

# **Appendix E**



# ILLINOIS POLLUTION CONTROL BOARD

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October 25, 2000

## GOVERNOR

Honorable  
George H. Ryan

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Illinois Department of Natural Resources  
524 S. Second Street  
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Dear Director Skinner and Director Manning:

On behalf of the Pollution Control Board, I am happy to present the following information for the review of the Water Resources Advisory Committee. While the Vonnahme-Park letter of October 5, 2000 to the Committee seeks commentary in three assignment areas, these remarks focus on "Assignment Number One": the need for substantive changes in law or regulation governing the usage of water in the State of Illinois.

In the June 6, 2000 press release announcing the establishment of this committee, Governor Ryan explained: "I want this new committee to take a close look at our water resources and specifically examine the impact of industry, agriculture and population on Illinois' groundwater and surface water supplies. It's important for us to look into the effects of our usage of our limited natural resources." More specifically, the Governor set forth the committee's task as follows: to focus on our water resources and its usage, including the effects of peaker plants on groundwater and surface water supplies.

As all of you know, at the same time Governor Ryan created this committee, he asked the Pollution Control Board to hold a series of Inquiry Hearings concerning the potential environmental impact of proposed new natural gas-fired peaker plants. Given the proliferation of these new facilities and the expressed public concerns, he asked the Board to specifically address the issue of whether further regulations or legislation is necessary to adequately protect the

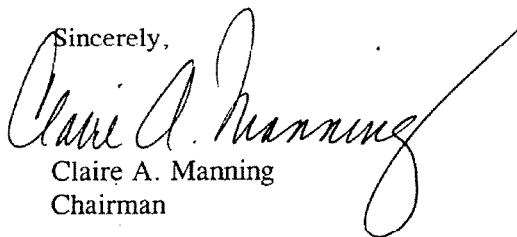
environment. Pursuant to that request, the Board held seven days of public hearing (August 23-24, Chicago; September 7, Naperville; September 14, Joliet; September 21, Grayslake; and October 5-6, Springfield.) During those hearings, the Board heard testimony from over 80 individuals -- representing a broad variety of interests: state and local government officials; legislators; industry representatives, and concerned citizens. I have enclosed a list of those persons who testified. The complete transcript of testimony for each hearing is available on the Board's Web site at [www.ipcb.state.il.us](http://www.ipcb.state.il.us).

While water usage was NOT the focus of these Board hearings, the issue of water usage was nonetheless an expressed concern of many who testified. Since it is the function of this committee to address those concerns, the Board has prepared a summary of all testimony relevant to the issue of water usage. For review by this committee, I have attached that summary. Especially important, I believe, is the testimony of local government officials who seek greater regional or state regulation of the State's precious supply of water.

For review of this committee, I have also asked Board staff to research the regulatory framework of several other Midwestern states (Iowa, Indiana, Missouri, Minnesota, Ohio, Wisconsin) as it concerns the use of water in each state. Interestingly, Illinois is alone in the virtual absence of state controls or plans regarding the use of water.

Based upon the enclosed information, I believe it is time to focus the committee's attention on the development of a workable regulatory framework for the conservation and fair allocation of water resources in this great State: one that meets the needs of all concerned entities and citizens. I hope the enclosed information aids us in that important task. I look forward to seeing you both at the next meeting of the Governor's Water Resources Advisory Committee.

Sincerely,

A handwritten signature in cursive script that reads "Claire A. Manning". The signature is written in black ink and is positioned above the printed name and title.

Claire A. Manning  
Chairman

cc: Renee Cipriano  
Members of the Water Resources Advisory Committee

PERSONS TESTIFYING AT BOARD PEAKER HEARINGS

Chicago Hearings

August 23, 2000

1. Charles Fisher, Executive Director, Illinois Commerce Commission
2. Thomas Skinner, Director, IEPA
3. Christopher Romaine, Manager, Utility Unit, Permit Section, Division of Air Pollution Control, Bureau of Air, IEPA
4. Robert Kaleel, Manager of Air Quality Modeling Unit, Division of Air Pollution Control, Bureau of Air, IEPA
5. Greg Zak, Noise Advisor, IEPA
6. Steve Nightingale, Manager, Industrial Unit, Bureau of Water Permits Section, IEPA
7. Rick Cobb, Manager, Groundwater Section, Bureau of Water, IEPA
8. Todd Marvel, Assistant Manager of Field Operations Section and RCRA Coordinator/USEPA Liaison/IEPA
9. Brian Anderson, Director, Office of Scientific Research and Analysis, IDNR
10. Derek Winstanley, Chief, Illinois State Water Survey, IDNR

August 24, 2000

1. Gerald Erjavec, Business Development, Indeck Energy Services, Inc.
2. Greg Wassilkowsky, Manager, Business Development, Indeck Energy Services, Inc.
3. Arlene Juracek, Vice President, Regulatory and Legislative Services, ComEd
4. Steve Nauman, Vice President, Transmission Services, ComEd
5. Deirdre Hirner, Executive Director, IERG
6. Richard Bulley, Executive Director of Mid-America Interconnected Network

7. Freddi Greenberg, Executive Director and General Counsel, Midwest Independent Power Suppliers
8. Michael Kearney, Manager, Economic Development, Ameren Corp.
9. Richard Trzupsek, Manager, Air Quality, Huff & Huff

### Suburban Hearings

#### Naperville

September 7, 2000

1. Mayor George Pradel, Naperville
2. State Senator Chris Lauzen
3. State Representative Mary Lou Cowlshaw
4. Mayor Vivian Lund, Warrenville
5. Paul Hass, Zoning Manager, DuPage County Department of Development Environmental Concerns
6. Richard Ryan, President and Chairman, Standard Power and Light, Oak Brook
7. Diana Turnbull, Consultant to variety of citizen groups, private foundations and businesses who have been in opposition to some of the peaker plants
8. Carol Dorge, Attorney representing Lake County Conservation Alliance
9. Connie Schmidt, Representative of River Prairie Group
10. Mark Goff, Resident, Warrenville
11. Cathy Capezio, Resident, Aurora
12. Terry Voitik, Resident, DuPage County, and Founder of Citizens Against Power Plants in Residential Areas (CAPPRA)
13. Maurice Gravenhorst, Member, CAPPRA
14. Lucy Debarbaro, Member, CAPPRA

15. Terry Voitik on behalf of Steve Arrigo, CAPPRA
16. Susan Zingle, Executive Director, Lake County Conservation Alliance
17. Beverly Dejovine, Representative, Citizens Advocating Responsible Environments (CARE), Bartlett
18. Cathy Johnson, Vice Chair, Rural and City Preservation Association (R&CPA)
19. Chris Gobel, Member, CAPPRA
20. Elliot "Bud" Nesvig
21. Sandy Cole, Commissioner, Lake County Board
22. Chris Gobel, Member, CAPPRA

**Joliet**

**September 14, 2000**

1. Dr. Thomas Overbye, Associate Professor, Department of Electrical and Computer Engineering, University of Illinois, Champaign-Urbana
2. Alan Jirik, Director, Environmental Affairs, Corn Products International, Inc.
3. Carol Stark, Director, Citizens Against Ruining the Environment, Lockport
4. Susan Zingle, Executive Director, Lake County Conservation Alliance
5. Keith Harley, Chicago Legal Clinic
6. Elliot "Bud" Nesvig
7. Michael Shay, Senior Planner Responsible for Long-Range Planning, Will County

**Grayslake**

**September 21, 2000**

1. State Senator Terry Link
2. State Representative Susan Garrett
3. Tom Lynch, Trustee, Libertyville Township

4. Betty Rae Kaiser, Trustee, Village of Wadsworth
5. Daniel J. Kucera, Chapman & Cutler, appearing on behalf of the Lake County Public Water District
6. Jim LaBelle, Chairman, Lake County Board
7. Sandy Cole, Commissioner, Lake County Board
8. Bonnie Carter, Commissioner, Lake County Board
9. Greg Elam, CEO, American Energy
10. Larry Eaton, Attorney, on behalf of the Liberty Prairie Conservancy, Prairie Holdings Corporation, and Prairie Crossing Homeowners Association
11. Toni Larsen, Resident, Zion
12. Chris Geiselhart, Chairperson, Concerned Citizens of Lake County
13. Diane Turnbull, Representing Liberty Prairie Conservancy, Concerned Citizens of Lake County, CARE from McHenry County, Bartlett CARE, and Southwest Michigan Perservation Association
14. Lisa Snider, Resident, Wadsworth
15. Verena Owen, Co-Chair, Zion Against Peaker Plants
16. Elliot "Bud" Nesvig
17. Carolyn Muse, Resident, Zion
18. John Matijevich
19. Dennis Wilson, Resident, Island Lake
20. Terry Jacobs, Resident, Libertyville
21. Jim Booth, Resident, Newport Township in Lake County
22. William McCarthy, Resident, Libertyville
23. Susan Zingle, Executive Director, Lake County Conservation Alliance
24. Barbara Amendola, Resident, Zion

25. Mark Sargis, Attorney, working with citizens who have been concerned about peaker issues
26. Cindy Skrukrud, Resident, Olin Mills, McHenry County
27. Paul Geiselhart, Resident, Libertyville
28. Dr. William Holaman, President, Illinois Citizen Action
29. Evan Craig, Volunteer Chair, Woods and Wet Lands Group of the Sierra Club
30. Phillip Lane Tanton

### Springfield Hearings

#### October 5, 2000

1. Roger Finnell, Engineer, Division of Aeronautics, Bureau of Airport Engineering, IDOT
2. John Smith, Representative of Illinois Section of American Waterworks Association
3. Brent Gregory, Representative of National Association of Water Companies, Illinois Chapter
4. James R. Monk, President, Illinois Energy Association
5. Patricio Silva, Midwest Activities Coordinator, Natural Resources Defense Council
6. Brian Urbaszewski, Director, Environmental Health Programs, American Lung Association
7. Elliot "Bud" Nesvig
8. Carol Dorge, Attorney representing Lake County Conservation Alliance

#### October 6, 2000

1. Susan Zingle, Executive Director, Lake County Conservation Alliance
2. Scott Phillips, Attorney, IEPA



3. Kathleen Bassi, Attorney, IEPA
4. Chris Romaine, Manager, Utility Unit, Permit Section, Division of Air Pollution Control, Bureau of Air, IEPA
5. Greg Zak, Noise Advisor, IEPA
6. Todd Marvel, Assistant Manager of Field Operations Section and RCRA Coordinator/USEPA Liaison/IEPA
7. Steve Nightingale, Manager, Industrial Unit, Bureau of Water Permits Section, IEPA

## **Testimony and Comments Regarding Use of Water by Peaker Plants — given to IPCB in context of Peaker Plant Hearings**

### **CHICAGO HEARINGS**

#### **Commonwealth Edison — Prefiled Testimony of Arlene A. Juracek and Steven T. Naumann**

Water impacts, including with regard to any potential contamination and water supply, are also carefully assessed during the planning and development of any peaker plant. Stringent state requirements regulate the discharge of contaminants while local authorities often directly oversee issues of water supply. In addition, the impact of peaker plants and other facilities on water resources and usage will be closely examined by Governor Ryan's newly appointed Water Resources Advisory Committee, which will present its recommendations to the Governor by December 2000.

#### **Midwest Independent Power Suppliers Coordination Group -- Prefiled Testimony of Freddi Greenberg**

While water usage will vary depending upon the specifics of the plant involved, the simple cycle technology currently used for peaker facilities typically places a small demand on water resources. For example, the owner of one peaker plant located in Kane County advises that the plant consumes no more than 2.5 million gallons of water in a year. In comparison, the average golf course in the Great Lakes region consume[s] almost 31,000,000 gallons of water in a year. (Weathermetrics, Inc. 1999 website) MWIPS recommends that the Pollution Control Board defer its consideration of the impact of peaker plants on water resources so as to consider the report the impact of peaker plants on water supply which will be issued by Governor Ryan's Water Resources Advisory Committee.

#### **Indeck Energy Services, Inc. -- Gerald M. Eriavec**

##### **Prefiled Testimony**

To counter this effect, various methods are employed to cool the inlet air and increase its density. One such method is the use of chillers; however, these require power to operate and are sometimes counter productive. Another method is called evaporative cooling, in which the air stream is passed over water and the air is cooled through evaporation, much like perspiration cools the

skin. This cooling effect can be limited on humid days. While water consumption varies based on temperature and humidity, an evaporative cooler on a 300 MW plant will average about 40 gallons per minute (gpm) of water consumption.

Even though these hearings are directed at peaking plants, the subject of combined cycle plants is sure to come up, so a brief discussion of them is in order. Simply put, a combined cycle plant adds a steam cycle to the process but directing the hot exhaust gas from the combustion turbine through a boiler, which generates steam to turn a steam turbine. Because more energy from the fuel is recovered and used to produce electricity, combined cycle plants can be as much as 50% more energy efficient than "simple cycle" peakers; however, they are not suited to peaking use because they cannot be brought on line quickly enough to function as peakers. Combined cycle plants also have increased water needs compared to peakers. The first use of water, in the steam system, is minimal, about 25 gallons per minute in a system that has been coupled to 300 MW of combustion turbines to create a 200 MW steam cycle. Water can also be used to cool the steam after it passes through the steam turbine. If water is the sole medium, up to 2,500 gpm can be consumed, which may be significant in some areas. Fortunately, advances have been made in cooling technologies so that this use can be greatly reduced or eliminated if the situation calls for it.

\* \* \*

Water consumption impacts were also compared against other enterprises and found, in most cases, to be at the low end of the impacts.

#### Testimony at Hearing

Water consumption can vary by humidity and temperature. For example, on a very humid day, you'll [evaporate] very little water. So very little water will be used. On a hot, dry day would probably be your maximum consumption. Typical for, say, a 300 megawatt unit would be about an average of 40 gallons per minute. It can range from about zero to 80, depending upon the temperature and the humidity.

One of the things that's a concern about this type of plant here is the water use, and I would like to bring that up. The water use, there's two places. Number one, there's water in the steam system going around this way. You have to -- you get some trace contamination going in there. So you have to occasionally blow it down. The steam cycle on this plant, this is based on putting a heat recovery unit on the back of a 300 megawatt plant, would probably be about 25 gallons per minute, which is not a lot.

\* \* \*

You can use about 2500 GPM, which can trend toward, depending upon where you are, significant numbers.

Now, the good news is that there are other ways to attack this problem. They've made significant advances in dry-cooling systems, which would not require this water at all. There are some hybrid systems that cut down on the amount of water use.

Water use, as I noted before, when operating a typical 300 megawatt peaker plant with an evaporative cooler uses a maximum of 80 gallons per [minute], an average of about 50. Technology, the evaporative cooler generally is only used above 60 degrees.

\* \* \*

What is 80 gallons per minute? Well, basically it's the equivalent of 11 homes watering their lawns at the same time. If you walk down the street and you saw 11 homes watering their lawns, you probably wouldn't think anything of it. On an annual basis, approximately the consumption of about 30 homes, 30 average homes. Other water impacts that need to be considered are wastewater and stormwater. Stormwater is captured on site.

\* \* \*

Water consumption, a million gallons per year. Compare your 300 megawatt peaking plant to a 50-home subdivision, a typical high school, or a retirement home, a 200-bed medical center, or a 400-room hotel, way down at the low end, I think my laser pointer is dying here, of water consumption.

#### **IDNR -- Testimony of Brian Anderson, Director, Office of Scientific Research and Analysis**

In Illinois, except for withdrawals of water from Lake Michigan, there is extremely limited regulatory authorities associated with water withdrawals from our other surface waters and from groundwater. It's, therefore, more appropriate to deal with water quantity issues in front of -- in the context of Water Resources Advisory Committee, however, we do acknowledge the relationship between these issues and I have asked Dr. Derek Winstanley, Chief of the Illinois Water Survey, to provide a concise summary of some of the water quantity issues relating to peaker power plants.

#### **Illinois State Water Survey, IDNR -- Testimony of Dr. Derek Winstanley, Chief of the Illinois State Water Survey**

One focal point that I do wish to make is that the discussion of peaker power plants and the impacts on groundwater resources should be placed within the context of all other water demands including those for combined cycle plants as well as Illinois' growing water needs for domestic, municipal, agricultural and other industrial uses. We do need to look at total demands from groundwater resources as a basis for sound water resource management. The water demands

from the peaker power plants vary widely depending upon plant design, their intended use and the number of days of operation.

I would like to give you some examples of the quantities of water that may be associated with operations of peaker power plants by putting that in context of some other water uses. First of all, peaker power plants, and I am going to focus on just a simple cycle power plant when I refer to the peaker power plants, these are typically small producing a few tenths to a few hundred, perhaps a thousand megawatts of electricity. They do not operate everyday of the year. The typical period of operation is from perhaps 20 to 90 days per year. The range of water use there is from less than 100,000 gallons per day to about 2 million gallons per day. Translating that into an annual use that gives us a range of from about 1.4 to 180 million gallons of water per year.

Turning to baseload power plants, which is combined cycle, these are obviously much larger, typically generate maybe 500 to several thousand megawatts of electricity and are intended to operate more or less continuously throughout the year. They consume water within the range of about 5 to 20 million gallons per day. Translating that to an annual water use, that gives us a range from about 1,500 million gallons per year to 6,000 million gallons per year.

So in context, the peaker power plants consume about a fraction of 1 percent to about 3 percent of the water used by typical baseload combined cycle plants.

Another example of water use, municipal water use, and I give you data from Champaign, Urbana, for context. Champaign, Urbana, has a population of about 120,000 people, and they need that water supply regularly 365 days per year. Champaign, Urbana, currently consumes about 20 million gallons per day of groundwater, which translates into an annual use of about 7,300 million gallons per year.

So to put the water use by peaker plant in context of a municipal use, a typical peaker plant would use the same amount of water as between about 25 and 3,000 people, depending upon the nature of the peaker.

One concept that is important in examining not only peaker power plants but all groundwater use is the concept of sustainable yields. And in my written testimony, I refer to that as potential yield. Sustainable yield is a fairly diffuse concept but generally, it tends to mean the yield of water that can be sustained over the long term so that it can be used not only by the current population but also by future generations and a yield that will have no significant impacts.

The determining sustainable yield is a complex scientific exercise that involves consideration of variables such as rainfall, recharge rates, geology and impacts. Impacts not only on existing wells, but on peaker systems and on stream flows.

The point here is that for most aquifers in Illinois, we do not have a very highly accurate estimate of sustainable yield. We need much better scientific data and modeling capabilities to be able to estimate sustainable yields.

Another important point is that aquifers themselves are not very sensitive to the end uses of water. That is an aquifer doesn't really differentiate whether a million gallons of water is going to be used for drinking water or for peaking power plants or for golf courses but the public often does differentiate among those end uses and, I think, trying to incorporate the public values and preferences into the equation on water resource management is an important consideration as well as the actual amount of water used.

Water quality has been mentioned by people from Environmental Protection Agency giving previous testimony. There are natural occurrences of various chemicals in the groundwaters throughout Illinois. These lead to mineral concentrations that can effect not only the operation of the peaker plants, but also the discharges from the peaker plants. So the water quality also needs to be considered.

In conclusion, I would like to make two points, one focusing exclusively on groundwater, the other combining groundwater with surface water.

Focusing on groundwater, it's important to recognize that in the use of groundwater resources, all uses of groundwater, not just peakers, that we need to consider the scale of the natural resource, that is the aquifer.

Groundwater typically is found in discrete squifers that transcends political jurisdictions. They cut across municipalities, counties and even states. Plumbing management by individual communities will not solve problems in the long term, we need to take an aquifer-wide perspective. Beyond just groundwater, I think that we need much more consideration of the conjunctive use of surface and groundwater. There can be many efficiencies gained in water supplying usages by considering conjunctive uses of surface and groundwater.

So my bottom line is that I think Illinois would benefit from moving towards much more comprehensive regional water resource planning and management. This will bring together communities and cut across jurisdictions and we'd — much more appropriate to the scale of the natural resources, that is the aquifers in the case of the groundwater supplies and river basins and water sheds for surface waters.

\* \* \*

Let me give you one example I think is an excellent model of what is going on in one part of Illinois and that is in central Illinois. We have a major aquifer, the [Mahomet] aquifer, that extends from the Illinois River across to Indiana,

which embraces 15 counties. Now, in the past couple of years, the local communities in that 15 county area have bonded together to form what is called the [Mahomet] aquifer consortium and they're collectively concerned about the future of their own water resources, want to better characterize those resources and opportunities as a basis for self-management to the water resources. So, I think, on the one hand we may need new laws, regulations, but I think we also need to encourage local communities to attempt to solve their own problems.

**IEPA -- Prefiled Testimony of Richard P. Cobb, Manager of the Groundwater Section of Bureau of Water**

However, the few Illinois court decisions since the enactment of the Water Use Act have interpreted that "reasonable use" for groundwater does not restrict the use of groundwater except from malicious or wasteful purposes of the user.

Concurrent with the requirement for these hearings, Governor Ryan, by Executive Order, established a Water Resources Advisory Committee. The committee's task will be to focus on our water resources and its usage, including the effects of peaker plants on groundwater and surface water supplies. The committee will also examine the various economic and social issues related to energy producing facilities and water use in Illinois and present recommendations for action to the Governor by December 2000. I plan on attending this committee's first meeting on August 31, 2000.

**IEPA -- Prefiled Testimony of Christopher Romaine, Manager of the Utility Unit in the Permit Section of Division of Air**

A key factor in the design of a peaker plant is the capability to maximize the power output of the plant to be able to meet peak electric power demand. This leads to a number of variations on the basic simple cycle turbine, all due to the scientific fact that the power output of a gas turbine varies based on the density of the air being used in the turbine. The denser the air, the more air that can be pushed through the turbine and the higher the power output. This means that in the absence of any adjustments, the output of a given gas turbine will be significantly less on a 90°F day in July, when peak power is most likely to be needed, than on a 20°F day in January. To correct for this phenomenon, the modern simple cycle turbines used in peaking plants are routinely equipped with devices to cool the air going into the turbine. While it may appear counterproductive to cool the air in a turbine before heating it, cooling the air allows more air to be handled by the air compressor, thereby allowing more fuel to be burned and increasing the power output of the turbine.

Gas turbines can be equipped with several different types of air cooling systems that vary in the effectiveness with which they can cool the inlet air to boost a gas turbine's power output. In the simplest system, water is injected directly

into the incoming air to cool the air by evaporative cooling. Clean demineralized water must be used to prevent excess build up of scale or erosion of the blades in the air compressor of power turbine. In more advanced systems, water may also be injected at a point in the air compressor itself. The inlet air may also be cooled by indirect systems in which the air passes through cooling coils. In this case, water may still be used in an open cooling tower where evaporation of water is used to dissipate the heat generated by a mechanical refrigeration unit. Alternatively, a dry cooling system may be used in which the heat generated by a refrigeration unit is dissipated to the atmosphere by dry cooling towers or radiators. The more complex the cooling system, the greater the amount of energy that is consumed in its pumps and compressors, which accounts for some of the increase in power output.

Another approach to boost power output of a gas turbine is to inject clean water of steam into the burners or to inject steam after the burners. All these measures increase the gas flow through the power turbine and thus increase its power output. Because fuel must be burned to evaporate the water (either in the turbine itself or in a separate boiler to make steam), these measures to increase power output are accompanied by a loss of fuel efficiency by a gas turbine.

### **NAPERVILLE HEARING**

#### **Connie Schmidt, Representative of River Prairie Group**

DuPage County is so close to Chicago, one would think it is very urban. I myself have a well and septic on my property and I am incorporated. I live within the city limits of Warrenville. So it is not totally unusual -- and all my neighbors do because we don't have city water in our neighborhood. So the groundwater use as well as what happens to it after it's been used, I think, is a realistic concern in our area.

#### **Mark Goff, Resident, Warrenville**

So obviously well water is a concern.

#### **Lake County Conservation Alliance -- Testimony of Susan Zingle, Executive Director**

A lot of people have talked about water supply. Some of the peakers do use vast amounts of water. Some of them as much as a combined cycle plant. We're looking at Zion is going to use over 200 gallons (sic) a day. That's as much as the entire city of Zion in itself. McHenry and parts of Wisconsin draw on that same aquifer. How can Woodstock and Zion even be aware of each other's plants let alone determine which of the two plants is built if either. Water supply is not a local issue



**Rural and City Preservation Association (R&CPA), Cathy Johnson, Vice Chair**

The water issue, which is a major one in McHenry County, is barely even considered in the new standards. A new peaker plant has to only respond to how the water it uses affects the area one-quarter of a mile around the plant. This is ridiculous. This standard isn't there to protect us.

**JOLIET HEARING**

**Corn Products Internal, Inc., Alan Jirik, Director, Environmental Affairs**

With regards to cooling water consumption, our plant currently takes water from the Sanitary and Ship Canal. The water is used for non-contact cooling purposed for the corn wet milling operating and then returned to the canal. In a clever and environmentally friendly approach, we plan to use the existing cooling water flow to supply cooling water to the new cogeneration operation. We accomplish this by routing an additional loop from our existing cooling water line to serve the cooling needs of the cogen. After servicing the cogen, the water will return to our existing line and be discharged the same as it is today. Thus, the project will not increase our current water withdrawal and will not result in any new water discharges, any new intake or outfall structures, or cause any other disruptions to water bodies, water tables, groundwater, aquifers or burden the community drinking water supply.

**Citizens Against Ruining the Environment, Lockport, Carol Stark, Director and Exchange with Board Member Kezelis**

We also have information that states the aquifers located **on this site** are joined together. This is the first of our concerns. The fact that the aquifers, our water supply, could be affected by this peaker using thousands of gallons a day is not a comforting thought.

\* \* \*

Board Member Kezelis: Ms. Stark, do you know what the source of your public water supply is in Lockport?

Ms. Stark: We do -

Board Member Kezelis: Is it the aquifer?

Ms. Stark: Yeah. We do have -- and then there are some people that are on wells, but yes, it's the aquifer. We have never tied into Lake Michigan water.

**Will County, Michael Shay, Senior Planner Responsible for Long-Range Planning and Exchange with Chairman Manning, Board Members Flemal, Girard, Kezelis and McFawn**

The largest thing that we found that concerned us was that Will County's aquifer reserve water is about 66 million gallons a day. That's how much we have — it's currently recharging -- that we could use for water supply. We contacted several facilities and went on several industry websites and they said five to 12 million gallons a day per facility for a combined cycle facility and roughly a million gallons a day for a simple cycle facility.

So we contacted some of them that actually started operation in Will County, including the one that you visited today. We arrange tours. On our tour, we found out they're actually planning -- or they were planning for an expansion and this comes to a key point that I'd like to discuss today. There was discussion earlier about separating simple and combined cycle plants. We do not think you can separate those two facilities.

Simple cycle facilities are designed and physically organized to be converted to combined cycle facilities down the road and that plans that we received as we reviewed these petitions explicitly and clearly state that; that they are designed to be converted or added onto at a later date. So we do not want to see those two issues separated at all.

So they -- we get into more discussions with them and they say 16 million gallons a day for one of the facilities which we visited, which means that four such facilities of which there are already that many could eat up the entire reserve water capacity for Will County. We are not likely to get more lake water. River water is another issue altogether regarding quality of our water. So when you add that to the fact that we are the fastest growing -- numerically growing county in Illinois and also the fastest in the sunbelt, we see a problem for a collision between growth and these facilities for that resource.

We are also concerned -- when we continue to do our research, we said, that's a lot of water to draw from one facility. How do you get that? Well, they drop wells in the aquifer obviously and they pull it up at such a rate that it creates a drawdown. It creates a reverse cone or a cone of water supply and the radius on that for a facility of the magnitude that we were discussing is six miles drawdown, 300 feet drawdown at the point of the well and still 35 to 50 feet of the six-mile radius.

Will County has thousands and thousands of wells; residential, industrial or group wells. We're concerned about well failure because we continue to place

these facilities over time and if they're to be converted to combined use facilities.

\* \* \*

Board Member Kezelis: I have a question. I, too, hope to be brief, Mr. Shay.

That status of the suggestions that you and the planners for Will County propose to your board, what is the current status?

Mr. Shay: Well, we have a first set of regulations in place. We're currently discussing the second set of -- we're researching and discussing the second set. If I had to provide a guess, which bureaucrats despise doing, but I will do nonetheless, I would suspect that they will prohibit the use of aquifer water for electric generation.

\* \* \*

Board Member McFawn: Is the only industry that you're concerned about the drawdown well or is that general a concern?

Mr. Shay: It's the only industry we know of that draws that amount that quickly. We can't find another that draws from the aquifer at that rate, but we're unaware of one that draws at that rate.

Let me illustrate this real quickly. When you're talking about 16 million gallons a day, that means that three of those facilities could put a pipe on the end of the Fox River in St. Charles and the river would end while it was in operation.

Chairman Manning: Where did you get those figures in terms of the drawdown effect and how much water is actually being used by these facilities?

Mr. Shay: We got from the-- well, we got the information on flow and amount of the aquifers and reserve capacity from the Illinois Water Survey. They regularly publish those statistics and we acquired them from them and then we acquired numbers on the use actually directly from the industry itself.

The engineers who built the Elwood plant, we -- our land use and zoning committee and planning and zoning committee visited those facilities. In those discussions, we asked them about water use and they gave us very frank answers on that. The number that they gave us came out to 16 million gallons a day and we confirmed with them that that was an accurate assessment. So we're fairly confident of those numbers.

\* \* \*

Board Member Kezelis: Mr. Shay, what's your understanding about the Elwood facility; single or combined?

Mr. Shay: My understanding is that it is currently a single cycle plant that the two additional -- the Elwood two and Elwood three will also be simple cycle.

All three of those phases, though, are designed to be converted to combined cycle should they wish to do so.

Board Member Kezelis: So the 16 million gallons per day --

Mr. Shay: Would be if they became a combined cycle. They are not currently. They do have a well, but it's comparably small.

\* \* \*

Board Member Girard: Mr. Shay, if Will County passes an ordinance that prohibits the use of aquifer water or electrical generating facilities, would that also apply to a facility that tried to site itself inside a municipality in Will County?

Mr. Shay: No. That's why we're concerned about jurisdiction hopping, but it would also cover a number of the intersections of pipelines and transmission facilities.

Board Member Flemal: One of the things that this board may see it necessary to do ultimately in our decision here is to address the issue of how much local and how much regional or state level oversight there ought to be in the siting of these facilities.

We've heard quite a range of perspectives from it should be entirely in the hands of the locals with the facility to what I think I heard you say that there should be a strong top-down oversight on the plants.

First off, have I characterized where you're coming from correctly?

Mr. Shay: Okay. I would like a strong state or national presence on the issue of drawing from wells.

Board Member Flemal: Soley on that issue?

Mr. Shay: And issues that affect cross-jurisdictional -- an aquifer doesn't make a jurisdictional boundary. It could go across several counties and several municipalities, et cetera. Well, local authorities, because we are competing for economical development efforts and because of the nature of the politics between them, are often played against each other by the private industry

Board Member Kezelis: Mr. Shay, the water use, as you know, is not something that we are to address. The Governor has appointed the water commission to address water use for the state. Nonetheless, your reference to the water use a few moments ago, I needed clarification of.

You indicated that approximately 16 million gallons per day would be used by a combined peaker facility and that the drawdown for such a facility would impact roughly a six-mile radius, is that correct?

Mr. Shay: That's correct, according to the information we have from the Illinois Water Survey.

Board Member Kezelis: So you received that information from the Water Survey itself?

Mr. Shay: Yes. We got it off their website. They have a very graphical explanation.

### **GRAYSLAKE HEARING**

#### **Testimony of State Senator Terry Link**

Since the effect of peaker power plants, air quality, water supply, natural gas supply, noise, taxes, are felt regionally, not just locally, I believe we must take a regional approach in regulating the peakers.

#### **Testimony of State Representative Susan Garrett**

Our aquifer is on the verge of being mined. We are concerned for our long-term water supply. We need to resolve this.

#### **Testimony of Sally Ball on behalf of State Representative Lauren Beth Gash**

Our friends and neighbors are understandably worried about the impact of so-called peaker plants on air quality and water supplies.

#### **Appearing on behalf of the Lake County Public Water District, Daniel J. Kucera, Chapman & Cutler and Exchange with Board Member Kezelis**

Now, the term peaker plants is a misnomer because it implies an oversimplification. The types of electric generating facilities being proposed throughout the state, and which are raising environmental concerns for many people, are both base-load plants and peak-demand plants. The environmental impact issues raised by such plants, including water use, differ only in magnitude.

In addition, these plants can be both simple cycle and combined cycle. Accordingly, demand for water and resulting environmental impact of that demand can vary according to the type of plant. Clearly, a combined cycle plant, which uses steam to generate a portion of its electricity, can be expected

to use more water than a small simple-cycle plant, which uses water only for cooling.

A witness for the Illinois State Water Survey in these proceedings, Mr. Winstanley, has testified that simple-cycle peaker plants can use up to 2 million gallons of water per day. And combined-cycle plants can use 5 million to 20 million gallons per day.

\* \* \*

Presently with very limited exception, there is no permitting process or regulatory oversight over the uses of water by peaker plants. Witnesses for IEPA in these proceedings have acknowledged that IEPA currently has no jurisdictional responsibility over peaker plant water use.

A public water supply providing Lake Michigan water to a peaker plant would have to have a sufficient allocation from the Department of Natural Resources to enable it to supply peaker plant demand.

The Illinois Water Use Act of 1983, 525 ILCS 45/ *et seq.*, was cited by one of the IEPA witnesses in this proceeding. Section 5 of the Act does provide that a land owner who proposes a new well expected to withdraw over 100,000 gallons per day must notify the local soil and water conservation district. The district is then to notify other units of local government whose water systems may be impacted. And the district is to review the impact and make findings. However, the statute provides no enforcement mechanism.

Moreover, this provision does not even apply to the region governed by diversion and allocation of Lake Michigan water under 615 ILCS 50/1 *et seq.*

The Water Use Act states that the rule of reasonable use does apply to ground water withdrawals, but it does not provide supporting, permitting or regulation.

As to the need for permitting and regulator oversight, I would first address Lake Michigan water. Lake Michigan is a valuable and limited domestic water supply resource. It is valuable because in northern Illinois lake water is perceived to be superior to ground water.

Aquifers in the region commonly contain high levels of iron, manganese and other constituents which raise esthetic issues and which can require costly treatment facilities. Deep wells often contain high radium or alpha-particle contents.

Further, in portions of northern Illinois, water levels in the aquifers have diminished and some deep wells have been mined into salt water. Obviously, there is a great demand for lake water to provide the domestic water supply for as many communities as possible. However, Lake Michigan

water is a limited resource because of legal limits on how much water Illinois may withdraw. Accordingly, the use of Lake Michigan water by peaker plants for cooling, steam production or even as backup to ground water for these uses should be limited or even prohibited.

As to ground water, because peaker plants can be heavy users of ground water, upwards of several million gallons per day, there should be regulatory oversight over such uses. In particular, the potential effects upon aquifers and ground water domestic water supplies should be evaluated as part of the permitting and regulatory process. Mr. Winstanely has well stated the issues in his testimony in this proceeding.

It is also important to point out that the ground water is a limited resource in certain portions of the state. For example, in parts of central Illinois ground water is extremely limited, even for domestic water supplies and, of course, aquifers in northern Illinois have been subject to diminishment.

Finally, other surface water, needless to say where a peaker plant may withdraw water from a stream or inland lake, the impact of such withdrawal also could be evaluated. For example, it could reduce the resource value of the water body for domestic water supply, aquatic life or recreation.

There are now some additional water issues that I would like to bring to your attention, one of them is decommissioning.

For example, if a plant is terminated, who will be responsible for resulting excess capacity in the local public water supply? Who will be responsible for capping the plant's wells? Who will be responsible if leakage from the plant has contaminated the source of supply for the local water utility or for individual residential wells? Where is the accountability when these plants are closed down?

It would seem appropriate to enact a decommissioning procedure to protect water sources and the public when these plants are removed from service. At the very least, there should be a procedure for a state administered trust account, which peaker plants would be required to fund, to assure remediation and restoration funds will be available if plant owners abandon plants without protecting water resources.

Another possibility is a requirement that a surety bond or letter of credit be posted to secure the obligation to protect water sources.

Another issue is competition. Public water supplies can be expected to remain a highly regulated industry so as to continue to assure safe drinking water for the public. Unlike other utility functions, public water supply is not likely to

be deregulated or to be subject to the competitive marketplace. The investment in water infrastructure per customer far exceeds the comparable investment for other utilities. This investment in water infrastructure will only continue to increase under the Sale Drinking Water Act amendments as new requirements are proposed. Redundant water systems do not make sense.

It is important, therefore, that electric generating plants not be permitted to engage in helping to finance new public water supplies which may compete with existing public water supplies. Such predatory competition could deny customer the benefits of economies of scale.

*Another issue we believe is siting. Presently siting of electric generating plants is considered to be a local issue. However, there may be siting concerns of a broader interest, as related to water use. Recent proposals indicate multiple peaker plants in close proximity to each other. What is the impact of multiple draw-downs on an aquifer at a particular location?*

Another concern relates to soil conditions at a proposed site. How vulnerable are site conditions to a contamination spill? Could a shallow aquifer be adversely impacted? Presently, there is no regulatory oversight of these siting issues.

\* \* \*

Finally, cross-connection. When an electric generation facility is partially served by a public water supply and partially served by the facility's own wells, there must be assurance that no cross-connections will exist. For example, the public water supply may provide water for domestic use and fire protection, while the facility uses its own wells for process water. However, the public water supply might also provide backup in the event the wells are out of service.

Local governments may not necessarily have the staff with skills to constantly monitor for cross-connections in generating plants. Indeed, it is not clear that they ever would have access to the plants. Who then will be responsible for policing for cross-connections and protecting the public water supply?

The District understands that the Governor's water advisory committee may be considering water issues related to peaker plants. We are not aware whether that committee is soliciting public comment. Therefore, we believe it is important that the Pollution Control Board in its report to the Governor include water issues related to peaker plants discussed in the testimony and comments submitted in this proceeding.

In conclusion, we suggest that the Illinois legislature should adopt a permitting of regulatory oversight requirement for process water used by all electric generating facilities, including both base-load and peaker plants.



\* \* \*

Board Member Kezelis: I just have a question. Can you for the record tell us what your rate of capacity is and roughly how many gallons per day your customers do take?

Mr. Kucera: Our peak day capacity is 6 million gallons per day. I think in actuality the customers average between 3 and 4 million gallons a day.

**Lake County Board, Jim LaBelle, Chairman**

The process should not only consider air quality but also other environmental factors such as water consumption impacts on aquifers or Lake Michigan water allocations.

\* \* \*

In addition to the IEPA considering the polluting impact of multiple plants, the Department of Natural Resources and the ICC need to consider the impact on ground water resources, natural gas availability and pricing impact if numerous peakers operate at the same time.

\* \* \*

The high volume of ground water usage can lessen the supply for any other entity tapping the same aquifer.

**Lake County Board, Sandy Cole, Commissioner**

In addition to air quality, peaker power plants may affect the region's water supply as they need to draw significant amounts of water from Lake Michigan or local aquifers.

**Lake County Board, Bonnie Carter, Commissioner**

The village of Island Lake was being asked to annex the land. The plant proposed for the small community on the far western edge of Lake County was not a peaker plant. The plant was proposed to provide base-load power year round with ground water usage of 4 to 8 million gallons daily.

Local officials, myself included, and concerned citizens began investigating the issues surrounding the type of power plant involved. Many issues such as air quality, noise and lighting were raised. Water usage was by far the most overwhelming environmental concern. While gathering information, I became well acquainted with the work of the Illinois State Water Survey, a division of the Department of Natural Resources and an affiliate of the University of Illinois at Urbana-Champaign. According to data assembled by the ISWS, the volume of water required to supply the proposed plant for a year would have been far greater than what was required for the village's entire population.

I further learned that neither the Illinois Environmental Protection Agency, nor the ISWS or any other state agency had any authority limiting ground water withdrawal. The proposal for the Island Lake plant was eventually withdrawn and most of the subsequent plant proposals in Lake County are for peakers, not base-load. This, I feel, is a direct result of the heightened awareness of the water withdrawal issue and how precious a resource water is. Though the issue of water usage is not as critical with peakers, it is still significant enough to warrant scrutiny.

In February 1999 I drove to Springfield with my two constituents who had originally brought this issue to my attention. We met with IEPA Director Tom Skinner, officials from Storm Water Management, Illinois Department of Natural Resources, Fish and Wildlife, the IEPA Bureau of Water, the IEPA Bureau of Air and two state legislators. We expressed our deep concerns with the permitting process of a 90-day review on construction applications, the lack of regulatory authority over ground water withdrawal and the lack of public hearings. We also discussed air quality impacts along with the noise and lighting.

We all felt that the IEPA directors and supervisors that sat among us were frustrated with having to review permit applications without being able to take the regional impacts of these plants into consideration. They agreed that a regional element should be included in the review. We were surprised and shocked to learn that each division did not review the applications together. One division follows the application approval process after the other division has completed its work. They may never have been aware of the combined impact on adjoining property owners or cumulative environmental impacts. In other words, they didn't talk to each other.

After we left Springfield that day, some minor changes did take place. The 90-day review process was reversed back to 180 days. Public hearings started to take place on applications and the IEPA Director Skinner never forgot us in Lake County.

As you may see, we are still dealing with this issue today and we are still very frustrated. I hope and pray we will all be heard today and that, as a result, you recommend improvements, not only to the process, but to help reduce the negative impact power plants could have depending on where they are sited.

As with many of the issues surrounding peaker plants, it is important to recognize that ground water is a regional issue. It is also important to recognize while one peaker plant may not threaten a region's water supply, multiple peakers may. Aquifers do not end at municipal or political boundaries. The water consumed in one village not only limits the supply of its immediate

neighbors, but impacts the supply of further villages, commercial wells and deep community wells which draw from the same aquifer.

In the case of the Island Lake proposal, adjacent villages would have realized significant financial impacts. Nowhere in the permit application process submitted by the applicant were those impacts acknowledged or addressed. One neighboring village, the village of Wauconda, would have incurred expenses close to \$1 million to reset the pumping well head in two municipal wells. The taxpayers of this neighboring village, not the power company, would have borne this expense, \$1 million. This village had no opportunity to voice its concern during the application review. Surely, this demonstrates why a regional application approach must be in place, must be put into practice.

Determining the amount of water available for peaker use as well as all other users is a significant undertaking for any local community. Dr. Derek Winstanley of the ISWS in his written testimony to this Board wrote of the expense of collecting ground water data. Conducting a study to determine the sustainable level of water usage for Lake County is estimated to be a multi-million dollar project. To expect local communities to shoulder this burden is unreasonable. Yet without regional data, a single community cannot make an informed decision on water supply.

At the August 18th, 1999 meeting of the Lake County Public Works and Transportation Committee, Illinois State Water survey Director Dr. Derek Winstanley reported that around the year 2030, Lake County will maximize its water use. Today, we are at the maximum sustainable level of the northeastern Illinois deep bedrock. We cannot continue to increase withdrawals from the deep aquifer. Water demand is up 20 percent, and we are at the point where supply and demand are beginning to conflict.

Another large source of water for the Lake County area is Lake Michigan. Here again, the County's usage impacts the supply of other counties and states. The supreme court fixes allocations. Local governments do not have an endless supply.

Peaker plants will either draw ground water, which will have an impact on neighboring wells, or draw on Lake Michigan water that has already been fully allocated. Clearly this issue needs to be understood and addressed.

The quality of water will also be impacted by extensive withdrawal. Research has shown that when too much water is pumped, surface waters can be impacted. Water availability to stream beds, wetlands and lakes can decrease, and the quality of the existing water may be threatened. Eventually, animal and plant life will be threatened. Since the technology exists to convert peaker plants to combines plants at any time, peakers should not be considered as a

minor use, but rather as a major use with regional impact. I would suggest that all applications should be specific as to whether they are peaker or base-load. Applications for peakers should question the intention toward possible future conversion to a base-load.

Allowing one industry that provides a very few number of jobs to have unlimited use of our water supply impacts the economic growth in communities where other industries also require water.

Officials in Lake realize that it is not only peaker plants that threaten our water supply. Development of any kind, whether residential, commercial or industrial will place an additional burden on limited resources. County officials further realize that electricity may be one of the resources in short supply. However, our analysis of the realities of peaker power plants and the marketing of power do not convince us that peaker plants located in Lake County will alleviate a power shortage in Lake county. We feel we are being asked to give up one precious natural resource with no guarantee that the sacrifice will realize a benefit for the county's citizens.

The Water Use Act of 1983 and the Water Authorities Act do not give counties the authority to regulate ground water withdrawal. A plan that regulates major aquifer draw-downs is needed. The Lake County Board recommended legislation to do just that. It is believed that there is support from state agencies to clarify regulatory authority for ground water withdrawal. These initiatives are included for your review.

The state needs to determine what the reasonable use is. I finally realize that the IPCB does not have the authority to regulate ground water withdrawal. I have the pleasure of being a member of the Water Resources Advisory committee that was recently initiated by Governor Ryan. This issue will be covered in this committee and our recommendations will be made to the Governor in December. I feel it is imperative to point out that we need to share our expertise with all governing state agencies in order to be better equipped to make decisions involving the power industry. It is too complex an issue for one agency to comprehensively see all facets. I believe that the Pollution Control Board, the ICC, the IEPA, the ISWS also all need to support each other and work together. We need a regional cooperative group with regulatory authority when reviewing applications.

The Lake County Board has made a decision last year to be proactive and not reactive. Our actions support that position. I ask you to support this board and the people of Lake County by doing the same. Place a moratorium on all pending and new applications for power or peaker plants until such time as all agencies have collaboratively worked together reducing and/or eliminating the

negative impact to our quality of life. Thank you, Chairman Manning and the IPC Board.

**Toni Larsen, Resident, Zion**

In the Zion area, there are at least five pending permits which will be licensed separately for future plants. I believe all facilities within Lake County need to be evaluated regionally to assess the cumulative effect. One of the sites is in Zion and it is zoned industrial, although most of the neighboring properties are not in Zion.

These neighboring communities have no say what goes in their backyard. These communities get their water from wells. One of the proposed peaker plants plans on drilling an industrial well. This plant can use up to 2 million gallons of water a day. I believe that needs to be more study on ground water supply issues.

**Concerned Citizens of Lake County, Chris Geiselhart, Chairperson**

There is a potential drawdown of hundreds of thousands of gallons of water from Lake Michigan, which already exceeded water usage for the mining of deep well aquifers as sources of water for these facilities.

**Zion Against Peaker Plants, Verena Owen, Co-Chair**

Environmental impact studies for peaker plants are required by other states, for instance, Wisconsin, Indiana and Ohio. The environmental impact studies should contain at a minimum hydrology and water quality, water usage, waste water, water run-off and potentially polluted run-off containment, air quality, biology, loss of habitat, loss of agricultural land, land use and community character, archaeology, socioeconomic impact, visual impact, impact on local services, traffic, noise and public health and safety.

**Jim Booth, Resident, Newport Township in Lake County**

Upon investigation, I learned that the city of Zion, who purchases their water from the Lake County Public Water District had exceeded its 822.345 million gallons of Lake Michigan water by 22 million gallons. They purchased 844 million gallons from the Lake County Water District in the period May 1999 through April of 2000.

\* \* \*

Zion, of course, is [considering] the peaker power plant, which would use a maximum peak of 2.124 million gallons of water per day when they are operating their five turbines. And they divide this by 365 days a year, of course. And that would run 230,000 gallons per day. Unless Zion files and is

awarded an increased allocation of Lake Michigan water, they cannot serve my business nor can they serve the proposed peaker plant.

The state of Illinois is in debt to Canada for exceeding their Lake Michigan water allocation. This debt is to be repaid by 2019. I assume you are familiar with that. For 20 years, Illinois took more than their allotted amount of water out of Lake Michigan, and now they have to pay it back. The bottom line is that there is less water to be divided among the municipalities, 177 or so, that use Lake Michigan water.

But the peaker power plant has an alternative which I do not have. They can drill wells and tap into the Ironton Galesville Sandstone Aquifer.

Circular 182 from the Illinois Department of Natural Resources Water Survey by Adrian A. Zuchowski addressed the water level trends and pumpings into the deep bedrock aquifers in the Chicago region in the period 1991 through 1995. On page 15 he wrote that Schlect in 1976 estimated that the practical sustained yield of the deep bedrock aquifers regardless of the scheme of well development cannot exceed 65 million gallons a day.

The practical sustained yield of the deep aquifers is defined as the maximum amount of water that can be withdrawn without eventually dewatering the most productive water yielding formation, that is the Ironton Galesville Sandstone Aquifer.

In a fax dated August 15th of this year, Mr. Scott Meyer of the Illinois State Water Survey faxed me and said I recently estimated deep bedrock withdrawals in that area, referring to Zion, at about 71 million gallons a day. That is 6 million gallons above the practical sustained yield.

The point is this. One peaker power plant drawing 230,000 gallons per day from the Ironton Galesville Sandstone may not seem overly significant. But it is reported that there is some 55 peaker power plants proposed in the state of Illinois. How many will be drawing water from the Ironton Galesville Sandstone aquifer in the eight-county area?

Now, the survey that I referred to, the circular 182 involved water being taken from the following eight counties: Cook, DuPage, Grundy, Kane, Kendall, Lake, McHenry and Will. Now, five plants the size of the proposed Zion plant would draw 1,150,000 gallons of water per day from that aquifer. For 20 months plants would draw 4,600,000 gallons per day average, but at peak would draw 42 million gallons in one day. Now, this is out of an aquifer that can only sustain 65 million gallons and is currently being drawn at 71 million gallons.

The former state senator and minority leader Everitt McKinley Dickson once said after attending his first budget meeting, a billion dollars here and a billion dollars there, and pretty soon it added up to some real money. The same thing is true of the peaker power plants and their great appetite for water.

I ask you to consider the following questions. Should quality Lake Michigan water be used for peaker power plants or should that be reserved for human consumption? Should there be a limit on the quantity of water mined from the Ironton Galesville Sandstone Aquifer considering eight counties depend upon this water source, Cook, DuPage, Grundy, Kane, Kendall, Lake, McHenry and Will Counties? This is not a local issue. This is a regional issue.

And remember, this Ironton Galesville Sandstone Aquifer begins in Minnesota, runs through Wisconsin, northern Illinois, central Illinois, into Missouri and finally into the state of Iowa. It can be mined dry.

**William McCarthy, Resident, Libertyville**

As far as water use is concerned, these plants do use a lot of water.

\* \* \*

Peaker Plants are inefficient. They only convert 28 percent of the power that they burn into electrical energy. Combined-cycle plants convert 56 percent. Obviously, you are going to get a lot more bang for your buck with a combined-cycle plant.

The problem is combined-cycle plants use more than 2 million gallons of water a day. Peaker plants use maybe 120,000 gallons a day. That is a big difference.

And as has been mentioned before, Illinois is under water use restrictions because they don't want Lake Michigan being drained for all different kinds of uses. And probably some of you read National Geographic and you are aware of the Aral Sea disaster in the Soviet Union. The Aral Sea was completely drained within a period of 20 years by overirrigation. And it is a water body one fourth the size of Lake Michigan. So they drained -- I think it was 100 billion trillion gallons of water. It is practically gone. If you could just look it up on the Internet, you will see.

**Cindy Skrukrud, Resident, Olin Mills, McHenry County**

First, relating to the State's commitment to water conservation, ground water withdrawals, McHenry County is one of the many counties in Illinois totally dependent on ground water for our drinking water. Combined-cycle plants with their massive need for water pose a real competitive threat to these water supplies. This is an issue we need to address.

## SPRINGFIELD HEARINGS

### Illinois Section of American Waterworks Association – Testimony of John Smith and Exchange with Chairman Manning and Board Members Girard and McFawm

Number three: Should new or expanding peaker plants be subject to siting requirements beyond applicable local zoning requirements? ISAWWA believes that peaker plant siting requirements should encourage the siting of these plants near a sanitary water treatment plant, if practical, so as to utilize the discharge from the sanitary water treatment plant known as gray water or cooling water." We only wish to comment on the use of water resources by these facilities. Number one, the State of Illinois must manage, protect and enhance the development of the water resources of the state as a natural and public resource. Number two, water resources have an essential and pervasive role in the social and economic well-being of the people of Illinois and is of vital importance to the general health, safety and economic welfare. Number three, water resources of the state must be used for beneficial and legitimate purposes. And number four, waste and degradation of water resources must be prevented.

ISAWWA is not opposed to the use of water resources by peaker plants. We are only asking for the responsible use of water resources by these facilities and all major new water consumers. We believe the regulation or permitting of large water resource withdrawals should be the responsibility of regional agencies, such as municipalities, counties or water boards, and that a state agency should have oversight of these regional agencies.

We believe that the basis for the decision on how much water can be safely used from a designated water resource be based on the existing knowledge and scientific studies of that resource, and, if knowledge of that resource is lacking, then additional research into the adequacy of this source should be done before allowing major withdrawals. The decision to allow the development of existing or new water resources must be based on sound science, not politics. We believe that funding must be adequate for the state agency to perform these studies.

In conclusion, Illinois Section AWWA is not opposed to peaker facilities. We are calling for the rules and regulations of water resources be based on scientific studies of our valuable water resources and that an unbiased state agency be charged with oversight of regional water use. Adequate funding for the state agency must allow for the scientific study of our state water resources, and the State must have a plan for the efficient management of water resources.

Chairman Manning: Thank you for being here today. I do have just one question. Are you aware of any projects right now that are ongoing between a



peaker plant developer and a sanitary treatment facility in the state we could speak to?

Mr. Smith: I'm not aware of any

Board Member Girard: So what you're advocating is that we have a state water resources board that allocates these large withdrawals? Is that what you're saying:

Mr. Smith: What we are saying is that we believe a state agency such as the Illinois State Water Survey should have some oversight over the regional agencies that normally would have some control over water. We believe that in most cases, the regional agency has at least some knowledge of the water resource and how much of that resource can be used safely without impacting other consumers or their industries. However, if the local agency has — unreasonably tries to restrict the use of these water resources, then a state agency could have oversight of the local agency.

\* \* \*

Board Member McFawn: Is your association involved at all with any studies of water resources, be they groundwater or surface water, and their adequacy or even just their quantity?

Mr. Smith: Yes, we are. Illinois Section of AWWA is involved with the Mahomet Aquifer Consortium, which has — is trying to secure federal funding to do further studies of the Mahomet aquifer located in the central part of Illinois. This consortium and the action that we are doing to try to study this reservoir has already generated interest from other states in that they have inquired how we have put together the consortium and how we are going about to try and initiate these studies.

Our friends and neighbors are understandably worried about the impact of so-called peaker plants on air quality and water supplies.

**National Association of Water Companies, Testimony of Brent Gregory, Representative of Illinois Chapter and Exchange with Board Members Melas and McFawn**

The ability to provide water of sufficient quality and quantity to sustain commercial, industrial and residential growth goes hand-in-hand with the availability of electrical power. Water suppliers rely on adequate available electricity, and generating plants rely on an adequate supply of water. NAWC supports the development of new electrical generating capacity as needed for the economic advancement of Illinois.

We do not believe that peaker plants pose a unique threat to the environment compared to other types of state-regulated facilities. We believe that existing environmental regulations are adequate to address air and water quality concerns from peaker plants.

We emphasize the need for water use decisions to be based on sound scientific assessment of local and regional water resources. Where existing knowledge is insufficient, the state technical agencies should provide the scientific studies needed to permit or deny water withdrawals. State funding must be adequate to support these efforts. The right of existing public water supplies to condition withdrawing at their current installed capacities should be grandfathered into any program that is developed. The state should consider competent third-party assessments presented by those seeking to utilize the water resource.

We believe that permitting of new peaker plants and siting requirements should encourage conservation measures such as recycling of cooling water and use of other discharges for cooling when possible, such as those from sanitary treatment plants.

In summary, NAWC believes that the ability to expand power and water resources is important to the economic growth of Illinois.

\* \* \*

Board Member Melas: Do you have any comments about the quantity of the — or the adequacy of particularly groundwater supplies?

Mr. Gregory: Well, we recognize that in certain areas of the state in particular, there may be some quantity concerns. We're traditionally known as a water-rich state, and yet due to concentrations of industry and populations and other circumstances, there are areas where, particularly in long-term outlook, water quantity is a concern. That's why we concur that there is a need for sound comprehensive management of the state's water resources with regard to quantity.

Board Member McFawn: You mentioned you thought that the quantity -- I believe it was the assessment of it should be done by an independent third party? Could you explain that a little bit more?

Mr. Gregory: Yes, I can. If there is some legislative or regulatory control set up over the use of Illinois water resources, it needs to be based on sound scientific assessment of the resource, which we believe that the state has — is the appropriate — has the appropriate technical resources to conduct those. However, if there would arise a dispute over the use or the application for the use of water or withdrawal of water and there is better science to be presented by a petitioner for the use of that water, that should be allowed.

Board Member McFawn: We are talking about just quantification, not quality?

Mr. Gregory: That is really in the context of quantity.

Mr. Gregory: If somebody wants to withdraw water from an aquifer or from a watershed and is able to hire a qualified consultant to demonstrate the reasonableness of that petition, then that should be considered.

**Natural Resources Defense Council – Testimony of Patricio Silva and Exchange with Board Member McFawn**

Mr. Silva: The water withdrawals were in part because there was some concern about adverse impact from the water withdrawals on the Hudson River for several fish species in that section of the Hudson River. I cannot remember off the top of my head if there was any impacts for nesting birds, but I don't believe so.

\* \* \*

Board Member McFawn: [Y]ou said that NRDC was concerned about water used in single-cycle units. I've always thought that the single-cycles didn't cause that concern and it was the combined-cycles.

Mr. Silva: A great many single-cycle combustion turbine projects that we've seen -- not just the few that we've looked at in Illinois, but -- in elsewhere across the country -- rely on once-through cooling. Water is used once for evaporative cooling at the inlet duct and then essentially discarded. That, depending on the size of the unit -- and remember, the single-cycle turbines, we've seen anywhere from 80, some projects have 1,000 megawatts, so the water demand is going to be quite dramatic. Some of the combined-cycle units we've seen actually rely on dry cooling where there is essentially a process that involves a closed loop and onetime withdrawal of water.

So the demands -- even though the unit -- the technology's more efficient, in some applications the combined-cycle units can be hogs as well. They can be quite water intensive. So -- But there is -- there are technology options.

**Exhibit from Reliant Energy**

How much water will the plant use?

The plant does not require a large amount of water. Unlike many older plants, Reliant Energy Aurora does not use steam to generate electricity and its demand for water is similar to other light industrial uses. The primary use of water will be to cool the air flowing into the units and to control emissions.

The only other uses of water will be for the purposes of employee sanitation and for fire

The plant will use an average of only 300 gallons per minute (gpm) during the summer months and that the peak water usage rate will be gpm. The water will be provided from a deep aquifer well (Cambrian Ordovician650) which is at least one mile away from any known deep aquifer wells in the area. Compared with the water used in the City of Aurora on an annual basis, the maximum consumption from this well is less than 1% of the city's water use.

**Public Comment #3 -- Ron Molinaro**

Thirdly, there is the amount of water used. These plants can consume up to 2 million gallons of water a day. At a recent Zion City Council meeting a gentleman who owns a local confectionery company spoke of the possibility of the expansion of his business. When checking into the accessibility of additional water he discovered that the city of Zion exceeded its allocated amount for 1999 by 22 million gallons. If we were to allow these plants to be constructed in Zion, will there be enough water allocated for the expansion of existing business or the construction of new homes? This is a question that needs to be answered before we allow any power plants to be constructed in this region.

**Public Comment #7 — Susan Zingle**

Attachments to Public Comment #7 submitted by Susan Zingle – three letters from the Illinois State Water Survey.



## Illinois State Water Survey

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Ground-Water Section • Tel (217) 333-4300 • Fax (217) 244-0777



December 4, 1998

Mr. Robert Wargaski  
Lake-McHenry Environmental Cooperative  
P.O. Box 134  
Wauconda, IL 60084

Dear Mr. Wargaski:

This letter is in response to your request of December 1, 1998, concerning the development of two 5-million gallons per day (mgd) ground-water supplies from the Cambrian-Ordovician-Age aquifer system for the purpose of steam generation in electrical power generating facilities. One site (designated herein as the Island Lake Project) will be located in the SW $\frac{1}{4}$  of Section 9, T.44N., R.9E., Lake County. The other site (designated herein as the Libertyville Project) will be located in the NE $\frac{1}{4}$  of Section 12, T.44N., R.10E., Lake County. The distance between these sites is approximately 9 miles. You have asked the Water Survey to comment on the potential impacts these ground-water withdrawals may have on surrounding water wells finished within the same aquifer system. You also inquired about ground-water law and regulation. The following are responses to the specific questions you posed to the Water Survey concerning this matter:

*"The proposed Island Lake and Libertyville sites are within 10 miles of each other. Each would draw up to 5 million gallons of water per day. Please comment on the impact they would have operating together and simultaneously on the aquifer and the surrounding community wells. Which community wells would be affected by the interface drawdown."*

Withdrawal of ground water from a well may cause water levels in nearby wells tapping the source aquifer to decline. This water-level decline is referred to as interference drawdown or, more simply, as interference. Interference drawdown decreases with increasing distance in all directions from a pumping well, defining an inverted conical water-level surface around the well. This is known as the cone of depression. The size and shape of the cone of depression created by a pumping well will depend on the areal extent and hydraulic properties of the aquifer, the pumping rate, and the duration of pumping at the well. When interference drawdown causes the water level in a well to decline below the pump intake (in which case the pump breaks suction) or below a level at which the pump can lift the desired volume of water to the surface, remedial measures such as lowering the pump setting or sizing a higher capacity pump may be necessary to restore a normal supply. The risk posed by a pumping well on the ability of a nearby well to deliver its normal supply is, therefore, a function both of the amount of interference and of various construction features of the affected well -- chiefly, the pump setting, dynamic head rating of the pump, and well efficiency.

For the Island Lake and Libertyville Projects, nearby existing wells finished within the Cambrian-Ordovician-Age aquifer system, pre-dating the Lake Michigan water allocations to the area of question, may not be severely impacted by the proposed well field because those wells were engineered and

constructed when regional water levels were considerably lower than at present. Prior to Lake Michigan water allocations, pump intakes in water wells were set at lower depths and had greater water lifting capacities because of lower ground-water levels caused by regional pumpage. However, wells finished in the deep sandstones within the last few years could see more severe impacts because they were constructed after the regional "recovery" of water levels within the Cambrian-Ordovician-Age aquifer system.

The impact of the withdrawal of 5 mgd from two sites on ground-water levels with the Cambrian-Ordovician-Age aquifer system was determined through the use of an analytical-mathematical model using regional values for the hydraulic properties of this aquifer system. The use of this model required that significant assumptions be made to simplify the natural variability often encountered in aquifer systems. Assumptions include homogeneous and isotropic aquifer hydraulic properties (as opposed to properties that may vary vertically and horizontally in three dimensions), no ground-water recharge, infinite aquifer extent (as opposed to geologic and hydraulic features which may limit the size of the aquifer), and a continuous pumping schedule (as opposed to a time-variant pumping rate).

The hydraulic properties and pumping scenarios were assumed to be identical at the Island Lake and Libertyville Projects sites. As you requested, each proposed well field pumped simultaneously in our model simulation. For purposes of construction of the model, we assumed each well field would consist of eight wells (finished in the St. Peter and Ironton-Galesville Sandstone aquifers) supplying 5 mgd (about 434 gallons per minute each) on a continuous basis for 20 years. Given these parameters, the model provided the graphic output shown in accompanying Figure 1.

Under the pumping and hydraulic conditions described in the above scenario, mutual interference effects between the well fields may cause water level declines of as much as 280 feet. Interference effects decline to approximately 150 feet at 12 miles.

This analytical model also suggests that as much as 520 feet of drawdown would be observed in the centers of each well field. This would lower the potentiometric head of the Cambrian-Ordovician-Age aquifer in the study area into the St. Peter sandstone. Dewatering of any artesian aquifer can lead to the reduction in pumping capacity. For a properly designed well field, the Cambrian-Ordovician-Age aquifer should be able to yield the desired quantity of water on a sustainable basis.

Given the possibility that the aquifer properties, number of pumping wells, well spacing, pumping rates, pumping periods, and total pumpage of the proposed wells may be different than what was assumed for this report, we recommend a more detailed analysis be made of the number of existing wells and their distance from the proposed high-capacity well fields. In addition, static water levels, pumping water levels, and pump intake settings of nearby water wells could be analyzed to determine if, and which, domestic, industrial, or municipal water wells would be potentially impacted.

Pumping water from this aquifer in the Island Lake and Libertyville areas has wider ranging effects than simply being a local phenomenon. Consideration should be given to the effects on the practical sustained yield of the entire aquifer system including the effects of pumping on ground water within the State of Wisconsin. The aquifer system is currently being pumped at, or slightly above, its estimated practical sustainable yield of 65 mgd per day. Further development is likely to contribute to the mining of ground-water in northeastern Illinois. A more sophisticated ground-water model of northeastern Illinois, one that

Mr. Robert E. Wargaski/Page 3/December 4, 1998

can incorporate regional variations in aquifer properties (unlike the simplistic analytical model we used to calculate drawdowns for this letter), would be a very important planning tool for state and local governmental leaders to have available to them in their efforts to manage this natural resource.

We recommend that a three-dimensional numerical ground-water model be used to better predict what long-term impacts the proposed ground-water development would have on the Cambrian-Ordovician-Age aquifer in northeastern Illinois. The Illinois State Water Survey has previously modeled this aquifer system (Prickett 1971, Visocky 1982, Burch 1991); however, the Water Survey's most recent model (Burch 1991) will need extensive updating. A three-dimensional numerical ground-water model could incorporate natural variations in aquifer properties, thickness, and withdrawals from existing high-capacity wells. Such a model would also allow studying the aquifer in a more regional context.

To reiterate, estimates of water-level decline contained in this letter were determined from a strictly theoretical consideration of aquifer hydraulics, making use of regional aquifer property data. More accurate estimates would be possible given better aquifer property data and recharge rates collected through properly conducted "on-site" aquifer tests. It is possible that the predictions in this letter will not prove to be accurate. We, therefore, recommend that further study be made of this particular issue. The Illinois State Water Survey has the expertise to provide these services to the residents of Lake and McHenry Counties; however, such involved research would require a contractual agreement (administered through the University of Illinois) between interested parties and the Water Survey.

As to your question relating to which municipal water wells would be affected by the theoretical well fields, the total number of wells impacted and corresponding economic repercussions are impossible to quantify at this time without further in-depth study.

*"Does Illinois have any regulations on the limits of water that can be drawn from the aquifer? Do other states have limits and which ones."*

The State of Illinois does not have any specific laws that limit ground-water withdrawals. The Rule of Reasonable Use allows "property owners to unlimited and non-permitted use of the water beneath their land as long as the use is 'reasonable' and injury to a neighboring well does not arise but of malice" as stated by Bowman (1991). We suggest that you contact Mr. Gary Clark of the Office of Water Resources, Illinois Department of Natural Resources, at (217) 785-3334 for further information on this matter. Mr. Clark is one of the State's leading experts on ground-water law, and we are confident he will be able to address any ground-water law related questions that you pose to him. For your information, we have enclosed a copy of an Illinois Department of Transportation 1985 report to the Illinois Groundwater Association *Illinois Groundwater Law: The Rule of Reasonable Use*. Mr. Clark is the author of this document. We are also enclosing a copy of Illinois State Water Survey Report of Investigation 114 *Ground-Water Quantity Laws and Management*, for additional discussions of Illinois ground-water laws and the law practiced in several other midwestern states.

*"What is the change in the level of the deep sandstone aquifer since communities switched from aquifer wells to Lake Michigan water."*

For your information on this particular subject, we have enclosed Illinois State Water Survey Circular 182 *Water-Level and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1991-1995*. This

Mr. Robert E. Wargaski/Page 4/December 4, 1998

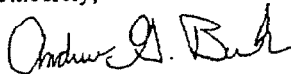
publication is an excellent resource for the analysis of water level trends in the Cambrian-Ordovician-Age aquifer system. Figure 9 on page 30 of this document shows changes in the potentiometric surface of the deep bedrock aquifers between 1991 and 1995. In Lake County, there were areas that observed an increase in water levels (potentiometric head) of over 250 feet. Wauconda Municipal Well 4, located in Section 24, T.44N., R.9E., Lake County, experienced a rise in ground-water levels of 45 feet between 1991 and 1995.

*"With the growing population trend in Lake and McHenry County, what limitations would you suggest be incorporated to protect the aquifer and keep it healthy for future generations."*

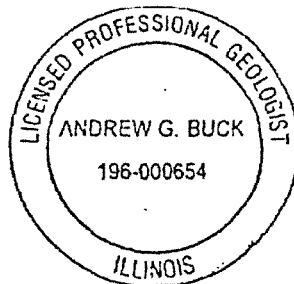
The Illinois State Water Survey is a strictly an objective scientific organization. We do not make, nor do we enforce, rules and regulations. However, our research and guidance is often utilized in the development of water-related laws and statutes. In the case of the issues addressed in this letter, we have the knowledge and expertise to offer the citizens and their governmental representatives to make informed decisions about how to develop their natural resources. However, additional research will be needed before we can more accurately address your many concerns.

For your information, I have enclosed all prior letter correspondence that deal with power generation in Lake and McHenry County areas. If we can be of any further assistance, please feel free to call or write.

Sincerely,



Andrew G. Buck, P.G.  
Assistant Hydrogeologist  
Ground-Water Section  
Phone: (217) 333-6800



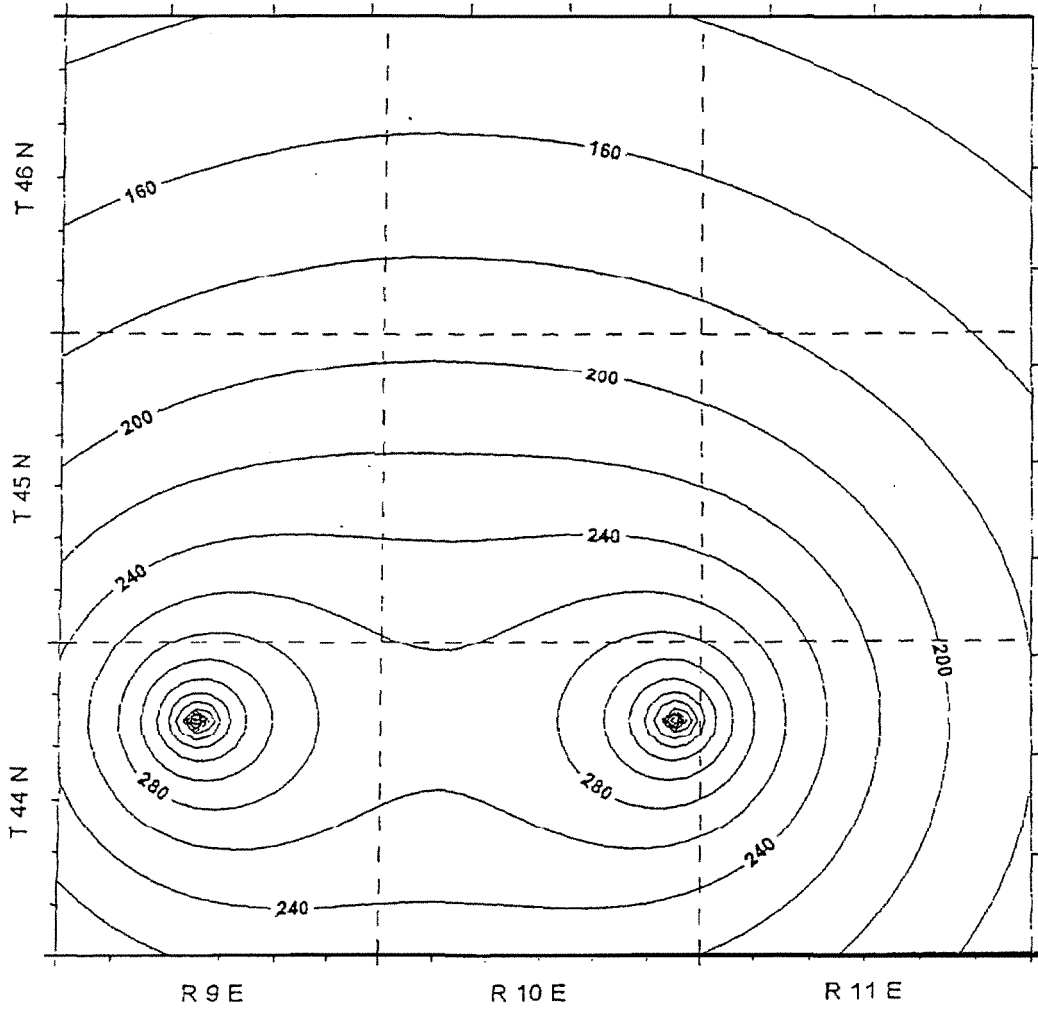
agb

Enclosures as stated

cc: Winstanley, ISWS  
Bhowmik, ISWS  
Roadcap, ISWS  
Clark, IDNR-OWR



Drawdown created by two wellfields  
each pumping 5 MGD from 8 Wells.  
( $T = 15,000$  gpd/ft,  $S = 0.0004$ )





## Illinois State Water Survey

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Ground-Water Section • Tel (217) 333-4300 • Fax (217) 244-0777

December 2, 1998

Mr. Kenneth C. Hopps  
 Natural Gas Pipeline Company of America  
 747 East 22<sup>nd</sup> Street  
 Lombard, Illinois 60148-5072

Dear Mr. Hopps:

This letter is in response to your request concerning the development of a 2.5 million gallon per day (mgd) ground-water supply from the Cambrian-Ordovician-Age aquifer system for the purpose of steam generation in an electrical power generating facility. We understand that the proposed power plant will be located in the SW¼ of Section 9, T.44N., R.9E., Lake County. You have asked the Illinois State Water Survey to comment on the potential impact this ground-water withdrawal may have on surrounding water wells finished within the overlying unconsolidated sand and gravel deposits and Silurian-Age dolomite bedrock aquifer. It should be noted that the Water Survey has previously provided estimates of theoretical water level drawdowns in the Cambrian-Ordovician-Age aquifer system given several different water withdrawal scenarios. These previous letter reports to your company were dated September 3 and October 13, 1998, and addressed the interference effects caused by a theoretical well field on wells finished within the Cambrian-Ordovician-Age aquifer.

Withdrawal of ground water from a well will cause water levels in nearby wells tapping the source aquifer to decline. This water-level decline is referred to as interference drawdown or, more simply, as interference. Interference drawdown decreases with increasing distance in all directions from a pumping well, defining an inverted conical water-level surface around the well known as the cone of depression. The size and shape of the cone of depression created by a pumping well will depend on the areal extent and hydraulic properties of the aquifer, the pumping rate, and the duration of pumping at the well. When interference drawdown causes the water level in a well to decline below the pump intake (in which case the pump breaks suction) or below a level at which the pump can lift the desired volume of water to the surface, remedial measures such as lowering of the pump setting or sizing a higher capacity pump may be necessary to restore a normal supply. The risk posed by a pumping well on the ability of a nearby well to deliver its normal supply is, therefore, a function both of the amount of interference and of various construction features of the affected well -- chiefly the pump setting, dynamic head rating of the pump, and well efficiency.

With respect to your question, the key variable when determining whether a well(s) withdrawing ground water will adversely impact a nearby well(s) is dependent on the hydraulic connection

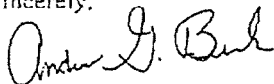
Mr. Kenneth C. Hopps/Page 2/December 2, 1998

between the source aquifers. In this case, you have asked us to address the potential impacts on wells finished in the unconsolidated sand and gravel deposits above bedrock and wells completed in the Silurian-Age dolomite when the deeper lying Cambrian-Ordovician-Age sandstone aquifers are pumped. For your reference, we have enclosed an excerpt from Illinois State Water Survey Circular 182, titled *Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1991-1995* (Visocky et al., 1985, page 6 and 7, figure 2), which shows the stratigraphy, water-yielding properties of the rocks, and the character of the ground water in northeastern Illinois. In this part of Illinois, the Ordovician-Age Maquoketa shale separates the unconsolidated materials and Silurian-Age dolomite from the deeper lying Cambrian-Ordovician-Age (St. Peter and Ironton-Galesville sandstones) aquifers.

The Maquoketa shale is approximately 105 feet thick in the area of interest. Under natural conditions, the Maquoketa acts as an effective hydraulic barrier between the upper (sand and gravel and dolomite) and lower (Cambrian-Ordovician-Age sandstones) aquifer systems. Consequently, changes in ground-water levels in the Cambrian-Ordovician-Age are relatively independent of those in the shallower aquifer systems. Given this, pumping the Cambrian-Ordovician-Age aquifer system should not affect water levels in the shallower sand and gravel and dolomite aquifers. It should be noted that this assumes that a well finished in the Cambrian-Ordovician-Age sandstones must be constructed such that the geologic materials from the Ordovician-Age St. Peter sandstone and above are "cased off". An "open" bore hole hydraulically connecting the Silurian-Age dolomite and deeper-lying sandstone formations would render the above conclusions false. Water levels in the shallower aquifers probably will be impacted by water withdrawals from the Cambrian-Ordovician-Age sandstone aquifers if the geologic materials above the St. Peter sandstone were not sealed off by well casing.

If we can be of any further assistance, please feel free to call or write.

Sincerely,



Andrew G. Buck, P.G.  
Assistant Hydrogeologist  
Ground-Water Section  
Phone: (217) 333-6800

agb/psl

Enclosure as stated



## Illinois State Water Survey

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Ground-Water Section • Tel (217) 333-4300 • Fax (217) 244-0777



October 1, 1998

Mr. Stan A. Smogorzewski  
 LS Power, LLC  
 13522 Calais Drive  
 Del Mar, California 92014

Dear Mr. Smogorzewski:

This letter is in response to your request concerning the development of a 10.8 million gallon per day (mgd) ground-water supply from the Cambrian-Ordovician-Age aquifer system for the purpose of steam generation in an electrical power generating facility. We understand that you are considering two sites for this facility. One site (designated herein as McHenry Project) will be partially located in the E½ of the NE¼, of Section 8, T.44N., R.9E., McHenry County and partially in the NW¼ of Section 9, T.44N., R.9E., Lake County. The other site (designated herein as Lee Project) will be located in the N½ of the SE¼ of Section 32, T.21N., R.8E., Lee County. You have asked the Water Survey to comment on the potential impacts these ground-water withdrawals may have on surrounding water wells finished within the same aquifer system given this pumping rate over a 1-year period. In this letter report, we will address the theoretical impact that a 7,500 gallon per minute (gpm) well may have on ground-water levels within the Cambrian-Ordovician-Age aquifer system.

Withdrawal of ground water from a well will cause water levels in nearby wells tapping the source aquifer to decline. This water-level decline is referred to as interference drawdown or, more simply, as interference. Interference drawdown decreases with increasing distance in all directions from a pumping well, defining an inverted conical water-level surface around the well known as the cone of depression. The size and shape of the cone of depression created by a pumping well will depend on the areal extent and hydraulic properties of the aquifer, the pumping rate, and the duration of pumping at the well. When interference drawdown causes the water level in a well to decline below the pump intake (in which case the pump breaks suction) or below a level at which the pump can lift the desired volume of water to the surface, remedial measures such as lowering of the pump setting or sizing a higher capacity pump may be necessary to restore a normal supply. The risk posed by a pumping well on the ability of a nearby well to deliver its normal supply is, therefore, a function both of the amount of interference and of various construction features of the affected well -- chiefly the pump setting, dynamic head rating of the pump, and well efficiency.

For the McHenry Project, nearby existing wells finished within the Cambrian-Ordovician-Age aquifer system, pre-dating the Lake Michigan water allocations to the area of question, may not be severely impacted by the proposed well field because those wells were engineered and constructed when regional water levels were considerably lower than at present. Prior to Lake Michigan water

allocations, pump intakes in water wells were set at lower depths and had greater water lifting capacities because of lower ground-water levels caused by regional pumpage. However, wells finished in the deep sandstones within the last few years could see more severe impacts because they were constructed after the regional "recovery" of water levels within the Cambrian-Ordovician-Age aquifer system. This situation does not apply to the Lee Project because water levels in that area have not been regionally lowered.

The impact of the withdrawal of 7,500 gpm on ground-water levels with the Cambrian-Ordovician-Age aquifer system were determined through the use of an analytical mathematical model using regional values for the hydraulic properties of this aquifer system. The use of this model required significant assumptions be made to simplify the natural variability often encountered in aquifer systems. Assumptions include homogeneous and isotropic aquifer hydraulic properties (as opposed to properties that may vary vertically, horizontally, and with direction), infinite aquifer extent (as opposed to geologic and hydraulic features which may limit the size of the aquifer), and a continuous pumping schedule (as opposed to a time-variant pumping rate).

Because the hydraulic properties and pumping scenarios were assumed to be identical at the McHenry and Lee Projects, the distance-drawdown estimates shown below apply to both sites. As you requested, the proposed well field was assumed to consist of only one well (finished in the St. Peter and Ironton-Galesville Sandstone aquifers) supplying 10.8 mgd (7,500 gpm) on a continuous basis for one year. Given these parameters, the model provided the following distance-drawdown relationships (also see the enclosed distance-drawdown plot and map):

<u>Distance from pumped well</u>	<u>Drawdown after pumping 1-year</u>
¼ mile	350 feet or less
½ mile	285 feet or less
1 mile	225 feet or less
2 miles	170 feet or less
3 miles	135 feet or less
4 miles	110 feet or less
5 miles	90 feet or less

Although these impacts are considerable, the available drawdown in deep sandstone wells is probably adequate for the desired amount of ground-water yield, assuming a properly designed well field. The number of wells impacted and corresponding economic repercussions are impossible to quantify at this time without further in-depth study.

Given the possibility that the aquifer properties, number of pumping wells, well spacing, pumping rates, pumping periods, and total pumpage of the proposed wells may be different than what was assumed for this report, we recommend a more detailed analysis be made of the number of wells and their distance from the proposed high-capacity well field. In addition, static water levels, pumping water levels, and pump intake settings of nearby water wells could be analyzed to determine if, and

Mr. Stan Smogorzewski/Page 3/October 1, 1998

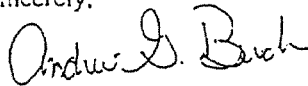
which, domestic, industrial, or municipal water wells would be potentially impacted. Also, it would be prudent to run a sophisticated numerical ground-water model to better predict what long-term impacts the proposed ground-water development would have on the Cambrian-Ordovician-Age aquifer in northeastern Illinois. Such a model could incorporate natural variations in aquifer properties, thickness, and withdrawals from existing high-capacity wells. This would be a very important planning tool for local governmental leaders to have available to them in their efforts to manage this natural resource.

Another issue in any use of water from the Cambrian-Ordovician-Age aquifer system is water quality. There are reports of radioactive isotopes associated with these waters which can be a factor in its use.

To reiterate, estimates of water-level decline contained in this letter were determined from a strictly theoretical consideration of aquifer hydraulics, making use of regional aquifer property data. More accurate estimates would be possible given better aquifer property data collected through properly conducted "on-site" well tests. It is possible that the predictions in this letter will not prove to be accurate. We, therefore, recommend that further study be made of this particular issue. The Illinois State Water Survey has the expertise to provide these services to LS Power and the citizens of Lake, McHenry and Lee Counties; however, such involved research would require a contractual agreement (administered through the University of Illinois) between your firm and the Water Survey.

To further your knowledge of the water resources of the deep sandstones aquifers of Illinois, we have enclosed Cooperative Report 10, titled *Geology, Hydrology, and Water Quality of the Cambrian and Ordovician Systems in Northern Illinois* and Illinois State Water Survey Circular 182, titled *Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1991-1995*. If we can be of any further assistance, please feel free to call or write.

Sincerely,

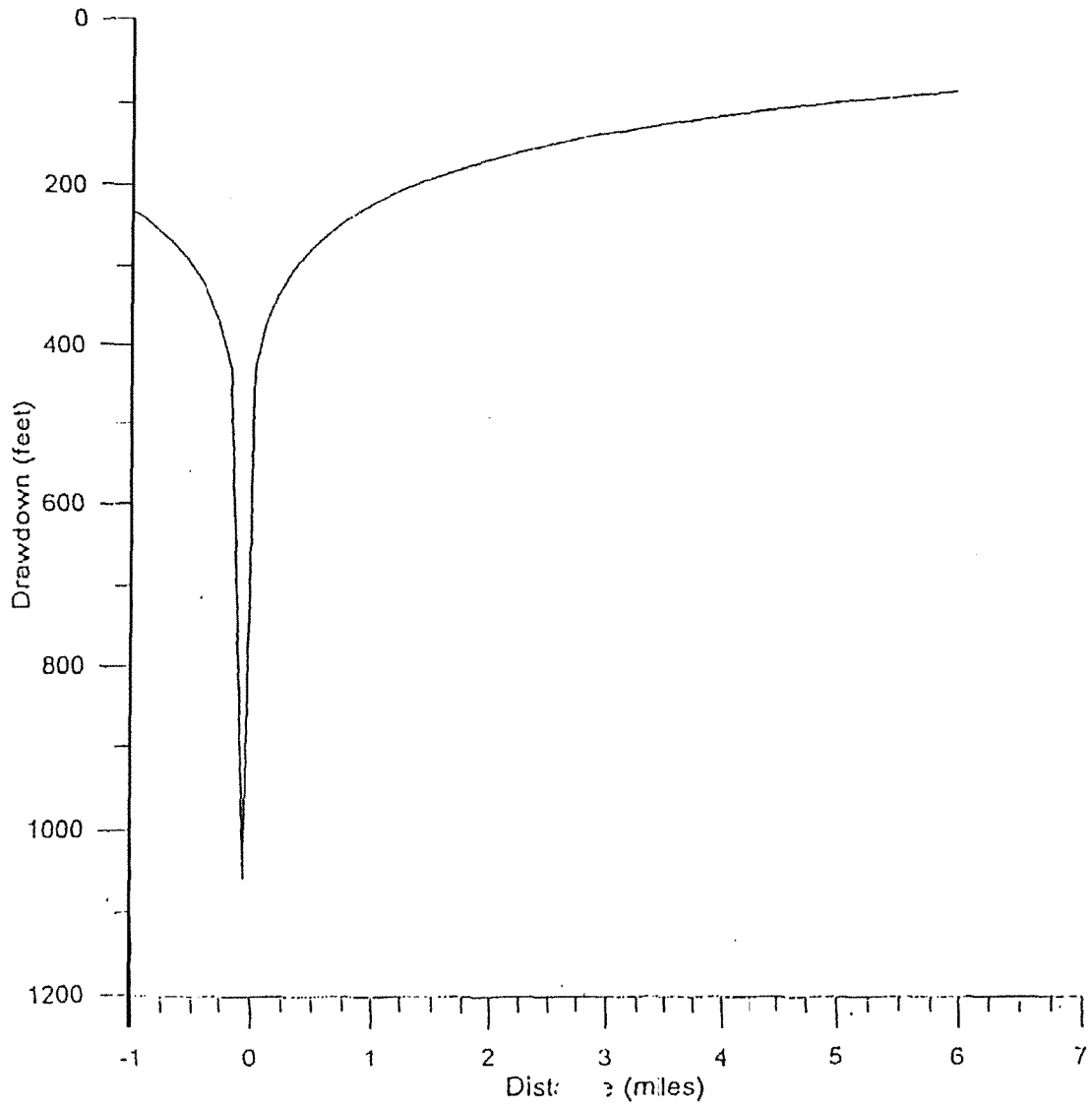


Andrew G. Buck  
Assistant Hydrogeologist  
Ground-Water Section  
Phone: (217) 333-6800

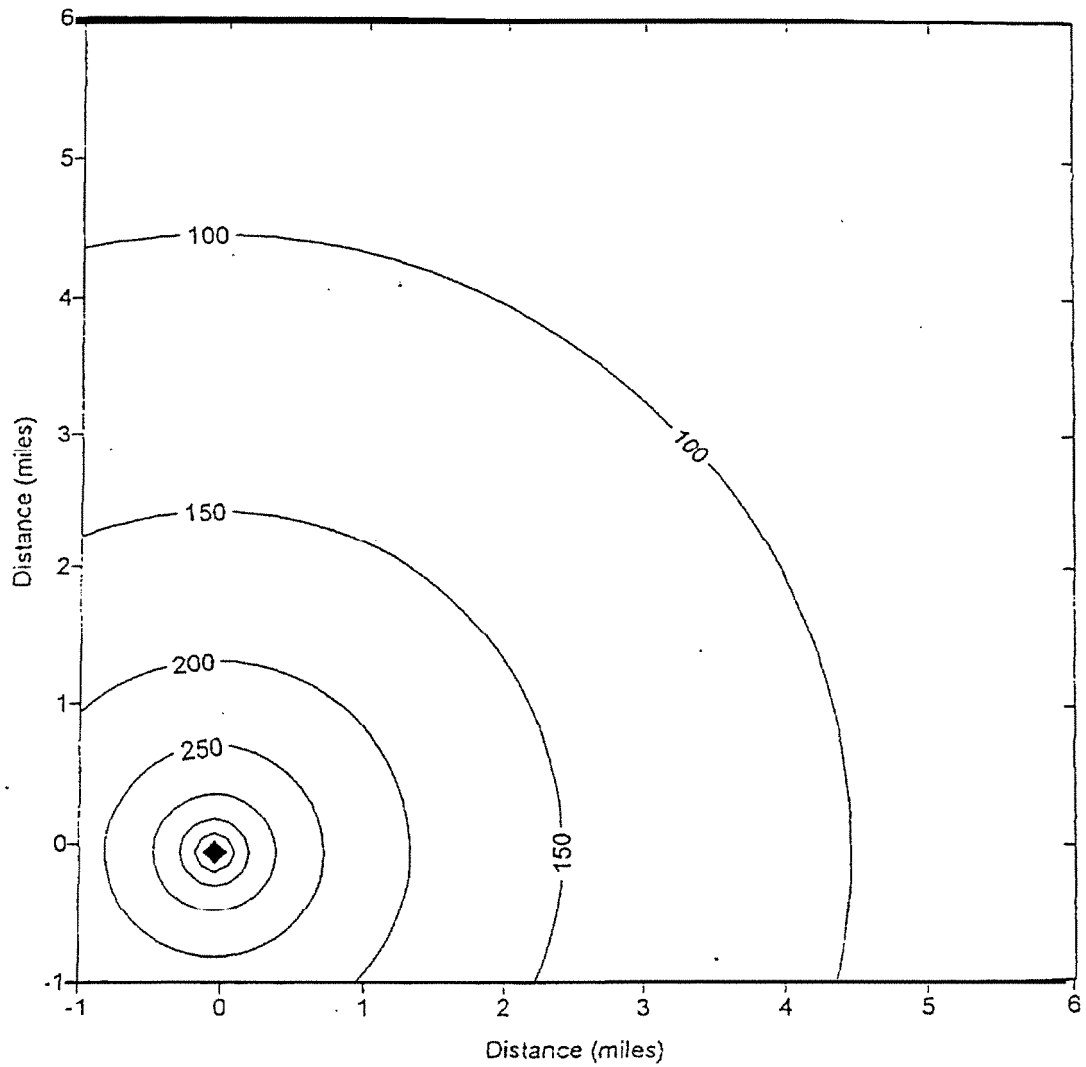
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Enclosures as stated

Regional drawdown in the Cambrian-Ordovician aquifer  
produced by 1 well pumping 7500 GPM.  
( $T = 20,000$  gpd/ft<sup>2</sup>,  $S = 0.0004$ , time = 1 year)



Regional drawdown in the Cambrian-Ordovician aquifer  
produced by 1 well pumping 7500 GPM.  
( $T = 20,000$  gpd/ft<sup>2</sup>,  $S = 0.0004$ , time = 1 year)





## SUMMARY OF WATER QUANTITY LAWS FROM MIDWESTERN STATES

### IOWA

**Statute:** Code of Iowa, 455B (1999)

**Regulatory Entity:** Department of Natural Resources; Environmental Protection Division

**Summary:** Permit is required for any person who diverts, stores or withdraws more than 25,000 gallons of water per day (surface or groundwater); Permits are generally issued for 10 years but, depending on geological conditions, can be for lesser period of time; Permit program insures consistency in decisions on allocations; Allocations based upon concept of "beneficial use" the key points of which are (1) water resources are to be put to beneficial use to the fullest extent; (2) waste and unreasonable uses are prevented; (3) water conservation is expected; (4) established average minimum instream flows are protected; Administrative process resolves water use conflicts; Provisions in place for public involvement in issuing water allocation permits and in generally establishing water use policies.

### MINNESOTA

**Statute:** Minnesota Statute 103G.265

**Regulatory Entity:** Department of Natural Resources; Waters Office

**Summary:** Permit is required for all users withdrawing (surface and groundwater) more than 10,000 gallons per day or 1 million gallons per year (Exceptions include: domestic uses serving less than 25 persons, certain agricultural drainage systems, test pumping of a groundwater source, and reuse of water already authorized by permit, e.g., water purchased from a municipal water system); Permits granted for no longer than 5 years; Policy: to manage water resources to ensure an adequate supply to meet long-range seasonal requirements for domestic, agricultural, fish and wildlife, recreational, power navigation, and quality control purposes; Water Appropriation Permit Program exists to balance competing management objectives that include both development and protection of Minnesota's water resources; Permitted users required to submit annual reports of water use; Reported information used to evaluate impacts and to aid in resolving conflicts.

## OHIO

**Statute:** Ohio Revised Code Sections 1521.16; 1521.17; Sections 1501.30 and 1501.33

**Regulatory Entity:** Department of Natural Resources; Division of Water

**Summary:** Permits are required for those making a new or increased consumptive use of water greater than an average of 2 million gallons per day over a 30-day period; Registration is required for any facility or combination of facilities with the capacity to withdraw more than 100,000 gallons of water (surface or ground) daily; Chief of DNR Division of Water has authority to designate “ground water stress areas” and to require water withdrawal registration in these areas for users of water less than the normal 100,000 gallon threshold; Annual reporting is required of those who must register; Purpose of registration and reporting requirements: to gather data to assist in resolving future water use conflicts; Chief also has responsibility to maintain Water Resources Inventory which must include information to assist in determining the reasonableness of water use; While “reasonable use” is used by courts to determine water conflicts, legislature has set forth nine specific factors (applicable to both surface and groundwater) which define reasonableness; Consumptive use is defined as a use of water resources, other than a diversion, that results in a loss of that water to the basin from which it is withdrawn and includes, but is not limited to, evaporation, evapotranspiration, and incorporation of water into a product or agricultural crop.

## INDIANA

**Statute:** Indiana Code, 14-25

**Regulatory Entity:** Department of Natural Resources (DNR); Natural Resources Commission (NRC)

**Summary:** Registration and annual reporting requirement for owners of significant water withdraw facilities (withdrawal of 1,000,000 gallons per day of surface water, groundwater, or combination); NRC has statutory authority to require, by rule, a permit for most water withdrawals from navigable waters, but authority has not yet been exercised; NRC is required to develop and maintain inventories, gather and assess all information needed to properly define water resource availability; NRC can establish, by rule, minimum stream flows; Where groundwater threat, DNR may designate a “restricted use area.” Permit then required for withdrawal of more than 100,000 gallons per day beyond use at time of restricted use designation; In granting or refusing a permit, the DNR considers the concept of beneficial use.

## MISSOURI

**Statute:** Missouri Revised Statutes, Chapter 256

**Regulatory Entity:** Department of Natural Resources (DNR)

**Summary:** Major water users must register with DNR; A major water user is defined as an entity that is capable of withdrawing or diverting 100,000 gallons or more per day from any water source; Failure to register may result in DNR request that Attorney General file action to stop all withdrawal or diversion; Purpose of registration program is to insure the development of information required for the analysis of certain future water resource management needs.

## WISCONSIN

**Statute:** Wisconsin Statutes, Chapter 281; DNR Rules, Chapter NR 142

**Regulatory Entity:** Department of Natural Resources (DNR)

**Summary:** Wisconsin law provides for (1) development of statewide water quantity resources plan; (2) registration and annual reporting (with fees) of major withdrawals (over 100,000 gallons per day in 30-day period); (3) permit approval process (with administrative hearing process) for construction, development and operation of wells where capacity and rate of withdrawal of groundwater from *all wells on one property* is in excess of 100,000 gallons a day; *Specifics of Permit Approval Process:* 90-day approval process. Approval withheld or restricted if withdrawal will adversely effect or reduce availability of public utility water supply or doesn't meet grounds for approval which are: (a) No adverse effect on public water rights in navigable waters; (b) No conflict with any applicable plan for future uses of waters of state or water quantity resources plan; (c) Reasonable conservation practices have been incorporated; (d) No significant adverse impact on environment and ecosystem of the Great Lakes basin or the upper Mississippi River basin; (e) Plan for withdrawal consistent with the protection of public health, safety and welfare and not detrimental to public interest; (f) No significant detrimental effect on the quantity and quality of the waters of the state; (Even more factors apply if the proposed withdrawal will result in an "interbasin diversion). Regulations define water loss and consumptive use; Also, permit is required for any diversion of water from any lake or stream for diversions of 2,000,000 gallons per day in any 30-day period; If DNR receives application for a withdrawal from the Great Lakes basin that will result in a new water loss averaging 5,000,000 gallons per day in any 30-day period, DNR notifies governor of other Great Lakes States, requesting their input. The rules incorporate methods for citizens to initiate DNR investigations of alleged violations.