BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	R08-18
PROPOSED AMENDMENTS TO	)	(Rulemaking-Public Water Supplies)
GROUNDWATER QUALITY	)	
STANDARDS	)	
(35 Ill. Adm. Code 620)	)	

NOTICE

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Service List

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Illinois Pollution Control Board the Illinois Environmental Protection Agency's Errata Sheet Number 2 and Pre-filed Testimony of Richard P. Cobb and Thomas Hornshaw a copy of which is herewith served upon you.

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: Kimberly A. Geving
Kimberly A. Geving
Assistant Counsel
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DATED: May 28, 2008

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
PROPOSED AMENDMENTS TO	)	R08-18
GROUNDWATER QUALITY	)	(Rulemaking-Public Water Supplies)
STANDARDS	)	
(35 Ill. Adm. Code 620)	)	
	)	

ERRATA SHEET NUMBER 2

NOW COMES the Illinois Environmental Protection Agency through one of its attorneys, Kimberly Geving, and submits this ERRATA SHEET NUMBER 2 to the Illinois Pollution Control Board and the participants on the Service List. Please note that the errata changes reflect amendments to our proposal as submitted to the Board on February 15, 2008 and not to the existing rule.

Tom Hornshaw or Rick Cobb will provide testimony in support of these changes at the first hearing.

Section		
620.410(b)	Anthracene	0.043 ~~0.0434~~
	Benzo(k)fluoranthene	0.00017 ~~0.0008~~
	Chrysene	0.0063 ~~0.0016~~
	1,1-Dichloroethane	1.4 ~~0.7~~
	Fluoranthene	0.21 ~~0.206~~
	Indeno(1,2,3-cd)pyrene	0.000022 ~~0.00043~~
	2-Methylnaphthalene	0.028 ~~0.0028~~
	p-Dioxane	0.0077 ~~0.005~~
	Pyrene	0.21 ~~0.135~~
	2,4-Dinitrotoluene	0.0001 ~~0.00002~~
620.420(b)	Anthracene	0.043 ~~0.0434~~
	Benzo(a)pyrene	0.0016 ~~0.00162~~
	Chrysene	0.0063 ~~0.0016~~
	1,1-Dichloroethane	7.0 ~~3.5~~
	Fluoranthene	0.21 ~~0.206~~
	Indeno(1,2,3-cd)pyrene	0.000022 ~~0.00043~~
	p-Dioxane	0.0077 ~~0.005~~
	Pyrene	1.05 ~~0.135~~

2,4-Dinitrotoluene	0.0001 ~~0.00002~~

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: _____
Kimberly A. Geving
Assistant Counsel
Division of Legal Counsel

DATED: May 28, 2008

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
GROUNDWATER	)	R08-18
QUALITY STANDARDS	)	
AMENDMENTS:	)	(Rulemaking-Public Water Supplies)
35 ILL. ADM. CODE 620	)	

TESTIMONY OF RICHARD P. COBB, P.G., ON NEW PROPOSED GROUNDWATER QUALITY STANDARDS

My name is Richard P. Cobb. I am a licensed professional geologist and the Deputy Manager of the Division of Public Water Supplies of the Illinois Environmental Protection Agency's ("EPA") Bureau of Water ("BOW"). My primary responsibilities include managing the Groundwater and Source Water Protection, Field Operations, and the Administrative Sections of the Division. Further, I assist with administering the public water supervision program under the federal Safe Drinking Water Act ("SDWA"). Additionally, my responsibility includes the integration of source water protection with traditional water supply engineering and treatment practices, and to further assist with linking Clean Water Act and SDWA programs. I also directly manage the BOW's Groundwater Section. The groundwater section applies Geographic Information System ("GIS") programs, global positioning system technology, hydrogeologic models (including, 3D geologic visualization, vadose zone, groundwater flow, particle tracking, solute transport, and geochemical models), and geostatistical programs for groundwater protection and remediation. I represent the BOW on Illinois EPA's Contaminant Evaluation Group, Strategic Management Planning Team, Environmental Justice Committee, Information Management Steering Committee, and GIS Steering Committee. Since 1985 I have worked on the development of legislation, rules, and regulations. I have also served as a primary Agency witness at Illinois

Pollution Control Board ("Board") proceedings in the matter of groundwater quality standards, technology control regulations, regulated recharge areas, maximum setback zones, clean-up regulations, and water well setback zone exceptions. Furthermore, I have served as a primary Agency witness in enforcement cases under these laws and regulations.

For further detail on my qualifications I have enclosed a copy of my Curriculum Vitae in Attachment I. This testimony, the statement of reasons, and attachments included with this testimony describe the basis for the proposed regulations.

I. PURPOSE OF THE PROPOSAL

The purpose of my testimony today is to provide the background required to propose new groundwater quality standards ("Standards") under Section 8 of the Illinois Groundwater Protection Act ("IGPA") (415 ILCS 55/8(b)(1) (1998)). The term Standards includes the nondegradation requirements for Class I and Class III groundwater as specified by the Board's adopted regulations at:

> SUBPART D: GROUNDWATER QUALITY STANDARDS
>
> Section 620.401 Applicability
>
> Groundwaters must meet the standards appropriate to the groundwater's class as specified in this Subpart and the nondegradation provisions of Subpart C.

Further, the Board's Groundwater Standards Final Opinion and Order (R89-14 (B)), November 1991, on Page 16 had this to say about nondegradation:

> It has sometimes been said that casting the nondegradation provision as it is today is equivalent to allowing pollution up to the standard. The Board believes that this characterization is too simplistic. Among other matters, the whole preventive notification and response program (see following) is directed toward an early alert to, and staving off of, **any increase in contamination in the sensitive groundwater/potential source situations.** (Emphasis added)

Dr. Thomas Hornshaw, Manager of the Illinois EPA's Toxicity Assessment Unit, will provide the supporting toxicological basis for the proposed groundwater standards where appropriate.

II. BACKGROUND

Since the inception of the Illinois Environmental Protection Act ("Act") in 1970, it has been the policy of the State of Illinois to restore, protect, and enhance the groundwater of the State as a natural and public resource. Groundwater has an essential and pervasive role in the social and economic well-being of Illinois, and it is vitally important to general health, safety, and welfare. Groundwater resources should be utilized for beneficial and legitimate purposes; waste and degradation of the resource should be prevented; and the underground water resource should be managed to allow for maximum benefit of the State. Groundwater used as drinking water is one of the highest beneficial uses of the groundwater resource. The IGPA defines "Resource groundwater" as groundwater that is presently being or in the future capable of being put to beneficial use by reason of being of suitable quality (415 ILCS 55/3(j)).

The Act included Sections 11 and 12(a). Section 11 describes part of the purpose of Title III, as follows:

> "...assure that no contaminants are discharged into waters without being given the degree of treatment or control necessary to prevent pollution."

Section 11(b) of the 2005 Act includes the same purpose statement. Water pollution was defined in Section 3(a) of the 1970 version of the Act the same as it is to this day. Moreover, Section 12(a) of the 1970 version of the Act includes the following:

> **" No person shall: (a) cause, threaten or allow the discharge of contaminants into the environment in any State so as to cause or tend to cause water pollution** in Illinois, either alone or in combination with matter from other sources,

> or so as to violate regulations or standards adopted by the Pollution Control Board under this Act." (Emphasis added)

The term "threat" in Section 12(a) of the Act established Illinois' original narrative nondegradation standard. The Board's final order and opinion, for 35 Ill. Adm. Code: Subtitle C, indicated that:

> "...Standards are **applicable to groundwaters that are a present or are a potential source of water for potable use or for food** processing, except where deviation is due to natural causes. It is significant to note that these standards **apply in situ; that is they are ambient water quality standards. They also apply irrespective of whether they are used by a public water supplier, a private water supplier, or have the potential for being so used.** (Emphasis added).

Additionally, the Board's opinion, in regard to *Water Quality Standards Revisions* (#R71-14), and *Water Quality Standards for Intrastate Waters* (SWB-14) (#R71-20) indicated the following:

> "203 General Standards. Today's revision is based upon the principle that **all waters should be protected against nuisances and against health hazards to those near them;** that all waters naturally capable of supporting aquatic life, with the exception of a few highly industrialized streams consisting primarily of effluents in the Chicago area, should be protected to support such life; **and that waters that are used for public water supply should be clean enough that ordinary treatment processes will assure their potability..."**
>
> "...**Since general criteria apply to all waters designated for public water supply**, the present regulation omits separate requirements for those parameters whose general standards are tight enough to protect public water supplies: boron, chromium, copper, fluoride, mercury, silver and zinc. The remaining standards are based largely upon Public Health Service standards, as amplified by the Green Book and by McKee and Wolf. While the PHS explicitly states that its standards are intended to prescribe the quality of finished rather than of raw water, **it is clear from the evidence that many of the metals and other contaminants here listed are not substantially affected by ordinary water supply treatment, and therefore, as the Green Book recommends, the raw water must itself meet the standard to assure satisfactory finished water." (Emphasis added)**

The phrase "ordinary treatment processes", emphasized in the Board's opinion above, is one of the keys to understanding Illinois' nondegradation requirements for groundwater. First, it is

important to note that there is a significant difference between what is considered ordinary treatment processes for surface water versus groundwater sources of drinking water. All community water systems ("CWS") using surface water apply coagulation, sedimentation, filtration, disinfection, and treatment for taste and odor. Private drinking water systems do not use surface water as a source of drinking water, due to the inherent vulnerability of surface water resources to contamination and the associated cost for treating such water. A private drinking water system is defined as a system that serves an owner occupied single family dwelling (415 ILCS 55/9(a)). Secondly, there is a significant difference between what is considered ordinary treatment processes for a small CWS using groundwater versus a private drinking water system well. The small CWS using groundwater has more treatment infrastructure resources available than the owner of a private well. Lastly, a private well owner typically only has to chlorinate his or her well to use the groundwater for potable uses. Thus, this defines the lowest common denominator of what ordinary treatment processes means to the protection of Class I: Potable Resource Groundwater. In other words, the Act and Board regulations prohibit a person from causing, threatening or allowing contamination of potable resource groundwater above what is not removed by ordinary treatment processes in a private drinking water system well. For example, a plume of tritium at a concentration above background or naturally occurring levels, moving toward a private drinking water system well, is considered a threat to diminishing the existing Class I groundwater resource, since tritium cannot be removed by advanced treatment processes let alone ordinary treatment processes. This diminishment of resource groundwater (415 ILCS 55/3(j)) may lead to preclusion of the use of the well if the private well owner chooses not to use it (e.g., suitability) due to the contamination.

The Illinois Supreme Court also determined the following in *Central Illinois Public Service Company v. Pollution Control Board*, 116 Ill.2d 397:

> The Board, at the outset, disagrees with CIPS' interpretation of the definition of water pollution in the Act. **The Board argues that the Act treats water as a resource, and that pollution occurs whenever contamination is likely to render water unusable. Under the Board's interpretation there is not need to show that harm *will* occur, only that harm *would* occur if the contaminated water were to be used.** Since the Board is charged with administering the Environmental Protection Act, its interpretation of the statute is entitled to deference. (*Massa v. Department of Registration & Education* (1987), 116 Ill.2d 376, 107 Ill.Dec, 661, 507 N.E.2d 814; *Illinois Consolidated Telephone Co. v. Illinois Commerce Com.* (1983), 95 Ill.2d 142, 152, 69 Ill.Dec. 78, 447 N.E.2d 295.) **Under the Board's view any contamination which prevents the State's water resources from being usable would constitute pollution, thus allowing the Board to protect those resources from necessary diminishment.** CIPS' interpretation, on the other hand would mean that water rendered unusable would not be polluted so long as use of the water ceased subsequent to contamination. **We find the Board's interpretation preferable to CIPS' interpretation, especially considering the deference we must accord to the Board.** (Emphasis added)

The Illinois EPA framed and the Board adopted the following after the legal cornerstones detailed above:

> Section 620.301 General Prohibition Against Use Impairment of Resource Groundwater
>
> a) **No person shall cause, threaten or allow the release of any contaminant to a resource groundwater such that:**
>
> 1) Treatment or additional treatment is necessary to continue an existing use or to assure a potential use of such groundwater; or
>
> **2) An existing or potential use of such groundwater is precluded.** (Emphasis added)

In summary, the conclusions and facts, provided above, clearly provide the supporting foundation for Standards, as follows:

- The original Act and regulations establish that no person shall discharge contaminants that threaten, cause or allow contamination;
- The intent of this multi-tiered standard is to prevent degradation of the resource up to the numerical standard;
- The Board clearly established that current and potential sources of potable resource groundwater were to be protected;
- Section 12(a) of the Act is integrated with Board regulations to prohibit polluting up to the numerical standards in such regulations;
- The Board's opinions in the matters, quoted above, indicate that resource groundwater should be protected such that a private water supply would be able to obtain clean drinking water through ordinary treatment processes;
- The Board's opinion on Illinois' Groundwater Protection Plan is "...that unreasonable waste and degradation of the resources be prohibited;"
- Public Act 85-863 indicates that waste and degradation of the resources be prevented and includes this as a factor that the Board must consider in adopting comprehensive groundwater quality standard regulations;
- The Illinois Supreme Court has upheld the Board's view that any contamination that prevents the State's water resources from being usable would constitute pollution, thus allowing the Board to protect those resources from unnecessary diminishment; and
- The Board's final opinion and order on groundwater quality standards indicates that the numerical standard is not meant to be a level to pollute up to and included

specific preventive standards prohibiting contamination above detectable levels that threaten a preclusion of use.

III. CONTAMINANTS COMMONLY DETECTED IN ILLINOIS GROUNDWATER

The Illinois EPA evaluated the electronically reported groundwater data for all Illinois Resource Conservation and Recovery Act ("RCRA") and Solid Waste facilities under our purview. The Illinois EPA Bureau of Land ("BOL") Permit Section provides regulatory oversight for these facilities. A data query was conducted for a list of approximately 300 groundwater parameters not included in 35 Ill. Adm. Code 620, Subpart C. The data set evaluated spanned from April 1984 to April 2004. Illinois EPA has also evaluated confirmed groundwater contaminants at various cleanup sites.

The Illinois EPA is proposing a groundwater standard for perchlorate based on the new reference dose published by United States Environmental Protection Agency ("U.S. EPA") and recommended by the National Academy of Science ("NAS"). The Illinois EPA proposes to use the default Relative Source Contribution ("RSC") term of 20 percent. Additionally, Illinois EPA is proposing an amendment to the existing groundwater standard of 0.050 milligrams per liter ("mg/l") for arsenic based on the amendment of the federal drinking water standard or maximum contaminant level ("MCL") for arsenic to 0.010 mg/l. The Board MCL for drinking water has already been amended to 0.010 mg/l at 35 Ill. Adm. Code 611.301.

Arsenic is a naturally occurring element in the earth's crust. Arsenic is found in the deep bedrock materials throughout Illinois, as well as in the shallow glacial materials that cover the northern two-thirds of the State. Arsenic is dissolved naturally from these materials and enters groundwater. For further detail, see *Arsenic in Illinois Groundwater*, developed by Rick Cobb,

Ken Runkle of IDPH and Steve Wilson of the Illinois State Water Survey ("ISWS"), published on November 20 2001, in Attachment II and at http://www.epa.state.il.us/water/groundwater/publications/arsenic/index.html.

There are also a number of incorporations by reference that need to be updated in the Board's groundwater quality standards regulation.

IV. THE AGENCY'S PROPOSAL

A. Section 620.110 Definitions

Illinois EPA proposes that the federal register reference (56 Fed. Reg. 3526-3597) in the Method Detection Limit ("MDL") portion of the "Detection" definition should be replaced by 40 CFR Part 136, Appendix B (2006) citation.

Illinois EPA also proposes to add the "Wellhead protection area" or "WHPA" definition from 35 Ill. Adm. Code 611.101 to 35 Ill. Adm. Code 620.110. This definition is used in conjunction with 2 new proposed incorporations by reference. These new provisions support an amendment to Subsection 620.505(a)(5) for enhancing the hydrogeologic processes in that Section. A WHPA represents a CWS well's recharge area delineated beyond an applicable setback zone, as described in Subsection 17.1(a)(2) of the Act (415 ILCS 5/17.1(a)(2)). Hydrogeologists refer to this as a "contributing recharge area." Groundwater modelers also call this a "capture zone." These terms are used interchangeably by hydrogeologists. In addition, the definition of "Wellhead Protection Program" ("WHPP"), also codified by the Board under 35 Ill. Adm. Code 611.101, is also proposed to be added here since it elaborates on the definition of WHPA, and the two new incorporations by reference that are being proposed. This existing Board definition also provides the nexus between a WHPP and a groundwater protection needs assessment.

There were also amendments made to existing Board definitions due to the revisions of the cross referenced citations in the Act.

B. Section 620.125 Incorporations by Reference

There are new references that need to be added to the Incorporations by Reference in the Board's Standards. The American Society for Testing and Materials ("ASTM") standard has been revised. Further, changes have been proposed because the Federal Register citations have been codified into the Code of Federal Regulations ("CFR"). In addition, many new supplements have been adopted and included in 40 CFR. Additionally, original references have been updated. Further, the sources from which this information is obtained has changed and has been revised. Illinois also proposes a new incorporation by reference to include Illinois' Approved Wellhead Protection Program Document and Guidance Document for Groundwater Protection Needs Assessment because they are used to improve hydrogeologic assessment aspects of Section 620.505 Compliance Determination provisions.

C. The word "or" needs to be deleted from Section 620.201(a)(4).

D. Section 620.310(a)(3)(A)(ii) Preventive Response Activities

Illinois EPA proposes that the Board amend this subsection to include preventive response levels for the following contaminants, which are not classified as carcinogens, with proposed Class I standards based on a statistical increase above background:

> Acenaphthene; acetone; anthracene; benzoic acid; carbon disulfide; 2-butanone (MEK); dicamba, dichlorodifluoromethane; 1,1-dichloroethane; diethylphthalate; di-n-butyl phthalate; di-n-octylphthalate; fluoranthene; fluorine; isopropylbenzene (Cumene); MCPP (Mecoprop); 2-methylnaphthalene; 2-methylphenol; molybdenum; naphthalene; pyrene; trichlorofluoromethane; and vanadium.

E. Section 620.410(a)

The standards proposed below are based on either a U.S.EPA or Board MCL, a reference dose ("RfD") in U.S. EPA's Integrated Risk Information System ("IRIS"), U.S. EPA Health Effects Assessment Summary Table ("HEAST") RfD, Provisional Peer Reviewed Toxicity Values ("PPRTV") RfD, IRIS Slope Factor ("SFo"), or MDL used to derive the 35 Ill. Adm. Code 620, Subpart F, Appendix A: Human Threshold Toxicant Advisory Concentration for Tiered Approach for Correction Objectives ("TACO") (35 Ill. Adm. Code 742) groundwater ("GW") objectives. In addition, we are proposing to amend the existing Subpart F procedures to establish a new procedure that utilizes a 10^{-6} risk level versus the default PQL that was used in the 1980's. Many of the PQLs have dropped significantly and may be well below the respective10-6 risk level. Since 1991, the 10^{-6} risk level has become widely accepted and is used in the Board's TACO regulations. In addition to the 10^{-6} risk level, water solubility is being proposed as a factor. If an organic chemical is present at concentrations in groundwater exceeding its solubility a two-phase system may exist, and the behavior and migration of the chemical in such a system may be difficult to predict. Thus, the water solubility is the proposed basis for several contaminants where the 10^{-6} risk level exceeds water solubility. Dr. Hornshaw's testimony will go into more detail on these proposed amendments.

Carcinogens are denoted in the proposed Class I standards by an asterisk ("*"). Illinois EPA proposes that the Board amend Subsection 620.410(a) to include a Class I: Potable Resource Groundwater Standard for the following inorganic contaminants listed below:

Inorganic Chemicals *Denotes a carcinogen	Proposed Class I Standard (mg/l)	Basis
Arsenic*	0.010	Board and U.S. EPA MCL
Molybdenum	0.035	IRIS RfD
Perchlorate	0.0049	IRIS RfD
Vanadium	0.049	TACO GW Objective

F. Section 620.410(b)

The Illinois EPA proposes to the Board that this subsection be amended to include a Class I: Potable Resource Groundwater Standard for the following organic contaminants:

Volatile Organic Compounds ("VOCs") * Denotes a carcinogen	Proposed Class I Standard (mg/l)	Basis
Acetone	6.3	TACO GW Objective
2-Butanone (MEK)	4.2	IRIS RfD
Carbon disulfide	0.7	TACO GW Objective
Chloroform*	0.0002	TACO GW Objective
Dichlorodifluoromethane	1.4	IRIS RfD
1,1-Dichloroethane	1.4	PPRTV RfD
Isopropylbenzene (Cumene)	0.7	IRIS RfD
Trichlorofluoromethane	2.1	IRIS RfD

Semivolatile Organic Compounds * Denotes a carcinogen	Proposed Class I Standard (mg/l)	Basis
Acenaphthene	0.42	TACO GW Objective
Anthracene	0.043	Water Solubility
Benzo(a)anthracene*	0.00013	TACO GW Objective
Benzo(b)fluoranthene*	0.00018	TACO GW Objective
Benzo(k)fluoranthene*	0.00017	TACO GW Objective
Benzoic acid	28.0	TACO GW Objective
Chrysene*	0.0063	Water Solubility
Dibenzo (a,h,) anthracene*	0.0003	TACO GW Objective
Diethyl phthalate	5.6	TACO GW Objective
Di-n-butyl phthalate	0.7	TACO GW Objective
Di-n-octyl phthalate	0.02	Water Solubility
Fluoranthene	0.21	Water Solubility
Fluorene	0.28	TACO GW Objective
Indeno(1,2,3-cd)pyrene*	0.000022	Water solubility

2-Methylnaphthalene	0.028	IRIS RfD
2-Methylphenol	0.35	TACO GW Objective
Naphthalene	0.14	TACO GW Objective
p-Dioxane*	0.0077	10^{-6} cancer risk
Pyrene	0.21	TACO GW Objective
Pesticides/PCBs * Denotes a carcinogen		
alpha-BHC*	0.00011	TACO GW Objective
Dicamba	0.21	IRIS RfD
MCPP (Mecoprop)	0.007	IRIS RfD

G. Section 620.410(c)

The Illinois EPA proposes that the Board amend the Class I: Potable Resource Groundwater Standards to include a new subsection to for the following explosive contaminants:

Explosives * Denotes a carcinogen	**Proposed Class I Standard (mg/l)**	**Basis**
1,3-Dinitrobenzene	0.0007	IRIS RfD
2,4-Dinitrotoluene*	0.0001	10^{-6} Cancer risk level
2,6-Dinitrotoluene*	0.00031	TACO GW Objective
HMX	1.4	IRIS RfD
Nitrobenzene	0.0035	TACO GW Objective
RDX	0.084	IRIS RfD
1,3,5-Trinitrobenzene	0.84	IRIS RfD
2,4,6-Trinitrotoluene	0.014	IRIS RfD

H. Section 620.420(a)

The final opinion and order of the Board (Docket R89-14(B)), for establishing Class II groundwater quality standards (35 Ill. Adm. Code 620), published November 7, 1991, pages 19 and 20 states that:

> Section 620.420 establishes standards for Class II: General Resource Groundwaters. Because groundwaters are placed in Class II because they are quality-limited, quantity-limited, or both (see Subpart B discussion above), it is necessary that the standards that apply to these waters reflect this range of possible attributes. Among the factors considered in determining the Class II numbers are the capabilities of

treatment technologies to bring Class II waters to qualities suitable for potable use (R3 at 75) ["R3" means the transcript from the Board's May 1991 hearing on this matter, and "at 75" is page 75]. Thus, many Class II standards are based on MCL's as modified to reflect treatment capabilities. For some parameters the Class II standards are based on support of a use other then potability (e.g., livestock water, irrigation, industrial use) where a different use requires a more stringent standard (R3 at 1148)).

The same principle is applied to these proposed Class II standards here today. The standards proposed below are based on irrigation and livestock watering from the National Academy of Sciences, 1972, *Water Quality Criteria.*

Illinois EPA proposes that Subsection 620.410(a) be amended to include a Class II: General Resource Groundwater Standard for the following inorganic chemicals:

Inorganic Chemicals	**Reference Proposed Class I Standard (mg/l)**	**Proposed Class II Standard (mg/l)**	**Basis for Class II**
Arsenic	0.010	0.2	Irrigation
Molybdenum	0.035	0.035	Class I standard (Irrigation criterion is 10)
Perchlorate	0.0049	0.0049	0X
Vanadium	0.049	0.1	Irrigation

I. Section 620.420(b)

Most of the original groundwater standards for organic compounds were based on U.S. EPA MCLs. Best Available Treatment ("BAT") technology removal efficiencies are published in the CFR and 35 Ill. Adm. Code 611, Subpart F. However, none of the contaminants in this proposal, with the exception of arsenic standard, has a codified MCL. Thus, the Illinois EPA used some of the same factors used by U.S. EPA to develop BAT surrogates.

Air Stripping - Due to the high volatility of many of the organic compounds, air stripping is an efficient and cost effective treatment technology (35 Ill. Adm. Code 611, Subpart F). Air

stripping is a proven, effective means to remove VOCs from groundwater as detailed in 35 Ill. Adm. Code 611, Subpart F. Less volatile compounds (e.g., low Henry's Law Constants) are not as easily removed via air stripping (Canter, L.W., and R.C. Knox, 1985, (*Ground water pollution control*, Lewis Publishers). In contrast, compounds with lower Henry's Law Constants are more difficult to remove by air stripping than compounds with high constants. Methylene chloride has one of the lowest Henry's Law Constants at 8.98 X 10^{-2} unit less at 20° Celsius ("C") (35 Ill. Adm. Code 742) in comparison to other VOCs. Where multiple VOCs are present, the compound with the lowest Henry's Law Constant will generally be the limiting compound in the design of the air stripper.

Carbon Adsorption - Carbon adsorption is also is an efficient and cost effective treatment technology (35 Ill. Adm. Code 611, Subpart F) for removing various organic contaminants. Activated carbon is widely used to remove organic compounds (American Water Works Association, 1995, *Water Treatment*). The process of adsorption onto activated carbon requires the contaminated groundwater to come into contact with carbon, which selectively adsorbs organic constituents by a surface attraction phenomenon (due to chemical and physical properties). The organic molecules are attracted to the internal pores of the carbon granules (U.S. EPA, 1989). A coefficient referred to as partition or sorption coefficient (Log K_{oc}) represents the ratio of adsorbed chemical per unit weight of organic carbon to the aqueous concentration (Montgomery, J.H., and L.M. Welkom, 1995, *Groundwater chemicals desk reference*, Volume I, Lewis Publishers.). This value provides an indication of the tendency of a chemical to partition between organic carbon particles and water (Montgomery, 1995). Compounds that bind strongly to organic carbon have characteristically low solubilities, whereas compounds, such as methyl

tertiary butyl ether ("MTBE"), with low tendencies to adsorb to organic particles have high solubilities. Correlations between K_{oc} and the solubility of organic compounds in water have shown a log-log linear relationship (Montgomery, 1995).

Treatment Factor - A five fold treatment factor ("5X") was used to derive a proposed Class II standard for organic compounds with a K_{oc} value greater than (>) ethylbenzene's K_{oc} of 363 liters per kilogram at 20° C or a Henry's Law constant greater than methylene chloride's (8.98 X 10^{-2} unit less at 20° C). A five fold treatment factor equates to a removal efficiency of 80%. This is a very economical approach, since most of the BATs achieve a 99% removal rate. The Class I standard was proposed where either or both were below the factors detailed above.

Illinois EPA proposes that the Board amend Subsection 620.420(b) to include a Class II: General Resource Groundwater Standard for the following organic compounds:

Volatile Organic Compounds	**Reference Proposed Class I Standard (mg/l)**	**Proposed Class II Standard (mg/l)**	**Basis For Class II**
Acetone	6.3	6.3	TACO GW Objective
2-Butanone (MEK)	4.2	4.2	0X
Carbon disulfide	0.7	3.5	TACO GW Objective
Chloroform	0.0002	0.001	TACO GW Objective
Dichlorodifluoromethane	1.4	7.0	5X
1,1-Dichloroethane	1.4	7.0	5X
Isopropylbenzene (Cumene)	0.7	3.5	5X
Trichlorofluoromethane	2.1	10.5	5X
Semivolatile Organic Compounds			
Acenaphthene	0.42	2.1	TACO GW Objective
Anthracene	0.043	0.043	Water Solubility
Benzo(a)anthracene	0.00013	0.00065	TACO GW Objective
Benzo(b)fluoranthene	0.00018	0.0009	TACO GW Objective
Benzo(a)pyrene	0.0002	0.0016	Water Solublity
Benzo(k)fluoranthene	0.00017	0.0008	Water Solubility
Benzoic acid	28.0	28.0	TACO GW Objective
Chrysene	0.0063	0.0063	Water Solubility

Diethyl phthalate	5.6	5.6	TACO GW Objective
Dibenzo (a,h,) anthracene	0.0003	0.0015	TACO GW Objective
Di-n-butyl phthalate	0.7	3.5	TACO GW Objective
Di-n-octyl phthalate	0.02	0.02	Water Solubility
Fluoranthene	0.21	0.21	Water Solubility
Fluorene	0.28	1.4	TACO GW Objective
Indeno(1,2,3-cd)pyrene	0.000022	0.000022	Water Solubility
2-Methylnaphthalene	0.028	0.14	5X
2-Methylphenol	0.35	0.35	TACO GW Objective
Naphthalene	0.14	0.22	TACO GW Objective
p-Dioxane	0.0077	0.0077	10^{-6} Cancer risk
Pyrene	0.21	1.05	TACO GW Objective
Pesticides/PCBs			
alpha-BHC	0.00011	0.00055	TACO GW Objective
Dicamba	0.21	0.21	0X
MCPP (Mecoprop)	0.007	0.035	5X
Methoxychlor	0.04	0.045	Water Solubility

In addition, the existing Class II standard for Benzo(a)pyrene should be amended to 0.0002 mg/l based on its water solubility. Additionally, the Class II standard for Methoxychlor should be amended to 0.045 mg/l based on its water solubility.

J. Section 620.420(c)

This new subsection has been amended to propose a Class II: General Resource Groundwater Standard for the following explosive compounds:

Explosives	Reference Proposed Class I Standard (mg/l)	Proposed Class II Standard (mg/l)	Basis
1,3-Dinitrobenzene	0.0007	0.0007	0X
2,4-Dinitrotoluene	0.0001	0.0001	0X
2,6-Dinitrotoluene	0.00031	0.00031	TACO GW Objective
HMX	1.4	1.4	0X
Nitrobenzene	0.0035	0.0035	0X
RDX	0.084	0.084	0X
1,3,5-Trinitrobenzene	0.84	0. 84	0X
2,4,6-Trinitrotoluene	0.014	0.014	0X

K. Section 620.440 Groundwater Quality Standards for Class IV: Other Groundwater

Explosives are used during various phases of mining. It is not expected that residuals of explosive contaminants will even be detectable after reclamation has been completed for a previously mined area (e.g., excavation left after the coal seam(s) have been removed). However, the Illinois EPA and the Office of Mines and Minerals believe it is important to establish a Class IV standard for explosives within previously mined areas. Designation of a previously mined area is being proposed because it moves the compliance point from the pit of the mine to the boundary of the permitted area. This is necessary because we want to establish a monitoring point that will assess the potential for off-site contamination of resource groundwater beyond the permitted boundary. The alternative would establish a compliance point in the pit of the mine. We already know, expect, and accept that this area would be impacted by TDS, sulfate and other contaminants listed in Class IV previously mined areas. It is simply an environmental cost of doing coal mining. In addition, setting a compliance point at the permitted boundary is certainly consistent with monitoring programs under other Board regulations such as the solid waste landfill monitoring requirements.

L. Section 620.450 Alternative Groundwater Quality Standards

Section 620.450(b) establishes the applicable coal reclamation groundwater standards. A new Subsection 620.450(b)(3)(D) is proposed to include explosive contaminants. Thus, the existing concentration of these contaminants, if present post reclamation, is proposed to be the applicable standard within the permitted area. This establishes an appropriate compliance point for resource groundwater beyond the permitted area.

M. Section 620.505(a)(5)

Section 620.505 contains the provisions for determining compliance with the Board's groundwater quality standards. Appropriate monitoring points are selected based on the ability to represent groundwater quality accurately. When this Section was originally drafted and ultimately adopted by the Board in 1991, the Groundwater Protection Needs Assessment ("GPNA") provisions of the Act (415 ILCS 5/17.1) had not been fully developed or implemented. In addition, Illinois' WHPP had not yet been approved by U.S. EPA. Further, not much progress had been made with delineations during subsequent groundwater standards update proceedings. However, as a result of the source water assessment requirements and grant funding available under the 1996 SDWA amendments, over 300 WHPA's have been delineated beyond the applicable setback zones for CWS wells. These delineations have been conducted based on Illinois' *Guidance Document for Conducting Groundwater Protection Needs Assessments* and Illinois' approved WHPP. Therefore, this proposed amendment is intended to utilize this new hydrogeologic data where it is available.

Before proceeding it is important to provide some historical background. The 1986 amendments to the SDWA required States to develop and implement WHPPs after approval by U.S. EPA. In 1987, U.S. EPA published its *Guidelines for Delineation of Wellhead Protection Areas.* The development of U.S. EPA's WHPA delineation guidance included a *Model Assessment for Delineating Wellhead Protection Areas.* Paul van der Heijde of the International Ground-Water Modeling Center ("IGWMC") conducted this assessment for U.S. EPA. After the SDWA requirements in 1986 to delineate WHPAs and the subsequent requirements to provide recharge area delineation technical assistance under Illinois law in 1987, the ISWS developed new models, such as GWPATH (Shafer, J.M., 1987, *Reverse pathline calculation of time-related capture zones in nonuniformflow*, Ground Water, v. 25, no. 3, pp. 283-289) and conducted

research pursuant to Section 7 of the IGPA (415 ILCS 55/7(b)(4)) that further advanced WHPA modeling techniques (Wehrmann, H.A., and M.D. Varljen, 1990, *A comparison between regulated setback zones and estimated recharge areas around several municipal wells in Rockford*, IL, Proceedings of the NWWA 1990 Conference, February 20-21, 1990, Kansas City, MO. pp. 497-511).

The ISWS, Illinois State Geological Survey ("ISGS"), and the Illinois EPA collaborated to develop a nexus between WHPAs, and the delineation requirements under the Act, so that one approach would meet both requirements. The hydrologic term that describes the recharge area of a pumping well is referred to as a "contributing recharge area" because it is a subset of an overall aquifer recharge area supplying groundwater to a well. Another term used to describe a contributing recharge area is referred to as a capture zone. Capture zone models predict the pathlines of groundwater flow that contribute recharge to a pumping well. The outline of a capture zone, containing pathlines, is a WHPA or contributing recharge area. A time of travel ("TOT") can also be related to a capture zone. Illinois uses the 5-year TOT travel as the minimum threshold for WHPA delineations. This approach was presented to the Interagency Coordinating Committee on Groundwater ("ICCG") (415 ILCS 55/4) and the Groundwater Advisory Council ("GAC") (415 ILCS 55/5). After ICCG and GAC approval, this was presented to U.S. EPA for their approval. U.S. EPA fully approved Illinois' WHPP in1991.

The Illinois EPA and the surveys then collaborated on four pilot GPNA projects, starting in 1991, to further develop the technical basis for WHPA delineation. Pilot GPNA's were conducted for the following CWSs: Pleasant Valley Public Water District ("PWD"); Village of Cary; Village of Woodstock; and City of Pekin. These sites were purposely chosen because of their location within two priority groundwater protection planning regions, established by the ICCG and GAC,

and based on the hydrogeologic data provided by *Illinois Potential for Aquifer Recharge Map,* developed by the ISWS and ISGS pursuant to Subsections 17.2(a) and 17.2(b) of the Act.

Another reason for choosing the City of Pekin for a pilot GPNA was that the ISWS was conducting research specifically on the uncertainty associated with modeling WHPAs at the Pekin wells (Varljean, M.D., and J.M. Shafer, October 1991, *Assessment of Uncertainty in Time-Related Capture Zones Using Conditional Simulation of Hydraulic Conductivity,* Ground Water, v. 29, no. 5, pp. 737-748). This allowed for further collaboration between the ISWS and Illinois EPA on developing and applying appropriate WHPA modeling techniques.

The industry standard United States Geological Survey ("USGS"), numerical groundwater flow model ("MODFLOW"), and groundwater pathline model ("MODPATH") was used on these pilot projects. The IGWMC's WHPA modeling assessment (van der Heijde, P.K.M, 1988, *Model Assessment for Delineating Wellhead Protection Areas)* document, evaluated the usability and the reliability of these USGS models. Evaluation of reliability included if: 1) the model's theory and coding had been "peer reviewed"; 2) if the models had been "verified"; and 3) if these models had been "field validated". MODFLOW and MODPATH met all of these criteria.

MODFLOW and MODPATH were used to delineate the WHPAs for Pekin, Cary, and Pleasant Valley PWD GPNAs. The Illinois EPA and the ISWS worked on the development of the Pekin flow model, Clark Engineers developed the Pleasant Valley PWD model, and Baxter and Woodman developed the model for the Village of Cary. The Woodstock pilot, conducted by the ISGS, focused on geologic mapping techniques that can be used in the GPNA (Berg, R.C. 1994. *Geologic Aspects of a Groundwater Protection Needs Assessment for Woodstock, Illinois*: Illinois State Geological Survey Environmental Geology 146).

Illinois EPA worked with the Central Groundwater Protection Planning Committee, designated by our Director pursuant to Section 17.2 of the Act, and comprised of local stakeholders, to develop a local overlay zoning ordinance based on the Pekin WHPA. The Central Committee facilitated working with the City of Pekin, the Illinois American Water Company, local business, and other interest groups to develop and adopt Pekin's WHPA ordinance. The ordinance was adopted by the Pekin City Council in 1995.

Following the implementation of the pilot GPNA's the Illinois EPA, ISGS and ISWS began work on the development of *A Guidance Document for Conducting Groundwater Protection Needs Assessments* that was published 1995. The WHPA delineation process described in this guidance document was based on: 1) the ISWS's vast experience (For example; ASTM's *Standard Guide for Subsurface Flow and Transport Modeling,* ASTM 5880-95, was based in part on ISWS's ground breaking modeling work done in the late 60's and early 70's); 2) U.S. EPA's *Guidelines for Delineation of Wellhead Protection Areas;* 3) IGWMC's *Model Assessment for Delineating Wellhead Protection Areas;* and 4) the four pilot GPNAs.

The Illinois EPA used the WHPA modeling conducted for the Pleasant Valley PWD to develop a regulated recharge area proposal for submission to the Board. The Illinois EPA prepared this proposal in response to a request from the Central Committee pursuant their authority under Section 17.3 of the Act. Illinois EPA must prepare a proposal in response to a regional committee request. The Board held a series of hearings at which the WHPA modeling techniques were discussed in detail. Illinois' *Guidance Document for Conducting Groundwater Protection Needs Assessments* was included as an attachment to my testimony in that proceeding. The Board adopted a regulated recharge area for Pleasant Valley based on Illinois' WHPA modeling, which became effective September 1, 2001.

The Village of Marquette Height's maximum setback zone proposed by the Illinois EPA and adopted by the Board on May 4, 2007 was based Illinois' WHPA modeling. This proposal was also based on a recommendation from the Central Committee.

In summary, Illinois' *Guidance Document for Conducting Groundwater Protection Needs Assessments* is used to provide technical assistance on how to conduct WHPA modeling pursuant to Subsection 17.1(i) of the Act. Moreover, over 300 WHPA's have been delineated on a state wide basis for CWS wells using these processes.

The amendment to this subsection is intended to utilize the hydrologeologic information where WHPAs have been delineated for CWS wells according to the hydrogeologic procedures in a *Guidance Document for Conducting Groundwater Protection Needs Assessments.*

N. Section 620.510

The proposed amendments to the monitoring and analytical requirements are a result of the updates and revisions to the incorporations by reference in Section 620.125.

O. Section.620.605

The federal register citations have been updated to the relevant Code of Federal Regulation references.

P. Section 620.Appendix A

Section 620.Appendix A(b)(2) has also been amended to replace federal register with 40 CFR citations.

Q. Section 620.Appendix A

Section 620.Appendix A(b)(2) has also been amended to replace federal register with 40 CFR citations.

Dr. Hornshaw will provide testimony on further changes to Subpart F.

V. CONCLUSION

This concludes my testimony. I will be happy to address any questions.

ATTACHMENT I - CURRICULUM VITAE of RICHARD P. COBB, P.G.

Work Experience

Deputy Manager, Division of Public Water Supplies (DPWS), Bureau of Water (BOW), Illinois Environmental Protection Agency (EPA). (5/02- Present) My primary responsibilities include managing the: Groundwater Section, Field Operation Section, and the Administrative Support Unit of the Division. Further, I assist with administering the public water supervision program under the federal Safe Drinking Water Act ("SDWA") and the Wellhead Protection Program ("WHPP") approved by the United States Environmental Protection Agency ('U.S. EPA"). Additionally, my responsibility includes the integration of source water protection with traditional water supply engineering and treatment practices, and to further assist with linking Clean Water Act and SDWA programs. I also directly manage the BOW's Groundwater Section. The Groundwater Section applies Geographic Information System ("GIS") programs, global positioning system ("GPS") technology, hydrogeologic models (3D geologic visualization, vadose zone, groundwater flow, groundwater particle tracking, solute transport, and geochemical models), and geostatistical programs for groundwater protection and remediation projects. The Groundwater Section also continues to operate a statewide ambient groundwater monitoring program for the assessment of groundwater protection and restoration programs. I also do extensive coordination with federal, state and local stakeholders including the Governor appointed Groundwater Advisory Council ("GAC"), the Interagency Coordinating Committee on Groundwater ("ICCG"), four Priority Groundwater Protection Planning Committees, Illinois Source Water Protection Technical and Citizens Advisory Committee, and with the Ground Water Protection Council ("GWPC"), Association of State Drinking Water Administrators ("ASDWA"), and the Association of State and Interstate Water Pollution Control Administrators ("ASWIPCA") to develop and implement groundwater protection policy, plans, and programs. I represent the BOW on Illinois EPA's: Contaminant Evaluation Group ("CEG"); Strategic Management Planning Team; Environmental Justice Committee; Information Management Steering Committee; and the GIS Steering Committee. Since starting with Illinois EPA in 1985, I have worked on the development of legislation, rules and regulations. I have also served as a primary Illinois EPA witness before Senate and House legislative committees, and at Illinois Pollution Control Board ("Board") proceedings in the matter of groundwater quality standards, technology control regulations, cleanup regulations, regulated recharge areas, maximum setback zone, and water well setback zone exceptions. Furthermore, I have served as primary Illinois EPA witness in enforcement matters.

Manager, Groundwater Section, DPWS, BOW, Illinois EPA. (9/92-5/02) My primary responsibilities included development and implementation of Illinois statewide groundwater quality protection, USEPA approved WHPP, and source water protection program. The Groundwater Section worked with the United States Geological Survey ("USGS") to refine Illinois EPA's ambient groundwater monitoring network using a random stratified probability based design. The Groundwater Section continued to operate a statewide ambient groundwater monitoring program for the assessment of groundwater protection and restoration programs based on the new statistically-based design. I co-authored a *Guidance Document for Conducting*

Groundwater Protection Needs Assessments with the Illinois State Water and Illinois State Geological Surveys. I also continued to conduct extensive coordination with federal, state and local stakeholders including the Governor appointed GAC, the ICCG, four Priority Groundwater Protection Planning Committees, Illinois Source Water Protection Technical and Citizens Advisory Committee, and at the national level as Co-chair of the GWPC Ground Water Division to develop and implement groundwater protection policy, plans, and programs. I also served periodically as Acting Manager for the Division of Public Water Supplies. Additionally, the Groundwater Section provided hydrogeologic technical assistance to the BOW Permit Section and Mine Pollution Control Program to implement source water protection, groundwater monitoring and aquifer evaluation and remediation programs. I continued to work on the development of legislation, rules and regulations. I also served as a primary Illinois EPA witness at Board proceedings in the matter of groundwater quality standards, technology control regulations, regulated recharge areas and water well setback zone exceptions. Furthermore, I served as an Agency witness in enforcement matters.

Acting Manager, Groundwater Section, DPWS, BOW, Illinois EPA. (7/91-9/92) My responsibilities included continued development and implementation of Illinois statewide groundwater quality protection, U.S. EPA approved WHPP, and ambient groundwater monitoring program. The Groundwater Section developed the Illinois EPA's WHPP pursuant to Section 1428 of the SDWA and was fully approved by U.S. EPA. Illinois EPA was the first state in U. S. EPA Region V to obtain this approval. I performed extensive coordination with state and local stakeholders including the Governor appointed GAC, the ICCG to develop and implement groundwater protection, plans, policy, and programs. Developed and implemented the establishment of Illinois' Priority Groundwater Protection Planning Committees. Developed and implemented Pilot Groundwater Protection Needs Assessments. The Groundwater Section also provided hydrogeologic technical assistance to the BOW Permit Section and Mine Pollution Control Program staff to develop groundwater monitoring and aquifer evaluation, remediation and/or groundwater management zone programs. I also served as a primary Agency witness at Board proceedings in the matter of groundwater quality standards and technology control regulations. Additionally, I served as an Agency total quality management ("TQM") facilitator, and TQM trainer.

Manager of the Hydrogeology Unit, Groundwater Section, DPWS, Illinois EPA (7/88-7/91) Managed a staff of geologists and geological engineers that applied hydrogeologic and groundwater modeling principals to statewide groundwater protection programs. Developed, and integrated the application of GIS, GPS, geostatistical, optimization, vadose zone, solute transport, groundwater flow and particle tracking computer hardware/software into groundwater protection and remediation projects. Conducted extensive coordination with state and local stakeholders including the Governor appointed GAC and ICCG to develop and implement groundwater protection policy, plans, and programs. Developed and implemented a well site survey program to inventory potential sources of contamination adjacent to community water supply wells. Additionally, I worked on the development of rules to expand setback zones based on the lateral area of influence of community water supply wells. Furthermore, I provided administrative support to the Section manager in coordination, planning, and supervision of the groundwater program. I also assisted with the development of grant applications and subsequent management

of approved projects. In addition, I assisted the section manager with regulatory and legislative development in relation to the statewide groundwater quality protection program. I also served on the Illinois EPA's Cleanup Objectives Team ("COT").

Environmental Protection Specialist I, II, and III, Groundwater Section, DPWS, Illinois EPA. (7/85-7/88) I was the lead worker and senior geologist in the development and implementation of Illinois statewide groundwater quality protection program. I worked on the development of Illinois EPA's ambient groundwater monitoring network, and field sampling methods and procedures with the USGS. I published the first state-wide scientific paper on volatile organic compound occurrence in community water supply wells in Illinois. In addition, I assisted with the development of *A Plan for Protecting Illinois Groundwater*, and the legislation that included the *Illinois Groundwater Protection Act.*

Consulting Well Site Geologist, Geological Exploration (GX) Consultants, Denver Colorado. (3/81-12/83) I worked as a consulting well site geologist in petroleum exploration and development for major and independent oil companies. I was responsible for the geologic oversight of test drilling for the determination and presence of petroleum hydrocarbons. Prepared geologic correlations and performed analysis of geophysical logs, drilling logs and drill cuttings. Supervised and analyzed geophysical logging. Made recommendations for conducting and assisted with the analysis of drill stem tests and coring operations. In addition, I provided daily telephone reports and final written geologic reports to clients.

Undergraduate Teaching Assistant, Geology Department, Illinois State University. (3/79-3/81) I was responsible for teaching and assisting with lecture sessions, lab sessions, assignment preparation and grading for Petrology, Stratigraphy and Geologic Field Technique courses.

Undergraduate Education

B.S Geology, 1981, Illinois State University ("ISU"). Classes included field geology at South Dakota School of Mines and Technology, and Marine Ecology Paleoecology at San Salvador Field Station, Bahamas

Post Graduate Education

Applied Hydrogeology, 1984, ISU Graduate Hydrogeology Program

Engineering Geology, 1984, ISU Graduate Hydrogeology Program

Geochemistry for Groundwater Systems, 1986, USGS National Training Center

Hydrogeology of Waste Disposal Sites, 1987, ISU Hydrogeology Program

Hydrogeology of Glacial Deposits in Illinois, 1995, ISU Graduate Hydrogeology Program

MODFLOW, MODPATH and MT3D groundwater modeling, 1992, USGS National Training Center

24 Hour Occupational Health & Safety Training, 1994

Computer Modeling of Groundwater Systems, 1995, ISU Graduate Hydrogeology Program

Introduction to Quality Systems Requirements and Basic Statistics, 2001, U.S. EPA

Source Water Contamination Prevention Measures, 2001, U.S.EPA, Drinking Water Academy

Fate and Transport Processes and Models, 2006, Risk Assessment and Management Group, Inc.,

National Response Plan (NRP), an Introduction IS-00800.A, 2007, EMI

National Incident Management System (NIMS) an Introduction *IS-00700*, 2006, Emergency Management Institute (EMI),

Intermediate ICS for Expanding Incidents *IS-00300*, 2008, EMI

ICS for Single Resources and Initial Action Incidents *IS-00200*, 2006, EMI,

Introduction to the Incident Command System (ICS) *IS-00100*, 2006, EMI

License

Licensed Professional Geologist 196-000553, State of Illinois, expires 3/31/2009

Certification

Certified Professional Geologist 7455, Certified by the American Institute of Professional Geologists 4/88

Certified Total Quality Management Facilitator, 5/92, Organizational Dynamics Inc.,

Summary of Computer Skills

I am proficient with using the following computer programs ARC VIEW, Aqtesolv, SURFER, WHPA, DREAM, AQUIFEM, MODFLOW, MODPATH, and MT3D.

Professional Representation

Illinois EPA liaison to the ***GAC*** and representative on the ***ICCG*** (1988 – present)

Senate Working Committee on Geologic Mapping.

Illinois EPA representative and subcommittee chairman, ***State Certified Crop Advisory Board,*** and ***Ethics and Regulatory Subcommittee*** established in association with the American Society of Agronomy/American Registry of Certified Professionals in Agronomy, Crops and Soils (1995 – 2001)

Illinois groundwater quality standards regulations technical work group (1988 – 1991).

ICCG State Pesticide Management Plan Subcommittee for the protection of groundwater.

Illinois EPA representative, ***State task group involved with developing the siting criteria for a low level radioactive waste site in Illinois.***

Fresh Water Foundation's Groundwater Information System (GWIS) project in the great lakes basin.

Illinois EPA technical advisor, ***four priority regional groundwater protection planning committees*** designated by the Director to advocate groundwater protection programs at the local level (1991 – present)

Groundwater Subcommittee of the National Section 305(b) Report, of the Clean Water Act Consistency Workgroup.

Ground Water Protection Council's Wellhead Protection Subcommittee.

Co-Chair, ***Groundwater Division of the GWPC*** on (September 1997 to 2003)

Chairman, ***Illinois' Source Water Protection Technical and Citizens Advisory Committee.***

United States Environmental Protection Agency National Ground Water Report Work Group. One of 10 state representatives serving on a work group sponsored by U.S. EPA headquarters charged with development of a national report to be submitted to the U.S. Congress on the status and needs for groundwater protection programs across the country. (January 1999 to July 2000)

Illinois EPA representative, ***Northeastern Illinois Planning Commission Water Supply Task Force.*** The purpose of this task force is to assist the Commission in the development of a Strategic Plan for Water Resource Management. (March 1999 to 2001)

GWPC/U.S. EPA Futures Forum Work Group providing input on source water protection for the next 25 years. (January 1999 to 2001)

GWPC/ASDWA work group providing input into the U.S. EPA Office of Ground and Drinking Water Strategic Plan for Source Water Protection. June 2000 to March 2005.

Co-Chair, ***U.S. EPA Headquarters/GWPC/ASDWA/ASWIPCA workgroup to develop the second Ground Water Report to Congress***. March 2002 –present.

Chair, ***ICCG Groundwater Contamination Response Subcommittee*** responsible for developing a new strategy for responding to groundwater contamination and the subsequent notification of private well owners. March 2002 – April 2002.

Illinois EPA representative, ***ICCG Water Quantity Planning Subcommittee*** working on development of a surface and groundwater quantity- planning program for Illinois. June 2002 – January 2003

Chair, ***ICCG Right-to-Know (RTK) Subcommittee,*** *2006*

GWPC, Groundwater Science and Research Advisory Board, 2007

Professional Affiliation

American Institute of Professional Geologists
Illinois Groundwater Association
Ground Water Protection Council
National Groundwater Association -Association of Groundwater Scientists and Engineers
Sigma Xi – The Scientific Research Society

Honors

Sigma Xi - Elected to *Sigma Xi* The Scientific Research Society for undergraduate research conducted and presented to the Illinois Academy of Science. 4/81

Director's Commendation Award - Participation in the development of the City of Pekin, Il. Groundwater Protection Program and commitment to the protection of Illinois groundwater. 7/95

Certificate of Appreciation - Outstanding contribution to the development of the Ground Water Guidelines for the National Water Quality Inventory 1996 Report to Congress from the United States Environmental Protection Agency Office of Ground Water and Drinking Water. 8/96

Groundwater Science Achievement Award - Illinois Groundwater Association for outstanding leadership and service in the application of groundwater science to groundwater protection in Illinois and in the development of the wellhead protection program and pertinent land-use regulations. 11/97

Certificate of Appreciation - GWPC for distinguished service, remarkable dedication, valuable wisdom and outstanding contribution as a GWPC member, division co-chair and special committee member. 9/99

Drinking Water Hero Recognition - United States Environmental Protection Agency Administrator Carol Browner at the 25th Anniversary of the Federal Safe Drinking Water Act Futures Forum in Washington D.C. 12/99.

Certificate of Recognition - United States Environmental Protection Agency Region V Administrator Fred Lyons for outstanding achievements in protecting Illinois' groundwater resources. 12/99

Exemplary Systems in Government (ESIG) Award - Nomination by the Governor's Office of Technology from the Urban and Regional Information Systems Association (URISA) for the Illinois EPA's Source Water Assessment and Protection Internet Geographic Information System. 6/01

Expert Witness Experience

IN THE MATTER OF: GROUNDWATER QUALITY STANDARDS (35 ILL. ADM. CODE 620), R89-14(B) (Rulemaking). Subject: I served as the principal witness recommending adoption of this Illinois EPA Agency proposal. R89-14(B) was adopted by the Board. The standards became effective January 1991.

STATE OIL COMPANY vs. DR. KRONE, McHENRY COUNTY and ILLINOIS EPA, PCB 90-102 (Water Well Exception). Subject: This case involved obtaining an exception from the owner of a non-community water supply well for placing new underground gasoline storage tanks within the 200-foot setback zone of well. I served as the principal witness for Illinois EPA on this case. The Board granted the exception with conditions.

People vs. AMOCO OIL COMPANY and MOBIL CORPORATION, Case no. 90-CH-79, Tenth Judicial Court, Tazewell County, Illinois. Subject: Groundwater contamination resulting from releases at above ground bulk petroleum storage terminals resulting in violation of Illinois' Groundwater Quality Standards Regulations (35 Illinois Administrative Code 620). I served as the principal Illinois EPA witness on this case. The case was settled with a penalty of $125,000 and the requirement of a comprehensive corrective action program.

IN THE MATTER OF: GROUNDWATER PROTECTION: REGULATIONS FOR EXISTING AND NEW ACTIVITIES WITHIN SETBACK ZONES AND REGULATED RECHARGE AREAS (35 ILL. ADM. CODE 601, 615, 616 and 617), R89-5 (Rulemaking). Subject: I served as the principal Illinois EPA witness supporting adoption of this Agency proposal. R89-5 was adopted by the Board and became effective January 1992.

HOUSE BILL 171 METHYL TERTIARY BUTYL ETHER (MTBE) ELIMINATION ACT, House Environmental and Energy Committee. Subject: This law required the phase out MTBE within 3 years of enactment. I served as a principal Illinois EPA witness in support of the proposed legislation. The legislation was adopted as Public Act 92-0132 on July 24 2001. PA 92-132 required the ban of MTBE within three years.

IN THE MATTER OF: GROUNDWATER QUALITY STANDARDS (35 ILL. ADM. CODE 620), R93-27 (Rulemaking). Subject: I served as the principal Illinois EPA witness recommending amendments of new constituent standards in this Agency proposal.

SHELL OIL COMPANY vs. COUNTY of DuPAGE and THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY, PCB 94-25 (Water Well Setback Exception). Subject: A new underground gasoline storage tank was seeking an exception from the Illinois Pollution Control Board in relation to a private drinking water supply well setback zone. The DuPage County and the Illinois EPA held that the tank would be a significant hazard and opposed the exception. I served as the principal Illinois EPA witness. Shell withdrew the petition from the Board after hearings were held.

People ex rel. Ryan v. STONEHEDGE, INC., 288 Ill.App.3d 318, 223 Ill.Dec. 764, 680 N.E.2d 497 (Ill.App. 2 Dist. May 22, 1997). Subject: The State brought Environmental Protection Act action against company engaged in business of spreading deicing salt, alleging that salt stored on company's industrial property leaked into area's groundwater supply, thereby contaminating it. The Circuit Court, McHenry County, James C. Franz, J., granted company's motion for summary judgment. State appealed. The Appellate Court, Colwell, J., held that: (1) wells existing before Illinois Water Well Construction Code was enacted are not "grandfathered" in as being in compliance with Code, so as to be automatically subject to testing for groundwater contamination, and (2) fact issues precluded summary judgment on claim arising from alleged deposit of at least 50,000 pounds of salt in pile within 200 feet of two existing water supply wells. Affirmed in part and reversed in part; cause remanded.

People vs. STONEHEDGE INC. Case no. 94-CH-46, Circuit Court of the 19th Judicial Circuit, McHenry County. Subject: This case involved a violation of the potable well setback zone provisions of Section 14.2 of the Illinois Environmental Protection Act. Stonehedge Inc. placed a salt pile of greater than 50,000 pounds within the 200 foot setback of multiple private drinking water supply wells. I served as an Agency principal witness. Stonehedge Inc. was found to be guilty of violating the setback prohibition in this case and was assessed a penalty of $1,500 and attorneys fees of $4,500.

SALINE VALLEY CONSERVANCY DISTRICT vs. PEABODY COAL COMPANY, Case No. 99-4074-JLF, United States District Court for the Central District of Illinois. Subject: Groundwater contamination from the disposal of 12.8 million tons of coarse coal refuse, slurry and gob. Witness for the Illinois EPA. This is an on-going case.

IN THE MATTER OF: PROPOSED REGULATED RECHARGE AREAS FOR PLEASANT VALLEY PUBLIC WATER DISTRICT, PROPOSED AMENDMENTS TO (35 ILL. ADM. CODE 617), R00-17 (Rulemaking). Subject: I served as the principal Illinois EPA witness supporting adoption of this Agency proposal. The proposal was adopted on July 26, 2001 and became effective September 1, 2001.

IN THE MATTER OF: PROPOSED AMENDMENTS TO TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (35 Ill. Adm. Code 742), (R00-19(A) and R00-19(B)) (Rulemaking). Subject: I served as a supporting Illinois EPA witness recommending inclusion of MTBE in this Agency proposal.

IN THE MATTER OF: NATURAL GAS-FIRED, PEAK-LOAD ELECTRICAL GENERATION FACILITIES (PEAKER PLANTS), R01-10 (Informational Hearing) Subject: I served as a supporting Illinois EPA witness to discuss the impact of peaker plants on groundwater.

IN THE MATTER OF: GROUNDWATER QUALITY STANDARDS AND COMPLIANCE POINT AMENDMENTS (35 ILL. ADM. CODE 620), R01- 14 (Rulemaking). Subject: I served as the principal Illinois EPA witness recommending amendments of a groundwater standard for MTBE and compliance point determinations in this Agency proposal. The Board adopted the proposal unanimously on January 24, 2002.

TERESA LeCLERCQ; AL LeCLERCQ; JAN LeCLERCQ; WALT LeCLERCQ, individually; and on behalf of all persons similarly situated vs. THE LOCKFORMER COMPANY, a division of MET-COIL SYSTEMS CORPORATION, Case no. 00 C 7164, United States District Court, Northern District of Illinois. Subject: I was called as a witness by Lockformer Company to testify about a Well Site Survey prepared and published in 1989 by the Illinois EPA for Downers Grove community water supply.

TERESA LeCLERCQ; AL LeCLERCQ; JAN LeCLERCQ; WALT LeCLERCQ, individually; and on behalf of all persons similarly situated vs. THE LOCKFORMER COMPANY, a division of MET-COIL SYSTEMS CORPORATION, Case no. 00 C 7164, United States District Court, Northern District of Illinois. Subject: I was called as a witness by Lockformer Company to testify about groundwater contamination in the Lisle and Downers Grove area.

HOUSE BILL 4177 PRIVATE WELL TESTING PROPERTY TRANSFER and DISCLOSURE ACT, House Environmental and Energy Committee. Subject: Legislation to require volatile organic chemical contamination testing of private wells at the time of property transfer and reporting to the Illinois Department of Public Health and the Illinois EPA. I served as a principal Illinois EPA witness in support of the proposed legislation. The legislation was not supported due to the opposition from the realtors association.

MATTER OF PEOPLE vs. PEABODY COAL, PCB 99-134 (Enforcement). Subject: the State of Illinois developed an amended complaint against Peabody Coal Company (PCC) for violation of the groundwater quality standard for total dissolved solids, chloride, iron, manganese, and sulfate. I developed testimony to address PCC's affirmative defense of challenging the basis for the groundwater quality standards for these contaminants.

IN THE MATTER OF: PROPOSED AMENDMENTS TO TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (35 Ill. Adm. Code 742) (TACO), (Rulemaking). Subject: I served as the Illinois EPA witness supporting amendments TACO to include wellhead protection areas. September 2004.

MAXMIUM SETBACK ZONES FOR MARQUETTE HEIGHTS PUBLIC WATER SUPPLY (35 ILL. ADM. CODE 618), R05-09 (Rulemaking). Subject: Pursuant to request by the Village of Marquette Heights the Illinois EPA developed a maximum setback zone for the Marquette Heights community water supply wells. I served as Illinois EPA's principal witness. The proposal was adopted on May 4, 2006.

IN THE MATTER OF: STANDARDS AND REQUIREMENTS FOR POTABLE WATER WELL SURVEYS AND FOR COMMUNITY RELATIONS ACTIVITIES PERFORMED IN CONJUNCTION WITH AGENCY NOTICES OF THREATS FROM CONTAMINATION UNDER P.A. 94-134 (35 Ill. Adm. Code 1505), R06-023 (Rulemaking), JANUARY 2006. I served as an Agency panel witness to support the adoption of the RTK regulation.

IN THE MATTER OF: PROCEDURES REQUIRED BY P. A. 94-849 FOR REPORTING RELEASES OF RADIONUCLIDES AT NUCLEAR POWER PLANTS: NEW 35 Ill. Adm. Code 1010, R07-20. I served as the Agency primary witness in this proceeding.

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Illinois Groundwater Protection Act, Public Act 85-0863, September 1987. 68 pp.

Public Act 92-0132 (***MTBE Elimination Act***), July 24 2001.

Executive Order #5 - requires the ICCG to designate a subcommittee to develop an integrated groundwater and surface water resources agenda and assessment report. The report shall analyze the burden's on Illinois finite water resources, quantify Illinois' water resources, and prioritize an agenda to plan for the protection of these water resources. The Director of the Department of

Natural Resources chaired this subcommittee. The ICCG and GAC shall use the subcommittee's agenda and report to establish a water-quantity planning procedure for the State. The Governor signed executive order #5 on Earth Day April 22, 2001.

Amendments to Sections 2, 3 and 4 of the Illinois Groundwater Protection Act 415 ILCS 55/2 to establish a Groundwater and Surface Water Quantity Protection Planning Program, January 2002, 3 pp. These amendments were never adopted due to opposition from the Illinois Farm Bureau.

Public Act 92 –652 (Senate Bill 2072)- Amends the Illinois Groundwater Protection Act to require the Environmental Protection Agency to notify the Department of Public Health, unless notification is already provided, of the discovery of any volatile organic compound in excess of the Board's Groundwater Quality Standards or the Safe Drinking Water Act maximum contaminant level. The Governor signed this into law as Public Act 29-652 (effective July 25, 2002).

House Bill 4177 - Amends the Illinois Groundwater Protection Act. Provides that before property that has a well used for drinking water on it can be sold, the owner must have the well water tested for volatile organic chemical groundwater contaminants. Provides that if the well water does not meet the Illinois Pollution Control Board's Groundwater Quality Standards (35 Il Adm Code Part 620), the owner shall notify the Illinois Department of Public Health (IDPH) and the prospective buyer of the property. The realtors association July 2002 opposed House Bill 4177.

House Resolution 1010 - The resolution drafted by in cooperation with Senator Patrick Dunn' staff urge the Illinois Environmental Protection Agency to further strengthen its public outreach efforts by developing, after negotiations with individuals representing areas affected by contamination and other relevant State agencies, a procedure to notify property owners whenever the Agency has confirmed an exceedence of applicable health and safety standards, using scientifically credible data and procedures under Illinois regulations. HR 1010 was adopted by voice vote on June 1, 2004.

Public Act 94-314 (Senate Bill 0214) – This is referred to as Right-to-Know (RTK) law. The law includes providing the Illinois EPA with administrative order authority (AO), information order authority, and established the requirements for providing notices to residents or business exposed or potentially exposed to contamination. The Illinois EPA had been seeking this type of AO authority for the past 35 years. Senate Bill 0214 was unanimously passed by both the Senate and the House May 2005. The legislation was signed into law by the Governor July 27, 2005.

Public Act 94-849 (House Bill 1620) - Amends the Environmental Protection Act. Requires the owner or operator of a nuclear power plant to report to the Environmental Protection Agency any unpermitted release of a contaminant within 24 hours. The bill was sign by the Governor on June 12, 2006.

Arsenic in Illinois Groundwater

Illinois Department of Natural Resources
Illinois Department of Public Health
Illinois Environmental Protection Agency

November 20, 2001

What are the Sources of Arsenic in Illinois Groundwater?

Arsenic is a naturally occurring element in the earth's crust. Arsenic is found in the deep bedrock materials throughout Illinois, as well as in the shallow glacial materials that cover the northern two-thirds of the state. Arsenic is dissolved naturally from these materials and enters groundwater. Many other states have a similar problem.

Why is Arsenic a Concern?

Dissolved arsenic found in Illinois' groundwater is generally in inorganic form and is considered toxic. The Department of Health and Human Services lists arsenic as a known carcinogen. Ingesting inorganic arsenic over many years (chronic exposure) increases the risk of skin cancer and tumors of the bladder, kidney, liver, and lung. It has also been found to cause blood vessel damage, heart problems, darkening of the skin, and nervous system damage. Recently, the National Academy of Sciences (NAS) has reviewed the updated toxicological data base for arsenic and has determined that cancer risks from arsenic exposures are greater than previously estimated. This prompted a call to lower the drinking water standard for arsenic in order to protect human health.

About 35 percent of Illinois residents use groundwater for their water source. In addition, approximately 90 percent of rural citizens utilize groundwater from private wells for their source of water. In total, over four million Illinois residents use groundwater.

Regulation of Arsenic in Drinking Water

The national drinking water standard for arsenic has been 50 micrograms per liter (µg/L), which is 50 parts per billion. This standard was set in 1942. The World Health Organization has set a guideline of 10 µg/L. The United States Environmental Protection Agency (USEPA) recently evaluated the drinking water standard for arsenic and on October 30, 2001, USEPA recommended that the standard be lowered to 10 µg/L.

The new rule will be phased in such that compliance to the national drinking water standard for arsenic will be required by 2006 for all public water supplies. The Illinois Pollution Control Board has final say on Illinois' adoption of the national standard and typically the national regulation is quickly adopted and made law in Illinois. It is anticipated that the adoption of the national standard in Illinois will be finalized before the end of the year. At that point, the federal standard will become the law in Illinois as well. In Illinois, the IEPA and Illinois Department of Public Health (IDPH) are responsible for enforcing the standard for all

community and non-community public water supplies.

An ongoing debate centers around the high costs of removing arsenic, especially for regulated small communities and unregulated individual homes, versus the health benefits of lowering the arsenic standard.

Public Groundwater Supplies

The new national standard for arsenic, 10 µg/L, applies to all community and non-community public water supplies. Figure 1 shows the locations of community public groundwater supplies where, utilizing existing treatment, finished water will likely exceed the new standard unless additional treatment is applied. These data, based on sampling conducted by the Illinois Environmental Protection Agency (IEPA), indicate that arsenic is prevalent in groundwater in many parts of the state.

For the community water supply data included in the Illinois State Water Survey (ISWS) Water Quality Database, which are of well water samples taken prior to treatment, 2.1 percent of the samples had arsenic levels of 50 µg/L or greater, and about 11 percent were above 10 µg/L.

Communities with arsenic levels above the standard in the raw water supplies treat their water so that the finished water provided to their residents is below the standard.

How Much Arsenic Is Found In Illinois' Private Wells?

Private water supplies and wells are not regulated for the amount of arsenic present in their drinking water. Because most private water supplies are not tested for arsenic and few have available treatment to remove arsenic, the health risks to domestic well owners may be higher than for public water supplies.

In Illinois, only a few private well data are available statewide for determining the concentration of arsenic in groundwater. One exception is in Tazewell County, where the Tazewell County Health Department sampled 590 private wells for arsenic in 1985.

Groundwater is the sole source of drinking water in most of Tazewell County. There is wide variability in arsenic concentration over relatively small areas (Figure 2). Little information regarding well depth was available for evaluating these data, but additional research in Tazewell, McLean, and Logan counties by the ISWS indicated that the shallower aquifers had a greater percentage of samples with high arsenic concentrations, compared to the deeper sand and gravel aquifer. These results suggest that shallow glacial materials may contribute more to the arsenic found in groundwater than previously believed.

In Tazewell County, of the 590 samples tested, 202 (34 percent) had arsenic concentrations at or above 50 µg/L. 350 samples (59 percent) had arsenic concentrations at or above 10 µg/L. This is much greater than the percentage of arsenic concentrations in public wells, which are usually much deeper. Only 7 (4 percent) of the more than 180 community groundwater wells in Tazewell County had arsenic concentrations above 50 µg/L and about 70 (39 percent) had arsenic concentrations above 10 µg/L in their ambient water samples

That arsenic concentrations vary dramatically over a relatively short distance indicates

that local conditions dictate arsenic concentration in groundwater, and it is difficult to make regional generalizations.

Effect of a New Arsenic Rule in Illinois

For Illinois residents served by public water supplies, compliance with a new arsenic rule will reduce their exposure to arsenic in groundwater. It will also likely have economic impacts due to higher treatment costs. Illinois residents served by untreated private wells will continue to experience the same exposures and health risks as before, but because the arsenic standard will be lower, the perceived health risks may be greater. Private well water can be treated at a cost.

In Illinois, many communities remove iron and manganese from their raw water to reduce the hardness of the water. Data from the IEPA on the water quality of both raw water and finished water indicate that some communities also are lowering their arsenic levels by using these treatment methods. For example, at Monticello, the change in arsenic concentration from raw water to finished water was 53 µg/L to 10.7 µg/L. At Clinton, arsenic concentrations dropped from 36 µg/L to 18.9 µg/L.

The USEPA recently published a report outlining the available technologies and associated increased costs for removing arsenic. For large communities, the average cost per person will likely be reasonable, but for small communities, the average cost per person will likely be significant. The USEPA estimates that the average cost per person in a community with 200 people will be 10 times the average cost per person in a community with 20,000 people. IEPA has estimated a total cost of $40 million to remove arsenic below 10 µg/L for 50 community water supplies in Illinois. Figure 3 illustrates the distribution of the 50 community water supplies relative to the projected cost of reducing arsenic to less than 10 µg/L.

The rule also, for the first time, requires non-community, non-transient public water supplies (e.g., schools, small businesses, etc.) to comply with the new standard. At this time it is unknown how many of the existing 440 supplies in this category will have to install treatment. The rule requirements for monitoring, reporting, and possible additional treatment could present financial burdens on these facilities.

There are a number of options for individual well owners who are concerned about the arsenic levels in their drinking water. Reverse osmosis, ultra-filtration, and ion exchange are available technologies for removing arsenic from private well water. These treatments, especially reverse osmosis, are effective in removing arsenic, but there are installation and maintenance costs. According to USEPA, the cost of treating a private system would range

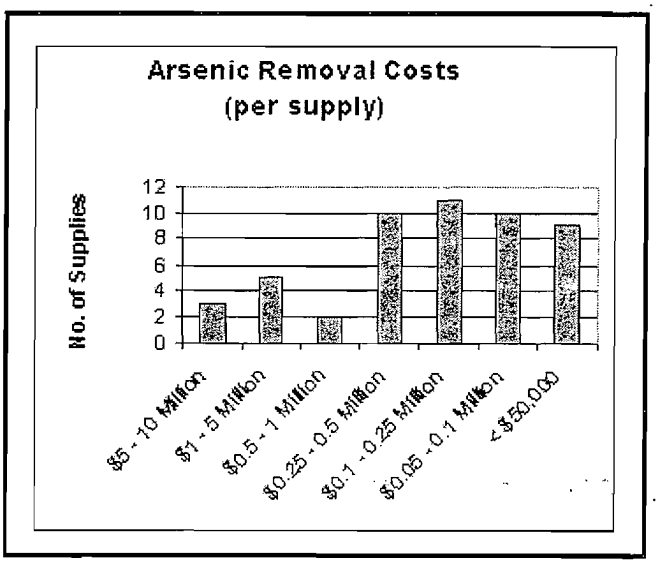

Figure 3. Projected Number and Cost of Removing Arsenic from Community Water Supply Wells in Illinois

between $400 and $3000 a year, depending on the amount of treated water and the method of treatment. Purchasing bottled water is another option.

What Activities Are Being Undertaken to Address The Arsenic Problem?

The Public Service Laboratory Program at the ISWS provides Illinois residents with water sample analyses for their private drinking water supplies (http://www.sws.uiuc.edu/chem/psl/), but arsenic is not routinely determined. The ISWS is looking into adding arsenic to the constituents evaluated in water samples. The Midwest Technology Assistance Center for Small Public Water Systems (MTAC), housed at the ISWS, is currently supporting research on arsenic treatment technologies that will lead to reduced treatment costs for the removal of arsenic in small public water systems. The ISWS is discussing with other agencies the feasibility of initiating a program to sample public, non-community wells and private wells throughout Illinois. Their goal is to characterize arsenic occurrence throughout Illinois and to identify the characteristics of the aquifers and groundwater chemistry that promote high arsenic concentrations.

The IDPH has a regulatory role for non-community public water supplies and an advisory role for private water supplies. The new rule will require, for the first time, non-community public water supplies test for arsenic. Residents with private well results can contact the IDPH Toxicology Section for a health-based assessment of the data. IDPH has a pamphlet entitled "Arsenic in Groundwater" available on the IDPH home page (http://www.idph.state.il.us) and by mail.

The IEPA is involved with various activities associated with implementing the federal Safe Drinking Water Act, the Illinois Groundwater Protection Act, and the Clean Water Act. IEPA has analyzed applicable treatment technologies and costs associated with the treatment of arsenic in community water supplies that would potentially exceed a maximum contaminant level (MCL) of 10 µg/L. Presentations have been made at seminars and meetings explaining the content of the published federal drinking water standards and possible impacts on water supplies that exceed the new standard. Water supplies that exceed the standard are required to provide Public Notice to customers of adverse health effects associated with arsenic and publish this notice in a newspaper having local circulation. All water supplies that exceed half the arsenic standard are also required to notify customers in the annual Consumer Confidence Report. IEPA has a monitoring program in place to evaluate arsenic in ambient groundwater used by community water supplies, and surface water in rivers and streams. These data from community water supply wells have been further assessed in relation to the supplies that potentially exceed an MCL of 10 µg/L, and to their existing treatment and treatment processes. The IEPA has made the arsenic data collected from community water supply wells available to the public from the Source Water Assessment and Protection Internet Geographic Information System at http://www.epa.state.il.us/water/groundwater/source-water-quality-program.html

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	R08-18
PROPOSED AMENDMENTS TO	)	(Rulemaking-Public Water Supplies)
GROUNDWATER QUALITY	)	
STANDARDS	)	
(35 Ill. Adm. Code 620)	)	
	)	

TESTIMONY OF THOMAS C. HORNSHAW

Qualifications

My name is Thomas C. Hornshaw. I am a Senior Public Service Administrator and the Manager of the Toxicity Assessment Unit of the Illinois Environmental Protection Agency (Agency). I have been employed at the Agency since August of 1985, providing expertise to the Agency in the area of environmental toxicology. Major duties of my position include development and use of procedures for toxicity and risk assessments, review of toxicology and hazard information in support of Agency programs and actions, and critical review of risk assessments submitted to the Agency for various cleanup and permitting activities.

I was a member of the Agency's Cleanup Objectives Team until February of 1993, when that Team's responsibilities were assumed mainly by the Toxicity Assessment Unit. I was also a member of the Groundwater Standards Technical Team during the development of the Groundwater Quality Standards. These two teams have looked in depth at the problems involved with determining acceptable residual concentrations of chemicals in soil and/or groundwater.

I received Bachelor of Science (with honors) and Master of Science degrees in Fisheries Biology from Michigan State University, East Lansing, Michigan. I also received a dual Doctor of Philosophy degree from Michigan State University, in Animal Science and Environmental Toxicology. I am a member of the Society of Environmental Toxicology and Chemistry and

Sigma Xi, the Scientific Research Society. I have authored or co-authored six papers published in peer-reviewed scientific journals, one report issued through the U.S. Environmental Protection Agency, and have written or co-written six articles which have appeared in trade journals. I have also presented nineteen posters and/or talks describing facets of my graduate work and my work at the Agency at various regional and national meetings. A more descriptive account of my work and educational background and a list of publications, posters, and talks are included in a Curriculum Vitae presented as Exhibit A to this testimony.

Testimonial Statement

In my testimony today I will describe how chemicals that have been detected and confirmed in groundwater were selected for addition to Part 620. I will also discuss updates needed in Part 620 to make this rule consistent with groundwater remediation objectives listed in Part 742 (TACO) for several chemicals detected in groundwater but not currently included in Part 620. Then I will briefly discuss the development of the new standards that are proposed for this update. But first I will describe changes in the hierarchy for selecting the most appropriate toxicity information for evaluating a chemical, changes that have impacted the development of groundwater standards for certain chemicals.

I. TOXICITY INFORMATION HIERARCHY

On December 5, 2003, USEPA issued a memorandum (OSWER Directive 9285.7-53) from Michael B. Cook, Director of the Office of Superfund Remediation and Technology Information, to the Superfund National Policy Managers, Regions 1-10, on Human Health Toxicity Values in Superfund Risk Assessments. This memo revised the hierarchy for selecting human health toxicity values that had been used since the issuance of the original hierarchy in the 1989 Risk Assessment Guidance for Superfund (RAGS). The RAGS hierarchy, which has

also been used by the Toxicity Assessment Unit in developing human health toxicity values, was to first use values from EPA's Integrated Risk Information System (IRIS) database, if available, or else values from the most recent Health Effects Assessment Summary Tables (HEAST). If no toxicity value was available from these sources, then values could be derived from literature sources or a request could be made to EPA's National Center for Environmental Assessment (NCEA) for provisional toxicity values.

The revised hierarchy still specifies the IRIS database as the first option for toxicity values, but now includes second and third tiers of data sources. The second tier is a recently introduced database, EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) available from NCEA. The third tier, Other Toxicity Values, includes three named sources but could also include other sources as appropriate. The three named sources are the Agency for Toxic Substances and Disease Registry's (ATSDR) Minimal Risk Levels (MRLs), developed for ATSDR risk assessments, California EPA's toxicity values, developed to support various rules and programs, and EPA's HEAST, which was last updated in 1997.

The Toxicity Assessment Unit has adopted this hierarchy, with some minor revisions, as the basis for determining the toxicity values for its activities. As we began using the new hierarchy, we became aware of some minor issues that ultimately lead to certain revisions of the hierarchy. To keep this portion of my testimony brief, I will illustrate three issues that resulted in a minor revision:

- PPRTVs are retired by EPA after a certain period of time, leading us to question what should be the role of retired values; we ultimately decided to continue using them instead of going to tier three.

- EPA does not provide guidance on which value to use if more than one value is available from the three named sources in tier three; we ultimately decided to use the lowest of the tier three values available in such cases.
- IRIS does not contain values for subchronic exposures, only values for chronic exposures, so there is essentially no first tier for shorter-duration exposures; however, some chronic IRIS values use an Uncertainty Factor to extrapolate to chronic exposures from a study of subchronic duration, and we have used the IRIS value with this Uncertainty Factor removed as the first tier when available.

The Toxicity Assessment Unit has used this new hierarchy to re-evaluate the soil and groundwater objectives for all the chemicals currently included in Part 742 (TACO), other than those groundwater objectives that are based on a Maximum Contaminant Level from the Safe Drinking Water Act (which would require a change at the federal level). Changes needed in TACO because of this new hierarchy will be included when the Agency's next revision to TACO is proposed to the Board, and these changed values for groundwater are also included in the list of chemicals we are proposing to be added to Part 620 to make it consistent with TACO, as discussed below. We have also used this hierarchy to derive the proposed standards for the newly detected chemicals that must be added to Part 620, also discussed below. Finally, as Mr. Cobb has testified, the Agency has determined that no groundwater standard or objective should exceed the water solubility for a chemical, and the one-in-a-million risk concentration for a carcinogen should be considered along with the chemical's analytical detection limit to derive the most appropriate groundwater objective. These factors have been included in the development of the Agency's proposal for updating Part 620.

II. ADDING NEWLY DETECTED CHEMICALS

In preparation for updating Part 620, the Agency's Bureau of Land reviewed analytical results from many remediation activities to determine what chemicals had been detected in groundwater and confirmed by resampling. The master list from this review, consisting of chemicals detected primarily at Resource Conservation and Recovery Act (RCRA), solid waste disposal, and Department of Defense and Superfund sites, was then reviewed by the Toxicity Assessment Unit to determine which of the chemicals had sufficient toxicity values to support the development of a new groundwater standard. After this review, the Toxicity Assessment Unit decided that, in addition to those chemicals already included in TACO, any chemical on the master list for which a toxicity value was available in the IRIS database would be an appropriate candidate for inclusion in the Part 620 update. Thus, in addition to the TACO chemicals discussed below, the following chemicals were added to the proposed update: 2-Butanone (Methyl ethyl ketone, MEK), Dicamba, Dichlorodifluoromethane, p-Dioxane, 1,3-Dinitrobenzene, the explosive HMX, Isopropylbenzene (Cumene), Mecoprop (MCPP), 2-Methylnaphthalene, Molybdenum, Perchlorate, the explosive RDX, Trichlorofluoromethane, 1,3,5-Trinitrobenzene, and 2,4,6-Trinitrotoluene (TNT).

III. ADDING GROUNDWATER OBJECTIVES FROM TACO

In this proposed update to Part 620 the Agency determined that it is now necessary that chemicals that have Groundwater Remediation Objectives in TACO Part 742.Appendix B, Table E, are not included in Sections 620.410 and 620.420, and have been detected and confirmed in groundwater should be added to Sections 620.410 and 620.420, so that these two rules are consistent. Thus, after all the TACO Groundwater Remediation Objectives were updated

according to the new toxicity value hierarchy as described above and compared to solubility limits and one-in-a-million cancer risk concentrations (for carcinogens), the following chemicals not included in Part 620 were added to this proposed update: Acenaphthene, Acetone, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzoic acid, alpha-BHC, Carbon disulfide, Chloroform, Chrysene, Dibenzo(a,h)anthracene, Di-n-butyl phthalate, Diethyl phthalate, 2,4- and 2,6-Dinitrotoluene, Di-n-octyl phthalate, Fluoranthene, Fluorene, Indeno(1,2,3-c,d)pyrene, 2-Methylphenol, Naphthalene, Nitrobenzene, Pyrene, and Vanadium.

IV. DERIVING THE NEW STANDARDS

In order to accommodate the changes regarding the one-in-a-million cancer risk concentration for carcinogens and solubility limits for all chemicals, it was necessary to change the wording of Part 620. Subpart F. Specifically, changes were needed in Section 620.605, as follows:

- In Section 620.605(b)(1), insert at the beginning "Except as specified in Section 620.605(c), if..." (no changes to the rest of this section).
- Amend Section 620.605(b)(2) to read "Except as specified in Section 620.605(c), if the chemical substance is a carcinogen, the guidance level for any such chemical substance is the one-in-one-million cancer risk concentration, unless the concentration for such substance is less than the lowest appropriate PQL specified in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," EPA Publication No. SW-846, incorporated by reference at Section 620.125 for such substance. If the concentration for such substance is less than the lowest appropriate PQL for the substance specified in SW-

846, the guidance level is the lowest appropriate PQL. The one-in-one-million cancer risk concentration, the Human Nonthreshold Toxicant Advisory Concentration (HNTAC), shall be determined according to the following equation:" The equation then follows the text in the proposed amendment.

- Add a new Section 620.605(c), "If the guidance level determined for a chemical pursuant to Section 620.605(a) or (b) exceeds the water solubility of that chemical, the guidance level shall be the water solubility."

The new hierarchy for toxicity values was used to identify the most appropriate values for the chemicals to be added, and the procedures of Part 620. Subpart F (including the new sections described above), were used to derive the standards that are being proposed. Please note that all proposed values now contain two significant figures, to be consistent with a Toxicity Assessment Unit policy decision that specifies two significant figures be used for all new and updated standards and objectives.

V. TESTIMONY REGARDING ERRATA SHEET 2

In Errata Sheet Number 2 the Agency proposes to make changes to its initial filing regarding certain chemicals listed in Sections 620.410(b) and 620.420(b). Additional corrections are necessary for several reasons. First, selection criteria for groundwater standards have been revised and now require a comparison of each carcinogenic constituent's health-based concentration (the 10^{-6} risk level) with its corresponding analytical method detection limit. The greater of these values is then compared to the constituent's reported water solubility. The lower of these two values then becomes the standard. Second, source information used by the Agency concerning chemical/physical properties was recently updated and has subsequently been incorporated into the Agency's database. Finally, crucial sources for toxicological values that

form the bases for health-based standards have been updated and expanded necessitating subsequent updates to the Agency database.

A brief explanation of the reason for each of the changes follows:

Section 620.410(b):

- Anthracene- The solubility-based standard is corrected to two significant figures.
- Benzo(k)fluoranthene- For this carcinogen, the standard is corrected to the detection limit of 0.00017 mg/L since it does not exceed the water solubility value of 0.0008 mg/L.
- Chrysene- The 10^{-6} risk level of 0.012 mg/L would be the standard because it is greater than the detection limit of 0.0016 mg/L; however, the standard is corrected to the chemical water solubility of 0.0063 mg/L, which should not be exceeded.
- 1,1-Dichloroethane- The standard is corrected to reflect a revised toxicological reference dose value.
- Fluoranthene- The solubility-based standard is corrected to two significant figures.
- Indeno(1,2,3-cd)pyrene- The standard is corrected to the chemical's water solubility, which should not be exceeded.
- 2-Methylnaphthalene- The standard is revised to correct a typographical error.
- P-Dioxane- The standard is corrected to the 10^{-6} cancer risk concentration of 0.0077 mg/L because it is greater than the detection limit of 0.005 mg/L.
- Pyrene- The standard is corrected to the health-based value of 0.21 mg/L following an increase in pyrene's reported water solubility concentration.
- 2,4-Dinitrotoluene- The standard is corrected to the 10^{-6} cancer risk level of 0.0001 mg/L because it is greater than the originally proposed detection limit of 0.00002 mg/L.

Section 620.420(b):

- Anthracene- The solubility-based standard is corrected to two significant figures.
- Benzo(a)pyrene- The solubility-based standard is corrected to two significant figures.
- Chrysene- The 10^{-6} risk level of 0.012 mg/L would be the standard because it is greater than the detection limit of 0.0016 mg/L; however, the standard is corrected to the chemical water solubility of 0.0063 mg/L, which should not be exceeded.

- 1,1-Dichloroethane- The standard is corrected to reflect a revised toxicological reference dose value.
- Fluoranthene- The solubility-based standard is corrected to two significant figures.
- Indeno(1,2,3-cd)pyrene- The standard is corrected to the chemical's water solubility, which should not be exceeded.
- p-Dioxane- The standard is corrected to the 10^{-6} cancer risk concentration of 0.0077 mg/L because it is greater than the detection limit of 0.005 mg/L.
- Pyrene- The standard is corrected to the health-based value of 1.05 mg/L following an increase in pyrene's reported water solubility concentration.
- 2,4-Dinitrotoluene- The standard is corrected to the 10^{-6} cancer risk level of 0.0001 mg/L because it is greater than the originally proposed detection limit of 0.00002 mg/L.

Concluding Statement

This concludes my portion of the Agency's testimony for the proposed amendments to Part 620.

STATE OF ILLINOIS)
)
COUNTY OF SANGAMON)

PROOF OF SERVICE

I, the undersigned, on oath state that I have served the attached Errata Sheet Number 2 and Pre-filed testimony of Richard P. Cobb and Thomas Hornshaw upon the person to whom it is directed, by placing a copy in an envelope addressed to:

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and mailing it from Springfield, Illinois on May 28, 2008 with sufficient postage affixed.

Kimberly A. Geving

SUBSCRIBED AND SWORN TO BEFORE ME

This 28th day of May, 2008.

Brenda Boehner
Notary Public

OFFICIAL SEAL
BRENDA BOEHNER
NOTARY PUBLIC, STATE OF ILLINOIS
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