

# ***LAW OFFICE OF GARY A. ABRAHAM***

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March 4, 2014

Ms. Linda Palmer, Clerk of the Chemung County Legislature  
John H. Hazlett Building  
203 Lake Street, 5th Floor  
Elmira, New York 14902-0588  
**via email to: lpalmer@co.chemung.ny.us**

Re: Proposed Chemung County Landfill Expansion

Dear Ms. Palmer:

Please accept the following comments regarding the above-referenced proposal on behalf of Residents for the Protection of Lowman and Chemung (“RFPLC”). As you know, the County’s Draft Environmental Impact Statement (“DEIS”) for this project proposal, on which together with public comments it will rely to decide whether to approve the proposal, is posted on line on the County’s website. In addition, several landfill-related documents referred to below have been posted on my website (see letterhead above).

### ***The County’s decision not to consider Marcellus Shale waste issues***

The County announced in the scoping statement prepared for this proposal last June that because such issues were considered in a 2010 state Department of Environmental Conservation (DEC) review of an earlier proposal to increase the tonnage rate at the landfill, it would not consider any comments related to potential exposure of workers and residents to radioactivity:

[Certain] comments were not incorporated into this RFSD [Revised Final Scoping Document] because they were not relevant, not environmentally significant, and/or adequately addressed in a prior environmental review. Such issues include impacts relating to radiation, radon and/or acceptance of materials from the Marcellus [Shale] as those impacts were examined in a prior environmental review before the NYSDEC, and/or are not environmentally significant based on the composition of Marcellus shale waste materials that are currently being deposited at the landfill.<sup>1</sup>

However, the premise of the County’s decision to exclude the potential impact of radioactive wastes from its consideration of the current landfill expansion proposal is not borne out by the record. In fact, in 2010 DEC clearly ruled it would not adjudicate issues relating to radiation,

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<sup>1</sup> Chemung Landfill, LLC, REVISED FINAL SCOPING DOCUMENT [RFSD] FOR A DRAFT ENVIRONMENTAL IMPACT STATEMENT (June 2013), p. 12.

radon and/or acceptance of materials from the Marcellus Shale :

No issue exists for adjudication. The permit modification proposed by RFPLC, to disposal of Marcellus Shale gas waste streams, is unrelated to and involves issues distinct from those bearing on the permit modification proposed by the County, to increase the tonnage of undifferentiated concerns about the radioactivity of particular Marcellus Shale waste streams should have been -- and may still be -- raised before DEC Staff in a request for modification of the landfill permit under 6 NYCRR 621.13(b).<sup>2</sup>

Thus, there is no basis for the County's assertion that radioactivity exposure issues are "not relevant, not environmentally significant, and/or adequately addressed in a prior environmental review." Since offers of proof brought by RFPLC that these issues deserve a hearing were turned away by DEC, no meaningful record exists on which the County could rely for its conclusion that these issues are irrelevant and/or not significant.

However, there is a record of volumes of Marcellus Shale industry wastes disposed in the landfill, and the radioactivity in landfill leachate, which is trending upward, in the time since the 2010 DEC proceeding.

### ***What's in the County landfill?***

As acknowledged in the County's scoping document, it is important to understand "the composition of Marcellus shale waste materials that are currently being deposited at the landfill."<sup>3</sup>

In 2010 Chemung County Landfill disposed 48,225 tons of Marcellus Shale drilling waste from Pennsylvania, almost half the total tonnage disposed; in 2011 the number was 58,741 tons, about one-third of the total tonnage disposed; in 2012 the number was 68,903 tons, also almost one-third of the total tonnage disposed. These amounts do not include tens of thousands of tons of "daily cover" imported from Pennsylvania.

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<sup>2</sup> *Rulings of the Administrative Law Judge on Issues and Party Status, In the Matter of the Application of Chemung County for modification of the Part 360 permit for its municipal solid waste landfill on County Route 60 in Elmira [sic], Town of Chemung, Application No. 8-0728-00004/00013, SEPTEMBER 3, 2010, p. 33, available at <[http://www.dec.ny.gov/docs/legal\\_protection\\_pdf/chemung.pdf](http://www.dec.ny.gov/docs/legal_protection_pdf/chemung.pdf)>. The Rulings of the ALJ were affirmed upon appeal by DEC Commissioner Martens in DECISION OF THE COMMISSIONER, *In the Matter of the Application for Modification of the Part 360 Permit for a Municipal Solid Waste Landfill on County Route 60 in Lowman, Town of Chemung, New York, by Chemung County, Applicant*, August 4, 2011, available at <[http://www.dec.ny.gov/docs/legal\\_protection\\_pdf/chemungd.pdf](http://www.dec.ny.gov/docs/legal_protection_pdf/chemungd.pdf)>.*

<sup>3</sup> *Cf. above*, note 1.

The DEIS specifies that the landfill disposes “Marcellus Shale drill cuttings” and other wastes from the Marcellus Shale industry, but not other drill cuttings or gas and oil wastes.<sup>4</sup> Presumably, non-Marcellus Shale oil and gas wastes, such as drill cuttings from the vertical section of a wellbore, do not need to be disposed in a landfill.

Drill cuttings arrive at the landfill wet, raising issues about what is in the liquid that accompanies the cuttings. Specifically, drill cuttings are coated with either briny liquid that is part of the shale formation, or drilling fluid which was injected into the wellbore to help bring the cuttings to the surface, or both.

Much of the concern with wastewater and wet wastes from the Marcellus Shale industry is addressed to radium, which is soluble in water and is known to cause bone cancer and leukemia when ingested. In its 2011 draft environmental impact statement addressing high-volume hydro-fracking, DEC found that brine returned from Marcellus Shale drilling sites had concentrations of Ra-226 ranging from 7,885 ( $\pm$  1,568) to 16,030 ( $\pm$  2,995) picocuries per liter (pCi/L).<sup>5</sup> DEC has also acknowledged that “concentrated radiation” is found in the waste residue left after closure of a Marcellus Shale drill site’s waste water holding pond, including the sediments, liner and any remaining liquid.<sup>6</sup> EPA measured values of radioactivity for Marcellus Shale flowback water (brine) of 9,000 pCi/L, or about 9,000 times the natural radiation in normal well water.<sup>7</sup> For reference, the legal limit for discharges of liquid (including landfill leachate) to a treatment plant is 60 pCi/L, the drinking water limit for combined radium (Ra-226 + Ra-228) is 5 pCi/L.

Thus, Marcellus Shale drill cuttings accepted at the landfill are coated with return water from drilling operations that can be expected to exhibit high concentrations of radioactive

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<sup>4</sup> See DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR CHEMUNG COUNTY LANDFILL (“DEIS”), 151 (specifying waste streams accepted at the landfill, including “Marcellus Shale drill cuttings”), available at <<http://www.chemungcounty.com/index.asp?pagelid=574>>.

<sup>5</sup> DEC, REVISED DRAFT SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS, AND SOLUTION MINING REGULATORY PROGRAM (Sept. 7, 2011) (hereafter, “2011 dSGEIS”), Appendix 13, available at <<http://www.dec.ny.gov/data/dmn/rdsgeisfull0911.pdf>>.

<sup>6</sup> Senate Standing Committee on Energy Conservation, *Public Hearing to examine waste water produced by hydraulic fracturing, sponsored by New York State Senators Mark Grisanti and Patrick Gallivan*, testimony of Eugene Leff, Deputy Commissioner, Remediation and Materials Management, NYS Department of Environmental Conservation (January 12, 2011, Canandaigua, NY), available at <<http://www.shaleshockmedia.org/2011/12/14/2-eugene-leff-dec-deputy-commissioner/>> (go to time 1:01:36-1:02:52).

<sup>7</sup> DEC, 2011 dSGEIS, section 5.2.4.2.

radium. Considering that DEC permits the landfill to accept wastes solidified to 20% solids (thus, 80% liquids), substantial volumes of liquid saturated with radium could be disposed in the landfill.

As RFPLC told DEC in 2010, the concentration of radioactivity in leachate transported from the landfill for treatment at the County Sewer District treatment plants in Elmira can be expected to increase as increasing volumes of Pennsylvania oil and gas wastes are disposed in the County landfill. The County Sewer District prohibits “[a]ny wastewater containing any radioactive wastes” unless approved by the district’s Executive Director.<sup>8</sup> To our knowledge, the Executive Director has not approved the acceptance of any radioactive components in the landfill’s leachate.

Casella sends roughly 2 to 10 million gallons of leachate per year to Elmira.<sup>9</sup> It should be stressed that no publicly owned wastewater treatment plant in New York is licensed to, or is capable of removing radioactivity from wastewater.<sup>10</sup> However, there is no indication the County has considered the impact of approving the landfill’s expansion on the radiological character of the County sewer district’s discharges to the Chemung River.

Despite dismissal of RFPLC’s effort to have this issue adjudicated before DEC in 2010, the DEC Commissioner directed regional DEC staff to modify the landfill’s permit to enhance monitoring for radioactivity. As a result, the landfill’s permit was modified to require radiation portal detectors at the landfill gate, and to require analysis twice each year of leachate from the landfill, once each year from the leachate lagoon (an open air pond) to which all leachate is

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<sup>8</sup> Chemung County Sewer Use Law, Rules & Regulations § 602(11).

<sup>9</sup> See Chemung County Landfill, 2009 Annual Report (to NYSDEC), p.4 (reporting that 2.0 million gallons were transported off site for treatment); 2010 Annual Report, p. 6 (reporting 5.6 million gallons treated); 2011 Annual Report, p. 6 (reporting 9.7 million gallons treated); 2012 Annual Report, p. 6 (reporting 2.99 million gallons treated). These reports are available at <http://www.garyabraham.com/ChemungLF.html>.

<sup>10</sup> Waste treatment plants, including pretreatment plants, are not designed to remove radionuclides, and discharge of “NORM associated with oil and gas extraction . . . that requires a change of disposal practice (e.g., radioactivity, etc.) is considered to be interference under the pretreatment program.” Memorandum from James Hanlon, Director of EPA’s Office of Wastewater Management to the EPA Regions, “Natural Gas Drilling in the Marcellus Shale under the NPDES Program, Attachment, 16, available at <http://cfpub.epa.gov/npdes/hydrofracturing.cfm> (citing 40 C.F.R. §§ 403.3(k)(2), 403.5(a)(1)). Discharge of “radioactive wastes” is prohibited under 40 C.F.R. § 403.5(b). Cf. EPA, *Guidance Manual for the Identification of Hazardous Wastes Delivered to Publicly Owned Treatment Works by Truck, Rail, or Dedicated Pipe*, No. 833B87100 (June 1987), C-3, available at <http://www.epa.gov/npdes/pubs/owm0190.pdf>.

stored before pumping and transport to Elmira, and from lagoon sediments. These leachate analysis requirements are scheduled for three years, ending in June 2014, after which the landfill is required to sample and analyze leachate once annually, only from the lagoon. After 2014, no further analysis of sediment or leachate collected directly from landfill cells would be required.<sup>11</sup>

In addition, at the time of the 2010 DEC proceeding, in May 2010, leachate was collected directly from landfill cells and analyzed. Although the landfill has not fully complied with the three-year sampling and analysis requirements, the results of sampling up to June 2013 are available and displayed in the following tables:<sup>12</sup>

TOTAL RADIUM IN LANDFILL LEACHATE SAMPLES - CELLS I/II/III

sampling date	lab results (Ra-226 + Ra-228, pCi/L)
May 2010	15.60
January 2012	3.12
June 2012	---
January 2013*	7.00
June 2013	---

\* Ra-226 = 7.0, but Ra-228 = -0.388. Since negative concentration is impossible, and since the uncertainty (2.16) exceeds the reported negative value, it assumed to be zero.

TOTAL RADIUM IN LANDFILL LEACHATE SAMPLES - CELLS I/II/III (FILTERED)

sampling date	lab results (Ra-226 + Ra-228, pCi/L)
May 2010	---
January 2012	3.35
June 2012	---
January 2013	3.34
June 2013	---

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<sup>11</sup> Chemung County Landfill, LLC, *Environmental Monitoring Plan*, Appx. E. This plan is incorporated as conditions in the landfill's DEC permit.

<sup>12</sup> The analytical reports from which these numbers are taken are available in full at <http://www.garyabraham.com/ChemungLF.html>. Dashes indicate a failure to sample as scheduled.

TOTAL RADIUM IN LANDFILL LEACHATE SAMPLES - CELL IV

sampling date	lab results (Ra-226 + Ra-228, pCi/L)
May 2010	1.44
January 2012	3.71
June 2012	8.05
January 2013	6.94
June 2013	14.18

TOTAL RADIUM IN LANDFILL LEACHATE SAMPLES - CELL IV (FILTERED)

sampling date	lab results (Ra-226 + Ra-228, pCi/L)
May 2010	---
January 2012	---
June 2012	5.72
January 2013	1.27
June 2013*	3.70

\* Ra-226 = 7.0, but Ra-228 = -6.51. Since negative concentration is impossible, and since the uncertainty (7.3) exceeds the reported negative value, it assumed to be zero.

TOTAL RADIUM IN LANDFILL LEACHATE SAMPLES - LEACHATE LAGOON

sampling date	lab results (Ra-226 + Ra-228, pCi/L)
January 2012*	1.23
January 2013	4.91

\* Average of primary sample and duplicate results

TOTAL RADIUM IN LANDFILL LEACHATE SAMPLES - LEACHATE LAGOON FILTERED

sampling date	lab results (Ra-226 + Ra-228, pCi/L)
May 2010	---
January 2012	1.16
January 2013	5.40

TOTAL RADIUM IN LANDFILL LEACHATE SAMPLES - LAGOON SEDIMENT

sampling date	lab results (Ra-226 + Ra-228, pCi/L)
May 2010	---
June 2012*	5.10
June 2013**	4.91

\* Using EPA Method 901.1. A second analysis was completed using Method 903.1 for Ra-226, and Method 904.0 for Ra-228 (total = 4.29).

\*\*Only Ra-226 was analyzed, no Ra-228 results are reported. According to the lab report, the sample “was accidentally dried upon receipt.”

These results show that the radium concentration in landfill leachate was high after wet Marcellus Shale wastes were first accepted in 2009-2010 (this included loads of “soil contaminated with brine from produced water”).<sup>13</sup> There is no baseline analysis of radium or other radionuclides prior to this period, so it is difficult to evaluate the May 2010 results as a spike.<sup>14</sup> However, there is a discernible upward trend in the concentration of radium in leachate from the January 2012 sampling event forward, especially for Cell IV, the most active landfill

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<sup>13</sup> *In the Matter of the Application of Chemung County for modification of the Part 360 permit for its municipal solid waste landfill on County Route 60 in Elmira [sic], Town of Chemung*, Application No. 8-0728-00004/00013, Issues Conference Transcript, April 28, 2010, 83-84 (unsworn testimony of Casella’s attorney Thomas West).

<sup>14</sup> Letter from Lisa P. Schwartz, Assistant Regional Attorney, NYSDEC Region 8, to G. Abraham, October 31, 2011 (“Department staff does not have any records of any testing to establish baseline (i.e., prior to the acceptance of Marcellus Shale drill cuttings) leachate radiological conditions.”).

cell in the period since 2010. Concentrations in the leachate lagoon would be expected to be lower because the lagoon receives precipitation run off from the working face of the landfill, and is otherwise diluted by rainfall. Although only two samples of wastewater in the lagoon have been taken, the second sample is about three times more concentrated in radium than the first.

Radioactive radium (Ra-226 and Ra-228) is a persistent bioaccumulative carcinogen. It is bioaccumulative because its concentration in the environment progressively increases as it moves up the food chain. Radium released into water will be ingested by micro-organisms, and these micro-organisms will be eaten by other micro-organisms. The concentration of radium will be greater in larger organisms, and concentrations increase roughly geometrically as the radium moves up the food chain. The fish people catch and eat from the Chemung River, where Casella's leachate goes after treatment, will have the highest concentrations.

Finally, Ra-226 is persistent because its half-life is 1,620 years. Thus, in 3,240 years half the Ra-226 discharged into rivers will still be in the environment. It is important to stress that none of the radium would naturally be in the environment without fracking; it would remain deep underground for many millions of years. Radium binds to sediments in streams and rivers and will build up there over time even after the river washes much of it downstream. Thus, radium is dangerous because it is a persistent bioaccumulative carcinogen.

No one has estimated the volume of waste liquid being dumped into the Chemung County Landfill along with Marcellus Shale drill cuttings. In addition to the liquid accompanying drill cuttings, the landfill accepts spill contaminated soil, filtration solids, and waste sludges from the treatment of Marcellus Shale waste water. These wastes can be even more wet than drill cuttings.

Pennsylvania recently imposed more stringent rules on the management of gas and oil drilling wastewater, requiring that it be treated and reused as much as possible. Indeed, Casella has taken advantage of this change in policy by installing "liquid solidification" facilities at the McKean County Landfill in Pennsylvania and the Hyland Landfill in Angelica, NY. The processing of wastewater results in substantial volumes of wet waste solids taken out of the water that are landfilled in the Chemung County Landfill, the Hyland Landfill in Angelica and the Hakes Landfill in Painted Post, all operated by Casella.

Such wastes are considered "solid waste" so long as they contain a minimum of 20% solids. It should not have any free-flowing liquids. But a relatively uniformly consistent sludge can approach 80% liquid. Wet waste can be made uniform, and free liquids can be reduced, by mixing the waste with sawdust or oak bark chips. One observer has described a load of sludge from a Marcellus Shale drilling site being dumped at a landfill looked like chocolate pudding as it fell out of the truck.

It is clear that substantial volumes of Marcellus Shale waste water are being dumped in the Chemung County Landfill, mixed with the other liquids in the landfill, and collected from the bottom of the landfill as leachate.



### *The need to evaluate risks of releases of radioactive waste*

#### **Treated leachate discharged to Chemung River**

The concentration of radium in landfill leachate discharged to a treatment plant in Elmira is clearly associated with a risk of release of radioactive wastewater to the Chemung River because, as previously noted, the treatment plant is unable to remove radium from the leachate.

#### **Leachate discharged to groundwater**

In addition, the risk of a release of radioactive leachate to groundwater beneath the landfill should be considered. Landfills have plastic bottom liners above and below a layer several feet thick of gravel into which piping is installed to allow the leachate to escape. Landfills are allowed to leak 20 gallons of leachate per acre per day from the gravel layer. The currently active area where drilling wastes are disposed is 29 acres, so the allowable leakage rate for that area is 580 gallons per day, or about one-quarter of a million gallons per year. The proposed expansion would add about 45 more acres.<sup>15</sup>

Drill cuttings are approximately four times more dense than conventional waste accepted at the landfill. This means that the landfill must support substantially more weight over time than it may have been designed to do. This puts unanticipated pressure on the liner system, may substantially increase the liquid content of the landfill, and may as a result increase the risk of the release through the liner system to groundwater.

As part of its presentation to DEC in 2010, Casella provided a study modeling the consequences of a landfill liner leak of radioactive leachate. However, that model assumes that drill cuttings alone are being dumped, and no waste water accompanies the cuttings. The model also assumes the maximum Ra-226 concentration in the waste is 50 pCi/g. However, in 2012, a load of drill cuttings from Pennsylvania was measured at the Allied Waste Systems landfill in Erie County and Ra-226 concentrations were found to be as high as 205 pCi/g. These measurements were taken at eight transects across the open top of the waste load, from the top down into the load. The Casella model is therefore unreliable.

At the Chemung County Landfill no measurements of the waste load in the truck are taken. Instead, a radiation alarm is installed at the gate. The radiation alarm at the landfill has not been triggered once by Marcellus Shale wastes, despite the fact that radiation alarms were triggered at PA landfills by loads of Marcellus Shale drill cuttings over 1,000 times between 2009 and 2012. Why? We think there are several reasons. First, the radiation alarms measure gamma radiation, but only three percent of the radiation emitted by radium is gamma radiation. The rest is alpha rays, and these do not pass through the skin, and certainly not through the walls of a truck. Second, the radiation detector is located at the weigh scale at the landfill gate, on

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<sup>15</sup> Cf. DEIS, vol. 1, page preceding Table of Contents.

either side of an incoming truck. Radioactive waste can be buried in the middle of a waste load and avoid detection.

Third, the radiation alarm level at Chemung County Landfill has been set by DEC at five times the local background radiation level, and the maximum radiation concentration allowed in waste is 50 pCi/g, about 50 times background.<sup>16</sup> By contrast, at New York's only hazardous waste landfill, the radiation investigation level for waste has been set at 1.5 times local background, and the maximum concentration allowed in waste is designated in the landfill's permit as "slightly above background."<sup>17</sup> Under those permit conditions, waste loads measuring much less than what is permitted at Chemung County Landfill have been turned away.<sup>18</sup>

Finally, we believe the radiation alarms are not always operated properly, for example a truck will be allowed to coast through the weigh scale without coming to a full stop, and avoid detection.

The risk of a release of radioactive leachate to groundwater should also be evaluated in

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<sup>16</sup> Letter from Lisa Schwartz, Regional Attorney, NYSDEC Region 8, to NYSDEC Commissioner Joseph Martens, dated October 19, 2011, p. 4, available at [http://www.garyabraham.com/files/Chemung\\_Co/Staff\\_response\\_10-19-11\\_OCR.pdf](http://www.garyabraham.com/files/Chemung_Co/Staff_response_10-19-11_OCR.pdf).

<sup>17</sup> Hazardous Waste Management Permit for CWM Chemical Services L.L.C., Model City Facility, Niagara County, DEC Permit No. 9-2934-00022/00097 Attachment C, C-2 (November 2013), available at <http://www.dec.ny.gov/chemical/30726.html> ("Any wastes containing trace levels of radioactive material that reads slightly above background may not be land disposed without NYSDEC approval. Wastes with higher levels of radioactivity are prohibited from land disposal.").

<sup>18</sup> Letter from Barbara Youngberg, Chief, Radiation Section, NYSDEC Bureau of Hazardous Waste and Remediation, to Jill Knickerbocker, CWM Chemical Services, LLC, July 26, 2002 (citing the permit condition quoted in footnote 7, above, and stating: "The results from our analysis indicated the presence of Thorium-232 at approximately 10 pCi/gram and Radium-226 at approximately 6 pCi/g. This would indicate that this container of material is not suitable for disposal at your facility."); Letter from B. Youngberg, NYSDEC, to J. Knickerbocker, CWM, January 14, 2004 (the same, and stating: "radium-226 and its decay products in concentrations ranging from 19 pCi/g to 66 pCi/g . . . are not considered trace concentrations. Therefore, based on these results, this waste cannot be accepted for disposal at CWM."); Letter from B. Youngberg, NYSDEC, to J. Knickerbocker, CWM, January 14, 2005 (the same, and stating: ". . . this waste contains thorium-232 and radium-228 in concentrations of about 16 picocuries per gram. This does not meet the criterion of being a trace concentration reading slightly above background. Therefore, this waste is not acceptable for disposal at your facility."). These letters are on file with the Author.

light of the proximity of the landfill to the Chemung River Valley Aquifer. The landfill site was originally approved by DEC in the 1980s, but only after “a protracted period of correspondence” between the agency and the County and a notice canceling the permit, ordering the landfill to close, and recommending four alternative landfills the County could use, including Seneca Meadows and the Broome County Landfill.<sup>19</sup> The Seneca Meadows and Broome County landfills are still in operation with sufficient permitted disposal capacity to constitute reasonable alternatives for the County’s disposal needs.

The principal issue on which NYSDEC balked when considering whether to approve expansion of the County landfill in the 1980s was the proximity of the landfill to the Chemung River Valley principal aquifer, an underground water source capable of serving area municipalities, and the potential interference with publicly owned water treatment plants that would result from treating the expanded landfill's leachate.<sup>20</sup> The County subsequently completed a hydrogeological report that confirmed DEC’s position, that the landfill is either located directly over the primary aquifer or its tributary to the aquifer, either circumstance requiring closure.<sup>21</sup> Further internal DEC review of the County’s and other information resulted in a determination that the landfill expansion site “is adjacent to and upgradient from a Principal aquifer,” and that the risk to groundwater affects “numerous residents in the area” who rely on well water.<sup>22</sup> A subsequent DEC staff evaluation concluded that the expansion landfill does not lie directly over a principal aquifer, defined as a groundwater resource sufficient to serve a municipality.<sup>23</sup> The initial expansion of the old landfill was therefore allowed to go forward, since the expansion at that time was to the north of old landfill.<sup>24</sup>

The current expansion proposal would extend the landfill laterally to the south. By diminishing the lateral distance to the Chemung River Valley Aquifer, therefore, the proposal increases the risk of groundwater contamination for those residents who rely on well water drawn from this aquifer. However, the DEIS lacks any discussion of this potentially significant issue.

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<sup>19</sup> Letter from Albert W. Butkas, Regional Permit Administrator, DEC Region 8, to Robert H. Roller, Chemung County Solid Waste Disposal District, August 5, 1985.

<sup>20</sup> Letter from Albert W. Butkas, DEC, to Dennis A. Fagan, P.E., Chemung County Solid Waste Disposal District, November 13, 1985.

<sup>21</sup> Letter from Dennis A. Fagan to Albert W. Butkas, January 15, 1986; Letter from Frank E. Shattuck, P.E., DEC, to Dennis A. Fagan, February 18, 1986.

<sup>22</sup> DEC Memo from Barolo to Nosenchuck, “Chemung Co. SLF Expansion - Aquifer Determination,” December 2, 1986.

<sup>23</sup> DEC Memo from Barolo to Nosenchuck, “Aquifer Determination - Chemung Co. - Area 3,” January 30, 1989.

<sup>24</sup> Letter from Dennis A. Fagan to Albert W. Butkas, January 15, 1986.

### **Releases of radioactive radon gas**

Another concern that is inadequately understood is the risk of releases of radon, a radioactive gas and the second leading cause of lung cancer in the U.S., after cigarette smoking. Radon results from the decay of Ra-226. Radon-222 has a half-life of eight days and decays to other radioactive element such as polonium, bismuth, and lead, which are emitted as fallout concentrated in the local area. These radon decay products are solid fine radioactive particles that can reside in the lung, yielding a radiation dose to the lung, and they can be taken up by plants grown in local gardens.

Will the landfill emit radon gas into the air as the radium decays? If so, how much? And will residential property in the area around the landfill be exposed at harmful levels? Radon has a very fast half-life, eight days, so the concern about exposure is focused on landfill workers and residents who live close the landfill.

Landfills generate hundreds of thousands tons of gas each year, most of which is carbon dioxide and methane. Less than one percent of the gas is highly toxic and has resulted in regulations requiring landfills to capture the gas with gas wells installed into the landfill and interconnected with horizontal pipes and blowers and directed to a combustion device that will burn off the toxics. However, much like radiation in waste water, radon will pass through the gas collection and control system into the ambient air. That effect, and the potential impact of this pathway for radiation exposure has not been considered.

Radon is also a potential issue for those concerned with area groundwater quality. In 2008, the U.S. Geological Service sampled well water in the Chemung River Valley, finding groundwater in the area is contaminated by elevated levels of inert radioactive radon gas.<sup>25</sup> Specifically, USGS found Radon-222 in every sample collected with activity levels from 153 to 1,740 pCi/L.<sup>26</sup> “Radon currently is not regulated in drinking water,” but U.S. EPA has proposed a maximum contaminant level for radon in drinking water of 300 pCi/L.<sup>27</sup>

### ***Conclusions regarding radioactivity exposure issues***

In the absence of baseline water quality data for the leachate generated by the landfill,

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<sup>25</sup> Amy J. Risen and James E. Reddy, *Groundwater Quality in the Chemung River Basin*, New York, 2008, USGS Open-File Report 2011-1112, available at <http://pubs.usgs.gov/of/2011/1112/>.

<sup>26</sup> *Id.*, at 6.

<sup>27</sup> USGS, *Groundwater Quality in the Upper Susquehanna River Basin*, New York, 2009, at 7, available at <http://pubs.usgs.gov/of/2012/1045/>. See also USGS, *305(b) Ambient Groundwater Quality Monitoring*, at <http://ny.water.usgs.gov/projects/305b/>.

prior to commencing disposal of Marcellus Shale industry wastes in 2009, it should be assumed that the increasing radium concentrations in the landfill's leachate is the result of Marcellus Shale industry waste disposed at the landfill. It is certain that releases of radium to groundwater will further increase the amount of radioactive radon gas in area groundwater. This is clearly a concern because groundwater is the source of drinking water for both urban and rural residents of the area. Increasing concentrations of radium in landfill leachate can also be expected to increase the release of radon from the landfill's leachate lagoon.

There was no prior environmental review by DEC of these issues, and the composition of Marcellus Shale waste materials that are currently being deposited at the landfill have never been adequately studied. For example, waste loads are not sampled and tested at the landfill. A limited number of samples of drill cuttings (but not other Marcellus Shale wastes accepted at the landfill) were analyzed for radioactivity by a Casella contractor in connection with the 2010 DEC permit review, but that study was never fully considered because DEC dismissed the issue of the safety of disposing such materials.<sup>28</sup> And as previously noted, the volume of highly radioactive waste water disposed in the landfill has never been evaluated. Thus although we know quite a lot about the harmfulness of Marcellus Shale wastes in general, this information has never been applied to this specific landfill.

In short, we know based on independent research that relatively high-activity radioactive materials are generated at Marcellus Shale drilling sites. We also know that radium is not removed from leachate before being treated and discharged into area waterways. Nor is radon removed from gas generated by the landfill and emitted into the local air. But no one has done any study of the pathways of exposure to radiation that result from increasing volumes Marcellus shale industry wastes landfilled by the County.

The Pennsylvania Department of Environmental Protection (PADEP) has begun a series of studies of the pathways to radiation exposure from trucking, landfilling and treating and discharging landfill leachate, but the results are not expected until later this summer.<sup>29</sup> These

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<sup>28</sup> Cf. CoPhysics Corporation, *Radiological Survey Report, Marcellus Shale Drilling Cuttings from Tioga and Bradford Counties, Pa.*, April 2010, available at <[http://www.garyabraham.com/files/gas\\_drilling/NEWSNY\\_in\\_Chemung/CoPhysics\\_Apr10.pdf](http://www.garyabraham.com/files/gas_drilling/NEWSNY_in_Chemung/CoPhysics_Apr10.pdf)>.

<sup>29</sup> PADEP, "DEP Announces Comprehensive Oil and Gas Development Radiation Study" (January 24, 2013), available at <<http://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/RadiationProtection/rls-DEP-TENORMStudy-012413.pdf>>; PADEP, TENORM Study Scope of Work (April 3, 2013), 1, available at <[http://www.portal.state.pa.us/portal/server.pt/community/oil\\_gas\\_related\\_topics/20349/radiation\\_protection/986697](http://www.portal.state.pa.us/portal/server.pt/community/oil_gas_related_topics/20349/radiation_protection/986697)>. PADEP defines TENORM as materials "whose radionuclide concentrations or potential for human exposure have been increased above levels encountered in the undisturbed natural environment by human activities." *Final Guidance Document on Radioactivity Monitoring at*

studies will also evaluate the “rapid buildup of radon and progeny in samples/waste streams impacted with radium,” based on the following consideration: “The evaluation of waste containing Ra-226 is subject to the buildup of radon gas and the other short-lived progeny of Ra-226, complicating any decision made to transport or dispose of such materials based on an exposure rate survey of the container.”<sup>30</sup> Without adequate information about radiation exposure, the assertion in the County’s DEIS that portal radiation detectors alone “will mitigate any potential significant adverse environmental impacts to the maximum extent practicable”<sup>31</sup> is not credible.

Finally, there is clear evidence that radium has leached from within the landfill to the leachate collected from the landfill. Sampling and analysis for radioactivity in landfill leachate should not be diminished. Indeed, the County should insist that the radioactivity testing measures be augmented and extended in time until there is no longer any reason for concern. The County should, therefore, at a minimum, withdraw its proposal to expand the landfill until this information becomes available.

### ***The County’s role as “lead agency” under SEQRA***

The County is considering the landfill expansion proposal pursuant to the State Environmental Quality Review Act (SEQRA). SEQRA requires that an EIS discuss mitigation measures with sufficient detail to ensure that environmental consequences have been fairly evaluated. The mitigation discussion is also needed to evaluate whether anticipated environmental impacts can be avoided. An essential component of a reasonably complete mitigation discussion is an assessment of whether the proposed mitigation measures can be effective. A mitigation discussion without at least some evaluation of effectiveness is useless in making that determination.

In this matter, disposal of long-lived radioactive contaminants clearly should be avoided. The landfill gate portal’s radioactivity detectors are the principal (perhaps the sole) mitigation measure designed to avoid that outcome. However, there has never been any direct measurements of typical or worst-case loads as they arrive at the landfill gate, including measurements of portions of the waste located in the center of the load, where radioactivity would be the most difficult to detect. In addition, the concentration of radioactivity in the landfill, as detected in the landfill’s leachate, appears to be increasing, indicating that the portal detectors by themselves do not provide effective mitigation. The County cannot therefore reasonably issue findings that the portal detectors are effective in keeping relatively high levels of radioactivity (e.g., several times higher than the background environment) from contaminating the landfill, its leachate and the

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*Solid Waste Processing and Disposal Facilities*, PADEP Doc. No. 50-3100-001 (January 2, 2004), 4.

<sup>30</sup> PADEP, TENORM Study Scope of Work, 8.

<sup>31</sup> DEIS, 152.

gas emissions from the landfill.

If the effectiveness of the portal detectors is unsupported by any evidence in the record, the County cannot rely on the portal detectors alone to find that the portal detection system is adequate. If the County's ultimate SEQRA findings lack an adequate discussion of effectiveness of the system as a mitigation measure, the public will be unable to rely on the County's findings.

The potential for adverse impacts of an ineffective radiation portal detection system cannot be eliminated from County consideration on the basis that this system may be evaluated later, by the DEC, in the context of an application for a modification of the County's state landfill operating permit. In the first instance, no such application has been submitted to DEC. But more importantly, DEC is not required to consider the effectiveness of the system. Whether DEC will in the context of a subsequent state permit modification consider the effectiveness of the system, by measuring waste loads to confirm or deny the system's effectiveness, is not certain because it did not do so when initially adding the requirement to operate the system as a special condition at the time of the last permit modification. Moreover, SEQRA obligates the County to take a look at all impacts, not just impacts that may be remedied by state landfill regulations. Stated differently, an agency may not excuse itself from its SEQRA hard look duty where a facility operates pursuant to a state permit.

Thus a lead agency may not rely on compliance with another agency's substantive standards as a proxy for the lead agency's more expansive hard look duty. Instead, the County has an independent duty to analyze the effects of radiation in the waste it accepts at the landfill regardless of whether the landfill operates in compliance with a state permit. Without fully exercising that duty, the County can not reach a fully-informed and well-considered decision.

We contend that the County is obligated to consider whether the landfill has in place measures that can be relied upon to adequately monitor radioactivity in the waste it disposes and, until it has done so, the County should not approve the expansion proposal.

Respectfully submitted,

  
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