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Sent via email: landfillpubliccomment@peoriacounty.org

September 18, 2011

Peoria City-County Landfill Committee

Please find attached Dr. Anne Jones-Lee's and my comments on the Peoria City/County proposed Landfill 3 with respect to its advocates' position that the landfill as proposed is, "*designed, located, and proposed to be operated so that public health, safety, and welfare will be protected*". As discussed and documented in our comments, this proposed landfill will not be protective of public health and safety, groundwater resources, or the interests/welfare of the residents of Peoria City and County over the period that the wastes in the landfill would be a threat to public health and the environment.

The City/County should not proceed with the development of the proposed large Landfill 3 and instead focus on a smaller landfill. In light of the well-know deficiencies in today's MSW landfilling requirements it is prudent public policy for Peoria County to adopt a smaller landfill. A smaller landfill will have a shorter duration of operation and thereby allow the development of a future landfill that will be regulated by truly protective public health and the environment in siting, design, operation, closure and post-closure care/funding requirements.

We have provided an overview of guidance on how the City/County can/should develop an MSW landfill that will provide for more reliable protection of public health, groundwater resources, and public interest over the time that the wastes deposited in the landfill will be a threat, in a manner in keeping with what other states are requiring.

Adoption of the recommended approach for managing the Peoria City/County MSW and "non hazardous" industrial solid wastes will provide a more reliably protective landfill. While initially more expensive than the minimum approach proposed for Landfill 3, it will, in the longer-term, be more protective of public health, welfare, and interests of the City/County and will minimize the long-term financial burden to future City/County residents. Further, those in the City and County would pay the true cost of managing their MSW as it is generated/disposed and not pass those costs to future generations.

Please contact us if members of the Peoria City-County Landfill Committee have questions on our comments. If there is interest, we would be happy to participate in a conference call to discuss these issues.

G. Fred Lee, PhD, PE, BCEE, F.ASCE and Anne Jones-Lee, PhD

Copy to J. Blumenshine

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September 18, 2011

Peoria County Siting Committee:

The following comments are being submitted on behalf of Heart of Illinois Group Sierra Club (HOI Sierra ) and Peoria Families Against Toxic Waste (PFATW ) regarding a review of potential public health and environmental problems associated with the Peoria County Board's Proposed Siting Review for City-County Landfill Number 3. These citizen groups are highly concerned that the development of this landfill as proposed will be a significant threat to public health, groundwater resources, and financial and other interests of the people of Peoria County.

According to Joyce Blumenshine, Conservation Chair, HOI Sierra and member PFATW, in her letter to me requesting my review,

*"We need if possible to ask that your comments might be structured to address specific landfill siting criteria contained in the attached flyer (IL EPA Siting a Pollution Control Facility in Illinois March 2003). PFATW and Heart of IL Group Sierra think the Peoria Disposal Company / Peoria City County Landfill, Inc. for this application, fails to meet the Siting Criteria II."*

*"II. The facility is designed, located and proposed to be operated so that the public health, safety, and welfare will be protected."*

Our comments presented herein are specifically directed to address this issue.

### **Overall Finding**

Contrary to statements made by Shaw Environmental, the location of the proposed Peoria City/County Landfill 3 is not a suitable location for this landfill. The area does not offer natural protection for off-site groundwater quality from deleterious chemicals in the deposited waste. These chemicals will pose a threat as long as they remain in the landfill. Over time moisture will enter the buried wastes and generate leachate that will contain hazardous and otherwise deleterious components of the wastes. The landfill liner system will deteriorate over time and lose its capacity to contain/collect leachate. As the leachate penetrates the liner, it will pollute the area groundwater; the incipient pollution of the groundwater will likely go undetected owing to the inadequacies in the groundwater monitoring plan. By the time groundwater pollution is detected, there will likely already be widespread offsite groundwater pollution. Once groundwater is polluted with landfill leachate, it is essentially impossible to remediate it to the point of being suitable for domestic and other water supply purposes.

Shaw Environmental has not provided the County with adequate and reliable information concerning the ability of the proposed landfill containment system (liner, leachate collection system, cover, and monitoring approach) to provide dependable protection of public health and environmental quality for as long as the wastes pose a threat. Landfill regulatory requirements are inadequate to ensure containment of waste-derived chemicals that will be present in the leachate that develops in this landfill over the very long period of time (hundreds of years or more) that the wastes in this proposed landfill will be a threat in generate leachate that can pollute off-site groundwater.

The proposed escrow fund that is proposed to be generated during the active life of the landfill could readily be inadequate for the City/County to stop the advancement of pollution throughout the post-post-closure period and to remediate leachate-polluted groundwater. This proposed, large landfill expansion could become a significant financial burden to future City/County residents due to the inadequacy of the escrow funds to provide support to address plausible worst-case needs for additional landfill maintenance and remediation long after it has stopped accepting wastes.

### **Recommendation**

The County should not proceed with the development of the proposed large Landfill 3 in favor of developing a smaller landfill. The design of an appropriate landfill should not be the minimum specifications allowed under current regulations, which are well-known to be inadequate to provide for reliable long-term protection of public health and environmental quality. The design should, instead, provide for more reliable detection of the failure of the landfill containment system when it first occurs. As is required in other states, a landfill-area-wide double-composite liner with a leak detection system between the liners would provide an earlier and more reliable opportunity to detect the generation of leachate and the opportunity to repair the landfill cover system to better retard the entrance of water into the wastes through the cover, before leachate migrates through the lower liner of the landfill. It is essential that funds be available to repair the landfill cover when leachate is detected in the leak detection system between the two composite liners. The groundwater monitoring system needs to be designed and operated to reliably detect narrow finger-plumes of leachate that can develop at the groundwater downgradient edge of the liner when they first migrate from the landfill. The post-closure and post-post-closure funding for monitoring/maintenance established during the active life of the landfill should be established in a trust of sufficient magnitude to generate sufficient interest to fund all post-closure funding needs based on a plausible worst-case analysis of the failure of the landfill containment system and monitoring program.

The City/County should practice solid waste recycle/reuse to the extent practicable to minimize the need to landfill solid wastes.

Adoption of this proposed approach for managing the Peoria City/County MSW and “non hazardous” industrial solid wastes will provide a more reliably protective landfill. While initially more expensive than the minimum approach proposed for Landfill 3, it will, in the longer-term, be more protective of public health, welfare, and interests of the City/County and will minimize the long-term financial burden to future City/County residents. Further, those in the City and County would pay the true cost of managing their MSW as it is generated/disposed and not pass those costs to future generations.

Detailed discussion of the appropriate development of MSW landfills and related issues, with examples and references to the professional literature, is provided in our “Flawed Technology” review:

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 July (2011).

<http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf>

Please let me know if we can be of assistance in developing the recommended solid waste management.

## **Qualifications to Provide Comments**

A summary of Dr. Lee's qualification to provide comments on a proposed landfill development is presented below.

**Dr. G. Fred Lee, PE, AAEE Bd. Cert. Env. Engr., F.ASCE**

**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 academic course and field work involved review of impacts of municipal and industrial solid waste landfills on public health and the environment.

Dr. Lee earned a Master of Science in Public Health degree from the University of North Carolina, Chapel Hill, in 1957. The focus of his master's degree work was water quality evaluation and management with regard to protection of public health and the environment from chemical constituents and pathogenic organisms.

In 1960 Dr. Lee earned a PhD degree in environmental engineering from Harvard University. An area of his specialization during his PhD work was aquatic chemistry. As part of his degree work he undertook additional formal education on the fate, effects, and significance of, and development of control programs for, chemical constituents in surface and groundwater systems, as well as in water management facilities.

For a 30-year period, Dr. Lee 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 that period he taught graduate-level environmental engineering courses in water and wastewater analysis, water and wastewater treatment plant design, surface and groundwater quality evaluation and management, and solid and hazardous waste management. Dr. Lee has published more than 1,150 professional papers and reports on his research results and professional experience.

Dr. Lee's work on the impacts of hazardous chemical site landfills and municipal/industrial solid waste landfills began in the 1960s. 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. He conducted pioneering research beginning in the 1970s on the impacts of organic solvents on clay liners for landfills and waste piles/lagoons.

In the early 1980s, while holding a professorship in Civil and Environmental Engineering at Colorado State University, Dr. Lee 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 that 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 that 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 while holding the joint positions of Director of the Site Assessment and Remediation Division of a multi-university consortium hazardous waste research center and a Distinguished Professorship of Civil and Environmental Engineering at the New Jersey Institute of Technology, Dr. Lee was involved in numerous situations concerning the impact of landfilling of municipal solid waste on public health and the environment. Dr. Lee 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. Attention was focused on the compatibility of such liners with landfill leachate and their expected performance for containing waste-derived constituents for as long as the waste in the landfill will be a threat.

Dr. Lee has served as an advisor to the states of California, Michigan, New Jersey and Texas on solid waste regulations and management. While serving as a full-time university professor, Dr. Lee was also active as a part-time, private consultant to governmental agencies, industry, and community and environmental groups on water quality, and solid and hazardous waste and mining waste management issues. His work in that capacity included evaluating the impacts of a number of municipal and industrial solid waste landfills. Much of that 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, Dr. Lee retired after 30 years of graduate-level university teaching and research and expanded his part-time private consulting into a full-time activity. A principal area of his work since then has been assisting water utilities, municipalities, industry, community and environmental groups, agricultural interests and others in evaluating the potential public health and environmental impacts of proposed or existing hazardous, as well as municipal solid waste landfills. He has been involved in the review of approximately 80 different landfills in various parts of the United States and in other countries (see list at <http://www.gfredlee.com/exp/areawork.htm>).

With Dr. Anne Jones-Lee, his wife, he has published extensively on the issues that should be considered and addressed in developing and evaluating new and 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. The currently proposed approach for developing landfills frequently falls short of providing true long-term health and environmental protection from the landfilled/capped waste. Their more than 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. Many of their publications and reports prepared on behalf of clients are available as downloadable files from their website ([www.gfredlee.com](http://www.gfredlee.com)) in the Landfills-Groundwater Hazardous Chemical Sites, Mine Waste Impacts, and Contaminated Sediment sections.

Drs. Lee and Jones-Lee have developed a comprehensive review of the “Flawed Technology of Subtitle D Landfilling” for protecting public health, groundwater resources and the environment for as long as the municipal solid wastes in a “dry tomb”-type landfill are a threat. It includes a discussion of how municipal landfills can be developed to protect public health and environmental quality. That report is available from their website at

<http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf>.

In addition to teaching, conducting research and serving as a consultant in environmental engineering for over 45 years, Dr. Lee is a registered professional engineer in the state of Texas and a Diplomate in the American Academy of Environmental Engineers (AAEE). Membership as a Diplomate in the Academy recognizes his leadership role in the environmental engineering field. For more than 20 years he served as a Chief Examiner for the AAEE, first in New Jersey and then, since 1989, in north-central California. In this capacity until 2010 he is responsible for administering examinations for professional engineers with extensive experience and expertise in various aspects of environmental engineering, including solid and hazardous waste management, desiring admission to the Academy. In December 2009 Dr. G. Fred Lee was elected as an ASCE Fellow. This election recognizes Dr. Lee five decade career as a national/international leader university graduate level educator and environmental consultant. In November 2010 the Sacramento Section of the ASCE selected Dr. Lee as the “Outstanding Life Member.”

Dr. Lee has served on the editorial boards for several professional publications, and currently serves on the editorial boards for the Journals Stormwater and Remediation. Dr. Lee created and authors an email-based Stormwater Runoff Water Quality Newsletter which he has distributed about monthly for the past 14 years, at no-cost, to about 8,000 subscribers.

Dr. Lee's work on landfill impacts has included developing and presenting several two-day short courses devoted to landfills and groundwater quality protection issues. Those courses have been

presented through the American Society of Civil Engineers; the American Water Resources Association; 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. Dr. Lee has also participated in a mine waste management short-course organized by the University of Wisconsin-Madison and the University of Nevada.

Dr. Lee served for many years as an American Chemical Society tour speaker, through which he is invited to lecture on landfills and groundwater quality protection issues, as well as domestic water supply water quality issues throughout the US. Additional information on the qualifications of Drs. Lee and Jones-Lee to undertake reviews of the potential impacts of landfills and landfill expansions on public health, groundwater resources and the environment is available from their website [gfredlee@aol.com](mailto:gfredlee@aol.com) or by contacting Dr. Lee at [gfredlee@aol.com](mailto:gfredlee@aol.com).

Over the past nearly 45 years of reviewing the potential impact of MSW landfills most of their reviews have been conducted on behalf of public agencies (states, California, Michigan and Texas), cities, counties, environmental organizations, and public groups that are concerned about the potential adverse impact of a landfill. Examples of our work of this type is presented in reports located on their website in the Landfills Groundwater section Examples of Specific Landfill Studies located at, <http://www.gfredlee.com/plandfil2.htm#examples>



## **Comments on Proposed Landfill Siting and Design**

Our review has focused on landfill siting and design files for the proposed landfill that are provided on the Peoria County website (<http://www.peoriacounty.org/countyBoard/pdc3/>), which presents a section entitled, “Peoria County Board: Proposed City-County Landfill Number 3.”

As part of our effort to develop information on the impact of MSW and other types of landfills we have developed our “Flawed Technology” review. This review is about a 100 page discussion with about 150 references to the professional literature on the potential impact of Subtitle D landfills. It is located 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 July (2011).

<http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf>

We also discuss how landfilling of non recyclable MSW can be conducted and protect public health, groundwater and surface water resources, the interests of those who own and live/work within the sphere of influence of a MSW landfill for as long as the wastes in the landfill will be a threat.

In our comments presented herein we make reference to sections of this Flawed Technology review for further information on the topics being discussed.

### **Landfill Siting in Abandoned Mines**

The key to developing a MSW landfill that will be protective of public health, groundwater resources, the environment and the interests of the county residents for the county in which the landfill is proposed is the characteristics of the proposed landfill site. One of the most significant errors in the US EPA Subtitle D regulations governing the development of MSW landfills is the failure of these regulations to provide detailed guidance on suitable sites for landfills. The importance of properly siting a Subtitle D landfill relates to the fact that the allowed landfill design for the liner, cover, and groundwater monitoring and the post closure funding required are not protective of the area of the landfill from hazardous and deleterious chemicals that are a threat to public health and the environment for as long as the wastes in the landfill will be threat. Subtitle D landfills will be a threat for many decades to hundreds of years. The landfill containment and monitoring systems allowed have a limited finite period where they can be effective in containing the wastes derived leachate and the landfill gas. As a result it is important to select landfill disposal sites that provide as much natural protection as possible. We are doing current work on behalf of a citizens group in north east Pennsylvania in a former coal mining area that is the focus of a cancer cluster. We find that the complex hydrology of former coal

mine areas makes it very difficult to trace the release of toxic chemicals to surface waters that can impact public health and the environment.

There are many potential problems with using abandoned mine areas for MSW disposal . The eventual failure of the proposed landfill containment systems will be likely to lead to Peoria City/County having to spend large amount of funds trying to remediate the pollution that will eventually occur at this location.

## Overview of City/County Landfill Development Plan

Comments on PowerPoint Slide presentation, “Peoria City – County Landfill Expansion” at April 7, 2011 meeting

Slide 6 (Page 3), “Expansion” states for the proposed Landfill Expansion

- *“PCCL selected for expansion and under contract required to:*
- *Provide Post Closure Care for a minimum of 30 years after Closure”*

This duration of post-closure care is the minimum allowed under US EPA Subtitle D regulations. Apparently, the City/County will be responsible for the post-post-closure landfill maintenance, monitoring, and remediation of polluted groundwater after 30 years. Given the very large size of the proposed landfill, its siting at a geologically unsuitable site, and the inadequacies of the proposed design for providing for reliable long-term protection of public health and welfare, and environmental quality, the post-post-closure funding requirements could readily exceed the escrow account proposed for the landfill expansion during the hundreds to 1000 years or so that the landfill will be a threat to cause groundwater pollution. The proposed size of the landfill expansion magnifies the significance of the deficiencies in the design and operation specifications for the proposed landfill.

Slide 21 presents the proposed *“Fees and other revenue from Landfill 3.”*

Slide 24 states that the escrow fund at closure is estimated to be \$93,000,000.

It will be very important for the City/County and their residents to carefully analyze the proposed fee structure and especially the specific provisions of the escrow account to determine whether the funds potentially available would be adequate to address plausible worst-case needs for monitoring, maintenance, and groundwater remediation over the very long period of time that the proposed landfill would be a threat. We are involved in reviewing the State of California Integrated Waste Management Board’s and the Sherburne County, MN’s post-post-closure funding needs for MSW landfills developed under US EPA Subtitle D regulations. The magnitude of funding needed for post-post-closure is landfill-specific but is recognized to far-exceed current fee structures of landfill-owner contributions to the county. This type of analysis needs to be conducted for the proposed Landfill 3 in light of the unsuitability of the site and inadequacies in landfill design and monitoring provisions for the proposed landfill expansion.

Slide 54 Section 39.2 Criteria ii Shaw Environmental staff states,

*“ii. Location, Design, and Operations*

*The facility is so designed, located and proposed to be operated that the public health, safety and welfare will be protected.”*

As discussed in these comments the proposed location, design and monitoring of the proposed Landfill 3 will not be protective of *“public health, safety and welfare.”* Detailed information on the inadequate, unreliable and for some information distorted information on the characteristics of the proposed landfill is presented in our comments.

Regarding information in Slides 69 and 70 in the set of slides entitled, “Site Geology Found to Be as Anticipated” and Slide 73: Average, laboratory-measured vertical hydraulic conductivity values have been relied upon heavily for assessing potential migration of liquid in the proposed landfill site. Such laboratory assessments of vertical gradients are unreliable/inadequate for assessing a site’s geological characteristics and suitability for Subtitle D landfills. Furthermore, relying on “average” values from such assessments adds to the misperception left by the data. These issues are discussed further in a subsequent section of our comments.

Slide 85, *“Key Site investigation Conclusions”* states:

- *“The proposed landfill expansion will be surrounded by a low-permeability cohesive material (Mine Spoil) and underlain by low-permeability (predominantly shale) bedrock of the Carbondale Formation.*
- *“Field and laboratory test results and field observations indicate that the surrounding low permeability materials will effectively restrict vertical and horizontal movement of groundwater and will serve as an additional environmental safeguard at the proposed expansion site.”*

Those statements do not reliably characterize the movement of water/leachate-polluted groundwater that would develop under this proposed landfill as the liner system eventually fails. The rate of movement of that water will be such that in time the polluted groundwater will pollute off-site groundwater rendering it unusable for domestic and some agricultural purposes.

That slide continues with the conclusion:

- *“Upon construction of the expansion, since groundwater elevations outside of the proposed landfill will be much higher than the conservatively calculated interior leachate level, an inward hydraulic gradient is expected. This will result in groundwater flowing inward through the landfill liner in the unlikely event that the proposed landfill develops a leak.”*

The high groundwater table under the proposed landfill is another reason that the proposed site is unsuitable site for this landfill. Typically, landfill siting requirements specify at least a 5-ft separation between the bottom of the wastes and the highest point of the groundwater table.

Rather than being an advantage to a proposed landfill site, a groundwater table that would allow water to enter the wastes is a deficiency of the site; it represents another source of water that can generate leachate, which can then escape from the landfill during times of a lower water table. An inward gradient for the groundwater to enter the landfilled wastes means that the leachate that is generated in the landfill will have to be pumped for removal and treatment it for as long as the wastes in the landfill will be able to generate leachate upon contact with water; that period may be many decades to hundreds of years, i.e., long after the end of the post-closure period.

The phrase, “*in the unlikely event that the proposed landfill develops a leak*” is an indication of bias in landfill advocacy rather than of technically sound, fact-based reporting. It is well-known in the technical community that landfill liners of the type proposed for this landfill will deteriorate over time and become ineffective barriers to the passage of water and leachate.

Slide 86, “*Key Site Investigation Conclusions*” incorporates “conclusions” that are not justified based on the technical literature and an objective understanding of landfill liner systems and their performance in the real world, as discussed elsewhere in our comments. Off-site groundwater that can be used for domestic and other purposes will be polluted by leakage from the landfill. The proposed groundwater monitoring approach is, without question, unreliable for detecting leachate-polluted groundwater on the landfill property before it reaches off-site groundwater.

Slide 99 lists the following as “*Goals as a Designer*”:

- “**Control** - *Minimize the production and concentration of contaminants*
- **Contain** - *Use of liners and covers*
- **Collect** - *Use of collection systems*
- **Monitor** - *Confirm landfill performance*”

While those are suitable goals for controlling landfill contamination of the nearby area, the location, design, operation, and monitoring proposed for Landfill 3 will not be effective in or adequate for achieving them. These issues are discussed in detail elsewhere in these comments.

Slides 101, 102, 103, 104, 105, 106 and 112 are discussed in a following section of these comments. There discussion is provided on the unreliability, inadequacy, and for some issues distortions of information presented by Shaw Environmental in characterizing the “protective” properties of these components of the landfill containment system.

## Peoria City/County Landfill Expansion – Discussion of Issues Criteria

Shaw Environmental’s “Peoria City/County Landfill Expansion” PowerPoint slides provide a discussion of Criteria for the proposed landfill. Following are our comments concerning a number of those slides.

Slide 13, “Criterion 2,” states:

*“The Facility is so designed, located, and proposed to be operated so that public health, safety, and welfare will be protected” [emphasis theirs].*

Based on our experience in reviewing MSW landfills and their public health and environmental quality impacts, the statement of achieving “Criterion 2” is a gross overstatement of what can realistically be expected from the proposed Landfill 3. As discussed in these comments, the location chosen for the proposed landfill is highly unsuitable for a landfill of the proposed design. In time the landfill containment and monitoring systems will fail to prevent off-site pollution. If the County proceeds with the development of this landfill it will be committing future residents of the County to spending large amounts of money to remediate the environmental pollution that will occur at this landfill.

Slide 17, “Location Standards” lists as one of the standards,

- *“Water Supply Wells Setback*

*No off-site water supply wells are located within 200' of the waste boundary, nor are there any community water supply wells within 2,500 feet of the Waste Boundary (Appendix G2)”*

The current and future owners of adjacent and nearby properties should be protected from pollution of their groundwater by MSW leachate. A 200-ft zone from the waste boundary is grossly inadequate for dissipation of the pollution of groundwater that will occur under the landfill as the landfill liner system diminishes in its ability to contain the leachate. Furthermore, the monitoring program planned would be unlikely to detect the passage of leachate past the point of compliance for groundwater monitoring.

Slide 19, “Conclusion,” states:

*“Based on the information provided in Section 2.1 of the siting application, the facility is located such that public health, safety, and welfare will be protected.”*

That conclusion is not justified on the basis of the location or design of the proposed landfill. The landfill as proposed could not be expected to protect public health, safety, or welfare, or environmental quality for as long as the wastes in the landfill will be a threat.

Slide 64, “*Wastes That Will Not be Accepted for Disposal*,” [emphasis theirs] lists “*Hazardous Wastes*” as one waste category that will not be accepted at the proposed landfill. While that statement is in keeping with US EPA regulatory requirements for Subtitle D MSW landfills, it does not mean that no “hazardous chemicals” would be present in the wastes deposited in the landfill or in the leachate generated by the landfill. As discussed in our “Flawed Technology” review, owing to the operationally defined nature of the US EPA’s definition of “hazardous waste,” large amounts of highly hazardous chemicals can be placed in landfills compliant with Subtitle D regulations and be present in leachate that will be generated in the landfill. For example, MSW waste, itself, can contain hazardous and otherwise deleterious chemicals, as can construction and demolition debris, and other wastes specifically noted as being acceptable at the landfill (See Slide 63, “*Waste Acceptance Criteria*”).

Slide 86, “Hazardous Waste Preclusion,” states:

- “*NO Hazardous Waste will be accepted at the landfill.*” [Emphasis theirs]

As discussed above in reference to Slide 64, some defined “hazardous wastes” and large amounts of toxic and otherwise deleterious chemicals will be legally deposited in this landfill. The presence of those materials in the landfill will cause the leachate that will be generated in the landfill to be hazardous to the health and welfare of those who use water polluted by landfill leachate. The “waste acceptance program” outlined in Slide 86 will not be effective in eliminating defined hazardous wastes from being deposited in the landfill, much less the vast amounts of hazardous and otherwise deleterious chemicals that will be legally accepted at the landfill.

Slide 88, “*Conclusion*,” states:

*“Based on the information provided in Section 2.6 of the siting application regarding site operations, the facility is so proposed to be operated that the public health, safety and welfare will be protected.”*

That conclusion, by a consultant hired to help the company gain approval for a proposed landfill, is not supported by the plethora of technical information available on the inability of the so-called protection components proposed for the landfill to provide long-term protection of public health and environmental quality from adverse impacts.

## **Peoria City/County Landfill Expansion – Landfill Design**

Shaw Environmental's "Peoria City/County Landfill Expansion" PowerPoint slides summarize the landfill design. Following are our comments concerning a number of those slides.

Slide 9, "Overview of Design Options," states that the "Stand-Alone Design Option," would provide for "*10.1 million tons of waste disposal capacity*" and "*34 years of extended facility life.*"

We can understand the administrative desire of Peoria City/County to develop a very large landfill and thereby eliminate the need to undertake another landfill expansion process in a few years. However, from the perspective of ensuring long-term protection of public health and environmental quality, such an approach is ill-advised given the current state of landfilling regulations. The regulations under which municipal solid waste landfills are permitted today were developed by the US EPA in the late 1980s and adopted in 1992. It was well-recognized at the time the regulations were adopted, and is still the case today, that the regulations are grossly inadequate to ensure that MSW landfills will protect public health and the environment for as long as the wastes in the landfills will be a threat.

The technical background for this position and a discussion of these issues are provided in our "Flawed Technology" review. As discussed, even at the time the Subtitle D MSW landfilling regulations were adopted, it was recognized and discussed in the professional community that landfills developed within the regulations would eventually fail to contain the waste-derived pollutants in the landfill. MSW landfills of the type being developed today under those regulations, including the proposed Peoria landfill expansion, can, at best, be expected to only temporarily contain waste-derived constituents and postpone the inevitable pollution of groundwater with landfill-derived chemicals that render it unusable for domestic and some agricultural purposes. With time, the allowed landfill liner system relied upon for leachate containment will deteriorate, become increasingly less effective, and allow leachate to pass into the underlying groundwater and be transported off-site to pollute adjacent properties groundwater. Those systems are buried beneath the wastes and hence are not amenable to attentive inspection and effective maintenance and repair. Manifestation of the deterioration of the systems may be delayed for tens of years – even beyond the "post-closure period during which time the landfill owner has responsibility for monitoring, maintenance, and repair. However, it is indisputable that meeting Subtitle D requirements will not ensure protection of public health and environmental quality for the hundreds to thousands of years that the wastes in today's Subtitle D landfills will be a threat to generate leachate that can pollute groundwater rendering it unusable for domestic and agricultural purposes.

Once the post-closure period has passed, responsibility for the truly long-term care and remediation that will be essential for MSW landfills of the type being proposed, will fall to the



City/County. The development of large MSW landfills of the type proposed will exacerbate the long-term problems and financial responsibilities of the City/County for the impacts of the disposed wastes. The extent and severity of pollution and eventual costs of post-post-closure care for the City and County would be expected to be much less for properly sited and designed, smaller landfill than they would be for a large landfill. This is especially true under the current landfilling regulations whereby privately owned landfills are allowed to be sited at geologically unsuitable sites such as that proposed for Landfill 3 with limited financial responsibility for funding of landfill care for the totality of time – hundreds of years or more – that the landfilled wastes will be a threat. To permit such large MSW landfills under today’s meagerly protective regulations is not in the best interest of the people of the City/County of Peoria.

Slide 19, “Composite Liner System Schematic,” shows that the proposed liner is a typical single-composite design, which is the minimum design allowed under US EPA Subtitle D regulations. Our “Flawed Technology” review provides detailed information on fundamental flaws in such a design for collecting leachate that will be generated in such a landfill over the hundreds or more years that leachate can be generated in water that enters the landfill through the landfill cover. As quoted in that review, the US EPA acknowledged decades ago that such a liner will eventually fail to prevent leachate from passing into the underlying groundwater and leading to pollution. The US EPA knew and stated at the time, that the minimum design specifications of Subtitle D would not prevent pollution from the landfilled wastes. Such minimum design Subtitle D landfills are not allowed in about a half-dozen US states because of their eventual failure. If the proposed Landfill 3 is developed as proposed, there is no doubt that in time there will be off-site groundwater pollution; clean-up and remediation for that pollution will fall to the City/County who will be required to fund a Superfund-like clean-up.

Slide 20, “Composite Liner System in Leachate Collection “V” Notch and Sumps (Critical Areas),” shows that a Geosynthetic Clay Liner is to be added as an additional layer under the leachate collection/removal sumps. This slide contains the following footnote:

*“Note: The GCL and additional geomembrane in the critical areas significantly exceeds (sic) the minimum liner requirements.”*

That footnote is misleading. Shaw Environmental failed note the well-recognized near-term and especially long-terms problems with GCL liners in prevention of leachate from penetrating through the liner. These issues are discussed in our “Flawed Technology” review with references to the professional literature on the unreliability of this type of liner system.

Slide 22, “Leachate Collection System,” presents a drawing of the leachate collection system proposed for the proposed Landfill 3. Key to the ability of this leachate collection system to collect all the leachate that is generated in this landfill is the perpetual integrity of the plastic-sheeting liner in the landfill. As discussed in our “Flawed Technology” review, over time the

integrity of the plastic sheeting layer in the liner will diminish and deteriorate; leachate will eventually penetrate the plastic layer into the clay liner. The design of the clay liner will allow leachate to pass through it into the underlying groundwater system.

Slide 23, “Final Cover Schematic,” shows that the proposed landfill cover will be the minimum allowed under Subtitle D regulations. As discussed in our “Flawed Technology” review while such a landfill cover design could, if properly constructed, be effective in preventing entrance of water into the landfilled wastes when new, over time its low-permeability characteristics will deteriorate and allow large amounts of rainwater/snow melt to pass through the cover into the landfilled wastes where it will generate leachate. Conventional landfill cover maintenance does not address the deterioration of the plastic sheeting layer (40 mil HDPE) that will occur over time. The deterioration of the plastic sheeting layer is not visible from the landfill surface. The required post-closure funding does not provide for repair of the plastic sheeting layer. Since this is proposed to be a privately developed landfill, at the end of the post-closure period of required funding the City/County will likely be required to provide the funds needed for long-term landfill cover maintenance and cover repair.

Slide 24, “Landfill Gas Collection,” states:

- *“The low-permeability composite bottom liner and final cover systems are designed to prevent landfill gas from migrating beyond the waste boundary.”*

That is a misleading statement. It is well-known that today’s landfill liner systems allow some components of landfill gas, including carcinogens, to pass through the landfill liner and pollute groundwater in the vicinity of the landfill. This issue is discussed in our “Flawed Technology” review.

- *“Landfill gas will be removed using a vacuum extraction process.”*

The claim that all landfill gas will be removed by the landfill gas extraction process is a distortion of the real situation that will occur at this landfill. It is well-known that the typical landfill gas collection system does not collect all landfill gas generated in the landfill. Furthermore, for that system to work even somewhat effectively it must be effectively operated and maintained over the entire period of time during which landfill gas can be generated in the landfill. Since landfill gas can be generated well-beyond the post-closure period, the City/County will have to fund operation, maintenance, and repair of the landfill gas collection system. These issues are discussed in our “Flawed Technology” review.

Slide 29 presents drawings of the proposed groundwater monitoring system as a set of monitoring wells located around the edge of the landfill. While a Shaw Environmental representative stated at the landfill hearing (see PDF site transcript page 392) that their

“modeling showed a 99% monitoring well efficiency,” when Joyce Blumenshine had asked earlier in the transcript how close the wells would be placed, the representative never answered.

In order to be “99% efficient” at intercepting incipient groundwater pollution from a lined landfill, the monitoring wells around the edge of the landfill would have to be spaced no more than a few feet apart. From the monitoring well array presented in slide 29 it appears that Shaw Environmental proposes to space monitoring wells 100 or more feet apart. As discussed in our “Flawed Technology” review, each monitoring well of the type normally used and sampled can only sample water within a foot or so of the well; leachate-polluted groundwater that arises from the initial leakage of the landfill liner will move as narrow finger-plumes. Thus, it is likely that the initial finger-plumes of leakage would pass between monitoring wells and not be detected by them. Unless Shaw Environmental can produce documentation that shows that the proposed monitoring well array will be 99 % effective in detecting incipient leachate-pollution of groundwater, that claim by the Shaw Environmental staff must be considered unreliable.

Slide 34, “Stormwater Management,” presents a list of various systems for managing the flow of stormwater runoff. However, no information is presented on the surface water quality monitoring that will be needed essentially forever to determine if pollutants associated with the landfill are present in the runoff waters, which can be adverse to off-site surface water quality and aquatic life.

## Site Suitability and Adequacy of Site Investigation

Based on a review of the Shaw Site Investigation Update PowerPoint slides which summarize the geotechnical and hydrological investigation of the proposed landfill area, we wish to provide the following comments.

The Site Slide 9 “Geology Found to Be as Anticipated” presents information on the “average” vertical conductivity of the mine spoil area based on laboratory tests. It is well known that laboratory tests of hydraulic conductivity are not reliable and can be in significant error. Also presenting on the average hydraulic conductivity can give a very misleading indication of the maximum rate of water movement through the strata. Presenting only average values is a tactic used by consultants for landfill developers to mislead the reviewer of a landfill application on the worst case situation for transport of leachate polluted groundwater for the area. A proper presentation would present the maximum values as well. The horizontal hydraulic conductivity of about  $10^{-3}$  to  $10^{-4}$  cm/sec shows that this area will allow rapid movement of leachate polluted groundwater when the landfill liners eventually fail to collect all leachate that will be generated in this landfill.

Slide 10 presents the laboratory measured average vertical hydraulic conductivity of the upper shale but fails to mention that laboratory measured values can be in significant error and fails to present the maximum vertical hydraulic conductivity found. Also no mention is made that since shale formations frequently have cracks that can allow much more rapid transport of water (leachate polluted groundwater) than laboratory measured values. The average horizontal hydraulic conductivity of about  $10^{-6}$  cm/sec will allow fairly rapid transport of leachate polluted groundwater through the Carbondale Formation.

The Springfield Coal strata data suffers from the same limitations on reliability as discussed above for the other strata of the area.

Slides 13, 14 and 15 presents the “Potentiometric Surface of the Mine Spoil,” “Upper Shale” and “Springfield Coal” where the estimated seepage velocity is presented. Based on the deficiencies in the approach used by Shaw Environmental in presenting hydraulic conductivity data it is likely that the estimated seepage rates are much less than the maximum seepage rate that can occur at this site.

Slide 16 “Vertical Gradients” presents Shaw Environmental’s conclusion that the vertical gradients that the “*Carbondale Formation is acting as an aquitard (barrier) beneath the site*” and that “*vertical fractures do not appear to provide good vertical hydraulic connection through the shale.*”

This conclusionary statement can be greatly in error based on the unreliable measurement approaches used at the site.

Slide 26 “Key Conclusions”

- *“The proposed landfill expansion will be surrounded by a low-permeability cohesive material (Mine Spoil) and underlain by low-permeability (predominantly shale) bedrock of the Carbondale Formation.”*
- *“Field and laboratory test results and field observations indicate that the surrounding low permeability materials will effectively restrict vertical and horizontal movement of groundwater and will serve as an additional environmental safeguard at the proposed expansion site.”*

As discussed above these statements are not reliable since they are based on laboratory based vertical testing and average velocities. On the contrary the mine spoil will not prevent offsite groundwater pollution by leachate polluted groundwater.

Slide 27 “Key Conclusions”

- *“The proposed expansion is located in an area which, due to low yield, is unfavorable for the development of groundwater resources and which exhibits the lowest potential for aquifer contamination within Peoria County. Large supplies of potable groundwater cannot be obtained in this area.”*

The low yield of groundwater in the offsite area does not preclude its use for local domestic and agricultural purposes. Also US EPA Subtitle D regulations do not allow offsite groundwater pollution by MSW leachate.

- *“The hydrogeologic conditions at the site will allow a comprehensive groundwater monitoring system to be implemented which will be able to adequately verify if groundwater resources are being impacted by the landfill.”*

Discussed in another set of these comments is that the proposed groundwater monitoring is not necessarily reliable to detect leachate polluted groundwater when it first reaches the point of compliance for groundwater monitoring as required in US EPA Subtitle D regulations.

Overall the hydrological studies show that this area does not provide for natural protection of offsite groundwaters by leachate polluted groundwater and is not a suitable site for the Peoria landfill expansion.