PERMIT APPLICATION RESPONSIVENESS SUMMARY
December 2019

Hakes C&D Landfill Expansion Project
Town of Campbell, Steuben County, New York

I. Introduction

Hakes C&D Disposal, Inc. owns and operates the Hakes C&D Landfill (Landfill), located at 4376 Manning Ridge Road in the Town of Campbell, Steuben County, New York, for the disposal of construction and demolition debris (C&D debris). Since 1989, the Department has permitted this landfill's operation under New York State Environmental Conservation Law (ECL) Article 27, Title 7, and the related solid waste management regulations at 6 NYCRR Part 360. As the landfill draws closer to the current permitted capacity, Hakes has sought to expand.

As the lead agency under the New York State Environmental Quality Review Act (SEQR) for the landfill expansion, the Department accepted a Draft Supplemental Environmental Impact Study (DSEIS) in January 2018. The Department held a SEQR public hearing on the DSEIS in February 2018. After reviewing oral and written public comment, the Department accepted a SEQR Final Supplemental Environmental Impact Study (FSEIS) in December 2018.

Later that month, Hakes applied to modify its Part 360 landfill permit and its Air State Facility permit (concerning air pollution control governed by ECL Article 19). Hakes has also applied for a new, individual Section 401 Water Quality Certification to fill approximately 0.672 acres of federally-regulated wetlands for the expansion. The Department also regulates the landfill expansion under the State Pollutant Discharge Elimination System (SPDES) Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activities, and Hakes has submitted related updates to the landfill stormwater pollution prevention plan. In May 2019, the Department notified the public that the permit applications for the landfill expansion project were complete. In June 2019, the Department held a public hearing, and received oral and written comment on the applications.

The largest part of the 2018 FSEIS provides the Department's responses to public comments on the landfill expansion project. Because the public comments on the permit applications are essentially the same as the earlier public comments on the DSEIS, the 2018 FSEIS already addresses virtually all the public comments on the permit applications. Thus, the responses presented by the FSEIS are not fully repeated here. Rather, by this reference and the following link, the 2018 FSEIS is incorporated into this Application Responsiveness Summary: hakesexpansion.blogspot.com. The following section incorporates and re-organizes certain aspects of the 2018 FSEIS in response to common categories of public comments received on the permit applications

II. Topical Response to Public Comment

Hakes Landfill has legally accepted drill cuttings for years. Years ago, prior to Hakes proposal of this Landfill expansion, DEC considered the nature of drill cuttings and their potential radioactivity and determined that solid waste management landfills in the State could dispose drill cuttings. The recent comprehensive update of the State's solid waste management regulations (6 NYCRR Part 360 et seq.) in November 2017 continue to allow this drill cutting disposal at landfills regulated thereunder, including Hakes Landfill.

The expansion of the Hakes Landfill will enhance current environmentally protective measures already implemented at the Hakes Landfill. Because the updated 6 NYCRR Part 360 et seq. regulations applicable to the Landfill expansion clarify the Department's requirements for C&D debris landfills that accept drill cuttings for disposal, the permit modification now issued for the landfill expansion enhances the environmentally protective measures already employed at the landfill. For example, the updated regulations now clearly require all landfills that accept drill cuttings to have fixed radiation detectors to monitor incoming waste loads, and clearly prohibit landfill acceptance of any waste loads which exhibit radioactivity above 25 pCi/g. Hakes Landfill first installed its fixed radiation detectors in 2010. Although Hakes Landfill already has monitored its incoming waste loads with fixed radiation detectors for years (and no waste load exhibiting radioactivity above 25 pCi/g has been accepted), the updated regulation insures continuance of these environmentally protective measures.

Drill cuttings are not "hydrofracking waste." Hydraulic fracturing occurs only after a well has been drilled and the drill cuttings have been removed. Drill cuttings are produced when a well is being drilled. As the drill bit grinds and cuts downward through layers of rock, fluid removes the ground rock to create the well bore. The drilling fluid then carries the cut rock (drill cuttings) to the earth's surface for disposal. Hydraulic fracturing ("hydrofracking") only occurs after a well has been drilled and the drill cuttings have been removed from the well. Specifically, hydraulic fracturing is the act of pumping hydraulic fluid through part of a well bore (e.g., the horizontal leg of a well bore) into the surrounding geologic formation. It is a type of well stimulation because the fracturing of the geological formation increases its permeability to stimulate the well's production of oil or gas.

The Hakes Landfill is a C&D debris landfill, and drill cuttings are C&D debris. Since the time the Department first permitted the Landfill, it has been classified as a C&D debris landfill. The Landfill's design, including for the landfill expansion, complies with the DEC regulations for C&D debris landfills. DEC considers drill cuttings to be C&D debris because they are produced when a well (structure) is being drilled (constructed).

Drill cuttings disposed at C&D landfills like Hakes Landfill contains little, if any, Marcellus Shale.

The drill cuttings accepted at Hakes Landfill are generated almost entirely before well drilling into the Marcellus Shale formation occurs. These drill cuttings are generated mainly from well drilling in the geological formations located above the Marcellus Shale geological formation, *not* from drilling into the Marcellus shale itself.

DEC prohibits disposal of drill cuttings that derive from oil-based drilling at 6 NYCRR Part 360 et seq. permitted C&D debris landfills, including the Hakes Landfill. Previously under permit conditions, and now under 6 NYCRR Part 360 et seq., only drill cuttings derived from water or air-based drilling may be disposed at any C&D debris landfill, including the Hakes landfill. Typically, drill cuttings derived from water or air-based drilling are generated from the drilling of the vertical portion of a well bore. The vertical portion of the well bore cuts through geological formations closer to the earth's surface until the target formation is reached. (The target formation is the geological formation from which the well will produce oil and gas; in this case, it is the Marcellus Shale). Once the vertical drilling reaches the target (Marcellus Shale) formation, vertical drilling stops and horizontal drilling of the well commences. This horizontal drilling is performed using oil-based fluids. These drill cuttings using oil-based fluids are not allowed at the Hakes C&D debris landfill. Thus, the drill cuttings disposed at Hakes contain little, if any, of the Marcellus Shale formation.

The State's 2017 comprehensive update of the solid waste management regulations applicable to the Hakes Landfill clarifies and updates regulatory requirements relating to oil and gas well drilling and production waste, including but not limited to drill cuttings. Under the most recent update of 6 NYCRR Part 360 et seq., DEC also regulates drill cuttings as drilling and production waste because they emanate from the bores of oil, gas, or other deep wells. For all Part 360 landfills that accept drill cuttings, including Hakes:

- The landfill's waste control plan (part of the facility manual implemented under the Part 360 permit) must specifically include the drill cuttings and describe any special handling or disposal procedures associated with the drill cuttings (6 NYCRR 363-7.1[p]).
- The landfill must have a radioactive waste detection plan including procedures for detecting radioactive material; operation and maintenance documents for radiation detectors which address proper equipment placement for effective operation and include setting of investigation alarm setpoints and calibration methods; and response procedures to be implemented if radioactive waste is detected (6 NYCRR 363-4.6[n]).
- Operation of a fixed radiation detection unit to monitor all incoming waste is required; the investigation alarm setpoint of the radiation detector must be set at least two times but no greater than five times site background radiation levels; background radiation readings must be measured and recorded daily; field

checks of the radiation detector using a known radiation source must be performed and recorded weekly; the radiation detector must be calibrated at least annually or more often if recommended by the manufacturer; and each instance in which a radiation detector is triggered must be documented and reported to DEC (6 NYCRR 363-7.1[a][5]).

- The landfill must conduct training related to radiation detection system operating procedures and radiation investigation alarm response procedures at least annually (6 NYCRR 363-7.1[p]).
- The landfill is prohibited from disposing any wastes, excluding firebrick, which exhibit a concentration greater than 25 pCi/g of Radium-226 (6 NYCRR 363-7.1[o]).
- The landfill is prohibited from disposing fluids produced from an oil or gas production well, including flowback water (fluid returned to the earth's surface after well stimulation) and production brine (fluid brought to the surface during the production of oil or gas from a well or during natural gas withdrawal from an underground storage reservoir) (6 NYCRR 363-7.1[o]).
- The landfill is prohibited from disposing naturally occurring radioactive material waste (NORM) which has been processed and concentrated (also known as technically enhanced, or TENORM) (6 NYCRR 363-7.1[o]).
- Every landfill, including Hakes landfill, must have an environmental monitoring plan that requires sampling and analysis of landfill leachate (semi-annually for five years and at least annually after that) (6 NYCRR 363-4.6[f][8][iii][*b*], and Table 3a) for the following radionuclides: Radium-226 per EPA 903.1; Radium-228 per EPA 904.0; and Total Uranium per EPA 908.0.

Links to related DEC rulemaking documents for the most recent update of 6 NYCRR Part 360 et seq. (which became effective in November 2017) can be found at https://www.dec.ny.gov/regulations/81768.html. These documents include DEC's initial (June 2017) and supplemental (August 2017) responses to comments (RTCs) from the SEQR process supporting the regulatory update. Both RTCs respond to public comments about drill cuttings.

Drill cuttings are NORM, not TENORM; drill cuttings are not a radioactive material subject to State regulation under 6 NYCRR Part 380. Years prior to the November 2017 update of 6 NYCRR Part 360 et seq., DEC had determined that the NORM in drill cuttings (such as those disposed at Hakes and other 6 NYCRR Part 360 regulated landfills) is not "processed and concentrated" (i.e. is not TENORM); that as a result, these drill cuttings are not regulated as radioactive materials under 6 NYCRR Part 380; and that, as a further result, these drill cuttings may be disposed at a landfill regulated under 6 NYCRR Part 360. The derivation of these drill cuttings (i.e., drilling through and thereby cutting rock, trucking/possibly rail transport of cut rock, and disposal of cut rock at landfill) has not changed since DEC's earlier determination that drill cuttings are not TENORM. Significantly, nothing is done to the drill cuttings which increases - or in any way changes - the concentration of natural radioactivity in them.

In 2018, DEC updated 6 NYCRR Part 380, and public comment suggested that DEC should consider drill cuttings (among other drilling waste) to be TENORM and regulate them under 6 NYCRR Part 380 rather than 6 NYCRR Part 360. DEC continued to disagree: DEC's April 10, 2018 "6 NYCRR Part 380 Summary of the Assessment of Public Comment" provides a condensed version of DEC's response to public comment on that regulatory update, stating in part:

> "Many commenters requested that all waste generated by the drilling and development of oil and gas wells subject to hydraulic fracturing classified as NORM be reclassified as TENORM. DEC's response explained that waste containing NORM that has been processed and concentrated continues to be regulated radioactive waste per 6 NYCRR Part 380-1.2(e), and that waste containing NORM in natural isotopic abundance is not regulated waste under Part 380. Drilling waste (i.e., cuttings) contains NORM in natural isotopic abundance; for this reason, drilling waste is not regulated by Part 380, because such waste does not contain elevated levels of radioactive materials resulting from processing. It would be inappropriate to reclassify waste containing NORM as TENORM when the waste does not exhibit elevated levels of radioactivity. In addition, other DEC regulations (6 NYCRR Parts 360 and 363) apply to landfills; waste containing NORM is not prohibited from disposal in landfills within the State. However, Part 363 prohibits the disposal of waste containing elevated levels of radioactivity, consistent with Part 380 requirements. Hence, TENORM is prohibited in a Part 363 landfill." *(Part 380 APC Summary pages 2-3, item 2)*

Links to related DEC rulemaking documents for the most recent update of 6 NYCRR Part 380 (which became effective in May 2018) can be found at https://www.dec.ny.gov/regulations/106149.html. These documents include DEC's Summary Assessment of Public Comment and DEC's Assessment of Public Comment, each dated April 10, 2018, from the SEQR process supporting the regulatory update. The former document summarizes the latter; both contain DEC response to public comments about drill cuttings.

Radionuclides in the Local Environment Radium is a naturally occurring radioactive element. In the natural environment, radium – a metal - occurs at trace levels in virtually all rock, soil, water, plants and animals. Radium-226 (having a half-life of 1600 years) and Radium-228 (having a half-life of 5.75 years) are the most common - isotopes (variants) of the element radium.

As Radium-226 decays over time, other isotopes are produced (also called decay products), including but not limited to its immediate progeny, gaseous Radon-222, which has a half-life of 3.8 days. In turn, Radon-222 decays to its decay products include the particulates Bismuth-214 and Lead-214, which each have a half-life of less than thirty minutes.

As a result of local geology, naturally occurring radon accumulates indoors at levels in Steuben County which may require property owner mitigation. (See also FSEIS

Comment and Response B-13.) Certain comment has inaccurately stated that the indoor average level of indoor radon in the Town of Campbell is 4 pCi/l. However, the New York State Department of Health has reported an average indoor radon level of 14.11 pCi/l in the Town of Campbell, as well as 7.54 pCi/l in the Town of Caton; 10.15 pCi/l in the Town of Cohocton; and 12.15 pCi/l in the Town of Fremont. Because radon is an indoor air health concern, USEPA recommends that properties with indoor radon levels of more than 4 pCi/l mitigate to reduce the level to below 4 pCi/l. Both the United States Environmental Protection Agency and the New York State Department of Health report that naturally occurring radon is not an outdoor exposure health problem.

Past and Current Leachate Testing Requirements For years, Hakes has tested its leachate (via laboratory analysis of leachate samples) for Radium-226, Radium-228, and total Uranium. For part of this time, Hakes also reported analyses of leachate for Bismuth-214 and Lead-214. By 2012, although the regulations at 6 NYCRR Part 360 did not specify that Hakes must test its leachate for any radionuclides, the Part 360 permit required the following radionuclide analysis for leachate:

- Radium-226
- Radium-228
- Total Uranium
- Gamma Spectrum

Hakes provided test results for Bismuth-214 and Lead-214 as part of the gamma spectrum analysis performed using USEPA analytical method 901.1 (EPA 901.1). In 2018, after the November 2017 update of the solid waste regulations at 6 NYCRR Part 360 et seq., Hakes discontinued EPA 901.1 analysis of its leachate. This discontinuance was acceptable to the Department. Leachate analysis for Radium-226, Radium-228 and Total Uranium has continued.

The updated 6 NYCRR Part 360 et seq. applies to the Landfill expansion and requires semi-annual radionuclide analysis of leachate for Radium-226 (using USEPA analytical method 903.1), Radium-228 (using USEPA analytical method 904.0), and Total Uranium (using USEPA analytical method 908.0). See 6 NYCRR 363-4.6(f)(8)(iii)(*b*) and 363-4.6[h] at Table 3A. The updated regulation does not require any other radionuclide analysis of the Landfill leachate for the expansion.

The Department has chosen not to use EPA 901.1 to analyze for radium in leachate because this analytical method was originally designed for soil analysis and the use of it for water analysis results in unacceptably high uncertainties. Furthermore, using the method for radon quantitation relies on potentially erroneous assumptions of equilibrium to back-calculate radon concentrations in the leachate, or in the waste material that is the source of the decay products. Decay products can, and often do, become disassociated with the radium parent isotope through processes such as differential/variable solubility, and radon preferential accumulation in material voids spaces, gas and liquid collection systems, etc. These variables can result in imbalances in the usual equilibrium assumptions used in attempts to back calculate radium or radon concentrations in the waste, which can throw off the results as much as

several orders of magnitude. For this reason, the Department relies on direct analysis for radium in leachate using an analytical method not subject to these compounding errors, EPA 903.1. This methodology is widely used and regarded as the most accurate analytical method for determining Radium-226 activity/concentrations in liquids.

There's no basis to assert that radionuclides in Landfill leachate will contaminate local waters. A comment questions whether radionuclides detected in Landfill leachate may enter the effluent that the municipal waste water treatment plant (WWTP) in the Town of Bath discharges to local surface waters. While it is true that Bismuth-214 and Lead-214 have been detected in Landfill leachate, these radionuclides have very short half-lives and would decay before entering surface waters. Before any leachate constituent could possibly be discharged from the WWTP, leachate must be collected at the landfill, stored, trucked to and pretreated at the Steuben County landfill in Bath, sent through a pipe from the County landfill pretreatment to the WWTP, and treated again, as part of the WWTP wastewater influent. Radon-222 decays away over the course of about a month. Hence, so will its progeny, Lead-214 and Bismuth-214. Along with this decay, radon will naturally emanate out of the water during treatment via aeration and other processes. So, by the time any such radionuclides could reach surface waters via WWTP effluent, they would be at significantly lesser values and quickly decay along with the radon.

One comment asserts that the Landfill's leachate should be analyzed for Lead-210, a decay product further down the decay chain than Bismuth-214 and Lead-214. The updated regulations at 6 NYCRR Part 360 et seq. do not require any leachate analysis for Lead-210 for Hakes or any other landfill.

Comment also questions whether Lead-210 will enter waters due to leachate entering the WWTP. There is no significant potential for Lead-210 from radon in Hakes leachate to enter waters because there is not enough time between leachate collection and disposition for Radon-222 decayed to Lead-210 to accumulate to any detectable values.

The assertion there is a concentration of 1.05 E+6 pCi/l of Radon-222 within the landfill waste mass is unsupported and misleading. The comment provides no support (i.e., source citation that has been subject to scientific peer review and publication, or even the calculation itself) to assert that the concentration of Radon-222 in the landfill is 1.05 E+6 pCi/l (approximately one million pCi/l). This asserted value could only have been speculatively back-calculated using several assumptions utilizing the Lead-214 and Bismuth-214 values shown to exist in the Landfill leachate. Again, the Lead-214 and Bismuth-214 in the leachate are generated from Radon-222 in the landfill, and Radon-222 is substantially more likely to originate from the surrounding environment than from the drill cuttings. Thus, the asserted value is also misleading in this matter, where the majority of the public comment focuses on radioactivity relating to drill cuttings.