ORIGINAL

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
PROPOSED AMENDMENTS TO	)	
TIERED APPROACH TO	)	R09-9
CORRECTIVE ACTION	)	(Rulemaking - Land)
OBJECTIVES (35 ILL. ADM.	)	
CODE 742)	)	

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STATE OF ILLINOIS
Pollution Control Board

Proceedings held on January 27, 2009, at 10:35 a.m., at the Illinois Pollution Control Board, 1021 North Grand Avenue East, Springfield, Illinois, before Richard R. McGill, Jr., Hearing Officer.

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Board Member Gary L. Blankenship
Board Member Thomas E. Johnson
Board Member Shundar Lin

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(January 27, 2009; 10:35 a.m.)

HEARING OFFICER MCGILL: Good morning. I'd like to welcome everyone to this Illinois Pollution Control Board hearing in Springfield today. My name is Richard McGill, and I'm the hearing officer for this rulemaking proceeding docketed as R09-9 and captioned, "In the Matter of: Proposed Amendments to Tiered Approach to Corrective Action Objectives, 35 Illinois Administrative Code 742," better known as TACO.

Briefly, by way of background, on September 3, 2008, the Board received a rulemaking proposal from the Illinois Environmental Protection Agency. The Agency proposes to amend the Board's TACO rules in order to add the indoor inhalation exposure route to TACO's risk-based methodology as well as update remediation objectives for all exposure routes. Today is the first hearing. Another hearing is scheduled for March 17 and 18, 2009, in Chicago.

Also present today on behalf of the Board is Board Member Dr. Shundar Lin to my far left; next to him, Board Member Gary Blankenship; Chairman Tanner Girard; the lead board member, Thomas Johnson; and to my right, our technical unit, Anand Rao and Alisa Liu.

To make today's hearing as efficient as possible, I issued an order on October 20 requiring the filing of prefiled testimony, prefiled questions and prefiled answers. We will begin today by entering those materials into the record as if read, as well as designating a number of hearing exhibits. The Agency's witnesses who prefiled testimony will be giving summaries of their testimony, and Agency witness Dr. Atul Salhotra will present a slide presentation and give his associated testimony. That will be followed by questions for the Agency's witnesses, who will be responding today as a panel. After that, we will allow anyone else to testify, time permitting. Toward the conclusion of today's hearing we will take up a number of procedural items and discuss a potential prefiled testimony filing deadline for the second hearing. We do have this room reserved for tomorrow if business still remains at the end of today. Otherwise, we will conclude the hearing today with those procedural items I mentioned.

Today's proceeding is governed by the Board's procedural rules. All information that is relevant and not repetitious or privileged will be admitted into the record. Those who testify will be sworn in and may be asked questions about their testimony. For those who

wish to testify but who did not prefile testimony, we have a witness sign-up sheet located at the back of the room. I would ask for the court reporter transcribing this proceeding if you would please speak slowly and not talk over one another. Please speak up so we'll have a clear transcript for the Board to review.

We learned this morning that Dr. Salhotra has been delayed somewhat. He's in transit. He's expected to be here by around noon. Depending on the progress we make, how many follow-up questions we have for the Agency's witnesses, we will take an hour lunch break unless it looks like we're in a position to wrap up without breaking, in which case we'll just forge ahead. Are there any questions about our procedures today?

Seeing none, I'm going to take up one procedural item that I normally would take up toward the end of the day, but given Dr. Salhotra's delay, I thought we might as well take care of this matter right now. It concerns the Board's request to the Department of Commerce and Economic Opportunity for an economic impact study. Section 27(b) of the Environmental Protection Act requires the Board to request that the Department of Commerce and Economic Opportunity conduct an economic impact study, or EcIS, on proposed rules before the Board

adopts the rules. DCEO may within 30 to 45 days of the request produce a study on the economic impact of the proposed rules. The Board must make the economic impact study or DCEO's explanation for not conducting one available to the public at least 20 days before a public hearing. On October 7, 2008, the Board sent DCEO a request to conduct an EcIS on the Agency's rulemaking proposal. DCEO has not responded to the Board's request. Is there anyone who would like to testify regarding this matter?

Seeing no response, I will move on to address the prefiled testimony. Absent any objections, the prefiled testimony, questions and responses will be entered into the record as if read. After that I'm going to be designating these as hearing exhibits. It'll make it a lot easier to cite them later if we give them a specific hearing exhibit number. Any questions at this point?

Okay. Seeing none, first, is there any objection to entering as if read any of the prefiled testimony of Thomas Hornshaw, Gary King or Tracey Hurley? Seeing none, each is so entered. Next, is there any objection to entering as if read any of the prefiled questions of Gail Artrip or the Illinois Environmental Regulatory Group? Seeing none, each is so entered. Finally, is

there any objection to entering as if read any of the prefiled responses of the Agency? Seeing none, each is so entered. Again, for ease of later citation, I will now take up designating each of the prefilings as hearing exhibits. I'm sorry. Go ahead.

MS. GEVING: Mr. Hearing Officer, we also wanted to know if you were going to enter Dr. Salhotra's slides as an exhibit, because that's --

HEARING OFFICER MCGILL: I was going to take that as an exhibit. I can do that after his presentation or can take care of it now. I was just going to make that a hearing exhibit since it wasn't actually testimony.

MS. GEVING: I have copies of all the documents now if you'd like them, including errata sheets number 1 and 2.

HEARING OFFICER MCGILL: Perfect. I can take those now. Thank you. Okay. First, is there any objection to designating as a hearing exhibit the Agency's errata sheet number 1, which was filed with the prefiled testimony? Seeing none, that is Hearing Exhibit No. 1. Is there any objection to designating as a hearing exhibit the Agency's errata sheet number 2, which was filed with the prefiled responses? Seeing none, that

is Hearing Exhibit No. 2. Okay. Is there any objection to designating as a hearing exhibit the prefiled testimony of Gary King along with its attached document entitled "Instances of Vapor Intrusion Risk at Sites in Illinois"? Seeing none, we'll make that Hearing Exhibit 3.

Next, is there any objection to designating as a hearing exhibit the hard copy of the colored slide show presentation of Dr. Atul Salhotra? Seeing none, that will be Hearing Exhibit 4. Next, is there any objection to designating as a hearing exhibit the prefiled testimony of Thomas Hornshaw along with his attached CV? Seeing none, that will be Hearing Exhibit 5. Next, is there any objection to designating as a hearing exhibit the prefiled testimony of Tracey Hurley? Seeing none, that will be Hearing Exhibit 6.

And before designating the prefiled questions as hearing exhibits, I will mention that the first question to which the Agency responded came from Kara Magyar not as a prefiled question but rather as a public comment. That question will therefore not be made a hearing exhibit and may simply be cited as public comment number 1. Is there any objection to designating as a hearing exhibit the prefiled questions of Gail Artrip? Seeing

none, that'll be Hearing Exhibit 7. Is there any objection to designating as a hearing exhibit the prefiled questions of the Illinois Environmental Regulatory Group? Seeing none, that will be Hearing Exhibit 8. Finally, is there any objection to designating as a hearing exhibit the prefiled responses of the Agency? Seeing none, that will be Hearing Exhibit 9.

At this point we will proceed with the Agency's presentation. I would ask the court reporter to please swear in the Agency's witnesses collectively.

(Witnesses sworn.)

HEARING OFFICER MCGILL: Thank you. Now I would ask Agency attorney Kimberly Geving to begin the Agency's presentation.

MS. GEVING: Good morning. As you stated, my name is Kimberly Geving. I'm assistant counsel for the Bureau of Land. I'll do my best -- I'm sitting right near you, so you can hear me. I'm going to introduce today our panel of witnesses and also Agency staff present here today. To my immediate right is Heather Nifong, programs advisor for the division of remediation management. Next to her is Gary King, acting chief of the Bureau of Land. Next to Gary is Hernando Albarracin,

manager of the leaking underground storage tank section. Next to Hernando is Andy Frierdich, project manager in the state sites unit, and next to Andy is Tracey Hurley, an environmental toxicologist. Next to Tracey is Dr. Tom Hornshaw, manager of the toxicity assessment unit, and last but not least is Joyce Munie, manager of the remedial project management section. I will turn it over to them for summaries.

HEARING OFFICER MCGILL: Thank you.

MR. KING: My name's Gary King. I appreciate the opportunity to present testimony here, and I'm not going to go into length on all of this, but I'll summarize some of the aspects of the proposal. Our proposal really has two major components. One, and I think is the -- been the most significant in terms of development, has been the addition of the indoor inhalation exposure route, and the second part is the updating of the remediation objectives.

This is the fourth time we have come before the Board with amendments to TACO since the rule was first adopted in 1997. I testified at that -- those first set of hearings. I didn't have any gray hair at that point. I do now, so -- and I've been involved with each of these rules as we've developed them. The commitment we made

back in '96 was that we would continue to update TACO as we gathered further information relative to its implementation and relative to the science that supported it, and that's what we've continued to do and that's what we're doing with the proceeding that we're testifying at today.

We're fortunate in terms of the proposal we're making in that when we first set TACO up over a decade ago, we did a -- we set up a rule that was very comprehensive but yet was very flexible in its approach to establishing remediation objectives. The system we have, as I've seen what other states have around the country, I think we have the best system of any state in the country, and I think because of that it's allowed us to come back and add, make changes and build on the system that we already have in place, and that's what we're doing with our proposal that we submitted for this docket.

The second thing I think is -- that's been real important relative to TACO -- and again, it's fairly unique among states -- we -- the Illinois statute set up initially a group called the Site Remediation Advisory Committee, and we took our involvement with them very seriously from the start and we've continued to take that

very seriously. It's really -- That's a group of the people who are regulated by -- subject to the regulations of TACO, and they have over the years provided us with very exceptional professional input on the things we've proposed, and that's also true of the proposal that we submitted in this proceeding. We ended up -- We started with -- We spent about a year or so developing a proposal. We sent it out to the advisory committee in May of 2007 and requested that they review it and they -- and that they transmit it to all the people that they could, you know, find that would be interested in it, and they did that, and they ended up coming back to us with, oh, I don't know, about 125, 130 questions and issues to be addressed, and so we had a series of meetings with them and addressed those issues, and that involvement really resulted in some very significant changes to our proposal.

Just to highlight a couple of those, one of them was relative to soil gas corrective action objectives. We have that now in our Tier 1 table, and when we initially went out with the proposal, we didn't have those in there, and one of the comments we got back from the advisory committee is that we really needed to include that, and so we've gone ahead and prepared those

type of objectives. Another significant comment we received was relative to building control technologies, that we needed to have a set of defined types of building control technologies, so we went back and included those as well, and then there's a lot of other smaller changes that we made, so that was really -- I think really a key to developing this proposal, and Brian Martin, who is the current chair of the Site Remediation Advisory Committee, was really instrumental in working with us with regards to the development of the proposal.

Let me talk about -- a little bit about the proposal itself. Again, we're looking at the -- on the indoor inhalation side, we phrased it that way in the rules. More typically in a colloquial kind of way it's called vapor intrusion, and so if you see it in the press and those kind of things, that's the way it's normally referred to. We call it indoor inhalation just to -- because it fits better within the context of our rules, and it also is not quite -- it's not quite as inflammatory a term as vapor intrusion is. And really, this pathway is focused on the movement of contaminants from soil and groundwater through soil gas and then into building interiors, where it can create health risks when occupants breathe that contaminated air. We have

included 59 chemicals of concern that we have identified should be subject to this exposure route. Those are listed in the proposal.

Management of the indoor inhalation route is going to be similar to what we have in the other pathways of TACO. Again, as I said before, it's really building upon it. We've got a three-tiered approach, a Tier 1 with a table of numbers that can screen compounds out or not; there's a set of Tier 2 equations that are put in the rules; and then finally there's Tier 3 that kind of deals with situations that fall outside of Tier 1 and Tier 2. We have included opportunities for pathway exclusion, as we have done with the other pathways, and we've included, as I was describing before, building control technologies, which is somewhat similar to the concept of engineering barriers that we had relative to the other pathways.

Included with my testimony are some case studies, and that's -- that was from seven different sites, and the reason why we put those together, it's not that those are the only things we've encountered, but we wanted to give kind of a flavor of the fact that this issue relative to indoor inhalation is something that needs to be addressed across all of the programs that Illinois EPA

looks at when they're managing a cleanup site, and it really shows the kind of variety of those types of sites and shows the different types that are encountered and really shows the need for having a consistent methodology for how you address indoor inhalation, which is what we are proposing in this rule.

We think this is going to have three important benefits for the state and for the residents of the state. First there's going to be -- this methodology will create a better way of protecting Illinois residents from volatile chemicals migrating into -- from contaminated soil and groundwater into their homes or places of business. Secondly, site owners and other remediation applicants will have a more expanded liability relief through issuance of a no further remediation letter that covers this pathway. And then finally, we think that this -- having these remediation objectives will facilitate property transactions.

In March of last year, ASTM issued a standard practice document for assessment of vapor intrusion into structures relative to real estate transactions. As part of that practice document, they instruct users to apply state generic risk-based concentrations as they're going through the process of using the ASTM standard. We think

that what we're doing here really is part of helping assist that process along.

Rather than go through the details, I think the details of the proposal are kind of spelled out. We'll kind of talk about those further as we discuss some of the questions and responses to them. I wanted to talk briefly about -- we submitted a couple of errata with our -- subsequent to our proposal. Errata 1 proposes removing a subsection, 742.1210(c)(4). That section contains a building control technology requirement for a barrier made of geologic materials. As I put together in my testimony after -- we initially had that included, but as we went through the process of our developing our proposal and developing the other building control technologies, we realized that that (c)(4) provision really didn't make sense to be included based on the way the equations worked, so we are proposing that that be dropped. The second errata --

HEARING OFFICER MCGILL: I'm sorry. Could I just interrupt you for one sec? I want to make sure I'm looking at the right errata sheet. You said that was in errata sheet number 1?

MR. RAO: Yes.

MR. KING: Yes.

HEARING OFFICER MCGILL: Okay. Thank you.

MR. KING: Then in errata number 2 we are proposing an addition to Section 742.105(i), and I'll just read it to give it -- give some context here. It says, "A no further remediation determination issued by the Agency under this part addresses the potential of contaminants present in soil, soil gas and groundwater to reach human receptors. It does not evaluate the safety or protectiveness of buildings on or off-site."

What we're dealing with in that issue is the fact that buildings can have volatile chemicals within them, okay, and the fact that a -- the groundwater or the soil on a site meets the criteria of the rules doesn't mean that any existing building necessarily is safe, so we wanted to make it clear that what we're focusing on here is not contamination within a building but contamination that can move from contaminated soil or groundwater into a building, and, you know, that -- and we -- the importance of that was identified -- just recently I saw a report out of Maryland where they actually had PCE which from a dry-cleaner site had gone into the drywall of the building, and then as the site changed usage, the PCE was coming off into the air within the structure. So, I mean, it's -- like I said, it's important to

recognize that we're not talking about using TACO to determine whether the environment within the building has been made safe from things within the building. That's the purpose of errata 2.

The final thing I wanted to address as part of my opening testimony, one of the questions that we received from IERG -- if you want to just refer to it, it's question 8 -- and we presented an answer in our prefiled responses, but I had a conversation with Mr. Martin last week, who indicated he thought that that response was incomplete and was too generalized and needed to have a little more specification, so I prepared a response that's a little bit different from the answer that we have in the prefiled question, and I can just read that into the record or we can submit that, however --

HEARING OFFICER MCGILL: That would be fine if you want to just go ahead and read it.

MR. KING: Okay.

HEARING OFFICER MCGILL: Is this replacing your prior answer or supplementing it?

MR. KING: Yes, this would be replacing the prior answer. Do you want me to read the question as well?

HEARING OFFICER MCGILL: That might be

helpful for those who haven't read the question.

MR. KING: Okay. This is question 8, and the question is as follows: "If there is a well at the property boundary and it exceeds the remediation objectives for the vapor intrusion groundwater pathway, will the site still qualify for an NFR letter? For example, the remediation site might not have any buildings and indoor inhalation ROs might not apply, but presumably the groundwater (and exceedance) might go off-site." Okay. And the answer is as follows: "Yes, if the site meets the soil gas remediation objectives at the property boundary and no other pathways are a concern. If soil gas concentrations exceed remediation objectives, the site evaluator must investigate off-site."

Just as an aside, that's similar to what we had before in the answer. Here's kind of the difference where we broke it out into the LUST program and site remediation program. "Under the LUST program, if contamination is identified off-site, the site evaluator must either clean up the contamination or negotiate an ELUC." That's capital E, capital L, capital U, capital C. "Under the site remediation program, the site evaluator need only actively remediate the on-site

contamination to qualify for an NFR letter. The NFR letter issued by the site remediation program will not, however, release the site from any off-site liability. For both programs, the absence of any buildings, on-site or off-site, does not matter when performing the site investigation."

That concludes my presentation.

HEARING OFFICER MCGILL: Thank you.

MS. GEVING: Ms. Hurley, if you'd like to proceed with your summary, please.

MS. HURLEY: Okay. My name is Tracey Hurley. My testimony concerns the updates to the appendices, errata sheet number 1 and errata sheet number 2. We have four primary reasons for the updates to the appendices. One is we've calculated new remediation objectives for the indoor inhalation route, and we have added a new associated table with the Tier 1 remediation objective, and we have also added a new table with the Johnson and Ettinger equations, and we have added a new table with the parameters that were used in the Johnson and Ettinger equations and the default values for these parameters, and in the appendices we have also updated the remediation objectives for the other pathways, and this was due to updates in the toxicity criteria and

updates in the chemical and physical parameter values, and we have also added new chemicals from the proposed groundwater standards.

Errata sheet 1 corrects errors in the tables, and errata sheet 2, we are proposing a change in Section 742.227, and this is in response to a prefiled question that we received from IERG, question number 13. When we were preparing our response, we realized that the rules weren't clear that Section 742.227 does not apply to sub-slab soil gas samples, so we are adding language to clarify this. Do you want me to read the language?

HEARING OFFICER MCGILL: This is in the current errata sheet number 2?

MS. HURLEY: Yes.

HEARING OFFICER MCGILL: Okay. Sure, if you'd like to.

MS. HURLEY: Okay. At the end of the opening paragraph to Section 742.227, we are adding the following sentence: "Proposals to use sub-slab soil gas data shall follow Section 742.935(b)."

Also in errata sheet number 2, in Appendix A, Table L, we are changing the Csat value for the chemical m-Xylene. We are changing the value from 1.50E+00 to 1.50E+02, and this is correcting a typographical error in

the value. In Appendix B, Table A, for the chemical 1,4-Dichlorobenzene, also known as p-Dichlorobenzene, we are changing the ingestion value from 120 with a footnote of "e" to 5,500 with a "b" footnote, and we are changing the outdoor inhalation value from 3.3 with an "e" footnote to 12,000 with a "b" footnote, and this was in my prefiled testimony on errata 1. It was actually supposed to be in errata sheet 1 but was inadvertently omitted from the actual filed copy of errata sheet 1. And the last change on errata 2 is in Appendix C, Table M. For the symbol Qsoil in the column entitled "Source," we are deleting the references to Part 742.505(a)(2)(D) and Part 742.505(b)(5), and these sections refer to an old draft version of the TACO rules and these sections no longer exist in the current proposal. And that concludes my summary.

HEARING OFFICER MCGILL: Thank you.

MS. GEVING: Dr. Hornshaw, if you'd like to proceed.

DR. HORNSHAW: Yes. My name is Tom Hornshaw, and I'm the manager of the toxicity assessment unit. In contrast to the prior hearings for TACO, my testimony is limited to one small portion of errata sheet 1 dealing with the area background determination for

groundwater, and the reason for this is that a problem that became apparent in a legal case that we're involved with in which the responsible party is using the current prescriptive approach for determining area background, which is Section 742.410(b)(1), which specifies that if a data set contains ten samples, is normally distributed and has no more than 15 percent non-detect values, then the responsible party may calculate an upper tolerance limit from that data set using the procedures listed in the prescriptive approach.

A problem is -- that occurred is with nitrate determination at this legal case in which this -- the next sample that will complete the ten data sets will result in an upper tolerance limit for nitrate in the range of 50 to 55 milligrams per liter, a concentration that has been shown to cause adverse effects in infants in the past. Realizing this, we looked at the 1999 Unified Guidance, which was not available at the time of the original TACO hearing back in 1997. The time -- At that time -- We were using EPA guidance at that time, which gave the way of doing the prescriptive approach which is now outdated. The Unified Guidance specifies many different statistical procedures to be used, which the use of which depends on the characteristics of the

individual data set. It is worth noting that upper tolerance limit is not among any of the statistical procedures specified in the new guidance. Therefore, we are recommending to delete the prescriptive approach in Section 410(b)(1) and replace it with a language that specifies statistics appropriate to the data set be used after approval by the Agency. And that concludes my small portion of this proceeding.

HEARING OFFICER MCGILL: Just a quick follow-up. You referred to the Unified Guidance. Could you just elaborate on -- describe that? What is that referring to?

DR. HORNSHAW: It's -- The actual title is "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities-Unified Guidance," USEPA, Office of Solid Waste, 1999c, which is in progress, and I've been told that it has not been finalized as of this point.

HEARING OFFICER MCGILL: Thank you.

MS. GEVING: Are you going to need a copy of that document?

HEARING OFFICER MCGILL: No. Thank you.

MS. GEVING: Well, at this time, that concludes the Agency's summaries until Dr. Salhotra arrives, so if you want to open it up for follow-up

questions.

HEARING OFFICER MCGILL: Why don't we go off the record for a moment.

(Discussion held off the record.)

HEARING OFFICER MCGILL: At this point in time we're going to open it up for questions of the Agency's witnesses. If you are a member of the public and have a question, I would ask that you signal me, and after I acknowledge you, if you would state your name and, if applicable, your title and any organization you're representing here today. The Board does have some questions, but I understand that the Illinois Environmental Regulatory Group also has some questions, so we're going to let IERG lead with its questions.

MR. DAVIS: Thank you. My name's Alec Davis. I'm here on behalf of the Illinois Environmental Regulatory Group, or IERG. I want to thank you for the opportunity to participate. With me today is Brian Martin, who's an IERG member and is also, as Gary King mentioned, the chairman of the Site Remediation Advisory Committee. Also with me is Deirdre Hirner -- she's executive director of IERG -- and Monica Rios with the law firm of Hodge Dwyer Zeman, who's here on behalf of IERG as well.

I'm just going to go through, I think, our questions in order as they're presented in the follow-ups. I just wanted to develop a few of our questions a little more fully so that we really have an understanding of what we're facing here, and I will begin with questions 2 and 3. That will be on pages 6 and 7 of the prefiled answer document.

HEARING OFFICER MCGILL: And just for the record, that is Hearing -- now Hearing Exhibit 8?

MR. DAVIS: Okay.

HEARING OFFICER MCGILL: You're referring to the prefiled questions of IERG?

MR. DAVIS: No, this was the prefiled answers.

HEARING OFFICER MCGILL: You're referring to the responses?

MR. DAVIS: Right.

HEARING OFFICER MCGILL: The Agency responses?

MR. DAVIS: The Agency responses contain the questions as well.

HEARING OFFICER MCGILL: Okay. So that's Exhibit 9, I believe, Hearing Exhibit 9. Thank you.

MR. DAVIS: In questions 2 and 3, IERG asked

the Agency to provide some information regarding the contents of NFR letters -- that would be no further remediation letters -- in various circumstances, and I wanted to ask a few questions to kind of broaden the circumstances a little bit. Our questions focused mostly on things like the location of buildings, which your answers indicated did not -- were not taken into account. However, I want to ask whether your response -- specifically looking at 2, your response to 2b and c on page 7, I wanted to know, would your answer change if there was not contamination underlying an existing building on a portion of a site?

HEARING OFFICER MCGILL: Would it be all right if you just go ahead and restate the question? That might help others who haven't read this already and also refresh our memory.

MR. DAVIS: Question 2 asks, "Can the Agency provide draft language that will be included in no further remediation letter under the following circumstances," and "b" and "c" is where there's no building on-site and "c" is where there's no building on the site when an NFR letter is issued but there's a likelihood of construction of a building on a known location in the future or an unknown location, and their

response was that "b and c are the same purposes -- are the same for purposes of an NFR letter. Illinois EPA intends for the entire site to be safe for current and future building occupants regardless of where those buildings are located." And so my question is whether or not the location of contaminants relative to a building location makes a difference in the response. Would an NFR letter be appropriate given a building location that is not overlying the contaminated portion of the site?

MR. KING: I mean, there still would be institutional control on the property. I guess I'm a little -- Maybe if you phrased the question as a hypothetical.

MR. DAVIS: I can do that, certainly. If you had a site where, you know, you had -- we'll just say, you know, the north half of the site was not contaminated, the south half of the site was contaminated, would an NFR letter -- could an NFR letter be issued that would, you know, require an institutional control over the south half and, you know, either allow for buildings or if there was an existing building on the north half, would that be permissible?

MR. KING: Yes, I think that's correct.

MR. DAVIS: Okay. I just wanted to clarify

that.

MR. KING: Just as long as it -- again, it's -- what's critical to that hypothetical is the area of contamination be identified.

MR. DAVIS: Okay. And just generally, on NFR letters that are going to be issued under this new regime with inhalation exposure route, will those letters when they're issued explicitly refer to the fact that the indoor inhalation route has been evaluated or some other instance just to set them apart from previously issued no further remediation letters?

MR. KING: At this point we weren't planning on making that kind of separation. I mean, it would just -- it would be -- the way we have things set up is once the rules go into effect, a site has to end up addressing all of the pathways, including indoor inhalation, so it's just to be -- presumed to be the case.

MR. DAVIS: Okay. Moving on, then, from that --

BOARD MEMBER JOHNSON: Wait a second, Alec. I mean, if one of your goals is to facilitate property transactions, don't you think the addition of language addressing that specifically in an NFR letter would

benefit that?

MR. KING: You know, we have put in language at the request of remediation applicants that wanted specific language in there. I think we could evaluate that. We just -- We weren't going to set up a procedure where we were mandating that that would apply because we don't do that now and there's multiple pathways, so again, we're just trying to be somewhat similar to the way we've been, but if somebody wants to have that referenced, I think we could accommodate that.

MR. DAVIS: Thank you. All right. For question 7, our -- IERG's question 7 is, "Will the Agency require actual data or allow modeling of groundwater to evaluate the vapor intrusion pathway to an off-site building?" My question, I guess, which is relative to this but isn't specifically drafted is, does the indoor inhalation pathway require modeling of the migration of contaminated soil or groundwater?

MR. KING: When you say -- Are you just looking at the J&E model or are you looking at R26 or -- because those are two separate models, so I'm a little confused by the question.

MR. DAVIS: Well, I -- your response referred to R26, but I think if you could describe both,

that would be good, just to enhance our understanding and just what it is that is actually required, what modeling is actually required by indoor inhalation.

MR. KING: Well, you don't -- I mean, if you found out the extent of contamination -- let's just say we're talking about soil -- you found the extent of contamination and those are -- and that was below -- all below the Tier 1 numbers, then there wouldn't be any modeling required relative to the indoor inhalation pathway. If it was above those screening numbers, then there would be a choice of using the Tier 2 equations with site-specific inputs or Tier 3 or actually monitoring what the soil gas is. If the soil gas demonstrates that the Tier 1 numbers are complied with, again, you wouldn't have to do any -- there would be no modeling required.

MR. DAVIS: And would your response be the same for groundwater?

MR. KING: Yes.

MR. DAVIS: Thank you. And then actually, my last point that I wanted to make is just going back to your testimony. This isn't based on prefiled questions. On page 4 of your testimony you describe averaging, and that was in the averaging of sample results for soil gas

samples, if I recall correctly, and I just wanted to ask whether the Agency remains willing to evaluate an averaging methodology if IERG or SRAC was to provide you with some language that was felt to address the issues that you outlined in your testimony here.

MR. KING: Yes, as long as it's done soon enough before we're done with the whole process so it's --

MR. DAVIS: No, I realize that -- the timing constraints. I just --

MR. KING: Yeah. Well, we're definitely -- we're open to evaluate an averaging approach or, as outlined in my testimony, kind of the issues that we think are appropriate to think about in developing an averaging approach.

MR. DAVIS: All right. Thank you. That's all I've got.

HEARING OFFICER MCGILL: Thank you. At this point I wanted to see if anyone else in the audience has any questions for the Agency's witnesses. Sir, again, if you could just state your name and any organization you're representing.

MR. REOTT: Raymond Reott. I wonder if I could pull my chair up so you don't have to turn.

HEARING OFFICER MCGILL: Sure.

MR. REOTT: It's awkward to speak to the back of people's heads. A couple of questions for the panel. As I understand it, like any other pathway, this new pathway would apply to every piece of real estate in Illinois regardless of whether it currently has a structure on it. Is that right?

MR. KING: That's correct, for -- as long as they're going through our programs, we're addressing them.

MR. REOTT: All right. There were -- seemed to be a couple assumptions that need to be made to make them all work in Illinois. I know that at least on some of those, like temperature, you made an Illinois-specific adjustment to the Johnson and Ettinger model to reflect Illinois' condition. Did you make any other adjustments to reflect Illinois-specific factors?

MR. KING: That's a good question, and I didn't spend any time in my testimony talking about it. One of the complexities to developing this rule was because there are various things that needed to be thought through to develop remediation objectives that were different than what we had for the other pathways. One of them, for instance, is building parameters. We

had to make a decision on what size building is going to be assumed for purposes of developing the Tier 1 numbers. You have to pick a building size. I mean, that's just the way it works, and we did, and that's reflected in the appendices in terms of the -- it's in -- I'll tell you where it's at. It's Appendix C, Table M, which is the parameters. So we had to develop -- reach some conclusions as to factors such as the building size. We used an Illinois-specific temperature, as you noted, as opposed to using the number that was used by USEPA. They used a 25 degree C number, and we thought that was way too conservative for the circumstances in Illinois. So, I mean, it really -- if you look through the -- through that Table M, there's a few items that we had to reach conclusions on, and I think those are pretty well identified.

MR. REOTT: On the building size -- I don't know if I saw over there -- what did you assume on the building size?

MR. KING: The building size for residential was -- it was assumed to be 10 meters by 10 meters as a -- you know, as a residential size, so I'm trying to -- it's about 1,000 square feet, I guess, if I'm thinking that through properly, so you can see what kind of

building size we're talking about as far as a residence.

MR. REOTT: And in the commercial/industrial setting?

MR. KING: We doubled the length of the building, so it became 20 meters by 20 meters. And again, you know, we could have picked a smaller size or a bigger size, but we had to pick something that we felt was going to be reasonable as a suitably conservative approach.

MR. REOTT: You also, it appears, made an assumption about the geologic material that would exist between the contaminated media and the building, and I think, if I remember correctly, you chose sand as your default value; is that correct?

MR. KING: That's correct.

MR. REOTT: Did anyone consult with the state geologist about whether that was an appropriate, you know, assumption given Illinois' thicker geology?

MR. KING: Well, that -- one of the things that we tried to do as we were developing the parameters to use with the J&E model is we always went back and looked at what did we do under TACO as it always stood, okay, and we used sand as the default condition under the existing TACO rule, so that's what we used here.

MR. REOTT: This is more of a science question, so maybe it's not you, but do any of the science people -- maybe it's a question for your later witness. Do you think that that assumption would affect the parameters a little differently in a vapor context as opposed to the original TACO context?

MR. KING: Well, it's -- it definitely affects the values that are calculated, but again, we were -- we wanted to have a -- again, as I said, build on what we had before in TACO and have something that continues to be a reasonably conservative approach.

MR. REOTT: What about the depth to the contaminated media? What did you assume there?

MR. KING: I think -- The parameter -- again, this is still in that Table M -- is Dsource, distance from the ground surface to top of contamination, and for soil it's 152 centimeters, which how many feet is that?

MR. FRIERDICH: Almost five feet.

MR. KING: Which is about five feet. You know, it's just -- just got to work with the metric system, so, I mean, it's just -- it's all still too old, can't -- it's hard to visualize the metric stuff. And then the groundwater contamination, it's 304.8

centimeters, which is about ten feet.

MR. REOTT: Are those factors that can be varied in a Tier 2 type analysis --

MR. KING: Well, they --

MR. REOTT: -- to show that -- in your site-specific conditions that that contaminant be used different?

MR. KING: They could, but they're the least -- they're -- they have very little sensitivity in the model, because the model's assuming an infinite source, so it -- whether it's deeper or not as deep, you know, it doesn't vary that, doesn't have that much of an impact.

MR. REOTT: If you end up in a Tier 2 analysis, what factors did you find had the most sensitivity?

MR. KING: The biggest one is -- let me find it here -- is theta w, which is described as water-filled soil porosity. That has the biggest impact, and then the next one is FOC, which is --

MR. REOTT: Fraction organic?

MR. KING: -- fraction organic carbon content.

MR. REOTT: So that would basically be

challenging whether it's really sand or not.

MR. KING: Yes.

MR. REOTT: Okay. Was any attempt made based upon those seven case studies that you had talked about in your testimony to try to correlate actual indoor air quality readings in the field with the predicted values under the Johnson and Ettinger model?

MR. KING: The simple answer is no.

MR. REOTT: It seems that one of the -- or two of the primary impacted populations by this rule change is going to be the LUST fund and the City of Chicago, the LUST fund because of the number of sites that could potentially be affected. Has anybody done a financial calculation to see the impact of this on the LUST fund?

MR. KING: No, we have not done that. I mean, part of that too again, what we're seeing as far as remediation costs is that the petroleum contaminants are not as significant of a problem as the chlorinated compounds, so how much actual impact there would be relative to tank sites in terms of actual remediation is not quite clear at this point.

MR. REOTT: Did the Agency do any tables that directly compare for the 59 chemicals the

preexisting TACO pathway values and the proposed values? Because you have separate tables now in the way the rule's written. Just to keep someone from having to reconstruct this, did you guys internally do anything in a more -- in an easy-to-compare formula show the new projected values for indoor inhalation versus the existing TACO values for the same 59 chemicals?

MR. KING: Yeah, that was one of the things we kind of struggled with. We wanted to put it all in the same set of tables just for making that kind of comparison you're talking about easier to do, but it just, you know --

MR. REOTT: Print ends up so small you can't read it.

MR. KING: Yeah. You know, you can't -- and you get to a point -- I mean, we've got footnotes on those tables, and those footnotes are important, and all of a sudden you take them apart and you can't even -- you can't read what the footnote is, so we chose to use a separate table, and we did do some comparison, and in some situations they're more conservative than what's existing now and then in other situations they're not. Where the groundwater ingestion pathway that's still -- that's in the older set of rules is still -- has not been

excluded or that's not been excluded, that is generally still going to be the driving pathway.

MR. REOTT: The most restrictive criteria.

MR. KING: Right, the most restrictive criteria. Where that has been excluded, okay, then a lot of the time the indoor inhalation pathway will become the most restrictive for volatile chemicals.

MR. REOTT: So for volatile chemicals at sites in the city of Chicago or other communities with groundwater ordinances, the indoor inhalation pathway will turn out to be the most restrictive pathway, then.

MR. KING: I think that's -- that is going to turn out to be true.

MR. REOTT: So particularly for those populations, you know, people with sites in those kind of communities, Chicago and other communities with groundwater ordinances, then there's something substantial at stake here, you know, in this change. This is not a minor change to the rule. It's a pretty big change.

MR. KING: No, it is a significant change, and that was one of the things we earlier identified for people, is that the groundwater ordinance institutional control would not apply for this pathway, and so there --

it is something that additionally will be -- will need to be addressed.

MR. REOTT: There's a couple of points in the testimony where different witnesses describe different issues with trying to measure indoor air quality and use indoor air testing to evaluate compliance with an indoor inhalation pathway and point out obvious problems with indoor air testing. It seemed as if most of those problems resulted in false positives in a sense that, you know, if the person in the home is using some volatile chemical, it will result in a positive in the sense that it will show that chemical in the air in the house or building but it didn't necessarily come from the soil or groundwater. If you have indoor air results that are negative, so in other words they show the chemicals are not present, why wouldn't those still trump the other predicted modeling sources for what the indoor air quality would be?

MR. KING: Under Tier 3 that would be an option, but it's still -- you'd still have to address the source of the contamination. I mean, it -- you could go into a building and find negative values, but, you know, where is that building in the context of the contamination? There has to be a correspondence between

where the contaminants are and where the building's at. It would be -- That would be a potential way to approach things, but again, as you were commenting, the danger of false positives and the intrusive nature of that kind of sampling, particularly when you're talking about residences, we just thought it was a more sound approach to look at the contamination at the site without having that -- you know, the indoor aspect as a -- as its own tier.

MR. REOTT: So at least in a Tier 3 type evaluation, the Agency would consider that approach?

MR. KING: Yeah, we could consider it. I wouldn't advise it, I mean, just because of the -- I think that would be kind of a last resort kind of an approach given the other flexibilities we've included in the rules.

MR. REOTT: That's it. Thank you.

HEARING OFFICER MCGILL: Mr. Reott, if you -- are you just here on your own behalf or representing an organization today?

MR. REOTT: I --

HEARING OFFICER MCGILL: On your own behalf is fine. I just --

MR. REOTT: I'm here -- I testified three

times in the original TACO rulemaking --

HEARING OFFICER MCGILL: Yeah, we recall.

MR. REOTT: -- for those of you who were around for that, was one of the two people who opposed the original Agency proposal in that rulemaking, which the Board substantially changed, and I just think that --

HEARING OFFICER MCGILL: And before you proceed, I -- we certainly would be happy to swear you in if you would like to provide some testimony.

MR. REOTT: No. I may well do that in March.

HEARING OFFICER MCGILL: Okay. Fair enough.

MR. REOTT: Today was more informational gathering about the nature of the Agency's proposal, try to flush out a couple of parameters. This is really important. This is going to affect a lot of sites, and, you know, I think I'll probably elaborate on that in March, but, you know, this needs to be looked at very carefully.

HEARING OFFICER MCGILL: Thank you. We look forward to hearing from you.

MR. KING: Could we make one other addition? Dr. Hornshaw wanted to make one other addition.

HEARING OFFICER MCGILL: Sure. We're still

on the record. Go ahead.

DR. HORNSHAW: Just wanted to point out that in addition to the potential problem of false positives, there's also a problem -- a potential problem for false negatives. You can pump up the ventilation, open the window, etc., to help defeat the actual results that might be truly there.

HEARING OFFICER MCGILL: Thank you. I'll ask again if anyone in the audience has any questions for the Agency's witnesses. Seeing none, why don't we go off the record for a moment.

(Discussion held off the record.)

HEARING OFFICER MCGILL: The Board -- Seeing at this point there were no other questions from the audience, the Board was going to pose its questions, after which if Dr. Salhotra hasn't shown up yet, we'll probably break for lunch.

MS. GEVING: Okay.

MR. RAO: We'll just go section by section and start with the definitions. Mr. King, in the definition of a building, could you please explain the rationale for choosing six months as a time frame for minimum occupancy?

MR. KING: Well, we were -- we knew we had

to have something longer than a day, you know, so it -- we just -- this is one of those discussions we had with the Site Remediation Advisory Committee in terms of trying to come up with something that would be, you know, a reasonable time frame that would indicate that there was a permanency to the structure, you know, so in essence, if you had a -- you know, Larry Estep, who is with -- on behalf of Site Remediation Advisory Committee, he wanted to make sure that his chili tents that he set up for chili cook-offs weren't going to be considered buildings, you know, and so we kind of had to make sure that tent structures set up for a short period of time were not buildings, so it was kind of like -- had to reach the conclusion as to what represented a permanent structure, and so we just -- we came up with six months as that kind of designation.

MR. RAO: So if somebody has a summer rental and occupies it for three months, that --

MR. KING: Well, if the building -- excuse me. Yeah, if it's intended for or supports any human occupancy for more than six consecutive months, I guess we'd be in a close call there, because that's something that's intended for -- you know, could be intended for occupancy for more than six months. I mean, it's --

we're kind of trying to look at the building itself.

MR. RAO: Okay.

HEARING OFFICER MCGILL: I had a question. The definition of residential property is not -- the Agency proposal does not seek to amend it, but I've got a couple questions on that definition and whether or not it needs to be amended to take into account the new indoor inhalation pathway. I think because you included the definition section, most of you probably have the definition in front of you, but I'm going to read it just quickly from Section 742.200. Residential property is defined as any real property that is used for habitation by individuals or where children have the opportunity for exposure to contaminants through soil ingestion or inhalation at educational facilities, health care facilities, child care facilities or outdoor recreational areas, and my question is, should the definition of residential property be amended so that the Tier 1 residential indoor inhalation remediation objectives clearly would apply to, for example, where children have the opportunity for exposure to contaminants through indoor inhalation at educational facilities, health care facilities, child care facilities or conceivably indoor recreational areas?

MR. KING: So you're looking at -- it says soil ingestion or inhalation, and then you're looking at how those modifiers are working there.

HEARING OFFICER MCGILL: Well, right. There's the -- well, several things. There's -- And you know the history of this provision probably as well as anyone back in '97. In R97-11 and R97-12 there was a lot of attention paid to this language, so, yeah, I think there's a question of whether soil ingestion or inhalation would cover indoor volatilization and then also the reference to outdoor recreational areas. At the time of the original TACO rulemaking, indoor recreational areas were specifically mentioned in the Board opinion as not being included, so I just was wondering if you guys revisited that definition in light of this proposal.

MR. KING: No, we did not, but I -- in looking at the definition in the context of the questions you've raised, I think we certainly will go back and look at this and consider submitting an additional errata on this point to clarify it.

HEARING OFFICER MCGILL: Thank you. And if -- while you're looking at that, if you could also -- I'm sure you'll be looking at R97-11 and 12, where there was a lot of discussion and Agency-proposed language. At

that time the -- there was an Agency proposal and the Board agreed to reference children specifically as opposed to persons, and there was a rationale for that, I think, at that time, and I'm just wondering if -- should that still be limited to children or should it be more broadly persons?

MR. KING: We'll look at both the children concept there and then the inhalation.

HEARING OFFICER MCGILL: Yeah, with -- I'm not trying to revisit decided issues or things that are already reflected here, but in terms of the indoor inhalation pathway in particular, since we're adding it, and residential property definition is such a touchstone --

MR. KING: Right.

HEARING OFFICER MCGILL: -- for this and for Part 740, I'd appreciate you guys taking a close look at that and getting back to us.

MR. KING: Okay. We will.

HEARING OFFICER MCGILL: Thank you.

MR. RAO: Mr. King, the definition of soil gas, I think the proposed definition states that it means air existing in void spaces in the soil between the groundwater table and the ground surface. Groundwater

table is a well understood, you know, term in the field. My question was, should we put that definition of groundwater table in the rule just to make sure anyone reading the rule will clearly know what it means?

MR. KING: You know, I -- I'm looking -- I'm getting these looks on this. We had -- I -- We had considered putting that in there. We found that once we started trying to look at it in different programs and site-by-site issues that it was going to be really difficult to have a single definition, but we can go back and think about that again.

MR. RAO: Yeah, I thought that may be one of the reasons for not putting it in, but sometimes we get these requests from JCAR, so I was thinking it had better come from you guys than we coming up with a definition really late in the rulemaking, so I'd appreciate it if you take a look at that.

MR. KING: Okay. Thank you.

MS. LIU: Miss Hurley, hi. Good morning. On page 7 of your prefiled testimony you explained that a volatile chemical is defined in a new way, differently from a VOC. The previous definition references to the vapor pressure as well as the boiling point, but the new definition of volatile chemical doesn't include a

reference or a limitation on boiling point, and I was wondering if you could explain why.

MS. HURLEY: We looked at several different physical chemicals of the property -- physical chemical properties of the chemicals, and boiling point did not really correlate very well with whether a chemical was analyzed as a volatile or semi-volatile, and we wanted to consolidate the two definitions of volatile chemical that we had in the rules, so we decided to drop boiling point from the definition.

MS. LIU: Also referring to those same two definitions side by side, there is a difference in the temperature referenced. One was 25 degrees celsius and the other was 20 degrees celsius. Was the reason for that change to approach Illinois-specific factors or indoor air temperature more closely, or was there another reason?

MS. HURLEY: We changed the current definition to 25 degrees from 20 degrees because most of the data is collected at 25 degrees C as opposed to 20 degrees C.

MS. LIU: Thank you.

HEARING OFFICER MCGILL: Ms. Hurley, this is just sort of a housekeeping question. There -- You

had -- There were a number of sources referenced in your prefiled testimony, and we were just hoping that the Agency could provide us with an author, a date, citation, you know, Web address, that sort of thing, so I'm just going to rattle off these sources, and if you guys can just follow up with us on that to provide that information.

At page 2 of your prefiled testimony you list sources that were used for the revised physical and chemical parameter values, specifically USEPA's Superfund Chemical Data Matrix, SCDM. Next is CHEMFATE. Next is PhysProp. It's P-H-Y-S, one word, capital P-R-O-P. The next is USEPA's Water, the number 9, software. Next is the Handbook of Environmental Degradation Rates. And then on page 3 of your prefiled testimony you refer to USEPA's Provisional Pier Reviews Toxicity Values, or PPRTVs. Next, USEPA's HEAST -- that's all caps, H-E-A-S-T -- and then the California EPA's toxicity values. And last, on page 18 you refer to the recommended exposure limit, REL, established by the National Institute for Occupational Safety and Health. If you could provide that additional information so we can identify those sources, we would appreciate it, and I'll ask that Kim Geving can take a look at whether any

of those need to be added to your list of studies and reports used in regulatory development. That's Section 102.202(e) of the Board's procedural rules. And last, the Agency proposal that we received doesn't seem to have a hard copy of an ASTM, so I wanted to give you that identification and then if you could provide a hard copy. It's ASTM D1946-90.

MS. GEVING: It was one of our incorporations that you did not receive? Is that correct?

HEARING OFFICER MCGILL: Yes.

MS. GEVING: Okay.

HEARING OFFICER MCGILL: Thank you.

MR. RAO: Mr. King, I had a question on Section 742.227, "Demonstration of Compliance with Soil Gas Remediation Objectives." This is in subsection (d). The proposed language states that soil gas remediation objectives shall be compared to concentrations of soil gas collected at a depth at least three feet below ground surface and above the saturated zone. First question is, does saturated zone mean groundwater table in this context?

MR. KING: It means the top of the capillary fringe, is what we are talking about.

MR. RAO: Okay. So it's not the same as -- groundwater table as soil gas is defined, I guess.

MR. KING: Hang on just a second.

MR. RAO: Yeah.

HEARING OFFICER MCGILL: We can go off the record for a moment if you like.

MR. KING: Can we -- Why don't we -- We'll come back to you after lunch on that one.

MR. RAO: Yes. Okay.

HEARING OFFICER MCGILL: Why don't we go off the record for one moment.

(Discussion held off the record.)

HEARING OFFICER MCGILL: The Agency has indicated that they will provide an additional response to Anand Rao's question after we take a short break, so why don't we proceed with our next question.

MR. RAO: Next question is on Section 742.812. Subsection (b) of this section sets forth that thickness of the capillary fringe layer is 17 centimeters, and subsection (c) states that volumetric content of the capillary fringe shall be 90 percent of the total porosity of the soil that comprises the capillary fringe. Mr. King, can you please explain the rationale for, you know, setting the thickness of the

capillary fringe and the volumetric water content?

MR. KING: We went back and looked at the documents that USEPA used in their initial guidance document and how they derived those numbers, because that's where we're taking those numbers from. We're coming from the USEPA guidance document, and in that document they talked about the difficulty of on a site-by-site basis evaluating and determining those numbers and that really it requires a comprehensive set of studies over a -- you know, over a range of materials to be able to reach some conclusion, so we really kind of tracked how they were approaching the issue and not having really people spend a lot of time trying to figure out something that would be a much larger study than what should be applied on an individual site basis.

MR. RAO: Did you look to any Illinois-specific information?

MR. KING: No. We just went off the nationwide materials.

MR. RAO: Okay. Thank you. Miss Liu just alerted me that -- could you please give us a citation to the USEPA document that you used to get that information?

MR. KING: It's in our incorporations by reference. It's just a matter of finding that.

MR. RAO: Okay. If you want, you can provide that later.

MR. KING: Okay. It's described as the "User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings," February 2004. That's one of our incorporations by reference.

HEARING OFFICER MCGILL: While we're talking about incorporations by reference, I was wondering if the Agency could identify in a motion to incorporate Rick Cobb's testimony from the pending R08-18 proceeding. In Ms. Hurley's prefiled testimony there's -- pages 1 and 2 reference to the main revisions to the tables and then how Rick Cobb, the Agency provided testimony on the addition of chemicals to the proposed groundwater standards during the Part 620 hearings. It would just be helpful and for the completeness of this rulemaking record if we knew specifically what portions of the R08-18 record you thought were relevant to this proceeding, and you could certainly do that in the form of a motion to incorporate the portions from R08-18 into this rulemaking.

MS. GEVING: We'll take a look at that.

HEARING OFFICER MCGILL: Thank you.

MS. LIU: Miss Hurley, I have another

question for you. On page 2 of your prefiled testimony you state that the revised chemical parameter values are the results of updates in the sources that IEPA uses for information, and we were just wondering if you could please clarify whether the Handbook on Environmental Degradation Rates has been updated since it was published in 1991 or if that was the only one that you had.

MS. HURLEY: That has not been updated.

MS. LIU: Okay. Thank you.

MR. RAO: I have one more for you, Miss Hurley. On page 7 of your testimony you state that USEPA's definition for volatile chemical includes many polynuclear aromatic hydrocarbons that do not volatilize in a specific amount. Could you please clarify whether any of these chemicals are included in Appendix A, Table J?

MS. HURLEY: Appendix A, Table J is the list of TACO volatile --

MR. RAO: Oh, okay. Yeah.

MS. HURLEY: -- chemicals for the indoor inhalation exposure route. That includes Naphthalene and 2-Methylnaphthalene, which I believe are the only PNAs, and it does not include any of the PNAs that would not volatilize. That's why we chose the definition that we

have in TACO for volatile chemical, to exclude the chemicals that would not volatilize.

MR. RAO: Any reason why USEPA included some of these PNAs which do not volatilize as volatile chemicals? Is there any concern with those chemicals in terms of indoor inhalation? I see Dr. Salhotra shaking his head here, saying no, but --

DR. HORNSHAW: Part of the reason we chose naphthalene is because it's included in both method 8260 and method 8270, 8260 being volatiles and 8270 being semi-volatiles, so we chose that as a cutoff point to determining whether a chemical meets the definition of volatile chemical or not.

MR. RAO: Okay. Thanks for the clarification.

MS. GEVING: Could we just have Dr. Salhotra sworn at this point? Because he may want to add some testimony.

HEARING OFFICER MCGILL: Sure. Would you please swear in the witness?

(Witness sworn.)

HEARING OFFICER MCGILL: You want to go ahead and introduce --

MS. GEVING: This is Dr. Atul Salhotra with

the RAM Group out of Texas, correct? Dr. Salhotra, do you have anything to add to that last question, any response?

DR. SALHOTRA: I think that's correct. The other one you can add is the solubility of those chemicals is very small, so there's going to be very little of those chemicals present in the groundwater.

MR. RAO: Okay. That helps. Thank you.

HEARING OFFICER MCGILL: Thank you.

MS. LIU: Miss Hurley, you're on the hot seat today. In Appendix C, Tables B and D, the Agency proposes to revise the source information for some of those parameters listed from what was used as IEPA and then, in parentheses, IRIS/HEAST, to simply just the Illinois EPA as the source. You explain on page 11 of your prefiled testimony that this is simply to simplify the source information. I understand from reading your prefiled testimony and now the record explains how this reflects the new hierarchy and -- that was described in the OSWER Directive. However, I think the simple reference in the table now to just Illinois EPA might be a little too vague for somebody actually using the table later on. I was wondering if it might be possible for the Agency to consider maybe a footnote to that Illinois

EPA source that might elaborate on what sources you did consider in an overall sort of way.

MS. HURLEY: Most of the -- well, all of the toxicity values that were used are on the Agency's Web site, in the Bureau of Land TACO Web site. That's one of the reasons we referenced -- we put the source as Illinois EPA. We could put that in a footnote, refer people to the Agency's Web site. It might get a little complicated to put all the sources in a footnote that we considered, the IRIS and HEAST or Cal/EPA or PPRTVs.

MS. LIU: Is the Web site something that would list those kinds of things, then, if somebody went there to look?

MS. HURLEY: I don't believe -- We don't believe it has the source, the source listing on the Web site. I think -- We think it's just the values.

MS. LIU: Just for the benefit of the user to understand what the source of the information is?

MS. HURLEY: Okay.

MS. LIU: For me, I could just put your phone number down, but somebody else using it, I don't know if that would be appropriate.

MS. HURLEY: Okay. All right. We'll consider it. Thanks.

HEARING OFFICER MCGILL: And certainly if you just want to reconsider keeping it the -- I have focused on that part of the proposal or your testimony, but it looks like you're considering just streamlining some, instead of having IEPA, IRIS/HEAST, it would be Illinois EPA, and so I'm sure one of the things you'll look at are the merits of making that change or keeping it for the more descriptive language.

MR. RAO: And I had a question for you, Miss Hurley, along the same lines regarding the default physical and chemical parameters you have in Appendix C, Table E, and on page 11 of your testimony you note that these default physical and chemical parameters are based on several USEPA online databases and the Handbook of Environmental Degradation Rates, and in Table E it basically lists the physical and chemical parameters but there's no information about the sources. Does IEPA's TACO Web site have any information about where these parameters are coming from?

MS. HURLEY: Well, no, we don't believe it -- the Web site contains that information. I think -- We think the Web site just lists the values.

MR. RAO: Do you believe it would be helpful for the regulated community or anyone who's interested in

looking at the rules to see where these numbers come from?

MS. HURLEY: I -- Are you suggesting that we footnote each individual value with the reference?

MR. RAO: Have you done that? I'm not expecting you to put a footnote for every chemical. At least in the record there's no information as to where these numbers are coming from. For example, recently when we did the groundwater rulemaking, which is still ongoing, for every change there was information provided into the record as to the source of the default parameters that were used in determining those standards.

MS. GEVING: Would the Board consider perhaps doing a board note at the very end of a table stating that the various chemicals may have come from and then list X sources just as a general board note at the end, perhaps?

HEARING OFFICER MCGILL: We can certainly look at that. I think right now we're just -- we're less concerned about the rule language and more just developing this record so that we know the source of the proposed values.

MR. RAO: Yeah.

MS. GEVING: Okay. We can take a look at

that and see -- maybe make a suggestion the best way to get that information in there.

MR. RAO: Thank you.

HEARING OFFICER MCGILL: Thank you.

CHAIRMAN GIRARD: Let me just -- I want to go back to something Anand asked about earlier for, you know, consider looking at the definition of water table and whether we should include that here, but also bring in another question that wasn't quite answered dealing with capillary zone and saturated zone. Maybe when you're considering whether or not to put a definition of water table in here, maybe we should also look at a definition for capillary zone and saturated zone.

MR. KING: Okay.

CHAIRMAN GIRARD: And then in addition to your proposed language, if you decide to put that in, you know, give us a discussion of how these different terms would interrelate, whether they're distinct terms or whether they overlap, whether you've got a general term or whether you've got a general understanding throughout the rule that's very specific.

MR. KING: Okay. I think that's a fair request, and we'll look at how best to handle that.

CHAIRMAN GIRARD: Thank you.

HEARING OFFICER MCGILL: I think at this point we're going to take --

MR. KING: Can I just --

HEARING OFFICER MCGILL: Sure.

MR. KING: I want to make one other comment, and just kind of going back to Mr. Reott's comments about the significance of this rule, I wanted to -- a couple comments on what we have done with this proposal that are different from what has happened in other states, okay, because you may -- in the course of reading about the controversies related to vapor intrusion, you might, you know, hear or read about what's going on in the different states and their approaches. We've done two really I think significant things that are different. One is related to the different forces that act upon contaminants as they move through soil gas into a building, and Dr. Salhotra will talk about this later, but the concept of diffusion and advection, okay? In our Tier 1 table, we developed the numbers based on diffusion. In other states, they have developed their objectives based on diffusion plus advection. It makes for in some cases a considerably more conservative Tier 1 number. We didn't think that that was -- it was necessary to use that advection component in establishing

a Tier 1 table; that we felt that what we had was conservative enough as it was and adding in those -- that advection component was going to be overly conservative for a Tier 1 table.

The second thing we did which is different from a number of other states, you'll see for instance in New York and New Jersey, they are -- basically they're reopening a huge number of closed sites to relook at the indoor inhalation component. We're not proposing that be done. In fact, one of the questions that IERG posed to us really was related to information on our Web site that we -- which we discussed that. We're not -- The only time we're planning on looking towards reopening a site that's got an NFR letter in place is where we've got new site-specific information that indicates that there is an actual problem. We're not going to approach, as other states have had, of reopening all closed sites to relook at this. So it continues to be and Mr. Reott is correct that this is a significant rule, but I just want to point out that we've done some -- we've made some significant decisions that are embodied in here that tend to reduce some of the difficulties that other states have had as they've implemented vapor intrusion policies or guidances, or however they're doing it.

HEARING OFFICER MCGILL: Thank you.

MS. LIU: May I ask a question to follow up on that?

HEARING OFFICER MCGILL: Sure.

MS. LIU: How does the Agency envision new site-specific information coming out as a result of a problem or somebody just being curious?

MR. KING: I think it's going to be more of a situation where there's a problem identified.

MS. LIU: Okay.

MR. KING: You know, there could be a situation where a new owner comes in and now is evaluating the site for some reason and thinks that there is a problem and now they want to come back and address it, or we could get a citizen complaint relative to a problem. That's what -- That's the kind of situation we're looking at, something that's focused on that site.

HEARING OFFICER MCGILL: Thank you. At this point we're going to take a ten-minute break. It's 12:25, so we'll start up again at 12:35. We'll go off the record.

(Brief recess taken.)

HEARING OFFICER MCGILL: Why don't we go back on the record, and I believe we're going to proceed

at this point with the slide presentation and testimony of Dr. Salhotra.

MS. GEVING: Correct.

HEARING OFFICER MCGILL: Thank you.

MR. KING: Before we begin, could I just give a few brief comments about --

HEARING OFFICER MCGILL: Sure. Is this regarding the follow-up to the --

MR. KING: No, it's actually in regard to the presentation.

HEARING OFFICER MCGILL: Okay. I wasn't sure. You had potentially wanted to follow up on -- supplement one of your responses to Anand Rao's question.

MR. KING: Yeah. I think what we're going to do is rather than respond to that today, Board Member Girard really, you know, posed the question to us about definitions for saturated zone and water table and capillary fringe, and I'd like to really for purposes of the next hearing come back and have something as a concrete recommendation on those as a way to respond to that question.

HEARING OFFICER MCGILL: Thank you.

MR. KING: Dr. Salhotra has been involved with us on a consulting basis in helping us put together

our proposal, and as you will see, he's got a -- he's taught classes here at IEPA relative to this pathway, and our association with him goes back many years. When we were first developing the TACO rules back in the mid '90s, Dr. Salhotra made presentations to us with regards to kind of the whole fabric of how cleanup objectives fit together with the risk issues and that, so we've had a long history with him, and, you know, we wanted to have him present to the Board here relative to the indoor inhalation pathway because we thought it'd give the Board a little better understanding of some of the real fundamental scientific issues related to this pathway, and that's his purpose in being here.

DR. SALHOTRA: Thank you very much for having me here and for your patience. Given the weather and so forth, I wasn't sure whether I'd make it here, but thank you very much. And as Mr. King mentioned, I've been associated with the Department for several years now, and last few years in particular we've been doing a lot of work related to the indoor inhalation pathway. We've had training here, we've had a lot of discussions, and I really enjoy -- it was a very enjoyable experience in working with the team that is over here, and I think it's a fantastic team that has worked very hard to

understand the pathway and put together a methodology that is very practical and recognizes that there are a lot of controversies and there are a lot of scientific information that is coming out of this pathway, and it has a very good balance of being very practical and very feasible, and I think it'll be a great program to see how it works.

So with that, the agenda here is I'm going to talk about three main things; introduction to the pathway -- and some of it may be repetition because you all have heard about it, thought about it, seen it. The second part is how do chemicals move in the soil and what are the forces that drive chemicals to move from the source into the buildings, and also talk about the methods that are out there to evaluate this pathway.

So let's talk about the pathway. What we are -- The pathway that -- The new inhalation pathway is shown to the right, and this is what we already have in the TACO program, so this is a situation where you have soil that is impacted, has some chemicals that may volatilize, and then you have a building sitting on top of this contaminated material or a building that may be built in the future, and the concern is vapors might radiate from this soil, entering the building and causing adverse

health effects to the people living inside the building.

And this is -- it's in the unsaturated zone above the water table, and the second pathway that we are talking about is very similar except that the contamination is now under the water table, so it's in what we call the saturated soil, saturated with water, and above this water table, which of course fluctuates over time, there is a capillary fringe, which is a zone which is essentially full of moisture, and vapors can migrate through the capillary fringe through the unsaturated zone and get inside the homes and cause a potentially adverse health effect. So the big question is, how clean is clean, how clean is this groundwater, what should be the concentration of the groundwater that will make it safe for people to live on top of this type of a situation, or, if they are not there, to build a building, and it could be a residence, residential building, or it could be a commercial/industrial type of building.

So when you think of this pathway, there are six discrete side effect things that are happening here. The first one is that you have some contamination under the building, under the ground surface, and chemicals have to volatilize, and not all chemicals volatilize, so in the

rule we have a definition of what is the -- it has a definition of volatilization, and there is a list, as we talked earlier, of the volatile chemicals. Once the chemicals volatilize, then they have to migrate, because if they volatilize and stay there, ten feet, fifteen feet, five feet below the building, there is not going to be any adverse risk to anyone. So in this particular case, the second step is for those chemicals to migrate from the point of volatilization. We can call it source for -- the source that we refer in the definition to, but for this, we can think of that as a source and migration of those chemicals into the buildings, so that's the second process that will happen.

The third thing is for these chemicals, they must enter the living space or the working space inside the building, because if they stay outside the building and the building prevents it from migrating into the building, again, there will not be any adverse health effects to people who are inside the building. So that's an important third step. The next thing is once chemicals enter the building, those chemicals mix with the indoor air because there is a natural draft, natural mixing going on of the air inside the building, and that causes those chemicals to mix with the air, which then

have to be inhaled by the individuals to cause potential adverse health effects. So the fourth step causes a certain concentration in the air. The fifth step is obviously if there are people living there, they would be breathing, and so chemicals potentially get inside there or the body, and then we look at the toxicity of the chemical to see if it is a potential adverse health effect. So in the rules that you are seeing, there are these six steps that are -- that help you evaluate this part.

BOARD MEMBER LIN: May I ask a question now?

DR. SALHOTRA: Sure, any time.

HEARING OFFICER MCGILL: Sure.

BOARD MEMBER LIN: The mixing, vapor and air, is there any chemical reaction that become nontoxic or more toxic?

DR. SALHOTRA: Yeah. Typically the chemicals that we are talking about are not going to react with the air inside the building and cause some chemical reactions, so typically we are talking about very low concentrations and we are not talking about any reaction inside the building.

So these are the six steps, and it helps you conceptualize and break this complex process into

individual pieces and kind of visualize as to what's happening here.

Now, as we talk about this, one of the factors that affect the migration of these chemicals into the building -- and there are several factors -- first of all, the source is important; in other words, what type of chemicals do we have, which chemicals do we have and where are they located, are they three feet below the building or are they fifteen feet below the building. So the characteristics of the source have an effect on this pathway. Then we have the media through which chemicals migrate. We already talked about capillary fringe, the vadose, or what's called the unsaturated zone, the building materials through which chemicals may migrate into the building and if there are cracks in the floor, they are not open cracks, there are some dirt or soil inside those cracks. So those media have an effect on the migration, and then each of these media has certain properties, like the porosity, water content, permeability and organic carbon content, which essentially describe each of these media, so -- and I think all of these terms are the ones for which there are default values and for which are defined in the rule, proposed rule.

Other factors that affect this pathway are the characteristics of the building, the type of air conditioning system you have, the amount of ventilation you have in the building, the size of the building, whether you have any preferential pathways that allow vapors to get into the building, the use of the building, so these are all characteristics of the building, and then of course we have the general climatic factors. The higher the temperature, the greater is the volatilization, or if the -- there is an atmospheric pressure which is a low atmospheric pressure, you could have degassing of the vapors. So these atmospheric pressure are generally a very transient phenomena, and so -- but the temperature can have an effect, although we are talking about chemicals coming from five, six, ten feet below ground where the temperature does not change as much as it will change in the atmosphere.

But these are all the factors that are considered, and because of all these factors, this pathway is more complex than the other pathways, and in fact, in the last four or five years, I don't think you could have gone to any environmental conference or gathering of individual professionals without having some discussion of this pathway, and what makes this complex

is the factors listed here. First of all, there are many factors that affect the migration intrusion of vapors into a building. Not only are there many factors, but these factors also have some spatial and temporal variability. Things change in time. The ventilation system in the building changes with time. The concentrations of chemicals in the soil is going to be different, so there's differences in space and time.

There are many factors that are site-specific but they cannot easily be measured, so we have to rely on good professional judgment and default values. We already talked about -- There was a question about capillary fringe. It can vary from one location to another, but it is difficult to measure, and so a more practical approach is to adopt some default values that are generally accepted in the industry. The number of cracks and the size of cracks in the walls of basements or floors affect this pathway.

The other complicating factor is that there are many chemicals that have indoor sources. The same benzene that we consider a contaminant, we have a leak of gasoline, is also the chemical that is generated if someone smokes inside a house. The same solvents, PCE, that we consider a contaminant is the chemical that

dry-cleaners use to clean our clothes. Every time we bring clothes into our house that are dry-cleaned, we bring trace of those chemicals into our home. A lot of our cleaning products have those chemicals. So that adds a big -- a huge dimension to the complexity of this pathway, and because of these indoor sources, if you have elevated indoor air concentrations, they -- it does not necessarily imply that there is a contamination problem under the building, so those high sources may just be because of the activities that are going on inside the building.

The -- So those are all the complexities, but the first thing that we have to do is determine whether this pathway is really complete, whether we need to evaluate this pathway at a given site, and here are some factors that have to be present for the pathway to be complete. If the pathway is not complete, that means it does not need to be evaluated on the site. So the first one is the presence of volatile chemicals. If you have a site with only metals problem, other than mercury, then you will not have any vapor intrusion issues. The presence of a building, current or in the future, the -- and typically, if you have a building, you are going to have some human receptors inside it. The question is for what

period of time. And then if you do not have a barrier that prevents the migration of vapors into a building, then in those situations this pathway will be complete and has to be evaluated.

Now, we have a history of evaluating this pathway. The most recent major publication is the ASTM standard, although there is some debate as to how that standard can be modified and adjusted or perhaps even removed, but it is a good document, has a lot of good references and is being actively used in many parts of our country.

Now, the next part of the discussion is how do these vapors move, so if you imagine a building with ten feet of clay under it and below that you have a volatile chemical, what causes those molecules of benzene or any of the other volatile chemicals to get inside the building? There are two known forces or known phenomena that cause that to happen. The first one is diffusion and the second one is advection, and in the next few slides I'm going to briefly talk about each of these two processes.

So the first one is diffusion, and diffusion is something that happens all the time, and what -- the best way to visualize it is if you take a bowl of water and

drop -- put a drop of ink over there in the middle of it and let it sit there for a long time, and we know just from empirical experience that over time that blob of ink or that blob of color will spread in the water, so the fact that it spread means that the molecules of ink have vibrated from where we put the drop to further away from that source. That phenomena is what we call diffusion, and it happens because molecules are always in a state of continuous vibration. In solids they might vibrate slower; in gas they vibrate at a higher frequency and have a -- can travel more. And so diffusion, although in this case I was talking about water because you can visualize it, the same thing happens in air, and so this is the phenomena of diffusion.

So just a few characteristics of this, it occurs due to molecular vibrations, and none of us here have any control over how the molecules vibrate, and so that's why this is a primary phenomena that happens all the time. It causes mass to move from areas of high concentration to area of low concentration, and high concentration, low concentration is where you have a large number of molecules versus less molecules, and in nature, the effort is to reduce those differences, and so vapors will move from high concentration to low concentration. We

have high concentration in the source, ten feet, five feet, three feet below the building, we have low concentration inside the building, and so there is a diffusive flux or diffusion that will cause -- that will tend to equalize the concentrations, and we've known this phenomena for a very long time, and mathematically, there is a law called the Fick's law which we use to estimate how much of the benzene from the subsurface soil gets inside the building by diffusion, and this is the phenomena that we have included in the proposed rule.

Now, the other mechanism by which -- well, before I get to that, these are the various factors that come into diffusion, and we already talked about porosity and water content and the spatial variability, and those are all factors that are included in the rules. For example, you can have a building here, and what you see here is the foundation or the floor of the building and these are the cracks, and you can have some clay, you can have some sand, and below that you might have the source, and so vapors have to diffuse through sand, through clay, through these dirt-filled cracks to get inside the building, and this variability in the subsurface formation is included in our evaluations.

Now, the other mechanism by which vapors can get

inside the building is what we call advection, and advection is the migration of chemicals due to bulk movement of air which occurs due to pressure differences. If you have an area of high pressure and an area of low pressure, you will have movement of air. That's why we have wind speed, that's why we have ocean currents. And so if we have a building that is under low pressure and we have high pressure under the building, then that high pressure will essentially push the vapors into the building, and that process is what they call advection. It's no different than what happens in a vacuum cleaner. It basically sucks the dirt. It has high pressure at one place, outside the pressure is low, and so it pulls the dirt away from the -- it pulls the dirt.

So the -- So this particular phenomena is variable. If you do not have a pressure difference between the building and the source, this pathway will not -- this process will not occur. Also, the zone of influence of this pressure is very small, so if -- even if you have a low pressure in the building, about four or five feet, three feet below the building, that effect of that low pressure is not as strong, and so for this and other reasons, this is included only in Tier 3 of the proposed rules. So we don't neglect it completely, we

incorporated it into Tier 3 if the situation requires that it be evaluated.

Now, I hope this gives you some general idea of the pathway we are talking about and how chemicals move. The next part of my discussion is so how do we develop a methodology to evaluate this situation, and different states have different ways to evaluate this pathway, but if you look at all the states and the ASTM standard and USEPA's guidance and any of the numerous papers and publications, you can divide all the methods into two categories, so the first one is where you evaluate the pathway by collecting indoor air samples, so you go inside the building, whether it is commercial, industrial or a residential, and you measure the indoor air concentration and then you see if it meets the indoor air standard.

The other approach is where you actually collect soil, groundwater or soil gas samples below or adjacent to the building and then use that to decide whether the situation is safe or not. So in other words, rather than having indoor air standards, you have standards that apply to the soil vapors or the soil contamination or groundwater contamination, which is where the problem is originating. So there are two very different approaches,

and different states use different combinations of these approaches, they give different weights to these approaches, and each of them has its own unique pros and cons, so let me briefly talk about that, and then I can just tell you how we are handling these two approaches in the proposed rule.

The -- If you decide to use the first approach, which is to go inside the building and measure the concentration, you have to do two things. First you have to measure the concentrations and then you have to evaluate the measured concentrations, and measuring the indoor air concentrations is not that difficult. You know, you can -- if you follow the correct protocols and you put your instrumentation correctly, it's a relatively straightforward procedure. It is intrusive, so it has certain disadvantages, but it can be done rather easily, but the problem is, once you get the data, evaluation of that data makes it very difficult because of the numerous indoor air sources of chemicals, so if you measure concentration in an industrial building that we suspect is being impacted by vapors coming from below and we go inside and we measure the concentration, we don't know whether that concentration is coming from below into the building or whether it is because of chemicals that are

stored inside the building, and the chemicals that we are dealing with oftentimes are not so unique that we wouldn't have them inside the building, so that makes it very difficult to evaluate the data and to determine what is the cause of the problem, if there is one. And so because of this reason and because here are all the sources of indoor air pollutants that we are talking about --

MR. KING: Is that your basement, Atul?

DR. SALHOTRA: Well, in Texas we have big garages that look like that. Yeah, it's only in Texas you'll have a $30,000 car outside and everything in the basement -- in the garage is what's probably $1,000, right?

So anyway, there are many, many indoor sources, and so what we have said in our rule is that in Tier 3, on a site-specific basis you can measure indoor air concentration, then evaluate them if it makes for a site-specific -- if that type of evaluation and analysis is required at a site. However, in -- what we do in the rule is we have soil, groundwater and soil vapor concentrations that were developed using a model that is publicly available and has been used by USEPA and many other agencies and states.

Now, this model, it's obviously a very technical model, but what it really does is simulates those six steps that I talked about earlier, the volatilization of chemical, the migration of chemical entering into the building, mixing with the building, and then somebody breathe that, and then it calculates the risk, okay? So without spending too much time in the nitty-gritty details of this model -- and of course you can ask me questions and I'll try to answer those -- but basically, this model simulates those six steps using indoor parameters that we talked about some of those that are default values, which are all in the rule, and then comes up with what we call the acceptable soil and groundwater and soil vapor concentrations. So we have three standards, so to speak, soil concentration, groundwater concentration and soil vapor concentrations, below or adjacent to the building that are considered protective of this pathway, and those are based using this model and using the diffusion process that we talked about and using the six steps that I alluded to earlier.

And we can go through each of the steps. The way the model does the calculation is it first looks at the building and says what is acceptable concentration inside the building. That of course depends on how long a

person is there and their characteristics and of course the toxicity of the chemical that we are dealing with, so it takes that value and then does a calculation for each of those other five steps now, because the sixth step is just done, five steps, and comes up with a factor which we call the attenuation factor. Now, this is like a catch-all factor which accounts for the soil, the chemical properties of the chemical, the properties of the building and all those factors that we talked about and gives you the relationship between the concentration inside the building and what you can expect ten feet below the building, and this -- of course that relationship depends on the type of soil and the characteristics and so forth, and those are all accounted for in this model and sort of embodied in this attenuation factor. And so in the first step, we -- the model calculates what is acceptable for us to breathe and in the second step it calculates this alpha, and based on that, it calculates an acceptable soil gas concentration.

So as I mentioned, the attenuation factor accounts for the migration of contaminants from the source through the vadose zone. The source of contaminant can be either soil or groundwater, and if the chemical is in groundwater, then we have the capillary

fringe through which vapors have to migrate. The attenuation factor also accounts for the migration of contaminants through cracks in the slab-on-grade or basement floor and then mixing within the air inside. So all those factors we talked about are embodied in this factor.

Now, the last thing over here is sometimes the way chemicals occur in groundwater is shown here, and what you have in each of these closed -- the picture of closed thing over here is a particle or soil, so this could be a sand particle, this is a gravel piece and clay particles, and in between these various clay particles is space, and that space is either filled with some moisture which may have chemicals in it or some of that space is filled with vapors, which are the ones we are talking about that migrate, and then some of those chemicals are absorbed onto the soil, and so within the model, it accounts for this complex soil that occurs below the building and looks at how much of the chemical is in the moisture, how much of the chemical is in the vapors, how much of the chemical is stuck to soil, and uses this information to come up with the soil, groundwater and soil vapor target levels.

And so if you summarize the -- kind of the entire

sequence of how this model works, you start with what is considered the acceptable risk level, which has not changed from the existing TACO regulations, and you look at the toxicity of the chemical and the human body's response to these chemicals and you estimate what is an acceptable indoor air concentration, and then we have another model that does calculations to come up with the attenuation factors, and by combining the attenuation factor and the indoor air concentration, you can get what we call the acceptable soil gas concentration, and this soil gas concentration here would be the Tier 1 remedial objective. This is like the standard for soil gas. And based on the properties of the soil and how the chemicals partition between soil and groundwater and moisture, you then can also estimate soil and groundwater concentrations. So these are the three ROs that we have in our proposal, soil gas concentration, soil and groundwater concentration.

And to summarize, the indoor inhalation depends on soil vapor concentrations; it depends on the parameters of what is between the source and the building; it depends on the building and certain environmental parameters; and these are the parameters that are included in the various tables for which we have

default values, which can obviously be changed to meet site-specific conditions under Tier 2 or Tier 3.

So finally, the indoor inhalation pathway is conceptually simple. We have the six steps from the source to the building. There are many input parameters on which this pathway depends on. The data that is necessary can be collected and analyzed in a timely and cost-effective way, the ones that we are requiring people to collect. There are others that is a little bit more complicated and costly, and so we have default values for those. There are simple methods that can be used to make the pathway incomplete. There are -- The rule allows vapor barriers and other types of mechanisms to close the pathway, so with the correct type of risk management and correct type of barriers, you can make a pathway incomplete, and then it involves building control technologies and suggests that those be evaluated up front as part of evaluating this pathway.

So I think I'll stop here, and again, as I mentioned earlier, the rule that we have is very practical, it's a very usable rule, and I think it strikes a very good balance with the size and the practicality of dealing with this pathway.

HEARING OFFICER MCGILL: Thank you.

DR. SALHOTRA: I'll take any questions that you have.

HEARING OFFICER MCGILL: Mr. King?

MR. KING: Atul, I just wanted to just clarify a question, just because this is on the record, and it's kind of a small point, but I want to make sure. The slide that you discussed the step 2 attenuation factor definition --

HEARING OFFICER MCGILL: And let me just interject here that the slide presentation is Hearing Exhibit 4. Thank you.

MR. KING: I think, as I recall, you said that this allows you to calculate, then, an objective at ten feet, but I don't think you intended that to mean only at ten feet. It would just be -- That would be -- It would allow you to calculate at a depth of ten feet, but you could calculate it at other depths.

DR. SALHOTRA: That's right. This -- Yes, and that's a -- this alpha or the attenuation factor helps you calculate concentration at any depth below the building, and so, yes, that's correct.

HEARING OFFICER MCGILL: Thank you. Are there any questions from any members of the audience for Dr. Salhotra? Go ahead. If you could again just restate

your name.

MR. REOTT: Raymond Reott. Doctor, what are the forces that would retard the movement part of the migration in this system that you've defined? Absorption I assume would be one of them. What other forces are there?

DR. SALHOTRA: Well, the -- as vapors migrate from the source, they can absorb through the soil, and that absorption through the soil can slow their migration into the building, so that's one. But I think the other factor that you might be thinking about and -- is that as those vapors might move up, certain of those vapors, they biodegrade, and so it doesn't retard the movement, but it reduces the amount of vapors that get into the building.

MR. REOTT: How are these two factors reflected in the model, absorption and biodegradation?

DR. SALHOTRA: Yeah. The absorption, when we first calculate the soil vapor concentration using this attenuation factor and then when it is converted to an equivalence or a concentration, absorption is taken care of at that point, so that's one place. As far as the retardation during the process of vapors migrating, that is not accounted for, and it's reasonable not to

account for it because the assumption is we have a large source, and so the -- and it's a steady-state situation, so retardation will only delay the -- or even slow the movement, but it will not reduce the movement, so as far as -- that's as far as retardation is concerned. So the retardation that happens while the chemicals are moving, the vapors are moving, has not been accounted for, but it's not necessary because we are dealing with more technically, if you recall, an infinite source, so if -- when you have an infinite source or a very large source, then that factor is not relevant.

As far as biodegradation is concerned, that I believe can be handled in a Tier 3 type evaluation. In Tier 1 and Tier 2, the assumption is that the vapors do not migrate, and there's a technical reason for that, because really, biodegradation is such a site-specific phenomenon that we cannot come up with a generic biodegradation rate, and so it's best handled on a site-specific basis if necessary in a Tier 3 type evaluation.

MR. REOTT: Would the rate of absorption be affected by the choice of sand as your default material in the vadose zone?

DR. SALHOTRA: Yes, sand versus clay will --

well, if you're talking about retardation, yes. The organic carbon content and the sand versus clay will affect retardation. However, because we are talking again of a very large infinite type source, steady-state situation, retardation has no effect, so whenever we are dealing with a non-degrading steady-state situation, retardation in the movement is not relevant. All it does is it delays when steady state is reached.

MR. REOTT: One of your slides described the, quote, key technical components of the Johnson and Ettinger model, and one of the bullet points was, quote, finite source and infinite source. I take it the model allows for the consideration of either of those two options.

DR. SALHOTRA: Well, the original -- yes, the model allows for that, but in our program, if someone really wanted to use finite source, which would be very, very, very rare situation, it would be -- could be dealt with as a Tier 3 evaluation.

MR. REOTT: The current Tier 1 numbers have been calculated, however, using an infinite source assumption?

DR. SALHOTRA: Yeah, that is correct.

MR. REOTT: Just to make it clear.

DR. SALHOTRA: That is correct, but I think we shouldn't go away thinking that infinite means thousands and thousands of kilograms of contaminants. I mean, that's not what we want. What we are really talking about is a steady-state source, and so the amount of vapor that get into the building relative to what we have is what we have to consider in terms of infinite, so I don't want anybody going away thinking that infinite like we normally think of infinite being huge and endless. What we are talking about is the relative mass that goes in versus what comes out.

MR. REOTT: But the system has reached stability.

DR. SALHOTRA: It's reached a steady state, yes.

MR. REOTT: Does the mixing that occurs under the model depend on the assumptions that are made about the building size?

DR. SALHOTRA: The mixing -- It is assumed that the air inside the building is completely mixed, so the air inside the building, whether it is a small building or a big building, is assumed to be completely mixed, so I don't know if that answers your question.

MR. REOTT: For purposes of back calculating

the remedial objectives for either soil gas or groundwater or soil, you have to assume a particular building size.

DR. SALHOTRA: That's right.

MR. REOTT: Okay.

DR. SALHOTRA: And that building size, the default values are given, and the assumption is that within that building the air is completely mixed.

MR. REOTT: The -- There's also -- one of the steps is sort of the entry into the building from the subsurface.

DR. SALHOTRA: That's right.

MR. REOTT: There also must be a set of assumptions about the frequency of cracks and media within those cracks in the foundation.

DR. SALHOTRA: Yes, but going back to your previous question, if you had a situation, let's say an industrial setting, where there were two buildings with very different ventilation rates because of the process that they had going on, the -- you could include that in a Tier 3 evaluation as we separate buildings by different rates, so although for Tier 1, the size of the building and inhalation -- and the mixing is -- there's a default value in a Tier 3 setting that can be modified. But,

yes, there are certain -- to answer your second question, yes, there are default values for the cracks and so forth which are in the rule.

MR. REOTT: And last, I don't mean to monopolize this, but you had explained some of the reasons why it was hard to evaluate indoor air measurement data. If you had negative data -- i.e., you measured and you did not find a chemical -- is that as hard to evaluate, or are you talking about false positives?

DR. SALHOTRA: No, you are right. If you go inside a building and measure indoor air concentrations and those indoor air concentrations are below the standards for indoor air, then the obvious conclusion is there is no problem, so it doesn't matter whether whatever you measured there, it came from inside the building or below the building, so you are right. If you measure indoor air concentration and the concentrations are acceptable, then, yes, there is no problem. However --

MR. REOTT: And that would assume that you measured under representative --

DR. SALHOTRA: That's right. That's why in my slide "representative" is underlined, which means, you

know, summer versus winter and, you know, weekends versus weekdays, so there can be a lot of variation. There's a lot of temporal variability. So as long as you can come up with representative values, which may be difficult in a particular situation or may not be depending on the situation, that could happen, and that's why that's allowed in Tier 3.

HEARING OFFICER MCGILL: Any additional questions for the Agency witness? Seeing none, the Board has one question.

DR. SALHOTRA: Sure.

HEARING OFFICER MCGILL: Maybe more, but go ahead.

MS. LIU: Dr. Salhotra, thank you very much for your presentation. In the Johnson and Ettinger model there's a parameter N, as in Nancy, and it's the total number of layers of different types of soil that vapors migrate through. As used in equation J&E9a, I was wondering if you could please describe how the number of layers would be determined. Is that something that would show up on a professional geologist's soil boring log?

DR. SALHOTRA: Yeah. Let me see if I can go to my slide. Here. So the question is how many layers to have between the source and the indoor building.

Typically that would be determined based on the boring logs that you would do at a site, so at a given site you would have monitoring wells or you may just have soil borings, and when you drill those soil borings, you collect samples to see how the stratigraphy varies under the building, so you will look at those and then use that to decide how many layers you want to have. In this particular case I have two layers, and then the third layer is the cracks, and if you have groundwater, there will be four layers, because one layer is the capillary fringe, so if it was groundwater, you would have capillary fringe as your first layer and then sand is the second, clay is the third, and this would be your fourth layer, and that will be determined on the site.

HEARING OFFICER MCGILL: I'm sorry. You said, "This would be your fourth," and you pointed. What were you referring to?

DR. SALHOTRA: Oh, the fourth would be the cracks, and this zone, only this part is relevant, because the assumption is vapors are not going through the concrete; they're only going through the cracks.

HEARING OFFICER MCGILL: Thank you. Are there any other questions for any of the Agency witnesses? Seeing none, I'll ask if anyone else is

interested in testifying today. Seeing no response, why don't we go off the record.

(Discussion held off the record.)

HEARING OFFICER MCGILL: We just had a discussion off the record about setting deadlines for prefiling. I'm going to state what those deadlines are now. For the second hearing, the deadline for filing prefiled testimony is February 24, the deadline for filing prefiled questions is March 5 and the deadline for filing prefiled answers is March 12, and I'll put that in a hearing officer order that I'll issue. The mailbox rule will not apply to any of those filings, so the Board will actually have to receive each of those filings on those deadline dates. By those deadline dates, I should say.

The second hearing for this rulemaking is scheduled for March 17, 2009, at 10 a.m. in room 9-040 at the James R. Thompson Center in Chicago. If business remains at the end of that day, we will continue the next day, March 18, beginning at 9 a.m. in a different room within the James R. Thompson Center, and that's room 2-025. Copies of today's transcript should be available on the Board's Web site no later than February 6, but ideally sooner than that. If anyone has any questions

about the procedural aspects of this rulemaking, please contact me.

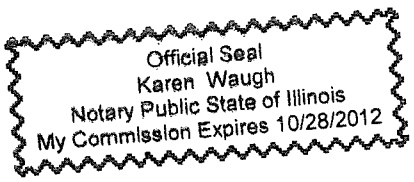
Are there any other matters that need to be addressed at this time? Seeing none, I would like to thank everyone for their participation today, and this hearing is adjourned.

(Hearing adjourned.)

STATE OF ILLINOIS)
) SS
COUNTY OF BOND)

I, KAREN WAUGH, a Notary Public and Certified Shorthand Reporter in and for the County of Bond, State of Illinois, DO HEREBY CERTIFY that I was present at the Illinois Pollution Control Board, Springfield, Illinois, on January 27, 2009, and did record the aforesaid Hearing; that same was taken down in shorthand by me and afterwards transcribed, and that the above and foregoing is a true and correct transcript of said Hearing.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my Notarial Seal this 5th day of February, 2009.



Karen Waugh

Notary Public--CSR

#084-003688