

QUARTERLY PROGRESS REPORT

[August 1, 2019 to May 10, 2020]

PROJECT TITLE: PFAS RELEASES FROM LANDFILLS IN FLORIDA

PRINCIPAL INVESTIGATOR: Helena Solo-Gabriele, Professor

AFFILIATION: University of Miami, Dept. of Civil, Arch., & Environ. Engineering

CONTACT INFORMATION: hmsolo@miami.edu, 305-284-3467

COPRINCIPAL INVESTIGATOR: Dr. Timothy Townsend

AFFILIATION: University of Florida, Department of Environmental Engineering Sciences

CONTACT INFORMATION: ttown@ufl.edu, 352-392-0846

PROJECT WEB-SITE: <http://hmsolo.coe.miami.edu/pfas-in-landfill-leachate>

Work accomplished during this reporting period:

- We have assembled research teams at both UM and UF. At UM, Hekai Zhang and Yutao Chen were hired as PhD students on the project. Yalan Liu and Nicole Robey are UF PhD students working on this project.
- In addition, through Dr. Townsend's EPA project, additional academic team members have been added including Dr. John Bowden, UF Chemist, and his PhD student Atiye Ahmadi. Additional UF students working under the EPA project include Paola Mendoza-Perilla and Chad Spreadbury.
- The UM/UF teams are meeting twice a month with the U.S. EPA research team using screen sharing capabilities. A subset of the UM/UF team is meeting twice a month with Pegasus for Pegasus employees to provide updates. We are also meeting monthly with the entire project team that includes Battelle, Pegasus, plus EPA (includes Dr. Thabet Tolaymat), UM and UF teams.
- The UM/UF teams visited EPA in Cincinnati to discuss project plans during July 2019.
- We have collected samples from 37 landfills in Florida. Results are available for 36. We have initiated the process of analyzing this data.
- As part of the work sponsored by the U.S. EPA (facilitated by Dr. Thabet Tolaymat and Dr. Townsend's EPA grant) we have initiated the process of collecting samples outside of Florida. So far samples have collected samples from one landfill outside Florida. We have sample collection plans prepared for 8 additional landfills. Once travel restrictions are lifted (because of COVID), the research team will commence sample collection through the U.S. EPA work.

TAG Meetings:

- The first TAG meeting was held on August 21, 2019. Fourteen participated in person and 42 participated virtually. The minutes and the videos of the presentations are posted on the project web site.
- The next TAG meeting is scheduled for the end of June 2020. We are currently planning this meeting.

Metrics:

1. Research publications from THIS Hinkley Center Project.

JOURNAL ARTICLES

- Solo-Gabriele, H.M., Jones, A.S., Lindstrom, A.B., Lang, J.R., 2020. Waste Type, Incineration, and Aeration are Associated with Per- and Polyfluoroalkyl Levels in Landfill Leachates. Waste Management, 107: 191-200. <https://doi.org/10.1016/j.wasman.2020.03.034>

ABSTRACTS

- Helena Solo-Gabriele, Yutao Chen, Hekai Zhang, Yalan Liu, Nicole Robey, Timothy Townsend, 2020. Implications of PFAS in Landfill Leachates. Abstracts of the Emerging Contaminants Conference, Westminster, CO. March 2020.
 - Yutao Chen, Hekai Zhang, Helena M. Solo-Gabriele, Nicole Marie Robey, Timothy G. Townsend, Yalan Liu, 2020. Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Level of the Liquid Source in Different Landfills and Leachate Treatment Processes. Abstracts of the 2020 Joint Summit between Recycle Florida Today and Florida SWANA, Lake Buena Vista, FL. January 2020.
 - Helena Solo-Gabriele, Athena Jones, Hekai Zhang, Johnsie Lang, 2019. Perfluoroalkyl substances in landfill leachates produced from different waste types. Abstracts from the American Chemical Society Spring 2019 National Meeting & Expo, Orlando, FL, April 2019. <https://tpa.acs.org/abstract/acsnm257-3110261/perfluoroalkyl-substances-in-landfill-leachates-produced-from-different-waste-types>
 - Helena Solo-Gabriele, Timothy Townsend, Yutao Chen, Hekai Zhang, Yalan Liu, Nicole Robey, 2019. PFAS in Groundwater, Storm Water, Gas Condensates and in Leachates from Landfills. Fall Meeting of the American Geophysical Union, San Francisco, CA. December 2019.
 - Nicole Robey, Yalan Liu, Hekai Zhang, Yutao Chen, Timothy Townsend, Helena Solo-Gabriele, 2019. PFAS in Aqueous Samples from Landfills. Abstract Book, Society of Environmental Toxicology and Chemistry North America 40th Annual Meeting, 3–7 November 2019, Toronto, Ontario, Canada.
2. Research presentations resulting from THIS Hinkley Center Project. The interim results from this study have been presented during the following meetings:
- “Research Efforts on PFAS in Florida’s Waste Stream.” Webinar organized by the Tampa Bay Association of Environmental Professionals (TBAEP), Tampa, FL. May 2020. (speaker presentation by T. Townsend).
 - “Summary of PFAS Research Presented at the Emerging Contaminants Summit.” Webinar organized by Geosyntec, Atlanta, GA. April 2020. (speaker presentation by H. Solo-Gabriele). [This webinar was attended by 941 individuals and registration had to be stopped due to limitations of webinar capabilities.]
 - “Research focused on PFAS in Landfill Leachates at UM/UF.” Webinar before the Environmental Working Group, Washington D.C., April 2020. (speaker presentation by H. Solo-Gabriele).
 - “Implications of PFAS in Landfill Leachates.” 2020 Emerging Contaminants Conference, Westminster, CO, March 2020. (speaker presentation, session keynote, by H. Solo-Gabriele).
 - “Update on PFAS Research.” Webinar before the U.S. EPA Chemical Risk Assessment and Applied Research, Office Washington D.C. (speaker presentation by H. Solo-Gabriele).
 - “Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Level of the Liquid Source in Different Landfills and Leachate Treatment Processes.” 2020 Joint Summit between Recycle Florida Today and Florida SWANA, Lake Buena Vista, FL. January 2020. (speaker presentation by Yutao Chen).
 - “PFAS in Landfill Leachate.” Environmental/Solid Waste Workshop sponsored by SCS Engineers at FIU College of Engineering, Miami, FL, January 2020. (presentation by H. Solo-Gabriele).
 - “PFAS in Groundwater, Storm Water, Gas Condensates and in Leachates from Landfills.” Fall Meeting of the American Geophysical Union, San Francisco, CA, December 2019. (speaker presentation by H. Solo-Gabriele).
 - “PFAS in Aqueous Samples from Landfills.” Society of Environmental Toxicology and Chemistry North America 40th Annual Meeting, Toronto, Ontario, Canada. November 2019. (poster presentation by Nicole Robey).

- “Characterization of Per- and Poly-fluoroalkyl Substances (PFAS) in Landfill Leachate and Preliminary Evaluation of Leachate Treatment Processes.” Hinkley Center for Solid and Hazardous Waste Management Advisory Board Meeting, Orlando, Florida, September 28, 2018. (Speaker presentation by H. Solo-Gabriele)
 - “What are Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) and an Update of Studies Focused on Evaluating Landfill Leachate.” Sponsored by the Florida Section of the American Water Works Association, Webinar, September 26, 2018. (Speaker presentation by H. Solo-Gabriele)
 - “Perfluoroalkyl substances in landfill leachates produced from different waste types.” American Chemical Society 2019 Spring Meeting, April 1, 2019 (Speaker presentation by H. Solo-Gabriele)
 - A list of planned presentations is provided in the appendix
3. List who has referenced or cited your publications from this project. Of note Dr. Solo-Gabriele’s and Dr. Townsend’s research are highly cited. Please see Google Scholar for citation details
For Solo-Gabriele: <https://scholar.google.com/citations?hl=en&user=zvpDSPoAAAAJ>
For Townsend: <https://scholar.google.com/citations?hl=en&user=PqujfgkAAAAJ>
4. How have the research results from THIS Hinkley Center project been leveraged to secure additional research funding? Pending.
- The U.S. Environmental Protection Agency Office of Research and Development has committed to providing in-kind support to this project by covering the costs of sample analysis, shipping, and primary supplies.
 - We have received an award from the U.S. EPA on a separate project led by the University of Florida (Townsend, PI) for a national level PFAS study. This project is entitled, “A systems-based approach to understand the role of waste type, management strategies and treatment methods on the occurrence, source, and fate of PFAS in landfills.” The start date was September 2019.
5. What new collaborations were initiated based on THIS Hinkley Center project?
- We have collaborated with the U.S. EPA, Office of Research and Development.
 - With the second year of Hinkley funding, the University of Florida (Townsend) group has been formally added to the research team as a subcontract. The in-kind support for the second year Hinkley funding is provided through the U.S. EPA Office of Research and Development.
 - Through the U.S. EPA funded project we have teamed up with: Dr. John Bowden and Katherine Deliz of UF, in addition to Dr. Townsend’s group. We have also teamed up with Dr. Kavitha Dasu, and expert in PFAS analysis, from Battelle.
6. How have the results from THIS Hinkley Center funded project been used by the FDEP or other stakeholders.
- We have received numerous calls from landfill operators (especially from the 37 landfill operators from whom we have collected samples) asking about the results of the leachate analysis. The landfill operators have indicated that they have heard that the FDEP and EPA are currently evaluating PFAS in Florida.

- We have also been interacting with the FDEP, Joe Dertian, who has inquired on a couple of occasions about the PFAS work. In the process, he has been very helpful in guiding the team through on-line public FDEP databases.

Planned Presentations

COVERED by: Dr. Tim Townsend [Conference postponed] because of COVID]
Conference Date: March 23-26, 2020
Where: Atlanta, GA
Sponsor: SWANAPalooza
Abstract due date: November 8

COVERED by: Nicole Robey [Conference postponed] because of COVID]
Conference Date: April 22-24, 2020
Where: Tampa
Sponsor: UF TREEO Center and Gene Jones of SWIX.
Abstract due date: January 17, 2020

COVERED by: Dr. Helena Solo-Gabriele
Webinar Date: June 3, 2020
Where: Virtual
Sponsor: AWWA
Abstract due date: April 2020

COVERED by: Yalan Liu [Conference postponed] because of COVID]
Conference Date: July 26-28, 2020
Where: Naples, FL
Sponsor: SWANA FL
Abstract due date: Contact Jason Timmons, jtimmons@scgov.net

COVERED by: John Schert and Thabet Tolaymat [Conference postponed] because of COVID]
Conference Date: July meeting focused on PFAS
Where: Washington DC
Sponsor: Environmental Council of the States (ECOS), <https://www.ecos.org/event/2020-ecos-spring-meeting/>

Appendix: TAG Member List

PFAS TAG Member List

Version dated: October 31, 2019

RESEARCH TEAM MEMBERS

Name	Affiliation and Address	Phone Number	Email
Helena Solo-Gabriele	Professor, Principal Investigator University of Miami, 1251 Memorial Drive McArthur Building Room 252, Coral Gables, FL 33146	305-284-3467 (office) 305-989-9103 (cell)	hmsolo@miami.edu
Athena Jones	Graduate Student University of Miami		a.jones18@umiami.edu
Hekai Zhang	Graduate Student University of Miami		h.zhang24@umiami.edu
Yutao Chen	Graduate Student University of Miami		y.chen55@umiami.edu
Tim Townsend	University of Florida		ttown@ufl.edu
Yalan Liu	Graduate Student, University of Florida		yalanliu@ufl.edu
Nicole Robey	Graduate Student, University of Florida		nicolemr@ufl.edu
Shaopeng Xu	Undergraduate Student, University of Florida		shaopengxu@ufl.edu
Jake Thompson	Undergraduate Student, University of Florida		jaketthom@ufl.edu
Ying Guo	Undergraduate Student, University of Florida		yingguo621@ufl.edu
Kyle Clavier	Graduate Student, University of Florida		kclavier@ufl.edu
Tom Smallwood	Graduate Student, University of Florida		tsmallwood@ufl.edu
Katherine Deliz*	Research Associate, University of Florida		katherine.deliz@essie.ufl.edu
John Bowden*	Assistant Professor, University of Florida		john.bowden@ufl.edu
Kavitha Dasu*	Research Director, Battelle		dasu@battelle.org

*Collaborators through EPA Star Grant (Townsend, PI)

HINKLEY CENTER

Name	Affiliation and Address	Phone Number	Email
John Schert	Director University of Florida, Gainesville, FL	(352) 392-6264 (office)	jschert@ufl.edu
Wester W. Henderson III	Research Coordinator III		wester.henderson@essie.ufl.edu

Name	Affiliation and Address	Phone Number	Email
Morton A. Barlaz, Ph.D., P.E (Jean-Rene Thelusmond)	Distinguished University Professor and Head, Dept. of Civil, Construction, & Environmental Eng., North Carolina State University Box 7908, Raleigh, NC 27695-7908	(919) 515-7212	barlaz@ncsu.edu jthelus@ncsu.edu
Stephanie Boylard, Ph.D.	Research and Scholarship Program Manager Environmental Research & Education Foundation (EREF) 3301 Benson Drive, Suite 101, Raleigh, NC 27609	Phone: 919.861.6876 ext. 108 Fax: 919.861.6878	sbolyard@erefdn.org
Rula A. Deeb, Ph.D. Elisabeth Hawley	Senior Principal, Geosyntec Consultants 1111 Broadway, 6 th Floor, Oakland, California 94607	(510) 836-3036 (510) 932-9110 (cell)	RDeeb@Geosyntec.com
Eric Charest Alternate: Himanshu Mehta	Environmental Compliance Specialist, Indian River County Utilities 1801 27th Street, Vero Beach, FL 32960	(772) 226-1822	echarest@ircgov.com hmehta@ircgov.com
Viraj deSilva, PhD, P.E., Wastewater Treatment Director	SCS Field Services, Environmental Consultants and Contractors 3922 Coconut Pam Drive, Suite 102, Tampa, FL 33619	813-621-0800 x 2153 Cell: 813-817-0766	vdesilva@scsengineers.com
Cory D. Dilmore, P.E.	Environmental Administrator, FDEP Permitting and Compliance Assistance Program 2600 Blair Stone Road, MS 4565, Tallahassee, FL 32399	(850) 245-8712	cory.dilmore@dep.state.fl.us
Elizabeth Foeller Seth Ramaley (Marietta GA)	Area Manager – Environmental Protection, Waste Management, Inc. of Florida 14415 County Road 39, Duette, FL 34219	(941) 720-0564	efoeller@wm.com
Ramana P. Kari, P.E. Additional: James Telson Ron Schultz	Chief Engineer, Solid Waste Authority of Palm Beach County 7501 N. Jog Road, West Palm Beach, FL 33412	(561) 640-4000 ext. 4610	rkari@swa.org
Johnsie Lang, Ph.D.	Arcadis		jrlang@ncsu.edu
Chris May	Asahi/America R&D 655 Andover Street, Lawrence, MA 01843	(781) 502-5323	cmay@asahi-america.com

Name	Affiliation and Address	Phone Number	Email
Richard Meyers	SWRS Program Manager, Broward County Solid Waste and Recycling Services 1 N. University Dr., Suite 400, Plantation, FL 33324	(954) 474-1848	rmeyers@broward.org
Joseph H. O'Neill, P.E.	Professional Engineer II, Solid Waste Management Division, Hillsborough County, 332 N. Falkenburg Road, Tampa, FL 33619	(813) 663-3223 (813) 455-2185	ONeillJ@hillsboroughcounty.org oneillj@HCFLGov.net
Hilary Thornton	Remedial Project Manager & NARPM Co-Chair: Restoration & Investigation Section US EPA Region 4: Superfund Division, 61 Forsyth Stree SW, Atlanta, GA 30303	(404) 562-8809 (404) 852-1030 (cell)	thornton.hilary@epa.gov
Thabet Tolaymat, Ph.D.	Acting Associate Director for Emerging Materials and Sustainability, Chemical Safety for Sustainability Research Program, U.S. EPA 26 West Marting Luther King Drive, Mail Code: 236, Cincinnati, OH 45268,	(513) 487-2860	Tolaymat.thabet@epa.gov
Ashley Danley-Thomson, Ph.D.	Assistant Professor at Florida Gulf Coast University with research that relates to PFAS	(239) 745-4390	athomson@fgcu.edu
Weiland Uchdorf, Ph.D., Alternate: Steve Christiansen	Facility Engineer, Resources Recovery Facility, Department of Solid Waste Management, Miami-Dade County 6990 NW 97th Ave, Miami, FL 33178	(305) 591-3534,	wfu@miamidade.gov