BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	R09-9
PROPOSED AMENDMENTS TO	)	(Rulemaking-Land)
TIERED APPROACH TO CORRECTIVE	)	
ACTION OBJECTIVES	)	
(35 Ill. Adm. Code 742)	)	
	)	

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NOTICE

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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 ("Illinois EPA") Pre-First Notice Comments a copy of each of which is herewith served upon you.

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: _____
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DATE: May 27, 2009

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF: PROPOSED AMENDMENTS TO TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (35 Ill. Adm. Code 742)	)))))))	R09-9 (Rulemaking-Land)

ILLINOIS EPA'S PRE-FIRST NOTICE COMMENTS

NOW COMES the Illinois Environmental Protection Agency ("Illinois EPA"), by one of its attorneys, Kimberly A. Geving, and pursuant to 35 Ill. Adm. Code 102.108, respectfully submits these PRE-FIRST NOTICE COMMENTS in the above-captioned matter to the Illinois Pollution Control Board ("Board").

It is the Illinois EPA's contention that the proposed amendments filed in this matter with the Board on September 2, 2008, and the corresponding Errata Sheets 1 through 4 filed subsequent to the initial proposal, constitute technically feasible, economically reasonable, and well-supported amendments to Part 742. The Illinois EPA believes that the Board should adopt the proposed amendments in their entirety as submitted by the Illinois EPA, including changes proposed in Errata Sheets 1 through 4.

A. Background

On September 2, 2008, the Illinois EPA filed its proposed amendments in the above-captioned matter to incorporate changes to the rules that are designed to improve and update particular aspects of the Tiered Approach to Corrective Action Objectives ("TACO") methodology, including adding a new pathway to address indoor inhalation concerns. Since the last amendments in 2005 (adopted in February 2007), changes in scientific information at the national level have made it necessary to update various provisions of Part 742. Over the last

few years, the Illinois EPA has been compiling changes to remediation objectives that stemmed from changes at the national level as well as developing a methodology to address the indoor inhalation exposure route.

As is typically the case when the Illinois EPA proposes amendments to its rules, we had several outreach meetings with the regulated community during the development of the proposed amendments. Overall, the Illinois EPA believes that the vast majority of the regulated community's comments and concerns were incorporated into the proposed amendments that the Board received last September and were further refined through the four Errata Sheets filed with the Board during the regulatory process. The Illinois EPA realizes that its proposal cannot satisfy 100% of the members of the regulated community, but we believe that the proposed amendments are scientifically sound and serve the public by protecting human health and the environment.

B. Issues of Concern at Hearing

The Illinois EPA believes that there were a number of issues raised at hearing that merit discussion in these comments, including fixing a few errors in the errata sheets.

1. The Illinois EPA noticed an error in Errata Sheet Number 1 regarding Section 742.410(b). We inadvertently did not strike enough text in that subsection. Subsection 742.410(b)(2) should also have been stricken.
2. In Errata Sheet Number 4 at the bottom of page 1, the chemical to be updated should have been 1,2-Dichloroethane (Ethylene dichloride), not 1,2-Dichloroethylene. The ingestion column changes from 7^{e} to 7.0^{e}.

3. Also in Errata Sheet Number 4, there is an error in Appendix B, Table A for the value 1,1-Dichloroethane. The Class I value should have had a footnote "r" in the Errata Sheet rather than a footnote "e".

4. In Errata Sheet Number 4, Appendix B, Table C, we should have changed a footnote for the Lead pH range of 8.75 to 9.0. The footnote should have been a "c" rather than a "b". (Note: the Hearing Officer requested that the Illinois EPA provide, along with its Pre-First Notice Comments to the Board, a copy of the rules on disk that incorporates all four Errata Sheet changes into the rules. These corrections have been incorporated into that disk).

5. The proposed Class II Groundwater Standard for MCPP (Mecoprop) in 35 Ill. Adm. Code 620 was revised in Errata Sheet Number 4 of docket R08-18. Inadvertently, that change was not made in Docket R09-9; therefore, the proposed amendments need to reflect the correct Class II Groundwater Standard. The revisions are as follows: In appendix B, Tables A and B, change the Values for the Soil Component of the Groundwater Ingestion Exposure Route for Class II to 0.033[i] mg/kg. This is the same as the Class I value. For Appendix B, Table D, the entire row for MCPP should be changed to read as follows:

Chemical (totals) (mg/kg)	pH 4.5 to 4.74	pH 4.75 to 5.24	pH 5.25 to 5.74	pH 5.75 to 6.24	pH 6.25 to 6.64	pH 6.65 to 6.89	pH 6.9 to 7.24	pH 7.25 to 7.74	pH 7.75 to 8.24	pH 8.25 to 8.74	pH 8.75 to 9.0
MCPP (Mecoprop)	0.046	0.037	0.034	0.034	0.033	0.033	0.033	0.033	0.033	0.033	0.033

Finally, in Appendix B, Tables E and F, change the Class II value to 0.007^{c} (which would be the same as the Class I value). **NOTE to the Board**: these changes are NOT reflected in the copy of the rules or on the CD submitted to the Board with these comments since we did not formally make these changes in an Errata Sheet to this rulemaking. If the Board chooses to accept these changes, they will need to be added to the rules.

6. At the second hearing, on pages 23-24 of the transcript from the morning (I will reference the morning transcript as TR1 and the afternoon transcript as TR2)(TR1 at 24), Mr. Davis asked Ms. Hurley a few questions regarding the source that the Illinois EPA uses to update the toxicity data. At the time of hearing, Ms. Hurley was not certain if the source was actually listed on the Illinois EPA's website or not. The Hearing Officer asked us if we could clarify that in our public comment. The answer is yes; the source is listed on the toxicity tables on the Illinois EPA's website.

7. At the second hearing on page 34 of the transcript (TR1 at 34), the Board asked the Illinois EPA whether it thought there would be a significant cost impact if a party chooses to go to Tier 3. Attached as Exhibit 1 to these Comments we have included a document prepared by our expert witness, Atul Salhotra, which outlines costs that were incurred at four different sites. The purpose of these case studies is to attempt to give the Board an illustration of what types of costs may be encountered as a result of adding the indoor inhalation exposure route. The Illinois EPA contends that the public policy argument for adding this exposure route far outweighs any additional costs that may be incurred as a result of its addition to the regulations.

8. At the second hearing on pages 35-36 of the transcript (TR1 at 35-36), Mr. Rao asked Mr. King questions about the J&E parameters in Appendix C, Table M for the width, height, and length of the building. Mr. King stated that we would look at that and make any necessary change. In order to address the site-specific question, we should have added the following language under the "Tier 1 or Calculated Value" column for these parameters:

   H_B Under both Slab on Grade and Basement add " in Tier 3" after "Site-Specific". L_B add " in Tier 3" after "Site-Specific". Q_{bldg} Under both Slab on Grade and Basement add " in Tier 3" after "Site-Specific". W_B add " in Tier 3" after "Site-Specific". Please note that we have addressed this issue and included it in the revised version of the rules that are being submitted on CD to the Board along with these Comments.

9. At the second hearing on pages 46-49 (TR1 at 46-49), Mr. Elliott asked a series of questions regarding why one cannot alter the size of the building under a Tier 2 evaluation and why that must be addressed in Tier 3. The Illinois EPA feels that this issue was adequately addressed at hearing. However, we would like to reiterate that we believe that if one is going to look at building size, that is a very site-specific issue that should be addressed under a Tier 3 evaluation where all factors that are highly site-specific get addressed. If one were to alter the building size, which changes the assumptions of the J&E model, the NFR Letter would need to restrict current and future building sizes. This diminishes the usefulness of the liability release and makes it inappropriate for widespread use under Tier 2.

10. At the second hearing on page 69 (TR1 at 69), Mr. Reott made the statement that : "Most of Illinois has a groundwater ordinance at this point." His statement was apparently

made to support his argument that the Agency's changes are too conservative and would "drive people into cleaning up groundwater in much of Illinois, and would force them to address issues because of the tenfold change in clean-up standards that would be otherwise not dealt with in the current scenarios that are out there." (TR1 at 70). The Illinois EPA wishes to rebut Mr. Reott's argument that most of the State has a groundwater ordinance. In fact, as of April 2009, according to the Secretary of State's website, there are 1,209 incorporated areas in the State of Illinois. Of those, approximately 139 towns and cities in Illinois have an approved citywide ordinance for purposes of an acceptable institutional control under TACO. An additional 61 towns or cities have only an approved limited area ordinance under TACO. Of those 61 towns and cities with approved limited area ordinances, 39 have only 1 area of the town covered; 10 have 2 areas covered; 5 have 3 areas covered; 1 has 4 areas covered; 3 have 5 areas covered; 2 have 7 areas covered; and 1 has 9 areas covered. This in no way comes close to "most of Illinois" being covered by a groundwater ordinance. Therefore, the Illinois EPA contends that its proposal to address this medium for purposes of the indoor inhalation exposure route is a critical element of the proposal.

11. At the second hearing, Mr. Reott raised a concern about the application of the Johnson & Ettinger model in the Underground Storage Tank ("UST") program (TR1 at 73-74) because USEPA does not apply the model to UST sites. USEPA states in its User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings that the model is not recommended for use at UST sites. USEPA further explains that the model does not account for contaminant attenuation (which includes biodegradation). However, in the Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from

Groundwater and Soils, USEPA has developed screening levels for benzene, ethyl benzene, toluene, and xylene ("BETX"). These contaminants are commonly found at UST sites as well as at other sites. USEPA seems to be contradicting itself because there is no information to suggest that these contaminants will behave differently at UST sites than at other sites. Therefore, Illinois EPA does not see the logic in treating these contaminants differently because they originated at UST sites. TACO currently has remediation objectives for ingestion, outdoor inhalation, and migration to groundwater for the BETX contaminants and does not differentiate between the origins of the contamination. Illinois EPA recognizes that petroleum contaminants will degrade over time. However, at this time, there is no generally acceptable quantitative attenuation factor available. If an attenuation factor does become available, it can be incorporated into TACO. Until then, attenuation of petroleum contaminants can be considered under Tier 3. Additionally, if after several years, it is found that the contaminants have attenuated and are no longer an issue, then the context of the NFR letter can be revised (Gary King testimony, TR1 at 28-29).

12. At the second hearing, Mr. Reott (TR1 at 79) and Mr. Pokorny (TR2 at 5-9) raised the issue of indoor air sampling. From their testimony, it appears that both Mr. Reott and Mr. Pokorny believe that TACO should allow for the use of indoor air samples as a measure of compliance in Tier 1. Illinois EPA believes that indoor air sampling should be a Tier 3 issue because indoor air sampling is problematic for several reasons. (The equations for calculating indoor air remediation objectives are provided as J&E1 and J&E2 in Appendix C, Table L, if someone chooses to perform an indoor air quality assessment.)

Indoor air sampling data should not be used alone. It should be used in conjunction with soil gas, soil, and groundwater sampling data. As Mr. Pokorny states in his pre-filed testimony, Minnesota and California do have indoor air remediation objectives. But Minnesota and California recommend that the subsurface be characterized first. Indoor air sampling, if necessary, is the last step.

Indoor air sample results that are greater than the calculated remediation objectives do not necessarily indicate a subsurface source. Indoor air results can be influenced by several factors including occupant smoking, use of aerosol consumer products, attached garages, ambient air, and the building materials themselves. There is a potential for false positives where the indoor air sample results are greater than the calculated remediation objectives but the soil, soil gas, and groundwater sample results are all less than the remediation objectives.

Indoor air sampling is neither simple nor non-intrusive. Because of the potential for indoor sources of contamination, many guidelines recommend that an indoor survey to identify potential sources be performed prior to indoor air sampling so that any identified indoor sources can be removed, if possible, before indoor air sampling is done. The Massachusetts Department of Environmental Protection has developed a thorough Indoor Air Quality Building Survey and Instructions for Residents of Homes Being Sampled. The survey and instructions are attached as Exhibit 2 to these Comments and the link to the website that contains the survey and instructions is: http://www.mass.gov/dep/cleanup/laws/02-430.pdf. (Minnesota also uses surveys).

Indoor air samples are typically collected with all the windows and vents closed. This may not be practical in industrial/commercial buildings or homes in hot summer

months. Indoor air sampling may also require at least three visits to the building. The first is to conduct the pre-sampling survey; the second is for installing the sampling equipment; and the third is for the equipment retrieval. Usually two separate sampling events are recommended: one in late summer/early fall and one in late winter/early spring.

Illinois EPA intends for the entire site to be safe for current and future building occupants. If soil gas or soil and groundwater sample results are greater than the remediation objectives and indoor air sample results are less than the calculated remediation objectives, the potential exists that contaminants may enter the building. There is no guarantee that the building will not develop cracks and leaks in the future.

TACO does not evaluate the safety or protectiveness of buildings on or off-site. In other words, TACO does not take into account health risks posed by indoor exposure to asbestos, lead-based paint or deteriorating structures. It will also not take into account health risks posed by the indoor inhalation of contaminants originating from within the building (for example, from consumer products used in the building or from building materials).

13. At the second hearing, Hearing Officer McGill requested that the Illinois EPA include in its comments information regarding what some of the other states are doing (TR1 at 85-86). Additionally, Mr. Rao asked us to provide information regarding how other states deal with indoor air screening levels (TR1 at 88-89). In response to these two requests for information, the Illinois EPA has had its expert, Atul Salhotra, compile a comparative evaluation that discusses what several other states do. That evaluation is attached as Exhibit 3 to these Comments.

14. Finally, as part of the Board's request for the information, Hearing Officer McGill also asked the Illinois EPA to discuss why we think our proposal is better than what is occurring in other states. In response, the Illinois EPA contends that our proposal better suits Illinois for the following reasons:

    a. Our proposal is designed to work within the context of TACO and the regulatory cleanup programs that rely on TACO. The proposal uses many of the same assumptions and controls that are already in place and functioning well. By fully integrating the indoor inhalation pathway into TACO, we're benefitting from economies of scale as well as retaining the flexibility and input from site owners that has made Part 742 such a successful regulation.

    b. The proposal allows soil and groundwater data, collected as part of routine site assessment work, to be used to determine compliance with the indoor inhalation exposure route. It allows exterior soil gas data to determine compliance in all Tiers, and sub-slab soil gas data under Tier 3. This ability to use multiple lines of evidence--specifically exterior soil gas to complement existing soil and groundwater data—increases site evaluation options and can lead to more precise remedial work.

    c. The proposal discourages the use of indoor air data (allowed in Tier 3) for reasons stated earlier in these Comments.

    d. The proposal uses a modified J&E model that calculates a chemical-specific and geotechnical-specific attenuation factor rather than relying on a default value applied uniformly to every site.

    e. As a pathway exclusion option, the proposal provides for building control technologies and gives specific design and implementation requirements.

C. CONCLUSION

In conclusion, the Illinois EPA believes that its position on matters raised in this proceeding is well established by the testimony of its witnesses. Additionally, the Illinois EPA has attempted in these Pre-First Notice Comments to further clarify and support its position on those issues raised at hearing.

WHEREFORE, the Illinois EPA submits its Pre-First Notice Comments, including the three exhibits, for the Board's consideration and respectfully requests that the Board accept the proposal in its entirety for First Notice.

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

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

Dated: May 27, 2009

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EXHIBIT

1

Costs Associated with Soil Vapor Investigations
Illinois Environmental Protection Agency

The costs of performing soil vapor investigations at a site can vary considerably depending on the situation. Several cases are possible:

1. Soil and groundwater investigations have already been performed. Soil vapor investigations are subsequently performed to evaluate the indoor inhalation pathway because soil and groundwater concentrations exceeded ROs or in response to other issues, e.g. third party litigation.
2. Soil, groundwater, geotechnical, and soil vapor investigations are being performed concurrently.
3. Permanent soil vapor wells vs. one-time sampling event without installing soil vapor wells.
4. Resampling of existing soil vapor monitoring wells.
5. The specific regulatory program, drivers (litigation, property development, real estate transaction, citizen odor complaint), etc may also affect costs.

Specifically, for soil vapor sampling, the following can vary significantly from site to site and based on client requirements:

1. Planning, develop site specific health and safety plan, utilities clearance, etc.,
2. Daily onsite safety meetings during field activities,
3. Hand auguring or air knifing to identify buried utilities,
4. Drilling,
5. Soil vapor well installations,
6. Soil vapor sampling,
7. Building surveys, and
8. Data compilation, evaluation, and reporting results (the number of reports can be numerous in some cases).

The following are some example case studies:

Site 1

This investigation involved a one-time soil vapor sampling event to evaluate the vapor intrusion risks at three residential properties due to migration of impacted groundwater with volatile chemicals from an adjacent source. The driver for this site was potential litigation and high-profile publicity.

The field work required one day to complete. The scope of work included the use of a Geoprobe 550B track-mounted rig using post-run tubing (PRT) to obtain soil vapor samples and one duplicate from depths up to 6 ft below ground surface (bgs). The borings were located in the lawn along the perimeter of each home. Additionally, one ambient air sample outside one of the three homes was collected. Difluoroethane was

used as the leak detection compound for the soil vapor sampling. A basement survey was performed in two of the three homes.

The soil vapor and ambient air samples were analyzed in the laboratory for volatile chemicals. No soil vapor monitoring wells were installed and no soil, groundwater, or geotechnical samples were obtained. The evaluation consisted of compilation of all data, comparison to IEPA TACO Tier 1 soil gas ROs, estimation of vapor intrusion risks to residents and day-care employees and children (at one residence), and review by an Illinois PE.

The report distribution requirements included 10 bound copies and one electronic copy on disk consisting of 181 pages per report (text, tables, figures, and appendicies). Also, individual summary letter reports for each home were prepared and distributed to the home owners, regulatory agencies, and other parties. The costs associated with this investigation are summarized on Table 1.

Site 2

This investigation involved the long-term (seasonal) evaluation of vapor intrusion risks at three homes due to migration of impacted groundwater with volatile chemicals from an upgradient adjacent source. The driver for this site was alleged orders.

Five sampling events were performed over a 1-year period. The investigation included two soil vapor monitoring well locations per home (total of 6 locations) up to depths of 10 ft bgs; two of the well locations were completed at two depths of 5 ft and 10 ft bgs (total of 8 well sampling points); and each well was sampled quarterly over a one year period. During a few quarters, soil gas samples could not be collected due to well screens occluded with water. Helium was used as the leak detector for the soil gas sampling.

The following differences in scope by quarter affected the costs:

a) 1st Qtr – installation of wells and sampling
b) 2nd Qtr – sampling
c) 3rd Qtr – sampling
d) 4th Qtr - sampling
e) 5th Qtr – sampling and abandonment of wells

The soil vapor evaluation consisted of compilation of all data, estimation of indoor air concentrations from soil vapor concentrations using conservative attenuation factors. Comparison of estimated indoor air concentrations to (i) Tier 1 risk based target levels, (ii) indoor air background concentrations, and (iii) ambient air concentrations.

The final summary report consisted of 94 pages including text, 15 tables, 4 figures, and 3 appendices. Also, individual summary letter reports were prepared for each of

the 3 residences for distribution to the homeowner, regulatory agencies, and client after each of the five quarterly sampling events. The costs associated with this investigation are presented in Table 2.

Site 3

This investigation involved the installation of permanent soil vapor monitoring wells up to 6 ft bgs primarily in concrete, asphalt, and gravel pavement (one in grass) along the perimeter of a commercial building in a mixed commercial and residential area. The objective was to evaluate the vapor intrusion risks to employees and visitors/customers due to migration of impacted groundwater with volatile chemicals from a former onsite and adjacent source. The driver for this site was proactive voluntary action by the responsible party.

The field work required four days to complete. A Geoprobe 5400 rig mounted on a Ford F450 4-wheel drive truck was used for boring advancement and soil sampling. The soil vapor monitoring wells consisted of 6-inch stainless steel mesh implants, Teflon tubing, glass beads pack, and flush-mounted manways. The scope of work included the sampling for laboratory analysis of soil for geotechnical parameters and soil vapor including one duplicate and ambient air for volatile chemicals. Difluoroethane was used as the leak detection compound for soil vapor sampling. A building survey was performed.

Soil analytical data obtained by others was also included in the evaluation and documentation. The evaluation consisted of compilation of all data; comparison to IEPA TACO Tier 1 soil gas ROs; and estimation of vapor intrusion risks to employees and visitors/customers.

The report distribution included 8 bound copies and one electronic copy on disk consisting of 190 pages per report including text, 6 tables, 3 figures, and 10 appendices. The costs associated with this investigation are summarized on Table 3.

Site 4

This investigation involved the installation of permanent soil vapor monitoring wells up to 7 ft bgs in concrete and asphalt pavement along the perimeter of a commercial building in a commercial area. The objective was to evaluate the vapor intrusion risks to employees and visitors/customers due to migration of vapors from impacted soil and groundwater with volatile chemicals from a former onsite source. The driver for this site was proactive voluntary action.

The field work required three days to complete. A Geoprobe 550B track-mounted rig was used for boring advancement and soil sampling. The soil vapor monitoring wells consisted of 6-inch stainless steel mesh implants, Teflon tubing, glass beads pack, and flush-mounted manways. The scope of work included the sampling for laboratory analysis of soil for geotechnical parameters and soil and soil vapors for volatile

chemicals including two duplicate samples. Difluoroethane was used as the leak detection compound for the soil vapor sampling. A building survey was performed.

Groundwater sample data collected by others (cost not included) was also used in the evaluation. The evaluation consisted of compilation of all data; comparison to IEPA TACO Tier 1 soil gas ROs; estimation of soil vapor concentrations from soil and groundwater data; comparison of calculated and measured soil vapor samples; and estimation of vapor intrusion risks to employees and visitors/customers.

The report distribution included 10 bound copies and one electronic copy on disk consisting of 274 pages per report including text, 13 tables, 4 figures, and 14 appendices. The costs associated with this investigation are summarized on Table 4.

Attachments: Tables

Table for Site 1

Task	Cost	Comments
Planning, project management, and report preparation	$15,584	labor, copying, IL PE review, drafting, FedEx, submittal of draft and final reports
Field labor	$2,977	1 professional for 1 day
Field supplies/equip	$303	equipment rental, supplies
Drilling, sampling, and well installation	$2,111	1 driller, sampled soil vapor from 8 borings using Geoprobe PRT methods
Laboratory analysis of samples	$2,066	9 soil vapor and 1 ambient air for modified TO-15 plus naphthalene and difluoroethane
Local travel exp	$569	meals, car rental & gasoline, lodging
Total	**$23,609**	

Notes:
does not include transportation & disposal of investigation derived wastes (IDW)

Table for Site 2

Soil Probe Installation

Task	Cost	Comments
Planning, project management, and report preparation	$2,500	
Field labor	$4,500	
Drilling, sampling, and well installation	$5,100	8 soil vapor wells
Laboratory analysis of samples	$1,125	Geotech and environmental laboratory analysis
Local travel exp	$500	
Total	**$13,725**	

Soil Vapor Sampling Quarterly

Task	Cost	Comments
Planning, project management, and report preparation	$2,500	
Field labor	$2,400	
Field supplies & sample shipment	$1,000	
Laboratory analysis of samples	$4,200	
Local travel exp	$500	
Total per Quarter	$10,600	
Total for 5 Quarters	**$53,000**	

Soil Vapor Probe Abandonment

Task	Cost	Comments
Field labor	$1,500	
Field supplies	$250	
Local travel exp	$500	
Total	**$2,250**	

Soil Vapor Data Analysis and Risk Evaluation

Task	Cost	Comments
Planning, project management, and report preparation	$20,691	15 individual residence reports (1 per residence per 5 sampling events per 3 residences), 1 summary report, drafts & final
Total	**$20,691**	

Project Total **$89,666**

Table for Site 3

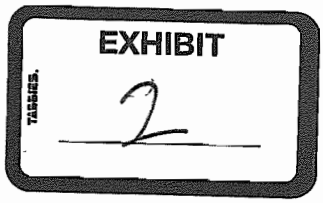
Task	Cost	Comments
Planning, project management, and report preparation	$10,395	labor, copying, IL PE review, drafting, submittal of draft and final reports
Field labor	$5,377	1 professional for 4 days
Field supplies/equip	$904	equipment rental, supplies, FedEx lab samples
Drilling, sampling, and well installation	$3,598	1 driller, 10 borings, 10 soil vapor wells, 1 soil samples for geotechnical
Laboratory analysis of samples	$3,101	11 soil vapor and one ambient air for modified TO-15 including BTEX, styrene, naphthalene, and difluoroethane, 1 geotechnical for grain size, foc, spec. gravity, moisture, bulk density, and total porosity
Local travel exp	$701	meals, car rental & gasoline, lodging
Total	**$24,076**	

Notes:
does not include transportation & disposal of investigation derived wastes (IDW)

Table for Site 4

Task	Cost	Comments
Planning, project management, and report preparation	$20,895	labor, copying, IL PE review, drafting, FedEx, submittal of draft and final reports
Field labor	$3,239	1 professional
Field supplies/equip	$1,534	equipment rental, supplies, FedEx lab samples
Drilling, sampling, and well installation	$3,526	1 driller, 8 borings, 8 soil vapor wells, 6 soil samples for analytical, 4 soil samples for geotechnical
Laboratory analysis of samples	$3,216	8 soil vapor for modified TO-15 plus naphthalene and difluoroethane, 8 soil for VOCs 8260, 4 geotechnical for grain size, foc, spec. gravity, moisture, bulk density, and total porosity
Local travel exp	$735	meals, car rental & gasoline, lodging
Total	**$33,144**	

Notes:
does not include transportation & disposal of investigation derived wastes (IDW)



APPENDIX 2

(a) Indoor Air Quality Building Survey
and
(b) Instructions for Residents of Homes to Be Sampled

INDOOR AIR QUALITY BUILDING SURVEY

Date: _____ **ID#:** _____
Address: _____
_____
_____

Residential Contact: _____
Phone: **home: ( )** _____ **work: ( )** _____

List of Current Occupants/Occupation:

AGE (IF UNDER 18)	SEX (M/F)	OCCUPATION

Building Construction Characteristics:

What type of building do you have? (Circle appropriate response)

Single Family Multiple Family School Commercial

Ranch
Raised Ranch
Cape
Colonial
Split Level
Colonial
Mobile Home
Other (specify) _____

2-Family
Duplex
Apartment House
# of units ____
Condominium
# of units ____
Other (specify) _____

General Description of Building Construction Materials: _____
_____

How many occupied stories does the building have? _____

Has the building been weatherized with any of the following? (Circle all that apply)
Insulation Storm Windows Energy-Efficient Windows Other (specify) _____

What type of basement does the building have? (Circle all that apply)
Full basement Crawlspace Slab-on-Grade Other (specify) _____

What are the characteristics of the basement? (Circle all that apply)

Finished	Basement Floor:	Foundation Walls:	Moisture:
Unfinished	Concrete	Poured Concrete	Wet
	Dirt	Block	Damp
	Other (specify) _____	Layed Up Stone	Dry

Is a basement sump present? (Y/N) ____
Does the basement have any of the following characteristics (i.e., preferential pathways into the building) that might permit soil vapor entry? (Circle all that apply)

Cracks Pipes/Utility Conduits Other (specify) _____
Foundation/slab drainage Sump pumps

Heating and Ventilation System(s) Present:

What type of heating system(s) are used in this building? (Circle all that apply)

Hot Air Circulation	Heat Pump	Steam Radiation	Wood Stove
Hot Air Radiation	Unvented Kerosene heater	Electric Baseboard	Other (specify): _____

What type (s) of fuel(s) are used in this building? (Circle all that apply)

Natural Gas	Electric	Coal	Other (specify): _____
Fuel Oil	Wood	Solar	

What type of mechanical ventilation systems are present and/or currently operating in the building? (Circle all that apply)

Central Air Conditioning	Mechanical Fans	Bathroom Ventilation Fan
Individual Air Conditioning Units	Kitchen Range Hood	Air-to-Air Heat Exchanger
	Open windows	Other (specify): _____

Sources of Chemical Contaminants:

Which of these items are present in the building? (Check all that apply)

Potential VOC Source	Location of Source	Removed 48 hours prior to sampling (Yes/No/NA)
Paints or paint thinners		
Gas-powered equipment		
Gasoline storage cans		
Cleaning solvents		
Air fresheners		
Oven cleaners		
Carpet/upholstery cleaners		
Hairspray		
Nail polish/polish remover		
Bathroom cleaner		
Appliance cleaner		
Furniture/floor polish		
Moth balls		
Fuel tank		
Wood stove		
Fireplace		
Perfume/colognes		
Hobby supplies (e.g., solvents, paints, lacquers, glues, photographic darkroom chemicals)		
Scented trees, wreaths, potpourri, etc.		
Other		
Other		

Do one or more smokers occupy this building on a regular basis?
Has anybody smoked in the building in the last 48 hours?
Does the building have an attached garage?
If so, is a car usually parked in the garage?

Do the occupants of the building frequently have their clothes dry-cleaned?

Was there any recent remodeling or painting done in the building?

Are there any pressed wood products in the building (e.g., hardwood plywood wall paneling, particleboard, fiberboard)?

Are there any new upholstery, drapes or other textiles in the building?

Has the building been treated with any insecticides/pesticides? If so, what chemicals are used and how often are they applied?

_____
_____
_____

Do any of the occupants apply pesticides/herbicides in the yard or garden? If so, what chemicals are used and how often are they applied?

_____
_____
_____

Outdoor Sources of Contamination:

Is there any stationary emission source in the vicinity of the building? _____
_____

Are there any mobile emission sources (e.g., highway; bus stop; high-traffic area) in the vicinity of the building?

_____
_____

Weather Conditions During Sampling:

Outside Temperature (°F):
Prevailing wind direction: _____
Describe the general weather conditions (e.g., sunny, cloudy, rain): _____
Was there any significant precipitation (0.1 inches) within 12 hours preceding the sampling event? _____
Type of ground cover (e.g., grass, pavement, etc.) outside the building: _____

General Comments

Is there any other information about the structural features of this building, the habits of its occupants or potential sources of chemical contaminants to the indoor air that may be of importance in facilitating the evaluation of the indoor air quality of the building?

_____
_____
_____

(NHDES, 1998; NYDOH, 1997; VDOH, 1993)

Instructions for Residents
(to be followed starting at least 48 hours prior to and during the sampling event)

- Do not open windows, fireplace openings or vents.
- Do not keep doors open.
- Do not operate ventilation fans or air conditioning.
- Do not use air fresheners or odor eliminators.
- Do not smoke in the house.
- Do not use wood stoves, fireplace or auxiliary heating equipment (e.g., kerosene heater).
- Do not use paints or varnishes.
- Do not use cleaning products (e.g., bathroom cleaners, furniture polish, appliance cleaners, all-purpose cleaners, floor cleaners).
- Do not use cosmetics, including hair spray, nail polish, nail polish remover, perfume, etc.
- Do not partake in indoor hobbies that use solvents.
- Do not apply pesticides.
- Do not store containers of gasoline, oil or petroleum–based or other solvents within the house or attached garage (except for fuel oil tanks).
- Do not operate or store automobiles in an attached garage.

(NHDES, 1998)

EXHIBIT
3

COMPARATIVE EVALUATION OF VAPOR INTRUSION PATHWAY REGULATIONS
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

This document presents a comparative evaluation of the process used by several states to evaluate the Vapor Intrusion Pathway (VIP).

1.0 INTRODUCTION AND METHODS AVAILABLE

Since the publication of ASTM's RBCA standard in 1995 and the publication of USEPA's Draft Vapor Intrusion Guidance Document in 1992, several states and regulatory programs require that this pathway be evaluated as a part of the overall management of contaminated sites. Several states have incorporated the details of this pathway in their existing risk assessment guidance documents while others have developed stand alone documents and regulations to address this pathway.

Review of these documents indicates that states use one of the following three methods to evaluate this pathway:

Method 1: Measure Indoor Air Concentrations – In this method, representative indoor air concentrations are measured. The **measured** concentrations are compared with risk based target levels for indoor air that are often different for a child, adult resident or adult worker. These target levels are developed based on three factors (i) receptor-specific exposure factors, (ii) an acceptable risk level, and (iii) chemical-specific toxicity values.

This method is very simple. However, it is difficult to implement because:

- it is very intrusive and often causes unnecessary concern and results in time consuming and expensive litigation even in the absence of any problem,
- the measured concentrations are only representative of the period during which (typically 24 hours) the measurements were made and do not account for the variability in the indoor air concentrations, and
- the indoor air concentration are affected by indoor sources of chemicals which are often the same as the chemicals for which the site is being cleaned.

Note if the question is simply "Is it safe to breathe indoor air?", then this is the best method, provided multiple measurements to account for variability, can be made. However, if the question is "Are contaminants in soil and groundwater beneath the building causing an unacceptable indoor air quality?", then this is not the best method for reasons mentioned above.

Method 2: Measured Soil Vapor Concentrations – In this method, representative soil vapor concentrations below or adjacent to homes are measured. This includes the concept of collecting sub-slab samples. These measured soil vapor concentrations are used to **calculate** indoor air concentrations using attenuation factors. The **calculated**

indoor air concentrations are then compared with the indoor air acceptable risk based concentrations. The difference between Method 2 and Method 1 is that in Method 1, indoor air concentrations are **measured**, whereas in Method 2 they are **calculated**.

The attenuation factor includes all the factors that affect the migration of soil vapors to indoor air. These include but are not limited to (i) soil characteristics, (ii) building foundation characteristics, (iii) building characteristics, and (iv) chemical specific properties. There are two ways to obtain attenuation factors (i) the application of a fate and transport model that accounts for the various factors that affect the attenuation factor mentioned above, or (ii) an empirical attenuation factor based on literature. The most commonly used model to estimate the attenuation factor is the J&E model (Johnson, et. al., 1991) which is also described in USEPA (2004). The use of literature based generic attenuation factors, although simpler than the application of the model to estimate the attenuation factor, does not account for the various factors that affect the attenuation factor, and it, therefore, does not represent good use of science. This approach suffers from the commonly voiced criticism of many regulations "one size fits all".

Method 3: Measured Soil or Groundwater Concentrations – In this method, representative soil and groundwater concentrations are measured. These concentrations are used to estimate the equivalent soil vapor concentrations using a model referred to as the equilibrium theory model. This model requires three types of input (i) the soil type, (ii) concentration, and (ii) chemical-specific properties. Thus the only difference between Methods 2 and 3 are that in Method 2 the soil gas concentrations are **measured** whereas in Method 3 they are **calculated** from soil and groundwater concentrations.

As discussed above, none of the methods are perfect and each method has its own specific advantages and disadvantages; therefore, several states allow the use of different methods to evaluate this pathway.

In the attached table, remediation objectives for a few commonly encountered chemicals are presented and compared with the IEPA's Tier 1 values. Note that direct comparison may not be very meaningful because the application of these values and the overall process between the states is different.

The following section describes the approach used by a few states.

MINNESOTA POLLUTION CONTROL AGENCY (MPCA)

The MPCA's program as described in the Risk-Based Guidance for the Vapor Intrusion Pathway (2008) is applicable to the Superfund program, RCRA program, and the Voluntary Cleanup program. The three tier program includes the following screening levels:

- Initial Screening Values (ISVs): these are levels considered protective of indoor air and are based on a hazard quotient (HQ) of 1.0 for non-carcinogenic chemicals

and an individual excess lifetime cancer risk of 1×10^{-5} for carcinogenic chemicals.

- Soil vapor screening levels developed by multiplying the ISVs by a factor of 10 or 100.

- Groundwater screening levels developed by multiplying the groundwater levels equivalent to the ISVs with a factor of 1,000.

MPCA's program does not include any soil screening levels. The program does not make a distinction between residential or commercial/industrial scenarios. The MPCA's program consists of the following three tiers:

Tier 1: The objective of Tier 1 is to determine whether the VIP is complete, and, if so, whether it is of sufficient concern as to require further evaluation. For example, absence of volatile contaminants at a site is sufficient reason not to proceed any further. A clear definition of volatile chemical is not included. A site has to be further evaluated at the Tier 2 or Tier 3 level for VIP if the following are true:

- If receptors (current or potential future buildings) are located within 100 lateral ft of groundwater concentrations that exceed or equal groundwater screening levels;
- If receptors are located within 100 lateral ft of soil gas concentrations equal to or higher than 10 times ISV's.

Tier 2: This involves the collection of subsurface soil gas samples overlying the vapor sources in the direction of the nearest receptors. Data must be collected to define the extent and magnitude of the soil gas impacts. Depth of measurement should be at least 2 ft above the water table and 3 ft below the ground surface. Samples should be collected adjacent to the building and just below the level of basement slab.

Soil gas data is evaluated as follows:

- Representative soil vapor concentrations less than 10 times the ISVs are considered to not cause unacceptable risk.
- Representative soil vapor concentrations between 10 and 100 times the ISVs may require additional investigation to determine if the IVP risk is unacceptable. Other lines of evidence may be used to determine whether the site presents a risk or not.
- Soil gas concentration greater than 100 times the ISVs require a Tier 3 evaluation.

Tier 3: The goal of Tier 3 is to collect relevant building specific vapor sampling data to determine whether there is a complete pathway or the need for a response action. Tier 3 involves an interior building survey to identify potential vapor entry locations, potential indoor air sources, sub-slab soil gas samples to determine the magnitude and extent of soil gas contamination directly beneath the building and indoor air concentration measurements.

- Sub-slab concentrations less than 10 × ISVs requires no further action.
- Sub-slab concentrations between 10 × and 100 × ISVs. In a residential building the necessary action would be indoor air sampling.
- Sub-slab concentration greater than 100 × ISVs require indoor air sampling and remedial measures to eliminate potential entry of vapors.

Key Issues

MPCA's program does not include several very significant factors that affect IVP:

- Does not distinguish between residential or commercial land use in a quantitative manner.
- Does not account for building characteristics in a quantitative manner.
- Does not account for the soil type between the building and water table. One can argue that reliance on sub-slab samples makes this a mute point.
- Does not consider the depth to groundwater. One can argue that reliance on sub-slab samples makes this a mute point.
- Representative soil gas concentration is not defined.
- Subslab and indoor air measurements are very intrusive.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (IDEM)

IDEM's Draft Vapor Intrusion Pilot Program Guidance (2006) presents an approach that can be voluntarily applied or the responsible party may present an alternative approach to evaluate the VIP. It is IDEM's intent to use the data and experience obtained during the implementation of the pilot program to develop IDEM's VIP evaluation guidance and policy.

The pilot program consists of two parts each of which address the two major categories of contaminated sites. Part A applies to gasoline releases and focuses on BTEX compounds and Part B applies to chlorinated solvent release sites. The pilot program recognizes that these two classes of chemicals have very different physical and chemical properties and also that BTEX compounds biodegrade. The two parts include essentially the same process but use different attenuation factors.

The program consists of the following screening levels:

BTEX Compounds

- Groundwater screening levels that are soil and depth to groundwater dependent.

- Residential prompt action level benzene vapor screening levels for crawl space (14 $\mu g/m^3$), sub-slab (140 $\mu g/m^3$), and soil gas (1,400 $\mu g/m^3$). Each of these differs by an empirical/arbitrary factor of 10. Similarly, commercial levels that also differ by a factor of 10 are available.

- Residential potential chronic vapor screening levels for crawl space (2.5 to 14 $\mu g/m^3$), sub-slab (25 to 140 $\mu g/m^3$), and soil gas (250 to 1,400 $\mu g/m^3$). Similarly, commercial levels that also differ by a factor of 10 are available.

- Indoor air action levels for exposure durations of 1, 5, 10, 20, and 30 years are also presented for both commercial and residential land uses for 61 chemicals.

- Soil screening levels of 10 mg/kg of benzene are suggested. The guidance states that no generally accepted method exists to estimate this value. Elsewhere in the document it states that this screening level was developed using the J&E model. The 10 mg/kg levels significantly higher than the existing soil cleanup levels and hence soil cleanup may not be dictated by vapor intrusion pathway.

Chlorinated Compounds

- Residential and commercial groundwater screening levels that are soil and depth to groundwater dependent for PCE, TCE, 1,2-DCA, and VC for exposure duration of 1, 5, 10, 20, and 30 years.

- Residential and commercial soil screening levels for PCE, TCE, VC, and 1,2-DCA for 1, 5, 10, and 20 year exposure duration.

- Residential and commercial prompt action and potential chronic screening levels for crawl space, sub-slab, and soil gas. Each of these levels differs by an arbitrary factor of 10.

- Indoor air action levels for exposure durations of 1, 5, 10, 20, and 30 years are also presented for both commercial and residential land uses for 61 chemicals.

Part A BTEX Compounds

- **First Step**

    - If benzene concentrations in soil or groundwater exceed the screening levels within 50 ft of an occupied building, then an investigation of soil gas is necessary. (No details are provided whether this is 50 ft lateral or vertical or the rationale for 50 ft.). IDEM requires a sequential approach involving measurement of soil gas, sub-slab, and indoor air sampling.

    - If soil or concentrations exceed 10 times the screening levels or free phase is known or suspected, IDEM recommends prompt collection of paired sub-slab and indoor air samples.

    - If groundwater is within 5 ft of the basement, slab or ground surface, the above screening levels do not apply and indoor air sampling is required.

- In the absence of knowledge of the soil type the recommendation is to use sand or sand and gravel as the soil type.

- **Second Step**

  - Sub-slab samples are used to estimate indoor air concentrations using an attenuation factor of 0.1. However, the document allows the use of alternate screening levels based on site specific conditions. Although the focus is on benzene, the document requires that other chemicals of concern be also evaluated.

  - When sub-slab samples cannot be collected, the recommendation is to collect soil gas samples at two depths and on two sides of the building. The first sample should be collected at a depth of 5 ft below ground surface or the bottom of the basement and the second sample at a depth several ft above the water table.

  - An attenuation factor of 0.01 is used for shallow soil gas concentrations.

  - If soil gas concentrations of any chemical exceed the screening levels, indoor air is recommended.

  - The guidance document includes general details of soil gas, indoor air and sub slab sample collection.

Part B Chlorinated Compounds

The process described is exactly the same as for BTEX except that the distance is increased from 50 ft to 100 ft and the reason given is that benzene biodegrades.

General Comments

The IDEM process suffers from the same drawbacks as the MPCA process in that it relies on arbitrary attenuation factors that disregard building characteristics. However, varying soil types and depth to groundwater have been included.

OHIO ENVIRONMENTAL PROTECTION AGENCY (Ohio EPA)

On April 12, 2005, Ohio EPA published a Technical Decision Compendium (TDC) titled Methodology for Vapor Intrusion Assessment essentially adopting the USEPA's Draft Guidance document for the evaluation of VIP (2002) for use by Department of Emergency Remedial Response's (DERR) Remedial Response Program. The TDC suggested a few changes related to the use of OSHA standards in certain situations.

KENSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

KDHE's vapor intrusion guidance (2007) is very general, lacks specifics and it appears they handle every site on a case by case basis. KDHE's vapor intrusion guidance document states that, "the direct measurements under worst case conditions are the best option, although flexibility may be granted due to certain site conditions. For large sites, a soil gas/vapor survey may be the most appropriate first step, followed by indoor air sampling."

KDHE's document also states, "Due to variability of sites, KDHE does not use these types of screening values generally across the site and, therefore, does not allow them to be used to evaluate health risk at sites in Kansas." This is despite the fact that their petroleum UST guidance document (2005) has soil and groundwater screening levels protective of indoor inhalation.

MISSOURI DEPARTMENT OF NATURAL RESOURCES (MDNR)

MDNR has two risk based programs, one for the petroleum UST program, and a second for managing all other contaminated sites (dry cleaners, voluntary clean-up, etc.). Evaluation of the indoor air pathway is similar in both the programs in that they follow a tiered approach.

TIER 1: Under Tier 1 if the pathway is complete, site concentrations have to be compared with Tier 1 soil, groundwater or soil vapor target levels. These levels were developed using the J&E model and conservative default input parameters.

TIER 2: Under Tier 2 if the pathway is complete, representative soil, groundwater or soil vapor concentrations have to be compared with Tier 2 soil and groundwater target levels developed using J&E model. However, unlike Tier 1, the J&E model has to be implemented with site specific input parameters. In both Tier 1 and Tier 2 advection is neglected.

TIER 3: Under Tier 3 the entity performing the evaluation has considerable flexibility and can use any reasonable approach including indoor air measurements based on an MDNR approved work plan.

Thus in many ways the MDNR program is similar to the IEPA TACO program.

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Johnson, P.C, and R.A. Ettinger, 1991 Heuristic model for predicting the intrusion rate of contaminant vapors in buildings. Environmental Science and Technology, 25: 1445-1452.

KDHE. 2005. Risk-Based Corrective Action for Petroleum Storage Tanks Sites (KRBCA Manual).

KDHE. 2007. Vapor Intrusion Guidance Chemical Vapor Intrusion and Residential Indoor Air.

MPCA. 2008. Risk-Based Guidance for the Vapor Intrusion Pathway.

Ohio EPA, 2005. Methodology for Vapor Intrusion Assessment.

USEPA, 2002. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance).

USEPA, 2004. Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings.

Table 1
Comparison of Residential Target Levels Protective of Indoor Inhalation

State	Benzene			Naphthalene			PCE			TCE	
	SS	SV	GW	SS	SV	GW	SS	SV	GW	SS	SV
	$\mu g/m^3$		µg/L	$\mu g/m^3$		µg/L	$\mu g/m^3$		µg/L	$\mu g/m^3$	
Illinois	NA	41,000	360	NA	610,000	31,000	NA	66,000	210	NA	180,000
Indiana*	25 - 140	250 - 1,400	100	NA	NA	NA	32	320	8.1	12	120
Michigan	150	1,500	5,600	160	1,600	31,000	2,100	21,000	25,000	700	7,000
Missouri	NA	190,000	1,000	NA	42,600	2,250	NA	200,000	338	NA	546,000
Colorado	NA	2,900	16	NA	>VP	900	NA	NA	NA	NA	NA
New Jersey	16	NA	15	NA	NA	NA	34	NA	1	27	NA
Ohio	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes

SS: Sub-slab soil vapor
SV: Soil vapor below sub-slab
GW: Groundwater
PCE: Tetrachloroethylene
TCE: Trichloroethylene
µg/L: Micrograms per liter
NA: Not available
$\mu g/m^3$: Micrograms per meter cube

>VP: Denotes that even at a concentration equal to the vapor pressure of the chemical, a hazard quotient of 1 and a cancer risk of 1 E-6 is not exceeded.

*: 1) Benzene screening levels for GW are for sand soil type and 10 ft of depth to GW.
2) Benzene screening levels for SS and SV are for potential chronic exposure.
3) PCE and TCE screening levels for GW are for sand soil type, 10 ft depth of GW, and for an exposure duration of 30 years.
4) PCE and TCE screening levels for SS and SV are for potential chronic with an exposure duration of 30 years.

Sources:

IEPA (September 2008). Tiered Approach to Corrective Action Objectives (TACO), Table G in Appendix B of Section 742.
IDEM (April 2006). Draft Vapor Intrusion Pilot Program Guidance.
MDEQ (June 2008). Remediation and Redevelopment Division (RRD) Operational Memorandum No. 4. Attachment 4 - Soil Gas and Indoor Air. (Note this is a peer reviewed un document.)
MDEQ (January 2006). Remediation and Redevelopment Division (RRD) Operational Memorandum No. 1. Attachment 1 and Table 1.
MDNR (April 2006). Departmental Missouri Risk Based Corrective Action. Table B-2
CDLE (October 2005). Petroleum Storage Tank Owner/Operator Guidance Document. (for PCE and TCE).
CDLE (December 2007). Petroleum Hydrocarbon Vapor Intrusion Guidance Document. (for Benzene).
NJDEP (October 2005). Vapor Intrusion Guidance. (Note the values are from revised tables dated November 2007).
OEPA (April 2005). Methodology for Vapor Intrusion Assessment.

GW
µg/L
890
5.1
15,000
1,600
NA
1
NA

ıpublished

Table 2
Comparison of Industrial/Commercial Target Levels Protective of Indoor Inhalation

State	Benzene			Naphthalene			PCE			TCE		
	SS	SV	GW	SS	SV	GW	SS	SV	GW	SS	SV	GW
	$\mu g/m^3$		µg/L	$\mu g/m^3$		µg/L	$\mu g/m^3$		µg/L	$\mu g/m^3$		µg/L
Illinois	NA	300,000	2,400	NA	620,000	31,000	NA	490,000	1,400	NA	1,300,000	6,000
Indiana*	53 - 440	530 - 4,400	340	NA	NA	NA	68	680	17	79	790	33
Michigan	600	6,000	35,000	230	2,300	31,000	8,500	85,000	170,000	2,900	29,000	97,000
Missouri	NA	998,000	5,250	NA	223,000	11,800	NA	1,050,000	1,770	NA	2,860,000	8,410
Colorado	NA	37,000	410	NA	>VP	900	NA	NA	NA	NA	NA	NA
New Jersey	26	NA	15	NA	NA	NA	26	NA	1	27	NA	1
Ohio	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes

SS: Sub-slab soil vapor PCE: Tetrachloroethylene µg/L: Micrograms per liter

SV: Soil vapor below sub-sl TCE: Trichloroethylene NA: Not available

GW: Groundwater $\mu g/m^3$: Micrograms per meter cube

>VP: Denotes that even at a concentration equal to the vapor pressure of the chemical, a hazard quotient of 1 and a cancer risk of 1 E-6 is not exceeded.

*: 1) Benzene screening levels for GW are for sand soil type and 10 ft of depth to GW.

2) Benzene screening levels for SS and SV are for potential chronic exposure.

3) PCE and TCE screening levels for GW are for sand soil type, 10 ft depth of GW, and for an exposure duration of 25 years.

4) PCE and TCE screening levels for SS and SV are for potential chronic with an exposure duration of 25 years.

Sources:

IEPA (September 2008). Tiered Approach to Corrective Action Objectives (TACO), Table G in Appendix B of Section 742.

IDEM (April 2006). Draft Vapor Intrusion Pilot Program Guidance.

MDEQ (June 2008). Remediation and Redevelopment Division (RRD) Operational Memorandum No. 4. Attachment 4 - Soil Gas and Indoor Air. (Note this is a peer reviewed unpublished document.)

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MDNR (April 2006). Departmental Missouri Risk Based Corrective Action. Table B-5.

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NJDEP (October 2005). Vapor Intrusion Guidance. (Note the values obtained are from revised tables dated November 2007).

OEPA (April 2005). Methodology for Vapor Intrusion Assessment.

STATE OF ILLINOIS)
)
COUNTY OF SANGAMON)

PROOF OF SERVICE

I, the undersigned, on oath state that I have served the attached Pre-First Notice Comments upon the persons to whom they are directed, by placing a copy of each in an envelope addressed to:

Dorothy Gunn, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 W. Randolph, Suite 11-500
Chicago, Illinois 60601

Bill Richardson
Chief Legal Counsel
Illinois Dept. of Natural Resources
One Natural Resources Way
Springfield, Illinois 62702-1271

Matt Dunn
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Richard McGill
Hearing Officer
Illinois Pollution Control Board
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Chicago, Illinois 60601

Participants on the Service List

and mailing them (First Class Mail) from Springfield, Illinois on May 27, 2009, with sufficient postage affixed as indicated above.

SUBSCRIBED AND SWORN TO BEFORE ME
This 27th day of May, 2009.

Notary Public

OFFICIAL SEAL
BRENDA BOEHNER
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 11-3-2009

OFFICIAL SEAL
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NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 11-3-2009