



SIERRA CLUB

ATLANTIC CHAPTER

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VIA EMAIL

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Re: Comments on the Draft Supplemental Environmental Impact Statement for the proposed expansion of the Hakes Construction and Demolition Landfill

Dear Ms. Merchant and Town of Campbell Planning Board:

On behalf of its 54,000 members, including 230 members in Steuben County, the Sierra Club Atlantic Chapter, together with Concerned Citizens of Allegany County, Inc. and People for a Healthy Environment, Inc. respectfully submit the following comments on the draft supplemental environmental impact statement (DSEIS) on the proposed expansion of the construction and demolition landfill owned and operated by Hakes C&D Disposal Inc. and located at 4376 Manning Ridge Road in the Town of Campbell, Steuben County, New York.

We request that the New York State Department of Environmental Conservation (DEC) and the Town of Campbell Planning Board deny all permit applications made by Hakes C&D Disposal Inc. in connection with the Hakes expansion project. Because the DSEIS is not an adequate review of the impacts of the expansion project in accordance with the requirements of the State Environmental Quality Review Act ("SEQRA"), the permit applications under review must be denied. The DSEIS fails to comply with the requirements of SEQRA because it fails to take a "hard look" at the issue of radioactivity in the landfill or the issue of the health impacts of the landfill or to provide a reasoned elaboration for why increasing the capacity of the landfill will not have an adverse effect on the environment and the health and safety of the people, animals and plants living near the landfill.

Among the specific issues not identified or not adequately addressed in the DSEIS are the following:

1. The DSEIS fails to evaluate the high levels of radioactivity shown in the landfill's leachate test results

The DSEIS asserts that “at no time have any levels” of radioactivity in Hakes leachate “been detected that would indicate any radioactivity beyond those associated with background levels.”¹ This statement is contradicted by the landfill's own leachate test results which show high levels of the radionuclides Lead-214 and Bismuth-214 in some of the test samples. The presence of high levels of these short-lived radionuclides in some of the leachate samples demonstrates that high levels of radium and radon are present in the landfill.

The significance of the presence of Lead-214 and Bismuth-214 in the leachate test results is discussed in the affidavits of Dr. Raymond Vaughan, Mr. Dustin May and Dr. David Carpenter, copies of which are attached as Exhibits 1, 2 and 3. These affidavits were originally filed in the case of *Sierra Club v. DEC* in Steuben County Supreme Court on January 19, 2018.²

As discussed in the affidavits, the highest levels of lead-214 and bismuth-214 concentrations are shown in samples from landfill cells 3, 4, 5, 6, and 8B, all cells receiving shale gas drilling wastes. The highest observed Lead-214 and Bismuth-214 concentration was approximately 6000 pCi/L from an unfiltered leachate sample taken from Cell 8B in Q2 2017.

The affidavits explain why the presence of high levels of these short-lived radionuclides in some of the leachate samples demonstrates that high levels of radium and radon are present in the landfill. As described in ¶21 of Mr. May's affidavit:

Of major concern regarding these results are the concentrations of lead-214 and bismuth-214 found in some of the leachate samples analyzed. In 9 of the 79 leachate samples analyzed from 2012 to 2017, lead-214 and bismuth-214 concentrations exceeded 1000 pCi/L and all of these samples showed good agreement between lead-214 and bismuth 214, indicating that these are unlikely to be false positives as lead-214 decays directly to bismuth-214. These elevated lead-214 and bismuth-214 concentrations were found in samples from Cells 3, 4, 5, 6, and 8B, all cells receiving drilling wastes. The highest observed lead-214 and bismuth-214 concentration was approximately 6000 pCi/L from an unfiltered leachate sample taken from Cell 8B take in Q2 2017. Of the 9

¹ DSEIS, p. 16.

² *Sierra Club v. DEC*, Steuben County Supreme Court, Index No. E2017-1384CV, filed November 30, 2017, stipulation of withdrawal filed February 9, 2018. The petitioners in the case are Sierra Club, Concerned Citizens of Allegany County, People for a Healthy Environment, Inc. and three individual neighbors of the landfill, John Culver and Brian and Maryalice Little. The papers filed in the case are posted at <http://treichlerlawoffice.com/waste/hakes/index.html>.

samples found to be extremely high in lead-214 and bismuth-214 concentrations, 6 of these samples were filtered in the laboratory prior to analysis. In a number of other samples, a substantial disequilibrium was observed, with the concentration of lead-214 and bismuth-214 greatly exceeding the concentration of radium-226 measured in the samples via EPA 903.1. These results indicate major potential enrichment of leachate with radon-222 gas; the half-lives of lead-214 and bismuth-214, 27 and 20 minutes, respectively, are too short for these radionuclides to exist independently during the time period between collection and analysis, they would have decayed away entirely. Thus, in order for these two radionuclides to be detectable in the samples weeks after collection, they would have to be supported and exist in an equilibrium state with radon-222 gas or radium-226.³

Mr. May explains that the variances in the levels of Lead-214 and Bismuth-214 in the test samples indicate that radon gas has escaped from some of the test samples during sample collection and handling of those samples. Mr. May states, “Variability in the measured concentrations between the filtered and unfiltered samples taken at the same time, with one analysis showing extremely high concentrations of lead-214 and bismuth-214 and the other showing much less or no observable lead-214 and bismuth-214, indicates the likely escape of radon-222 gas from the sample.”⁴

Dr. Vaughan summarized the significance of the levels of radioactivity in the leachate test results at a presentation at the Campbell high school on February 10, 2018. The slides for Dr. Vaughan’s presentation are attached as Exhibit 4. The video of Dr. Vaughan’s presentation is posted at <https://www.youtube.com/watch?v=8YuC6cHWd3A>. In the presentation, Dr. Vaughan explains the scientific principles that show that, in a leachate test sample that contained 6000 pCi/liter of Lead-214 and Bismuth-214 and very little Radium-226 (<10 pCi/liter) 21 days after sample collection, there would have had to have been 270,000 pCi/liter of Radon-222 in the sample – and thus in the sampled leachate – at the time of collection.⁵ He explains that to have 270,000 pCi/liter of Radon-222 dissolved in the landfill leachate at the time of collection there would have had to have been approximately 1.05 million pCi/liter of Radon-222 in the air of the landfill.⁶ Dr. Vaughan points out that the air in the landfill would contain *more* than 1.05 million pCi/liter of Radon-222 if its parent radium remained dry in the landfill, consistent with intended landfill practice, and if the Radon-222 reached the leachate by an air pathway inside the landfill.⁷

³ Ex. 2, ¶ 21.

⁴ *Id.* ¶ 23-25.

⁵ Ex. 4, Presentation on Unresolved Issues for Disposal of Radium-bearing Wastes at Hakes Landfill by Dr. Raymond Vaughan, February 10, 2018, slide 28.

⁶ *Id.*, slide 30.

⁷ See video of Vaughan presentation at <https://www.youtube.com/watch?v=8YuC6cHWd3A>.

Alternatively, he explained, the air in the landfill could contain less than 1.05 million pCi/liter of Radon-222 if its parent radium remained wet in the landfill, contrary to intended landfill practice, and if the Radon-222 reached the leachate by a water pathway inside the landfill.⁸ As he notes, these values apply at a temperature of 20°C and would be somewhat different at other temperatures.⁹

We are concerned that the report on Hakes' 2017 3rd Quarter Radionuclide Monitoring Results states that "the laboratory indicated that Bismuth-214 and Lead-214 are no longer include [sic] in the gamma list due to the fact that the any [sic] positive results are actually lab created as a result of the ingrowth step in the method."¹⁰ For the reasons stated above and explained in detail in the expert affidavits of Dr. Vaughan, Mr. May and Dr. Carpenter, the Bismuth-214 and Lead-214 results in the leachate test samples are extremely significant information. It would further undermine the ability of DEC and the public to understand and monitor the radionuclides in the landfill if DEC were to allow the landfill to stop collecting this data. As discussed below, the landfill needs to begin testing for a greater number of radionuclides, not eliminate testing of the very radionuclides that have been observed in high levels in the leachate.

The DSEIS fails to address the likely source of the radioactivity demonstrated in the landfill's leachate test results, i.e., the Marcellus shale drill cuttings that have been accepted at the landfill since 2010. According to a 2017 report by Environmental Advocates summarizing data collected by the Pennsylvania Department of Environmental Protection ("PADEP"), the Hakes landfill has taken more tons of solid gas drilling wastes from Pennsylvania than any other landfill in New York other than the Chemung County landfill.¹¹ According to the EA report, Hakes landfill began accepting Marcellus shale gas drilling wastes from Pennsylvania in 2010. Some of the landfill's annual reports indicate that as much as 45% of the wastes deposited in certain years may have been gas drilling wastes from Pennsylvania.¹²

⁸ *Id.*

⁹ *Id.*

¹⁰ 2017 3rd Quarter Radionuclide Monitoring Results, Hakes C&D, Painted Post N.Y., Hakes C&D Landfill Permit No. 8-4630-00010/00001-0, November 14, 2017, released by DEC on February 23, 2018, pursuant to a FOIL request from the Concerned Citizens of Allegany County.

¹¹ *License to Dump: Addendum*, Environmental Advocates, June 9, 2017, http://www.eany.org/sites/default/files/documents/license_to_dump_addendum_0.pdf, supplementing *License to Dump: Despite Ban New York Permits Pennsylvania to Dump Radioactive Fracking Waste Inside Our Borders*, Environmental Advocates, February 2015, <http://www.eany.org/our-work/reports/license-dump-february-2015>. According to the Addendum, Hakes has taken 167,238 tons and 332 barrels of fracking waste between 2010 to 2017.

¹² Hakes' 2011 Annual Report shows that total tonnage of wastes received at the Hakes landfill in 2011 was 376,485.60 tons. Of this amount, the report says 89,837.42 tons came from Bradford County Pennsylvania and 81,121.57 tons came from Tioga County, PA. The combined tonnage from these two counties was 170,958.99 tons, or 45% of the total tonnage received in 2011. The types of wastes received from these counties are not

It has long been recognized that the Marcellus shale contains radioactive materials and that these may have harmful health effects. In its review of DEC's Supplemental Generic Environmental Impact Statement (SGEIS) on high volume hydraulic fracturing, the United States Environmental Protection Agency (EPA) expressed concern about the lack of analysis of radon and other radiation exposure from shale gas drilling wastes. "Who is responsible for addressing the potential health and safety issues and associated monitoring related to external radiation and the inhalation of radon and its decay products?" the EPA asked. "Such potential concerns need to be addressed."¹³

Recent scientific studies raise new questions about the environmental mobility of radionuclides in Marcellus shale drill cuttings deposited in landfills. A team of University of Iowa researchers, including Dustin May whose affidavit is attached as Exhibit 2, released a study in November 2016 which evaluated radioactive materials—uranium, thorium, radium, lead, and polonium isotopes—from drill cutting samples extracted from a single well drilled in northern Pennsylvania.¹⁴ A copy of this study is attached as Exhibit A to Mr. May's affidavit. The Iowa research team found complex patterns of vertical stratification. For example, the deep drill cuttings had significantly more uranium (U) than the cuttings removed from shallow portions of the well. Noting that virtually all drill cutting waste from the Marcellus Shale is deposited in landfills, the authors examined the stability of the various radioactive materials by simulating different conditions of landfill leaching. The results suggest some environmental mobility of radionuclides in drill cuttings. In particular, as acidity increased, radionuclide leaching increased, with Uranium-238 and Uranium-234 being the most leachable radionuclides. The authors conclude, "Although previous studies have suggested that [radioactive materials] in drill cuttings pose a minimal health risk to the general public when deposited in landfills, our results indicate that Marcellus Shale drill cuttings warrant further radiochemical investigation."¹⁵

broken down in the annual report, but it is likely that a substantial portion of these wastes were shale gas drilling wastes.

¹³ Environmental Protection Agency. (January 11, 2012). EPA comments on revised draft NYSDEC revised dSGEIS for horizontal drilling and high-volume hydraulic fracturing to develop the Marcellus shale and other low-permeability gas reservoirs [Press release]. Retrieved from <http://www.epa.gov/region2/newsevents/pdf/EPA%20R2%20Comments%20Revised%20dSGEIS%20Enclosure.pdf>.

¹⁴ Eitheim, E. S., May, D., Forbes, T. Z., & Nelson, A. W. (2016). Disequilibrium of naturally occurring radioactive materials (NORM) in drill cuttings from a horizontal drilling operation. *Environmental Science & Technology Letters* 3, 425-29. doi: 10.1021/acs.estlett.6b00439, described in *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction)*, Fifth Edition, Concerned Health Professionals of New York and Physicians for Social Responsibility, March 2018 (*Compendium*), p. 93, http://concernedhealthny.org/wp-content/uploads/2018/03/Fracking_Science_Compendium_5FINAL.pdf.

¹⁵ *Id.*, p. 428.

In a 2015 study, the same team from the University of Iowa determined that previous testing and study methods likely underestimate radioactivity by focusing only on radium. The researchers developed a new method to accurately predict the concentrations of uranium, thorium, and radium and their alpha-emitting progeny, polonium and lead, in fracking wastewater. They found that, under certain conditions, radioactivity increased over time, due to ingrowth of alpha-emitting radioactive progeny of long-lived parent radionuclides such as radium.¹⁶ The authors warn that these decay products may potentially contaminate recreational, agricultural, and residential areas, and that a more detailed understanding is needed of how radionuclides accumulate in higher organisms.¹⁷

Because the DSEIS does not discuss the significance of the high levels of the radionuclides Lead-214 and Bismuth-214 in some of the Hakes landfill's leachate test samples or consider the ways in which the testing methodologies used by the labs testing Hakes leachate for radionuclides may have failed to detect radium or allowed radon to escape from the samples, the DSEIS fails to take a "hard look" at the issue of radioactivity in the landfill. The DSEIS also fails to provide a reasoned elaboration for why increasing the capacity of the landfill and allowing it to take more radioactive shale gas drilling wastes will not have an adverse effect on the environment and the health and safety of the people, animals and plants living near the landfill.

2. The DSEIS fails to evaluate the adequacy of the landfill's entrance monitors

The DSEIS states, "[a]t no time have any drill cuttings or other wastes from the oil and gas extraction industry set off the detector alarms at the Hakes Landfill. However, the alarms have proven to be effective in detecting several loads of solid waste that did not contain drill cuttings or other wastes from the oil and gas extraction industry, but potentially did contain radioactive wastes. This demonstrates the efficacy of the detection equipment."¹⁸

However, the efficacy of the landfill's entrance monitors in detecting radioactive waste entering the landfill is discredited by the landfill's leachate radionuclide test results which show that there are significant levels of radium and radon in the landfill.

Given the discrepancy between the landfill's leachate test results and the failure of any of the loads of waste entering the landfill or loads of leachate exiting the landfill to trigger the landfill's entrance monitors, the adequacy of the entrance monitors should have been evaluated in the DSEIS. The DSEIS should have discussed the correlation

¹⁶ Nelson, A. W., Eitheim, E. S., Knight, A. W., May, D., Mehrhoff, M. A., Shannon, R., Schultz, M.K. (2015). Understanding the radioactive in growth and decay of naturally occurring radioactive materials in the environment: An analysis of produced fluids from the Marcellus Shale. *Environmental Health Perspectives*, 123(7). doi: 10.1289/ehp.1408855, discussed in *Compendium*, pp. 95-96.

¹⁷ *Id.*

¹⁸ DSEIS pp. 16-17.

reports required by the radiation monitoring protocol in the landfill's operations and maintenance manual (OMM) and what the correlation reports show regarding the ability of the entrance monitors to detect radioactive wastes entering the landfill.¹⁹

Dr. Vaughan's affidavit addresses problems with the type of entrance monitors used by the landfill. He points out that truckloads carrying identical Radium-226 concentrations can have widely variable levels of gamma radioactivity measurable at the landfill entrance depending on whether radium breakdown products have been allowed to escape from the load or not. He explains that the gamma radiation dose measured outside a truck carrying Lead-214 and Bismuth-214 in secular equilibrium with Radium-226 because the truck is sealed would be about 60 times greater, or almost two orders of magnitude greater, than the gamma radioactivity measured outside an unsealed truck carrying the same amount of Radium-226, from which all breakdown products such as Lead-214 and Bismuth-214 have escaped. Dr. Vaughan states that this renders any "correlation" between the truckload sample analysis and the gamma radioactivity measurements meaningless unless the monitoring procedure at the landfill gate can quantify and control for the concentrations of Lead-214 and Bismuth-214 in the load of waste at the time the truck enters the landfill gate.²⁰

Because the DSEIS does not address the adequacy of the landfill's entrance monitors in light of the landfill's leachate radionuclide test results, the DSEIS fails to take a "hard look" at the issue of the adequacy of the landfill's entrance monitors or to provide a reasoned elaboration for why increasing the capacity of the landfill and allowing it to take additional truckloads of radioactive shale gas drillings wastes will not have an adverse effect on the environment and the health and safety of the people, animals and plants living near the landfill.

3. The DSEIS fails to evaluate the presence of radon gas in the landfill's air emissions, gas collection system emissions, and emissions from flaring

The Air and Particulate Items Report and Monitoring Plan, in Appendix H of the DSEIS, shows that the landfill is not testing for emissions of radon gas from the landfill surface or from the landfill's internal gas collection system. The DSEIS assumes that flaring of landfill gases will solve problems with harmful landfill gases, but radon is not flammable and will be collected and released through the landfill's gas collection system

¹⁹ Page 23 of the OMM provides that "In order to demonstrate a correlation between kcps and pCi/g, the facility will obtain six (6) samples from waste entering the landfill. Three (3) samples will represent loads that have no elevated radiation levels associated with them. The remaining samples will be taken from loads that trigger an investigation level condition. Radiation monitoring information will be obtained for each sample at the time of sampling. The samples will then be sent for radiological analysis by an appropriately certified laboratory. The sample results will be compared to the data collected on-site to further calibrate the monitors. In the event that no loads trigger an investigative level condition, other Department approved methods may be used to demonstrate a correlation."

²⁰ Ex. 1, ¶¶ 20-22.

during flaring of other landfill gases. This concern is accentuated by the landfill leachate radionuclide test results which indicate that, at least at certain times, there is approximately 1.05 million pCi/liter of Radon-222 in the air within the landfill, as described above.

Because the DSEIS does not address the adequacy of the landfill's air monitoring program in light of the landfill's leachate radionuclide test results, the DSEIS fails to take a "hard look" at the issue of radon gas in the landfill or to provide a reasoned elaboration for why increasing the capacity of the landfill and allowing it to take more radioactive shale gas drillings wastes will not have an adverse effect on the environment and the health and safety of the people, animals and plants living near the landfill.

4. The DSEIS fails to evaluate the possible presence of radium, radon and their breakdown products in the landfill's stormwater discharges, groundwater suppression system discharges or liner leakage discharges

The positive declaration issued by DEC for the landfill expansion project states that "[t]he project has the potential for significant impacts to groundwater requiring the design and construction of a landfill liner and leachate collection and leak detection systems. The construction and placement of waste in proximity of the existing water table requires the design and installation of a groundwater suppression system."²¹

DSEIS describes the landfill's groundwater and surface water monitoring program and states that the monitoring program provides the capability of detecting potential impacts to groundwater and surface water quality before they can have a significant adverse impact on the environment. But nowhere in the DSEIS or in the landfill's environmental monitoring protocols is it indicated that testing is conducted for the presence of radium, radon or their breakdown products in surface water and groundwater near the landfill. The DSEIS states that "To date, no groundwater contamination has been detected related to the operation of the lined cells."²² This statement overlooks the fact that the landfill is not testing for radium, radon and their breakdown products.

Because the DSEIS does not address the adequacy of the landfill's ground and surface water monitoring programs in light of the landfill's leachate radionuclide test results, the DSEIS fails to take a "hard look" at the issue of radium, radon and their breakdown products entering the environment through the landfill's stormwater discharges, groundwater suppression system discharges or liner leakage discharges, or to provide a reasoned elaboration for why increasing the capacity of the landfill and allowing it to take more radioactive shale gas drillings wastes will not have an adverse

²¹ DSEIS, App. A-1, p. 2.

²² DSEIS, p. 14.

effect on the environment and the health and safety of the people, animals and plants living near the landfill.

5. The DSEIS fails to evaluate the adequacy of the landfill's liner system and groundwater suppression system to protect against the radium, radon and their breakdown products present in the landfill from entering groundwater and surface water supplies adjoining the landfill

The DSEIS states that the landfill's composite liner system is the main source of protection against groundwater contamination by the landfill. The liner system is described in the DSEIS, but its annual leakage rate is not mentioned. It is widely recognized that every liner system has a leakage rate. It is also well understood that the liner systems used in construction and demolition landfills are much less substantial than the liner systems used in landfills accepting low-level radioactive wastes.

The DSEIS fails to evaluate the expected life of the landfill's liner system and the risks of harmful exposures from failure of the liner. There is no risk analysis and evaluation of the types of environmental hazards the liner system can withstand or the circumstances in which the integrity of the liner system could fail.

The surface water and wetland studies attached as Appendix E and Appendix J to the DSEIS make it apparent that numerous bodies of water and wetlands surround the landfill. As mentioned in the DSEIS, the drainage from landfill is to the Corning aquifer, the primary drinking water supply for the Corning-Painted Post metropolitan area, which is only three miles from the landfill.²³ All of these water bodies would be contaminated if there is leakage from the landfill and the DSEIS should have evaluated the adequacy of the landfill's liner system to protect against the radium, radon and their breakdown products present in the landfill from entering groundwater and surface water supplies adjoining the landfill.

The DSEIS states that Hakes is requesting a variance from the requirement in the solid waste regulations that the base of a landfill disposal cell be at least 10 feet above underlying bedrock.²⁴ The DSEIS relies upon the effectiveness of a yet-to-be-constructed groundwater suppression system in support of the landfill's request that only a five foot of separation from bedrock be allowed. There is no risk analysis and evaluation of the types of environmental hazards the groundwater suppression system can withstand or the circumstances in which the groundwater suppression system could fail in the DSEIS.

If the liner system or the groundwater suppression system were to fail, those failures might allow radium, radon and their breakdown products trapped in the landfill

²³ DSEIS, p. 20, Fig. 3-2.

²⁴ DSEIS pp. 21-23, 26, 70-71, citing 6 NYCRR Part 363-6.4.

to be released into surrounding water bodies and the environment and these risks should have been evaluated in the DSEIS.

Because the DSEIS does not address the adequacy of the landfill's liner system and groundwater suppression system to protect against the release of radium, radon and their breakdown products to the environment, the DSEIS fails to take a "hard look" at the issue of the adequacy of the landfill's liner system and groundwater suppression system or to provide a reasoned elaboration for why increasing the capacity of the landfill and allowing it to take more radioactive shale gas drillings wastes will not have an adverse effect on the environment and the health and safety of the people, animals and plants living near the landfill.

6. The DSEIS fails to evaluate the risk that opening up the landfill to tie-in the proposed expansion will create new pathways for radon and radium in the landfill to be released to the environment

The positive declaration issued by DEC for the landfill expansion project states that "[t]he project includes expansion of a solid waste management facility of large magnitude. It may result in the unearthing of C&D material as the new expansion is tied in with the existing facility. Bulk leachate storage and appropriate ongoing measures to prevent releases will be discussed."²⁵ But there is no discussion in the DSEIS of the process by which the new expansion is proposed to be tied in with the existing landfill.

Opening up the existing landfill to tie in the new expansion will inevitably create additional pathways for radium, radon and their breakdown products in the landfill to be released into the environment. The DSEIS contains no risk analysis and evaluation of the types of environmental exposures that may be entailed by opening up the landfill for the tie-in process.

Because the DSEIS does not evaluate the risk that opening up the landfill to tie-in the proposed expansion will create new pathways for radon and radium in the landfill to be released to the environment, the DSEIS fails to take a "hard look" at the issue of radioactivity in the landfill or to provide a reasoned elaboration for why increasing the capacity of the landfill and allowing it to take more radioactive shale gas drillings wastes will not have an adverse effect on the environment and the health and safety of the people, animals and plants living near the landfill.

²⁵ DSEIS, App. A-1, p. 2.

7. The DSEIS fails to evaluate the risk that the fires that have been occurring at the landfill have damaged the landfill’s liner system, gas collection system or leachate collection system and have created or will create new pathways for radon and radium in the landfill to be released to the environment

The DSEIS acknowledges that the landfill “has experienced both surface and subsurface fires.”²⁶ The DSEIS does not describe how many fires have occurred, in which cells the fires have occurred, how long the fires have lasted, or whether any fires are still burning within the landfill. The DSEIS does not evaluate whether the fires could damage or have already damaged the landfill liner system, gas collection system or leachate collection system and thereby create new pathways for radon and radium in the landfill to be released to the environment. Other than stating that the fires “could impact air resources by the release of smoke and other combustion products,”²⁷ the DSEIS contains no risk analysis and evaluation of the types of environmental exposures that could result from damages caused to damage the landfill liner, the gas collection system or the leachate collection system by the landfill fires.

Because the DSEIS does not evaluate the risk that the fires that have been occurring at the landfill have damaged the landfill’s liner system, gas collection system or leachate collection system and have created or will create new pathways for radon and radium in the landfill to be released to the environment, the DSEIS fails to take a “hard look” at the risk of radioactivity in the landfill, or to provide a reasoned elaboration for why increasing the capacity of the landfill and allowing it to take more radioactive shale gas drillings wastes will not have an adverse effect on the environment and the health and safety of the people, animals and plants living near the landfill.

8. The DSEIS fails to evaluate the health impacts of the landfill expansion project

Although the DSEIS states that “[a] major public concern regarding the construction or expansion of any solid waste facility is potential adverse impact on human health and the environment,”²⁸ the DSEIS fails to provide any meaningful analysis of the potential adverse impact on human health and the environment of the landfill expansion project.

A number of studies have documented the adverse health impacts of living near waste landfills. Research published in the *International Journal of Epidemiology* in 2016 showed that health is at risk for those who live within five kilometres of a landfill site. Researchers in Italy evaluated the potential health effects of living near nine different landfills in the Lazio region, and therefore being exposed to air pollutants emitted by the

²⁶ DSEIS, p. 17.

²⁷ *Id.*

²⁸ *Id.*, p. xv.

waste treatment plants. 242,409 people were enrolled in the cohort from 1996 to 2008. The results showed a strong association between Hydrogen Sulphide (used as a surrogate for all pollutants co-emitted from the landfills) and deaths caused by lung cancer, as well as deaths and hospitalizations for respiratory diseases. The results were especially prominent in children. The annual average exposure levels of Hydrogen Sulphide was 6.3 ng/m³, compared to people living close to larger landfills in Rome whose levels averaged 45 ng/m³. At the end of the follow-up period there were 18,609 deaths.²⁹

Dr. David O. Carpenter, director of the Institute for Health and the Environment, at the State University of New York at Albany spoke about his research on landfill toxins and public health at a 2010 program at Hobart and William Smith College in Geneva. An article in the *Finger Lakes Times*, described his presentation as follows:³⁰

Carpenter said a 1998 series of air sampling of 25 landfills in New York found high concentrations of carcinogenic chemicals that contributed not only to cancer but to neurological and liver diseases as well.

He said data was collected for 10 years on exposure to these chemicals from breathing the air, having it come into contact with skin, eating food grown nearby or drinking groundwater.

“Statistics from reports of illnesses contracted by people living in certain zip codes shows those near landfills have higher birth defects, thyroid disorders, nervous system disorders, immune system diseases and cancer,” Carpenter said.

He also said some studies have shown higher levels of hypertension, heart disease, diabetes and cardio-pulmonary disease.

“The facts show you are at higher risk of these diseases if you live near a landfill,” Carpenter said.

Later during the panel discussion, he told a questioner that three miles is considered close enough to a landfill to possibly be impacted by the toxins.

²⁹ Living near a landfill could damage your health, *Science Daily*, May 24, 2016, <https://www.sciencedaily.com/releases/2016/05/160524211817.htm>

³⁰ Panelists air landfill concerns: Speaking at HWS, they say health risks to those living nearby are clear, David Shaw, *Finger Lakes Times*, November 9, 2010, http://www.fltimes.com/news/panelists-air-landfill-concerns/article_cce461a9-ec14-5c88-85f2-f6feacb25797.html

“There is reason to be concerned. It’s pretty clear that if you live near a waste site, you have increased exposure to toxins and toxins increase your risk of disease,” Carpenter said.³¹

A key component of a health impact analysis is the study of the health impacts experienced by landfill workers and people living near the landfill, but no such studies are included in the DSEIS. The DSEIS excuses the failure to conduct studies of the health risks of working at the landfill or living near the landfill by stating that, “No specific health studies were included in the Consolidated Scope (Appendix B) prepared for this DSEIS, so none were performed.”³² The DSEIS also states that, “[t]he absence of specific health studies for the Town of Campbell or the landfill area makes it difficult to assess existing health conditions in the vicinity of the Hakes facility.”

While it is the case that the scope states that, “[the health issues section of the DSEIS] will be limited to regulatory requirements put in place by state and federal regulations to protect human health, and how the applicant will meet these requirements for the proposed expansion. This will include a discussion of the various air emission and water discharge limits and associated standards that are applicable to a facility of this type and how they were established to be protective of human health,”³³ the DSEIS does not discuss the various air emission and water discharge limits and associated standards that are applicable to the Hakes landfill and how they were established to be protective of human health.

In particular, the DSEIS fails to evaluate the risks of injury to human and environmental health from exposure to the levels of radioactivity shown by the leachate test data to be already present in the landfill or to evaluate the risks of the additional environmental exposures that would result from accepting additional levels of radioactive waste in the landfill.

Given the levels of radionuclides that are present in the landfill’s leachate test data, additional tests should have been conducted for the presence of radionuclides in the landfill to try and determine the exposure levels that may be experienced by landfill workers and people living near the landfill now and in the future.

An adequate health impact analysis must look beyond the current health impacts of working at the landfill and living near the landfill and take into account the long-term health and environmental impacts of radium in the landfill. Radium-226 has a half-life of about 1,600 years and bioaccumulates in the food chain. The DSEIS should evaluate the projected health and environmental impacts of radium in the Hakes C&D landfill over the long-term.

³¹ *Id.*

³² *Id.*, p.63.

³³ DSEIS, App. B, p.35.

New York's low-level radioactive waste disposal facility regulations provide that "[c]oncentrations of radioactive material which may be released to the general environment in groundwater, surface water, air, soil, plants or animals must not result in an annual dose exceeding an equivalent of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public. Releases of radioactivity in effluents to the general environment must be maintained as low as reasonably achievable." 6 NYCRR 382.11. There is no evaluation of potential exposures to radioactivity from radionuclides in the the Hakes landfill in the DSEIS.

Dr. David Carpenter states in his affidavit attached as Exhibit 3, "[b]ased on the information provided to me and my knowledge of the human health effects arising from exposure to ionizing radiation, I have concluded that: (a) there are substantial and significant risks to human health posed by the current procedures used at the Hakes Landfill and approved by NYSDEC, (b) while the greatest threat to human health comes from inhalation of radon-222, other naturally occurring radioactive material (NORM) and the progeny of these elements pose significant threats to human health, and (c) inhalation is the route of exposure of greatest concern but other routes (ingestion, dermal absorption) are also possible."³⁴

Dr. Carpenter concludes that "[t]he net effect of New York accepting drill cuttings and de-watered mud from Pennsylvania fracking sites will be the New Yorkers will have an increased risk of cancer, especially lung and gastrointestinal cancers, an increased risk of birth defects coming from DNA damage and increased risk of a shortened life span."³⁵

Because the DSEIS makes no attempt to evaluate the health risks of exposure to the levels of radioactivity shown to be present in the landfill or to evaluate the possibility of additional exposures not identified by the testing methodologies used by the landfill's laboratories, it is apparent that the DSEIS fails to take a "hard look" at the health impacts of the landfill expansion or to provide a reasoned elaboration for why increasing the capacity of the landfill and allowing it to take more radioactive shale gas drillings wastes will not have an adverse effect on the environment and the health and safety of the people, animals and plants living near the landfill now and in the future.

³⁴ Ex. 3, ¶ 6.

³⁵ Id., ¶ 19.

* * *

For each of the reasons discussed above, we respectfully request that the permit applications made in connection with the Hakes expansion project be denied.

Respectfully,



Roger Downs, Conservation Director
Sierra Club Atlantic Chapter



Frederick Sinclair, Chairman
Concerned Citizens of Allegany County



Gary McCaslin, Co-President
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TABLE OF EXHIBITS

Exhibit 1 — [Affidavit of Dr. Raymond Vaughan](#), dated January 18, 2018.

Exhibits to Vaughan affidavit may be downloaded from

<http://treichlerlawoffice.com/waste/hakes/vaughanexhibits.html>.

Exhibit A — [Vaughan CV](#)

Exhibit B — [Truck Monitor Correlation Report](#), Co-Physics, June 7, 2015

Exhibit C — [Hakes 2Q 2012 Leachate Radionuclide Analytical Results](#)

Exhibit D — [Hakes 4Q 2012 Leachate Radionuclide Analytical Results](#)

Exhibit E — [Hakes 2Q 2013 Leachate Radionuclide Analytical Results](#)

Exhibit F — [Hakes 4Q 2013 Leachate Radionuclide Analytical Results](#)

Exhibit G — [Hakes 2Q 2014 Leachate Radionuclide Analytical Results](#)

Exhibit H — [Hakes 4Q 2014 Leachate Radionuclide Analytical Results](#)

Exhibit I — [Hakes 2Q 2015 Leachate Radionuclide Analytical Results](#)

Exhibit J — [Hakes 4Q 2015 Leachate Radionuclide Analytical Results](#)

Exhibit K — [Hakes 2Q 2016 Leachate Radionuclide Analytical Results](#)

Exhibit L — [Hakes 4Q 2016 Leachate Radionuclide Analytical Results](#)

Exhibit M — [Hakes 2Q 2017 Leachate Radionuclide Analytical Results](#)

Exhibit N — [Chemung Leachate Radionuclide Analytical Results March 2015 through January 2017](#)

Exhibit O — Answer posted 27 September 2005 by George Chabot, PhD, CHP, providing an expert online answer to the question, [What value should be taken as the average gamma energy of 226Ra?](#) at the Health Physics Society website, <https://hps.org/publicinformation/ate/q4817.html>

Exhibit P — [Uranium-238 decay series](#)

Exhibit Q — Oak Ridge Institute for Science and Education (ORISE) presentation, [Radiological and Chemical Properties of Uranium](#), available online from the U.S. Nuclear Regulatory Commission website, www.nrc.gov/docs/ML1122/ML11227A233.pdf

Exhibit R — DEC's September 18, 2015 [Program Policy Memorandum on Recommended Permit Modifications and Operating Procedures for Landfills relating to Wastes from Drilling in the Marcellus Shale Formation](#)

Exhibit S — [Graph of time trends for Hakes leachate test results for Bismuth-214](#)

Exhibit T — [Graph of time trends for Hakes leachate test results for Lead-214](#)

Exhibit U — [Graph of time trends for Hakes leachate test results for Radium-226 \(tested by Method 901.1\)](#)

Exhibit V — [Graph of time trends for Hakes leachate test results for Radium-226 \(tested by Method 903.1\)](#)

Exhibit W — [Graph of time trends for Chemung leachate test results for Bismuth-214](#)

Exhibit X — [Graph of time trends for Chemung leachate test results for Lead-214](#)

Exhibit Y — [Graph of time trends for Chemung leachate test results for Radium-226 \(tested by Method 901.1\)](#)

Exhibit Z — [Graph of time trends for Chemung leachate test results for Radium-226 \(tested by Method 903.1\)](#)

Exhibit 2 — [Affidavit of Mr. Dustin May](#), dated January 17, 2018.

Exhibit A — [Eitrheim, E. S., May, D., Forbes, T. Z., & Nelson, A. W. \(2016\). Disequilibrium of naturally occurring radioactive materials \(NORM\) in drill cuttings from a horizontal drilling operation, Environmental Science & Technology Letters 3, 425-29. doi: 10.1021/acs.estlett.6b00439](#)

Exhibit 3 — [Affidavit of Dr. David Carpenter](#), dated January 17, 2018.

Exhibit 4 — [Unresolved Issues for Disposal of Radium-bearing Wastes at Hakes Landfill](#), slides of presentation by Dr. Raymond C. Vaughan, Sierra Club/CCAC Public Meeting, Campbell, NY, February 10, 2018. [Click here for the video of the presentation.](#)