

# Illinois EPA's Ash Impoundment Strategy Progress Report October 2011

## Introduction

In regard to coal combustion residues (CCR) at surface impoundments and coal fired electric generating plants; the Illinois Environmental Protection Agency (Illinois EPA or IEPA) Bureau of Water (BOW) has been implementing a program **very similar to the proposed "D prime" option** proposed by U.S. EPA. The corrective actions under the Illinois Pollution Control Board's (Board) groundwater management zone (GMZ) provisions are consistent with the existing closure requirements for solid waste landfills (40 CFR 258). U.S. EPA's proposals for closure of surface impoundments containing coal combustion residuals (CCR) are based on these existing models used for landfills.

## Illinois EPA's Strategy

Although Illinois was one of the first states in the country to have and apply groundwater standards (i.e. 1971), groundwater monitoring requirements, and corrective actions to ash impoundments (e.g., *Central Illinois Public Service Company v. Pollution Control Board*, 116 Ill.2d 397, approved GMZs at Havana<sup>1</sup>, Wood River and Hennepin, etc.) we chose to make further improvements in response to the massive coal ash spill at a Tennessee Valley Authority facility in Kingston, Tennessee. Illinois EPA developed an aggressive strategy to assess ash impoundments at coal fired power plants. Since the early 1990s, new ash ponds (surface impoundments) have been required to be lined and groundwater monitoring wells have been installed at many of these new ash impoundments. There are also older ash ponds at many of these facilities.

An inventory of power plants with surface impoundments permitted by the Illinois EPA under the National Pollutant Discharge Elimination System (NPDES) permit program has been created. There are 24 power plants in Illinois with a total of 83 ash impoundments. Table 1 below indicates the number of impoundments that were active, those that had low permeability liners, and those that had groundwater monitoring as of February 1st, 2009.

Total Impoundments	Active Impoundments	Inactive Impoundments	Lined Impoundments	Impoundments with Groundwater Monitoring
83	68	15	31	28

**Table 1. Number of Impoundments that are Active, have Low Permeability Liners, and Groundwater Monitoring Systems**

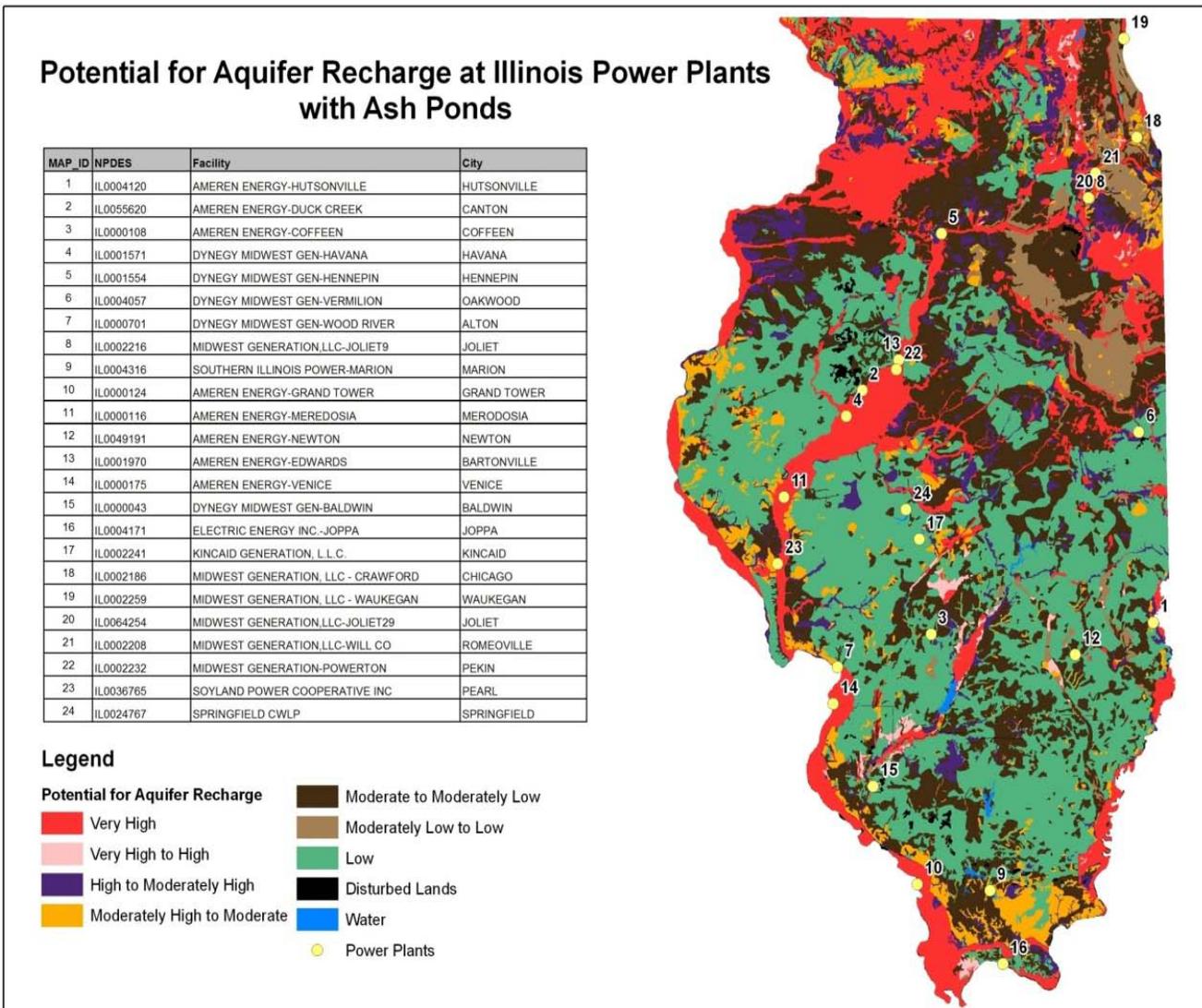
The geologic vulnerability of groundwater at the 24 power plants was assessed using the Illinois' "Potential for Aquifer Recharge" map which classifies the potential for precipitation to infiltrate the surface and reach the water table. This map can also be

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<sup>1</sup> The GMZ implemented at Havana has resulted in restoring groundwater quality to meet the Board standards.

used to determine the potential for groundwater contamination on a regional scale. Figure 1 shows the location of each power plant and the potential for aquifer recharge at each plant. This information, along with the presence of potable wells identified near the plants, was used to determine the potential contamination threat to those wells. The contamination potential ranges from “very high” to “low.”

The aforementioned criteria were used to develop assessment priorities for these facilities under an action-oriented strategic plan. The plan was finalized and implementation began on February 26, 2009.



**Figure 1. Illinois Power Plants with CCR Surface Impoundments**

Priority 1 facilities (i.e., high potential for aquifer recharge, and existing or future potable uses) were requested, under a modified BOW permit to conduct a potable well survey to

field verify the presence/absence of off-site drinking water supply wells, install a groundwater monitoring well system, implement a monitoring program<sup>2</sup>, and submit electronic compliance reports to the Illinois EPA. This information was requested at these 10 facilities, identified in Table 2, because they did not have groundwater monitoring systems. Additionally, the five facilities classified as Priority 2 because of the low potential for aquifer recharge and existing or future potable uses in the area, were requested to assess the potential for contaminant migration at their respective sites.

Priority 1	Priority 2
Ameren - Edwards Station, IL0001970	City Water Light and Power, IL0024767
Ameren - Grand Tower Station, IL0000124	Kincaid Generation, IL0002241
Ameren - Meredosia Station, IL0000116	Ameren - Newton Station, IL0049191
Ameren - Venice Station, IL0000175	Midwest Generation EME - Crawford Station, IL0002186
Dynegy Midwest - Baldwin Energy Center, IL0000043	Midwest Generation EME - Waukegan Station, IL0002259
Electric Energy Inc., IL0004171	
Midwest Generation EME - Powerton, IL0002232	
Midwest Generation EME - Joliet 29, IL0064254	
Midwest Generation EME - Will County Station, IL0002208	
Prairie Power Inc., IL0036765	

**Table 2. Priority 1 and 2 under Illinois EPA’s CCR Impoundment Strategy**

Potable well surveys have been conducted at all facilities to field verify the proximity of drinking water supply wells off-site. These surveys have shown that currently there appear to be no drinking water supply wells that are being threatened down gradient of these sites. In general, Illinois EPA would request a Section 43 referral to the Illinois Attorney General’s Office if there was an imminent threat to public health or the environment.

Illinois EPA has also coordinated with the Department of Natural Resources (DNR) Office of Dam Safety. All structures that meet the definition of a dam, as defined in the

<sup>2</sup> Statistically based monitoring programs are required by Illinois EPA to determine naturally occurring compounds (inorganic compound numerical standards apply except due to natural causes) and background concentrations. To take into account spatial and temporal variations a years worth of data is generally required.

Illinois Administrative Code, are regulated by the DNR. If a dam is unpermitted, it is because the regulation that applies to the dam does not require a permit. Of the 1600+ dams in the state that clearly fall under the regulations, only about 650 have an active permit. The rest are low hazard dams that do not require active permits, but are still regulated.

The GMZ provisions of the Board Groundwater Standards (35 Ill. Adm. Code 620) are modeled after the National Contingency Plan.

## **Progress**

The following provides a summary of the progress for each of the Priority 1 and 2 facilities:

### ***Priority 1***

- **Ameren Facilities** - Hydrogeologic assessment plans for Edwards Station, Meredosia Station, and Grand Tower have been approved and are being implemented. Initial groundwater monitoring results have been reviewed, and Illinois EPA is waiting on the next round of quarterly samples to further assess conditions at the site.

**Grand Tower** - Groundwater flows towards the river, and will therefore not impact any of the potable water supply wells identified proximate to the ash ponds. A letter has been sent to Ameren stating that if elevated levels of contaminants are confirmed, Illinois EPA will require further investigation and appropriate remedial activities where necessary.

**Meredosia** - IEPA analyzed groundwater flow direction based on the initial sampling event at the on-site monitoring wells at Meredosia. Groundwater flows towards the river, and will therefore not impact any of the potable water supply wells identified proximate to the ash ponds. A letter has been sent to Ameren stating that if elevated levels of contaminants are confirmed, Illinois EPA will require further investigation and appropriate remedial activities where necessary.

**Venice** - The groundwater GMZ was approved for this site to limit recharge through the contaminants leaching to groundwater by covering the ash ponds with a low permeability synthetic membrane (cover). The well inventory required by IEPA and completed by Ameren confirms that there is no use of groundwater for potable or industrial uses down gradient of the ash ponds. The area just south of the plume will be beneath the proposed I-70 bridge, virtually eliminating any potential use of the groundwater. Therefore, contaminated groundwater will not be pumped to control migration. The contaminated groundwater will slowly discharge into the river by subsurface seepage. Ameren analyzed the concentration

of boron that would enter the river through seepage. The result was a concentration of 0.0019 milligrams per liter in the river. This concentration is protective of human health and aquatic life. After the synthetic cover is in place, storm water that runs off the cover and not been in contact with ash will be pumped into the river. The ash ponds do not appear to be the source of the arsenic found east of the ponds. Leachate samples from the ponds have concentrations of arsenic lower than detected east of the ponds. Since groundwater flow is predominantly to the west another source of the arsenic is likely. The area around the ponds has been heavily industrialized for many years, including wood treatment, which utilizes arsenic.

- **Dynegy Midwest, Baldwin Energy Center** - A hydrogeologic assessment plan has been submitted and approved. Initial groundwater monitoring results have been reviewed. Illinois EPA met with Dynegy Midwest to discuss elevated levels of contaminants at the site. Dynegy Midwest will be doing further investigation to better define groundwater impacts at the site.
- **Electric Energy, Joppa Station** - A hydrogeologic assessment plan for this facility has been submitted and approved. EPA met with Electric Energy to discuss elevated levels of contaminants at the site and appropriate remedial alternatives. No private wells appear to have the potential for impact.
- **Prarie Power, Pearl Station** - A hydrogeologic assessment plan has been submitted and approved. Preliminary groundwater sampling results have been received indicating potential groundwater impacts. Additional sampling data is being collected to establish background water quality at the site. The initial monitoring indicates that groundwater flow is primarily towards the river. Potential to impact potable wells is minimal. Confirmation of elevated levels of contaminants will require further investigation and appropriate remedial activities where necessary.
- **Midwest Generation Facilities** - Hydrogeologic assessments plans which include groundwater monitoring for Will County Station, Powerton Station and Joliet 29 Station have been approved. Groundwater monitoring results have been received and are under review.

**Powerton** - Due to the presence of artificial lakes, the ash ponds and the river, groundwater flow is variable. Due to the potential for off-site movement Midwest Generation has been instructed that if elevated levels of contaminants are confirmed Illinois EPA will require further investigation and appropriate remedial activities where necessary.

**Joliet 29** - A hydrogeologic assessment plan has been submitted and approved. Groundwater sampling results have been received indicating potential groundwater impacts. Additional sampling data is being

collected to establish background water quality at the site. The initial monitoring indicates that groundwater flow is primarily towards the river. No private wells appear to have the potential for impact. Confirmation of elevated levels of contaminants will require will require further investigation and appropriate remedial activities where necessary.

**Will County Station-** A hydrogeologic assessment plan has been submitted and approved. Groundwater sampling results have been received indicating potential groundwater impacts. Additional sampling data is being collected to establish background water quality at the site. The initial monitoring indicates that groundwater flow is primarily towards the river. No private wells appear to have the potential for impact. Confirmation of elevated levels of contaminants will require will require further investigation and appropriate remedial activities where necessary.

## **Priority 2**

- **Ameren Facility** - Hydrogeologic assessments plans for Newton Station have been submitted and approved. Preliminary groundwater sampling results have been received indicating potential groundwater impacts. Additional sampling data is being collected to establish background water quality at the site.
- **City Water Light and Power (CWLP) – Dallman Station** A hydrogeologic assessment for Dallman has been received and is currently under review. CWLP met with the IEPA to discuss potential impact to the adjacent stream and the potential for off-site movement of contaminants. CWLP will be doing further investigation to better define groundwater impacts at the site. No private wells appear to have the potential for impact.
- **Kincaid Generation** – An assessment plan which includes the construction of monitor wells has been received and has been approved. Initial monitoring results have been submitted and are under review. There appears to be minimal potential for impact to potable wells.
- **Midwest Generation Facilities** - Hydrogeologic assessments plans which include groundwater monitoring for Waukegan Station and Crawford Station have been approved. Groundwater monitoring results have been received and are under review.

**Waukegan** - Groundwater flow at Waukegan appears to be highly dependant on the water level in the ash ponds. Due to the potential for

off-site movement, Midwest Generation has been instructed to complete some additional investigations to more fully evaluate contaminant movement. Confirmation of elevated levels of contaminants will require further investigation and appropriate remedial activities where necessary. No potable wells appear to have the potential for impact.

**Crawford** - A hydrogeologic assessment plan has been submitted and approved. Groundwater sampling results have been received indicating potential groundwater impacts. Additional sampling data is being collected to establish background water quality at the site. No private wells appear to have the potential for impact. Confirmation of elevated levels of contaminants will require further investigation and appropriate remedial activities where necessary.

In addition to the priorities described above, Illinois EPA concurrently continues to work with the eight facilities listed in Table 3 below to assess and remediate groundwater impacts (corrective action). A site specific rule has been adopted by the Illinois Pollution Control Board for the Ameren-Hutsonville site. This rule specifies the steps which are required to be taken to close out the inactive ash impoundment. Ameren is in the process of fulfilling its obligations required under the site specific rule. The closure requirements are consistent with if not more stringent than U.S. EPA's proposed CCR requirements for CCR under either option.

**Dynegy Midwest - Havana Station** had an approved GMZ, however groundwater at this site has returned to compliance with the numerical groundwater standards.

**Midwest Generation - Joliet 9 (Lincoln Stone Quarry)**- Lincoln Stone Quarry is a permitted Subpart C facility subject to the regulations of 35 Ill. Adm. Code 814 Subpart C and referenced portions of the 35 Ill. Adm. Code regulations. Because Lincoln Stone Quarry was a pre-existing facility with unique characteristics, the facility did not meet the design requirements intended for a 35 Ill. Adm. Code 811 landfill. In order to be permitted under the solid waste program, the facility had to receive an adjusted standard from the Board for relief from specific regulations, specifically design requirements including the applicable groundwater quality standards (AGQS). The AGQS is a statistically derived value based on data sets that are unaffected by the facility. The site specific data set represents ambient background, which often does not reflect any 620 Class standards. (e.g., ambient background may be naturally above or below the numbers listed under 35 Ill. Adm. Code 620.)

The Board granted an adjusted standard that included 35 IAC 620 Class II groundwater standards for several parameters north of the facility, between the disposal area and the river. The AGQS is applicable to the remaining wells at the facility. Subsequent to receiving the adjusted standard, the IEPA permitted the facility in 1999.

Pumping in the area of the facility subsequently changed groundwater flow direction in the shallow zone such that impacts have been seen in a limited area in the southeast corner of the facility. The Illinois EPA approved a corrective action for that area in 2009 along with additional groundwater assessment. In 2011, the IEPA approved the assessment reports and continues to work with the facility to establish an interim GMZ for the southeast area of the facility, along with a proposal for additional, preventative, corrective action along the south side of the landfill. Groundwater assessment and evaluation continues at the site.

Illinois EPA staff, in cooperation with Will County Department, sampled private wells east of this facility and all inorganic compounds were consistent with ambient background concentrations. The private wells were not impacted by this facility.

<b>Facility</b>	<b>Status</b>
Ameren -Coffeen Station, IL0000108	Further Assessment Underway
Ameren -Duck Creek Station, IL0055620	Remedial Action Under Development
Ameren -Hutsonville Station, IL0004120	Work is proceeding on the Site Specific Rule Adopted by the Board The requirements in this site specific regulation are consistent with if not more stringent than what U.S. EPA is currently proposing for CCR in surface impoundments modeled after 40 CFR 258.
Dynergy Midwest - Hennepin Station, IL0001554	Approved GMZ
Dynergy Midwest - Vermillion Station, IL0004057	Remedial Action Plan Under Development - There are three impoundments at this site. One is currently in use and lined. One unlined impoundment is in use as part of the waste stream under their NPDES permit,

although it rarely discharges. The third impoundment is unlined and no longer in use. There is currently no indication of contamination from the lined impoundment in use. Surface water monitoring of the Middle Fork of the Vermilion River does not currently indicate impairment for any potential contaminant. Groundwater monitoring results indicate there are potential contamination issues related to the two older unlined impoundments. Contaminants of concern include boron, sulfate, manganese, iron, total dissolved solids, and pH. An initial assessment conducted by the IEPA in early 2009, using internal databases, identified 20 potential private wells within 1 mile of the site. The IEPA then requested a survey of private wells within 2,500 feet of the site be conducted by Dynegy. This survey was completed June 15, 2009. The results of this survey verified one potable well up-gradient of the ash impoundments, the well used by the facility itself, and no private wells located down-gradient of the impoundments. A groundwater monitoring plan has been approved for the site, and the results of the initial one year of monitoring, a GMZ application, and a Corrective Action Plan (including a Closure Work Plan) to deal with contamination issues at the site is due April 1, 2012.

The closed pond referenced at the the site is not permitted by DNR. DNR is only aware of 1 active CCW storage pond, which is directly East of the power plant and is permitted. There is a pond on the North side of the property which receives runoff from the capped area of the old pond(s). The large lake on the site is used for cooling water, not CCW storage. All the structures on the site are in compliance with DNR regulations.

Dynegy Midwest - Wood River Station, IL0000701	Approved GMZ
Midwest Generation EME - Joliet 9, Landfill IL0002216 Lincoln Stone Quarry	In 2011, the IEPA approved the assessment reports and continues to work with the facility to establish an interim GMZ for the southeast area of the facility.
Southern Illinois Power (SIP), IL0004316	Further assessment is underway, and a meeting with a meeting has been requested to discuss results.

**Table 3. Facilities with On-going Groundwater Assessment and Remediation Activities**

Groundwater samples were analyzed for the full spectrum of inorganic parameters at these sites. The constituents listed in Table 4 were identified as contaminants of concern at one or more these facilities.

Boron
Sulfate
Chloride
Iron
Manganese
Total Dissolved Solids (TDS)

**Table 4. Contaminants of Concern**