



## Synagro and Waste Management Inc.'s Proposed Sludge Drying Plant at Grand Central Landfill Fact Sheet

### **DUST and the DRYING PROCESS**

A sludge drying plant uses heat to dry the sludge. A byproduct of the drying process is dust. The dust is combustible but is supposed to be controlled. Contaminants, including heat-resistant pathogens, can bind to the dust, producing toxic dust. This dust is supposed to be captured by filters but the question is how well they work to remove the tiny particles that can be inhaled and lodged in the lungs or deposited on surface water, such as Pen Argyl's drinking water reservoir, nearby Waltz Creek, Little Bushkill Creek or on ponds, such as the site's sediment basin.

- The process of drying sludge produces dust. Depending on the design of the drying plant there is the potential for a dust explosion to occur in the main dryer, dust collection and handling plant, pelletizer, and final product discharge plant.<sup>1</sup> The material can also self-heat leading to ignition and a slow burn that may be accelerated with additional airflow into the plant.<sup>2</sup>
- Treated sludge from wastewater treatment plants contains a number of organic and inorganic contaminants. The most significant health hazards relate to the wide range of pathogenic microorganisms such as protozoa parasites.<sup>3</sup> Adenoviruses and hepatitis A virus are the most thermally resistant (surviving the drying process) viruses found in biosolids and can survive for prolonged periods in the environment.<sup>4</sup>

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<sup>1</sup> Health and Safety Executive (n.d.). Information document (ID) on Risks from Sewage Sludge Drying Plants. Retrieved from <http://www.hse.gov.uk/pubns/risks-from-sewage-sludge-drying-plants.pdf>

<sup>2</sup> Ibid.

<sup>3</sup> Amoros Muñoz, I.; Moreno Trigos, MY.; Reyes-Sosa, MB.; Moreno-Mesonero, L.; Alonso Molina, JL. (2016). Prevalence of *Cryptosporidium* oocysts and *Giardia* cysts in raw and treated sewage sludges. *Environmental Technology*. 37(22):2898-2904. Retrieved from

<https://riunet.upv.es/bitstream/handle/10251/80964/Prevalence%20of%20Cryptosporidium%20oocysts%20and%20Giardia%20cysts%20in%20raw%20and%20treated%20sewage%20sludges.%28Version%20autor%29.pdf?sequence=4>

<sup>4</sup> Gerba, C.P., Pepper, I.L., & Whitehead, L.F. III (2002). A risk assessment of emerging pathogens of concern in the land application of biosolids. *Water Sci Technol.*, 46(10):225-30. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/12479475>

## **WHAT'S in the SLUDGE?**

The Sludge would be trucked in on local roads through towns, then offloaded at the plant, stored and processed. The liquid leachate would be transferred back into trucks and carried out the way it came in. The pathways of pollution for the sludge and leachate are leaks, spills, and surface runoff that can occur while in transport, in storage and during processing at the facility.

- A study published in 2011 analyzed Perfluorinated chemicals (PFCs) in land-applied biosolids coming from a sewage treatment plant in Decatur, Alabama. Local farmers had applied it to agricultural fields in Lawrence, Morgan, and Limestone counties in Alabama.<sup>5</sup> Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), two highly toxic PFCs, were detected in ground and surface water samples collected there, some at very high concentrations, above the EPA's health advisory levels. These chemicals, linked to cancer and other diseases, don't break down in the environment and, when ingested, build up in people's blood, increasing the risk of developing adverse health effects.
- Over 300 organic chemicals from a diverse range of classes of compounds have been identified in biosolids. The most common organic contaminants found in biosolids are phthalic acid esters (PAEs), polycyclic aromatic hydrocarbons (PAHs), chlorobenzenes (CBs), polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), chlorophenols, polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), organotin compounds, brominated flame retardants, surfactants, pharmaceuticals and personal care products, and natural and synthetic hormones.<sup>6</sup>
- Other organic contaminants in biosolids include perfluorinated chemicals (PFOS, PFOA), polychlorinated alkanes (PCAs), polychlorinated naphthalenes (PCNs), polybrominated diphenyl ethers (PBDEs), triclosan (TCS), triclocarban (TCC), benzothiazoles, antibiotics, synthetic musks, bisphenol A, quaternary ammonium compounds (QACs), steroids, and polydimethylsiloxanes (PDMSs).<sup>7</sup> Contaminants are from medical, industrial and household sources.<sup>8</sup>

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<sup>5</sup> Lindstrom, A.B. Strynar, M.J., Delinsky, A.D., Nakayama, S.F., McMillan, L., Lieblo, E.L., Neill, M., & Thomas, L. (2011). Application of WWTP Biosolids and Resulting Perfluorinated Compound Contamination of Surface and Well Water in Decatur, Alabama, USA. *Environ. Sci. Technol.*, 2011, 45 (19), pp 8015–8021. Retrieved from <https://pubs.acs.org/doi/abs/10.1021/es1039425>

<sup>6</sup> Haynes, R.J., Murtaza, G., & Naidu, R. (2009). Chapter 4 Inorganic and Organic Constituents and Contaminants of Biosolids: Implications for Land Application. *Advances in Agronomy*, Volume 104, Pages 165-267. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0065211309040048>

<sup>7</sup> Clarke, B.O., & Smith, S.R. (2010). Review of 'emerging' organic contaminants in biosolids and assessment of international research priorities for the agricultural use of biosolids. *Environ Int.* 2011 Jan; 37(1):226-47. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/20797791>

<sup>8</sup> Jenkins, S.R., Armstrong, C.W., & Monti, M.M. (2007). Health Effects of Biosolids Applied to Land: Available Scientific Evidence. Virginia Department of Health. Retrieved from <http://www.vdh.virginia.gov/content/uploads/sites/12/2016/02/Biosolids-1.pdf>

- Heavy metals found in biosolids include arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, and zinc.<sup>9</sup> Synthetic fibers or “microplastics” that detach from clothing during laundering, including polyester, nylon, and rayon, are non-biodegradable, are found in sludge and persist in biosolids.<sup>10</sup>
- Elevated concentrations of both heavy metals and dissolved organic matter are frequently found together in leachates below biosolids-treated soils. Dissolved organic matter acts as a “carrier” for heavy metals.<sup>11</sup>
- Biosolids produced through various processing methods have similar organic wastewater contaminants, regardless of the type of processing. Little research has been done on the composition and fate of these contaminants and yet they are being released into the environment.<sup>12</sup>
- The antibacterial pesticides triclosan and triclocarban are found in high concentrations in biosolids because 95% of their uses are in consumer products that are disposed of down residential drains.<sup>13</sup>
- Triclosan is not completely removed from water during the treatment process and it accumulates in sewage sludge in municipal wastewater systems. It has been shown to persist in the runoff from treated fields for as long as 266 days after biosolids application and persists in the sediment as well.<sup>14</sup>
- In its Targeted National Sewage Sludge Survey Report, the EPA found that triclosan was detected in 79 of 84 sludge samples that were surveyed.<sup>15</sup>

## **RADIOACTIVE MATERIALS IN SLUDGE**

One of the most dangerous and long-lived contaminants in sewage sludge is radioactive materials. The half-life of radium 226 is 1600 years and it is carcinogenic; radon is the second largest cause of lung cancer in the nation. The

<sup>9</sup> Haynes, R.J., Murtaza, G., & Naidu, R. (2009). Chapter 4 Inorganic and Organic Constituents and Contaminants of Biosolids: Implications for Land Application. *Advances in Agronomy*, Volume 104, Pages 165-267. Retrieved from

<https://www.sciencedirect.com/science/article/pii/S0065211309040048>

<sup>10</sup> Zubris, K.A.V., & Richards, B.K. (2005). Synthetic fibers as an indication of land application of sludge. *Environmental Pollution*, (138) 201-211. Retrieved from

<https://www.lehigh.edu/~incheme/pdfs/papers%20and%20projects/April%202005%20Synthetic%20Fibers%20as%20an%20Indicator%20of%20Land%20Application%20Sludge%20-%20Elsevier%20-%20Zubris.pdf>

<sup>11</sup> Haynes, R.J., Murtaza, G., & Naidu, R. (2009). Chapter 4 Inorganic and Organic Constituents and Contaminants of Biosolids: Implications for Land Application. *Advances in Agronomy*, Volume 104, Pages 165-267. Retrieved from

<https://www.sciencedirect.com/science/article/pii/S0065211309040048>

<sup>12</sup> Kinney, C.A., Furlong, E.T., Zaug, S.D., Burkhardt, M.R., Werner, S.L., Cahill, J.D., & Jorgensen, G.R. (2006). Survey of Organic Wastewater Contaminants in Biosolids Destined for Land Application. *Environ. Sci. Technol.*, 2006, 40 (23), pp 7207–7215. Retrieved from <https://pubs.acs.org/doi/abs/10.1021/es0603406>

<sup>13</sup> Shinbrot, X. (2013). Biosolids or Biohazards? *Pesticides and You*, Vol. 32(3). Retrieved from

<https://www.beyondpesticides.org/assets/media/documents/infoservices/pesticidesandyou/documents/Biosolids.pdf>

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

Nuclear Regulatory Commission confirms that radioactive substances are regularly present in sewage sludge. The radioactivity can persist in biosolids.

- Sewage sludge contains detectable amounts of radioactive materials. In addition, sewage flowing into a POTW can include anthropogenic materials exempt from regulatory control, such as excreta from individuals undergoing medical diagnosis or therapy, and discharges of limited quantities of radioactive materials from some licensees of the U.S. Nuclear Regulatory Commission (NRC) and NRC Agreement State licensees.<sup>16</sup>
- NRC estimates that of the more than 22,000 regulated users of Atomic Energy Act (AEA) radioactive materials, about 9,000 have the potential to release radioactive materials to municipal sewer systems.<sup>17</sup>
- Other sources of radioactive materials that may enter sewage collection systems include stormwater runoff, groundwater, surface water, residuals from drinking water treatment plants, and waste streams from certain industries (e.g., ceramics, electronics, optics, mining, petroleum, foundries, and pulp/paper mills).<sup>18</sup>
- Some states have identified cases where radium from drinking water treatment residuals has been concentrated in sewage sludge.<sup>19</sup>
- At present, there are no Federal regulations in place that limit levels of radioactive materials in sewage sludge or ash.<sup>20</sup>

## **WHAT ARE THE HUMAN PATHOGENS IN BIOSOLIDS?**

- Biosolids may contain high relatively high levels of pathogenic bacteria and viruses. There is growing concern regarding exposure to microbial pathogens from biosolids via aerosols, especially in population centers surrounding biosolids application sites where people may inhale or swallow bacterial or viral pathogens.<sup>21</sup> Some of these pathogens survive the drying process.
- Four major types of human pathogens can be found in biosolids: bacteria, viruses, protozoa, and helminths.<sup>22</sup> These would be found in the sludge waste that would be trucked into the proposed sludge drying plant.

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<sup>16</sup> U.S. Nuclear Regulatory Commission (2004). SCORS Assessment of Radioactivity in Sewage Sludge: Modeling to Assess Radiation Doses. Sewage Sludge Subcommittee. Retrieved from <http://www.iscors.org/pdf/FinalDoseModeling.pdf>

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Dowd, S.E., Gerba, C.P., Pepper, I.L., & Suresh, D.P. (2000). Bioaerosol Transport Modeling and Risk Assessment in Relation to Biosolid Placement. *Journal of Environmental Quality* 29(1). Retrieved from [http://qmrawiki.canr.msu.edu/images/Dowd\\_et\\_al.pdf](http://qmrawiki.canr.msu.edu/images/Dowd_et_al.pdf)

<sup>22</sup> Jenkins, S.R., Armstrong, C.W., & Monti, M.M. (2007). Health Effects of Biosolids Applied to Land: Available Scientific Evidence. Virginia Department of Health. Retrieved from <http://www.vdh.virginia.gov/content/uploads/sites/12/2016/02/Biosolids-1.pdf>

- Potential transmission pathways of human pathogens from biosolids include air, soil, and water. In addition, it is possible that vectors, such as flies, could transmit pathogens from biosolids.<sup>23</sup> How the sludge is stored is critical to controlling flies and other vectors.
- Bacteria found in biosolids includes *E. coli*, *Listeria monocytogenes*, *Staphylococcus aureus*, *Helicobacter pylori*, and *Legionella*.<sup>24</sup> In a 2002 study, 25% of people who complained of chemical irritation living near fields where biosolids were applied had *Staphylococcus aureus* infections, which contributed to 2 deaths.<sup>25</sup>
- Protozoan parasites found in biosolids include *Cryptosporidium*, *Giardia*, and *Microsporidia*.<sup>26</sup>
- Viruses found in biosolids include caliciviruses, adenoviruses, astroviruses, and rotaviruses.<sup>27</sup>
- Helminth worms found in biosolids include *Ascaris lumbricoides*, *Trichuris trichiura*, *Hymenolepis nana*, *Taenia saginata*, *Taenia solium*, *Necator americanus*, *Ascaris suum*, and *Toxocara canis*.<sup>28</sup>

## **WHAT ARE THE HEALTH EFFECTS OF EXPOSURE?**

Scientific studies show a higher incidence of adverse health effects for people living on or within 1 mile of fields where biosolids were applied. “Results revealed that some reported health-related symptoms were statistically significantly elevated among the exposed residents, including excessive secretion of tears, abdominal bloating, jaundice, skin ulcer, dehydration, weight loss, and general weakness. The frequency of reported occurrence of bronchitis, upper respiratory infection, and giardiasis were also statistically significantly elevated. The findings suggest an increased risk for certain respiratory, gastrointestinal, and other diseases among residents living near farm fields on which the use of biosolids was permitted.”<sup>29</sup>

While the proposed plant does not propose to apply biosolids to the land, the sludge and biosolids will be transported to, stored, handled and processed at the facility and the liquid residue will be produced, handled and transported from the facility on local roads. The drying process will not destroy all of these contaminants and the potential exists for release of pathogens and toxics into the local air and water.

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<sup>23</sup> Ibid.

<sup>24</sup> Ibid.

<sup>25</sup> Lewis, D.L. & Gattie, D.K. (2002). Pathogen Risks from Applying Sewage Sludge to Land. *Environ. Sci. Technol.*, 2002, 36 (13), pp 286A–293A. Retrieved from <https://pubs.acs.org/doi/abs/10.1021/es0223426>

<sup>26</sup> Jenkins, S.R., Armstrong, C.W., & Monti, M.M. (2007). Health Effects of Biosolids Applied to Land: Available Scientific Evidence. Virginia Department of Health. Retrieved from <http://www.vdh.virginia.gov/content/uploads/sites/12/2016/02/Biosolids-1.pdf>

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> Khuder, S, Milz, S.A., Bisesi, M., Vincent, R., McNulty, W., & Czajkowski, K. (2007). Health survey of residents living near farm fields permitted to receive biosolids. *Arch Environ Occup Health*, 2007 Spring; 62(1):5-11. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/18171641>

- In 2002, reports of illnesses and deaths from residents living near land application sites who were exposed to dust and water runoff from fields treated with sewage sludges indicated a pattern of chemical irritation. Symptoms, such as burning eyes, burning lungs, difficulty in breathing, and skin rashes followed within days to months by complaints of gastrointestinal, skin, and respiratory infections.<sup>30</sup>
- Affected residents living within approximately 1 km of land application sites and generally complained of irritation (e.g., skin rashes and burning of the eyes, throat, and lungs) after exposure to winds blowing from treated fields. A prevalence of *Staphylococcus aureus* infections of the skin and respiratory tract was found. Approximately 1 in 4 of 54 individuals were infected, including 2 mortalities due to septicemia and pneumonia.<sup>31</sup>
- The findings of a 2007 study suggest an increased risk for certain respiratory, gastrointestinal, and other diseases among residents living near farm fields on which the use of biosolids was permitted.<sup>32</sup>
- The reported health effects of those living within a mile of the fields where biosolids were applied included excessive secretion of tears, abdominal bloating, jaundice, skin ulcers, dehydration, weight loss, general weakness, bronchitis, upper respiratory infections, and giardiasis.<sup>33</sup>

## **WHAT'S GOING ON?**

Waste Management Inc. and Synagro Technologies, a “biosolids” processing company, want to build an enormous thermal drying facility to process sewage at the Grand Central Sanitary Landfill on the border of Pen Argyl and Plainfield Township, PA, near homes and businesses, children’s athletic fields, and two high quality streams. They would truck in up to 400 wet tons, up to 50 truck trips, every day of human sewage sludge from states throughout the region to produce dried sludge pellets, a “biosolids” product sold as fertilizer and heat pellets.

Residents of the area are opposed to the facility because of air and water pollution concerns, public health effects, safety issues and property value decline. Sludge from sewage treatment plants not only contains human pathogens, but can also contain industrial waste components such as heavy metals, chemicals, radioactive materials, pesticides, microplastics and perfluorinated compounds, to name a few typically found. The process of drying sludge produces dust that, if not fully contained, can directly impact the health of local residents and workers.

Visit the local organization working to oppose this plant: Sludge Free Slate Belt  
<https://www.facebook.com/sludgefreeslatebelt/>

<sup>30</sup> Lewis, D.L. & Gattie, D.K. (2002). Pathogen Risks from Applying Sewage Sludge to Land. *Environ. Sci. Technol.*, 2002, 36 (13), pp 286A–293A. Retrieved from <https://pubs.acs.org/doi/abs/10.1021/es0223426>

<sup>31</sup> Ibid.

<sup>32</sup> Khuder, S, Milz, S.A., Bisesi, M., Vincent, R., McNulty, W., & Czajkowski, K. (2007). Health survey of residents living near farm fields permitted to receive biosolids. *Arch Environ Occup Health*, 2007 Spring; 62(1):5-11. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/18171641>

<sup>33</sup> Ibid.