Minutes of the Technical Awareness Group Meeting
for the PFAS in Landfill Leachate Research
Supported by the Hinkley Center for Solid and Hazardous Waste Management

Meeting held, August 21, 2019, 2 to 4 pm
University of Miami, McArthur Engineering Building, Room 306
Meeting Participation was Also through Virtual Connection

Attendees:

In person
Fangmei Zhang, Miami-Dade Department of Environmental Resources Management
Hekai Zhang, University of Miami
Helena Solo-Gabriele, University of Miami
John Schert, Hinkley Center for Solid and Hazardous Waste Management
Lee Casey, SCS Environmental Consultants and Contractors
Liz Foeller, Waste Management Inc.
Malak Anshassi, University of Florida
Mario Porcelli, Miami-Dade County, Department of Solid Waste Management
Timothy Townsend, University of Florida
Viraj da Silva, SCS Environmental Consultants and Contractors
Weiland Uchdorf, Miami-Dade County Department of Solid Waste Management
Yalan Liu, University of Florida
Yanett Rodriguez, Miami-Dade County Department of Solid Waste Management
Yutao Chen, University of Miami

Via computer webinar
Amede Dimonnay, Broward County Environmental Engineering and Permitting Division
Ashley Danley-Thomson, Florida Gulf Coast University
Bob Curtis, SCS Engineers
Bryan White, Manatee County
Caroline Devitt, SCS Engineers
Cory Dilmore Environmental Administrator, Florida DEP
Eric Charest, Indian River County Department of Utility Services
Gail DeRuzzo, Battelle
Hilary Thornton, EPA Project Manager in EPA Region 4
Jamey Wilkes, Clay County Dept. of Environmental Services
Jean-Rene Thelusmond, North Carolina State University
John Merrill, Geosyntec Consultants
Kavitha Dasu, Battelle
Kevin Vann, CDM Smith
Kyle Clavier, University of Florida
Larry Ruiz, Hillsborough County Solid Waste
Linda Monroy, Lee County
Lois Rose, Sarasota County Solid Waste
Lynn Zender, Zender Environmental Health and Research Group
Mark Culbreth, Environmental Consulting & Technology
Morton Barlaz, North Carolina State University
Nicole Robey, University of Florida
Page Jordan, Oak Ridge Institute for Science and Education
Rebecca Rodriguez, Lee County
Meeting Agenda
(click on item to go to recording for the presentation, questions and answers are written below)

1. Welcome and introductions

2. PFAS Background
   Helena Solo-Gabriele

3. Prior Hinkley Study
   Helena Solo-Gabriele

4. Question and Answers #1 (see below)

5. Future/Current Hinkley Study
   a. Sample collection strategy
      Hekai Zhang
   b. Total PFAS versus landfill type and treatment
      Yutao Chen
      Questions and Answers #2 (see below)
   c. Landfill physical chemical parameters
      Yalan Liu
      Questions and Answers #3 (see below)
   d. Project future plans
      Helena Solo-Gabriele

6. Future EPA Star Grant
   Tim Townsend

7. Question and Answers #4 (see below)

8. Adjourn

Questions and Answer #1 (after Helena’s presentation):
   1. Q: What caused the EPA to issue their guidance?
R: We presume that it has to do with the health impacts that are now known in terms of blood levels in humans.

Q: In these political times it is counter-intuitive. [Is it possible to get a blood test?]
R: Agreed, we are not exactly sure what is causing the EPA to take note. It likely raised to do with raised awareness.

R (audience): There were studies that showed the health effects from the Dupont factory in Ohio. People nearby were getting sick. A group of 70,000 issued a lawsuit and won. Minnesota also filed suit, arguing that waste from major PFAS manufacturer 3M Co. contaminated water and land. These events let EPA pay more attention on PFAS problems. The attorney of the Ohio suite was Robert Bilott. The New York Times published an article about this attorney that further increased awareness. [This article was found at: https://www.nytimes.com/2016/01/10/magazine/the-lawyer-who-became-duponts-worst-nightmare.html]

2. Q: Graphic of temperature versus PFAS, is there information available about the residence time of the waste within the stream and on the grates.
R: This question was not asked but we can go back and ask the landfill operators.
Q: What is the incineration temperature for 100\% destruction of PFAS in solid waste?
R (from audience): 1000 degree Celsius.
Q: What is the process to destroy PFAS via incineration? How does this process work?
R (audience): Some research shows that incineration might be a possible method to remove PFAS. Actually, incineration converts some PFAS to other species of PFAS. But it still can decrease the PFAS concentration in some aspects.
Q/comment: Compared to dioxins it may have similar temperature destruction effects.

3. Q: What is the research team pursuing in terms of future PFAS work. Is there work towards evaluating PFAS in air?
R: Currently we are focused on leachates, although sample collection in air would be very important.

4. Q: Is there any method, like biological treatment process, in the landfill can reduce the PFAS levels?
R: Aeration is one of the common methods use in the leachate treatment process, usually for ammonia removal. The process can change the precursors of PFAS to other types of PFAS, but it cannot reduce total PFAS concentration very well. The PFAS level seems similar before and after aeration.

5. Q: For the measurement methods of EPA used to estimate PFAS, did they used method 537 or others?
R: We went to the lab to watch how the PFAS concentrations are measured in the leachate samples. EPA has an SOP available for the measurement methods and we will share this after the meeting.

6. Q: Some experiments show that PAC (powdered activated carbon) is a method which can reduce the PFAS level in leachate, do you have any research on PAC?
R: [Answered later during the presentation] In samples from seven on-site leachate treatment sysems, only one landfill used PAC in the treatment. Based on the PFAS results, it seems that PAC was not very effective to treat PAC. We take samples before, during and after the PAC treatment, and their PFAS concentration looked almost the same.

Question and Answers #2 (after Hekai’s and Yutao’s presentation)
1. Q: Different plastics were manufactured during different time periods. There may be an
opportunity to sample different cells of different ages to get an estimate of the release from
different plastics. Also, why was there an interest to analyze for metals?
R: The metals were analyzed because we were also evaluating treatment processes and we were
interested in understanding whether metals are removed through treatment.
Q: Slides show huge differences in various samples. For example AH21 and AH22. Do those
samples have anything to do with each other?
R: These samples came from different cells at the same landfill. There is huge variation.
R: There is also variation in ash landfills. Some ash landfills co-dispose MSW. Landfills that
were purely ash had lower levels of total PFAS. Those that co-disposed ash and MSW showed
higher levels of total PFAS.
Q/Comment: So the question is about the variability that we're observing from the different cells.
Are you talking with the landfill operators to better understand the age of the waste and the
characteristics of that waste?
R: What we do when we set up our sample collection plan….. We do have two interviews with
the solid waste operator to get a better sense of where we can collect samples and properties of
the landfill that would be useful, such as the age, and waste type. We document as best we can.
After we have the results, we may need to do a second round of interviews with the solid waste
landfill operators with the result in front of us, to better understand possible reasons for the
variability. For example the question about AH21 and AH22 would be useful to discuss with the
landfill operator.

2. Q: It would be of use to evaluate the fate of the solid waste residue. Is there a way to bind the
PFAS. If the concentrate from RO is re-introduced to the landfill, without binding, the PFAS will
be treated over and over.
R: Excellent point.

Question and Answers #3 (after Yalan’s presentation)

1. Q: What’s the form of arsenic in the gas condensate ?
R: The gas condensate are mixed with leachate, it’s hard to tell which part of the liquid comes
from the gas and which comes from the leachate.
R: In terms of the arsenic species, we did not measure it but it may be a volatile form.
R/comment: The best place to get the gas condensates is at the knock out stations. Also, the true
gas condensates are the wells with the pumps. Some of the gas condensates sampled included the
well with the pump. We’ve also collected the samples at the flare stations.
Comment: Collection of true gas samples is tricky and may need to request some help.
R: Some have significant expertise in this area.

2. Q: In looking at the PFAS graph versus the total organic carbon, do you separate by waste type
samples and distinguish ash from municipal solid waste and construction demolition waste?
R: We did the analysis. We didn't find a very clear difference between those different types. It's
probably because there’s a lot of variabilities for so many samples. And we didn’t show the results
here. But we still need to do additional work to further tease out the results.

Question and Answers #4 (after Tim Townsend’s presentation)

1. Q: How long did the CCA work take place?
R: CCA is still going on, but it has been 2 decades to date.
Q: How long do you predict the PFAS work to go on?
R: Very long probably after we retire.

2. Q: From a perspective from a municipal official they are going to want to know how to get rid of it. What is the solution?
R: Is there something that can be added to it to bind it up so it does not come out once in the landfill.
Comment: Another option is to burn it. May also be able to measure a surrogate as a way to address given the large number of compounds. Whether it is on activated carbon, ion exchange resins, or if put back into the landfill from the RO system, ideally it should be destroyed. Areas for productive research for the Hinkley Center include evaluating the size of the problem in Florida and the impact to groundwater.

3. Q: What is the concentration in the groundwater samples and can it be influenced by adjacent areas?
R: The groundwater samples can be influenced by the location at the landfill, for example, whether the well is upgradient and downgradient. Also it might be influenced by the adjacent landfill cells. For the most part, the groundwater samples were much lower in total PFAS concentrations relative to the leachates. We are interested in looking at practices at the landfill (e.g., spraying leachate) to see if there is an influence. Collecting groundwater is not easy. Some operators do not allow. Others indicate that we are to go through their consultants and only their consultants can provide the sample. Others allow us to collect a groundwater sample.

4. Comment: Would be useful to put on the web site a fair overview of concentrations in people and then provide guidance on how to get tested.
Comment: The solid waste trade magazine articles may be useful to post.

5. Q: The question is about sampling at POTW (Publicly owned treatment works)
R: Currently, we focus on specifically analysis on landfill. Some other states already do the studies on POTWs.
R (audience): There are states such as CA, NC, and others that have guidelines for POTWs and drinking water.