Comments on the US EPA's Efforts to Improve Solid Waste Recycling

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On June 18, 2015, the US EPA broadcast a webinar, "Advancing Sustainable Materials Management: Facts and Figures 2013," during which results of its review of trends in the generation, recycling, and disposal of municipal solid waste (MSW) in the US in 2012 and 2013 were presented. It was announced that the webinar presentations will soon be posted on the US EPA Office of Solid Waste and Emergency Response (OSWER) website (http://www.epa.gov/wastes/conserve/smm/). The introductory presenter, Mathy Stanislaus (Assistant Administrator for the US EPA OSWER and leader of the Agency's land cleanup, solid waste and emergency response programs), stated that he would like to receive comments on the Agency's efforts to improve MSW recycling to thereby reduce the amount of MSW disposal by landfilling. These comments are submitted in response to that request for comments on the adequacy of the US EPA's efforts to improve MSW recycling, based on the webinar's content.

The focus of the webinar review was the reduction of the volume of wastes destined for landfills. It, however, did not mention much less address, the impacts and implications on waste reduction of the significant deficiencies in the protection of public health/welfare and environmental quality provided by allowed MSW disposal practices. While the reduction in volume of certain waste streams diminishes the amount of certain materials buried in landfills, it does not substantially reduce the threats posed by materials that continue to be buried in Subtitle D's inadequately protective landfills, and that would continue to be buried even with even more substantial waste-stream reductions. This is because MSW is allowed to be, and is routinely, disposed of in minimum-design Subtitle D landfills incorporating a single-composite liner (a single layer of compacted soil and plastic sheeting layer), groundwater monitoring wells spaced hundreds of feet apart at the point of compliance for groundwater monitoring, and only 30 years of assured postclosure monitoring and maintenance, and groundwater remediation when the composite liner eventually fails to prevent groundwater pollution by landfill leachate. The US EPA, itself, has acknowledged such systems to be inadequate for the long-term protection of public health/welfare and environmental quality from buried MSW. The implications of the presence of materials in MSW streams that can leach chemicals that are hazardous and otherwise deleterious in groundwater, even with waste stream reductions, are not reliably or adequately considered in MSW landfill design, permitting, and funding. Furthermore, by reducing the amount of certain more inert components in the waste stream, such as glass, the wastes that are buried are more concentrated in materials that can leach hazardous and otherwise deleterious substances.

Dr. G. Fred Lee has been involved in investigating the pollution of groundwater by MSW landfills for the past 50 years, and Dr. Jones-Lee for the past 30 years. Their work has included

conducting university graduate-level research on landfill liner performance. They have developed approximately 100 professional papers and reports on their investigations and research on the disposal of MSW in landfills, most of which are available on their website, www.gfredlee.com, in the Landfill Impact section at http://www.gfredlee.com/Landfill_Impacts.html.

Several of our papers and reports discuss technical issues pertinent to these comments on deficiencies in the US EPA's program to increase recycling/reuse of MSW components. Our heavily-documented report that addresses numerous technical aspects of the inability of US EPA minimum-design Subtitle D landfills to prevent groundwater pollution for as long as the some of the MSW components will be a threat to produce leachate that can penetrate through the single-composite liner and pollute underlying and nearby groundwaters is:

> Lee, G. F. and Jones-Lee, A., "Flawed Technology of Subtitle D Landfilling of Municipal Solid Waste," Report of G. Fred Lee & Associates, El Macero, CA, December (2004). Last updated Jan (2015) www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf

As discussed in that report, the US EPA recognized in 1989 and the early 1990s that the minimum-design Subtitle D cover, liner, and monitoring systems, which are still prescribed today, will eventually lead to groundwater pollution by landfill leachate. Several senior staff members of the US EPA OSW recognized that the minimum-design Subtitle D provisions will eventually fail to prevent groundwater pollution by leachate. The flawed technology of Subtitle D minimum design is also recognized by many professionals and several state regulatory solid waste agencies as reflected in more protective state requirements.

In recognition that there will long be a need for landfilling of waste residues, we have discussed ways in which landfills can be developed to provide greater and more safe-guarded, long-term protection of public health/welfare and environmental quality in:

> Lee, G. F., "Developing Protective Landfills," Report of G. Fred Lee & Associates, El Macero, CA, January 19 (2013). http://www.gfredlee.com/Landfills/Sum_Developing_Protective_Landfills.pdf

As discussed in that report, some states require the use of a more protective double-composite liner systems with a leak detection system in-between to allow earlier detection of the inevitable failure of the landfill cover to prevent water from entering the landfill and generating leachate.

We also discussed these issues in our comments to the US EPA, comments on which the US EPA has failed to act:

> Lee, G. F., and Jones-Lee, A., "Comments on Criteria for Municipal Solid Waste Landfills (Section 610 Review), Submitted to Docket Number F-1999-MLFN-FFFFF, US EPA Office of Solid Waste," Report of G. Fred Lee & Associates, El Macero, CA, January 30 (2000). http://www.gfredlee.com/Landfills/subtitledcomcondver.pdf

Recently we published an invited review of funding issues for landfill postclosure monitoring

and maintenance to improve the protection of public health/welfare and environmental quality:

> Jones-Lee, A., and Lee, G. F., "Landfill Post-Closure and Post-Post-Closure Care Funding - Overview of Issues," WasteAdvantage Magazine 5(12):24-26 December (2014). http://www.gfredlee.com/Landfills/Funding_Issues_WasteAdvantage.pdf

As we discuss in that review, a fundamental problem is that regulatory agencies, including the US EPA, allow the development of MSW landfills that prescribe tipping fees on the average of about $50/ton. The level of funding generated from such tipping fees is inadequate to provide support for the maintenance, monitoring, and remediation that are known to be needed during and well-beyond a 30-year postclosure period. To provide at least the opportunity to better-fund those inevitable needs for the protection of public health/welfare and environmental quality for as long as the wastes as currently landfilled be a threat to generate leachate when contacted by water, tipping fees would need to be doubled or tripled, or more. The charging of appropriate tipping fees at levels commensurate with funding needs for true long-term protection would provide a significant monetary incentive to reduce waste generation, increase recycling, and enhance the true protection of public health/welfare and groundwater quality.

Over the years we have developed several other papers and reports that address these issues in particular, including:

> Lee, G. F. and Sheehan, W., "MSW Recycling Protects Groundwaters: Reply to 'Recycling is Garbage'," Letter to the editor New York Times, Hydrovision 5(3):6 (1996). http://www.gfredlee.com/Landfills/nyt-pap.pdf
>
> Lee, G. F. and Jones-Lee, A., "Three R's Managed Garbage Protects Groundwater Quality," Presented at CRRA conference, Monterey, CA, June (1997). Published in California Journal of Environmental Health 22:25-34 (1999). http://www.gfredlee.com/Landfills/mswrecyc.pdf
>
> Lee, G. F. and Jones-Lee, A., "Three R's Managed Garbage Protects Groundwater Quality," Presented at California Resource Recovery Association annual meeting, Monterey, CA, May (1997). Published in California Journal of Environmental Health 22:25-34 (1999). http://www.gfredlee.com/Landfills/mswrecyc.pdf
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> Lee, G. F. and Jones-Lee, A, "Three Rs Managed Garbage Protects Groundwater Quality," Proceedings Air and Waste Management Association 93rd national annual meeting, CD ROM paper 00-454, Pittsburgh, PA, June (2000).

On a related note, we are also discouraged that the US EPA continues to bend to political pressure by allowing coal combustion ash to be disposed of in Subtitle D landfills. As discussed in the following report, a technically valid assessment of the potential for coal combustion ash in Subtitle D landfills to pollute area groundwaters would result in their being classified as a hazardous waste and regulated accordingly.

> Lee, G. F., and Jones-Lee, A., "Comments on Proposed Disposal of Coal Combustion Ash in Subtitle D Landfill in Clay Mines," Report to Therese Vick, Blue Ridge Environmental

Defense League, Glendale Springs, NC, Report of G. Fred Lee & Associates, El Macero, CA, May 6 (2015).
http://www.gfredlee.com/Landfills/Comments_Ash_SubtitleD_Landfill.pdf

We appreciate that political realities effectively prevent the US EPA from revising the Subtitle D landfilling regulation as needed to better ensure true protection of public health/welfare for as long as landfilled wastes are a threat, and to better ensure that current MSW generators (i.e., the people who generate the wastes disposed in a landfill) pay the true costs of protective MSW disposal. Until the US EPA Office of Solid Waste and Emergency Response adequately addresses the significant deficiencies in Subtitle D regulations, however, its efforts to improve MSW recycling will be significantly less effective in protecting public health/welfare and environmental quality than they could be.

A summary of our professional background is provided below. Additional information on our qualifications and experience in the areas addressed in these comments is available on our website.

Summary Resume – G. Fred Lee, PhD, PE, BCEES, F.ASCE
American Academy of Environmental Engineers Board Certified Environmental Engineer

Dr. G. Fred Lee is President of G. Fred Lee and Associates, a specialty environmental quality consulting firm of which he and Dr. Anne Jones-Lee are the technical principals. They specialize in addressing advanced technical aspects of water supply water quality, water and wastewater treatment, water pollution control, and solid and hazardous waste impact evaluation and management. After earning his Master of Science in Public Health degree from the University of North Carolina in 1957 focusing on water quality, and his PhD degree from Harvard University in 1960 in Environmental Engineering, Dr. Lee taught university graduate-level environmental engineering and environmental science courses for 30 years at several US universities. During that time, he conducted over $5-million in research and published more than 475 papers and reports, and was active in professional service/education and part-time consulting. Dr. Lee retired from university teaching and research in 1989 and shifted his professional focus to full-time consulting. Since that time he has developed another 600 professional papers and reports.

One of the areas of his professional and consulting specialization is the development of technically valid water quality investigations and cost-effective pollutant control programs to protect the designated beneficial uses of waterbodies without significant unnecessary expenditures for constituent control. Many of Drs. Lee and Jones-Lee's professional papers and reports, as well as additional description of their areas of expertise and experience, are available on their website, www.gfredlee.com. Additional information on Dr. Lee's professional activities is available upon request.

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phone: (530)753-9630 • fax: (530)753-9956 • web: http://www.gfredlee.com

DATE & PLACE OF BIRTH: July 27, 1933; Delano, California, USA

EDUCATION

Ph.D.	Environmental Engineering & Environmental Science, Harvard University, Cambridge, MA, 1960
M.S.P.H.	Environmental Science-Environmental Chemistry, School of Public Health, University of North Carolina, Chapel Hill, NC, 1957
B.A.	Environmental Health Science, San Jose State University, San Jose, CA, 1955

ACADEMIC AND PROFESSIONAL EXPERIENCE
Current Position: Consultant; President, G. Fred Lee & Associates 1989 – present

Previous Positions:
- Distinguished Professor, Civil and Env. Engr, New Jersey Inst Technol, Newark, NJ 1984-89
- Senior Consulting Engineer, EBASCO-Envirosphere, Lyndhurst, NJ, (part-time) 1988-89
- Coordinator, Estuarine and Marine Water Quality Management Program, NJ Marine Sciences Consortium Sea Grant Program 1986-1988

- Director, Site Assessment and Remedial Action Division, Center for Research in Hazardous & Toxic Substances, NJIT et al., Newark, NJ 1984-1987
- Professor, Environmental Engineering, Colorado State University 1978-1982
- Professor, Environmental Engineering & Sciences; Director, Center for Environmental Studies, University of Texas at Dallas 1973-1978
- Professor of Water Chemistry, Department of Civil & Environmental Engineering, University of Wisconsin-Madison 1961-1973

Registered Professional Engineer, State of Texas, Registration No. 39906

American Academy of Environmental Engineers (AAEE) Board-Certified Environmental Engineer, Certificate No. 0701. From 1991 to 2013 Dr. Lee served as the AAEE Chief Examiner for Board Certification for Northern California.

PUBLICATIONS & AREAS OF ACTIVITY: Published more than 1100 professional papers, chapters in books, professional reports, and similar materials. The topics covered include:

- sources, significance, fate and the development of control programs for chemicals in aquatic and terrestrial systems;
- analytical methods for chemical contaminants in fresh and marine waters;
- landfills and groundwater quality protection issues;
- impact of landfills on public health and environment;
- environmental impact & management of wastewater discharges including municipal, mining, electric generating station, domestic & industrial wastes, paper & steel mill, refinery;
- stormwater runoff water quality evaluation;
- stormwater BMP development for urban areas, highways and agricultural areas;
- eutrophication-excessive fertilization – causes and control;
- impact of land disposal municipal & industrial wastes on groundwater & surface water quality;
- environmental impact of dredging and dredged material disposal;
- water quality modeling;
- hazard assessment for new and existing chemicals;
- water quality and sediment criteria and standards;
- water supply water quality;
- assessment of actual impact of chemical contaminants on water quality.

LECTURES: Presented more than 860 lectures at professional society meetings, universities, and to professional and public groups.

GRANTS AND AWARDS: Principal investigator for more than $8-million of contract and grant research in the water quality and solid and hazardous waste management fields.

KEY PROFESSIONAL SOCIETY ACTIVITIES: Member: American Chemical Society, American Fisheries Society, American Society of Civil Engineers, American Water Works Association, Society of Environmental Toxicology and Chemistry, Water Environment Federation

- Reviewer, Natl. Academy of Sciences & Engineering Panel on Water Quality Criteria, 1971

- Member, Water Pollution Control Federation Sediment Water Quality Task Force, 1992-94; Water Quality Criteria Task Force, 1993
- Reviewer, American Fisheries Society-US EPA Water Quality Criteria, 1977
- Chairman, Water Pollution Control Federation Standard Methods Subcommittee, "Interpretation and Application of Bioassays," 1979-1988
- Chief Examiner, American Academy of Environmental Engineers, North Central California, 1991 – 2013
- Led development of California Groundwater Resources Association, 1992-1993
- Member, California EPA Comparative Risk Project Human Health Committee, 1993-1994
- Member, WEF Urban Stormwater Quality Task Force, 1994-1997
- US EPA TAG Advisor for the UCD/DOE LEHR Superfund site, 1995 – 2010
- US EPA TAG Advisor for the Lava Cap Mine Superfund site, 2001-2004
- PI for $2-million/yr CALFED research project on the San Joaquin River DO TMDL Program
- Member, Editorial Board, Journal Stormwater, 2001 – present
- Member, Editorial Board, Journal Remediation, 1999 – 2012
- Member, CVRWQCB Ag Waiver Technical Issues Committee, 2004 – 2012
- Served various times, as member editorial board of several journals including Environ. Science & Technol., Journ. Society for Environmental Toxicology & Chemistry, Journ. Ground Water, Journ. Stormwater

HONORS AND AWARDS: Elected member of the following: Sigma Xi; Delta Omega, Honorary Public Health Scholastic Society; Phi Lambda Upsilon, Honorary Chemistry Scholastic Society; Diplomate, American Academy of Environmental Engineers

- Tied for first place for best paper presented at the Fifth Annual ASTM Aquatic Toxicology meeting in Philadelphia, PA, October, 1980
- Charles B. Dudley Award - American Society for Testing and Materials award for contribution to Hazardous Solid Waste Testing, "Application of Site-Specific Hazard Assessment Testing to Solid Wastes," published 1984
- Journal AWWA paper selected by the Resources Division of the AWWA as the best paper published in the Journal during the year, 1984
- Received Certificate of Appreciation from the Corps of Engineers for work on the Dredged Material Research Program, 1978
- Tribute of Appreciation - Groundwater Resources Association of CA, September 2000
- Elected Fellow of the American Society of Civil Engineers
- Sacramento Section awarded Outstanding ASCE Life Member 2010
- Additional information on Dr, Lee's qualification and experience is available on his website, www.gfredlee.com at http://www.gfredlee.com/gflinfo.htm

Announcement of American Society of Civil Engineers (ASCE) Election of Dr. G. Fred Lee as ASCE Fellow

In December 2009 Dr. G. Fred Lee was elected as an ASCE Fellow. This election recognizes Dr. Lee five decade career as a national/international leader university graduate level educator and environmental consultant. The ASCE announcement of this election is presented below.

G. FRED LEE, Ph.D., P.E., BCEE, F.ASCE, earned his Master of Science in Public Health from the University of North Carolina in 1957 and his PhD degree in environmental engineering from Harvard University in 1960. For 30 years he served on the graduate civil and environmental engineering/science faculty of several major US universities where he taught, conducted research, mentored the Masters and PhD work of 90 students, published extensively in professional journals, and actively undertook public service for the regulatory, professional, and lay communities.

In 1989 Dr. Lee retired from his academic career to focus on private consulting and public service; he is president of G. Fred Lee & Associates. Areas of emphasis include domestic water supply water quality focusing on how land use in a water supply watershed impacts water supply water quality; investigation and management of surface and groundwater quality, stormwater runoff, contaminated sediments, land surface activities that impact groundwater quality, and use of reclaimed wastewater; and investigation and management of impacts of solid and hazardous chemicals including MSW and hazardous waste landfills, Superfund, and other hazardous chemical sites.

Dr. Lee has served on the editorial boards for several professional publications, and currently serves on the editorial board for the Journals *Stormwater* and *Remediation*. Dr. Lee has long served on the American Academy of Environmental Engineers' (AAEE) examination board for AAEE professional engineer certification; until 2009 he served as Chief Examiner for Northern California in Water Supply and Wastewater and in the Hazardous Waste areas for 20 years.

Dr. Lee has published more than 1100 professional papers and reports many of which are posted on his website [www.gfredlee.com]. In addition, out of the need for greater influence of science and engineering in water quality regulation and management, he created and authors an email-based Stormwater Runoff Water Quality Newsletter which he has distributed about monthly for the past 12 years, at no-cost, to about 8,000 subscribers.

Outstanding ASCE Life Member

Dr. G. Fred Lee — G. Fred Lee & Associates

Dr. Lee has been a full-time consultant through the firm of G. Fred Lee & Associates since 1989 when he moved to El Macero, CA (near Sacramento). This firm specializes in evaluating and managing the impacts of chemicals on water quality, advanced level water supply water quality, water and waste water treatment, water pollution control, and solid and hazardous waste investigation and management. Dr. Lee has established a website, www.gfredlee.com, where he has make available over 600 papers and reports developed from his research and consulting activities. In December 2009, Dr. G. Fred Lee was elected as an ASCE Fellow. This election recognizes Dr. Lee's five-decade career as a national/international leader, university graduate-level educator, and environmental consultant. From: *The Engineerogram*, ASCE Sacramento Section Newsletter, Volume 72 No. 09, September 2010

SUMMARY RESUME
Anne Jones-Lee, PhD

CONTACT INFORMATION:
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El Macero, CA 95618-1005
phone: 530-753-9630

EDUCATION

Ph.D. Environmental Sciences, University of Texas at Dallas, Richardson, TX, 1978. Areas of Specialization: Aquatic Toxicology/Chemistry, Aquatic Biology, Water Quality Evaluation and Management
M.S. Environmental Sciences, University of Texas at Dallas, Richardson, TX, 1975
B.S. Biology, Southern Methodist University, Dallas, TX, 1973

ACADEMIC AND PROFESSIONAL EXPERIENCE

1989 – Present Vice President, G. Fred Lee & Associates
2000 - 2004 Adjunct Research Scientist, California State University, Fresno, CA
1984 - 1989 Associate Professor of Civil and Environmental Engineering (tenured), New Jersey Institute of Technology, Newark, NJ
1988 - 1989 Consulting Engineer, Ebasco-Envirosphere, Lyndhurst, NJ (part-time)
1984 - 1988 Director of Environmental Engineering Laboratories, Department of Civil and Environmental Engineering, NJIT, Newark, NJ
1982 - 1984 Research Associate and Lecturer, Department of Civil Engineering, Texas Tech University, Lubbock, TX
1982 Coordinator for Aquatic Biology, Fluor Engineers Advanced Technology Division, Irvine, CA
1978 - 1981 Research Assistant Professor, Department of Civil Engineering, Colorado State University, Fort Collins, CO
1973 - 1974 Research Technician, Frito-Lay Research and Development Laboratory, Irving, TX

SUMMARY OF PROFESSIONAL REPORTS AND PUBLICATIONS

Published more than 250 professional papers, and co-authored more than 450 reports and occasional papers. Topic areas addressed include:

- Sources, significance, fate, and control of chemical contaminants in fresh water, marine, and estuarine systems
- Environmental impact of various types of wastewater discharges including mining, electric generating station, domestic, and industrial
- Causes and control of eutrophication; groundwater quality; impact of land disposal of municipal and industrial wastes; environmental impact of dredging and dredged sediment disposal; water quality modeling; hazard assessment of new and existing chemicals; water quality criteria and standards; water supply water quality; assessment of actual environmental impact of chemical contaminants on water quality; toxicity of sediments; impact of landfills on environmental quality.

Served as collaborator in essentially all research and consulting projects and publications of Dr.

G. Fred Lee since the mid-1970s; many of their publications are available on their website at www.gfredlee.com. A bibliographic listing of papers and reports on which Dr. Jones-Lee (R. A. Jones) was senior author is provided at the close of this resume.

SUMMARY OF PROFESSIONAL PRESENTATIONS

Presented 55 lectures and professional papers at professional society meetings, short courses, universities, public service groups, and national and international conferences.

1983–With Dr. G. F. Lee, presented workshop to South African Water Research Commission on application of OECD eutrophication modeling approach to South African impoundments

1987–With Dr. G. F. Lee, presented one-week workshop for the USSR Academy of Sciences on water quality management programs for Volga River system

AWARDS

Charles B. Dudley Award - American Society for Testing and Materials award for contribution to Hazardous Solid Waste Testing, "Application of Site-Specific Hazard Assessment Testing to Solid Wastes," published (1984).

1986 Best Paper of the Year - American Water Works Association Resources Division award for paper published in the Journal, "Is Hazardous Waste Disposal in Clay Vaults Safe?" (1986)

TEACHING EXPERTISE AND EXPERIENCE

Taught Graduate Courses in

- Microbiological Aspects of Environmental Engineering
- Introductory Chemical Aspects of Environmental Engineering
- Aquatic Toxicology
- Water and Wastewater Analysis
- Introduction to Water and Wastewater Treatment
- Introduction to Environmental Engineering

Faculty Director of Women in Science and Engineering Program (1988)

OTHER PROFESSIONAL ACTIVITIES

Editor of the “Stormwater Runoff Water Quality Newsletter.” Past issues available at http://www.gfredlee.com/newsindex.htm

Webmaster for G. Fred Lee and Anne Jones-Lee’s website, www.gfredlee.com

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