

**Summary of Findings on the  
Environmental Impacts of the Proposed C&D Landfill on Top of the  
Closed Gentilly Landfill<sup>1</sup>**

My name is G. Fred Lee. I am the President of G. Fred Lee and Associates, a firm which specializes in addressing advanced aspects of water and wastewater management, water pollution control, and solid and hazardous waste management. I have a BA from San Jose State College, an MSPH (Master of Science in Public Health) from the University of North Carolina, and a PhD in Environmental Engineering from Harvard University, which I obtained in 1960. For 30 years, I held university graduate-level teaching and research positions at several major US universities focusing on water quality and solid and hazardous waste impact evaluation and management. During this time I conducted over \$5 million in university research and published over 500 papers/reports on this research. A summary of my professional background pertinent to preparation of this report is attached as Exhibit 1. One of my special areas of interest is the siting, design and potential impacts of landfills, including municipal solid waste landfills and so-called “construction and demolition debris” landfills. As Exhibit 1 shows, I have often written and lectured on topics related to landfill design and impacts, and have testified in state court on these subjects.

II.

I have been supplied with several documents concerning the Gentilly Landfill site in Eastern New Orleans. These include the following:

Closure Plan dated March 1983,

Permit application for the Gentilly Landfill “Type III”, Orleans Parish, Louisiana, September 2004,

Declarations of Emergency from the Louisiana Department of Environmental Quality,

Site Inspection Report for Gentilly Landfill, Orleans Parish, Louisiana, Prepared by Ecology and Environment for Louisiana Department of Environmental Quality, Baton Rouge, LA, June (1997),

January 20, 2006, LDEQ decision documents re the Gentilly landfill,

Limited Scope Phase I and Baseline Phase II Environmental Site Assessment prepared for Phillips and Jordan,

LDEQ Fourth Amended Declaration of Emergency,

LDEQ inspection dated October 2005 noting methane levels too high for open burning,

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<sup>1</sup> Reference as Lee, G. F., “Summary of Findings on the Environmental Impacts of the Proposed C&D Landfill on Top of the Closed Gentilly Landfill,” Submitted to Louisiana Department of Environmental Quality, Baton Rouge, LA, February (2006).

LDEQ letter to Corps of Engineers regarding asbestos disposal,

Correspondence from Gentilly Operator noting deviations from permit conditions,

Draft memorandum dated January 22, 2006 from NISTAC to Ken Sessa, FEMA.

Of particular note is that the Gentilly Type III landfill that is currently in use at this site for debris from New Orleans is sited over a former municipal waste landfill, which operated from the early 1960's until the mid-1980's. The municipal solid waste stream deposited in the former landfill contains a wide variety of known and yet-to-be-identified hazardous and otherwise deleterious chemicals that are a threat to public health and the quality of surface and groundwater. Common household items such as batteries, fluorescent bulbs, and cleaning fluids contain such hazardous chemicals. Among the waste components in municipal solid waste are a variety of heavy metals and organic compounds that are a threat to human health when ingested in drinking water and to aquatic life and wildlife.

The historic Gentilly landfill apparently had a cap consisting of approximately eighteen inches to two feet of silty clay, covered with topsoil. Lee and Jones-Lee (2005) have recently reviewed the potential problems with clay caps for landfills in preventing precipitation from entering landfilled wastes. The clay cap for the existing Gentilly landfill and the cap proposed for the Gentilly Type III C&D Landfill will not be effective barriers for preventing water from entering the C&D landfill and leachate (soluble waste components) generated in this landfill from entering the older Gentilly municipal solid waste landfill. Once water enters the landfill, it interacts with waste components to produce leachate containing hazardous and toxic substances. According to the records, the Gentilly Landfill waste was simply placed on the ground, so there is no liner to collect leachate and thereby prevent leachate escaping to the environment. Drs. G. Fred Lee and Anne Jones-Lee's website ([www.gfredlee.com](http://www.gfredlee.com)) contains several papers/reports discussing the potential impacts of groundwater pollution by municipal solid waste landfills.

The information summarized in the draft NISTAC report and the report prepared for Phillips and Jordan show groundwater contamination of the sort associated with municipal waste landfills. The very shallow groundwater aquifers at the site show levels of arsenic, lead and petroleum hydrocarbons in excess of Louisiana screening standards. Historically, even the deeper aquifer shows contamination with arsenic in particular that is above screening levels.

The NISTAC report expresses concern that the number of groundwater monitoring wells is insufficient to properly characterize the impacts of the closed landfill on groundwater. This is an accurate observation. The six wells that are present are not adequate to determine impacts to groundwater. Particularly troubling is that there does not appear to have been an accurate assessment of the number of wells that should be located downgradient of the landfill in the direction of groundwater flow. According to the reports this direction is generally north at the site.

The available documentation for the site characterizes the groundwater and surface water at the site as contiguous. Groundwater is found at as little as four feet below the surface of the

landfill area. Historical groundwater monitoring, however, was only at a depth of approximately 28-30 feet. The temporary wells installed by the EE&G indicate that this was a significant oversight, since petroleum hydrocarbons were found in the shallow aquifer.

It is significant that the groundwater is so shallow, because according to the 1983 closure plan for the landfill, leachate is expected to simply enter the shallow groundwater and exit the site into adjacent ditches as surface water (1983 Closure Plan 2-5). At some point this groundwater will simply exit the site as contaminated surface water.

According to the documentation, the cap on the old MSW landfill is to serve as the liner for the new construction and demolition debris landfill. As noted above, such caps are not impermeable, and will allow penetration of water. According to the documents, the new construction and demolition landfill is to have a minimum of twelve inches of silty clay soils as a cap on the debris. Such a cap will let a substantial amount of precipitation enter the landfill, especially in an area like south Louisiana that receives approximately 60-80 inches of rain per year.

There are only two places for this water to go; either it will go sideways once it encounters the cap of the old landfill, and exit the landfill as surface runoff, or it will go through the cap and enter the old landfill. Once in this landfill, it will eventually exit the landfill into shallow groundwaters, and eventually enter surface waters as explained in the 1983 closure plan.

I have reviewed the definition of construction and demolition debris in the Louisiana regulations. This includes non-water soluble materials such as lumber, shingles, sheet rock and plaster, but the definition specifically excludes asbestos-contaminated waste, white goods (i.e., appliances), furniture, trash or treated lumber. However, the Emergency Declarations permit other materials, including furniture and other waste to be placed in Type III (C&D) landfills.

There are two points that are significant here. First, even landfills accepting only traditional construction and demolition debris can have adverse impacts on water quality through leaching of pollutants. ICF Inc. (1995a), under contract with the US EPA Office of Solid Waste, conducted a review of the characteristics of leachate generated by construction and demolition (C&D) waste landfills. The ICF report was developed as part of the Agency's developing regulations for C&D landfills.

Construction and demolition landfill leachate sampling data were collected from 21 C&D landfills. Data were provided for 305 parameters. Potentially significant concentrations, compared to drinking water maximum contaminant levels (MCLs), were found of 1,2-dichloroethane, methylene chloride, cadmium, iron, lead, manganese and total dissolved solids (TDS).

The Ohio Environmental Protection Agency (Ohio EPA 2005) recently characterized the contaminated leachate production from several C&D landfill sites. This report found that leachate from construction and demolition landfills contains a number of contaminants at levels above LDEQ screening levels.

ICF Inc. (1995b) conducted a review of the “damage cases” caused by construction and demolition waste landfills. ICF Inc. (1995b) identified 11 damage cases where there was groundwater contamination by a C&D landfill. Constituents causing groundwaters to exceed the drinking water MCL were iron, manganese, TDS and lead. According to ICF Inc. (1995a), there were over 1,800 C&D landfills operating in the United States in the mid-1990s. Therefore, only a small number of the C&D landfills have been sampled for groundwater pollution.

The second point that is significant in the context of the Gentilly Landfill is that it is accepting mixed hurricane debris from New Orleans. This includes furniture, treated lumber and incidental waste mixed in with boards, bricks and other debris. Even modest amounts of items such as furniture, household wastes, contaminated sediment, or other wastes mixed in with construction debris can greatly increase the likelihood of contaminated leachate and water pollution. As an example is the recent finding that some household furniture is treated with polybrominated diphenyl ethers (PBDEs) as a fire retardant. PBDEs are carcinogens that are being found as widespread environmental pollutants that are accumulating in human breast milk and wildlife (Renner 2000). There is increasing concern that the current approach for examining landfill leachate and leachate-polluted groundwaters determines only a small number of the very large number of potential pollutants that can be present in landfill leachate. Daughton (2002, 2004a,b) of the US EPA has published several reports and papers on the inadequacies of current water quality monitoring in detecting potential pollutants.

It is also noteworthy that the two summaries of inspection reports I have examined indicate that items such as televisions, lawnmowers, and household appliances have been placed in the Gentilly landfill. These items are typically segregated even from municipal solid waste. This type of waste very clearly can produce contaminated leachate that would be very problematic in the long run.

The Gentilly Type III landfill site is in a location that makes it particularly susceptible to discharging polluted leachate to surface waters. Because the type III landfill is located on top of a municipal solid waste landfill with at best a two-foot clay cap, it is likely to add to the pollutant burden of the leachate from the closed landfill. The type of waste going into the Gentilly type III landfill is better suited to disposal in a Class II landfill, or at a minimum, a Class III landfill that is situated in an area with less readily available ground and surface water. Continued placement of waste in the Gentilly landfill has a high probability of causing significant environmental pollution.



G. Fred Lee, PhD, PE<sub>(TX)</sub>, DEE  
February 14, 2006

#### References

Daughton, C. G., “The Critical Role of Analytical Chemistry,” July (2002).

<http://www.epa.gov/nerlesd1/chemistry/pharma/critical.htm>

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<http://www.sciencedirect.com/science/journal/01959255>.

Daughton, C.G. "PPCPs in the Environment: Future Research — Beginning with the End Always in Mind," In *Pharmaceuticals in the Environment*, Kümmerer, K. (Ed.), 2nd edition, Springer, (2004b), Chapter 33, pp. 463-495. also see <http://search.epa.gov/s97is.vts> and <http://www.epa.gov/esd/chemistry/pharma/tracers.htm>

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) updated September (2005). <http://www.members.aol.com/apple27298/SubtitleDFlawedTechnPap.pdf>

ICF Inc., "Construction and Demolition Waste Landfills," Report prepared for US Environmental Protection Agency, Office of Solid Waste, by ICF Incorporated, Contract No. 68-W3-0008, February (1995a).

ICF Inc., "Damage Cases: Construction and Demolition Waste Landfills," Report prepared for US Environmental Protection Agency, Office of Solid Waste, by ICF Incorporated, Contract No. 68-W3-0008, January (1995b).

Ohio EPA, "Preliminary Evaluation of Leachate Analytical Results from Ohio C&DD Landfills," Interoffice memorandum from Jeff Martin, Environmental Specialist 2 to Dan Harris, Chief, DSIWM Ohio Environmental Protection Agency, Columbus, OH September 26, (2005).  
[http://www.theoec.org/pdfs/hottopics/hottopics\\_pr\\_cddanalysis.pdf](http://www.theoec.org/pdfs/hottopics/hottopics_pr_cddanalysis.pdf)

Renner, R, "PBDE Polybrominated diphenyl ether: What Fate for Brominated Fire Retardants?" *Environmental Science and Technology* May 1, (2000).  
<http://www.mindfully.org/Plastic/PBDE-Polybrominated-Diphenyl-Ether.htm>  
Additional information on PBDEs available via an Internet search for PBDE.

**Exhibit I**  
**Dr. G. Fred Lee, PE(TX), DEE**  
**AAEE Board Certified Environmental Engineer**

**Expertise and Experience in Hazardous Chemical Site and  
Municipal/Industrial Landfill Impact Assessment/Management**

Dr. G. Fred Lee's work on hazardous chemical site and municipal/industrial landfill impact assessment began in the mid-1950s while he was an undergraduate student in environmental health sciences at San Jose State College in San Jose, California. His course and field work involved review of municipal and industrial solid waste landfill impacts on public health and the environment.

He obtained a Master of Science in Public Health degree from the University of North Carolina, Chapel Hill, in 1957. The focus of his masters degree work was on water quality evaluation and management with respect to public health and environmental protection from chemical constituents and pathogenic organisms.

Dr. Lee obtained a PhD degree specializing in environmental engineering from Harvard University in 1960. As part of this degree work he obtained further formal education in the fate, effects and significance and the development of control programs for chemical constituents in surface and ground water systems. An area of specialization during his PhD work was aquatic chemistry, which focused on the transport, fate and transformations of chemical constituents in aquatic (surface and ground water) and terrestrial systems as well as in waste management facilities.

For a 30-year period, he held university graduate-level teaching and research positions in departments of civil and environmental engineering at several major United States universities, including the University of Wisconsin-Madison, University of Texas at Dallas, and Colorado State University. During this period he taught graduate-level environmental engineering courses in water and wastewater analysis, water and wastewater treatment plant design, surface and ground water quality evaluation and management, and solid and hazardous waste management. He has published over 1,000 professional papers and reports on his research results and professional experience. His research included, beginning in the 1970s, the first work done on the impacts of organics on clay liners for landfills and waste piles/lagoons.

His work on the impacts of hazardous chemical site and municipal/industrial solid waste landfills began in the 1960s when, while directing the Water Chemistry Program in the Department of Civil and Environmental Engineering at the University of Wisconsin-Madison, he became involved in the review of the impacts of municipal solid waste landfills on groundwater quality.

In the 1970s, while he was Director of the Center for Environmental Studies at the University of Texas at Dallas, he was involved in the review of a number of municipal solid and industrial (hazardous) waste landfill situations, focusing on the impacts of releases from the landfill on public health and the environment.

In the early 1980s while holding a professorship in Civil and Environmental Engineering at Colorado State University, he served as an advisor to the town of Brush, Colorado, on the potential impacts of a proposed hazardous waste landfill on the groundwater resources of interest to the community. Based on this work, he published a paper in the Journal of the American Water Works Association discussing the ultimate failure of the liner systems proposed for that landfill in preventing groundwater pollution by landfill leachate. In 1984 this paper was judged by the Water Resources Division of the American Water Works Association as the best paper published in the journal for that year.

In the 1980s, he conducted a comprehensive review of the properties of HDPE liners of the type being used today for lining municipal solid waste and hazardous waste landfills with respect to their compatibility with landfill leachate and their expected performance in containing waste-derived constituents for as long as the waste will be a threat.

In the 1980s while he held the positions of Director of the Site Assessment and Remediation Division of a multi-university consortium hazardous waste research center and Distinguished Professor of Civil and Environmental Engineering at the New Jersey Institute of Technology, he was involved in numerous situations concerning the impact of landfilling of municipal solid waste on public health and the environment. He has served as an advisor to the states of California, Michigan, New Jersey and Texas on solid waste regulations and management. He was involved in evaluating the potential threat of uranium waste solids from radium watch dial painting on groundwater quality when disposed of by burial in a gravel pit. The public in the area of this state of New Jersey proposed disposal site objected to the State's proposed approach. Dr. Lee provided testimony in litigation, which caused the judge reviewing this matter to prohibit the State from proceeding with the disposal of uranium/radium waste at the proposed location.

Dr. Lee's expertise includes surface and ground water quality evaluation and management. This expertise is based on academic course work, research conducted by Dr. Lee and others and consulting activities. He has served as an advisor to numerous governmental agencies in the US and other countries on water quality issues. Further, he has served on several editorial boards for professional journals, including *Ground Water*, *Environmental Science and Technology*, *Environmental Toxicology and Chemistry*, etc. Throughout his over-45-year professional career, he has been a member of several professional organization committees, including chairing the American Water Works Association national Quality Control in Reservoirs Committee and the US Public Health Service PCBs in Drinking Water Committee.

Beginning in the 1960s, while a full-time university professor, Dr. Lee was a part-time private consultant to governmental agencies, industry and environmental groups on water quality and solid and hazardous waste and mining management issues. His work included evaluating the impacts of a number of municipal and industrial solid waste landfills. Much of this work was done on behalf of water utilities, governmental agencies and public interest groups who were concerned about the impacts of a proposed landfill on their groundwater resources, public health and the environment.

In 1989, he retired after 30 years of graduate-level university teaching and research and expanded the part-time consulting that he had been doing with governmental agencies, industry and community and environmental groups into a full-time activity. A principal area of his work since then has been assisting water utilities, municipalities, industry, community and environmental groups, agricultural interests and others in evaluating the potential public health and environmental impacts of proposed or existing hazardous, as well as municipal solid waste landfills. He has been involved in the review of approximately 80 different landfills and waste piles (tailings) in various parts of the United States and in other countries.

Dr. Anne Jones-Lee (his wife) and he have published extensively on the issues that should be considered in developing new or expanded municipal solid waste and hazardous waste landfills in order to protect the health, groundwater resources, environment and interests of those within the sphere of influence of the landfill. Their over 100 professional papers and reports on landfilling issues provide guidance not only on the problems of today's minimum US EPA Subtitle D landfills, but also on how landfilling of non-recyclable wastes can and should take place to protect public health, groundwater resources, the environment, and the interests of those within the sphere of influence of a landfill/waste management unit. They make many of their publications available as downloadable files from their web site, [www.gfredlee.com](http://www.gfredlee.com).

Their work on landfill issues has particular relevance to Superfund site remediation, since regulatory agencies often propose to perform site remediation by developing an onsite landfill or capping waste materials that are present at the Superfund site. The proposed approach frequently falls short of providing true long-term health and environmental protection from the landfilled/capped waste.

In the early 1990s, Dr. Lee was appointed to a California Environmental Protection Agency's Comparative Risk Project Human Health Subcommittee that reviewed the public health hazards of chemicals in California's air and water. In connection with this activity, Dr. Jones-Lee and he developed a report, "Impact of Municipal and Industrial Non-Hazardous Waste Landfills on Public Health and the Environment: An Overview," that served as a basis for the human health advisory committee to assess public health impacts of municipal landfills.

In 2004 Dr Lee was selected as one of two independent peer reviewers by the Pottstown, PA Pottstown Landfill Closure Committee to review the adequacy of the proposed closure of the Pottstown Landfill to protect public health, groundwater resources and the environment for as long as the wastes in the closed landfill will be a threat.

In addition to teaching and serving as a consultant in environmental engineering for over 40 years, Dr. Lee is a registered professional engineer in the state of Texas and a Diplomate in the American Academy of Environmental Engineers (AAEE). The latter recognizes his leadership roles in the environmental engineering field. He has served as the chief examiner for the AAEE in north-central California and New Jersey, where he has been responsible for administering examinations for professional engineers with extensive experience and expertise in various aspects of environmental engineering, including solid and hazardous waste management.



His work on landfill impacts has included developing and presenting several two-day short-courses devoted to landfills and groundwater quality protection issues. These courses have been presented through the American Society of Civil Engineers, the American Water Resources Association, and the National Ground Water Association in several United States cities, including New York, Atlanta, Seattle and Chicago, and the University of California Extension Programs at several of the UC campuses, as well as through other groups. He has also participated in a mine waste management short-course organized by the University of Wisconsin-Madison and the University of Nevada. He has been an American Chemical Society tour speaker, where he is invited to lecture on landfills and groundwater quality protection issues, as well as domestic water supply water quality issues throughout the United States.

Throughout Dr. Lee's 30-year university graduate-level teaching and research career and his subsequent 16-year private consulting career, he has been active in developing professional papers and reports that are designed to help regulatory agencies and the public gain technical information on environmental quality management issues. Drs. Lee and Jones-Lee have provided a number of reviews on issues pertinent to the appropriate landfilling of solid wastes. Their most comprehensive review of municipal solid waste landfilling issues is what they call the "Flawed Technology of Subtitle D Landfilling of Municipal Solid Waste," which was originally developed in 1992, and redeveloped and updated in the fall of 2004. Between the two versions they have published numerous invited and contributed papers that provide information on various aspects of municipal solid waste landfilling, with emphasis on protecting public health and the environment from waste components for as long as they will be a threat. The "Flawed Technology" review has been periodically updated, including the most recent update in September 2005, which can be found on their website at <http://www.members.aol.com/apple27298/SubtitleDFlawedTechnPap.pdf>.

This review provides a comprehensive, integrated discussion of the problems that can occur with minimum-design Subtitle D landfills and landfills developed in accord with state regulations that conform to minimum Subtitle D requirements. The "Flawed Technology" review contains a listing of the various reviews that Drs. Lee and Jones-Lee have developed, as well as peer-reviewed literature. Over 40 peer-reviewed papers are cited in "Flawed Technology" supporting issues discussed in this review.

## SUMMARY BIOGRAPHICAL INFORMATION

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## EDUCATION

Ph.D. Environmental Engineering & Environmental Science, Harvard University,  
Cambridge, Mass. 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 College, San Jose, CA 1955

## ACADEMIC AND PROFESSIONAL EXPERIENCE

### Current Position:

Consultant, President, G. Fred Lee and Associates

### Previous Positions:

Distinguished Professor, Civil and Environmental Engineering, New Jersey Institute of  
Technology, 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  
Director, Site Assessment and Remedial Action Division, Industry, Cooperative Center for  
Research in Hazardous and Toxic Substances, New Jersey Institute of Technology et al.,  
Newark, NJ, 1984-1987  
Professor, Department of Civil and Environmental Engineering, Texas Tech University,  
1982-1984  
Professor, Environmental Engineering, Colorado State University, 1978-1982  
Professor, Environmental Engineering & Sciences; Director, Center of 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

Diplomate, American Academy of Environmental Engineers, Certificate No. 0701

## **PUBLICATIONS AND AREAS OF ACTIVITY**

Published over 1,060 professional papers, chapters in books, professional reports, and similar materials. The topics covered include:

- Studies on 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 and management of various types of wastewater discharges including municipal, mining, electric generating stations, domestic and industrial wastes, paper and steel mill, refinery wastewaters, etc.  
Stormwater runoff water quality evaluation and BMP development for urban areas and highways.
- Eutrophication causes and control, groundwater quality impact of land disposal of municipal and industrial wastes, 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 environmental impact of chemical contaminants on water quality.

## **LECTURES**

Presented over 760 lectures at professional society meetings, universities, and to professional and public groups.

## **GRANTS AND AWARDS**

Principal investigator for over six million dollars of contract and grant research in the water quality and solid and hazardous waste management field.

## **GRADUATE WORK CONDUCTED UNDER SUPERVISION OF G. FRED LEE**

Over 90 M.S. theses and Ph.D. dissertations have been completed under the supervision of Dr. Lee.

## **ADVISORY ACTIVITIES**

Consultant to numerous international, national and regional governmental agencies, community and environmental groups and industries.

## **Municipal Solid Waste Landfills and Groundwater Quality Protection Issues Publications**

Drs. G. Fred Lee and Anne Jones-Lee have prepared several papers and reports on various aspects of municipal solid waste (MSW) management and hazardous waste management by landfilling, groundwater quality protection issues, as well as other issues of concern to those within a sphere of influence of a landfill. These materials provide an overview of the key problems associated with landfilling of MSW and hazardous waste utilizing lined "dry tomb" landfills and suggest alternative approaches for MSW management that will not lead to groundwater pollution by landfill leachate and protect the health and interests of those within the sphere of influence of a landfill. Copies of many of these papers and reports are available as downloadable files from Drs. G. Fred Lee's and Anne Jones-Lee's web page (<http://www.gfredlee.com>). Recent papers and reports on landfilling issues are listed below. Copies of the papers and reports listed below as well as a complete list of publications on this and related topics are available upon request.

### **Overall Problems with "Dry Tomb" Landfills**

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) updated March (2005). <http://www.members.aol.com/apple27298/SubtitleDFlawedTechPap.pdf>

Lee, G. F., and Jones-Lee, A., "Municipal Solid Waste Landfills – Water Quality Issues," In: Water Encyclopedia: Water Quality and Resource Development, Wiley, Hoboken, NJ pp 163-169 (2005). <http://www.members.aol.com/annejlee/WileyLandfills.pdf>

Lee, G. F. and Jones-Lee, A., "Overview of Subtitle D Landfill Design, Operation, Closure and Postclosure Care Relative to Providing Public Health and Environmental Protection for as Long as the Wastes in the Landfill will be a Threat," Report of G. Fred Lee & Associates, El Macero, CA (2004). <http://www.gfredlee.com/LFoverviewMSW.pdf>

Lee, G. F., Jones, R.A., "Municipal Solid Waste Management: Long-Term Public Health and Environmental Protection," University of California, Davis Landfills and Groundwater Quality Short Course Materials, April (1991).  
<http://www.members.aol.com/annejlee/MSWMANAGT.pdf>

Lee, G. F., "Comments on GeoSyntec Consultants' Draft Report 'Landfill Facility Compliance Study Task 8 Report-Summary of Findings and Comprehensive Recommendations,' Dated May 2004," Comments Submitted to CIWMB by G. Fred Lee & Associates, El Macero, CA, June (2004). <http://www.members.aol.com/duklee2307/GeoSyntecTask8-Comments.pdf>

Lee, G. F., "Comments on GeoSyntec Consultants' Draft Report 'Landfill Facility Compliance Study Task 8 Report-Summary of Findings and Comprehensive Recommendations,' Dated May 2004," Comments Submitted to CIWMB by G. Fred Lee & Associates, El Macero, CA, June (2004). <http://www.members.aol.com/duklee2307/GeoSyntecTask8-Comments.pdf>

Lee, G. F., "Comments on the California Integrated Waste Management Board Landfill Facility Compliance Study," Comments Submitted to CIWMB by G. Fred Lee & Associates, El Macero, CA, November 2003. <http://www.gfredlee.com/CIWMBcomments11-20-03.pdf>

Lee, G. F., "Comments on the California Integrated Waste Management Board Landfill Facility Compliance Study Phase I Report - Results of Screening of 224 California MSW Landfills, Developed by GeoSyntec Consultants, Inc., December 2003," Comments Submitted to CIWMB by G. Fred Lee & Associates, El Macero, CA, January (2004). <http://www.gfredlee.com/CIWMBCompliance Study comments.pdf>

Lee, G. F., "Solid Waste Management: USA Lined Landfilling Reliability," An invited submission for publication in *Natural Resources Forum*, a United Nations Journal, New York, NY, December (2002). <http://www.gfredlee.com/UNpaper-landfills.pdf>

Lee, G. F., "Deficiencies in the US EPA's Characterization of the Protection Provided by Subtitle D Landfilling of MSW," Report of G. Fred Lee & Associates, El Macero, CA, March (2003). <http://www.gfredlee.com/USEPApropaganda.pdf>

Lee, G. F. and Jones-Lee, A., "Deficiencies in Subtitle D Landfill Liner Failure and Groundwater Pollution Monitoring," Presented at the NWQMC National Conference "Monitoring: Critical Foundations to Protect Our Waters," US Environmental Protection Agency, Washington, D.C., July (1998). <http://www.gfredlee.com/nwqmcl.html>

Lee, G. F. and Jones-Lee, A., "Deficiencies in US EPA Subtitle D Landfills in Protecting Groundwater Quality for as Long as MSW is a Threat: Recommended Alternative Approaches," Report of G. Fred Lee & Associates, El Macero, CA (1997).

Lee, G. F., "Comments on 'The Effectiveness of Municipal Solid Waste Landfills in Controlling Releases of Heavy Metals to the Environment,'" Report of G. Fred Lee & Associates, El Macero, CA, July (2004). <http://www.members.aol.com/duklee2307/SWANA-heavy-metals-comments.pdf>

Lee, G. F. and Jones-Lee, A., "'Dry Tomb' Landfills," *MSW Management* 6:82-89 (1996).

Lee, G. F. and Jones-Lee, A., "Municipal and Industrial Non-Hazardous Waste Landfills Impact on Public Health and the Environment: An Overview," Report to State of California Environmental Protection Agency Comparative Risk Project, Berkeley, CA (1994).

Lee, G. F. and Jones-Lee, A., "Deficiencies in US EPA Subtitle D Landfills in Protecting Groundwater Quality for as Long as MSW is a Threat: Recommended Alternative Approaches," Report of G. Fred Lee & Associates, El Macero, CA (1997).

Lee, G. F. and Jones-Lee, A., "Developing Landfills that Protect People: The True Costs," *MSW Management* 7(6):18-23, Nov/Dec (1997).

## **Liner Failure Issues**

Lee, G.F. and Jones-Lee, A., "Assessing the Potential of Minimum Subtitle D Lined Landfills to Pollute: Alternative Landfilling Approaches," Proc. of Air and Waste Management Association 91<sup>st</sup> Annual Meeting, San Diego, CA, available on CD ROM as paper 98-WA71.04(A46), 40pp, June (1998). Also available at <http://www.gfredlee.com>.

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**Landfills Evaluated by  
G. Fred Lee and Anne Jones-Lee**

<b>Arizona</b> <i>(State Landfilling Regulations)</i>	Verde Valley - Copper Tailings Pile Closure Mobile – Southpoint Landfill
<b>California</b> <i>(State Landfilling Regulations)</i>	Colusa County - CERRS Landfill San Gabriel Valley - Azusa Landfill City of Industry - Puente Hills Landfill North San Diego County, 3 landfills San Diego County - Gregory Canyon Landfill El Dorado County Landfill Yolo County Landfill Half Moon Bay - Apanolio Landfill Pittsburg - Keller Canyon Landfill Chuckwalla Valley - Eagle Mountain Landfill Barstow - Hidden Valley and Broadwell Hazardous Waste LFs Cadiz - Bolo Station-Rail Cycle Landfill University of California-Davis Landfills (4) San Marcos - San Marcos Landfill Placer County - Western Regional Sanitary Landfill Placer County – Turkey Carcass Disposal Pits Imperial County - Mesquite Landfill Los Angeles County - Calabasas Landfill Los Angeles County – Palos Verdes Landfill Contra Costa County – Concord Naval Weapons Station Tidal LF Nevada County - Lava Cap Mine Area Landfill Sylmar - Sunshine Canyon Landfill Roseville - Roseville Landfill
<b>Colorado</b> <i>(State Landfilling Regulations)</i>	Last Chance/Brush - Hazardous Waste Landfill Denver - Lowry Hazardous Waste Landfill Telluride/Idarado Mine Tailings
<b>Florida</b>	Alachua County Landfill
<b>Georgia</b>	Meriwether County – Turkey Run Landfill Hancock County – Culverton Plantation Landfill
<b>Illinois</b> <i>(State Landfilling Regulations)</i>	Crystal Lake - McHenry County Landfill Wayne County Landfill Kankakee County - Kankakee Landfill
<b>Indiana</b> <i>(State Landfilling Regulations)</i>	Posey County Landfill New Haven-Adams Center Landfill (Hazardous Waste)
<b>Louisiana</b>	Gentilly Landfill – New Orleans, LA
<b>Michigan</b> <i>(State Landfilling Regulations)</i>	Menominee Township - Landfill Ypsilanti- Waste Disposal Inc. (Hazardous Waste - PCB's)
<b>Minnesota</b>	Reserve Mining Co., Silver Bay - taconite tailings Wright County - Superior FCR Landfill
<b>Missouri</b>	Jefferson County - Bob's Home Service Hazardous Waste LF



<b>New Jersey</b>	Meadowlands - Landfill Fort Dix Landfill and Scotch Plains Leaf Dump
<b>New York</b>	Staten Island - Fresh Kills Landfill, Niagara Falls - Hazardous Waste Landfill, New York City – Ferry Point Landfill
<b>North Dakota</b>	Turtle River Township - Grand Forks Balefill Facility Landfill
<b>Ohio</b>	Clermont County - BFI/CECOS Hazardous Waste Landfill Huber Heights - Taylorville Road Hardfill Landfill Morrow County – proposed C&DD Landfills
<b>Pennsylvania</b>	Pottstown – Pottstown Landfill
<b>Rhode Island</b>	Richmond - Landfill
<b>South Carolina</b>	Spartanburg - Palmetto Landfill
<b>Texas</b>	Dallas/Sachse - Landfill Fort Worth - Acme Brick Hazardous Waste Landfill City of Dallas - Jim Miller Road Landfill
<b>Vermont</b>	Coventry, Vermont - Coventry Landfill
<b>Washington</b>	Tacoma - 304th and Meridian Landfill
<b>Wisconsin</b>	Madison and Wausau Landfills
<b>INTERNATIONAL LANDFILLS</b>	
<b>Belize</b>	Mile 27 Landfill
<b>Ontario, Canada</b> <i>(Prov. Landfilling Regulations)</i>	Greater Toronto Area - Landfill Siting Issues Kirkland Lake - Adams Mine Site Landfill Pembroke - Cott Solid Waste Disposal Areas
<b>Manitoba, Canada</b>	Winnipeg Area - Rosser Landfill
<b>New Brunswick, Canada</b>	St. John's - Crane Mountain Landfill
<b>England</b>	Mercyside Waste Disposal Bootle Landfill
<b>Hong Kong</b>	Three New MSW Landfills
<b>Ireland</b>	County Cork - Bottlehill Landfill County Clare - Central Waste Management Facility, Ballyduff
<b>Korea</b>	Yukong Gas Co. - Hazardous Waste Landfill
<b>Mexico</b>	San Luis Pontosi - Hazardous Waste Landfill
<b>New Zealand</b>	North Waikato Regional Landfill
<b>Puerto Rico</b>	Salinas - Campo Sur Landfill

**Surface and Groundwater Quality Evaluation and Management  
and  
Municipal Solid & Industrial Hazardous Waste Landfills**

<http://www.gfredlee.com>

Dr. G. Fred Lee and Dr. Anne Jones-Lee have prepared professional papers and reports on the various areas in which they are active in research and consulting including domestic water supply water quality, water and wastewater treatment, water pollution control, and the evaluation and management of the impacts of solid and hazardous wastes. Publications are available in the following areas:

Landfills and Groundwater Quality Protection

Water Quality Evaluation and Management for Wastewater Discharges

Stormwater Runoff, Ambient Waters and Pesticide Water Quality Management Issues,  
TMDL Development, Water Quality Criteria/Standards Development and  
Implementation

Impact of Hazardous Chemicals -- Superfund

LEHR Superfund Site Reports to DSCSOC

Lava Cap Mine Superfund Site reports to SYRCL  
Smith Canal

Contaminated Sediment -- Aquafund, BPTCP, Sediment Quality Criteria

Domestic Water Supply Water Quality

Excessive Fertilization/Eutrophication, Nutrient Criteria

Reuse of Reclaimed Wastewaters

Watershed Based Water Quality Management Programs:

Sacramento River Watershed Program

Delta -- CALFED Program

Upper Newport Bay Watershed Program

San Joaquin River Watershed DO and OP Pesticide TMDL Programs

Stormwater Runoff Water Quality Science/Engineering Newsletter

G. Fred Lee & Associates was organized in the late 1960s to cover the part-time consulting activities that Dr. Lee undertook while a full-time university professor. In 1989, when Dr. Lee retired from 30 years of graduate-level teaching and research, he and Dr. Anne Jones-Lee, who was also a university professor, expanded G. Fred Lee & Associates into a full-time business activity. Examples of governmental agencies, consulting firms, citizens groups, industries and others for whom G. Fred Lee has served as an advisor include the following:

U.S. Environmental Protection Agency - Various Locations  
Vison, Elkins, Searls, Connally & Smith, Attorneys - Houston, TX  
International Joint Commission for the Great Lakes  
U.S. Public Health Service - Washington, DC  
Attorney General, State of Texas - Austin, TX  
Madison Metropolitan Sewerage District - Madison, WI  
Great Lakes Basin Commission - Windsor, Ontario  
U.S. Army Environmental Hygiene Agency - Edgewood Arsenal, MD  
City of Madison - Madison, WI  
Council on Environmental Quality - Washington, DC  
National Academies of Sciences and Engineering - Washington, DC  
Water Quality Board State of Texas - Austin, TX  
U.S. General Accounting Office - Washington, DC  
U.S. Army Corps of Engineers - Vicksburg, MS  
Tennessee Valley Authority - Various locations in Tennessee Valley  
National Oceanic & Atmospheric Administration - Various locations  
Organization for Economic Cooperation & Development - Paris  
Attorney General, State of Illinois - Chicago, IL  
State of Texas Hazardous Waste Legislative Committee - Austin  
State of New Mexico Environmental Improvement Agency - Santa Fe  
New York District Corps of Engineers - New York, NY  
San Francisco District Corps of Engineers - San Francisco, CA  
Wisconsin Electric Power Company - Milwaukee, WI  
WAPORA - Washington, DC  
Reserve Mining Company - Silver Bay, MN  
United Engineers - Philadelphia, PA  
Automated Environmental Systems - Long Island, NY  
Procter & Gamble Company - Cincinnati, OH  
Inland Steel Development Company - Chicago, IL  
Kennecott Copper Corporation - Salt Lake City, UT  
U.S. Steel Corporation - Pittsburgh, PA  
Nekoosa Edwards, Inc. - WI  
Zimpro, Inc. - Rothschild, WI  
FMC Corporation - Philadelphia, PA  
Acme Brick Company - Forth Worth, TX  
Monsanto Chemical Company - St. Louis, MO  
Gould, Inc. - Cleveland, OH  
Illinois Petroleum Council - Chicago, IL  
Inland Steel Corporation - Chicago, IL  
Industrial Biotest Laboratories - Northbrook, IL  
Wisconsin Pulp & Paper Industries - Upper Fox Valley, WI

Thilmoney Pulp & Paper Company - Green Bay, WI  
Chicago Park District - Chicago, IL  
Nalco Chemical Company - Chicago, IL  
Boise Cascade Development Company - Chicago, IL  
Foley & Lardner, Attorneys - Milwaukee, WI  
Timken & Lonsdorf, Attorneys - Wausau, WI  
Strasburger, Price, Kelton, Martin & Unis, Attorneys - Dallas, TX  
Rooks, Pitts, Fullagar & Poust, Attorneys - Chicago, IL  
Jones, Day, Cockley & Reaves, Attorneys - Cleveland, OH  
Sullivan, Hanft, Hastings, Fride & O'Brien, Attorneys - Duluth, MN  
Hinshaw, Culbertson, Molemann, Hoban & Fuller, Attnys - Chicago, IL  
Colorado Springs - Colorado Springs, CO  
Mayer, Brown & Platt, Attorneys - Chicago, IL  
Pueblo Area Council of Governments - Pueblo, CO  
Platte River Power Authority - Fort Collins, CO  
Linguist & Venum, Attorneys - Minneapolis, MN  
Norfolk District Corps of Engineers - Norfolk, VA  
Spanish Ministry of Public Works - Madrid, Spain  
The Netherlands - Rijkswaterstaat - Amsterdam, The Netherlands  
U.S. Department of Energy - Various locations in US  
King Industries - Norwalk, CT  
Attorney General, State of Florida - Tallahassee, FL  
State of Colorado Governor's Office - Denver, CO  
Cities of Fort Collins, Longmont, and Loveland - CO  
E.I. DuPont - Wilmington, DE  
Allied Chemical Company - Morristown, NJ  
Outboard Marine - Waukegan, IL  
Amoco Oil Company - Denver, CO  
Appalachian Timber Services - Charleston, WV  
Mission Viejo Development - Denver, CO  
Fisher, Brown, Huddleston & Gun, Attorneys - Fort Collins, CO  
Tom Florczak, Attorney - Colorado Springs, CO  
Wastewater Authority - Burlington, VT  
Tad Foster, Attorney - Pueblo, CO  
Holmes, Roberts & Owen, Attorneys - Denver, CO  
Center for Energy and Environment Research - Puerto Rico  
City of Brush - Brush, CO  
Rock Island District Corps of Engineers - Rock Island, IL  
Santo Domingo Water Authority - Dominican Republic  
Ministry of Public Works and Environment - Buenos Aires, Argentina  
Neville Chemical - Pittsburgh, PA  
Fike Chemical Company - Huntington, WV  
Stauffer Chemical Company - Richmond, CA  
Adolph Coors Company - Golden, CO  
Water Research Commission - South Africa  
Grinnell Fire Protection Systems - Lubbock, TX

City of Lubbock Parks Department - Lubbock, TX  
National Planning Council - Amman, Jordan  
City of Olathe - Olathe, KS  
City of Lubbock - Lubbock, TX  
US AID - Amman, Jordan  
Buffalo Springs Lake Improvement Association - Buffalo Springs, TX  
Union Carbide Company - Charleston, WV  
Canadian River Municipal Water Authority - Lake Meredith, TX  
Mobil Chemical Company - Pasadena, TX  
Unilever Ltd. - Rotterdam, The Netherlands  
Brazos River Authority - Waco, TX  
U.S. Army Construction Engineering Research Laboratory - Champaign, IL  
James Yoho, Attorney - Danville, IL  
Zukowsky, Rogers & Flood, Attorneys - Crystal Lake, IL  
State of California Water Resources Control Board - Sacramento  
Public Service Electric & Gas - Newark, NJ  
Health Officer - Boonton Township, NJ  
Scotland & Robeson Counties - Lumberton, NC  
International Business Machines Corporation - White Plains, NY  
Newark Watershed Conservation & Development Authority - NJ  
State of Vermont Planning Agency - Montpelier, VT  
CDM, Inc. - Edison, NJ  
Attorney General, State of North Carolina - Raleigh, NC  
City of Vernon - Vernon, NJ  
Ebasco Services - Lyndhurst, NJ  
Kraft, Inc. - Northbrook IL, with work in Canada, FL and MN  
USSR Academy of Sciences - Moscow, USSR  
Tillinghast, Collins & Graham, Attorneys - Providence, RI  
City of Richmond, RI  
Idarado Mining Company - Telluride, CO  
Levy, Angstreich, Attorneys - Cherry Hill, NJ  
Newport City Development - Jersey City, NJ  
Orbe, Nugent & Collins, Attorneys - Ridgewood, NJ  
Schmeltzer, Aptaker & Shepard, Attorneys - Washington, DC  
CP Chemical - Sewaren, NJ  
Dan Walsh, Attorney - Carson City, NJ  
William Cody Kelly - Lake Tahoe, NV  
NJ Department of Environmental Protection - Trenton, NJ  
Hufstедler, Miller, Kaus & Beardsley, Attorneys - Los Angeles, CA  
Main San Gabriel Basin Watermaster - CA  
Metropolitan Water District of Southern California - Los Angeles, CA  
San Diego Unified Port District - San Diego, CA  
Delta Wetlands - CA  
Simpson Paper Company - Humboldt County, CA  
City of Sacramento - CA  
Northern California Legal Services - Sacramento, CA

Rocketdyne - Canoga Park, CA  
RR&C Development Co. - City of Industry, CA  
American Dental Association - Chicago, IL  
Emerald Environmental - Phoenix, AZ  
Clayton Chemical Company - Sauget, IL  
Stanford Ranch - Rocklin, CA  
Public Liaison Committee - Kirkland Lake, Ontario  
Miller Brewing Company, Los Angeles, CA  
ASARCO Inc., Tacoma, WA  
CALAMCO, Stockton, CA  
Yunkong Gas Company, South Korea  
Sutherlands, Pembroke, Ontario  
Silverado Constructors, Irvine, CA  
Agricultural Interests in Puerto Rico  
City of Winnipeg, Manitoba  
Strain Orchards, Colusa, CA  
Davis South Campus Superfund Oversight Committee, Davis, CA  
Monterrey County, California Housing Authority, Salinas, CA  
CROWD, Tacoma, WA  
Newport Beach, CA  
SOLVE, Phoenix, AZ  
Sports Fishing Alliance, San Francisco, CA  
Caltrans (California Department of Transportation)  
Citizens Group near St. John's, New Brunswick  
Colonna Shipyards, Norfolk, VA  
Clermont County, OH  
Wright County, MN  
Waikato River Protection Society, New Zealand  
Drobac & Drobac, Attorneys, Santa Cruz, CA  
Phelps Dunbar, L.L.P., Houston, TX  
Walters Williams & Co, New Zealand  
Environmental Protection Department, Hong Kong  
NYPRIG New York City, NY  
DeltaKeeper, Stockton  
City of Stockton, CA  
Central Valley Regional Water Quality Board, Sacramento, CA  
Carson Harbor Village, Carson, CA  
Sanitary District of Hammond, IN  
South Bay CARES, Los Angeles, CA  
Memphremagog Regional Council, Quebec, CANADA  
Mobile, AZ  
Pottstown Landfill Closure Committee, Pottstown, PA  
Grand Forks County Citizens Coalition, Grand Forks, ND  
Sunshine Canyon Landfill, Sylmar, CA  
Meriwether County, GA  
Hancock County, GA  
Louisiana Environmental and Action Network, Baton Rouge, LA  
OUTRAGE and POWER, Kankakee, IL

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