Subject: Re: Report for Upper Valley Landfill PFAA analysis
From: Bob Haynes <rhaynes@gmedc.com>
Date: 2/14/2020, 11:26 AM
To: "Surwilo, James" <James.Surwilo@vermont.gov>
CC: Stuart Blood <ssblood@riseup.net>, "Coppolino, Patricia" <Patricia.Coppolino@vermont.gov>, Tim Briglin <tim@tuckermancapital.com>, Jim Masland <jamesq56@yahoo.com>, Nick Clark <n.clark@thetfordvermont.us>, Guy Scaife <townmanager@thetfordvermont.us>, Mark Condon <mcondon@gmedc.com>, Troy McBride <mcbride@norwichtech.com>, Jim Merriam <Merriam@NorwichSolar.com>, Bob Walker <bobwalkervt@gmail.com>, Mike Kiess <michaelkiessvt@gmail.com>, Mark Condon <mcondon@gmedc.com>

Thank you Buzz. As you can see I have added several folks directly involved in the process for transparency and expediency.

Stuart, I am the “fellow from GMEDC”. In case you don’t already know, Jim Masland is your state Rep as well as one of our board members. I look forward to meeting you Monday if you plan to attend the SB meeting. We are trying todo this properly and to the benefit of the neighbours and the town in general.

Thanks all. We appreciate the input from various sources.

Regards, Bob

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Sent from my iPhone

> On Feb 14, 2020, at 9:31 AM, Surwilo, James <James.Surwilo@vermont.gov> wrote:
>
> Stuart, that cap schematic was for the UVRL closure, and actually more robust than “typical” or our minimum standards. Note that a geosynthetic clay layer was installed beneath the synthetic liner. This represents a “belt and suspenders” design. If the plastic is punctured and liquid contacts the clay, the clay swells and basically seals the hole. Very effective from what the literature that I’ve seen. Again, this would be critical in the sump of a lined landfill. In a cap, it was a pretty progressive and costly addition.
>
> So, yes, I was recently contacted by Bob Haynes of the GMEDC and provided him some of the same information that I’ve sent to you. I don’t want the appearance of having parallel conversations; I’m just answering questions as they come from two difference sources, so for transparency I’m going to send you what I sent Bob, and send Bob what I send you. You’ll both be on equal footing at the Selectboard meeting!
>
> I know that GMEDC is working with our Brownfield program on developing solar on UVRL under the BRELLA program, which offers some protection against future liability.

https://dec.vermont.gov/sites/dec/files/wmp/Sites/191106.BRELLA.Factsheet.pdf

I don't know the particulars of UVRL's position in the process – and I am no expert in Brownfields - but you can see from that document that there are a number of steps to be completed before a Certificate of Completion is issued and that limited liability is obtained. I'm copying Trish Coppolino, who heads the Brownfields program, if she wants to weigh in with the UVRL details.

Buzz

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From: Stuart Blood <ssblood@riseup.net>
Sent: Thursday, February 13, 2020 10:07 AM
To: Surwilo, James <James.Surwilo@vermont.gov>
Subject: Re: FW: Report for Upper Valley Landfill PFAA analysis

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Buzz,

Thanks for that reply and especially for the photo showing previous erosion and for the design drawing for the cap. It's much more reassuring to see something concrete. Is the drawing specifically for Post Mills, or is it a "typical" installation?

I finally got ahold of the staff person at the org that published the online paper on landfill cap longevity to ask for a citation for the 50 - 100 years. He contacted the author and reported back to me that it was the author's "opinion" based on discussions with "experts". So that's not terribly convincing. I think we've reached the point of diminishing returns using email to figure out what are credible estimates. At some point soon, I hope we can get on the phone together so I can get a better understanding of the state of the art.

One more important question regarding this:

> ... but the DEC has no intention of walking away from the site if there is no other entity willing to assume responsibility. That's one reason we look favorably on solar developments on a landfill cap. It keeps the responsible party focused and generates income to maintain the property.

This gets to the nub of my immediate concern. I'm hearing from people involved with the proposed project in Thetford that the fellow from GMEDC told the selectboard that his organization would take control -- I believe he said ownership -- of the landfill but would not assume legal liability associated with the previous operation. That appears to be at odds with ANR's post-closure procedure, the Policy on Constructing Solar Photovoltaics on Closed Solid Waste Landfills, and what you've written above. Have you been involved with the discussions involving

GMEDC and the developer, Norwich Solar Technologies? If so, are you aware of some arrangement where the State will formally assume legal liability while the developer operates the solar array? Your observation about revenue generated by the operation is important and something the town needs clarity on. Don't know if you're in a position to provide that.

The Thetford Selectboard will be discussing the landfill solar array project on Monday. The fellow from GMEDC will be there, and perhaps somebody from Norwich Technologies. I'm finishing up a memo to the SB to draw attention to all the issues that I've identified so far that the town ought to be considering -- to the extent we even have a say in the project. I'll cc you on that when I send it.

Thanks again for your patient engagement.

Stuart

On 2/12/2020 2:36 PM, Surwilo, James wrote:

> Stuart, I don’t know how many times that I read that article and missed the 50-100 year phrase. Sorry for making you find it.
>
> As the author of the report that I cited alludes to, since geosynthetic caps and liners haven’t been around that long, that no one knows with certainty what there lifespan is. I think Dr. Peggs made a great effort in looking at all the factors that may compromise a geomembrane. His estimation of 400 years is based on high quality of the material and high quality of the installation. He also considers “failure” to be a leak in the lining system to develop, and the paper focuses on bottom liners rather than top caps, and their role is different. Failure, by his definition, in a cap is much likely less serious than for a bottom liner, as the amount of liquid flowing through the membrane will be a function of hydraulic head. For instance, much more liquid will be forced through a, say, 1-inch hole in the line sump of a landfill than a one inch hole in the cap. And the capping system at UVRL is comprised of numerous layers and redundancies (see attachment) which, taken as a whole, function to preclude percolation into the waste mass. From grading to promote runoff, to drainage layers above the geomembrane, to a clay layer beneath, sand cushions, etc., this system was designed to be an effective barrier and to last a long time.
>
> A landfill needs to be maintained. We agreed on this point before. I can’t foresee 400 years into the future, but the DEC has no intention of walking away from the site if there is no other entity willing to assume responsibility. That’s one reason we look favorably on solar developments on a landfill cap. It keeps the responsible party focused and generates income to maintain the property.
>
> There are computer models available to estimate the quantity of leachate generated with different types of caps, and the inputs can be modified to factor in construction flaws or certain sized holes and how that affects leachate generation. I don’t believe that DEC has the HELP model anymore, and while it would be an interesting exercise, I can’t devote the time at the moment to find another entity to run it for academic purposes. My experience tells me that the cap system would have to fail catastrophically for there to be an appreciable increase in leachate generation. And, again in my experience, at this point in time, the majority of contaminants have been flushed from the site. (Probably before the cap was even placed.) Yes, there are contaminants that slowly mobilize, and wastes that slowly decompose, and a litany of emerging contaminants to be concerned about. We also have 30 years of data on the 75 or so lined and unlined landfills around the state, and are constantly weighing risks and costs.
>
> I don’t have much information on the erosion problem at the landfill. I could only find this map dated 2006 in the files, but no record of repairs. We have older paper files in storage, but are they worth rooting through? We (me included) perform the water sampling at the landfill twice per year, and we note no erosion, nor do we observe any differential settlement on the cap. The slopes are stable and the vegetation is lush.

Best, Buzz

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From: Stuart Blood <ssblood@riseup.net>
Sent: Tuesday, February 11, 2020 10:30 AM
To: Surwilo, James <James.Surwilo@vermont.gov>
Subject: Re: FW: Report for Upper Valley Landfill PFAA analysis

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Buzz,

The the Landfill Caps and Enhancements article says: "Landfill caps have a limited life span. They are estimated to last from 50 to 100 years." My question to you was, why shouldn't we take that as a credible estimate? Your question to me was, I think, what's the article's source for that information?

The article doesn't cite the source of that with a specific footnote, unfortunately. I've done a quick look at the references cited at the bottom of the article but I haven't tracked it down. What I am seeing indicates that caps can last for a few hundred years ***if they are continuously maintained***. And as I pointed out in my previous email, a reading of the article in the geomembrane industry journal that you sent me a link to has many additional qualifications on the estimate of 400 years, to the point that without permanent and regular monitoring, I would think that no assumption is valid.

Part of the maintenance system is to check monitoring well data. Correct me if I'm wrong, but I believe there's no entity or institution that has responsibility for maintaining the Post Mills cap ***forever***. Worse, once ANR makes a determination that the landfill qualifies for custodial care there will be no ground water tests because the wells will be abandoned and sealed. No testing, no evidence of leaks. No evidence of leaks, no basis for repairs.

Here are some of the references I checked:

EPA's Citizen's Guide to Capping
https://clu-in.org/download/Citizens/a_citizens_guide_to_capping.pdf

> "Caps can be effective for many years when they are properly maintained. They are maintained for as long as the contaminated materials remain in place."

http://www.itrcweb.org/Documents/ALT-2.pdf
3.1.7 Design Cover Performance for the Long Term
Take a look at the Limitations section. My reading is that it contradicts your assumption that leachate

is unlikely to be generated if the cap develops leaks in the future.

Can you address the other question I asked? You mentioned earlier in this thread that the department has "repaired some eroded areas in the past." Can you tell me how many times repairs have had to be made? Where on the cap? Are there reports that I can look at? Are you aware that Dave Fisk has reported a deformation in the cap apparently due to settling?

Thanks for your good-natured responses. I realize these requests must be a pain in the butt. We're each doing our jobs.

Stuart

On 2/10/2020 12:59 PM, Stuart Blood wrote:

Fair question. Let me look and get back to you. Thanks!

Stuart

On 2/10/2020 12:58 PM, Surwilo, James wrote:

Stuart, hello. Good to hear from you. Before I craft a response, the Landfill Caps and Enhancements link brings me to a short article but without information on longevity of liners and cap. There are many linked references. Does one of those contain those sorts of information? Thanks, Buzz

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From: Stuart Blood <ssblood@riseup.net>
Sent: Friday, February 7, 2020 12:52 PM
To: Surwilo, James <James.Surwilo@vermont.gov>
Subject: Re: FW: Report for Upper Valley Landfill PFAA analysis

EXTERNAL SENDER: Do not open attachments or click on links unless you recognize and trust the sender.

Hi Buzz.

I'm revisiting the issue of groundwater in Post Mills because, as you may know, there's consideration of placing a solar array on the capped landfill. (For the record, I consider development of distributed renewable energy sources an absolutely essential response to the climate emergency. And what better use of a contaminated site than solar panels?)

Would you be willing to elaborate on a couple of the points you made in

response to my questions several months back?

On 10/31/2019 11:04 AM, Surwilo, James wrote:

> We have seen steadily declining contaminant levels in most, if not all, of the 75 or so landfills that closed in the early 1990s, and have had to perform post-closure water quality monitoring. It's highly unlikely that that trend will be reversed in the future at any of these sites. Good or bad, most contaminants by now have either leached out or degraded, or are immobile.

No question there's been a steady decline in contaminant levels in Post Mills. But I question your assumption that most contaminants are either leached out degraded or immobile. How would we know? Without solid evidence to back up that statement, I also have to question your conclusion that the downward trend in contamination is unlikely to be reversed in the future. If you were to say unlikely during our lifetimes, that might be justifiable. Or unlikely in the next 400 years that might, just barely, be credible. But my understanding is that once the cap develops cracks and holes, as it inevitably will, surface water will again flow into and saturate the pile of hazardous waste and create at least some leachate that will once again move into groundwater. One would expect that, at that point, the trend of decreasing levels of pollution in the groundwater will be reversed. Is my reasoning faulty on this? Do you have evidence to support a counterargument?

> Here is, I think, a credible study that concludes that a liner in a municipal solid waste landfill should last about 400 years.
> https://www.geosynthetica.com/Uploads/IDPigsUKpaper.pdf

Well, I'm not so sure that's the correct conclusion to draw for the Post Mills cap. The second paragraph of the abstract specifies the various factors that the author has considered in estimating the durability of a landfill liner. In his summary, starting on page 20, he lists the 11 factors that he has considered. Then he says, "***If all these items are optimized*** it is expected that an HDPE geomembrane in an MSW landfill should last for about 400 yr." If everything about the manufacture and quality control were consistent and perfect; if the engineer who designed the installation was an expert who made absolutely no mistakes; if the equipment operator had provided a smooth and uniformly dense substrate -- on an existing landfill that had been settling for over a decade; and if the installer had laid out the cap with no wrinkles and "intimate contact with subgrade"; then the author expects the fabric should last about 400 years. Then, assuming the installation has been perfect, the author gives another 6 post-installation factors that can cause additional leaks. He also

observes that "Exposed liners are another matter altogether..." and says, "Perhaps 75 years is an appropriate place to start."

So, I wonder why wouldn't the estimate of longevity of a cap, 50 to 100 years, in the reference I had sent to you, be credible? Landfill Caps and Enhancements, is published by the independent nonprofit Center for Public Environmental Oversight, who presumably doesn't have a reason to underestimate cap longevity.

Final point on this question: You mentioned earlier in this thread that the department has "repaired some eroded areas in the past." Any reason to expect that once the department has put the landfill into "custodial care" and stopped active monitoring there won't continue to be erosion?

I understand this is an extremely difficult problem with no easy answers. I'm just trying to understand where the arbitrary lines are being drawn and what the potential consequences may be 100, 200 years from now.

Thanks for any further clarity you can offer

Stuart

--
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> But, in essence, 400 years is not forever, and landfills are forever. Some unlined landfills are mined, usually to make space for additional lined landfill volume, but maybe the resources now locked in landfills will become valuable enough to make it profitable to mine landfills just to extract those resources.
>
> No easy solutions. Buzz

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From: Stuart Blood <ssblood@riseup.net>
Sent: Tuesday, October 29, 2019 6:14 PM
To: Surwilo, James <James.Surwilo@vermont.gov>
Cc: selectboard <selectboard@thetfordvermont.us>; Kevin Geiger <kgeiger@trorc.org>; Thetford Town Manager <townmanager@thetfordvermont.us>
Subject: Re: FW: Report for Upper Valley Landfill PFAA analysis

Thanks, Buzz. That's very helpful. The response does raise a couple of additional questions.

In response to my question about mechanisms to alert residents and town officials to groundwater problems resulting from new wells, you said, "*All new water supply wells need to be sampled, also, with the results sent to the VTDOH.*" Does that mean all wells, including for multiple user and large-user commercial wells, as well as for single-family residences? Does the testing include the VOCs that are now tested at the landfill's monitoring wells?

My reading of the Custodial Care procedure is that the state can cease active post-closure care of the landfill after 20 years if groundwater contaminant concentrations are at or below the enforcement standard and are stable or decreasing for 5 years. At that point the monitoring wells will be abandoned. I'm reading that to mean that there's no provision for testing if a failure of the cap occurs after that. It does say that the "owner/operator" remains liable for future contamination releases afterward. It raises the question, though, without active monitoring who would know?

You said, "*I'm not sure if anyone really knows for certain what the lifespan is of a synthetic landfill cover (or liner system) but test data indicates it's in the hundreds of years.*" Can you cite the source of that conclusion? (Since synthetic caps have only been around for a few decades, it seems like the specifics of that testing would be important.) I can't find much information on the issue and I don't know how reliable it is. One source, Landfill Caps and Enhancements, published by the Center for Public Environmental Oversight, says that caps "are estimated to last from 50 to 100 years". The lower end of that range will be just about when the landfill's monitoring fund runs dry around 35 years from now.

Again, thanks for your patient responses to these questions.

Stuart Blood

On 10/29/2019 2:56 PM, Surwilo, James wrote:

Stuart, good questions. Please see below for answers, and feel free to follow up. Buzz

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From: Stuart Blood <ssblood@riseup.net>
Sent: Monday, October 28, 2019 11:11 AM
To: Surwilo, James <James.Surwilo@vermont.gov>
Subject: Re: FW: Report for Upper Valley Landfill PFAA analysis

Hi Buzz.

I have some follow-up questions. First, let me state my objectives in asking, so you'll have some context.

At some point, presumably, the state intends to discontinue monitoring groundwater quality in the bedrock aquifer and in the overburden near the landfill. At some point, presumably, monitoring of the landfill's cap will be discontinued. My concern is that new development in Post Mills decades from now will be uninformed by any awareness of poor ground water quality. If the town is going to make prudent land use decisions regarding future development in the neighborhood, we should be planning now while the institutional memory is still intact. So with that as context, here are the questions I have.

- Is the State of Vermont the responsible party for testing for metals and VOCs? If so, how long is the state required to continue testing?

The State has become the de facto caretaker of the landfill after it ceased operations and a protracted legal proceedings. We obtained the

insurance settlement from UVRL's insurer, which I believe was for $680,000, and used this money to cap the landfill and now monitor and maintain the closed landfill. There is now $175,000 remaining in that fund, and we spend about $5000/year on monitoring, not including staff time. We intend to continue monitoring until the landfill can be put into "custodial care," i.e., deemed to not be a threat to human health and the environment. Here are two documents explaining custodial care. A number of Vermont landfills closed around the same time as UVRL are now in custodial care. Of course, the UVRL situation is unique, since there really is no true responsible party.

https://dec.vermont.gov/sites/dec/files/wmp/documents/solidwaste/CustodialCareAfterPostClosure20130716.pdf

https://dec.vermont.gov/sites/dec/files/wmp/documents/solidwaste/ClosedLandfillCustodialCareGuidance2013.pdf

- Once the state's responsibility ends, will that responsibility be passed to another entity?

Excellent question. Or I would rephrase it as "does the State's responsibility ever end?" We control a dedicated, but finite, fund by which to monitor and maintain the landfill, the State did not operate the landfill, nor is UVRL State property. We would not abandon this responsibility, but I doubt 30 years ago when the case was settled, these matters were thought out in any detail.

- What entity is responsible for monitoring the condition of the landfill cap? When does that responsibility end? What is the rated life of the cap, after which its effectiveness degrades?

Basically, the same qualified answer as above. We observe the cap each time we sample in May and October and have repaired some eroded areas in the past. The Town has graciously agreed to mow the landfill years, which we appreciate, and helps to conserve the settlement fund. The responsibility for maintain a landfill never ends, unfortunately, and it's an issue that we, and all States, are grappling with. USEPA requires that private landfills

maintain financial responsibility for 30 years of post-closure care, and most States, including Vermont, have mirrored this requirement. But we know that even if monitoring is deemed unnecessary, someone will have to cut the grass, clean the ditches, lock the gate, etc., in theory, for perpetuity. How do we mandate this? In Vermont's case, fortunately, we have only a handful of closed, private owned landfills, and most were operated by ongoing entities who are taking care of them. There is one other private, closed landfill that is abandoned and that the State is performing post-closure care. I'm not sure if anyone really knows for certain what the lifespan is of a synthetic landfill cover (or liner system) but test data indicates it's in the hundreds of years. Bottom line is that post-closure costs and responsibility is not just a concern with UVRL, but all landfills in Vermont, and across the country. We are in constant contact with our counterparts in other States to share ideas and possible strategies. In the meantime, reduce, reuse, and recycle, so we don't perpetuate this situation.

- Based on the October PFAS test that shows PFOS at 10 ppt and PFOA at 11 ppt, will the SWM program continue to test at UVRL? If so, which well(s) will be tested and for how long?

At this point, to be determined. We have required closed landfills whose initial PFAS sampling to be above the 20 ppt standard, and that may pose a risk to receptors, to continue limited sampling. Frankly, I'm not surprised at the 21 ppt result in MW 101D and see it as a another data point, but not a compelling justification to expand the sampling regime.

- Is there some mechanism at the state level that will ensure an ongoing awareness of the ground water problem in Post Mills, i.e. to prevent inadvertent extraction of polluted water or to prevent large volume extraction that will effect the movement of the plume? In other words is there any mechanism in the state's waste water and water supply permit process that will protect new and existing users of the aquifer?

I spoke with Carl Fuller, regional water and

wastewater engineer, whose region includes Thetford. Every new water supply and every new wastewater system needs an ANR permit, which must be submitted by a qualified professional. The permit application requires that possible sources of contamination be identified, through our databases and other sources. Those possible sources of contamination must be accounted for when location a new water supply. All new water supply wells need to be sampled, also, with the results sent to the VTDOH. And as Kevin related, there are land records, and institution memory, zoning restrictions, etc.

There is a notice in the land records that the UVRL parcel was a landfill. I don't know if there are any specific restrictions on the UVRL deed, but as overseers, ANR would be first to know if their was a proposed change in use.

Please free feel to follow up with me. Buzz

Thanks in advance for any information you can provide.

Stuart Blood

--

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On 10/17/2019 2:25 PM, Surwilo, James wrote:

> Dear Selectboard and interested parties,
>
> On October 8th, the Solid Waste Management Program performed the semiannual environmental monitoring at the Upper Valley

Landfill. Volatile Organic Compound samples are analyzed by Endyne, Inc., in Williston, and inorganic analyses are performed at the Vermont ANR/AGR lab. Results from these samples are not yet available, but I have attached the monitoring well MW 101D PFAS results provided by the USEPA laboratory. Two PFAS compounds were detected, with a total concentration of 21 parts per trillion. For comparison, the Vermont Groundwater Enforcement Standard and Vermont Health Advisory is 20 parts per trillion.

I will forward the complete analytical results when they become available.

P.S. I did not appear that the landfill has been mowed this year, which made locating several monitoring wells difficult. Thanks if this can be done this fall, or before next May's sampling event.

Please contact me with any questions. Buzz

James "Buzz" Surwilo

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From: Boudreau, Dan <Boudreau.Dan@epa.gov>
Sent: Thursday, October 17, 2019 11:40 AM
To: Surwilo, James <James.Surwilo@vermont.gov>
Subject: Report for Upper Valley Landfill PFAA analysis

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