Evaluation of the Potential for Area Disposal Company Proposed Chemical Waste Unit Landfill to Pollute the County Water Resources with Hazardous Chemicals

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Report to DeWitt County Board
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The DeWitt County Board requested that we make an independent review of the Area Clinton Landfill, Inc., "Application for a Chemical Waste Unit at the Clinton Landfill No 3, dated October 2007," with respect to the potential for this Chemical Waste Unit to pollute groundwater resources of the county with chemicals that are a threat to human health. This report consists of the following components:

- **Evaluation of the Potential for Area Disposal Company Proposed Chemical Waste Unit Landfill to Pollute the County Water Resources with Hazardous Chemicals – Cover Page and Overall Summary**
- **Recommended Approach for DeWitt County to Improve Protection of Public Health & Groundwater Quality from Threats Posed by Proposed Clinton Landfill Chemical Waste Unit to Residents of DeWitt County, IL**
- **Specific Comments on Clinton Landfill No. 3 Chemical Waste Unit – October (2007) Application**
- **Comments on Transcript of April 7 Meeting with the US EPA Region 5 Representatives**
- **Appendix A: Dr. G. Fred Lee, PE(TX), BCEE, AAEE Board Certified Environmental Engineer, Expertise and Experience in Hazardous Chemical Site and Municipal/Industrial Landfill Impact Assessment/Management, including Summary of Experience in Working with PCB Pollution Issues**
- **Appendix B: Transcription of April 7, 2009 Joint Meeting of DeWitt County Board, Clinton City Council, County Land Use Committee**
- **Appendix C: 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 December (2008). Available through an Internet link at http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf**

Overall Conclusion

It concluded that the proposed Chemical Waste Unit (CWU) at the Clinton Landfill No. 3 will, if permitted, represent a significant long-term threat to the quality of the groundwater resources of DeWitt County. The Area Clinton Landfill, Inc. "Application for a Chemical Waste Unit at the Clinton Landfill No. 3" does not adequately present or reliably discuss, among other things, the following:

- the nature and potential hazards associated with the wastes expected to be buried at the CWU,
- the ability of the proposed CWU landfill waste containment systems, natural strata, and groundwater monitoring system to prevent leachate leakage from the CWU for as long as the wastes in the unit and overlying landfill represent a threat to pollute area groundwater, or
- the assurances of provision of adequate postclosure funding to monitor, maintain, and remediate polluted groundwaters for as long as the wastes in the CWU will be a threat, or
- the characteristics and present and foreseeable future use of all groundwater resources that stand to be adversely impacted by wastes in the CWU.

It was also found that the US EPA Region 9 representatives did not adequately address and provide complete, transparent, and reliable information on, or objective assessment of, the potential threat that the proposed CWU represents to the county's groundwater resources, to the DeWitt County Board and the public at the April 7, 2009 meeting.

Overall, if the proposed CWU landfill is permitted the DeWitt County Board should diligently work to follow the suggested approaches presented in this report to develop a landfill unit that will, in fact, afford reliable protection the county's groundwater resources for as long as the wastes placed in this landfill will be a theat.

Recommended Approach for DeWitt County to Improve Protection of Public Health & Groundwater Quality from Threats Posed by Proposed Clinton Landfill Chemical Waste Unit to Residents of DeWitt County, IL

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Application has been made to allow the expansion of the Clinton Landfill, a municipal solid waste landfill, to include a Chemical Waste Unit (CWU) that would accept wastes that contains PCBs. In the face of public opposition, the DeWitt County host agreement for the Clinton Landfill was amended to forbid the deposition of the chemical waste in the landfill without consent of the County Board, but the County Board agreed to remain neutral on the permitting of the proposed CWU, allowing the IL EPA and US EPA to render judgment on the acceptability of the public health and environmental quality measures proposed for the unit.

This report is in response to the County's request for our review of the development of the proposed Chemical Waste Unit at the Clinton Landfill, and for advise as to questions that should be asked of the US EPA and as to what safeguards the County should seek if a chemical waste landfill is developed, in order to protect the public health and safety of the residents of DeWitt County. As such, this report reviews key short-term and long-term public health and groundwater quality risks posed by the CWU as proposed, and suggests steps that should be taken to reduce those risks.

The characteristics of the CWU as proposed by Area Waste Disposal, Inc. are described in the October 2007 document entitled, "Application for a Chemical Waste Unit of the Clinton Landfill No.3," developed by Shaw Environmental, Inc. As discussed below, from our review of that document and other supporting material, it is our professional opinion that the inclusion of the CWU as proposed increases the threat that the Clinton Landfill represents to public health and the groundwater quality in DeWitt County. It poses a significant long-term threat to the Mahomet Aquifer, the major water supply source for DeWitt County. Pollution of that aquifer by hazardous chemicals such as PCBs will render that part of the aquifer polluted by hazardous chemicals unsuitable for use for domestic water supply owing to the threat to public health; it will cause the permanent loss of that groundwater resource for the County.

Threat of the Proposed CWU

A fundamental issue with respect to the proposed CWU is that many of the hazardous chemicals that are proposed to be disposed of in that landfill unit will be a threat to the county's residents effectively forever. Critical review of the CWU application shows that Area Disposal, Inc. does not provide a reliable presentation of information on the duration of the threat posed by the wastes; it does not discuss the fact that it will be a threat forever. According to the description provided in the application, the proposed liner for the CWU potentially provides somewhat greater protection of public health and groundwater quality than the minimum design for municipal solid waste landfills. However, the landfill cover will eventually fail to prevent moisture (water) from entering the unit during the infinite period that the wastes in this landfill unit will be a threat. As the cover integrity deteriorates or is breached, leachate will be generated

in the landfill. The materials that are proposed for use in the liner will ultimately deteriorate in their ability to contain that leachate. This will not occur as one discrete breach that needs to be mended, but rather as holes or imperfections in the liner, and as areas of material failure over time.

As the CWU liner system fails, hazardous chemicals will leave the CWU and proceed to pollute the Mahomet Aquifer. While Area Disposal, Inc. claims that the underlying aquifer is "naturally" protective, a critical review of this so-called "protection" shows that there are in fact pathways that would enable the hazardous chemical waste components that leak from the CWU through the proposed liner system to be transported to the part of the Mahomet Aquifer that is or could be used at sometime in the future used for a water supply destroying the use of those polluted areas as a water supply for the County residents.

It is also important to understand that since the liner system is beneath the buried wastes, it is not accessible for reliable and frequent detailed inspection for areas of deterioration or breach. As discussed below, once release of leachate is detected, it will likely have been occurring for some time. It is not reasonable to expect that the area or areas of deterioration or breach leading to the leachate release, can be located and repaired without exhumation of the wastes. The same problem exists with ensuring the long-term integrity of the cover of the landfill unit.

One of the glaring problems with the Clinton Landfill CWU application is its significant exaggerations and sweeping overstatements about the ability of the CWU containment and monitoring systems to provide for true containment of waste components in the landfill unit. For example page E-2, paragraph 2, of the Executive Summary states,
"The multiple layer composite liner system will effectively prevent the release of potential hazards from the Chemical Waste Unit."

Those knowledgeable in, and reliably report on, the properties of the liner materials that are proposed for the CWU know that over time the integrity of the liner materials will deteriorate and will ultimately fail to prevent hazardous chemicals such as PCBs disposed of in the CWU from passing through the liner system to the underlying aquifer. Key properties of these types of liner materials are critically reviewed in the report:
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 December (2008). http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf
and in other papers and reports on the Lee and Jones-Lee website [www.gfredlee.com] in the Landfill-Groundwater section located at http://www.gfredlee.com/plandfil2.htm.

As discussed in the Lee and Jones-Lee (2008) review, the landfill liner literature contains numerous papers that describe and discuss the inability of these types of liner materials to provide reliable containment of waste components for as long as the wastes will be a threat to public health and groundwater quality. Any landfill application that does not fully and reliably discuss the liner failure issues that will be faced for as long as the wastes in the landfill will be a threat, is significantly deficient. The unsupported, general claim that the liner system will "effectively prevent the release of potential hazards" is deceptive in its failure to reveal that these liner materials and systems have no demonstrated proven track record of over the long period of

time that the wastes in landfills will be threat. Such statements are simply propaganda by Shaw Environmental, Inc. on behalf of the landfill applicant Area Disposal Inc. that serve only to mislead and mollify the legitimate concerns of regulatory agencies and the public regarding the ability of the proposed CWU containment system to protect public health and groundwater quality.

The proposed CWU landfill liner system will unquestionably eventually fail to prevent leakage of leachate from the landfill. The application is deficient in a number of aspects to provide attainable and reasonable protection of public health and groundwater quality for DeWitt County residents. In order to reduce the likelihood that CWU wastes will leave the landfill for as long as the wastes in the landfill will be a threat, the permitting process must give technically valid and complete consideration to

- the recognition of the inevitability of containment failure,
- how failures will be detected,
- effective response strategies for mitigating the failures as they occur for the protection of public health and groundwater resources, and
- ad infinitum maintenance and remediation strategies.

Reliability of Proposed Landfill Cover

In order for CWU wastes components to migrate out the landfill unit through the liner there is need for moisture to enter the landfill unit that can generate leachate that can transport the wastes components out of the landfill through the liner system. Shaw Environmental Inc in its CWU application states with respect to the landfill cover,

"The primary purpose of the final cover is to prevent rainwater from entering the landfill and coming into contact with waste and producing leachate. The final cover system that will cap the landfill consists of a low-permeability layer to prevent precipitation from entering the landfill…"

This more propaganda in support of permitting this landfill Chemical Waste Unit; it fails to discuss the well known failure of the landfill cover to prevent moisture from entering the CWU during the very long period of time that that the wastes in the CWU that when in contact with moisture (water) that penetrates through the cover into the wastes in the CWU. In order to achieve a highly protective level of performance, it will be necessary to redesign the CWU to develop a leak detectable cover such as those discussed in the Lee and Jones-Lee 2008 review cited and insure its operation for as long as the wastes in the CWU are a threat to generate leachate above. An alternative is develop a more comprehensive and reliable landfill cover monitoring and maintenance approach than that proposed by Area Disposal Inc. to insure that effectively forever, the failure of the CWU landfill cover will prevent moisture from entering the landfilled wastes that can generate leachate that can leave the landfill when the landfill liner systems fails to prevent waste components from leaving the CWU.

Deficient Groundwater Monitoring

Another highly significant deficiency in the proposed CWU design is the proposed vertical monitoring well array located at the point of compliance for groundwater monitoring. The application Figure 7-1 is a map showing the proposed monitoring well location. Examination of this figure shows that the CWU monitoring wells are proposed to be located at about 400 feet apart around perimeter of the CWU. As is well known in the landfill literature and discussed in the Lee and Jones-Lee (2008) review, since the initial failure of the CWU landfill liner system

will be of limited area, such failure will likely lead to narrow plumes of leachate plumes that can pass past the monitoring wells and not be detected by the sampling wells. The normal periodic sampling of these wells typically only samples groundwater within about one foot of the well. This means that the leachate plumes that will be initially generated by failure of the liner system this failure will not be detected as required by US EPA regulation when the leachate polluted groundwater first reaches the groundwater monitoring well at the point of compliance for groundwater monitoring. Basically the proposed groundwater monitoring approach for detecting CWU liner failure is a flawed approach that is highly unreliable for detecting groundwater pollution before highly significant offsite pollution occurs.

Inadequate Postclosure Funding

The most significant deficiency of the proposed application for the development of the CWU at the Clinton Landfill is that Area Disposal Inc. only proposes to provide 30 years of postclosure funding. This is the minimum required under current US EPA landfill regulations. It is well understood in the landfill literature, that 30 years of postclosure funding for maintenance of the landfill cover, collect and maintain the leachate collection system, collect and analyze the monitoring well water composition, operate and maintain the landfill gas collection system and to perform groundwater remediation to the extent possible under US EPA regulations, is a very short time that postclosure funding will be needed for maintenance and monitoring of this CWU compared to the time that funds will be needed to perform these activities. Highly effective performance of these activities and changes in the proposed liner system monitoring failure can be important to greatly reducing the risk of the proposed Clinton CWU to the risk to the public health and groundwater resources. As discussed below it is possible to greatly improve the ability of the proposed Clinton Landfill CWU to protect public health and groundwater resources. The key to achieving this additional protection is to provide the required postclosure funding needed to perform these activities for as long as the wastes in the CWU will be a threat. For planning purposes the proposed period of assured postclosure funding needs to changed from the 30 year minimum allowed under current US EPA landfill regulations as proposed by Area Disposal Inc. to as long as the wastes are a threat i.e., forever.

Some states such as Pennsylvania have this type of landfill postclosure funding in its landfill regulations. As discussed in the Lee and Jones-Lee (2008) review, the California Integrated Waste Management Board (CIWMB) has reviewed this issue in connection with the regulation that a landfill shall be located, designed, operated, closed and provided with postclosure funding for as long as the wastes in a landfill (both MSW and hazardous waste) are a threat. The CIWMB has found that the amount of postclosure funds that are required to fund the postclosure funding is very great on the order of many millions of dollars for true postclosure funding. DeWitt County Board of Supervisors should work to require as part of permitting the proposed CWU that adequate postclosure funding be assured for as long as the wastes in the landfill unit will be a threat.

Assessing the Period of Threat

The period of time that a waste can be a threat can be evaluated by taking wastes from the CWU and exposing the waste to water and determine whether the leachate generated by exposing the waste to water leads to a leachate that can potentially cause groundwater pollution. So long as the wastes in the CWU can still generate leachate the landfill is still a threat.

Recommended Approach

The DeWitt County Board of Supervisors has requested information that could be used to improve the public health and groundwater resources protection from the threat that the wastes that are proposed to be accepted by the Area Disposal Inc. These issues have been discussed in the Lee and Jones-Lee (2008) review. A summary of approaches is presented below.

Postclosure Funding. To insure adequate postclosure funding, the cost of chemical waste disposal in the CWU, the waste disposal fees should be increased during the active life of the landfill. These funds would be used to develop a dedicated trust fund of sufficient amount to address plausible worst case scenarios where funds would be needed for CWU postclosure maintenance, monitoring and groundwater remediation for as long as the wastes in this landfill unit will be a threat. This approach would require that those who dispose of chemical hazardous waste in the CWU would pay the true cost of landfilling that is needed to insure with a high degree of certainty, that funds will be available to pay the continued postclosure care beyond the 30 year minimum that is needed to improve public health and groundwater quality protection from the threat that the waste disposal in the CWU represent.

Landfill Cover Maintenance. The key to stopping the leachate generated in the CWU from the penetrating through the CWU liner when the liner system deteriorates is to keep the landfilled CWU waste dry. To keep the CWU waste dry it is necessary to develop and maintain a landfill cover that does not allow moisture (water) to penetrate the cover to enter the landfilled wastes. This will require that funds are available forever to monitor and repair the cover low permeability layer (plastic sheeting). One approach to achieve this level of performance is to develop and maintain a leak detectable cover to detect when the plastic sheeting fails to prevent moisture from entering the landfill CWU. If the CWU wastes are kept dry there would be no leachate generation. Once the landfill CWU cover is closed leachate generation should stop.

If leachate generation continues as determined by the presence of leachate in the leachate collection system the CWU cover is not installed properly and needs to be reinstalled in those areas where the cover is not preventing moisture from entering the CWU. If at any time, in the infinite future, leachate is found in the CWU leachate removal system then those areas of the CWU where the cover is allowing moisture to pass through the cover must be repaired. The additional postclosure funding would be used to support this activity.

Operation of the Leachate Removal System. The additional postclosure funding that could be generated from additional waste disposal fees should also be used to continue the operations and maintenance of the leachate removal system for as long as the wastes in the CWU are a threat to generate leachate when contacted by water.

Improved Monitoring of Liner Failure. Rather than following the fundamentally flawed approach of trying to use vertical monitoring wells spaced at about 400 feet apart around the perimeter of the CWU, the presence of leachate polluted water in the leak detection system that underlies the upper most composite liner system indicates that the upper landfill liner system has failed. When the liner leak detection system has leachate in it, this means that it is only time till the lower components of the CWU liner system fails if they have not already deteriorated to

some extent, the stopping of leachate generation through improved cover maintenance must be implemented. Actually, the leachate collection system should have shown that the cover has lost its ability to keep the wastes in the CWU dry. However, since some non contaminated water is present in the leachate removal system it may be necessary to rely on leachate present in the landfill liner leakage layer to determine when the liner system has deteriorated to the point where the upper most composite liner system has failed.

Overall Recommended Approach

Adoption of these suggested approaches for enhanced postclosure funding, maintenance and monitoring will significantly improve the long term public health and groundwater quality protection. This approach will shift the burden of developing protection from the CWU wastes to those who dispose of wastes in this landfill unit and to the Area Disposal Inc. from the residents of DeWitt County.

Specific Comments on Clinton Landfill No. 3
Chemical Waste Unit – October (2007) Application

Presented in this section is information on some of the inadequate/unreliable information presented in the Area Disposal Chemical Waste Unit Application prepared by Shaw Environmental Inc. Dated October 2007

Page 1-1, paragraph 1:

"This application proposes to modify a portion of the permitted landfill design so that materials which are regulated under the Toxic Substance (sic) Control Act (TSCA) may be safely accepted."

As discussed in this report this is a propaganda statement in claiming that PCBs can be safely accepted in the proposed CWU. In fact Area Disposal Inc has not addressed the long term threat that PCBs and other hazardous chemicals that are proposed to be accepted in the CWU to the DeWitt groundwater resources.

Page 1-1, paragraph 2:

"A succession of low-permeability cohesive soil units are (sic) present beneath the proposed site which will separate the footprint of the proposed Chemical Waste Unit from the uppermost aquifer. These low permeability cohesive soil units have an average thickness of approximately 200 feet at the site (approximately 170 feet of which will remain between the bottom of the proposed liner invert and the Mahomet Sand Aquifer). Field and laboratory test results and field observations indicate that these materials will effectively restrict vertical and horizontal movement of groundwater and will serve as an additional environmental safeguard at the proposed Chemical Waste Unit."

The application fails to reliable analyze and present information on the potential that leachate derived from the CWU has pathways from under the landfill to the groundwater resources of importance to the County.

Page 2-2, paragraph 1:
"Field and laboratory test results and field observations indicate that these materials will effectively restrict vertical and horizontal movement of groundwater and will serve as an additional environmental safeguard at the proposed Chemical Waste Unit."
If there were no pathways through the more permeable strata underlying the landfill is it necessary for Area Disposal to qualify the protection of groundwater from pollution by landfill leachate by stating, "*effectively restrict vertical and horizontal movement of groundwater."* The County residents are interested in whether the natural strata will prevent the transport of leachate polluted groundwater to the Mahomet Aquifer forever? Is this more of the propaganda that Area Disposal is using to mislead the County residents into believing that the CWU will not pollute groundwater during the limited period that the Area Disposal plans to provide postclosure care?

Page 2-2, paragraph 3:
"Such a liner design greatly exceeds the requirements of the United States Environmental Protection Agency (USEPA) and has been accepted by the IEPA and other experts in the landfill field as providing a high level of environmental safety. The natural clay underlying the proposed Chemical Waste Unit is unweathered and will act as a second, natural liner system for the landfill."
As discussed above the clay underlying the proposed CWU has higher permeability layers that can serve as a pathway for hazardous and other chemical waste components that will be in CWU leachate to pollute the groundwaters underlying the landfill.

It is well established that the liners proposed by Area Disposal will not prevent the migration of CWU waste derived pollutants through the liner for as long as the wastes in the CWU will be a threat to interact with water to produce leachate.

Page 2-2, paragraph 4:
"*The hydrogeologic conditions at the site and the landfill design allow a comprehensive groundwater monitoring system to be implemented which will adequately verify that groundwater resources are not being threatened by the landfill."*
As discussed herein the groundwater monitoring system which is based on vertical monitoring wells spaced several hundred feet apart at the point of compliance for groundwater monitoring will have a low probability of detecting leachate polluted groundwater when it first reaches the point of compliance for groundwater monitoring. The proposed groundwater monitoring system for the CWU is basically a facade with respect to a reliable groundwater monitoring system that will detect the eventual CWU landfill liner failure before significant groundwater pollution occurs.

Page 3-1, paragraph 2:
"These design features have been shown to protect the public health, safety, and welfare, include the following:
1. Multiple Layer-Composite Liner System. … The multiple layer-composite liner system will effectively prevent the release of potential hazards from the Chemical Waste Unit."
This statement is more propaganda that unreliably presents information on the ability of the CWU proposed landfill system to reliable contains the pollutants in the CWU for as long as the

hazardous chemicals in the CWU will be a threat to penetrate the liner to eventually pollute the groundwaters of the area.

Page 3-1, item 3:
"3. Leachate Drainage/Collection System. … These liquids will be collected and managed so as not to impact the environment. The proposed Chemical Waste Unit has been designed with an extensive multiple layer leachate drainage/collection system to quickly remove leachate from the landfill for proper disposal."
This statement is more of the unreliable information on the landfill containment system to prevent migration of the leachate from the CWU to the groundwaters of the area. What Area Disposal did not discuss that there is no assured to funding to operate and maintain the leachate collection for as long as the wastes in the CWU will be a threat to generate leachate.

Page 3-1, item 5:
"5. Final Cover System. The final cover system that will cap the landfill consists of a low-permeability layer to prevent precipitation from entering the landfill,…"
Again more inadequate and unreliable information in that the proposed landfill cover ability to prevent moisture from entering the landfill will deteriorate over time and eventually allow water to enter the CWU wastes and generate leachate. No mention has not mentioned that Area Disposal only proposes to somewhat maintain the cover during the postclosure period of 30 years with no funds available to inspect and maintain the cover during the very long period of time that with wastes in the CWU will be a threat to generate leachate when contacted with water. Another significant deficiency in the application is that no funds are included in the 30 year postclosure period that Area Disposal proposes to fund postclosure care for repair of the plastic sheeting layer in the cover. It is highly likely that the plastic sheeting layer in the cover will deteriorate during the 30 year postclosure period that Area Disposal proposes to fund postclosure activities. No funds are provided to make these repairs.

Page 3-2, paragraph 2:
"At this rate, CLI expects to operate the Chemical Waste Unit for approximately 34 years. Volume calculations are provided in Appendix L."
The projected 34 year active plus the 30 year minimum postclosure period is the period of time that Area Disposal will be responsible for landfill monitoring and maintenance. This is a very small part of the hundreds to thousands of years that the wastes in CWU will be a threat.

Page 3-2, paragraph 3:
"An engineered multiple layer-composite liner system will be constructed across the base and sideslopes of the proposed Chemical Waste Unit in order to contain the waste materials and prevent contaminants from leaving the landfill and impacting groundwater."
As discussed above the proposed liner system will eventually deteriorate in its ability to prevent leachate from leaving the landfill and proceed on its way to polluting groundwater. The statement quoted above "*contain the waste materials and prevent contaminants from leaving the landfill and impacting groundwater*" is highly misleading and unreliable. The reasons for this failure are discussed in the "Flawed Technology " review available at,

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 December (2008). http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf
And in other papers and reports on www.gfredlee.com in the Landfills Groundwater section at, http://www.gfredlee.com/plandfil2.htm.

Page 3-2, paragraph 5:
"Field and laboratory test results and field observations indicate that these materials will effectively restrict vertical and horizontal movement of groundwater and will serve as an additional environmental safeguard beneath the proposed Chemical Waste Unit."
This is a repeat of the same statement discussed above on Page 2-2, paragraph 1 and is also highly unreliable in preventing groundwater pollution by the CWU

Page 3-3, paragraph 1:
"The hydrogeologic conditions at the site and the landfill design allow a comprehensive groundwater monitoring system to be implemented which will be able to adequately verify if groundwater resources are being threatened by the landfill."
This statement is another repeat of the statement on Page 2-2, paragraph 4. As discussed above it is highly unreliable.

Page 3-3, heading:
The heading of *"Geomembrane"* on Page 3-3: states,
"Geosynthetic Clay Liner (GCL)
A GCL will be placed between the two uppermost geomembranes throughout the landfill floor. GCLs are factory manufactured hydraulic barriers typically consisting of bentonite clay minerals supported by geotextiles and/or geomembranes, which are held together by needling, stitching, or chemical adhesives. Sodium bentonite, the clay used in the GCL, exhibits a high swelling property when hydrated. This swelling property provides the ability to seal around penetrations, giving the GCL self-healing characteristics. The GCL bentonite has a hydraulic conductivity no greater than $5.0x10^{-9}$ cm/sec."
This is a gross over statement of the properties of a geosynthetic liner (GLC) for as long as the wastes in the CWU will be a threat. The Lee and Jones-Lee (2009) update of the "Flawed Technology referenced above contains reliable information on the many problems with GLC liners. The low structural strength, ion exchange loss of low permeability in hard water systems etc are some of these issues that should have been reported in the application for an application that reliable reports on the properties of the CWU landfill containment system.

Page 3-7:
"Leachate Management for the Chemical Waste Unit
Any liquid that comes in contact with waste is known as leachate and will be removed from the Chemical Waste Unit and properly managed. The design and plan of operations for the Clinton Landfill No. 3 Chemical Waste Unit are intended to minimize leachate production throughout the operating life of the landfill and the post-closure care period.

The Clinton Landfill No. 3 Chemical Waste Unit is designed with a comprehensive leachate collection system to collect and remove leachate. Because of the low solubility of PCB's,

leachate is expected to exhibit significantly less than 50 ppm PCB's. Based on this, CLI anticipates hauling the extracted leachate to a commercial or publicly owned wastewater treatment facility for treatment and discharge under proper permits."
These statement are more of the unreliable in grossly inadequate assessment of the proposed leachate management discussed above in the response to Page 3-1, item 3. Area Disposal admits in this statement that it is only proposing to operate the leachate collection and removal system during a 30 year postclosure period, which is not as long as the wastes in the CWU will be a threat to generate leachate, i. e., forever.

Page 3-8:
"Leachate Drainage/Collection System
The leachate drainage/collection system is designed to efficiently drain and collect leachate throughout the operating life and post-closure care period and beyond for the proposed Clinton Landfill No. 3 Chemical Waste Landfill. Design calculations, with supporting assumptions and information, are provided in Appendix I."
More unreliable information on the leachate drainage/collection system that should have been discussed in this application.
Page 3-10, paragraph 2:
"Since PCB's exhibit very low solubility in water, leachate is expected to contain significantly less than 50 ppm. As a result, leachate will be transported to a commercial or publicly-owned wastewater treatment plant for treatment prior to discharge. … Alternatively, leachate with less than 500 ppm PCB's may be solidified as described in the facility's Chemical Waste Unit Operating Plan (Section 6 of this application), and disposed in the Chemical Waste Unit."
It should have been discussed that PCBs can cause POTWs to violate their NPDES discharge permit and/or cause problems in POTW sludge.

Page 3-11, heading: "Final Cover System" states,
Page 3-12, paragraph 3:
"A 40-mil high density polyethylene (HDPE) geomembrane material or equivalent will be included in the composite final cover system for the facility. The material specifications for the 40-mil geomembrane liner material are included in Section 5 of this application. The geomembrane layer will serve as an impermeable barrier against infiltration of moisture through the final cover into the landfill as well as a barrier to prevent future human or animal exposure to landfill wastes. Double-sided textured HDPE will be used on all slopes 5H:1V or steeper."
Area Disposal failed to include the well known information that HDPE geomembranes are subject to deterioration that will allow water to enter the CWU landfilled wastes during the time that these wastes are a threat to generate leachate.

Page 3-13, paragraph 4:
"Cover maintenance will be performed as necessary to maintain the final cover to meet the design objectives. Any areas identified by the operator or by inspections as particularly susceptible to erosion will be re-contoured. The post-closure Care Plan contained in Section 8 of this application provides additional details regarding final cover maintenance activities."

Area Disposal fails to discuss that it only will provide postclosure funding for cover inspection and limited maintenance. See the discussion of these issues in the comments on, Page 3-1, item 5:

Page 3-14, paragraph 3:
"Landfill Gas Management
Based on the waste streams anticipated of (sic) to be deposited at the Chemical Waste Unit, it is not anticipated that landfill gas will be generated. However, the permitted Clinton Landfill No. 3 MSW Unit has been designed with a permitted landfill gas management system."
A landfill gas system may be needed for the MSW that is proposed to be added to the CWU above the chemical wastes.

Page 3-14, heading:
"Groundwater Impact Assessment"
And Page 3-14, subheading:
"Groundwater Impact Assessment Model Input"
The so-called groundwater assessment preformed by Shaw Environmental Inc. can be manipulated to prove that the landfill will not pollute groundwater. The results of this type of assessment depend on the assumptions that are used in the assessment.
Page 3-15, paragraph 3:
"Although HELP modeling demonstrated less than 12 inches of leachate head would exist through the end of the 30-year RCRA post closure care period…"
The use of the HELP model to estimate the amount leachate will be generated is likely to be highly unreliable in estimating the leachate generation during the time that the cover has deteriorated to the point where it is no longer effective in preventing water from the landfill. These issues are discussed in the Lee and Jones-Lee (2009) Flawed Technology review.

Page 3-15, heading:
"Groundwater Impact Assessment Findings"
And Page 3-16, paragraph 1:
"The results of the permitted GIA and the design of the proposed Chemical Waste Unit demonstrate that the site is favorable for development of the proposed Chemical Waste Unit and that the proposed design will be effective in protecting groundwater quality beneath the site."
See the comments on Page 3-14, above.

Page 4-1, section title:
"Stormwater Management Plan"
No provisions are provided for maintaining the Stormwater management system after Area Disposal terminates its postclosure funding of the CWU.

Page 6-2, heading:
"Waste Acceptance Procedures"
The proposed waste acceptance procedure does not preclude that other hazardous chemicals are deposited in the CSU.

Page 6-15, subheading:

"Response Plan to Potential Leachate Seeps"
No mention on the management of seeps of hazardous chemicals that will occur from the above the ground surface sides of the landfill when Area Disposal will no longer provide postclosure monitoring and maintenance of the CWU.

Page 7-1, section title: "Environmental Monitoring"
Page 7-6, paragraph 2:
"All monitoring will follow strict quality control, quality assurance and chain of custody procedures. This groundwater monitoring program will verify that the facility design and construction are properly functioning to protect the public health, safety and welfare."

And Page 7-6, last item under Groundwater Monitoring:
"Semi-annually following closure of the Chemical Waste Unit."
These statements are additional examples of inadequate information on who will provide for monitoring of the CWU for as long as the wastes in the CWU will be a threat.

Page 8-1, section title: "Closure and Post-Closure Care Plan" states,
Page 8-1, paragraph 2:
"Post-closure care of the Chemical Waste Unit will continue perpetually. Financial assurance will be provided to the USEPA prior to waste acceptance in the proposed Chemical Waste Unit for premature closure and post closure care for a 30 year period after closure. Financial assurance will be maintained into perpetuity in order to provide at least 30 years of post-closure care."
And
Page 8-10, paragraph 1:
"Post-Closure Care Requirements
The post-closure care plan describes the steps necessary to monitor and maintain the Clinton Landfill No. 3 Chemical Waste Unit throughout the post-closure period. The post-closure care period begins upon completion of closure activities."
And
Page 8-10, paragraph 2:
"*The final cover over the Chemical Waste Unit will be integrated with the final cover over the Municipal Solid Waste Unit. That portion of the final cover that will overlie the Chemical Waste Unit footprint (22.50 acres) will be maintained in perpetuity or until the regulatory agency determines the site no longer poses a threat to the environment."*
And
Page 8-10:
"Maintenance and Inspection"
"*…Annual inspections would then be conducted in perpetuity or until the regulatory agency deems it no longer necessary. If any deficiencies are identified during the inspections, an assessment and remedial action plan will be implemented immediately*."
And Page 8-11, subheading: "Final Cover" states,
Page 8-12, paragraph 2:
"*The post-closure care costs developed in this Plan conservatively assume that quarterly monitoring will continue for perpetuity."*

Area Disposal admits that it only proposes to provide postclosure funding for landfill monitoring and maintenance for 30 years. The use of the "*maintained into perpetuity*" Funds for these types of activities will be needed for as long as the wastes in the CWU are a threat to generate leachate.

Page 8-12, paragraph 4:
"Leachate sampling will be performed as described in Section 7 of this application. The frequency of chemical analysis may be reduced by the regulatory agency based upon a demonstration by the owner or operator that the reduced period is sufficient to protect human health and the environment."
Since leachate will be generated well beyond 30 year postclosure period who will operate, sample and maintain the leachate collection system for as long as the wastes will be a threat?

Page 8-12, last paragraph:
"The post-closure care cost estimates presented in this report include budgeted amounts for annual maintenance activities, monthly and semi-annual leachate sampling/analysis, and cleaning the primary collection system every 5 years."
The issue of who will provide for funds for these activities for as long as the wastes in the CWU will be a threat is not provided.

Comments on Transcript of April 7 Meeting with the US EPA Region 5 Representatives

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Presented below are comments on the US EPA presentations and responses to questions at the April 7, 2009 joint meeting of the DeWitt County Board, Clinton City Council, and DeWitt County Land Use Committee. These comments do not reflect an exhaustive scrutiny of the proposed Chemical Waste Unit (CWU) or of the information provided in the presentations or responses to questions. Rather, they highlight a number of the key technical concerns, deficiencies, and inaccuracies in the information provided to the public at the April 7 meeting. Additional information on issues identified and addressed herein is provided in the Comments on the Area Disposal CWU Application as well as in the "Flawed Technology" review available at www.gfredlee.com as

> 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 December (2008).
> http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf

and in other papers/reports posted in the Landfill section of our website http://www.gfredlee.com/plandfil2.htm.

Upper Aquifers

An important issue raised at the April 7 meeting is the pollution of the upper aquifer (Glasford) that is being used as a water supply by local farmers. Johnson described that aquifer in these ways:

"Now there're two aquifers that stand in between the Mahomet and clay pan number 1. These are kind of patchy aquifers. Some folks draw water from them; others don't. They're kind of erratic, and they're not quite so predictable."

Given that these waters are being used by area landowners, the fact that they are apparently not well-defined or "predictable" is of concern for the implications of their pollution by landfill leachate. This is especially true in light of the usurpation of these aquifers in the vicinity of the landfill for use in leak detection and leachate management, as discussed further below.

After referring to "two" upper aquifers, Johnson made mention of flow direction of apparently one of those aquifers; the identification and distinction between the two was not addressed by the speakers. No further mention was made of more than one upper aquifer during the meeting.

With regard to the upper aquifer, Johnson stated,
"Well, it turns out that there isn't very much of this water underneath the landfill here – hardly any at all; it's only about 2 feet thick. But it actually makes for a very handy thing. It's how we monitor the bottom of the landfill with wells."

Cygan also stated,
"Keep in mind also that if there was a leak to the beneath the landfill, that the monitoring points would be in the one and only layer of the geology that would be transmitting the PCBs like a river, underground river. And so that those monitoring wells would be able to pick that up because the groundwater would deliver the contamination to the monitoring wells, themselves. And so that you would have a good sentinel system."

Johnson went on to explain about the "sentinel witness sand" thus:
"You see where I had witness flow? The witness water flows this way – it flows toward Salt Creek."
This suggests that there could be a potential for surface water contamination implications associated with the use of this "sentinel" aquifer for leachate detection that should have been explored thoroughly.

While both Johnson and Cygan touted this upper aquifer as a "sentinel" aquifer useful for early indication of landfill failure to contain pollutants, the speakers minimized the supply utility of the aquifer. However, they also indicated on several occasions, e.g., as quoted below, that they were still in the process of defining who might use that aquifer for water supplies and were still in the process of defining from where the area residents draw water.

"Our preliminary review of data that we do have in hand currently shows that there are no immediate downgradient, in other words in the line of the flow of the aquifer, no immediate downgradient receptors or residential wells that are drawing in the line of the landfill. Let me also say that at this point we're still trying to compile all of those residential wells so that we can absolutely say that for certain that we understand where these wells are located and in which aquifer they're screened. So this particular issue is a work in progress. We have preliminary data but we still want to have a little time to check that."

Johnson noted that the definition of the use of this water has not been made: *"We are gathering up the particulars, the areas that people who live in the vicinity; I've been plotting up the exact locations where they get their water from and developing a map that will show exactly who takes water from where."*

In response to the question: *"The upper aquifer – did they say that there is domestic water being drawn from that upper aquifer? That there were a few farms that drew from the upper aquifer? From the one that you'd be testing on?"* Johnson stated:
"The quick answer is: onsite, no; offsite, we feel that they won't be because we don't think that the water is coming from the same direction and the same parcel of water, but that's the question that I'm building an answer to make sure I've covered everybody's well-screens at least in a 2-mile area – 2-mile radius area. Those people's well water will be monitored by the 27-well monitoring array. If there is a hydraulic connection between the water underneath the landfill and their well screens, those things can be addressed because no well screen can properly evaluate what's going to happen 2, 3 miles away. We really have a hard time doing that. But almost everybody, everybody, sits on top of the Mahomet Aquifer, and so for most-part, that's always the backup."

Cygan went on to state: *"You have to keep in mind that right now Steve is trying to compile all of the data that's available through the Illinois State Water Survey and other resources, of who's drawing water from that particular aquifer that you're referring to and where those wells are located. Our preliminary review of data that we do have in hand currently shows that there are no immediate downgradient, in other words in the line of the flow of the aquifer, no immediate downgradient receptors or residential wells that are drawing in the line of the landfill. Let me also say that at this point we're still trying to compile all of those residential wells so that we can absolutely say that for certain that we understand where these wells are located and in which aquifer they're screened. So this particular issue is a work in progress. We have preliminary data but we still want to have a little time to check that."*

Johnson followed those remarks by indicating with respect to issues of evaluating use and protection of the upper aquifer(s):
"This really goes to some of the questions that I think fall outside of the typical regulatory requirements that the TSCA rules embody. The Regional Administrator has the authority to ask for this kind of information, and this is the kind of information that people living in the vicinity typically want to know. So this is why we're doing it."

The source of the water in the upper aquifer(s) has apparently not been defined. Johnson was asked about the source of water in an upper aquifer accessed by a 40-ft deep well about four miles from the site of the proposed CWU. He responded:
"The clay pan number 1is a barrier to downward infiltration and recharge. Clay pan number 2 is even more of a barrier to infiltration and recharge. The source of the water that you are referring to, best I've been able to tell, it's probably from water that migrates in from outside of the confines of that buried valley and trickles in in side-channels the sand that kinda come in from the sides."

Overall, with regard to the consideration of the upper aquifer or aquifers at the site of the proposed CWU, it is clear that this upper aquifer is an important local water supply and stands to be adversely impacted by the eventual failure of the CWU liner system. Indeed, in light of the fortuitous presence of that "sentinel aquifer" as described by Johnson above, it appears that the applicant expects it to be contaminated by the failure of the landfill liner. However, it also is clear that neither the extent of the current use nor the potential future use of the upper aquifer(s) has been reliably defined by the applicant. Further, neither the flow nor recharge of those aquifers has been defined. It also does not appear that the US EPA is requiring that these aspects be well-defined and evaluated as part of permitting consideration. Instead, those upper aquifer areas in the vicinity of the landfill, and potentially down-groundwater gradient of it, have been relegated to use by the landfill applicant for leachate detection and management associated with landfill deterioration and failure to completely contain leachate for as long as the wastes remain in the landfill.

With regard to this situation, it would seem that making all of those assessments and definitions should have been the responsibility of the applicant and that those assessments and definitions should have been made as part of the CWU application. While such information should have been presented and evaluated before preliminary US EPA approval was issued, it certainly should be collected and assessed before further consideration is given to final approval.

Even if there were presently no offsite local water supply well in line with the flow of polluted groundwater, a farmer(s) could, at sometime in the future, install a well on his/her property to tap into that aquifer, only to find that aquifer to be polluted by releases from the CWU. The offsite site groundwater in all aquifers should be protected from pollution by releases from the CWU for as long as the wastes in the CWU are a threat. By deeming the upper aquifer to be the landfill applicant's "sentinel aquifer," incorporating it into its leachate detection and collection system, the EPA is sanctioning the pollution of that aquifer and the confiscating of the beneficial uses of those waters that would otherwise be usable by area landowners.

Present projections of groundwater flow and/or pollutant migration will not necessarily be reliable in the future. Installation of offsite production wells, for example, can change the direction of groundwater flow. The US EPA should not allow Area Disposal to prevent the future use of offsite groundwaters owing to the potential pollution of this aquifer.

Lack of Local Recharge of Mahomet Aquifer

In his presentation, Johnson asserted that Lake Michigan is the source of the water for the Mahomet Aquifer, i.e., that there is no local recharge. However, in his response to questions about this, his position was more tenuous and speculative. He stated with regard to the source of water in the Mahomet Aquifer and local recharge:

"It isn't something that we've really considered as part of our technical review, but as a matter of course what we found is these clay pans are barriers and they're areas where there's no recharge whatsoever."

He continued on with that response:

"That's what we like. We want things built on clay pans. They're barriers to infiltration. That's why they call it invulnerable. This is a protected aquifer."

While Johnson did not identify who "they" are who call the aquifer "invulnerable," his repeating such an exaggerated claim does not suggest objectivity.

The source of the Mahomet Aquifer recharge can be readily evaluated by dating the aquifer's water. While such an evaluation should have been presented in the CWU application, it should certainly be made by the applicant before further consideration is given to permitting the CWU. It is also important to emphasize that what people presume to be true, or what everyone seems to rely upon (e.g., as Johnson stated, *"So everybody relies on this clay pan number 1 to isolate them from any problems here, because they're drawing water from waaay down deep from the Mahomet aquifer."*) is not necessarily technically reliable. Such anecdotal information should not be at the foundation of evaluations of the appropriateness of a site or engineered design for protecting public health and environmental quality from impacts of landfilled wastes.

Long-Term Integrity of Liners

The EPA speakers did not frankly acknowledge or address the realities of the progressive deterioration of the landfill containment system over time, or the consequences of it for public health, environmental quality, or remediation of the landfill. Rather, the speakers advanced their position that the system as proposed is composed of redundant protections and is failsafe. Indeed, Johnson stated with reference to PCB landfills, *"And the ones that are built to the*

standards we're talking about now don't fail." The US EPA speakers recounted repeatedly how the proposed CWU incorporated multiple redundancies in materials between the buried waste and the Mahomet Aquifer, and the incorporation of loosely defined monitoring scenarios for the upper aquifer for reassurance. At no point was mention made that liner/containment systems, even if installed as designed, lose integrity over time, and certainly over the time period during which the wastes in the landfill will be a threat to public health and environmental quality. No discussion was presented concerning how the integrity of the liner system would be restored once it begins to leak. There were only assurances that the containment will not be breached at any time in the future.

When pressed about what would be done if, in fact, leachate containment systems were breached, two different responses were offered:
Early in the public questions Johnson was asked, if waste breeched containment and the wells detected it, *"how are you going to correct the situation?"* Johnson responded, *"Dig it up."* He amplified on that by stating,
"Yeah, that happens every now and then, folks put waste in the wrong place and they have to dig it up. We've had this happen on occasion and that's why we have burial coordinate systems and we know exactly what's put where. And so often times we wind up having to move, believe it or not, whole landfills. That happens; but I don't anticipate it."

Johnson subsequently advanced the position: *"So if, for instance, somebody were to find a PCB false positive, or real positive that they couldn't get rid of, and everybody would get frustrated, they simply would put barriers around the barriers. And with the amount of material you have to work with here, there's an awful lot of maneuvering ground, if you will."*

When asked directly, *"is the United States EPA claiming that the liner system will not be breached?"* Johnson responded, *"We don't see any reason to think that it will."*
When the questioner pursued the issue further by asking, *"can you unequivocally say that the liner system will not be breached?"* Johnson replied, *"I'm not going to try to second-guess that question."*

Johnson's claims that the liner will not degrade is not in keeping with the findings of the US EPA and others. His description of the plastic sheeting layer in the liner as being thick *("3 or 4 Clorox bottles thick, at least. It's 60 mils thick."*) does not change the well-known fact that this plastic sheeting liner (as well as the other engineered components of the liner system) will eventually degrade and no longer function as an effective liner to prevent wastes in the CWU from leaving the landfill on its way to polluting groundwater. The degradation of the plastic sheeting liners in landfills is discussed in the Lee and Jones-Lee Flawed Technology review which includes references to US EPA statements and results of US EPA-sponsored research on this issue.

A question was asked about the maintenance of the landfill system into the future, beyond 30 or 60 years. Johnson's response was:
"All of the landfills in the whole United States have that same problem. And we look forward to building landfills that will extend out thousands of years, in fact there will maybe pretty well be ways the wastes inside those cells will be changed, transformed, modified, destroyed. PCBs

don't last forever." and, as discussed below, speculated on the degradation of PCBs. Whether or not other landfills have "the same problem," and what kind of landfills Johnson or the EPA would like to see are not relevant to ensuring of protection of public health and environmental quality from impact of the proposed CWU, except to highlight the limited and short-term nature of the "protection" that may be expected by area residents if the proposed CWU is permitted.

Johnson stated with regard to groundwater monitoring and the period of protection presumed to be provided by it:
"They've done some calculations, part of the groundwater monitoring, uh modeling system, designed to meet very rigorous, somewhat unrealistically harsh terms that were imposed upon the model in order to determine whether or not it would maintain safety for the foreseeable future, for the state of Illinois." He did not define the period he considered to be the *"foreseeable future."* Clearly, protection needs to be ensured for as long as the wastes remain in the CWU, which will extend considerably beyond the commonly understood near-term nature of the descriptor, "foreseeable future."

Johnson stated, *"There are ways to build landfills that have been demonstrated to be protective for tens of thousands of years."* That statement is grossly misleading, especially as delivered in the context of this particular proposed chemical waste unit. It certainly does not apply to the CWU being considered for DeWitt County. There is no credible "demonstration" of the ability of the proposed system, or any other system, to be protective for decades, much less to be "protective for tens of thousands of years." What is known about the initial integrity of engineered landfill components and protection afforded by natural strata, as well as the limitations in the ability to reliably project the long-term integrity of those systems, are discussed in our "Flawed Technology" review. As discussed therein, Johnson's claim is not supported by the technical writings of the US EPA.

Another questioner expressed concern about who will pay for long-term monitoring, maintenance, and ultimate remediation: *"I have a two-part question. Getting back to who pays for it, and I'm familiar with this and all the taxpayers and anybody that's buying gasoline and diesel fuel and whatever, there's a state tax to reclaim underground tanks and stuff that leaked and it all goes back to the taxpayers. It didn't go back to the companies because they went bankrupt or whatever. So that answers part of everyone's question: taxpayers will end up paying for this. My second part of my question is – the titanic sunk. Along with that idea is nobody in this room, I don't think, can tell me or tell anybody, is that going to be good for a hundred years or 300 years. Plastic lasts only how long before it disintegrates? 300 years? So what happens beyond that, when our kids' kids' kids are here, providing the earth is still in place, what's going to happen then? Has anybody planned ahead in the future?"*

Gonzalez responded thus: *"You know, I think we've mentioned earlier that there's a continuous monitoring that goes on, so that as part of this monitoring, adjustments are made to the landfill, or to any facility. I mean, I was in Superfund before I came here. And, you know, I could tell you that they go to great strides to protect or clean up anything that occurs at a site. But the one thing that you can be assured about is that there is a continuous monitoring. That's why they have all the wells all around in here so that we do have a modicum* [nb: this word means "a little bit," or "minimal"] *of protection for the community. So, I mean, that is you know, that is the*

same thing as having an air force, or an army. Why do you have an army that hardly ever fights. Because they're there to protect in case something happens. Well, we use the same sort of methodology with guarding over these sites that we're putting some of our waste in, they have to be monitored. And the person who holds the permit has a legal obligation to do so. So that's part of the program. Do we have all the answers? I don't think anybody on earth has all the answers. You know that as well as I do. But can we provide a modicum of safety? I think we've proven that we can."

In a proper, disinterested, technical review of the public health and environmental quality issues associated with a proposed chemical waste containment system, the realities of the truly long-term integrity of the engineered systems need to be addressed, and rational and considered contingencies thought out. Similarly, the limitations of clay layers, engineered as well as naturally occurring, in retarding the migration of waste components should be brought to light in a discussion of this proposed landfill. The EPA presentation did not reflect such a review of the applicant's proposal. Instead, as discussed further below, it appears that these EPA reviewers relied on their anticipation that the engineered systems will remain without breach indefinitely, and the "invulnerability" of the Mahomet Aquifer, and the insignificance of the upper aquifers, and the fortuitous degradation of the chemicals in the buried waste. And yet, the best assurance Johnson could give of that anticipation of failsafe protection was, "*I'm not going to try to second-guess that question."*

Landfill Cover Maintenance

An element critical to optimizing the performance of a "dry tomb" such as is being proposed is keeping the wastes dry for as long as they remain in the landfill. This requires reliable design; quality installation; rigorous, frequent and detailed inspection; and swift and reliable repair of the cover for as long as the wastes remain in the landfill. Johnson did not address the long-term requirements or problems of maintaining the integrity of the CWU cover or its repair except to say that it would be addressed in what he called the "perpetual care" of the landfill.

Johnson was asked clearly and directly about the proposed cover: *"what about the liner on the top? That's pretty important for I guess for PCBs to keep the water out. What happens, and who maintains this, and for how long? I need to know how this thing's going to be taken care of."*

His response to that question was essentially non-responsive, evasive and equivocal; it was basically that he has "confidence" that it would be taken care of, and that he "anticipates" that the cap will be "more than usual." He stated,

"Sure. Part of the process for a permit is to establish what's called a perpetual care program. And the perpetual care program involves financial insurance funding mechanism. A funding mechanism is set up for a 30-year interval, and we set that 30-year interval as a revolving plan. So every year we push 30 years ahead, and 30 years ahead, so we always look forward 30 years. So when the accounting sets up a fund to maintain the landfill, the cap and everything, they will have funds to take care of it. There are ways to build landfills that have been demonstrated to be protective for tens of thousands of years. In fact there's mounds in Illinois that without any particular protective measures have withstood [inaudible] the past years or more of erosion, and so we are quite confident that by the time we're done we will have come up with a cap that

consists of stuff like gravel, rounded river rock, somewhat sticky, cohesive soil, and a geomembrane, probably a 30 or 60 mil thick geomembrane. Those things will protect the overall liner, and on top of the TSCA waste the plan that they're calling for now is for municipal waste to sit on top of the TSCA waste. So the whole thing will be double-covered. There will be interim cover on top of the TSCA waste, then there'll be municipal waste, and then there'll be this long-term monitoring maintenance cap that sits on top of that. So the PCBs will be covered by municipal solid waste for a depth of something on the order of anywhere from 10 to maybe 30 or 40 feet for most of the entire thickness. So they will be protected by a very heavy cap itself. I anticipate that cap to be more than usual. That's not usually the case. We don't usually get situations where we put [inaudible] green inert solid waste on top of TSCA waste. This is another one of those situations where we have 2 liners, belt and suspenders duct tape type of scenario. It's a bit surprising."

The key issues at the heart of the question, including how the CWU cover would be monitored and maintained, how it would be replaced when needed, and as discussed below, the additional concerns raised by, and measures that would be necessitated owing to, the placement of municipal solid waste atop the cover of the CWU, were all left untouched. Instead, he stated that there would be a "perpetual care program" funded, according to his response, by annually-renewed 30-year funding periods. While he clearly implied that that funding and the unspecified "care" that it enabled would be maintained in perpetuity, i.e., forever, he did not commit to holding the applicant to that duration of care. In fact, there is a major disconnect between what the US EPA claims will be the length of the postclosure funding by Area Disposal (perpetual) and the information provided in the application, itself. That document clearly anticipates the applicant's expectation of being able to terminate monitoring and concern about the landfill at or before a single 30-year postclosure period.

Johnson continued his response with the undocumented and unexplained claim, "*There are ways to build landfills that have been demonstrated to be protective for tens of thousands of years."* That claim, even if it were accurate and related to the application at hand, does not address the issue of cap maintenance for the CWU.

He then stated, on the basis of those statements, *"so we are quite confident that by the time we're done we will have come up with a cap that consists of stuff like gravel, rounded river rock, somewhat sticky, cohesive soil, and a geomembrane, probably a 30 or 60 mil thick geomembrane."* From that statement, and the overall evasiveness of the response, it appears that the design and components, and hence the anticipated performance of the cover in its vital role of keeping the wastes dry, have not been developed by the applicant, much less carefully evaluated by the EPA prior to issuing its draft approval of the CWU.

Johnson then touted the placement of 10 to 40 feet of municipal solid waste atop the buried CWU as providing an additional cover for keeping the CWU dry. Quite to the contrary, putting municipal solid waste atop the CWU will only compound the problems with leachate generation and remediation of the landfill as the ability of the containment provisions deteriorates over time. MSW leachate would be expected to help mobilize PCBs in the CWU, making them more mobile than otherwise anticipated. This situation and its consequences were not mentioned by

the EPA speakers. Placing MSW atop the CWU, while indeed "surprising," certainly cannot be considered to be contributing to any redundancies in "protection."

Thus, overall, the EPA speakers did not address how the CWU cover would be monitored and maintained, how it would be replaced when needed, or the additional concerns raised by, and measures that would be necessitated owing to, the placement of municipal solid waste atop the cover of the CWU. Instead, extraneous, vague, and/or non-responsive statements were proffered along with the oft-repeated claim of multiple redundancies, the "*belt and suspenders and duct tape"* analogy.

PCB Breakdown

In light of the unsatisfactory reply to the question of long-term cover and landfill maintenance, the questioner asked,

"I don't think any of us are really worried about the next 30 or 60 years; we're worried on down the line and I guess that's why the questions asked, you know, who's going to maintain this. If we're only talking 30 years out or 60 years out, that's the concern of the community."

Johnson's response was that the PCBs wouldn't last forever. He stated:

"Right. And we have, too. All of the landfills in the whole United States have that same problem. And we look forward to building landfills that will extend out thousands of years, in fact there will maybe pretty well be ways the wastes inside those cells will be changed, transformed, modified, destroyed. PCBs don't last forever. And I've been talking to the applicant about ways they can actually facilitate the destruction – the biodestruction and degradation and natural processes that lead to the attenuation of the PCBs over a long period of time. Some of those may be fairly simple, and they kinda fall along in the lines of kinda irrigating and farming and maintaining appropriate nutrients. There may be ways that if they build things right that those PCBs will go away. They're not like heavy metals. Heavy metals don't go away. But PCBs, they're organic compounds. They do break down."

In short, Johnson's response to the reiterated question of how the proposed landfill, that has already received draft approval from the EPA, will be maintained beyond a 30-year postclosure period was that he'd like to be able to have landfills built that would last for thousands of years, but we're not there yet. He then, for the first time in his presentation, claimed that PCBs will decompose –"*if they build things right"*; in the context of the question posed, he is apparently indicating his belief that they can be expected to decompose within a few decades. He did not elaborate on what would be required in order for the applicant to *"build things right"* in order to effect that decomposition, or if that requirement is going to be a condition of the approval. In all, again, he did not answer the question.

Johnson's statement about PCB's breaking down is not supported by what is known about the characteristics and behavior of PCBs. The fact that PCBs are "organic" does not mean that they will *"break down"* or *"go away"* so as to assuage long-term concern for public health and environmental quality. Indeed, their resistance to decomposition into innocuous transformation products is the reason they are subject to "remediation" decades after their use has been discontinued. I have been working on PCB pollution in many areas since the mid-1960's and I

am familiar with the current information on the degradation of PCBs. If there were a way to economically degrade PCBs, the US EPA would not be trying to dispose of them in landfills.

Groundwater Impact Study

In his comments on the safety of the proposed CWU, Johnson stated that the Area Disposal Groundwater Impact Study showed that the CWU would not impact groundwater quality. Appendix N of the CWU application presented the "Permitted Groundwater Impact Assessment." That "Assessment" was prepared by PDC Technical Services, Inc. (PDC) PDC is associated with the a hazardous waste disposal company in Peoria, IL which is, in turn, affiliated with Area Disposal. Review of the so-called groundwater assessment shows that PDC has used a modeling approach to conclude that the CWU will not pollute groundwater.

I have extensive background and experience in reviewing water quality models. This includes formal education in developing and using such models, and teaching university graduate-level courses in model development, evaluation, and use. I am a member of the California Water and Environmental Modeling Forum (CWEMF) Steering Committee; the objective of that Forum is providing information on the appropriate development and use of environmental models, including water quality models. Based on my experience, I know that the results of a water quality model depend heavily on the assumptions made in formulating and applying the model. A review of the PDC Groundwater Impact Assessment shows that the results of the model used by PDC to conclude that groundwaters in the vicinity of the CWU would not be impacted by this landfill, were largely controlled by the assumptions made in modeling the releases of hazardous and otherwise deleterious chemicals from the CWU to the Mahomet Aquifer.

Review of the modeling approach shows that PDC assumed that the design and proposed construction of these systems would be applicable throughout the very long period of time during which the wastes in the CWU will be a threat. It is well-known that the properties of engineered containment systems all deteriorate over time, and will eventually fail to prevent large amount of water from entering the landfill, which can generate leachate that can leave the landfill on its way causing groundwater pollution.

Those assumptions make the groundwater impact assessment performed by PDC unreliable. New geomembrane (plastic sheeting) liners are known to contain a number of small holes when constructed; over time the properties of geomembrane liners deteriorate which progressively diminishes their ability to provide an effective barrier to leachate transport. The so-called "conservative" nature of the assumptions associated with using the HELP model fails to account for the fact that the HELP modeling approach does not consider the significant deterioration of the landfill cover's low-permeability layer over the period during which the wastes in the CWU will be a threat.

PDC claimed that the 3-ft-thick clay layer that is part of the liner system underlying the landfill will be significant in protecting groundwaters from pollution by landfill leachate. However, review of fundamental information provided by Workman and Keeble (1989) in their paper, "Design and Construction of Landfill Systems," shows the breakthrough time for water (leachate) through a 3-ft-thick clay layer having a permeability of 10^{-7} and under 1 ft of head will be between 5 and 7 years.

Workman, J., and Keeble, R., "Design and Construction of Landfill Systems," IN: **Sanitary Landfilling: Process, Technology and Environmental Impact**, Academic Press, San Diego, CA, pp. 301-309 (1989).

In the "Conclusions" on page 812.316-25, PDC stated,
"On the basis of the modeling, CLI concludes that leachate constituent concentrations of all expected leachate constituents will be less than the final AGQSs throughout the operating life and 100-years past landfill closure, pursuant to 35 IAC 811.317 and 811.320."

That statement is an acknowledgement that even with inappropriate assumptions made in conducting the modeling, CWU-associated chemicals can migrate from the landfill to the Mahomet Aquifer. There is no doubt that CWU wastes will eventually pollute the Mahomet Aquifer.

Leaching of PCBs
Johnson talked about the leachability of PCBs a number of times during the meeting. He stated,
"And that's a little surprising but it turns out PCBs are considered to be relatively immobile. And they're so immobile that you hardly can get them out of the waste. And that's why they're considered to be suitable for landfilling. And so the way the rules were set up was you just had to put them in an area that was not vulnerable to leaching."

Johnson was later asked, *"is there any studies or any incidence where the groundwater has been contaminated by PCBs from non-protected contaminated* [inaudible] *where the water actually leached directly through the soil and into a protected aquifer?"*

He responded to the question with the following:
"Yes, there's several. One of them is over in East St. Louis Monsanto. I worked with that for some time. The people who built the PCBs have contaminated several parts of their facility – Solutia is the name of the facility, company, and their PCBs have migrated. And what we found out is that we can control the migration by cutting off the infiltration because the migration of those PCBs is directly proportional to the amount of hydraulic head, the amount of water that forces it down, the amount of rain water that sits on top. So if we build a cap that's like a roof of a house with a little curvature to it, you cut off the amount of hydraulic forces that push those [inaudible] *contaminants downward. So Solutia is one. And there are others where, yes, we've seen what PCBs can do."*

So, despite the "*relatively immobile"* character commonly attribute to PCBs, the East St. Louis PCB pollution of groundwater by Monsanto in the American Bottoms area provides an example that groundwater pollution by PCBs can occur in high permeability aquifers. That, and other incidents of PCB-pollution of groundwater, is relevant to the proposed CWU because it demonstrates that the pollution of an aquifer by PCB-containing wastes in a landfill can indeed occur; the presence of a clay layer between the waste and the aquifer only serves to slow or postpone the pollution.

Johnson did not address how the entrance of leachate from the MSW landfill atop the CWU, into the buried PCB-containing wastes that will eventually occur as the MSW landfill liner

deteriorates, would alter the leachability of PCBs from the wastes. The "relatively immobile" characterization of PCBs and the examples of PCB-contamination of groundwater have reference to the solubility of PCBs in water; it does not have reference to the solubility of PCBs in the complex "garbage juice" mixture that is MSW leachate.

The impact of MSW leachate from the upper landfill on the integrity of the CWU cover and the solubility of PCBs in the CWU should have been considered and evaluated by the applicant. A thorough discussion of that assessment should have been provided to and considered by the EPA before it issued a draft approval of the proposed CWU.

Reliability of Monitoring Wells

As discussed above, Johnson stated the reliance of the applicant on the pollution of the upper aquifers to evidence breach of the liner containment of the CWU. The monitoring was described as being the last in the string of redundancies in protection of at least the lower, Mahomet Aquifer from the CWU. He described the monitoring well placement at several different points during the meeting. During his presentation he stated,

"It's how we monitor the bottom of the landfill with wells. There's going to be about 25 wells around the whole of the landfill, and about 10 or 15 of them right around the PCB cell – or at least to the north and south of the PCB cell."

Later in responding to questions he stated,

"The perimeter well testing is, I think, a 27-well system. And there are multiple levels. The witness sand zone is used around the entire solid waste landfill. The TSCA cell, because it's only a little corner, we could only fit about 6 or 7 downstream wells."

During questioning, Johnson was asked about the extent of the zone of groundwater capture about the monitoring wells, that is how close would the leachate plume need to be to a monitoring well before it is drawn into the well where it could be detected.

Johnson responded, *"Well, the area of influence is directly proportional to the kind of flow and the transmissivity of the sand layer. So in other words, if it's really coarse and the water is flowing fast, you have a fairly large area of influence. If the water is dead and the sand is fine, it doesn't have much of an area of influence. In this situation what they've done is they ringed the landfill with wells spaced at about 300-ft intervals. Those 300-ft intervals were designed to meet the projected diameter, or projected width, of a leak if one should occur. The projected leaks were intended on being something on the order of 200–300 feet wide, and so the well-spacing is about 200–300 feet wide. So in this situation, they've actually set the well-spacing according to some design principles."*

Cygan expanded on that response by saying: *"Keep in mind also that if there was a leak to the beneath the landfill, that the monitoring points would be in the one and only layer of the geology that would be transmitting the PCBs like a river, underground river. And so that those monitoring wells would be able to pick that up because the groundwater would deliver the contamination to the monitoring wells, themselves. And so that you would have a good sentinel system."*

Johnson's statement that the 200-ft to 300-ft well spacing would be based on *"some design principles"* that the groundwater plume generated by projected leaks in the containment of *"something on the order of 200 to 300 feet wide"* at the point of compliance for groundwater monitoring is not in accord with what is known about, or expected to be, the width of leachate plumes that would originate on a down-groundwater gradient side of the CWU. Rather than being wide fronts of 200 to 300-ft width as assumed by Johnson, such plumes will be narrow finger-like plumes. Such narrow plumes of leachate could readily be missed by monitoring wells spaced as far apart as the applicant has proposed.

Similarly, Cygan's description overstated ability of monitoring wells to detect groundwater pollution. The initial pollution plume will be a narrow plume rather than a pervasively polluted river of water flowing to a monitoring well. Dr. J. Cherry of the University of Waterloo in Canada, an international recognized expert on groundwater pollution issues, has discussed this situation. A summary of his publication as well as of others are presented in my Flawed Technology review.

Remediation of Polluted Aquifer

Several people questioned Johnson about what would be done when the containment system is found to have failed and leachate is detected in the groundwater. His first response was,
"Dig it up." He was unclear as to what would be dug up – the CWU and/or the polluted part of the aquifer. However, he went on to indicate that digging up landfills was not particularly uncommon, stating,
"Yeah, that happens every now and then, folks put waste in the wrong place and they have to dig it up. We've had this happen on occasion and that's why we have burial coordinate systems and we know exactly what's put where. And so often times we wind up having to move, believe it or not, whole landfills. That happens; but I don't anticipate it."

At a later point, Johnson backed away from that response by addressing the issue in this way,
"Well, I made a comment about the removal of the waste from a landfill which does happen on occasion. But there are many ways to solve the problem. If for instance there were PCBs found, most of the time when people find PCBs in landfill monitoring wells it's because the laboratories have actually made a mistake. Other times its because the people who have been working there haven't been clean enough. And it's really kind of a problem because they're monitoring these waters at such a low level it's actually kinda hard to keep the waste away from the equipment. But they make every effort to do so. There is a slight problem of cross-[inaudible] cross-contamination, and often time those lead to false positives. But if, for instance there were massive breach of some kind, there are back-up ways. In this case there's a particularly good back-up way that you could impose upon this by simply putting in things like cut-off walls. Cut-off walls would typically be bottomed into a clay pan. Here we have 2 clay pans at the bottom of the cut-off wall into. So if, for instance, somebody were to find a PCB false positive, or real positive that they couldn't get rid of, and everybody would get frustrated, they simply would put barriers around the barriers. And with the amount of material you have to work with here, there's an awful lot of maneuvering ground, if you will. And even thought the Mahomet Aquifer seems like a strange place to put a landfill, that's where the clay is."

It is clear, as indicated in his first response, that the steps that would be needed, and have to be adequately funded, to address the deterioration in containment that will, without question, occur, have not been *"anticipated"* by either the applicant or the regulatory agency.

Also of concern in the response is the fact that the EPA representative was quick to state a presumption that detection of PCBs, or presumably other attendant pollutants, would be initially viewed as laboratory error until proven otherwise. This level of suspicion of analytical results was not expressed, however, for the finding of "negative" results for PCBs. If the laboratory is doing sloppy work, however "human" it is, neither the positive nor the negative results can be considered reliable.

In the questioning of what would be done when containment failure is detected, Johnson was asked about who would pay for whatever "remediation" was undertaken.
When Johnson responded to the question about what would be done when contamination was found by saying *"Dig it up,"* the questioner followed up with the question, *"And who pays for that?"*

Johnson responded, *"The people who put it there."* to which the questioner asked, *"So that would fall back to the haulers, anybody that generates it? Or are we talking just"* It was at that point that Johnson gave the wholly non-response answer: *"Yeah, that happens every now and then, folks put waste in the wrong place and they have to dig it up. We've had this happen on occasion and that's why we have burial coordinate systems and we know exactly what's put where. And so often times we wind up having to move, believe it or not, whole landfills. That happens; but I don't anticipate it."*

Bray posed another question to understand the responsibility for remediating contamination from the CWU: *"One of the things you've mentioned was taking precautions after you found PCBs. There again, my question is who pays for the correction?"* to which Johnson responded: *"If we can point the finger at who made the problem, they'd be the ones who'd be responsible."*

Concern about these evasive and ambiguous responses to this fundamental issue that should be well-defined and understood was heightened by Gonzalez's comment with regard to his experience with clean-ups, *"So I've noticed that pinning blame on any one particular organization is very difficult when they're all joined together, using the same resources to say, ya-know it's X, and it's Y, and it's Z actually doing this."* No doubt pinning the blame on any particular organization is difficult; that makes it all the more important that these issues be, in fact, *"anticipated"* and planned for prior to even preliminary approval.

Near the end of the meeting, another attendee raised the question:
"So if this company should go out of business, you would take that over then and you would do the monitoring?"

Johnson responded in this way:
"Um, I'm not sure who would actually take over if the [inaudible] *would occur, because that would be part of the process of finding out who would be responsible for taking things over, but it brings up an important – yeah, the financial insurance could, too, if the company weren't*

available and nobody else willing to take responsibility. But there's something I happen to remember, and that is that the company I worked with in Michigan recently got inspection from the national center, uh national inspection, and they were descended upon by must have been 10 EPA inspectors from Denver for two weeks, and they went over that facility with a fine-toothed comb – day after day after day, for two weeks finding out problems because when that happens, it's hard to hide the systematic problems that exist. So Wayne Disposal recently subject to a thorough inspection by NCIC – I think that's National Center for Enforcement, and they had about a two-week inspection program on the facility while it's still operating because there're concerns about this issue about third-party reporting, so this does happen at the federal level, and it happens all the time at the state level."

Thus, his response was that he did not know what would happen, and diluted that significant deficiency in planning with extraneous discussion of an inspection of a Michigan facility.

There was also an illuminating exchange between a questioner and Gonzalez that goes to the issue of who will ultimately pay for long-term monitoring and remediation.
Questioner: *"I have a quick question. Superfunds, for those of you that don't know, Superfunds are hazardous waste sites around the United States, OK?, Superfund sites used to be cleaned up by the Superfund monies and at this point, aren't the funds cut to the point where it's just containment and notification now?"*
Gonzalez: *"No, I can speak to that. Superfund sites are still being cleaned up. It might not be not as many are being cleaned up because, you're right, the tax was taken off those companies who used to pay into that fund. But Superfund sites are still being cleaned up."*
Questioner: *"They're more containment right now."*
Gonzalez: *"No, Superfund, no Superfund sites are clean-ups; they're not containment. Because to be a Superfund site, it's immediate hazard to the community. So they have to be cleaned up."*

So it appears that with regard to Superfund sites that need clean-up because they pose immediate hazards to communities "*not as many are being cleaned up because, you're right, the tax was taken off those companies who used to pay into that fund."* Gonzalez did not follow that argument to address the question of who is paying for those clean-ups that are, in fact, being conducted despite the fact that the funding source no longer exists.

The public's concern about who will pay for whatever remediation is needed, as it is needed, is justified given the obvious lack of attention to this matter. That concern is heightened by the fact that evidence of failure of the CWU containment may well not be evidenced until after the applicant is no longer responsible for maintenance and remediation, either based on so many years of "non-detection" of pollution, or closure or other dissolution the applicant's company.

Again, the responses given to these matters did not engender confidence that that eventuality was properly planned for. The issue of who will pay for this cleanup was not addressed if this occurs after the US EPA has relieved Area Disposal of postclosure funding.

Meeting Regulatory Requirements
Johnson's statements that the proposed CWU meets and exceeds US EPA regulatory requirements do not mean that the CWU will not pollute the groundwaters of the area. It simply

means that, according to Johnson, the proposed CWU apparently meets the current regulatory requirements, regulations that are well-known to be inadequate to protect the public health and environmental quality for as long as the wastes in the CWU will be a threat.

Achievement of regulatory compliance cannot be considered assurance of long-term protection of public health and environmental quality. For example, Johnson stated with regard to the EPA evaluation of the application for the CWU, *"And then we considered the Data Quality Act, which is an act that the EPA uses in making sure that the data that we use in our decision-making is – passes standards so that we can rely on the work – we do our due-diligence to try to make sure this is reliable."* While that "due-diligence" may provide an ostensible level of confidence is the reliability of the numbers generated in a laboratory, it does not ensure that adequate samples were collected, the sampling program was adequately designed and executed to generate usable and sufficient data, or that the analytical detection limits were sufficient to ensure that concentrations below those that are of public health or environmental quality concern could be measured.

Similarly, the meeting of regulatory specifications does not ensure protection of public health and environmental quality when the regulations, themselves, are inadequate to ensure that protection.

TSCA More Protective

Johnson stated that TSCA regulations are more protective than RCRA landfills. I have examined the TSCA reference provided in his presentation and find the following.

> Title 40--Protection of Environment,
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> CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY (CONTINUED)
> PART 761--POLYCHLORINATED BIPHENYLS (PCBs) MANUFACTURING, PROCESSING, DISTRIBUTION IN COMMERCE, AND USE PROHIBITIONS

at, http://www.access.gpo.gov/nara/cfr/waisidx_07/40cfr761_07.html.

It is my assessment that those regulations are not, in fact, more protective than RCRA requirements. For example, no reference is make in TSCA regulations to postclosure care of the Chemical Waste Landfills. Claiming virtue in TSCA's "old-fangled" character and not having been "changed" as Johnson did: (*"The TSCA program was put in before the RCRA program and never was changed. So we have what we call old-fashioned technology, and wind up putting new-fangled construction on top of old-fangled technology, and we have a hybrid system that is not only RCRA-compliant, but TSCA-compliant because it satisfies engineering and geology.")* is irrelevant to the question of whether or not TSCA requirements, either alone or in conjunction with RCRA requirements, as interpreted and enforced for this proposed CWU, provide reliable protection of public health and environmental quality for as long as the wastes remain in the CWU.

Also any of the regulations of these types of landfills are subject to the Regional Administrator's interpretation of what is needed. This, in fact, was touched on by Johnson as he described the regulatory process:
"In a quick answer, they have to follow the regs. Realistically speaking, there is a certain amount of latitude in the way the regs are waived, waives work. Certain elements can be waived. We have a trade-off system. Often times we, for instance, waive the 50-foot to groundwater rule, and when we do that we ask for something to compensate. And we ask for an extra liner, or 2 or 3 or 4 as necessary. By the nature of this process, such regulation can become influenced by political consideration that can override what is necessary to provide protection of public health and environmental quality of the potentially affected area and population."
Johnson went on to state,
"In this situation, we have dry waste that's going to be solidified and we take that into consideration when we look at the overall siting because the kind of waste and the level of protective measures and the trade-offs we've made – it's a kind of a bargaining, if you will – we've made sure that the site, itself, is designed for the kind of constructions. We keep in mind that siting and the construction."

The US EPA representatives at the meeting expressed their absolute and unequivocal belief that the natural strata of the proposed site provides more than necessary protection of the Mahomet Aquifer (e.g., *"What they found out was areas that were overlain by clay pan number 1 and 2 together were very invulnerable to leaching. In that way you could bury municipal solid wastes because back before the new rules came out used to be you could put in landfills any way you want – dig them in the ground. These areas weren't susceptible to landfill leaching; and this is the area we're dealing with right now. One that's safe."*) and that the waters of the upper aquifers in the area are of value only in so far as they enable monitoring of the leakage of the landfill (e.g., *"Well, it turns out that there isn't very much of this water underneath the landfill here – hardly any at all; it's only about 2 feet thick. But it actually makes for a very handy thing. It's how we monitor the bottom of the landfill with wells."*) In light of these foundation beliefs by the regulators, one could conclude that substantial "trade-offs" and "bargaining" may be on the horizon in the regulation of the proposed landfill.

Local Agency Approval
The issue of local input to the evaluation and approval process was raised a number of times during the meeting. While Johnson began his presentation by noting,
"At this point, the process we're in review. That means that the decision to make the permit has not been made. We have not made the decision. But we are in a post-draft-approval position, which means we do have enough information to go forth." He then stated, *"We prepared the draft approval; we've got a rough draft in hand so we kinda know what we're going to the talking about."*

He noted that after review of the application for the CWU, the US EPA issued a "Notice of Deficiencies." According to Johnson, that "notice" was not for the purpose of alerting the applicant to problems or shortcomings of it's application, but rather apparently to request that the applicant make a "more compelling" argument for it's proposal. Johnson explained:

"A Notice of Deficiency usually what we do is we use that as an opportunity to expand on some of the material that the applicant has provided to us. Often times the material is very technical in nature and is rather difficult to understand. And in particular, I'd like to make the material easy for everybody to understand. So just as much of the Notice of Deficiency that I put together was to give the applicant the opportunity to try to explain things in ways that were much more compelling rather than having me try to put this together in ways that would somehow give folks an impression that maybe we were taking sides. So I thought it was important to give the applicant the opportunity to speak to the issues that we thought were important." As discussed further below, that statement does not sound like one of an advocate for the people who stand to be adversely impacted by the proposed CWU.

Johnson summarized his presentation with the statement:
"In summary, the application review is complete. We evaluated the technical merits of the application. That is complete. We have issued a Notice of Deficiencies. The applicant's response to the Notice has been reviewed, and the findings support going public. That's the last slide."

The first question asked of Johnson was, *"In your siting approval of this permit, how crucial is local permitting or approval in your permitting or approval?"*
Johnson responded, *"Local permitting authority. Local permitting authority goes to the state of Illinois' IRCRA siting, so part of the IRCRA*[or RCRA?] *siting approval is to get the siting approval from the local authorities. The US EPA is tasked with the authority of making a decision as to whether or not the applicant can dispose on site. The siting authority for landfills is conducted in cooperation with the state and we make every effort to cooperate, to conduct operations in cooperation with the county and municipalities."*

Johnson continued, *"Local approval is not absolutely required under TSCA. We make every effort to make sure local approval is part of the process, and we consider it an important part of the process."*

Other questioners asked related questions regarding what information the public could bring to light or to bear during the public hearing process that might influence, or dissuade, the EPA from permitting the proposed CWU. For example, one individual asked, "
"My follow-up to that Mr. Chairman, would be – you're still in the process of making your final determination. What type of information would you consider helpful in making that decision? Is there any additional information that could come forward that would assist you in making your final determination as to whether to site or not?"

The response interchange was: Johnson: *"Information we are working on right now with the landfill applicant? We are gathering up the particulars, the areas that people who live in the vicinity; I've been plotting up the exact locations where they get their water from and developing a map that will show exactly who takes water from where. So even though we've got this belt and suspenders and duct tape-type arrangement, we want to be able to show to those people their wells, and to make sure they feel comfortable about this whole thing."*

Gonzalez: *"Was your question in reference to what the city fathers could, the county could do?"*

Questioner: *"Just in general. The fact of the matter is that we recognize that a public comment period is coming. I am trying to find out what type of information that could come through that process that would be something that would be beneficial to you to make the final determination."*

Johnson: *"I think the quick answer is to make sure we've got everyone's wells in mind, so that we can address anybody's concerns that have concerns. And there may be questions, for instance, that go to the public health issues that you're referring to."* and then launched a discussion of air monitoring.

Overall, it appears that the information the US EPA is interested in obtaining from the public is whatever is necessary to *"make sure they feel comfortable about this whole thing"* and *"so that we can address anybody's concerns that have concerns."*

While the EPA speakers tried to put the "local input" in a prominent light, the fact remains that TSCA regulations do not require local agency and public approval for developing a Chemical Waste landfill for PCBs in an area. The US EPA can, in fact, impose a chemical waste landfill on a local community if it decides that the threat of failing to remove the PCB wastes from an area is of greater significance than the threat of groundwater pollution at the proposed site for landfill disposal of the wastes. This is part of the Agency's balancing of environmental protection and potential adverse impact to those in the vicinity of the chemical waste landfill.

Postclosure Perpetual Care

Johnson described "perpetual care" funding of the landfill in this way:
"Part of the process for a permit is to establish what's called a perpetual care program. And the perpetual care program involves financial insurance funding mechanism. A funding mechanism is set up for a 30-year interval, and we set that 30-year interval as a revolving plan. So every year we push 30 years ahead, and 30 years ahead, so we always look forward 30 years. So when the accounting sets up a fund to maintain the landfill, the cap and everything, they will have funds to take care of it. There are ways to build landfills that have been demonstrated to be protective for tens of thousands of years."

That concept of a 30-year "revolving plan" is not what is presented in the permit application. While the permit application refers to "perpetual care" being provided, in fact it specifies a finite 30-year postclosure responsibility period, and anticipates being able to be absolved of responsibility for further maintenance much sooner than 30-years post closure. If Johnson's description accurately represents the requirements for this CWU, the Application needs to be revised to reflect the 30-year "revolving plan" that needs to be renewed and maintained in perpetuity – for as long as the PCB-containing wastes remain in the landfill.

It has been discussed elsewhere in these comments that essentially no attention has apparently been given to realistic scenarios for providing for the long-term, truly perpetual, care that will be necessary for this site.

Another questioner expressed concern about who would pay for long-term care and remediation, This issue was addressed in response to this question.

Another related concern that was not addressed by the EPA representatives was how the US EPA make the determination that the CWU is no longer a threat, and relieve Area Disposal from further postclosure funding for CWU monitoring, maintenance and groundwater pollution remediation over the very long time that the wastes in the CWU will be a threat. As noted earlier, this is especially important in light of the absolute confidence of the EPA representatives in the adequacy and reliability of the clay pan protection of the Mahomet Aquifer and the lack of value of the upper aquifers.

Source of PCB Wastes

When asked about the source or sources of PCB-containing wastes that would be buried in the CWU Johnson was ambiguous and evasive at best. When asked if wastes from Gary, IN mentioned by Gonzalez were slated for the proposed CWU, Gonzalez responded, *"Not to my knowledge, it's not. Not to my knowledge. I don't think we have any knowledge of that quite frankly."*

When asked, *"How does this facility, though, participate in that* [Great Lakes bi-national strategy] *clean-up? That's what I'm asking."* Gonzalez responded: *"We don't think it does, actually. We have no knowledge of that."*

The questioner persisted in the line of questioning by asking: *"Where is this waste coming from, then? There is only so many AOC's that you guys know of; you've already got a list of them. So one of them has to be coming here."* The response given by Johnson was disturbingly evasive, even possibly misleading, as subsequently pointed out by the questioner in the following exchange:

Johnson: *"There is a Superfund process that's ongoing, but I can tell you that the Superfund process that is ongoing does not have this listed."*
Questioner: *"It doesn't exist yet."*
Johnson: *"It doesn't exist yet. Correct."*
Gonzalez: *"So you're speculating, then."*
Johnson: *"Right."*
Questioner: *"I'm attempting to find out where this waste is coming from. That's all I'm asking."*
Bray: *"I think what they're telling you is they don't know."*
Johnson[?]: *"We don't know."*
Questioner: *"You don't know where it's coming from. Well I don't know where it's coming from, we don't see no need for this facility whatsoever. That's all I want to know."*

In a subsequent exchange shortly thereafter, a questioner tried to understand the pressing need for the proposed CWU. She asked:
"My question is, how many locations in the United States are now accepting PCB chemical waste? How many?"

After banter about whether or not she was referring to "commercial" facilities, the questioner said, *"'Beg 'pardon. I still haven't heard how many."*

to which Johnson replied: *"I think it's 12 or 13 but I'm a little fuzzy on the exact number right now."*

Questioner: *"I've heard it's 10. (Johnson: mm-hm) And I've heard that of that 10, some of them are now filled up. And even the EPA would like to find a place to dump. Is Clinton going to be the place?"*

Johnson's response was, *"Uh, each one of those sites has plenty of room to expand."*
Notwithstanding their lack of knowledge of where the waste would be coming from, Johnson stated at one point in his presentation with regard to the wastes that would be put in the CWU: *"In this situation, we have dry waste that's going to be solidified.*

Overall, the statements made by the US EPA representatives regarding the sources of the PCB-containing wastes for the DeWitt County CWU were ambiguous and evasive. Similarly, they did not appear able to respond to the need for the proposed CWU when each of 10 existing facilities has room to expand. If the US EPA does not know that there is need for a CWU to clean up an area then why is there need for another CWU?

Additional Issues
As discussed above, Johnson's confidence in the adequacy of the proposed site and design is related in large part to his belief that PCBs are essentially immobile. An issue that has not been addressed is what other hazardous chemicals would be present in the PCB-containing wastes that could pollute the aquifers underlying the Area Disposal CWU landfill even if the PCBs did not migrate. As discussed by Dr. C. Daughton of the US EPA (Daughton, 2004), the US EPA and the states regulate only a hundred or so chemicals of the several million chemicals that are in commerce today. As also discussed in our Flawed Technology review, there could readily be highly hazardous chemicals, both regulated and unregulated, present in the PCB-containing wastes that could be deposited in the CWU; some or many of those other chemicals could be expected to be highly mobile and therefore rapidly pollute the aquifers underlying the proposed CWU.

An example of such a situation is what was found with the chemical perchlorate. Just a few years ago it was discovered that perchlorate was a widespread water pollutant that is highly hazardous but yet is not analyzed for in the characterization of complex mixtures of wastes. The problems of perchlorate have existed for many years without detection; it was not "detected" because it was not on list of chemicals that are typically analyzed for in evaluating the quality of a water supply. This issue was not discussed by Johnson at the April 7 meeting. Placing complex mixtures of wastes that contain PCBs in a CWU landfill that overlies aquifers used for domestic water supply is strongly contrary to the principles of prudent public health practice and protection of the interests of the current and future residents of DeWitt County.

Concluding Remarks
Overall, the presentation made by the US EPA representatives on the proposed CWU was generally evasive, dismissive, and at times antagonistic; it failed to exhibit considered regard for a number of key siting and landfill component issues in the protection of public health and environmental quality from adverse impact of wastes that could be placed in the proposed CWU,

in favor of extolling their beliefs of the virtues and perfection of the site and application. The tone and content of much of the presentation and response to questions was characteristic of an advocate for the landfill applicant, rather than as an advocate for protection of public health and environmental quality, or even as an objective, disinterested reviewer. Indeed, considerable attention was given to the work that Johnson apparently has done to evaluate the site, and to work that he is intending to do with regard to defining the use of the waters of the upper aquifers, work that would appear to more properly be required of the applicant prior to "draft approval."

Reference:

Daughton, C. G., "Non-Regulated Water Contaminants: Emerging Research," Environmental Impact Assessment Review, 24(7-8):711-732 (2004). This document can be accessed directly from: http://epa.gov/nerlesd1/chemistry/pharma/images/EIAR.pdf [note: minor content and formatting differences exist between this web version and the actual published version, which can be accessed here: http://www.sciencedirect.com/science/journal/01959255]

Appendix A
Dr. G. Fred Lee, PE(TX), BCEE
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 1,100 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-49-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 85 different landfills and waste piles (tailings) in various parts of the United States and in other countries, including 12 hazardous waste landfills, eight Superfund site landfills and five construction and demolition waste landfills. He has also served as an advisor to a hazardous waste landfill developer and to IBM corporate headquarters and other companies on managing hazardous wastes.

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 150 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.

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) 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 American Academy of Environmental Engineers (AAEE) board certified Environmental Engineer. 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 20-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 December 2008, which can be found on their website at
http://www.gfredlee.com/Landfills/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.

Drs. Lee and Jones-Lee have developed guidance on the evaluation of the potential impacts of landfills. This guidance is available as,

Lee, G. F., and Jones-Lee, A., "Guidance on the Evaluation of the Potential Impacts of a Proposed Landfill," Report of G. Fred Lee & Associates, El Macero, CA January (2007).
http://www.gfredlee.com/Landfills/EvaluationImpactLF.pdf

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

American Academy of Environmental Engineers Board Certified Environmental Engineer, Certificate No. 0701 Chief Examiner Northern California for AAEE Board Certification including in the solid and hazardous waste management

PUBLICATIONS AND AREAS OF ACTIVITY

Published over 1,100 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.

Publications are available in the following topics at http://www.gfredlee.com/plandfil2.htm

- **Overall Problems with "Dry Tomb" Landfills**
- **Liner Failure Issues**
- **Groundwater Pollution by Leachate**
- **Groundwater Monitoring**
- **Post-Closure Care**
- **Permitting of Landfills**
- **Fermentation/Leaching "Wet Cell" Landfills**
- **Landfill Mining**
- **Landfills and the 3R's**
- **NIMBY Issues**
- **Review of Specific Landfills**
- **Hazardous Waste Landfills**
- **Groundwater Protection Issues**

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

Arizona *(State Landfilling Regulations)*	Verde Valley - Copper Tailings Pile Closure Mobile – Southpoint Landfill
California *(State Landfilling Regulations)*	Colusa County - CERRS Landfill San Gabriel Valley - Azusa Landfill (Superfund Site) 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 Mountain View – Mountain View Landfill Barstow - Hidden Valley (Hazardous Waste) Mohave Desert - Broadwell Landfill (Hazardous Waste) Cadiz - Bolo Station-Rail Cycle Landfill University of California-Davis Landfills (4) (3 Superfund Site) 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 and Palos Verdes Landfill Contra Costa County – Concord Naval Weapons Station Tidal LF (Superfund) Nevada County - Lava Cap Mine Area Landfill (Superfund Site) Sylmar - Sunshine Canyon Landfill Roseville - Roseville Landfill San Diego County – Campo Landfill Cortina Landfill – Colusa County,
Colorado (*State Landfilling Regulations)*	Last Chance/Brush – (Hazardous Waste Landfill) Denver - Lowry (Hazardous Waste Landfill) Telluride/Idarado Mine Tailings
Delaware	Various MSW landfills – Evaluate past disposal of industrial wastes
Florida	Alachua County Landfill
Georgia	Meriwether County – Turkey Run Landfill Hancock County – Culverton Plantation Landfill
Illinois (*State Landfilling Regulations*)	Crystal Lake - McHenry County Landfill Wayne County Landfill Kankakee County – Kankakee Landfill Peoria County – Peoria Waste Disposal (Hazardous Waste) Chemical Waste Unit at Clinton Landfill
Indiana (*State Landfilling Regulations*)	Posey County Landfill New Haven-Adams Center Landfill (Hazardous Waste)
Louisiana	New Orleans vicinity - Gentilly Landfill and Chef Mentuer Landfill

Michigan (*State Landfilling Regulations*)	Menominee Township - Landfill Ypsilanti- Waste Disposal Inc. (Hazardous Waste - PCB's)
Minnesota	Reserve Mining Co., Silver Bay - taconite tailings Wright County - Superior FCR Landfill
Missouri	Jefferson County - Bob's Home Service (Hazardous Waste)
New Jersey	Fort Dix Landfill (Superfund Site) Cherry Hill – GEMS (Superfund Site) Lyndhurst - Meadowlands Landfill Scotch Plains Leaf Dump
New York	Staten Island - Fresh Kills Landfill, Niagara Falls Landfill – (Hazardous Waste), New York City – Ferry Point Landfill
North Dakota	Turtle River Township - Grand Forks Balefill Facility Landfill
Ohio	Clermont County - BFI/CECOS Landfill (Hazardous Waste) Huber Heights - Taylorville Road Hardfill Landfill (C&DD) Morrow County – Washington and Harmony Townships C&DD Landfills
Pennsylvania	Pottstown – Pottstown Landfill
Rhode Island	Richmond – Landfill (C&D)
South Carolina	Spartanburg - Palmetto Landfill
Texas	Dallas/Sachse – Landfill Fort Worth - Acme Brick Landfill (Hazardous Waste) City of Dallas - Jim Miller Road Landfill Pasadena – Mobil Mining and Minerals industrial waste pile
Vermont	Coventry, Vermont - Coventry Landfill
Washington	Tacoma - 304th and Meridian Landfill
Wisconsin	Madison and Wausau Landfills
INTERNATIONAL LANDFILLS	
Alberta, Canada	Waste Management proposed Thorhild Landfill
Belize	Mile 27 Landfill
Ontario, Canada (*Prov. Landfilling Regulations*)	Greater Toronto Area - Landfill Siting Issues Kirkland Lake - Adams Mine Site Landfill Pembroke - Cott Solid Waste Disposal Areas
Manitoba, Canada	Winnipeg Area - Rosser Landfill
New Brunswick, Canada	St. John's - Crane Mountain Landfill

Nova Scotia, Canada	Sydney Tar Ponds and Coke Ovens Site
England	Mercyside Waste Disposal Bootle Landfill
Hong Kong	Three New MSW Landfills
Ireland	County Cork - Bottlehill Landfill County Clare - Central Waste Management Facility, Ballyduff
Korea	Yukong Gas Co. - Hazardous Waste Landfill
Mexico (*Haz. Waste Landfilling Reg.*)	San Luis Pontosi Landfill- (Hazardous Waste)
New Zealand	North Waikato Regional Landfill
Puerto Rico	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 Newsletter

G. Fred Lee Advisory Services

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
Thilmany 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
Linquist & Vennum, 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
Hufstedler, 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
John Cobey et al., Morrow County, OH
Heart of Illinois Sierra Club and Peoria Families Against Toxic Waste, Peoria, IL
Sierra Club of Canada, Cape Breton Group, Nova Scotia
Tulane Environmental Law Center, New Orleans, LA
Backcountry Against Dumps, Boulevard, CA
The Roth Law Firm, Marshall, TX
Citizens group Meriwether, County, GA
North Sacramento Land Company, Sacramento, California
Macuga, Liddle & Durbin Detroit, Michigan
Lozeau & Drury, Alameda, CA
DeWitt County, IL
Concerned Citizens of Thorhild County Alberta, Canada

Experience in Working with PCB Pollution Issues

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El Macero, CA 95618
May 2009

In the 1960s, when he held the position of Professor of Water Chemistry and Director of the Water Chemistry Program at the University of Wisconsin, Madison, Dr. Lee directed the masters thesis and PhD dissertation work of a number of his graduate students on the occurrence, fate and effects of organochlorine pesticides in aquatic systems. During the course of that work they discovered that what some other investigators had reported to be DDT residues in birds was not in fact DDT, but rather was polychlorinated biphenyls (PCBs). Lee and his graduate students were among some of the first in the US to investigate the occurrence of PCBs in aquatic systems, and the sources of those PCBs; he directed the work of one of his PhD students specifically on environmental issues associated with PCBs.

Dr. Lee's pioneering work on PCBs gained national recognition, including his being interviewed by Walter Cronkite for the *CBS Evening News*. One of his graduate students whose PhD dissertation was devoted to PCB issues, Dr. Gilman Veith, became employed by the US EPA and directed the Agency's work on PCBs in the 1970s, which led to the PCB regulations that were adopted as part of the Toxic Substances Control Act (TSCA). The Veith and Lee papers on the PCB-pollution of water, sediments, and fish are available on www.gfredlee.com as,

Veith, G., and Lee, G. F., "A Review of Chlorinated Biphenyl Contamination in Natural Waters," *Water Research* **4**:265-269 (1970).
http://www.gfredlee.com/HazChemSites/Veith-Lee-ReviewPCB.pdf

Veith, G., and Lee, G. F., "PCBs in Fish from the Milwaukee Region," Proc. 14th Conf. Great Lakes Res., Internat. Assoc. Great Lakes Res. pp. 157-169 (1971).
http://www.gfredlee.com/HazChemSites/Veith-Lee-PCBFishMKE.pdf

Veith, G., and Lee, G. F., "Chlorobiphenyls (PCBs) in the Milwaukee River," *Water Research* **5**:1107-1115 (1971).
http://www.gfredlee.com/HazChemSites/Veith-Lee-PCB-MKERiver.pdf

PCBs were among the organochlorine compounds included in Lee's $1-million laboratory and field investigation of the release of sediment-associated pollutants during dredging and dredged sediment disposal in the 1970s under contract with the US Army Engineer Waterway Experiment Station. That study examined the behavior of about 30 chemical parameters in sediments from about 100 different sites across the US. The Corps of Engineers reports on that work were released as,

Lee, G. F., Jones, R. A., Saleh, F. Y., Mariani, G. M., Homer, D. H., Butler, J. S. and Bandyopadhyay, P., "Evaluation of the Elutriate Test as a Method of Predicting Contaminant Release during Open Water Disposal of Dredged Sediment and Environmental Impact of Open Water Dredged Materials Disposal, Vol. II: Data Report," Technical Report D-78-45, US Army Engineer Waterway Experiment Station, Vicksburg, MS, 1186 pp., August (1978)..

Jones, R. A. and Lee, G. F., "Evaluation of the Elutriate Test as a Method of Predicting Contaminant Release during Open Water Disposal of Dredged Sediment and Environmental Impact of Open Water Dredged Material Disposal, Vol. I: Discussion," Tech Report D-78-45, US Army Engineer Waterway Experiment Station, Vicksburg, MS, August (1978).

Those studies revealed that PCBs associated with sandy sediments tended to be released when the sediments were suspended in water, while the PCBs associated with sediments having high organic content were more tightly bound to the sediments.

Because of the widespread occurrence of PCBs in aquatic sediments, the US Army Corps of Engineers issued a contract to Dr. Lee to develop a review of PCBs in sediments and the potential impact of PCB-contamination of sediments on the Corps' dredging of US waterway sediments to maintain navigation depth. That work resulted in the publication of the report,

Lee, G. F. and Jones, R. A., "Significance of PCBs in Dredged Sediment," Final Report to the US Army Engineer Waterways Experiment Station, Vicksburg, MS, August (1979).

Dr. Lee served as a member of the PCB criterion review panel for the American Fisheries Society's Water Quality Panel review of the US EPA "Red Book" of Water Quality Criteria–1976. In addition, on behalf of the US Public Health Service, he chaired a committee responsible for evaluating the need for a drinking water MCL for PCBs.

The advice of Dr. Lee has been sought in the assessment, impacts, and management of PCB-polluted sediments in a number of areas including the Hudson River and Hudson River Estuary near New York City. On several occasions he was asked by the US EPA Region 2 to advise it on the approach that should be used to control excessive PCB accumulation in striped bass in the Hudson River. He was also involved as an advisor on issues of PCB accumulation in waterbodies in the state of Wisconsin, including the Milwaukee River. His work on managing PCB-contaminated sediments also included serving as an advisor to Outboard Marine Corporation on the PCB-pollution of sediments of Waukegan Harbor (Wisconsin). In addition, PCBs are an issue of concern at the UCD/DOE LEHR National Priority List Superfund site for which he served for 15 years as the US EPA-sponsored Technical Assistance Grant advisor to the public on the adequacy of the site investigation and remediation.

Dr. Lee has been involved in evaluating the potential for PCBs in hazardous chemical landfills to pollute groundwaters, including the Wayne Disposal Landfill for the Ypsilanti Township, Michigan, and the BFI/CECOS Landfill in Clermont County, Ohio. Dr. Lee has served as an advisor to the Sierra Club of Canada on approaches for the remediation of PCB-contaminated sediment of the Sydney Tar Ponds located at Sydney, Nova Scotia. That work is available as,

Lee, G. F., "Comments on, 'Remediation of Sydney Tar Ponds and Coke Ovens Sites Environmental Impact Statement, Sydney, Nova Scotia,' dated December 2005," Report of G. Fred Lee & Associates, El Macero, CA, USA, May 15 (2006).
http://www.gfredlee.com/Landfills/SydneyTarPondsReport.pdf

Lee, G. F. and Jones-Lee, A., "Progress toward Remediation of the Sydney Tar Ponds: A Major Canadian PCB/PAH 'Superfund' Site," Journal *Remediation* 17(1):111-119 (2006). http://www.gfredlee.com/Landfills/STP-Remediation-pap.pdf

On behalf of the California Water Resources Control Board Drs. Lee and Jones-Lee conducted a comprehensive review of the data base on organochlorine "legacy" pesticides and PCBs in fish in California Central Valley waterbodies from the late 1970s through 2005. Those data showed that while the concentrations of organochlorine pesticides in fish tissue have been decreasing, the PCB content of fish tissue has not. Their findings are available in the following reports:

Lee, G. F. and Jones-Lee, A., "Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance," California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002). http://www.gfredlee.com/SurfaceWQ/OClTMDLRpt12-11-02.pdf

Lee, G. F. and Jones-Lee, A., "Excessive Bioaccumulation of Organochlorine Legacy Pesticides & PCBs in CA Central Valley Fish," PowerPoint Slides made available at US EPA National Fish Contaminant Forum, San Diego, CA, January (2004). http://www.gfredlee.com/Runoff/OCl-slides-SanDiego.pdf

On behalf of William Jennings, DeltaKeeper, Dr. Lee and his associates demonstrated the approach that can be used to evaluate the bioavailability of PCBs in contaminated sediments. Their report on that work is available as:

Lee, G. F., Jones-Lee, A., and Ogle, R. S., "Preliminary Assessment of the Bioaccumulation of PCBs and Organochlorine Pesticides in *Lumbriculus variegatus* from City of Stockton Smith Canal Sediments, and Toxicity of City of Stockton Smith Canal Sediments to *Hyalella azteca*," Report to the DeltaKeeper and the Central Valley Regional Water Quality Control Board, G. Fred Lee & Associates, El Macero, CA, July (2002). http://www.gfredlee.com/HazChemSites/SmithCanalReport.pdf

Dr. Lee has provided guidance on developing TMDLs to control the bioaccumulation of PCBs:

Lee, G.F, and Jones-Lee, A., "Developing TMDLs for Organochlorine Pesticides and PCBs," Presented at the American Chemical Society Environmental Chemistry Division national meeting in San Diego, California, April (2001). http://www.gfredlee.com/Runoff/sandiego_030801.pdf

Currently Dr. Lee is active in evaluating the potential impact of disposal of PCB-contaminated sediments in a Chemical Waste Unit landfill in DeWitt County, Illinois.

Copies of Dr. Lee's reports on these and other studies are available on his website: www.gfredlee.com in the Landfills-Groundwater Section "Examples of Specific Landfill Studies" subsection [http://www.gfredlee.com/plandfil2.htm#examples], in the "Hazardous Chemical Sites" section [http://www.gfredlee.com/phazchem2.htm], as well as in other sections.

Appendix B
Transcription of April 7, 2009 Joint Meeting of DeWitt County Board, Clinton City Council, County Land Use Committee

(numbers refer to location on the recording. Names of questioners or commenters may be inaccurate or misspelled)

00:32 April 7, 2009 County Board Meeting, Clinton City Council reconvening, County Land Use Committee Meeting [NB: names may be inaccurate or misspelled]

County Board roll call:
Graham, Surley, Borden, Ingram, Evans, [inaudible], Rich, Sturgeon, Taylor, Tilly, Young, Bray

Mayor Willit, City Council of Clinton roll call:
01:33 City Council roll call: Commissioners Milton, Hickman, Wise, Edmonds (absent), Mayor Willit

County Land Use Committee roll call:
Brown, Corey, Evans, Young, Bray

04:05 County Bd Chairman: "Tonight is not the public hearing that will occur later, that the US EPA will hold as part of this chemical waste site. Tonight is simply an informational meeting. We have representatives from the EPA here tonight to share information on the process – where it's at to date and what to expect in the future. So I am going to, at this point, turn over to our state's attorney, Mr. Dick Koritz to kind of outline what's going to take place here this evening."

04:36 Koritz: "Procedurally, tonight, we're having a committee meeting, more or less, is the bottom line. The committee asked the EPA to come in and address the committee, the Land Use Committee. These individuals are from the Chicago office of the EPA. They're going to make a presentation. And again, as the chairman stated, this is not, quote/unquote, a public hearing, although it's certainly a public meeting. So what the procedure is going to be is outlined to be as follows. The EPA will present a PowerPoint presentation which will take about 20, 25 minutes. After that they'll make another oral presentation, and then take it to the committee and the County Board to ask questions. Those questions will come from the board to the EPA as the board sees fit. After that, if there's some time, the question period will be opened up to the group of you sitting out here or the press. Those questions will then come from the group to the chairman conducting the meeting which at this time would be Mr. Bray. Mr. Bray will acknowledge you, accept your question – it's whoever he wants to acknowledge for the question – and then will be presented to the EPA for response. I stress, there will be a public hearing some time in the future, as I understand it. That's what the EPA's informed me. But today is not what is normally referred to as a public hearing. Though again I stress, it is a public meeting and you're certainly entitled to be here and listen. The presentation will go on from there. Mr. Bray will conduct the meeting from here on."

06:25 Bray: "Right now I'm going to turn the meeting over to Rafael Gonzalez. Rafael, I want you to go ahead and tell them your procedure and what you want to do."

07:01 Gonzalez: "Well, we'd like to open up the meeting actually with a 'thank you' to Mayor Ed Willet and Mike Bray for inviting us both here – both you gentlemen for inviting us here to give us this opportunity to share with you exactly what it is that EPA has been doing all these months. And I'd also like to mention to you that, as already has been mentioned, this is not a public hearing. There will be a public hearing when we are either going to or not going to issue a permit. There will be a public hearing. The community will get a 30 to 45-day response to anything we put out there, so this is as was suggested, this is really just a presentation to show you what the process is and where we stand in the process. With that, I'd also like to remind you that we would like to respond to the questions but they would be, of course, through the committee chairman. You would pose the questions to us. And, quite frankly, we will be listening to your questions and respond accordingly, so we won't have to repeat the questions from the chair. So with that, I'd like to present two people who are with us this evening from EPA, and that is the Principal Project Manager on this site and that is Steve Johnson. He's right here to my right. And of course we have Gary Cygan, a senior geologist at EPA. Both these gentlemen have reviewed and continue to review the process and the permitting that is required of this site. So with that, I'd like to turn this meeting over to Steve Johnson." [Steve Johnson, geologist, US EPA, Chicago, TSCA Permits, Principal Project Manager for Site]

09:07 Johnson: "Good morning. I'm Steve Johnson. I'm with the US EPA, and I'm a geologist. I've been with the program at EPA for 19 years. And this is the program that I've been most attached with and I've studied it all my career here with the EPA. And with that, I'd like to turn to some slides and kinda go through the agenda. I'll speak to the slides. What we thought we'd address are the status of the permit right now, the process that we're going to be using as we go forth, what that schedule is, and some factual information that we've gleaned from the work that we've done."

09:52 Johnson: (slide 2) "At this point, the process we're in review. That means that the decision to make the permit has not been made. We have not made the decision. But we are in a post-draft-approval position, which means we do have enough information to go forth. We can go to the public with the information that we have. And we are pre-public comment. In other words, we will have a public comment period, and it'll be a formal one. We haven't put together the information that we will intend on giving to the public, to put it into a repository at some point in Clinton. But we don't have that Administrative Record or draft approval for you to look at and review. But we do have enough information at this point to go ahead."

10:55 Johnson: (slide 3) "This is the process. We received the application October of 2007, and we began the process about a year later, June of 08, and we've completed the application's We've received all of the material. We did a review. Typically it takes 180 days; we finished that review in January of 09. We put together a Notice of Deficiencies, and a response to that Notice of Deficiencies. That typically takes about 120 days. The preliminary Notification went out in September; final one came out in January, and the response was received in March. We have reviewed that NOD; usually takes 30 days and we finished it in March, about on time. Right now we're on that part where you can see it's colored. That's the preliminary decision point. We prepared the draft approval; we've got a rough draft in hand so we kinda know what we're going to be talking about. We haven't set a time for the public meeting. We sort of feel

that it'll happen in late April or early May. That time has not been determined. We have a public comment period that will follow, after that public meeting is held, and that period of time will be about 30 days. We expect that to extend from April to May. We had originally planned that in June, so we're actually a few months ahead if we manage to conduct the public comment period in April and May. Addressing comments from the public: we anticipate some comments and we'll take some time to process them. Take about 30 days. Effectively we expect those to be processed in June, and a final decision should be made within 30 days or so of the time we finally complete responding to the questions. At that time we'll put together some material and make it available to the public."

13:15 Gonzalez: "Before you put up the next slide, could you review quickly what a Notice of Deficiencies is please?"

13:21 Johnson: "A Notice of Deficiency usually what we do is we use that as an opportunity to expand on some of the material that the applicant has provided to us. Often times the material is very technical in nature and is rather difficult to understand. And in particular, I'd like to make the material easy for everybody to understand. So just as much of the Notice of Deficiency that I put together was to give the applicant the opportunity to try to explain things in ways that were much more compelling rather than having me try to put this together in ways that would somehow give folks an impression that maybe we were taking sides. So I thought it was important to give the applicant the opportunity to speak to the issues that we thought were important."

14:09 Gonzalez: "Can I just make one point about the public meeting and the public comment period. Usually what we like to do is have the meeting half way through the comment period so that the materials get to the repository, there'll be a notice in the newspaper, and it'll also be broadcasted over your local radio station that there is a repository on this site, at your library or wherever we decide that will be. Then we will announce the meeting. The meeting might be in the middle of that comment period. This way, the public has the opportunity to go to the repository, withdraw the information they need to get, garner that, come to the meeting somewhat prepared, and then have a balance of time to respond to the things they heard at the meeting or the questions that they might have had answered at the meeting. So that the public doesn't get sort of get slighted in that there's a public meeting, the comment period, and one doesn't connect with the other. Thank you."

15:18 Johnson: (slide 4) "Thought I'd start this out with a northward-looking, high-angle air shot. This is the solid waste cell that exists right now. Waste cell number 2. To the north you see the town of Clinton. In the north part of the upside, you'll see the Clinton well-field. And I drew a blue line there that shows the general direction of groundwater flow in the Mahomet Aquifer that many of you are familiar with. To the right you'll see a solid waste cell. I outlined that cell. It's not been constructed yet. In the corner of that cell you'll notice the letters 'PCB.' That corner will be a specially designated cell that's designed to be independent of the rest of the cell, and will be built with special standards that the applicant has deemed important, and will have an extra liner, and it will be bermed-off and separate from the solid waste cell."

16:21 (slide 5) "This is a map you'll – this shows the center of Illinois. It shows the town of Clinton, and it shows the county of Clinton [sic?], and what I really wanted to do by this is to show the two things that really dominate the setting here, and that is what I call 'clay pan number one' 'clay pan number two.' Throughout much of Illinois the geology is dominated by these two clay pans. And in fact here at the place where I marked 'Clinton LF,' which is Clinton Landfill just a few miles south of Clinton, it's smack-dab in the middle of an orange part – well, pink – is the approximate boundary of the Mahomet Aquifer. It's a large aquifer that extends for many counties, and DeWitt County straddles it. It turns out that that aquifer is actually the thick part of the clay pan. The clay pan extends over it, covers it completely for miles and miles in all directions and virtually nothing has ever cut through it. There are a few little areas where streams have tried to cut through it and they sometimes they cut through the top pan, Pan number 1, but they don't cut through Pan number 2."

17:44 (Koritz?): "Steve, before we go on would you show with the pointer on the slide what the Mahomet Aquifer extent is?"

17:52: "The Mahomet Aquifer is this part here, and all of the greenish this pink material down I'm afraid that it doesn't show – [dimming the lights] so this is the size of the aquifer. It's really huge. It's a buried valley. It's about 400 or 500 feet deep in some parts; 300 feet in others; 20 or 30 miles wide in various areas, and it extends over many counties, some 15; 5 or 10 counties at least. And so what we're doing is looking at the middle of the county on top of clay pan number 1 and it's somewhat dissected by these creeks and these rivers. And they cut down through most of clay pan number 1, but right where the landfill is we're sitting right on this green, this light green stuff. And that light green stuff is what I call clay pan number 1. This dark green stuff are the little moraine hills which are a little more gravelly. But the good farmland, the good high-grade clay here that is so impermeable and causes some folks trouble because the farm fields are hard to drain, that's the clay pan number 1 we're talking about."

19:20 (slide 8) "This gives you an isometric view, here's the state of Illinois, and a block. That block represents this area here and I have superimposed upon that a diagram that you can make out the outline of the county of DeWitt, and Clinton Landfill, and you can see Salt Creek right there. Salt Creek cuts through a little bit of that clay pan number 1, but the landfill sits smack dab on top of the green stuff. And then these little dark green moraine hills that I referred to – those are the hills that are just a little bit north of the county you guys may be familiar with. And if you go down through clay pan number 1 and clay pan number 2, you get down to the Mahomet sand aquifer sits down here. Now there're two aquifers that stand in between the Mahomet and clay pan number 1. These are kind of patchy aquifers. Some folks draw water from them; others don't. They're kind of erratic, and they're not quite so predictable."

20:25 (slide 9) "This kind of shows you some of the sand patches. These are relatively large features. And peeking through this dark mud [adjusting lights] there's a little bit of mud that you can see. This is clay pan number 2 and it extends pretty continuously over the whole area, with a little bit of Mahomet sticking through in a few different places. [inaudible] So clay pan number 2 is virtually continuous over the entire county, and certainly where we have the town of Clinton and the landfill."

21:20 (slide 10) "And here we have underneath that clay pan the Mahomet sand, and you can see it fills this valley that I was referring to. Here you can see the size of the county, and there's the city, there's the landfill. And the landfill is actually kinda sitting pretty close to a little island here, but there is still about 60, 70 maybe as much as 90 ft of sand underneath the clay pan number 2. So there's still some aquifer."

21:54 (slide 11) "And this is the very valley that that sand fills up. and that's [inaudible] that the groundwater is flowing in two directions around this little island here. So the landfill is sitting smack-dab 90 ft up above the bottom of the valley floor, and the water drains down from Lake Michigan through this and constantly flows towards the Mississippi River. So this constitutes the base, the basement of the Mahomet Aquifer, and then the way it sits there with DeWitt County. That's a buried valley aquifer and the sand fills it all up, anywhere from 90 to maybe 150 or 200 feet; you can kind of see it. And this is from a web page everybody can go to if they want. It's the Mahomet Aquifer Consortium. And so these slides are really excellent slides that I got from the Consortium and they've been put together, some of them, by the state of Illinois and the various surveys groundwater commissions."

23:00 (slide 11) "Now, this is a purple zone here. Could you go back one? I'd like to try to maintain scale. Inside here is a little pink square which is hard to see. Go forward to the next slide [no. 11]. That pink square is this pink square, and here is the town of Clinton and here is the groundwater well that I was pointing to before, and here is the PCB cell, and this is the direction of groundwater flow. The Mahomet as a rule goes along the northern fork of that little branch – the island is over here – and then over here there is another flow direction and this flow direction goes south of that. Here you can see what I was saying about Salt Creek cutting through most of, not all of, pan number 1. Pan number 2 kinda shows through a little bit, but not very much. Pan number 1 actually resides underneath Salt Creek here, but it's pretty thin.

24:06 (slide 12) "What we see, then, here is pan number 1, pan number 2, groundwater flow. I just arbitrarily made this arrow go a little bit more towards the island because if you go down here far enough, eventually the flow goes south of the island and north of the island and the bifurcation point is probably somewhere around here. Now what is important is to see a little bit of a line, north/south line, north and south, south, north, so if you go from the north side here you see this is the landfill and here is some notes that I took during the course of my looking at the landfill. And this is from the applicant's work. It will be available to you in the public repository. In fact, it's available now in the library. This isn't to scale. We just kinda used this as a good approximation. This is something on the order of 150 to 170 feet from the bottom of the landfill here to here – and noted it right here– and you can see the Mahomet sands sitting right there. And I actually went down to the next layer, the rock layers below, and I worried about what was happening down below that, too. But the main thing was to kind of get a sense of clay pan 1, clay pan 2. And remember what I was saying about some folks take water from up in the clay pan number 1. Well, it turns out that there isn't very much of this water underneath the landfill here – hardly any at all; it's only about 2 feet thick. But it actually makes for a very handy thing. It's how we monitor the bottom of the landfill with wells. There's going to be about 25 wells around the whole of the landfill, and about 10 or 15 of them right around the PCB cell – or at least to the north and south of the PCB cell. And we're going to monitor the water that's there – so there's going to be about 20 ft of high grade clay between the bottom of the cell

and the top of this little what we call a sentinel witness sand. And it's a little bit hard to see, but can you flip back one slide? You see where I had witness flow? The witness water flows this way – it flows toward Salt Creek. Here in Wellman Springs, water flows toward Salt Creek, exactly going the opposite way that Mahomet flow goes. And look what happens with the surface water. Surface water goes this way downstream, that way, that way, and that way. There is a wastewater treatment plant here. Here is the well stream there. So everybody relies on this clay pan number 1 to isolate them from any problems here, because they're drawing water from waaay down deep– could I have the following slide?– from the Mahomet aquifer. So this well draws from here, and that's very well protected because here we are six or seven miles – it's probably about 4 miles – This is about a section, one mile, one, two, three, and I think this is about 2 miles from here to the wastewater treatment plant. But here the water doesn't even go in the same direction [inaudible] Clinton. "

27:42 (slide 13 – slide subheaded: "Factual Information: Landfill Engineering X-Section") "Let's look at the bottom of the landfill, itself and actually look at what it is we're talking about. Here you see – and you remembering, these are very, very thick plastic liners. Not regular plastic. It's high density polyethylene. It isn't even the kind of stuff you get in a Clorox bottle, or something like that. It's about 3 or 4 Clorox bottles thick, at least. It's 60 mils thick, and you've got one, two, three of them. And in-between these two here you've got this synthetic clay. This synthetic clay is like pumping kitty litter. And if there's ever going to be a crack here, it'd get into this pumping kitty litter and it'd just pump right up. Wouldn't go anywhere. But if you actually managed to figure out how to get something through that pumping kitty litter, here, well we've got another backup here because this underneath is a composite drainage mat, and this a drainage area where water is sucked out because you've got a vacuum cleaner basically that sucks water out of this. And below that is another liner which then protects everybody from contamination in this clay that's been recompacted. This is basically highway clay; they run over this stuff with heavy equipment, recompacted it. You could drive heavy equipment over it; I don't think you could even plow it, it's so dense. And below that is natural clay, which is very dense, and, it looks like concrete."

29:10 (slide 14) "Now, there were some folks that were concerned about seismic events and things like that. What we did was we decided to take a worst possible case scenario and we took seismic and non-seismic case histories. And the applicant put together a series of diagrams – their consultants did this – Chaw [?] Environmental Company. They're the same guys I think who put in the nuclear power plant if I'm not mistaken. And what they found was that under the worst possible case scenario they got failure modes of about 1.3, 1.4 factor of safety. Now, for seismic, the state requirements are 1. So we are way over that; we are 1.3. We are so safe that this would actually stand up for earthquakes probably of 1000-yr, 10,000-yr – we haven't even seen return frequency that would be high enough to cause this kind of an earthquake. People have actually gone through and tried to experiment to come up with a way it would cause a failure. And if it were to fail, what would happen? It would actually just slide right into next-door neighbor landfill here; it's the solid waste cell to the north. It wouldn't go into Salt Creek at all because we have much higher numbers when you do the same kind of exercise the landfill slip circle calculations show these numbers are on the order of 2.3 or higher. So the worst-case scenario your number 1.37 and that's higher than the state requirements, and actually meets the state's requirements for non-seismic activity. It's a bit complicated to explain, but the nice thing

about that slide here is we've actually put it here so folks can look at it afterwards. And it's actually got no distortion; this is a true geometric representation of what's out there. There's no change in the X – Y coordinates. We haven't tried to compress it to just fit it on a piece of paper. This is what it really would look like when it's finished."

31:13 (slide 15) "These are guys out there who actually went up and down the creeks; some of them actually went up and down Salt Creek looking for signs of earthquake activity. Signs of earthquake activity include sand boils. Sand boils they found [inaudible] earthquake faults. The US Geological Survey has taken these sand boils very seriously. And they have surveyed all the rivers up and down Illinois, including in Salt Creek. And in the Salt Creek area they weren't able to find any sand boils. What they feel is that this is a very stable area. There are some areas where they did manage to find a few sand boils 4 or 5 miles away this way, 4 or 5 miles away this way. Nothing in the vicinity of the landfill, itself; which makes us think that any activity at all is – that the area has been seismically stable for as long as we can see. And this extends back a long time."

32:11 (slide 16) "What we want to do here is show the relevant regulations that we have looked at: the Toxic Substance Control Act, PCB Control Act is the one that controls polychlorinated biphenyls. Polychlorinated biphenyls are really a chemical stabilizer that they used to added to oil to help keep it from catching fire; it was a fire retardant. Resource Conservation and Recovery Act, state of Illinois, runs the solid waste landfill and they have to carve out a little piece of that solid waste landfill for the PCB guys; so we worry about this. Department of Transportation – we're worried about the roads and the trains. We consulted the Clean Water Act, and we recognized Salt Creek is there. And we have looked at national requirements for discharge of non-contact water because there will not be any discharge of anything but non-contact drain [rain?] water the way they built the dikes is to keep the rain waters separate from the water that falls on the waste. The water that falls on the waste will be separated. Water that falls outside the waste will eventually find its way to a settling pond, and finally will discharge to Salt Creek under what's called a National Pollution Discharge Elimination permit – NPDES permit. The next thing was a look at the Endangered Species Act. The state of Illinois has described a particular type of mussel as being subject to the Endangered Species Act, and we considered it, and they're not in the area that we know of. We looked. And then we considered the Data Quality Act, which is an act that the EPA uses in making sure that the data that we use in our decision-making is – passes standards so that we can rely on the work – we do our due-diligence to try to make sure this is reliable."

34:15 (slide 17) "So, we looked at the application – major application 4 volumes; looked at the Groundwater Impact Assessment that went to the state of Illinois – that was 1 volume; we looked at the response to the Notice of Deficiency – that's the one I got from the applicant, that was a volume. We coordinated with the IEPA RCRA Subtitle D modification people, because they are busy carving out a little piece of that solid waste landfill to accommodate the PCB guys. So we've been in coordination with them, and they have four volumes or more of their own, and they have their own process. And we keep track of each other and make sure that the issues that they deal with and the issues that we deal with are all wrapped up."

34:59 (slide 18) "Here are some of the sources of information that we've used. The Mahomet Aquifer Consortium that's a nice web page; I recommend everybody look at it. Illinois Water Survey publications; we looked at that for water supply issues; how water is, how much people rely on it; how important it is. I looked at the Illinois Geological Survey publications. I worried about whether there is coal down deep; whether or not anyone was going to worry about that. I figured they weren't; it's at least 500 ft below the bottom of the landfill, and it's not something that people would ever want to go after, and the state of Illinois wouldn't allow them if they tried. Illinois Department of Agriculture; I worried about the leaching vulnerability. It turns out a study was made by the state of Illinois in 1984 to determine which areas were most subject to leaching. They were worried about protecting the groundwater supplies, particularly something like the Mahomet Aquifer. What they found out was areas that were overlain by clay pan number 1 and 2 together were very invulnerable to leaching. In that way you could bury municipal solid wastes because back before the new rules came out used to be you could put in landfills any way you want – dig them in the ground. These areas weren't susceptible to landfill leaching; and this is the area we're dealing with right now. One that's safe.

The US Army/EPA, we looked at that for landfill performance; EPA Research and Development – we talked to the Cincinnati office; we talked about containment and degradation of PCBs. How long will they stick around? What ways can we develop that will break the PCBs down inside the cell?

Professional publications, we looked at them for groundwater monitoring and modeling. We talked to the US Geological Survey about topography and seismic maps. We contacted Federal Emergency Management Agency about fire safety issues because we're right next to a solid waste landfill, and the solid waste landfill will be extracting methane gas and we wanted to make sure that's OK."

37:07 (slide 19) "In summary, the application review is complete. We evaluated the technical merits of the application. That is complete. We have issued a Notice of Deficiencies. The applicant's response to the Notice has been reviewed, and the findings support going public. That's the last slide."

Questions:
37:50 Sherry: "In your siting approval of this permit, how crucial is local permitting or approval in your permitting or approval?"

38:04 Johnson: "Local permitting authority. Local permitting authority goes to the state of Illinois' IRCRA siting, so part of the IRCRA[or RCRA?] siting approval is to get the siting approval from the local authorities. The US EPA is tasked with the authority of making a decision as to whether or not the applicant can dispose on site. The siting authority for landfills is conducted in cooperation with the state and we make every effort to cooperate, to conduct operations in cooperation with the county and municipalities."

39:10 Gonzalez: "Did he answer your question?"

Sherry: "I think so."

[inaudible question – something about local approval]
39:22 Johnson continued: "Local approval is not absolutely required under TSCA. We make every effort to make sure local approval is part of the process, and we consider it an important part of the process."

39:42 Gonzalez: "Just one point of clarification: Steve, correct me if I'm wrong, but the state of Illinois has already approved the landfill. The landfill is already approved by the state of Illinois. So this addition is something that the state of Illinois would have to get approval or permission from the government, from the federal EPA, to actually place in their approved landfill. Is that correct?"

40:16 Johnson: "That's right. Very good."

40:23 Levi: "Mr. Johnson, on the cross-section that wasn't to scale, that showed the wells will be drilled down approximately 25 feet, I believe, page 12, you said that the Glasford Aquifer would be very beneficial for gaging possible contamination or testing abilities. That would be if the chemical waste is approved for those wells currently being used to gage contamination or different testing. You said there was 25."

41:01 Johnson: "Right. The perimeter well testing is, I think, a 27-well system. And there are multiple levels. The witness sand zone is used around the entire solid waste landfill. The TSCA cell, because it's only a little corner, we could only fit about 6 or 7 downstream wells. Remember there was that one that kinda showed the downstream part here, there's about 6, about 5 or 6 up here, so I believe there's 10 or 12 TSCA wells that are proposed, and they have been installed and there is work available to prove that the sand is clean before we ever put anything in."

41:56 Levi: "So essentially, just for the public's concern or whoever has the question, if we don't see any issues there, we're not going to see any issues 125 ft down farther."

42:07 Johnson: "Right."

42:12 Voice (Cygan?): "Do you want to point out on the cross-section where the monitoring would take place? That's representative of a monitoring well, that vertical stick there?"

42:24 Johnson: "The well has screened in that little sand zone; it's about 2-ft thick. You can kinda see the thickness is 0.6 to 2.5-ft thick – that's my little hen-scratching there. And this is the zone of attenuation that the state uses. And they worry about what would happen if something were to get all the way through this clay layer – through this really nice buried clay here which is a very high-quality clay – gets all the way through this, into here, and migrates past here, into there. They've done some calculations, part of the groundwater monitoring, uh modeling system, designed to meet very rigorous, somewhat unrealistically harsh terms that were imposed upon the model in order to determine whether or not it would maintain safety for the foreseeable future, for the state of Illinois."

43:25 Gonzalez: "If I could just make a point that Steve knows full-well, but probably just didn't mention it. The membranes that are going to be used in this cell are not part of the regulation. So, this is in addition, that the landfill has taken upon themselves to actually place to secure the safety of the cell. But the regs, themselves, do not say, 'hey! place 3 x-y-z membranes at this, or 2 or 1.' So, that's an additional safety factor."

44:00 Johnson: "That's correct. And that's a little surprising but it turns out PCBs are considered to be relatively immobile. And they're so immobile that you hardly can get them out of the waste. And that's why they're considered to be suitable for landfilling. And so the way the rules were set up was you just had to put them in an area that was not vulnerable to leaching. That's why I brought up the point that the state made back in 1984 to demonstrate vulnerability to leaching. In this situation what they've got is the 3 heavy duty liners, plus the kitty-litter liner, plus the underdrain, plus all the clay, recompacted clay, highway clay, buried clay, and monitoring. This is sort of a belt and suspenders and duct tape, and what-not type of scenario. It's a very difficult situation to find one that's really comparable. In fact, we never get a situation where we have 150 feet to the water table. The way the rules really read is that you have to write a waiver if you're less than 50 ft to the water table. In this case, we're talking about the top of the sand. And the water here is 150 ft down. Anybody who's tried to drill a well around here probably knows how much it costs to go down that far. And so we're saying that it's at least 150 ft down. I have never had an opportunity to have a landfill under my authority that I don't have to write a waiver for. And in this situation, because it is a buried valley, the clay is extra thick."

45:37 Bray: "One question on the monitoring well. When you set a monitoring well, it's only good for what, 2 feet around it, 3 feet around it? How far does that reach?"

45:46 Johnson: "Well, the area of influence is directly proportional to the kind of flow and the transmissivity of the sand layer. So in other words, if it's really coarse and the water is flowing fast, you have a fairly large area of influence. If the water is dead and the sand is fine, it doesn't have much of an area of influence. In this situation what they've done is they ringed the landfill with wells spaced at about 300-ft intervals. Those 300-ft intervals were designed to meet the projected diameter, or projected width, of a leak if one should occur. The projected leaks were intended on being something on the order of 200–300 feet wide, and so the well-spacing is about 200–300 feet wide. So in this situation, they've actually set the well-spacing according to some design principles."

46:36 Voice [Cygan?]: "Keep in mind also that if there was a leak to the beneath the landfill, that the monitoring points would be in the one and only layer of the geology that would be transmitting the PCBs like a river, underground river. And so that those monitoring wells would be able to pick that up because the groundwater would deliver the contamination to the monitoring wells, themselves. And so that you would have a good sentinel system."

47:20 Gonzalez [?]: "And how often is the monitoring done?"

47:24 Johnson: "The plan is for them to be done every quarter. The monitoring systems are done on a regular basis, and we have varying frequencies. It depends on the particulars of the

program and the particulars of the constituent of concern. In some cases the leachate is actually monitored every month, for the contaminants of concern because they have to get rid of the water. That's the primary area, the first zone of weakness. Any time anyone is going to find PCBs, they're going to find it in the leachate; so we check that every month because they have to get rid of the water. Second zone would be the perimeter monitoring array, and that would be monitored quarterly, and there are frequencies that the state and the US EPA have designated as being appropriate, but as a rule, quarterly is the frequency. I'd have to look in the permit to make sure I have answered the details, but that's what we have right now."

48:28 Question by Pete[?]: "I have a question back on your slide number 14, what you're talking about now if you have an earthquake and your chemical waste goes through there and your wells pick it up, how are you going to correct the situation?"

48:49 Johnson: "Dig it up."

Pete[?]: "And who pays for that?"

48:54 Johnson: "The people who put it there."

49:01 Bray: "So that would fall back to the haulers, anybody that generates it? Or are we talking just"

49:08 Johnson: "Yeah, that happens every now and then, folks put waste in the wrong place and they have to dig it up. We've had this happen on occasion and that's why we have burial coordinate systems and we know exactly what's put where. And so often times we wind up having to move, believe it or not, whole landfills. That happens; but I don't anticipate it."

49:29 Levi: "If we can go back to slide 13 so that everybody here can see it. Comparing slide 12 to slide 13 where we have the 3 liners, the clay, and the vacuum per se, where about in this depth would you say the Glasford Aquifer is where the groundwater [inaudible] and the monitoring wells are?"

49:54 Johnson: "Could you repeat the question?"

49:55 Levi: "Basically where we have the well on slide 12 – where the well actually is drilled for testing – can you compare that to slide 13 so the people can see approximately the depth on slide 13 where that well would hit."

50:18 Johnson: "Oh, that would be way, way down at the bottom; that would be off the scale because this is only like about 2 – this is 3 feet and this would be typically 3 feet; this is 6 feet, so 25 feet would be below the [inaudible]"

50:34 Levi?: "And this is just again showing that whatever the issue is, the leak has to get through the first liner and then the first clay, the kitty litter per se, and the second liner, then vacuum, then the third liner, then the compacted, and the concrete-like clay before it even gets anywhere near the first set of waters, so."

50:55 Johnson: “Right”

Voice: “You’ve got a winner here. You got it.”

51:10 Person: “Mr. Chairman, my question is kind of simplistic and it’s maybe two-pronged, but could you explain the criteria that you use in basing your decision whether or not to site. I guess what I’m asking is I know there is obviously scientific and technical data, I’m assuming by the fact that there’s a public comment or public hearing, the public also has at least a weighted part of this decision. Could you explain, I guess, simply the criteria for making the decision? “

51:39 Johnson: “Sure.”

51:39 Gonzalez: “Just as a point of clarification, you talkin about the decision we make to issue the permit?”

Person: “Correct.”

51:52 Gonzalez: “He’ll finish the technical part but I can tell you that EPA first considers the safety and health of the community. That is the premise under which all of this science falls under. After that, Steve can answer the rest of the question.”

52:15 Johnson: “In a quick answer, they have to follow the regs. Realistically speaking, there is a certain amount of latitude in the way the regs are waived, waives work. Certain elements can be waived. We have a trade-off system. Often times we, for instance, waive the 50-foot to groundwater rule, and when we do that we ask for something to compensate. And we ask for an extra liner, or 2 or 3 or 4 as necessary. In situations, for instance, where we have a lot of water that goes into the landfill, we have to make sure that the water isn’t going to get out and so we watch very closely for that. So we consider all of the regulations, and we consider the kind of waste that goes into the landfill. There are situations where we’ve had sludge that’s been sucked out of the Grand Calumet River by hydraulic dredge and that water stood 50 feet above the ground level, and it stood for months on top of two liners and didn’t leak through. In this situation, we have dry waste that’s going to be solidified and we take that into consideration when we look at the overall siting because the kind of waste and the level of protective measures and the trade-offs we’ve made – it’s a kind of a bargaining, if you will – we’ve made sure that the site, itself, is designed for the kind of constructions. We keep in mind that siting and the construction. RCRA program doesn’t have quite the same stringent level of requirements that the TSCA program does. TSCA program actually has geology. The RCRA program focuses on construction. All they really focus on are things like seismicity and shore lines and things like that. Our program looked more at the particulars. The TSCA program was put in before the RCRA program and never was changed. So we have what we call old-fashioned technology, and wind up putting new-fangled construction on top of old-fangled technology, and we have a hybrid system that is not only RCRA-compliant, but TSCA-compliant because it satisfies engineering and geology.”

54:30 Gonzalez: "So just as a point of interest, meeting the TSCA regulations is a much more difficult task than meeting the RCRA specifications. And this landfill falls under the TSCA regulations."

54:51 Person: "My follow-up to that Mr. Chairman, would be – you're still in the process of making your final determination. What type of information would you consider helpful in making that decision? Is there any additional information that could come forward that would assist you in making your final determination as to whether to site or not?"

55:14 Johnson: "Information we are working on right now with the landfill applicant? We are gathering up the particulars, the areas that people who live in the vicinity; I've been plotting up the exact locations where they get their water from and developing a map that will show exactly who takes water from where. So even though we've got this belt and suspenders and duct tape-type arrangement, we want to be able to show to those people their wells, and to make sure they feel comfortable about this whole thing."

55:48 Gonzalez: "Was your question in reference to what the city fathers could, the county could do?"

55:57 Person: "Just in general. The fact of the matter is that we recognize that a public comment period is coming. I am trying to find out what type of information that could come through that process that would be something that would be beneficial to you to make the final determination."

56:17 Johnson: "I think the quick answer is to make sure we've got everyone's wells in mind, so that we can address anybody's concerns that have concerns. And there may be questions, for instance, that go to the public health issues that you're referring to. We will be doing air monitoring. Often-times we look for background air evaluations; we may look at meteorological work. Sometimes we tie our monitoring into existing meteorological work to make sure that's OK. The air monitoring will be done for a period of a year or so from the time of the construction. So what we're going to try to figure out is when's the worst possible time that we could have air impact and we're going to try to do our monitoring then so we could possibly figure out how on earth we could possibly find something that looks like we have to take preventive measures for it, so we're going to try to figure out the worst possible time to take the air monitoring and then take it."

57:32 Question: "In comparison to the nuclear power plant that we have sitting out here, and you may not have been here at that time, to have permitted the power plant here – what does this in comparison do – the nuclear plant – have to do with the Mahomet Aquifer. Does the nuclear power plant put the aquifer at risk or is this something [inaudible]"

57:57 Johnson: "I just happen to have useful information that I got from the work that they did, and it is very handy to have all of this information. I've gotten information from everything from the new [inaudible] earthquake faults 1815 or 1812. You know I just pull information wherever I can find it to see if I can shed light on things to quell people's concerns, because I try

to think ahead. And so by the time this process is complete, I will have exhausted everything. Anybody who has the opportunity to talk about it, I hope to find the same thing.[?]"

58:36 Bray: "One other question is, we've talked a lot about the liner on the bottom, but what about the liner on the top? That's pretty important I guess for PCBs to keep the water out. What happens, and who maintains this, and for how long? I need to know how this thing's going to be taken care of."

58:57 Johnson: "Sure. Part of the process for a permit is to establish what's called a perpetual care program. And the perpetual care program involves financial insurance funding mechanism. A funding mechanism is set up for a 30-year interval, and we set that 30-year interval as a revolving plan. So every year we push 30 years ahead, and 30 years ahead, so we always look forward 30 years. So when the accounting sets up a fund to maintain the landfill, the cap and everything, they will have funds to take care of it. There are ways to build landfills that have been demonstrated to be protective for tens of thousands of years. In fact there's mounds in Illinois that without any particular protective measures have withstood [inaudible] the past years or more of erosion, and so we are quite confident that by the time we're done we will have come up with a cap that consists of stuff like gravel, rounded river rock, somewhat sticky, cohesive soil, and a geomembrane, probably a 30 or 60 mil thick geomembrane. Those things will protect the overall liner, and on top of the TSCA waste the plan that they're calling for now is for municipal waste to sit on top of the TSCA waste. So the whole thing will be double-covered. There will be interim cover on top of the TSCA waste, then there'll be municipal waste, and then there'll be this long-term monitoring maintenance cap that sits on top of that. So the PCBs will be covered by municipal solid waste for a depth of something on the order of anywhere from 10 to maybe 30 or 40 feet for most of the entire thickness. So they will be protected by a very heavy cap itself. I anticipate that cap to be more than usual. That's not usually the case. We don't usually get situations where we put [inaudible] green inert solid waste on top of TSCA waste. This is another one of those situations where we have 2 liners, belt and suspenders duct tape type of scenario. It's a bit surprising."

01:01:36 Bray: "I don't think any of us are really worried about the next 30 or 60 years; we're worried on down the line and I guess that's why the questions asked, you know, who's going to maintain this. If we're only talking 30 years out or 60 years out, that's the concern of the community."

01:01:52 Johnson: "Right. And we have, too. All of the landfills in the whole United States have that same problem. And we look forward to building landfills that will extend out thousands of years, in fact there will maybe pretty well be ways the wastes inside those cells will be changed, transformed, modified, destroyed. PCBs don't last forever. And I've been talking to the applicant about ways they can actually facilitate the destruction – the biodestruction and degradation and natural processes that lead to the attenuation of the PCBs over a long period of time. Some of those may be fairly simple, and they kinda fall along in the lines of kinda irrigating and farming and maintaining appropriate nutrients. There may be ways that if they build things right that those PCBs will go away. They're not like heavy metals. Heavy metals don't go away. But PCBs, they're organic compounds. They do break down."

1:03:10: Commenter on the board: "Before we go to the public comment, mine's not necessarily a question, but more of a statement of before tonight, just so you're aware, I've been a strong supporter of this project, but to me, seeing this presentation discussing with you tonight, even re-solidifies beyond further doubt that I'm still a supporter. So, you've re-solidified everything and take me past the 100% that I was before. So I just want to thank you for that."

01:03:37 Bray: [inaudible]

01:03:37 Commenter on the board: "I spoke as an individual."

Comments from the public:
01:03:47 George Wisbauer(?): "The upper aquifer – did they say that there is domestic water being drawn from that upper aquifer? That there were a few farms that drew from the upper aquifer? From the one that you'd be testing on?"

01:04:14 Johnson: "The quick answer is: onsite, no; offsite, we feel that they won't be because we don't think that the water is coming from the same direction and the same parcel of water, but that's the question that I'm building an answer to make sure I've covered everybody's well-screens at least in a 2-mile area – 2-mile radius area. Those people's well water will be monitored by the 27-well monitoring array. If there is a hydraulic connection between the water underneath the landfill and their well screens, those things can be addressed because no well screen can properly evaluate what's going to happen 2, 3 miles away. We really have a hard time doing that. But almost everybody, everybody, sits on top of the Mahomet Aquifer, and so for most-part, that's always the backup."

01:05:11 Commenter: You keep talking about the Mahomet Aquifer; I'm talking about the upper.

01:05:14 Johnson: "Right, right." "Sentinel…"

01:05:17 Commenter: "You're going to test, what, every 3 months? And there's people drawing from the aquifer that you're going to be testing."

1:05:30 Cygan: "You have to keep in mind that right now Steve is trying to compile all of the data that's available through the Illinois State Water Survey and other resources, of who's drawing water from that particular aquifer that you're referring to and where those wells are located. Our preliminary review of data that we do have in hand currently shows that there are no immediate downgradient, in other words in the line of the flow of the aquifer, no immediate downgradient receptors or residential wells that are drawing in the line of the landfill. Let me also say that at this point we're still trying to compile all of those residential wells so that we can absolutely say that for certain that we understand where these wells are located and in which aquifer they're screened. So this particular issue is a work in progress. We have preliminary data but we still want to have a little time to check that."

01:06:41 Johnson: "This really goes to some of the questions that I think fall outside of the typical regulatory requirements that the TSCA rules embody. The Regional Administrator has

the authority to ask for this kind of information, and this is the kind of information that people living in the vicinity typically want to know. So this is why we're doing it."

01:07:08 Terry: "I'm one of the guys that drill water out of the shallow aquifer. My well is about 4 miles from the site. I'm about 40 feet deep; I don't know if that the same aquifer that you're talking about monitoring or not, but I have a question about how the Mahomet Aquifer receives its recharge. How far away do you have to go from this area to get where the aquifer receives near-surface recharge? I know it's 150-ft deep here."

01:07:53 Johnson: "The clay pan number 1is a barrier to downward infiltration and recharge. Clay pan number 2 is even more of a barrier to infiltration and recharge. The source of the water that you are referring to, best I've been able to tell, it's probably from water that migrates in from outside of the confines of that buried valley and trickles in in side-channels the sand that kinda come in from the sides. The main valley itself probably extends out in headwaters in near Lake Michigan and around the Indiana border. And so there is water – I think – in that Mahomet Aquifer that is eventually gone from Lake Michigan, because I think the hydraulic connection from the Mahomet is through the Calumet sand into the Mahomet and here. So basically we've got a groundwater hydraulic connection. It isn't something that we've really considered as part of our technical review, but as a matter of course what we found is these clay pans are barriers and they're areas where there's no recharge whatsoever. That's what we like. We want things built on clay pans. They're barriers to infiltration. That's why they call it invulnerable. This is a protected aquifer."

01:09:31 Follow-up (Terry): "As a farmer I know that by far and away the easiest way to contaminate groundwater is through a back-siphon situation or an opening like contamination back through this thing [inaudible] but is there any studies or any incidence where the groundwater has been contaminated by PCBs from non-protected contaminated [inaudible] where the water actually leached directly through the soil and into a protected aquifer?"

01:10:18 Johnson: "Yes, there's several. One of them is over in East St. Louis Monsanto. I worked with that for some time. The people who built the PCBs have contaminated several parts of their facility – Solutia is the name of the facility, company, and their PCBs have migrated. And what we found out is that we can control the migration by cutting off the infiltration because the migration of those PCBs is directly proportional to the amount of hydraulic head, the amount of water that forces it down, the amount of rain water that sits on top. So if we build a cap that's like a roof of a house with a little curvature to it, you cut off the amount of hydraulic forces that push those [inaudible] contaminants downward. So Solutia is one. And there are others where, yes, we've seen what PCBs can do."

01:11:22 Follow-up (Terry): "In that area was the groundwater covered by clay, open sand?"

Johnson: "Oh no. It was open sand. It's bottom lands of the Mississippi bottom lands – East St. Louis American Bottoms. Unprotected aquifer. Absolutely unprotected."

01:11:43 Bill Spencer: "I noticed you said something about the Calumet. Where's the source of this waste coming from? Is it the area of concern we're in Chicago area?"

01:11:55 Gonzalez: "I happened to be working with US Steel, so US Steel is currently working on a clean-up that has to do with the same issues. That's an entire area over there that's industrialized. So I've noticed that pinning blame on any one particular organization is very difficult when they're all joined together, using the same resources to say, ya-know it's X, and it's Y, and it's Z actually doing this. But, there're a lot of sources to that contamination."

01:12:36 Spencer: "By national strategy, is that what you're talking about clean-up?"

01:12:43 Gonzalez: "Uh, I think you're taking it a step further than I'm talking about. I'm talking about the Gary, Indiana area and the industry there."

01:12:51 VoiceA: "That's coming here?"

01:12:55 Gonzalez: "Not to my knowledge, it's not. Not to my knowledge. I don't think we have any knowledge of that quite frankly."

01:13:05 VoiceB: "Is the EPA a major stake-holder in this operation?"

Gonzalez: "Is Who?"

01:13:07 VoiceB: "you guys"

Gonzalez: "no"

01:13:07 VoiceB: "It's part of your clean-up." "The bi-national strategy."

1:13:19 Cygan: "The bi-national strategy is the Great Lakes National Program Office for folks that aren't aware of, it's sometimes referred to as the bi-national strategy, the bi-national program? It's between Canada and the United States in administering its stewardship of the Great Lakes and the Great Lakes Basin, of which we are outside of the Great Lakes Basin in this county. Matter of fact, the Illinois portion of the Great Lakes Basin is that area pretty-much defined by Cook County, where Chicago sits. A very small sliver of the state is in the Great Lakes Basin. In Indiana, likewise, a very small portion of northwestern Indiana is in the Great Lakes portion, and is administered by the bi-national strategy. So it's a different program, and physically, geologically speaking, a different game. We're in a different watershed compared to the Great Lakes Basin."

01:14:20 VoiceB: "How does this facility, though, participate in that clean-up? That's what I'm asking."

01:14:28 Gonzalez : "We don't think it does, actually. We have no knowledge of that."

01:14:30 VoiceB: "Where is this waste coming from, then? There is only so many AOC's [?] that you guys know of; you've already got a list of them. So one of them has to be coming here."

01:14:43 Johnson: "There is a Superfund process that's ongoing, but I can tell you that the Superfund process that is ongoing does not have this listed."

01:14:51 VoiceB: "It doesn't exist yet."

01:14:51 Johnson: "It doesn't exist yet. Correct."

01:14:53 Gonzalez: "So you're speculating, then."

01:14:54 Johnson: "Right."

01:14:57 VoiceB: "I'm attempting to find out where this waste is coming from. That's all I'm asking."

01:15:00 Bray: "I think what they're telling you is they don't know."

01:15:03 Johnson[?]: "We don't know."

01:15:03 VoiceB: "You don't know where it's coming from. Well I don't know where it's coming from, we don't see no need for this facility whatsoever. That's all I want to know."

01:15:13: QuestionerC: "Those of us who are a little suspicious of the people who are making a profit off of this testing it, or the government testing it, quite frankly. Is there some way that, for instance, I could get my water tested for PCBs without breaking the bank? I'm guessing this'd be a very expensive operation for an individual. Is there some way that an individual could get their water tested?"

01:15:40 Johnson: "I,I, I think that would be an appropriate thing to bring up during a public comment period. I can't answer that right now."

01:15:46 Gonzalez: "Well, you certainly can have your water tested any time you want to. You know that, right?"

QuestionerC: "At my expense."

01:15:50 Gonzalez: "It's your water. Yeah."

01:15:51 QuestionerC: "It's not my PCBs that I'm testing for."

01:15:55 Gonzalez: "Well, but, well, but, Again, you're, you're, you're, you know, you're, you're sort of guessing at the fact that your water has PCBs in it, aren't you. You just assume that it would be?"

01:16:07 QuestionerC: "I'm protecting myself from them, yes."

01:16:08 Gonzalez: "Yeah."

01:16:13 Matt Markle: "My name is Matt Markle. The question I have is the United States EPA claiming that the liner system will not be breached?"

01:16:27 Johnson: "We don't see any reason to think that it will."

01:16:29 Markle: "So that the question is, can you unequivocally say that the liner system will not be breached?"

01:16:36 Johnson: "I'm not going to try to second-guess that question."

01:16:39 Markle: "At what rate will PCBs leach through the clay?

01:16:43 Johnson: "We haven't hardly been able to get any out. The waste that we have right now barely produces one part per billion when they leach and rain and suck the water out. We care barely get any out of the hottest waste we can find in the nation. It's just almost impossible to get the stuff out of the waste into the leachate."

01:17:06 Markle: "So is there a mathematical rate of at what speed or what rate PCBs leach to the clay?"

01:17:14 Johnson: "Depends on how much the carbon content is. There are numbers, for instance, 3 feet per thousand years is one number that I've seen."

01:17:26 Markle: "Are you claiming that the clay underneath the proposed chemical waste landfill site is solid clay?"

01:17:34 Johnson: "How deep? how far? how much? what solid?"

01:17:38 Markle: "Let me back up. The engineering drawings I'm looking at show cross-section of 19 sample borings that show sand pockets and things other than solid clay. Would you agree that's correct?"

(whispers: "Those were interesting questions." mm-hm.)

01:17:52 Johnson: "There's sand in there."

01:18:02 Mary Alice Magnitich[?]: "My name is Mary Alice Magnitich. My question is, how many locations in the United States are now accepting PCB chemical waste? How many?"

01:18:23 Johnson: "Commercial?"

01:18:26 Magnitich: "Well, I assume commercial."

01:18:28 Johnson: "Cuz there're a lot of people who accept their own waste. There're big clean-ups that –

Voice: "'come-on – they're commercial."

01:18:37 Magnitich: "'Beg 'pardon. I still haven't heard how many."

01:18:40 Johnson: "I think it's 12 or 13 but I'm a little fuzzy on the exact number right now."

01:18:45 Magnitich: "I've heard it's 10. (Johnson: mm-hm) And I've heard that of that 10, some of them are now filled up. And even the EPA would like to find a place to dump. Is Clinton going to be the place?"

01:19:07 Johnson: "Uh, each one of those sites has plenty of room to expand."

01:19:13 Magntich: "What happened to Peoria County?"

01:19:18 Johnson: "I don't know that that's really at issue right now."

01:19:21 Bray: "We're getting off base here."

01:19:22 Magntich: "Is it off base? (Bray: "You're talking about hazardous.") I'm just pointing out to everyone, are we going to be the dumping ground?" – pause – "That's all I have to say because I don't have a college education; I'm not that smart; but I've lived here for 83 years and I hate to see something like this come into town. Thank you."

01:19:55 Karen Lowry[?]: "I'm Karen Lowry. And for all of you, you should know there's a big difference between municipal solid waste, the trash that we produce in our kitchens and our garages, versus industrial hazardous waste. PCBs – they said that landfills have been around for a thousand years. PCBs haven't been around a thousand years, so they've only been being put in them the past how many years? 50 maybe? Maybe 60 years for the PCBs? (Bray: "Have you got a question?) So the question is, he said if there is leakage into the monitoring wells and somebody asked what they would do, he said well we'd have to get rid of the water. Well I would like to know how are you, where are you going to get rid of it to, and can you guarantee us that once they do find it in monitoring wells that we are still protected." pause (Johnson: yeah) Lowry continued: "Why would you build a landfill with PCBs on top of an aquifer of any type?" (Bray: "Let him answer.")

01:20:50 Johnson: "Well, I made a comment about the removal of the waste from a landfill which does happen on occasion. But there are many ways to solve the problem. If for instance there were PCBs found, most of the time when people find PCBs in landfill monitoring wells it's because the [Johnson chuckling] laboratories have actually made a mistake. Other times its because the people who have been working there haven't been clean enough. And it's really kind of a problem because they're monitoring these waters at such a low level it's actually kinda hard to keep the waste away from the equipment. But they make every effort to do so. There is a slight problem of cross-[inaudible] cross-contamination, and often time those lead to false

positives. But if, for instance there were massive breach of some kind, there are back-up ways. In this case there's a particularly good back-up way that you could impose upon this by simply putting in things like cut-off walls. Cut-off walls would typically be bottomed into a clay pan. Here we have 2 clay pans at the bottom of the cut-off wall into. So if, for instance, somebody were to find a PCB false positive, or real positive that they couldn't get rid of, and everybody would get frustrated, they simply would put barriers around the barriers. And with the amount of material you have to work with here, there's an awful lot of maneuvering ground, if you will. And even thought the Mahomet Aquifer seems like a strange place to put a landfill, that's where the clay is."

01:22:34 Lowrey: "My last question is how many states will be bringing PCBs to DeWitt County's PCB storage (whispering) and what is the tipping fee that's going to be paid to the owners, and what portion of that will be tax revenue for our county?"
01:22:52 Bray: "They can't answer that question. They don't know."

01:22:56 Gonzalez: "But you know, you're I just gotta say this. Your question about PCBs being around for 50 years. Well, that's not really correct, because PCBs have been around for a lot longer than that. It's just that we didn't know they were around."

01:23:12 Lowry: "We weren't using them in industry."

01:23:15 Gonzalez: "Well, they were being used in industry, we just didn't know that PCBs really existed. Ya'know, it's like the science kinda caught up to what's goin on. So PCBs have been around for a long time. Really long. Because industry's been around for a long time."

01:23:32 Johnson: "Often times, PCBs are simply the residue of a still bottoms of a refinery that has been processed inadvertently mixed with salty[?] material in a process that might very well produce by-product residues that are contaminated with PCBs that might very well never have been recognized in the past and could be almost any place. Now we take precautions to make sure that doesn't happen."

01:24:00 Bray: "One of the things you've mentioned was taking precautions after you found PCBs. There again, my question is who pays for the correction?"

01:24:08 Johnson: "If we can point the finger at who made the problem, they'd be the ones who'd be responsible."

(Voices: "Probably the PCBs." "We didn't do this.")

01:24:21 Ron Savage[?] "I'm Ron Savage[?] and I have a two-part question. Getting back to who pays for it, and I'm familiar with this and all the taxpayers and anybody that's buying gasoline and diesel fuel and whatever, there's a state tax to reclaim underground tanks and stuff that leaked and it all goes back to the taxpayers. It didn't go back to the companies because they went bankrupt or whatever. So that answers part of everyone's question: taxpayers will end up paying for this. My second part of my question is – the titanic sunk. Along with that idea is nobody in this room, I don't think, can tell me or tell anybody, is that going to be good for a

hundred years or 300 years. Plastic lasts only how long before it disintegrates? 300 years? So what happens beyond that, when our kids' kids' kids are here, providing the earth is still in place, what's going to happen then? Has anybody planned ahead in the future?"

(mumbling)

01:25:16 Gonzalez: "You know, I think we've mentioned earlier that there's a continuous monitoring that goes on, so that as part of this monitoring, adjustments are made to the landfill, or to any facility. I mean, I was in Superfund before I came here. And, you know, I could tell you that they go to great strides to protect or clean up anything that occurs at a site. But the one thing that you can be assured about is that there is a continuous monitoring. That's why they have all the wells all around in here so that we do have a modicum [nb: this word means "a little bit," or "minimal"] of protection for the community. So, I mean, that is you know, that is the same thing as having an air force, or an army. Why do you have an army that hardly ever fights. Because they're there to protect in case something happens. Well, we use the same sort of methodology with guarding over these sites that we're putting some of our waste in, they have to be monitored. And the person who holds the permit has a legal obligation to do so. So that's part of the program. Do we have all the answers? I don't think anybody on earth has all the answers. You know that as well as I do. But can we provide a modicum of safety? I think we've proven that we can."

01:26:48 Bray: "We've got time for a couple more questions."

01:26:52 Question: "How many sites in the United States are there PCBs either leaching out or leaking out? Whatever safety system was in effect at that time have failed."

01:27:07 Johnson: "Failed PCB landfill sites?"

01:27:09 "No. PCB sites. Every site that went in had some kind of safety measure."

Voice: "That might be on an NPL list."

01:27:16 Johnson: "Well, we haven't found any PCB sites. Remember I said here, I went to US Army EPA Landfill Performance Requirements. It's about a 12-13 hundred page document that went through all the landfills we could find. And the ones that are built to the standards we're talking about now don't fail."

01:27:31 Questioner: "We're not talking about standards now. The standards now are the current standards."

01:27:39 Gonzalez: "In all honesty, we really haven't looked at what has – I mean we didn't come here prepared to tell you there are 10 PCB landfills out there, 9 failed. I mean, we can come back and probably answer that. But we don't have that answer for you now."

01:27:55 Johnson: "I think the question may have been that have we changed our rules so that we now make landfills to make up for past failures, and the quick answer to that is no."

01:28:05 Questioner: "I have a quick question. Superfunds, for those of you that don't know, Superfunds are hazardous waste sites around the United States, OK?, Superfund sites used to be cleaned up by the Superfund monies and at this point, aren't the funds cut to the point where it's just containment and notification now?"

01:28:23 Gonzalez: "No, I can speak to that. Superfund sites are still being cleaned up. It might not be not as many are being cleaned up because, you're right, the tax was taken off those companies who used to pay into that fund. But Superfund sites are still being cleaned up."

01:28:42 Questioner continued: "They're more containment right now."

01:28:45 Gonzalez: "No, Superfund, no Superfund sites are clean-ups; they're not containment. Because to be a Superfund site, it's immediate hazard to the community. So they have to be cleaned up."

01:29:01 Questioner: "I have some big "ifs" to ask you. If this permit is approved, and if the water would get contaminated, and if some of you people lived in this area with the contaminated water, how would you feel about that?"

01:29:27 Johnson: "I don't know if we can address that."

01:29:28 Questioner: "Sort of hard to answer, isn't it."

01:29:31 Gonzalez: "Well, it's not, because you know what? I live in Wisconsin. And I live in a township. And there are farms around me; there're still farms around us. And we have all kinds of industry. There's a landfill maybe, as the crow flies, 2 miles from where I live. A HUGE landfill. I mean the garbage comes from Chicago. OK? I happen to know the landfill; it's well-maintained. They do a really good job of maintaining that landfill. And I have well water at home. OK? Comes from an aquifer. So, I mean, I feel safe. My family feels safe. I've been there over 25 years and we've never had an occasion to worry. And we other industry. We have mining – not very far because I live in a glacial area that produces great sand and materials for concrete production. So, I mean, as long as it's maintained and it's protective of us, the community. You know, we've had our arguments, just like you've had, and we've had our differences, but I mean this is what this is all about, you know. Sharing concerns. And I think that, you know, I mean, that's what this is about. I think you have the right to do that. So, I mean, we're listening to you."

01:30:53 Questioner: "All this scientific data and all that; and I hope they get the word to Mother Nature."

01:31:05 Deborah Shaw[?]: "You mentioned monitoring several times. And my impression from a comment you made recently is that this monitoring would be done by the landfill, not by an outside, impartial source. We know from what happened in a peanut plant factory what can happen with monitoring. And they weren't even monitoring it themselves; they just kept sending it to places until it got an "OK" – even though it wasn't really "OK." Or they ignored it."

01:31:47 Johnson: "Yeah, and I think they lost their business."

01:31:51 Shaw: "Well, that won't do much for anybody else.

01:31:55 Johnson: "What we have is state rules that the state usually has outside people that watch them very closely. I've been dealing with a landfill in a different state, and the state program is much closer at home. There are people routinely visit the sites, and really make a pest of themselves by asking all sorts of questions."

01:32:20 Shaw: "So an outside source periodically does it's own monitoring?"

01:32:22 Johnson: "I think the state does, but I can't really speak to the issue because the state's not here right now."

01:32:26 Shaw: "So you really can't answer that."

01:32:26 Gonzalez: "Well, no, no. But, if I'm not mistaken, I know that happens in Ohio and I know it happens in Indiana is that the utility would take its own test, but then they have to share the data, the test results back from the lab. I mean, they just don't go out and take a test take the lab, take a lab test, and put them in drawer. They have to share that with the local EPA. They just don't take the test and stash it in a drawer. They have to share that information. So I mean you can't, you can't cheat with the data. So once the data is taken and shared, in this case IEPA would be able to see whether or not we have a problem, or whether or not things are good."

01:33:14 Cygan: "One other thing, too, in addition to having a second party or a third party oversee the monitoring data, if there are inconsistencies or, for instance, a positive show up in one of the monitoring events, it goes into a different mode where we go back and check and recheck to make sure number one that that's a real positive, and chances are typically, like Steve was saying earlier, it could very well be a laboratory mistake. That happens occasionally because laboratories are run by humans and we make mistakes, through contamination or whatever. But the point is, is that if there is an inconsistency or an unexpected hit, we call them, of a contaminant, and we question whether it's real, or maybe it's circumstances surrounding that data, we will go in and actually do what we call "split samples" where the company will go in with their contractor or whomever who's hired to draw the water out of the monitoring wells, and we will go there with our sampling bottles ourselves and take our own samples and submit them to our own laboratories, independent of what the landfill company is using, so that we can get a totally independent set of data, and do this as many times as we please. And so that way we have what we call "quality assurance/quality control" and we can validate the data as being real."

01:34:54 Shaw: "So if this company should go out of business, you would take that over then and you would do the monitoring?

01:35:03 Johnson: "Um, I'm not sure who would actually take over if the [inaudible] would occur, because that would be part of the process of finding out who would be responsible for

taking things over, but it brings up an important – yeah, the financial insurance could, too, if the company weren't available and nobody else willing to take responsibility. But there's something I happen to remember, and that is that the company I worked with in Michigan recently got inspection from the national center, uh national inspection, and they were descended upon by must have been 10 EPA inspectors from Denver for two weeks, and they went over that facility with a fine-toothed comb – day after day after day, for two weeks finding out problems because when that happens, it's hard to hide the systematic problems that exist. So Wayne Disposal recently subject to a thorough inspection by NCIC – I think that's National Center for Enforcement, and they had about a two-week inspection program on the facility while it's still operating because there're concerns about this issue about third-party reporting, so this does happen at the federal level, and it happens all the time at the state level."

01:39:00 Land Use, City Council, and County Board Meetings Adjourned

Appendix C

Available as,

> 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 (2009).
> http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf

Since the development of this report on the potential problems with the proposed Clinton Landfill PCB WMU the authors have become aware of a report that adds considerable information on the long term problems of landfills of the type that are likely to occur at the proposed at the proposed Clinton PCB landfill. This report is,

> NRC Committee to Assess the Performance of Engineered Barriers, "Assessment of the Performance of Engineered Waste Containment Barriers," National Research Council, 134 pages, (2007). available from the National Academies,
> http://www.nap.edu/catalog/11930.html

Lee and Jones-Lee comments on this NRC report are available as,

> Lee, G. F., and Jones-Lee, A., "Comments on 'Assessment of the Performance of Engineered Waste Containment Barriers' Prepared by National Research Council Committee to Assess the Performance of Engineered Barriers, National Academies Press, Washington, DC (2007)," Report of G. Fred Lee & Associates El Macero, CA, September (2009). http://www.gfredlee.com/Landfills/NRC_EngrBarriers.pdf