.Y.C. ENVTL. PROT., *supra* note 2.

[59] *Biosolids Management Program*, N.Y.C. ENVTL. PROT., http://www.nyc.gov/html/dep/html/wastewater/biohome.shtml [https://web.archive.org/web/20190308194632/http://www.nyc.gov/html/dep/html/wastewater/biohome.shtm

Biosolids can be "removed from the treatment plant for [landfill] disposal or beneficial use."[60] Biosolids that are used for beneficial use are typically "mixed with a highly alkaline material, such as lime or Portland cement," to create a biosolid product that "resembles soil and is used as an agricultural liming agent."[61]

Before a biosolid can be used for a beneficial use or disposed of in a landfill, it must be stabilized to remove harmful organisms.[62] "Stabilization" refers to the process that reduces "the concentration of harmful (disease-causing) organisms, odor, and in some cases the volume, of the biosolids."[63] There are a variety of ways to stabilize biosolids. As previously mentioned in the description of wastewater treatment, the digestion process is one form of stabilization because it aids in the "break down [of] the complex organic substances found in untreated biosolids."[64] Also, previously mentioned, biosolids are commonly mixed with "alkaline material, such as lime, or Portland cement."[65] This process, known as "lime stabilization," raises the pH of the biosolids which causes a reduction in "the concentration of disease-causing organisms and reduces the odor of the material."[66] Finally, air drying biosolids "on a sand bed or paved surface for an extended period of time" can be used to stabilize biosolids, by evaporation creating a drier, safer product.[67]

In order for biosolids to be sold commercially, they must undergo additional stabilization and disinfection treatments.[68] "Advanced stabilization" is a term for a variety of methods that "reduce harmful organisms to below detectable levels," so that the biosolids can be sold as "a marketable product."[69] Depending on which of these methods is used, different kinds of marketable forms of biosolids are created.[70] One method for advanced stabilization is composting, "an aerobic biological process that accelerates the natural decomposition process under controlled conditions."[71] By putting the biosolids through the dewatering process and then mixing them with "wood chips or yard waste," the mixture can "decompose in an aerobic environment."[72] Another process, known as heat drying or pelletization (for the pellet shapes created by the process), relies on driers to "remove most of the water

l] (last visited Oct. 2, 2019).

[60] NYSDEC, *supra* note 44, at 1.

[61] N.Y.C. ENVTL. PROT., *supra* note 59.

[62] NYSDEC, *supra* note 44, at 1-2.

[63] *Id*. at 1.

[64] *Id*.

[65] N.Y.C. ENVTL. PROT., *supra* note 59.

[66] NYSDEC, *supra* note 44, at 1.

[67] *Id*.

[68] William Goldfarb et al., *Unsafe Sewage Sludge of Beneficial Biosolids?: Liability, Planning, and Management Issues Regarding the Land Application of Sewage Treatment Residuals*, 26 B.C. ENVTL. AFF. L. REV. 687, 688 (1999).

[69] NYSDEC, *supra* note 44, at 2.

[70] *Id*.

[71] *Id*.

[72] *Id*. (explaining that the mixture creates "a humus or soil-like material typically used for landscaping and other soil amendments").

from biosolids."[73] Finally, a third advanced stabilization process is known as "chemical fixation." Chemical fixation is like the lime stabilization method, which raises the pH of the biosolids, but this process involves adding "sufficient alkaline material" so that heat is produced to treat the biosolids.[74]

Proper stabilization is key for biosolids to be recycled for beneficial reuses because biosolids are regulated by Section 405 of the Clean Water Act ("CWA") of 1972, as amended.[75] Since 1993, biosolids have fallen under the National Pollutant Discharge Elimination System permit program and Part 503 Standards for the Use or Disposal of Sewage Sludge (the "503 Rule").[76] Further, the 503 Rule "establishes standards, which consist of general requirements, pollutant limits, management practices, and operational standards" for biosolid treatment, the land spreading biosolids, the disposal of biosolids in landfills, and the incineration of biosolids.[77]

The 503 Rule establishes biosolid standards including "pathogen and alternative vector attraction reduction requirements" for both the land spreading biosolids and the disposal of biosolids in landfills.[78] As previously described, there are a variety of methods for removing pathogens. The 503 Rule dictates that there are two classes of biosolids based on their level of pathogens, and these classifications, in turn, determine public access. Biosolids that qualify as Class A must pass a stricter degree of stabilization and—upon that stabilization—can "be applied to lawns, home gardens, or other types of land, or bagged for sale."[79] While public access to Class A is unrestricted, Class B biosolids require less stabilization and have higher pathogen levels, so they must be restricted.[80] As a result, 503 Rules directs that Class

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[73] *Id*. (explaining that as a result of the heat, the resultant pellets can be sold "as a fertilizer or for soil conditioning purposes").

[74] *Id*. (explaining that the resulting product is a liming agent commonly found in agriculture products).

[75] *Biosolids Laws and Regulations*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/biosolids/biosolids-laws-and-regulations (last visited Jan. 21, 2019).

[76] *Id*.

[77] *Id*.

[78] *Id*. The standards outlined in the 503 Rule were developed from the "results of risk assessments for chemicals that began in the mid-1970s." Qin Lu et al., *Land Application of Biosolids in the USA: A Review*, 2012 APPLIED & ENVTL. SOIL SCI. 1, 2 (2012). These assessments and the standards that came from them were "more extensive than any previous federal rulemaking effort for sludge, and established biosolids quality requirements for its land application." *Id*.

[79] Qin Lu et al., *supra* note 78, at 2. To be marketable as a Class A biosolid, manufacturers must ensure that the biosolids have "less than 3 MPN per 4 grams total solids biosolids (dry weight basis) for density of *Salmonella* sp., less than 1 PFU per 4 grams total solids biosolids (dry weight basis) for enteric viruses, and less than 1 viable helminth ova per 4 gram total solids biosolids (dry weight basis) for viable helminth ova." *Id*.

[80] *Id*. Class B "requires a fecal coliform density in the treated sewage sludge (biosolids) of 2 million MPN or CFU per gram total solids biosolids (dry weight basis). Viable helminth ova are not necessarily reduced in Class B biosolids." *Id*. The term *fecal coliforms* refers to a substance's density of bacterial pollution. B. E. Jimenez-Cisneros, *Helminth Ova Control in Wastewater and Sludge for Agriculture Reuse*, 2 WATER & HEALTH 1, 5 (2007). Helminth ova are parasitic worms, which rely on a host to survive. *Id*. at 3. Since the helminth ova cannot live on their own because of their need for a host to survive, the stabilizing process deals with removing the eggs of the helminth ova from biosolids. *Id*. at 1-3. The EPA and the World Health Organization ("WHO") are particularly concerned about helminth ova egg elimination because of the physical havoc that these eggs can wreak on the host. *Id*. If ingested, the eggs from helminth ova can cause

B biosolids "limit crop harvesting, animal grazing, and public access for a certain period of time."[81]

## B. NYC'S HISTORY WITH BIOSOLIDS

Following the passage of the ODBA, the NYC Department of Environmental Protection created the 1990 Sludge Management Act ("NYC's Biosolid Program"), which included the "establishment of contracts between [NYC] and private companies to process and beneficially reuse all city biosolids."[82] NYC saw that it had the opportunity to turn its waste into a beneficial and marketable product.[83] As NYC ventured into the biosolid market, a fascinating tale unfolded that is characterized by bias, perseverance, immense success, and rapid decline due to externalities.

To be clear, NYC was not revolutionary when it came to marketing biosolids. At this time, other cities were in the biosolid business as well. For example, King County had been spreading its "Loop" biosolids throughout the Pacific Northwest since 1976.[84] Further, Milwaukee, the oldest producer of biosolids, had been marketing its "Milorganite," a slow-releasing nitrogen fertilizer, since 1926.[85] While

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serious health problems, particularly in the intestines, including "intestinal wall damage, hemorrhages, deficient blood coagulation and undernourishment." *Id*. at 3. Within the host, the helminth ova continue to hatch eggs, with female helminth ova producing around twenty-seven million. *Id*. Further, helminth ova eggs are harder to stabilize than bacteria because "in contrast to fecal coliforms, helminth ova cannot be inactivated with chlorine, UV light or ozone." *Id*. at 5. As a result, the 503 Rule creates strict standards on helminth ova levels in Class A biosolids and also restricts access to Class B biosolids for concern about helminth ova exposure. Qin Lu et al., *supra* note 78, at 2.

[81] Qin Lu et al., *supra* note 78, at 2. It is important to note that there have been serious critiques of the EPA's Part 503 as being insufficient to properly gauge the safety of biosolids. In 2002, the National Research Council made the following suggestion:

"There is no documented scientific evidence that the Part 503 rule has failed to protect public health. However, additional scientific work is needed to reduce persistent uncertainty about the potential for adverse human health effects from exposure to biosolids. There have been anecdotal allegations of disease, and many scientific advances have occurred since the Part 503 rule was promulgated. To assure the public and to protect public health, there is a critical need to update the scientific basis of the rule to (1) ensure that the chemical and pathogen standards are supported by current scientific data and risk-assessment methods, (2) demonstrate effective enforcement of the Part 503 rule, and (3) validate the effectiveness of biosolids-management practices." NAT'L RES. COUNCIL, BIOSOLIDS APPLIED TO LAND: ADVANCING STANDARDS & PRACTICES 1, 4 (2002).

In the fall of 2018, the EPA launched an investigation into the safety of biosolids, and Jill Trynosky, a project manager with the inspector general's office, quoted on the EPA's podcast that "the EPA is unable to state whether, and at what level, the pollutants found in biosolids pose a risk to human health or the environment." Jennifer A. Dlouhy, *EPA Watchdog Questions Safety of Sewage Used as Fertilizer*, BLOOMBERG (Nov. 15, 2018), https://www.bloomberg.com/news/articles/2018-11-15/safety-of-sewage-used-as-fertilizer-questioned-by-epa-watchdog. These critiques of Part 503, particularly the recent EPA investigation, have made me interested in doing further research on the safety of biosolids on local environments and the efficacy of Part 503.

[82] Weinstein, *supra* note 14, at 16.

[83] Radiolab, *supra* note 48.

[84] *What is Loop?*, LOOP, https://www.loopforyoursoil.com/what-is-loop/ (last visited Jan. 25, 2019).

[85] *Environmental Stewardship: Milorganite*, MILORGANITE, https://www.milorganite.com/about-us (last

other cities may have been marketing their biosolids for decades, the NYC Biosolid Program was unique because of the scale of its sewage sludge available for reuse as biosolids.[86] However, unlike Milwaukee and King County which successfully marketed their biosolids programs, NYC struggled to find buyers for its product.[87] The reason why NYC had difficulty procuring agricultural contracts was largely due to negative perceptions of the waste coming from NYC.[88] Mike Sharp, the program development director of NYC's Biosolid Program, was tasked with not only procuring contracts from states with substantial agricultural need for biosolids, but also changing local misconceptions of the risks of biosolids from NYC.[89] State after state refused Sharp's proposals while still accepting biosolids from other cities.[90]

Michael Specter, an author for *The New York Times*, interviewed individuals about their concerns over the use of NYC biosolids in a 1993 article that was entitled *Ultimate Alchemy: Sludge to Gold; Big New York Export May Make Desert, and Budget, Bloom*.[91] Some of the concerns surrounding NYC biosolids included unsupported fears that since the biosolids were from NYC, they were particularly dangerous and contained "nuclear waste" or the "virus that causes AIDS."[92] These fears were persistent despite the biosolids being thoroughly checked for pollutants by employees at the sewage processing plants in New York, then by the EPA,[93] then before being "sealed in freight or truck containers," then checked "again by local health officials when it reach[ed] its destination," and "then constantly monitored once it is applied to the ground."[94]

While the public fear-mongered and rallied against biosolids, farmers, who were the groups that dealt directly with the physical product and observed its agricultural benefits, fought for the product.[95] Farmers praised the biosolids for restoring nitrogen and phosphorus levels to their soil and because, "unlike chemical fertilizers, [a biosolid] releases its nutrients slowly, making the soil stable and spongy so it can absorb and hold more water."[96]

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visited Jan. 25, 2019).

[86] Radiolab, *supra* note 48. In 1990, the population of NYC was 7,322,564 according to census data. *Decennial Census - Census 2000*, NYC DEPARTMENT OF CITY PLANNING, https://www1.nyc.gov/site/planning/data-maps/nyc-population/census-summary-2000.page (last visited Jan. 25, 2019). In 2013, Radiolab reported that every day, NYC produces 125 million gallons of sewage sludge, which is enough sewage sludge to fill the Rose Bowl in Pasadena, California. Radiolab, *supra* note 48.

[87] Radiolab, *supra* note 48.

[88] Michael Specter, *Ultimate Alchemy: Sludge to Gold; Big New York Export May Make Desert, and Budget, Bloom*, N.Y. TIMES (Jan. 25, 1993), https://nyti.ms/29jgVcp.

[89] Radiolab, *supra* note 48; *see also* Lori Irvine & Anne Bonelli, *Beneficial Use of Biosolids*, AMERICAN CITY & COUNTY (Oct. 1, 2000), https://www.americancityandcounty.com/2000/10/01/beneficial-use-of-biosolids/.

[90] Radiolab, *supra* note 48.

[91] Specter, *supra* note 88.

[92] *Id*.

[93] *See supra* Section II.A (regarding 503 Rules).

[94] Specter, *supra* note 88.

[95] Radiolab, *supra* note 48.

[96] Specter, *supra* note 88.

Despite these agricultural benefits, public opinion remained set against NYC biosolids. In fact, the debate over biosolids turned to tension between businesses and farmers and many residents and public officials.[97] For example, in Oklahoma, while farmers contracted with NYC for biosolids, "opposition by many residents and public officials [was] so intense that a plan to ship 1,150 tons a day was defeated after more than a year of suits, bitter letters and direct action."[98] Sharp became so desperate to unload some of the biosolids that he even began offering to give NYC biosolids away for no cost.[99]

Eventually, with the support of a few key farmers in Colorado, the NYC Biosolid Program had its first contract.[100] Colorado was the first state that truly embraced NYC's Biosolid Program.[101] In 1992, the first train, packed with several thousand tons of NYC biosolids, traveled west to Colorado.[102] The success was not immediate, with only a handful of farms using the biosolids because public resistance remained high.[103] However, the biosolid contracts between Colorado and NYC flourished because the biosolids positively influenced Colorado's wheat production and reduced some of the pests that affected the state's agricultural production.

The reason that Colorado came to crave NYC biosolids is because Colorado is a large wheat producer,[104] and Colorado farmers found that the NYC biosolids worked particularly well on their wheat crops.[105] Dryland winter wheat harvesters used about seventy-five percent of the biosolids that Colorado procured, and the remainder was placed on "rangeland, sand dunes, irrigated alfalfa and irrigated corn."[106] Wheat farmers found that by using NYC biosolids, they could increase their wheat production.[107] These early biosolid users also found that NYC biosolids deterred damage from the Russian wheat aphid,[108] a particularly insidious insect, which feeds on wheat crops.[109] In addition, the number of prairie dogs—another

[97] *Id*.

[98] *Id*.

[99] Radiolab, *supra* note 48.

[100] *Id*.

[101] *Id*.

[102] *Id*.

[103] *Id*.

[104] COLO. DEP'T OF AGRIC., MKTS. DIVISION, COLO. AGRIC. FROM A TO Z 1-2 (2018). In 2016, Colorado's wheat industry sold $300 million in wheat products. *Id*.

[105] Radiolab, *supra* note 48.

[106] Irvine & Bonelli, *supra* note 89.

[107] Radiolab, *supra* note 48. One of the early farmers to use NYC biosolids found his crops to increase about a third from the previous year before the NYC biosolids were used. *Id*.

[108] *Id*.

[109] Aubrey A. Weiland et al., *Biotypic Diversity in Colorado Russian Wheat Aphid (Hemiptera: Aphididae) Populations*, 101 J. ECON. ENTOMOLOGY 569, 569 (2008). The Russian wheat aphid is a small insect that feeds on grain. *Id*. When these pests consume wheat, they leave "longitudinal streaking and rolling of plant leaves," which can lead to a reduction in plant height, shoot weight, number of spikes through the jointing stage, and yield per plant." *Id*. From 1987 to 1993, these insects caused annually around $127 million per year globally in direct and indirect costs. *Id*.

agricultural pest that resides in the fields of Colorado—was also reduced where NYC biosolids were laid.[110]

Colorado and NYC would go on to build the strongest biosolid land application program in the country.[111] Thousands of pounds of biosolids moved across the country from NYC to be applied on Colorado farms yearly.[112] As NYC's Biosolid Program gained traction in Colorado, NYC was providing, on average, enough biosolids to cover 10,000 acres of land in Colorado, yet there was enough farmer demand for 50,000-75,000 acres of farmland to be covered with biosolids.[113] These figures show the popularity of NYC biosolids in the 1990s and how NYC could not keep up with the demand from the agricultural community.[114]

In 1998, after successfully marketing its biosolids in Colorado, NYC entered three fifteen-year contracts with private companies.[115] NYC entered into its first contract with Colorado's Environmental Protection and Improvement Control ("EPIC").[116] Initially, this relationship was limited to the NYC biosolids being directly applied to the Colorado farms, but beginning in 2004, EPIC subcontracted with Parker Ag Services LLC, which began to treat NYC biosolids through alkaline stabilization to create and market their own fertilizer products.[117] NYC's second contract was with the New York Organic Fertilizer Company ("NYOFCo") to produce fertilizer pellets through thermal drying.[118] Finally, NYC entered into the third fifteen-year contract with Tully Environmental whereby its biosolids "were processed with a combination of alkaline stabilization and composting" to be "employed for mine reclamation, restoring nutrients to landscapes deteriorated by mining practice."[119]

These three fifteen-year contracts accounted for seventy percent of NYC's beneficial reuse of its biosolids with the remaining thirty percent coming from short-term contracts.[120] As a result, from 1998-2009, one hundred percent of NYC's biosolids were dedicated to beneficial reuse.[121] However, the success of NYC's

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[110] Radiolab, *supra* note 48. The Colorado farmers who used the NYC biosolids believed that the human scent that emitted from the biosolids deterred prairie dogs. *Id*.

[111] Irvine & Bonelli, *supra* note 89.

[112] *Id*.

[113] Radiolab, *supra* note 48. Looking at the total land application of biosolids in Colorado from 1998 to 1999 shows the drastic jump in demand for the product. In 1998, "12,715 wet tons of biosolids were applied to land" in Colorado, and the following year, "in 1999, 36,875 wet tons were applied," which covered approximately 40,000 acres of farmland. Irvine & Bonelli, *supra* note 89.

[114] Radiolab, *supra* note 48.

[115] Weinstein, *supra* note 14, at 16.

[116] *Id*. The EPIC contract was NYC's most successful because it "was responsible for the beneficial reuse of approximately twenty percent of NYC biosolids per year." *Id*.

[117] *Id*. at 16; *see also General Information*, PARKER AG SERVICES, LLC, http://www.parkerag.com/Profile/About.htm (lasted visited Jan. 25, 2019).

[118] Weinstein, *supra* note 14, at 16. A majority of these pellets are sold to citrus groves in Florida. *Id*.

[119] *Id*.

[120] *Id*. at 17.

[121] *Id*.

biosolids reuse program would all change with the onset of the 2008 financial crisis.[122]

### C. THE RISE OF LANDFILLS

With the onset of the 2008 financial crisis, NYC pressured its biosolid operators in states like Colorado to reduce costs.[123] Eventually, with operators unable to keep up with these demands, NYC ended many of its biosolids contracts.[124] For example, in 2010, NYC ended its contract with NYOFCo, which had been set to expire in 2013.[125] Ending the NYOFCo contract was a major blow to the NYC Biosolid Program because the NYOFCo contract had been responsible for the disposal of half of NYC's sewage sludge for beneficial reuse as biosolids.[126]

Mayor Bloomberg's administration found itself promising to continue to promote the beneficial reuse of biosolids based on its green environmental policies while also promising to reduce sewage sludge disposal costs.[127] In a press release, the Department of Environmental Protection ensured that NYOFCo's replacement contract, WeCare Organics, would be able to achieve both of these commitments.[128] In reality, however, the WeCare contract and other subcontracts resulted in a major reduction in beneficial reuse of biosolids with a rise in cheaper landfill application.[129] By the end of 2012, NYC's commitment of one hundred percent beneficial reuse of its sewage sludge "had fallen to just 18%," and the remaining eighty-two percent of its sewage sludge being disposed in landfills.[130]

With a policy shift away from the beneficial reuse of the sewage sludge as biosolids, NYC's massive daily production of sewage sludge came to be mixed with garbage and moved into landfills across the country.[131] Contracts were made in states like Alabama because of their "inexpensive land and permissive zoning."[132]

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[122] Radiolab, *supra* note 48.

[123] *Id*.

[124] *Id*.; *see also* Weinstein, *supra* note 14, at 16–18.

[125] Weinstein, *supra* note 14, at 16–18. Along with ending the NYOFCo contract, NYC also changed its EPIC contract, from handling approximately twenty percent of NYC's biosolid beneficial reuse to only one percent. *Id*. at 18. The Tully contract, which had originally handled twelve to twenty percent of the biosolids, was changed to only ten percent. *Id*.

[126] *Id*. The NYOFCo contract was responsible for the management of approximately 600 tons. *Id*.

[127] *Id*. (citing Farrell Sklerov & Angel Roman, *DEP Issues Request for Proposals to Reuse Sludge: Seeks Cost-Effective, Sustainable Program to use Treated Sewage in Beneficial Way*, NYC DEPT. OF ENVTL. PROT.( 2010)).

[128] *Id*.

[129] *Id*. at 18. In replacing NYOFCo, the WeCare contract accounted to use 400 tons of NYC's sewage sludge (thirty-three percent of NYC's total sewage sludge) for beneficial reuse as biosolids, which was a sixteen percent reduction from NYOFCo's 600-ton commitment. *Id*. By 2012, however, WeCare "had only processed approximately 6,444.04 dry metric tons, or only seven percent of NYC's biosolids." *Id*.

[130] *Id*.

[131] Radiolab, *supra* note 48.

[132] Associated Press, *supra* note 1.

## III. WHY BIOSOLIDS ARE A STRONGER CHOICE

Landfilling remains the cheapest way for NYC to handle its immense, daily production of sewage sludge.[133] Despite landfilling's cost effectiveness as a means of disposal, landfilling has faced serious public backlash in the form of litigation and local governance permit denials, as evidenced by the recent legal turmoil in Alabama in the spring of 2018.[134] The purpose of this Part of the Note is to advocate why reliance on biosolids is a better option for NYC's sewage sludge disposal than landfilling.

This Part will begin by highlighting the costs and uncertainties associated with the local nature of land use law, which empowers municipalities with tools to guard itself against unpopular policies like landfilling. In connection to this idea of the local nature of land use law, this Part will also show how—like the public outcry against the landfilling method in Alabama—biosolids initially faced serious public backlash. This Part will focus on how—unlike the landfilling method—the NYC Biosolid Program persisted and succeeded because it had strong advocacy from the agricultural community and the EPA.

Next, this Part will call into question the long-term cost-effectiveness of landfilling. In particular, this Part will describe how the low prices of landfilling are not actually sustainable because the number of available landfilling sites is decreasing, which will contribute to increasing costs overtime. Further, this Part will contrast the decreasing of available landfilling sites to the agricultural industry's ever-expanding need for beneficial reuses of biosolids in lieu of mined phosphates. Finally, this Part will explain how the beneficial reuse of biosolids provides the environmental benefit of restoring the phosphorus cycle, whereas landfilling does not offer similar benefits.

### A. THE RIPPLE EFFECTS OF LANDFILL LITIGATION

While landfilling may be a cheaper mode of disposal for NYC sewage sludge, it carries distinct uncertainties that arise from the local nature of land use law—where a legal injunction in one locality can impact the local governance decisions of another locality. Because of these legal uncertainties, landfilling is a risky method for disposing of biosolids. The risk is amplified by the nuisance-related issues that spring from transporting a substance like sewage sludge by rail through many different communities on its way to disposal.[135] When presented with an unpopular local matter like the permitting of sewage sludge through its municipality's border,

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[133] Weinstein, *supra* note 14, at 19. According to Mike Sharp, the former program development director of NYC's Biosolid Program, and Wayne Shultz, who managed the dispersal of biosolids to contracted farmers in Colorado, the cost of shipping and disposing NYC sewage sludge in landfills is "about half as expensive" as it was to produce and ship the biosolids to Colorado. *Id.*; *see also* Radiolab, *supra* note 48.

[134] *See generally supra* notes 1–11.

[135] *Id.*

a municipality frequently has the option to utilize its local land use authorities within its local governments to successfully ban such permitting.[136] Another option for a municipality is to avail of a variety of litigation techniques to stop the trains filled with sewage sludge from cutting through their communities.[137]

Things can get messy when the decision in one municipality affects a neighboring municipality, which is what happened when a rail train of NYC sewage sludge came to a halt in Parrish, Alabama as a result of litigation in neighboring West Jefferson, Alabama.[138] Jefferson County residents flooded the court system with a variety of legal challenges about the transporting of sewage sludge to landfill sites within their communities.[139] First, the Jefferson County Commission (the "Commission") gave Big Sky Environmental and Sumiton Timber Company[140] notice that "using the facility to unload the sewage sludge was a violation of the county's zoning rules" on August 3, 2017.[141] The Commission used traditional land use zoning rules to justify its action because "operations at the rail yard produced an odor that was detected at nearby homes, making the activity unlawful under the property's current zoning."[142] Ten days later, Big Sky Environmental and Sumiton Timber Company applied to be re-zoned in order to be in compliance with the local zoning ordinance, but that application was denied by the Commission on October 5, 2017.[143]

Big Sky Environmental and Sumiton Timber Company and Jefferson County soon found themselves in federal court with Big Sky Environmental and Sumiton Timber Company seeking a temporary restraining order and claiming that their property rights were being infringed upon while Jefferson County sought court clearance to enforce its zoning authority.[144] Part of Big Sky Environmental and Sumiton Timber Company's claim was to challenge West Jefferson's ability to enforce its land use power by arguing that its landfilling operation "should be governed under the federal laws pertaining to railroad operations, which would

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[136] *See* Jones, *supra* note 4; *see also* Associated Press, *supra* note 1.

[137] Dennis Pillion ("Pillion I"), *Sludge Fight: Legal Battles over Imported Sewage Waste Rage on in Jefferson County*, AL.COM (Jan. 19, 2018), https://www.al.com/news/index.ssf/2018/01/sludge_fight_legal_battles_ove.html; *see also* Dennis Pillion ("Pillion II"), *Judge: Jeffco Can Act on Stinky NY, NJ Waste Imports*, AL.COM (Jan. 22, 2018), https://www.al.com/news/index.ssf/2018/01/judge_jefferson_county_can_enf.html; *see also* Jones, *supra* note 4; *see also* Associated Press, *supra* note 1; *see also* Pillion, *supra* note 10.

[138] *See supra* notes 4-6.

[139] Pillion I, *supra* note 137.

[140] *Id*.; *See also* Pillion II, *supra* note 137. Sumiton Timber is the company that "owns a rail yard in western Jefferson County where sewage sludge is shipped by train from New York and New Jersey. Pillion I, *supra* note 137. The sludge is then loaded onto trucks at the rail yard and hauled to the Big Sky landfill in Adamsville for disposal." *Id*.

[141] Pillion I, *supra* note 137.

[142] Pillion II, *supra* note 137; *see also* Pillion I, *supra* note 137. "The property is zoned I-3, as a pulpwood yard, which it was under a previous owner, and the Commission said the current activities would require a I-O zoning, the designation for industrial plots that emit obnoxious odors." *Id*.

[143] Pillion I, *supra* note 137.

[144] Complaint at 1, Sumiton Timber Co., Inc. v. Jefferson Cty., Ala., No. 2:17-cv-01846-AKK (N.D. Ala. Nov. 2, 2017), ECF No.1; Pillion II, *supra* note 137.

supersede local zoning ordinances."[145] Ultimately, the property rights claims of Big Sky Environmental and Sumiton Timber Company failed when Judge Abdul Kallon of the U.S. District Court for the Northern District of Alabama allowed Jefferson County to move forward with its legal action to seek enforcement of its zoning laws.[146] After months of litigation, West Jefferson County ultimately succeeded in gaining clearance from the court to enforce its zoning authority to stop the shipment of NYC sewage sludge into its municipal borders.[147]

As the legal drama in Jefferson County demonstrates, litigation surrounding landfilling touches on a variety of local land use governance concerns. This type of litigation can also have ripple effects in surrounding municipalities. Due to the local nature of land use law and the fact that NYC's sewage sludge must travel through a variety of municipalities in order to reach a landfill, the litigation in West Jefferson was not limited to the confines of West Jefferson, but instead, it also caused a local governance crisis in Parrish.[148] The negative ripple effects are compounded because of the nature of the product. Sewage sludge has a variety of nuisance factors, including intense odor and the health risks of diseases brought by flies.[149] Parrish was drawn into the litigation when Judge Kallon granted Jefferson County their injunction against the Sumiton Timber Company and Big Sky Environmental.[150] The consequence of this injunction was that the train carrying the sewage sludge to West Jefferson became halted in neighboring Parrish, which lacked the zoning regulation to block the cars.[151]

The optics of Parrish being forced to host tons of sewage sludge spawned both an intense public outrage within Parrish itself and the national media, which highlighted NYC's failure to responsibly handle its own waste.[152] The public fury was so intense that a special council meeting was called in Parrish that voted to deny

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[145] Pillion I, *supra* note 137.

[146] Pillion II, *supra* note 137. Not only was the Jefferson County litigation limited to federal court but also state court. Pillion I, *supra* note 137. Relying on nuisance claims in state court, the town of West Jefferson claimed the existence of flies and the smell caused the town to be unable to attract development in the area. *Id*. Again, this case centered on local land use laws with West Jefferson claiming that Big Sky Environmental and Sumiton Timber Company were violating West Jefferson's zoning laws. *Id*.

[147] Pillion II, *supra* note 137; *see also* Associated Press, *supra* note 1.

[148] Associated Press, *supra* note 1.

[149] *Id*.

[150] Pillion II, *supra* note 137; *see also* Associated Press, *supra* note 1.

[151] Associated Press, *supra* note 1.

[152] Jones, *supra* note 4; *see also* Associated Press, *supra* note 1; *see also* Duara, *supra* note 6; *see also* Dwyer, *supra* note 9. The *USA Today* article emphasizes the fury of residents by quoting Parrish residents and local leaders. One resident, Sherleen Pike, is quoted as saying: "Would New York City like for us to send all our poop up there forever?" *See* Associated Press, *supra* note 1. Further, the titles of some of these nationally published articles, such as Duara's *How NYC's Shit Ended Up Stuck on a Train in Alabama* and Dwyer's *The Poop Train's Reign Of Terror In Small-Town Alabama Has Ended*, are reflective of the feelings of animosity of residents that NYC could be so thoughtless of the well-being of Alabama residents impacted by the landfilling process. *See* Duara, *supra* note 6; *see* Dwyer, *supra* note 9. While this Note does not focus too much on the public relations aesthetics of NYC dumping its sewage sludge in Alabama, it is important to highlight how litigation in one area that negatively impacts a neighboring area and the media frenzy that covers that litigation can have negative public relations consequences.

the business permit for Big Sky Environmental to transport its sewage sludge within the municipality's borders.[153]

Along with the public uproar over the waste, special interest groups played a vocal role in undoing Big Sky's permit. For example, the Black Warrior Riverkeeper, an environmental group, vocalized the concern that as a result of its lack of land use restrictions, Alabama was accommodating out-of-state waste by acting as "'an open-door, rubber-stamp permitting place' for landfill operators."[154] The Black Warrior Riverkeeper recognized that rural Alabama localities were being particularly exploited by lax permitting, and as a result, the organization publicly lobbied for Big Sky to not receive a landfilling permit.[155] In Parrish, Big Sky Environmental did not have a strong special interest group arguing on its behalf to sway the Parrish Council to renew its transportation permit so that it could continue its landfill operation.[156] Instead, it had widespread public unrest and special interest groups like the Black Warrior Riverkeeper publicly lobbying the Parish Council to deny the company landfilling permits.[157]

Because of the local nature of land use, landfilling can carry significant costs, which is evidenced by the ripple effect of the litigation that began in West Jefferson and then led to sewage sludge being indefinitely stalled in Parrish. The truly local nature of land use law and the fact that sewage sludge is a product that carries intense nuisance-related issues ought to offer a clear warning to NYC of the fragile nature of relying on the landfilling method. This fragile nature is further exacerbated by local special interest groups, like the Black Warrior Riverkeeper, publicly lobbying against the landfilling permits.

The "poop train" scandal in Alabama shows that while landfilling may seem like a cheaper option at first glance, the nature of land use law makes landfilling tenuous and subject to the whims of local decisionmakers, who can effectively end a landfilling operation through legal injunctions or city council decisions.

### B. How Biosolids Gained Favor from the Agricultural Community

NYC was initially met with skeptics on the safety and efficacy of using biosolids on crops.[158] As it searched for contracts, NYC faced civil suits and contract

[153] Jones, *supra* note 4. Parrish's council members gave Big Sky Environmental three weeks to remove 250 metal containers of sewage sludge. *Id*.

[154] Associated Press, *supra* note 1. This article contained quotes directly from Nelson Brooke, the Riverkeeper of Black Warrior Riverkeeper. The Black Warrior Riverkeeper is "a citizen-based nonprofit organization dedicated to improving water quality, habitat, recreation, and public health throughout…the Black Warrior River watershed." BLACK WARRIOR RIVERKEEPER, https://blackwarriorriver.org (last visited Jan. 12, 2019).

[155] Associated Press, *supra* note 1.

[156] *See id*.; *see also* Jones, *supra* note 4.

[157] Associated Press, *supra* note 1; *see generally* BLACK WARRIOR RIVERKEEPER, *supra* note 154.

[158] *See generally supra* notes 87-94.

cancellations based on local fears of water contamination and disease.[159] The clearest example of this resistance came from Oklahoma residents, who overwhelmingly disapproved of the NYC biosolids and cancelled contracts.[160] But while the initial disapproval of biosolids seems to parallel the public rallying in small Alabama towns against NYC training its sewage sludge to nearby landfills,[161] there is a clear distinction between the two. The key distinction between the public resistance to biosolids in the early days of the NYC Biosolid Program and the landfill disposals in Alabama is that biosolids had a demonstrably beneficial impact on the crops where they were laid, which was noted by farmers and marketed by the EPA. Based on that positive agricultural impact, this portion of the Note will focus on the farmers who experienced the biosolids on their land advocated for and persisted in developing contracts through NYC's Biosolid Program, despite the public backlash.

The initial public resistance to NYC biosolids, the agricultural success of the same biosolids, and the eventual twenty-year flourishment of the NYC's Biosolid Program can be seen in Colorado where farmers witnessed the demonstrable success of the biosolids in producing strong crop yields and pest reduction in their fields.[162] While Colorado farmers, particularly wheat farmers, came to advocate for the largest contracts with NYC biosolids, other farmers from states like Texas, Colorado, and Arizona also fought to establish similar contracts in the midst of public blowback.[163]

When writing "Ultimate Alchemy: Sludge to Gold; Big New York Export May Make Desert and Budget, Bloom" for the *New York Times* in 1993, Michael Specter interviewed enthusiastic farmers who promoted the use of biosolids in the face of public controversy.[164] It is helpful to understand the support of the biosolids by looking directly at the quotes from the farmers that used NYC's biosolids on their farms. As previously mentioned, the biosolids were uniquely "stable" and "spongy," which served the rocky soil of midwestern and western farms.[165] Rock Cramer, a cotton farmer from Arizona, described the biosolids as having:

> …[e]verything we lack. A little zinc, some copper and an incredible load of organic material. I wish I could put 25 tons of this product per acre on my land. I would use 100 tons an acre if I could. As far as I'm concerned if everyone's sewage was like New York's this world would be a better place.[166]

Another biosolid user, Douglas Tallman, a farmer from Lamar, Colorado, advocated for the circular nature of biosolids from New York. He is quoted as saying: "…if there was ever a true sister city for New York it's Lamar. [Its] waste

[159] Specter, *supra* note 88.

[160] *Id*.

[161] *See generally supra* notes 138-157.

[162] *See generally supra* notes 95-117.

[163] Specter, *supra* note 88.

[164] *Id*.; *see also supra* notes 95-96.

[165] Specter, *supra* note 88.

[166] *Id*.

comes out here and fertilizes our wheat fields. That helps make some of the bread that finds its way back to [New York's] tables."[167]

Along with support from local farmers, the federal government also lobbied local communities to turn biosolids into an agricultural norm. In 1994, during the early boom of NYC's Biosolid Program, the EPA dispersed a policy booklet marketing the "great value" of biosolids at "improv[ing] soil fertility and tilth, reduc[ing] need for and enhanced response to inorganic fertilizers, [producing] better growth and quality of crops, and decreas[ing] consumption of energy."[168] In addition, this EPA booklet took particular aim at some of the misconceptions about biosolids by highlighting their safety and benefits. For example, it included a cyclical chart of the process of waste from humans and animals being used as biosolids, and then being processed by the plants, which would then be consumed by animals and humans to start the cycle again.[169] The chart's graphic includes a picture of a family with a young child, and next to the graphic is a line describing the biosolid process as "only natural to return this rich source of nutrients and organic matter back to the soil to perpetuate the cycle of life."[170] The booklet also hammers into the reader the benefits to local communities by highlighting a variety of states, like Maryland and Ohio, and municipalities, like Hannibal, Missouri; Madison, Wisconsin; and Seattle, Washington, which all have biosolid programs.[171] Further, the booklet lists practical benefits of biosolids like their ability to suppress pathogenic soil organisms,[172] accelerate tree growth,[173] and restore mined lands.[174] The booklet concludes by providing the reader with even more sources praising the benefits of biosolids in case the reader still had lingering doubts about the safety of biosolids.[175]

Ultimately, the advocacy from farmers and the EPA created an environment where even though the public may have held concerns about the safety of biosolids, having such wild praise for their benefits on crops made them a desirable battle to fight even in the face of public backlash. Unlike the use of landfills, which lack a special interest groups and, instead, have local groups like the Black Warrior Riverkeeper lobbying against their permitting, NYC's biosolids overcame public disapproval to become a major agricultural phenomenon for around twenty years because of their avid proponents.[176]

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[167] *Id*.

[168] ENVTL. PROT. AGENCY, BIOSOLIDS RECYCLING: BENEFICIAL TECHNOLOGY FOR A BETTER ENVIRONMENT 2 (1994).

[169] *Id*. at 5.

[170] *Id*.

[171] *Id*. at 7.

[172] *Id*. at 8.

[173] *Id*. at 9. The booklet mentions studies by the University of Washington and the U.S. Forest Service which found that biosolids as tree fertilizer could lead to a three-fold increase in tree growth. *Id*.

[174] *Id*. at 10.

[175] *Id*. at 28.

[176] *See generally supra* notes 154-57.

### C. WHY BIOSOLIDS ARE A MORE ENVIRONMENTALLY SUSTAINABLE OPTION

While biosolids have the benefit of fewer legal battles and the support of the agricultural community, they also offer a more environmentally sustainable form of sewage sludge disposal than using landfills. Biosolids may be more expensive to produce and ship to farms, but these economic factors fail to account for the environmental benefit of biosolids in restoring the natural phosphorus cycle.

The advanced stabilization process, which is described in detail in Part II, shows that biosolids are frequently sought after in agricultural products. Why is this? The reason that biosolids are prime ingredients for healthy agricultural production is that "biosolids contain several plant macronutrients, primarily nitrogen (N) and phosphorus (P) and varying amounts of micronutrients such as boron, copper, and zinc."[177] Phosphorus and the natural phosphorus cycle generally play an integral role in the global food supply.[178] The benefit of biosolids to the environmental health of the natural phosphorus cycle is one of the key reasons why NYC's use of biosolids outweighs the cost-friendly landfilling method of disposal.

The natural phosphorus cycle is a circular process that spans millions of years.[179] Phosphorus starts as a nutrient that is buried under the seafloor.[180] The nutrient gets brought to the surface through "tectonic plate uplift" and enters land rock.[181] "Weather and erosion break down these deposits, allowing phosphorus to enter the soil."[182] This phosphorus in the soil is toxic to humans, but not to plants, which "are able to absorb the toxic phosphorus and process the nutrient into phosphates."[183] These phosphates are not toxic to humans and when humans and animals eat the plants, they absorb the phosphates.[184] "To complete this cycle, human and animal wastes, along with plant and animal decomposition, return these nutrients to the soil."[185] Without any interference, the natural phosphorus cycle "recycles itself, creating a closed loop of supply and demand."[186]

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[177] NYSDEC, *supra* note 44, at 9.

[178] Weinstein, *supra* note 14, at 3.

[179] *Id*. at 8.

[180] *Id*.

[181] *Id*.

[182] *Id*.

[183] *Id*.

[184] *Id*. The process is furthered by humans eating animals that have consumed the phosphates from plants.

[185] *Id*.

[186] *Id*. The phosphorus cycle is different from other energy sources that humans are reliant on like fossil fuels. Unlike fossil fuels, which are finite, "phosphorus can be used over and over" because the phosphorus cycle "occurs in natural ecosystems, where it is recycled innumerable times from its first mobilization from the Earth's crust to its eventual deposition into lake and ocean sediments." James Elser & Stuart White, *Peak Phosphorus*, FOREIGN POLICY (Apr. 20, 2010), https://foreignpolicy.com/2010/04/20/peak-phosphorus/.

The phosphorus cycle has, however, faced a significant interference from modern waste management systems.[187] As industrialization occurred in Europe, mass urbanization led to widespread epidemics, like the cholera outbreak of 1854 in London, which came as a result of improper disposal of human waste leading to a diseased and unsanitary water supply.[188] Europe would develop techniques to modernize its waste management, and the United States followed suit.[189] As a result, however, the treatment of the sewage sludge in wastewater sites instead of being left to the land created a disruption to the phosphorus cycle.[190] As the industrialization and urbanization continued into the 20th Century, the Pacific Islands' supply of bones and guano supplied most of the global demand for phosphates.[191]

In 1938, President Franklin D. Roosevelt warned Congress that "the phosphorus content of American agricultural land" faced major diminishments,[192] which could impact American crop yields, and could detrimentally affect "the physical health and economic security of the people of the nation."[193]

Following President Roosevelt's warning, agricultural engineers "mobilized global mining efforts in ancient, phosphorus-rich marine deposits."[194] This process has been exacerbated by a global population increase of 4.2 billion since 1950.[195] As a result, mines are degrading and are requiring the necessity "to access deeper layers and extract a lower quality of phosphate-bearing rock."[196]

Biosolids contain "90% or more" of the phosphorus that is present in sewage sludge and can aid in the restoration of the phosphorus cycle.[197] Proponents argue that a reliance on biosolid land spreading "rather than allowing phosphorus to accumulate in urban areas or landfill, recycles nutrients back into the soil," imitates the natural phosphorus cycle and reduces the global need for mined phosphates.[198]

In addition to restoring the natural phosphorus cycle—depending on how the biosolids were stabilized—biosolids can be versatilely applied to a variety of lands.[199] The organic matter contained in biosolids "is useful for both fine-textured (clay) soils and coarse-textured (sandy) soils."[200] Biosolids applied to "fine soils can help make the soils looser or more friable and can increase the amount of pore space

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[187] *Id*.

[188] Weinstein, *supra* note 14, at 8.

[189] *Id*.

[190] *Id*.

[191] *Id*.

[192] Elser & White, *supra* note 186.

[193] *Id*. (citing Franklin D. Roosevelt, *Message to Congress on Phosphates for Soil Fertility*, THE AM. PRESIDENCY PROJECT (May 20, 1938), https://www.presidency.ucsb.edu/node/208838).

[194] Elser & White, *supra* note 186.

[195] *Id*.

[196] *Id*.

[197] Weinstein, *supra* note 14, at 14.

[198] *Id*.

[199] NYSDEC, *supra* note 44, at 9.

[200] *Id*.

available for root growth."[201] The organic material in biosolids applied to coarse soils "can increase the water-holding capacity of the soil."[202]

Unlike biosolids—which assist in the restoration of the natural phosphorus cycle through agricultural use—relying on landfills may offer a cheaper disposal option. But landfills require huge tracts of land, which are shrinking and not sustainable as a long-term disposal option.[203] According to the EPA figures, there were 7,924 landfills in 1988, but by 2010, that number of landfills reduced to just 1,908. With the shrinking number of landfills, there has been an increase in the fees associated with landfills.[204] Annual rates of landfills have increased by an "average of $1.24 per ton across the US each year."[205]

While the number of landfills is shrinking and landfill disposal prices are rising, the agricultural demand for phosphates is increasing, and biosolids can ameliorate the phosphate demand.[206] By 2008, industrial farmers were applying an annual 17 million metric tons of mined phosphorus on their fields.[207] In contrast to the shrinking number of landfills, the demand for mined phosphates for agricultural purposes is expanding at a rate of around three percent a year.[208]

Along with the shrinking number of landfills is the fact that biosolids can actually restore lands damaged by mining and smelting because of their ability to reduce runoff.[209] Biosolids are able to reinvigorate soil even on land like Palmerton, an EPA Superfund Site.[210] The soil and vegetation at Palmerton was destroyed from ninety years of smelting zinc on the site.[211] However, researchers introduced biosolids into the soil at Palmerton and found that it restored the soil.[212]

NYC ought to consider that landfilling may be a cheaper option under conditions, but it is not an option that has long-term sustainability because of the shrinking number of landfills and the resulting landfill fee increases.[213] Further, cases like Palmerton show that biosolids can be used to revegetate mine spoil.[214] On the other hand, NYC can market their biosolids as a sustainable and natural replacement to mined phosphates, which can assist in the health of the natural phosphorus cycle.

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[201] *Id*.

[202] *Id*.

[203] Weinstein, *supra* note 14, at 20.

[204] *Id*.

[205] *Id*.

[206] *Id*.

[207] Elser & White, *supra* note 186.

[208] *Id*.

[209] ENVTL. PROT. AGENCY, *supra* note 168, at 10.

[210] *Id*.

[211] *Id*.

[212] *Id*.

[213] Weinstein, *supra* note 14, at 20.

[214] ENVTL. PROT. AGENCY, *supra* note 168, at 10.

## IV. CONCLUSION

The proper disposal of human waste is an immensely complicated issue that contains considerable health, economic, legal, public support, and environmental considerations. NYC has struggled to weigh these considerations equally.

In the past, NYC disregarded the sanitary health and environmental welfare by disposing of its sewage sludge directly and untreated into the New York Bight Apex. Following prompting by the federal government with the passage of the ODBA, NYC created the NYC Biosolid Program that beneficially reused the sewage sludge in the form of biosolids. This system met the EPA's Rule 503 health standards and local standards without significant legal barriers and prevailed despite initial public pushback as a result of public support from the EPA and the agricultural community. NYC's immense biosolid program also benefits the environment because the phosphorus from biosolids restores the natural phosphorus cycle and offers a sustainable alternative to mining phosphates.

The success of the NYC Biosolid Program was cut short, however, based on the economic hardships of the 2008 financial crisis. In order to cut disposal costs, NYC has relied on landfills as the primary disposal method for its sewage sludge. This short-term effort to cut costs by using landfills is publicly unpopular and does not have any sort of advocacy group, like the EPA or the farmers who advocated for the NYC Biosolid Program. As a result of being unpopular and without an advocate, the landfilling method is open to legal backlash, as evidenced by the litigation in West Jefferson. Due to the local nature of land use law, litigation in one region can impact another region. Further, the contents of sewage sludge can cause health effects like attracting harmful flies and breathing problems for people, especially when the sewage sludge is grounded indefinitely due to litigatory injunctions. Finally, the power of local governing bodies like the Parrish town council can flex their muscle and use their permitting power to force an end to landfilling in their town limits. Shipping biosolids to farms may be expensive, but they are steadily in demand and have advocates in the farmers who use them.

Ultimately, NYC ought to reinvigorate the NYC Biosolid Program because it is the most responsible and sustainable way of dealing with the city's immense daily output of sewage sludge. It's time for NYC to send its poop train back to Colorado.