ILLINOIS POLLUTION CONTROL BOARD
JANUARY 23, 2019

IN THE MATTER OF:	)	
	)	R18-32
AMENDMENTS TO THE GENERAL	)	(Rulemaking - Water)
USE WATER QUALITY STANDARDS	)	
FOR CHLORIDES	)	

REPORT OF THE PROCEEDINGS held in the above entitled cause before Hearing Officer Martine Klein, called by the Illinois Pollution Control Board, taken by Steven Brickey, CSR, for the State of Illinois, 100 West Randolph Street, Chicago, Illinois, on the 23rd day of January, 2019, commencing at the hour of 10:06 a.m.

A P P E A R A N C E S

MR. MARTINE KLEIN, Chairman
MS. CARRIE ZALEWSKI, Board Member
MS. CYNTHIA SANTOS, Board Member
MS. TETYANA RABCZAK, Attorney Advisor
MS. KATIE PAPADIMITRIU, Board Member
MS. ALISA LIU, Technical Unit
MR. ANAND RAO, Technical Unit
MR. TIMOTHY FOX, Attorney Advisor
MS. U-JUNG CHOE, Board Member
MS. BRENDA CARTER, Board Member

ALSO PRESENT:

MR. JAMES HUFF
MR. ROGER KLOCEK
MR. DAVID SOUCEK
MR. ALBERT ETTINGER
MS. STACY MEYERS
MS. LAURA BARGHUSEN
MS. VIRGINIA YANG
MS. STEFANIE DIERS
MR. BRIAN KOCH
MR. SCOTT TWAIT
MS. MELISSA BROWN
MR. DANIEL PAULY

HEARING OFFICER KLEIN: Good morning, everyone. We're on the record. My name is Martine Klein. I am the hearing officer for this rulemaking entitled Amendments to General Use Water Quality Standards for Chloride.

Also present from the Board are Board members Carrie Zalewski and Cynthia Santos will be with us shortly. To my left is Anand Rao and Alisa Liu from the Board's Technical Unit and Tim Fox over to my right is with us who is the attorney advisor for Cynthia -- Board member Cynthia Santos. We also have Daniel Pauly here in the audience who is an attorney advisor for Member Choe.

On May 21st, 2018, Huff & Huff, Inc. filed a rulemaking proposal to amend Section 302.208(g) of the Board's water pollution regulations and add a new Section 302.214. The proposed amendments concern the Board's general use water quality standards for chloride.

On June 21st, 2018, the Board accepted Huff & Huff's proposal for public comment without sending it to first notice. On the same day, the Board requested an Economic Impact Study

from the Department of Commerce and Economic Opportunity by letter. The Board has not received a response from the DCEO.

I scheduled the first hearing in this proceeding for today January 23rd, 2019. The second hearing is scheduled for March 6th, 2019. Notice of the hearings were published in the Chicago Tribune on November 14th, 2018. The hearings are to address the merits and economic impacts of the proposal.

Today, we begin with the first hearing that, if necessary, will continue tomorrow at 10:00 a.m. By hearing officer order, I directed interested persons to file their pre-filed testimony for this hearing by January 2nd, 2019. The hearing officer order also set January 16th as the deadline for pre-filing questions. The Board timely received pre-filed testimony with attachments from James E. Huff, Roger Klocek and David Soucek on behalf of the rulemaking proposal; Laura Barghusen, on behalf of Openlands; and Cindy Skrukrud on behalf of the Sierra Club.

Pre-filed questions were timely

submitted by Huff & Huff; Illinois Environmental Protection Agency, whom I'll refer to as the IEPA; the Illinois Department of Natural Resources, whom I'll refer to as IDNR; Openlands; the Sierra Club and the Board. I will also note that the Board received written public comments from the DuPage River and Salt Creek Workgroup, Trotter & Associates, Inc. and IDNR.

Today's hearing is governed by the Board's procedural rules. Under Section 102.424(f), all testimony and questions filed prior to this hearing are entered into the record as if read. In addition, all information that is relevant and not repetitive or privileged will be admitted into the record. Please bear in mind that any question posed today by the Board or staff are intended solely to help develop a clear and complete record for the Board's decision and do not reflect any prejudgment or conclusions on any testimony, comment or other questions.

Today's hearing will be dedicated to the pre-filed testimony and questioning. All witnesses will be asked to swear in. If after the five witnesses have had their

opportunity to testify and answer questions and time permits, I will allow any other person wishing to provide public comment to speak. We have placed a sign-up sheet in the front of the hearing room in Chicago and I understand in Springfield. Please sign your name if you wish to provide oral comment. I will also remind members of the public that the Board accepts written public comments on its website and are given equal weight to spoken, public comment at hearing and they can be submitted at any time until the deadline is set -- or after the deadline that is set.

The Board received a filing from Huff & Huff at the end of the day yesterday titled Document Production Requested and Pre-Filed Questions with seven attachments. Because this hearing is held via video conference, the Board's rules require that any document to be offered today as a hearing exhibit that was not included with pre-filed testimony must have been filed 24 hours before the hearing. These documents were filed after the deadline so they will not be admitted into the record during this hearing.

Huff & Huff may resubmit those filings as comments after today's hearings or include them as attachments to pre-filed testimony for the second hearing. Otherwise, no additional filings were received by the 24-hour deadlines.

We will begin today's hearing with Huff & Huff's testimony starting with the proponent's witnesses and then we can continue with Ms. Barghusen, followed by Dr. Skrukrud, which follows the order in which their testimony was filed. I will remind you all that your testimony is entered into the record as if it was read.

So you all -- so I remind you that your -- you may give a brief opening statement, if you wish, and then we can proceed with questions. I ask all other participants when you speak to please state your name, spell your name for the court reporter and state who you represent. Also, please try to speak slowly, clearly and loudly for our court reporter. The Board will ask its questions first. Then questions will be asked in the order that they were received starting with IEPA, IDNR, Sierra

Club and Openlands.

Then the Board -- if any person has any follow-up question to a question asked, please raise your hand and I will call on you and then you may identify yourself and then you may ask your question.

Are there any questions before we proceed? Mr. Huff, I see two of you here. Is Roger Klocek coming today? And is David Soucek here? In Springfield? Great.

MS. ZALEWSKI: Before we begin, I'm wondering should we mute Springfield because there's a lot of background noise? Is that --

HEARING OFFICER KLEIN: No. Because one of the --

MS. ZALEWSKI: Can we turn it back on when they -- or is it just too hard to turn it on and off?

HEARING OFFICER KLEIN: So Member Zalewski was asking if we should mute the microphone in Springfield. Because I think one of the witnesses is in Springfield, I think we should leave it open in the event that he wishes to respond to a question.

MS. ZALEWSKI: Okay. All right.
HEARING OFFICER KLEIN: So, Mr. Huff, you may provide an opening statement, if you wish.
MR. HUFF: I just want to thank the Board for setting the hearing date on this. The primary focus of the work that we have completed was to look at cold temperature effects on the toxicity of chlorides and that's really what the focus of our testimony was, the focus on the winter chloride standard.
MS. ZALEWSKI: Can you hear, Springfield?
MS. DIERS: No, we cannot. He is going to have to speak up or get closer to the mic.
MR. RAO: There is no microphone here.
MR. FOX: That's what --
HEARING OFFICER KLEIN: I'm going to see if I can move the microphone to a central location.
I'm going to stress that everyone speak up. Mr. Klocek, if you can repeat

your opening statement for the folks in Springfield.

MR. HUFF: Mr. Huff.

HEARING OFFICER KLEIN: Mr. Huff. Sorry.

MR. HUFF: I just want to thank the Board for setting the hearing. Our primary focus in presenting this petition was to address whether chlorides in colder temperatures are less toxic and based on the research that we have completed, that's, indeed, the case. So that's our primary focus is on the winter chloride standard. Thank you.

HEARING OFFICER KLEIN: Can everyone in Springfield hear now?

MS. DIERS: Yes. Thank you.

HEARING OFFICER KLEIN: Mr. Klocek?

MR. KLOCEK: I have nothing further to add.

HEARING OFFICER KLEIN: All right. Mr. Soucek, do you have anything?

MR. SOUCEK: No.

HEARING OFFICER KLEIN: All right. So we'll begin with the Board's questions for --

to try to make this as efficient as possible, the Board will not read its preamble. The questions are in the record as if read. So we will read the questions without the preamble leading up to in order to try to get this to a speedy ending.

So Question 1A. Can you -- we will be reading the question.

So Question 1A. Can you provide a complete list of the regulated entities you had included in your outreach efforts?

MR. HUFF: A list of organizations that we initially reached out to will be submitted to the Board.

HEARING OFFICER KLEIN: Question 1B. Please provide a list of all regulated entities that will be impacted by this proposed rulemaking.

MR. HUFF: In general terms, the Illinois Department of Transportation, the Illinois Tollway, the Skyway, the City of Chicago, all county and highway departments in northeast Illinois, municipalities and counties throughout Illinois where there are smaller streams that receive runoff, which is likely most of the counties. In addition, industry, schools,

commercial areas, anyone with parking lots and/or private roadways. Basically, anyone that uses de-icing salts in Illinois.

HEARING OFFICER KLEIN: Question 1C. Please comment and provide support for whether these entities agree with your statement that the "regulated community" is "striving to achieve an unachievable standard."

MR. HUFF: I think there is genuine concern about achieving a not-to-exceed 500 mg/L by the regulated community and to the extent they supported this research, it is consistent with this belief. In a Technical Support Document, I presented chloride data on Salt Creek, the east branch of the DuPage River and the west branch of the DuPage River. The DuPage River Salt Creek Workgroup has worked hard on implementation of BMP's in these watersheds for over the past decade, yet they are far away from the 500 mg/L standard despite widespread use of BMP's by the Public Works Department.

MR. RAO: Moving onto language of the proposed rule. Question 2. The language of the proposed rule differs from the language for

acute and chronic standards at 35 Ill. Adm. Code 302.208(a) Subsection's A and B.

2A. Please explain what is meant by, and the difference between, "on the average" and "arithmetic average" as used in the proposed language. Should just one of these terms be used consistently?

MR. HUFF: There is no difference intended. So, yes, they should be consistent.

MR. RAO: 2B. For the addition of "more than once every three years," please discuss how the departure from the language for acute and chronic standards at 35 Ill. Adm. Code 302.208(a) and (b) is consistent with US EPA's reasoning for the 1988 US EPA Chloride Criterion.

MR. HUFF: My intent was to acknowledge that we are having more intense storm events and there will be snow events with dropping temperatures and/or freezing rain that will require salt applications for longer duration than the typical storm event and I was trying to provide an accommodation for these events.

MS. LIU: Good morning, Mr. Huff.

MR. HUFF: Good morning.

MS. LIU: Thank you for coming on a snowy day. Question 3.

Would you please explain if the proposed sections 302.214(a)(ii) and (b)(ii) for the chronic summer and winter standards should more closely mirror the mixing zone provisions provided in Section 302.208(b).

MR. HUFF: Yes, they should.

MR. RAO: Question 4. Please explain if the proposed sections 302.214(a)(ii) and (b)(ii) for the chronic summer and winter standards should more closely mirror the attainment status provisions provided in Section 302.208(b).

MR. HUFF: Yes, they should.

HEARING OFFICER KLEIN: Question 5. In pre-filed testimony, Mr. Huff indicated that he inadvertently did not include two changes to the Board's Section 302.407(g)(2) and (g)(3) and Section 303.449.

Can you please provide draft language for these proposed changes.

MR. HUFF: I will do that prior to the next round of hearings.

MS. ZALEWSKI: Good morning. Question six. The Illinois Natural History Survey (INHS) Report explains the test methods in detail but does not appear to cite to a specific US EPA method.

Please indicate if the test methods used in the INHS Report correspond to or are derived from particular US EPA methods.

MR. SOUCEK: This is Dave Soucek, David, S-O-U-C-E-K, from Illinois Natural History Survey and I will respond to this question.

As stated on page 87 of the pre-trial testimony of Huff & Huff and in attachment two of my pre-filed testimony, static, non-renewal, 96-hour acute toxicity tests were conducted generally according to guidelines detailed in American Society for Testing Materials, abbreviated ASTM, E729-96 in 2014 and ASTM E2455-06 (2014).

For chronic toxicity testing, the amphipod tests "were generally conducted according to recommendations detailed in the US EPA sediment toxicity testing methods from 2000, but with modifications to suit the particular

experimental conditions of these tests, that is test temperatures, shorter test duration and modifications to feeding regimes as detailed in a paper by Soucek, et. al, 2016. There are no US EPA or ASTM methods for chronic toxicity testing with mayflies or fingernail clams so we use methods developed in our laboratory.

MS. ZALEWSKI: Did you first say page 86 of your testimony? Is that what you --

MR. SOUCEK: Eighty-seven.

MS. ZALEWSKI: Eighty-seven. Thank you.

MR. RAO: Question 7. The 1988 US EPA Chloride Acute Criteria is based on the one-hour average concentration, and the Chronic Criteria is based on the four-day average concentration.

7A. Please explain what the "standard US EPA acute and chronic test periods" are and how they are different from the time periods used in the language of a criterion.

MR. SOUCEK: Again, I'll respond. US EPA and the ASTM recommend 48 to 96-hour tests for acute tests depending on the species. In most

cases, with a notable exception of ceriodaphnia dubia and other daphnids, 96-hour tests are used. Chronic tests ideally begin with early life stage and continue to reproduction according to the 1985 guidelines, Stephan, et al, 1985. However, this is not always possible, for example, the case of fresh water mussels for which the ASTM manual recommends a 28-day chronic toxicity test. We just divide our chronic test durations into attachment two of the Soucek pre-filed testimony. I can read through that quote, if necessary, or if you rather a briefer answer, I can end there.

MS. LIU: No. Please go ahead and read through it.

MR. SOUCEK: Okay. Quote, in two cases for the chronic toxicity testing, we chose to conduct somewhat shortened tests. The standard chronic test duration for hyalella is 42 days according to US EPA in 2000 and in our laboratory in a publication by Soucek and Dickson from 2015 we have conducted chronic toxicity testing with neocloeon, the mayfly, until emergence, which is approximately 30 days.

However, development time for

both species would be delayed at 10°C. For example, Sweeney and Vannote from 1984 show that neocloeon triangulifer, larval development at the adult stage took 179 days at 10°C compared to 27 days at 25°C.

In the case of this mayfly and the amphipod, in evaluating the reproductive endpoints these longer tests capture, would not be practical at 10°C. Furthermore, recent testing in our laboratory, unpublished data, indicated that for the mayfly a dry mass endpoint at 14 days was as sensitive to nickel and zinc toxicity as the most sensitive endpoints in full-life tests that incorporate emergence and preproduction.

Therefore, we conducted tests of identical duration at both temperatures for all three species, 14 days with neocloeon and 28 days for hyalella and sphaerium, end quote.

MR. RAO: 7B. Please explain how data from the 48 to 96-hour tests and the 7, 14 and 21-day tests translate into standards that are based on one hour and four days.

MR. HUFF: The standard tests of 48-hour and 96-hour were used to derive the

suggested acute water quality standards, as described in Section 6 of the Technical Support Document. As chronic effects at 10°C were not observed the test durations were extended to see if the toxic effects were simply delayed. Then the third round of testing where the chloride was elevated for seven days, then the chloride brought back to a controlled concentration to better mirror what occurs in the stream.

These longer test results were used as part of the sensitivity analysis in Section 7 of the Technical Support Document basically comparing these results to the proposed standards which were derived using the acute chronic ratio.

MR. RAO: Question 8. In the INHS Report, for the fingernail clam, sodium chloride acute and chronic data at 25°C, please elaborate why the values in the tables at nominal chloride (100) are denoted as "unreliable."

MR. SOUCEK: The question is referring to preliminary data from a preliminary report. The final report, including all data, is included as attachment two to my pre-filed

testimony. To answer that specific question, quote, unreliable in this case refers not to the nominal chloride concentration, but to the 95 percent confidence limit surrounding the 96-hour and 28-day LC50's. If insufficient, partial mortality is observed in a test, an effect level can be generated but confidence limits are too wide to be reliable.

MR. RAO: Thank you. Question 9. In the INHS report for mayfly chronic data, what does "NA" and "NC" stand for?

MR. SOUCEK: Again, the question is referring to preliminary data from a preliminary report. The final report, including all data, is included as attachment two under my pre-filed testimony. To answer the question, NA in this case means nonapplicable. There are no weight data because all the organisms died in that particular test. So a weight -- a weight measurement is not applicable. NC means not calculated.

The 10°C mayfly test in the original proposal was a preliminary test. A second definitive test at 10°C was included in the

final report in my pre-filed testimony and Table 11 from that report, not calculated, is spelled out with an explanation that no trend in weight was observed.

MR. RAO: Question 10. In the INHS Report, no chronic data was provided for amphipods at 10°C. The INHS Report for amphipods notes, "We will attempt to use older organisms derivative 14 day to start a test to allow young amphipods to grow stronger prior to acclimation to cold temperature and testing."

Please clarify if data was obtained using older organisms. If so, provide an update.

MR. SOUCEK: Again, the question is referring to the preliminary data from the preliminary report. The final report, including all the data, is included in my pre-filed testimony. The amphipod chronic toxicity test at 10°C are included in Table 13. As stated on page 89 of the pre-filed testimony, "organisms were adults at the beginning of the test with one individual added to each test chamber. Adults were used because repeated attempts to use seven

to nine-day old organisms resulted in control failures at 10°C. It was surmised that adults, which are more robust than juveniles, might be the life stage that overwinters in this species."

MR. RAO: Moving onto question 11. In the November 13, 2017, New England Bioassay Report, Tables 12 and 13, the values in the column for the Survival LC50 are almost consistently greater than the values in the column Survival NOEC.

Please explain why the NOEC concentration is greater than the LC50 concentration.

MR. HUFF: The LC50 is an estimation based on the dataset where 50 percent of the organisms will die. The NOEC highest concentration with no statistical effect is run on both survival and reproduction on the ceriodaphnia. If there is some mortality at lower concentrations, this brings down the LC50 estimation to a point lower than the NOEC for survival.

MS. ZALEWSKI: Question 12. Under hardness of test waters, looking at A, please

confirm the hardness of the test waters in the NEB and INHS tests.

MR. SOUCEK: For the INHS tests, measure hardness values for all tests are reported on page 91 for the acute test and the chronic tests and page 92 for the post-exposure. The measure hardness values of 97 to 100 mg/L as calcium carbonate placed in test waters in the moderately hard category according to US EPA methods.

MS. ZALEWSKI: B. Please elaborate on the hardness scale and where the test waters fall in terms of moderately hard water.

MR. SOUCEK: I'm sorry. I jumped the gun and answered that already.

MS. ZALEWSKI: You did. Sorry. Number 13. Sulphate concentration of test waters. Please confirm the sulfate concentration of the test waters in the NEB and the INHS tests.

MR. SOUCEK: For the INHS test, using the recipe detail in Table 1 of my pre-filed testimony results in a nominal sulfate concentration of 58.5 mg/L. We did not measure sulfate concentrations analytically in the test

waters but measured chloride concentrations which were typically close to 100 percent of nominal concentrations as were measured hardness levels. So it is safe to assume that sulfate concentrations were similar to nominal as well.

MR. HUFF: Same answer on the NEB as well.

MS. ZALEWSKI: Okay. Can you explain the safe to assume. You said it was not tested, is that accurate?

MR. SOUCEK: We didn't measure sulfate analytically, but when we measured chloride and hardness and we had a recipe that we used for all these tests, we make the water in the lab, it's deionized water and adding salt back to it and the recipe has a measured nominal sulfate concentration and because chloride and hardness were essentially 100 percent -- measured chloride and hardness were essentially 100 percent of the measured concentrations, we can safely assume that sulfate is also at 58 or thereabouts, plus or minus a mg/L.

MS. ZALEWSKI: Thank you for the clarification.

MR. ETTINGER: Excuse me. Mr. Klein? I don't know how you want to do this. In some hearings in the past, we've had people ask questions during other questions to form a more complete --

HEARING OFFICER KLEIN: Yeah, if you have additional questions, just raise your hand.

MR. ETTINGER: I've been sort of waiting because some of them are going to overlap with other questions, but can I go back then briefly to Question 11?

HEARING OFFICER KLEIN: Sure.

MR. ETTINGER: I'm a little confused.

Shouldn't the no observable effects concentration always be lower than the LC50?

MR. HUFF: Yeah.

MS. ZALEWSKI: Can you hear, Springfield?

MS. DIERS: We can hear.

MR. HUFF: Not -- not in the case where there was some death at smaller concentrations.

MR. ETTINGER: Well, isn't that an observable effect?

MR. HUFF: But statistically it wasn't valid and statistics don't apply in the case of the NOEC.

MR. ETTINGER: Okay. So death of some of the organizations would not be an observable effect if it was not statistically valid, is that --

MR. HUFF: I'll have to get back to you on that.

MR. ETTINGER: Thank you.

HEARING OFFICER KLEIN: Moving onto Board Question 14.

The Board asked for copies of 19 documents that were referenced in the initial filing and pre-filed testimony of Huff & Huff. Can you provide them for the record?

MR. HUFF: Yes, we will.

MS. ZALEWSKI: Okay. Moving onto 15. Under 1988 US EPA Chloride Criteria and Stephan 2009 updates, just moving onto subparts, Subpart A.

Have you -- are you aware of any

US EPA -- any work rather US EPA may be currently doing to reassess the 1988 Chloride Criteria or to propose new chloride criteria.

MR. HUFF: I am not aware of any.

MS. ZALEWSKI: B. Have you tried contacting Charles E. Stephan or someone else in his lab at US EPA about exploring the temperature variable in chloride toxicity with you?

MR. HUFF: Charles Stephan retired quite a few years ago. He is no longer there.

MS. ZALEWSKI: Have you tried to contact anyone else?

MR. HUFF: I have not.

MS. ZALEWSKI: C. When Iowa DNR worked with US EPA in hiring ENVIRON 2009 to conduct the additional toxicity tests, do you know how the work was funded?

If so, do you think a similar source of funding would be available for toxicity tests focused on the temperature variable?

MR. HUFF: The chloride project Dr. Soucek did for the Iowa standard was funded through Region 5 US EPA funds, but they were directly to the Great Lakes Environmental Center

and INHS was a subcontractor to Great Lakes Environmental Center. When Region 5 had funded Dr. Soucek on chloride toxicity, I approached Candice Bauer of Region 5. That was the primary reason I reached out to her initially.

Cold temperature chloride toxicity is clearly an issue in nearly all northern states, not just Illinois. So in a perfect world, federal dollars should be applied. With the manpower efforts Illinois is spending on watershed variances, that, in my opinion, will continue until the cold temperature toxicity of chloride is factored into the regulations. I saw taking on this work as an important contribution.

MS. ZALEWSKI: Okay. Thank you. 16. Under Iowa water quality standards for chloride, looking at Subpart A.

Given this statement from Iowa DNR about the similarities between the landscape and waterbodies of Iowa and Illinois along with the fact that the Iowa chloride water quality standard was approved by US EPA, please comment on developing a chloride water quality standard similar in structure to Iowa's.

MR. HUFF: Our focus was on the effect of colder temperatures on chloride toxicity. We utilized the Iowa method as it provided a straightforward approach that could be easily modified to add in our new data. Hardness, and to a lesser extent sulfate, are important factors. More refined standards will result in incorporation of these two parameters. So I would say yes to the --

MS. ZALEWSKI: Can you repeat the last phrase? There was a cough. I couldn't hear you.

MR. HUFF: Yes, I believe a similar approach to what Iowa has done could be factored into the colder temperature approach.

MS. ZALEWSKI: You may have addressed this -- go ahead.

HEARING OFFICER KLEIN: Sorry. Mr. Ettinger, do you have a follow-up?

MR. ETTINGER: But part of your proposal does cover a statewide standard that's a 365 -- covers 365 days a year, is that not correct?

MR. HUFF: I'm sorry. Could you

repeat that question?

MR. ETTINGER: You've said repeatedly that you focused on cold weather standards, however, your petition includes a proposal for 365 days a year.

MR. HUFF: Yes, I used the 1988 EPA chloride water quality criteria to be reflective of the summer standard.

MR. ETTINGER: And why did you use the 1988 EPA standard as opposed to the more recently approved Iowa standard for the summer?

MR. HUFF: My understanding was that US EPA Region 5 no longer believes the Iowa standard is an approvable approach.

MR. ETTINGER: And why is that?

MR. HUFF: I don't know.

MS. ZALEWSKI: I'm going to ask 16B. You may have answered, but just in case you didn't.

Please comment on whether chloride issues in Illinois could be addressed by a standard similar to Iowa's that included provisions for site specific hardness and sulfate concentration with the addition of a temperature

component.

MR. HUFF: If I understood the question correctly, could we have a standard that allowed for site specific data input on hardness and chlorides as an Illinois standard? Yes, I believe that would be appropriate.

MS. LIU: Question 17. Under the topic of water quality characteristics affecting chloride toxicity for temperature, the Technical Support Document in Appendix A contains a literature survey on the toxicity of chlorides with a focus on temperature effects.

17A. Was the literature survey able to identify the majority of the temperatures used in the studies that US EPA and Iowa DNR compiled in the Stephan 2009c updated list?

MR. HUFF: We -- we conducted a broad search on chloride toxicity with an emphasis on any articles that had a temperature effect beyond the standard tests that were run on those. I believe most of the 2009 references were included in that and their default temperatures to a large extent would be in the 23 to 25°C.

MS. LIU: Question B. Would you

please comment on creating a new table based on the table in Stephan 2009c and including a column for temperature values from all the referenced studies available.

MR. HUFF: As we amend Table 1, we will do that and put temperatures in there.

MS. ZALEWSKI: Question 18. Still under temperature.

The proposal would replace the current single value chloride water quality standard with acute and chronic values split into two seasons.

Subpart A. Has US EPA approved water quality standards in the past based on temperature rather than season?

MR. HUFF: The Illinois EPA in its pre-filed questions to me, Question 14, highlighted the ammonia water quality standards that are temperature-based. So I believe the answer to your question is yes. I confused effluent limits to water quality standards when making the statement that US EPA has always pushed for seasonal limits.

MS. ZALEWSKI: Subpart B. If new

studies could be performed to evaluate other temperatures besides 10°C, would it be possible to provide chloride water quality standards based on temperature rather than season to account for variability and temperatures throughout the year and throughout the State of Illinois?

MR. HUFF: Yes, that would be a good approach in moving forward. However, I would recommend not delaying a winter standard until that research is done.

MR. RAO: Moving onto hardness and sulfate. Question 19.

Mr. Klocek's pre-filed testimony stated "Iowa adopted new chloride standards in 2009 with Pennsylvania, Missouri and Wisconsin currently in the process of adopting similar standards as Iowa. Indiana adopted new chloride standards in 2012.

19A. Please provide citations to and summaries of the new chloride standards adopted or proposed for Pennsylvania, Missouri, Wisconsin and Indiana.

MR. KLOCEK: Indiana effective May 20th, 2015, had chloride limits set dependent on

sulfate and hardness tables. This is referenced in Illinois -- Indiana Administrative Code Article 2. It was online accessed on 1/19/19 at -- do I need to read the --

MR. RAO: If you have something you can submit in writing, that will be acceptable.

MR. HUFF: We'll submit those.

MR. KLOCEK: Yeah.

MR. ETTINGER: I'm sorry.

HEARING OFFICER KLEIN: Go ahead.

MR. ETTINGER: Again, I'm -- you say Indiana changed its standard in 2015?

MR. KLOCEK: No, it became effective. I don't know when they changed it.

MR. ETTINGER: Do you know if it was approved by US EPA?

MR. KLOCEK: I believe so because it's the EPA website that documents that Indiana standard.

MR. ETTINGER: Thank you.

MR. RAO: And you would be submitting information for the other states also?

MR. KLOCEK: Yes. Should I go on with the summaries for the other states or --

MS. LIU: Sure.

MR. RAO: Sure.

MR. KLOCEK: Okay. Pennsylvania adopted 230 milligram chloride water standard for potable water supplies only and are silent regarding chloride and aquatic species. The previous 2010 proposed adopting the Iowa standard which accounts for hardness and sulfates that was withdrawn. A Stroud report issued in 2012 listed weaknesses in the Pennsylvania proposal that included using only sodium chloride toxicity studies and not including calcium, magnesium or potassium chloride toxicity results.

Also, the Stroud report said that mussel toxicity data was lacking along with planned toxicity data, although the report admitted that plant data endpoints are lacking in the literature. Other procedural weaknesses in calculations were pointed out in the Pennsylvania proposal. That was from summary and comments by Clean Water Action to the Environmental Quality Board online access 1/19/2019 at a State of Pennsylvania online address.

Missouri -- the online address

will be supplied electronically. Missouri proposed chloride criteria was to copy the Iowa 2009 standard without comment. Missouri did not detail how this standard would be applied statewide or how they would develop sulfate or hardness databases for different regions of the state. Missouri also did not provide any discussion of including more recent toxicity testing data into their proposal. This was online accessed 1/19/2019.

Water quality standards for chloride in Wisconsin are set based on aquatic life toxicity. The water criteria for chloride in Wisconsin is presently 395 mg/L chronic and 757 mg/L acute. Again, a Wisconsin DNR website. And that concludes that.

MR. ETTINGER: You said Missouri did not say how it was going to -- it did not say that it was -- how it was going to consider more recent toxicity data --

MR. HUFF: Yeah.

MR. ETTINGER: -- is that a statement by you or are you quoting something? I'm sorry.

MR. KLOCEK: They were denied because they basically copied the Iowa standard without saying how they were going to develop their own databases for hardness which they didn't elaborate on it or how they were going to include more recent toxicity data.

MR. ETTINGER: And I missed something. Denied by who?

MR. KLOCEK: US EPA.

MR. ETTINGER: So US EPA turned down the Missouri standard based on the Iowa standard because it does not take into account more recent toxicity data?

MR. KLOCEK: Right.

MR. RAO: Moving onto 19B. Can you please comment on whether any of these standards will be mirrored or tailored for protecting Illinois waterways?

MR. HUFF: I think I would recommend that temperature be incorporated into any chloride water quality standard for Illinois, which has not been done in those other states to this point. As I indicated previously, the impact of sulfate and hardness at colder temperatures has not yet been

fully established.

MS. LIU: Question 20. The table in Stephan 2009C, Summary of Data Concerning the Acute Toxicity of Sodium Chloride to Aquatic Animals, includes the hardness and sulfate concentration of the test waters in each of the studies.

Would you please -- 20A. Please comment on adding to the creation of the table described above based on the table in Stephan 2009c, the hardness and sulfate concentration from the study performed by Illinois Natural History Survey and New England Bioassay.

MR. HUFF: We'll put those in table format. I think we indicated earlier the INHS hardness was 97 mg/L and the New England Bioassay hardness was 84 mg/L. Sulfate concentration in the INHS study was 58.5 mg/L. And I misspoke earlier on NEB. It was actually 65 mg/L in their study, also calculated similar to how INHS did theirs.

MS. LIU: 20B. Would you please comment on adding to this table the acute value of LC50 results from the studies performed by the

Illinois Natural History Survey and New England Bioassay for each test temperature.

Please comment on including both the acute value and the normalized acute values using the equation developed by Stephan 2009c at 1.

MR. HUFF: We will provide that information to the Board. Once those values are normalized -- those normalized values will be approximately 100 percent higher. And that, with the hardness of 300 mg/L, is the normalized value.

MR. RAO: Moving onto Question 21. 21A.

Does Illinois have sufficient ambient water monitoring data to determine statewide background values for hardness and sulfate?

MR. HUFF: That question is, perhaps, better asked for the Agency, but I believe the answer is, yes, hardness is utilized currently for establishing water quality standards for metals and for sulfates. I have requested and received yesterday from the Illinois EPA their hardness data for the statewide network.

MR. RAO: So will you be providing information of hardness and sulfate concentration of waters throughout the state along with comments on how they vary? That's in 21B.

MR. HUFF: The IEPA has access to that data in a computerized format. I'm not sure how they sort by regions of the state, but I assume that can be done. So, yeah, I'll follow back up with the Agency and see if they can point me to how I sort that by the watershed. That will probably be the best way to do that.

MR. RAO: 21C. Please elaborate on the hardness scale and where the test waters used in the studies by INHS and NEB fall in relation to hardness in waters throughout Illinois.

MR. HUFF: Using hardness and sulfate data that I received from the Agency yesterday prepared from 2000 to 2016, the mean hardness across the state is 286.8 mg/L and the mean sulfate is 86.8 mg/L. So those are both higher than the research that we conducted at 10 and 25°C.

MR. RAO: 21D. Are hardness and sulfate concentrations typically monitored in

streams where water quality compliance is assessed such that site-specific values can be determined?

MR. HUFF: Yes, that's my understanding. If that's not monitored there, the Agency uses a closest stream gauge in the same watershed is my understanding.

MR. RAO: 21E. Please describe how Illinois waterways are tested for hardness and sulfate, if it is typically done with other ongoing water quality monitoring, and how much it costs.

MR. HUFF: So, again, I think this question is better asked of the Agency, but my understanding is that the routine network monitoring is done six times a year at each location. I suspect there is a bias towards nicer weather. Days like today I expect the sampler would not be out there sampling. I believe most of these are routinely tested for as part of that network. Commercial laboratory costs are approximately $20 for a hardness sample and $25 for sulfate.

MS. DIERS: This is in Springfield. This is Stefanie Diers, S-T-E-F-A-N-I-E,

D-I-E-R-S. I know you've asked some questions here in 21 of Mr. Huff.

The Agency will respond in pre-filed testimony at the next hearing to clear some of the things he said up so you get accurate information on what the Agency does.

MR. RAO: We'd appreciate that. Thank you.

MS. DIERS: Thank you.

MR. RAO: Moving onto 21F. For permitted dischargers with water quality based effluent limits, how much would it cost to include effluent and in-stream sampling for hardness and sulfate?

MR. HUFF: Again, this is, perhaps, a better question for the Agency. My understanding is that for point source dischargers such as Publicly Owned Treatment Works and industrial, they would likely have composite samplers already on their effluent discharge. So the incremental cost would strictly be the laboratory costs that I just quoted in their cases.

For the communities, the

municipal storm sewer communities or MS 4 communities, there will be many outfalls with snow melt runoff and no automatic samplers. This would likely require grab samples during snow melt periods from representative outfalls. Some may be doing this already under their MS 4 permit. So the incremental cost would, again, in those cases be just the lab cost.

For the stream sampling, it's my understanding the Agency would like to have collected on the order of 50 samples over a two-year period for the stream to establish hardness and sulfate. So there would be a labor charge and a lab charge for 50 samples which would amount to approximately $5,000 per location.

MR. RAO: Thank you.

MS. LIU: Question 22. Under derivation of water quality criteria dependent on water quality characteristics 22A asks, are you aware of why the current general use chloride water quality standard is under 35 Ill. Adm. Code 302.208(g) for single-value standards instead of 302.208(e) numeric water quality standards for the protection of aquatic organisms?

MR. HUFF: The single value is reflective of the time period when this standard was originally adopted in 1972 in the Board proceedings in R70-8 where single water quality values were established for a variety of metal and cyanide chlorides. The chloride standard of 500 mg/L was based on testimony of Professor Lackey. Part 302.208(e) was adopted later and focused on the metals with hardness of the receiving stream added as a factor.

MS. LIU: 22B. Is there any reason revised chloride water quality standards couldn't take on an equation form and be located under 302.208(e)?

MR. HUFF: At this point in time, I do not believe sufficient temperature data has been generated for chloride toxicity. The recent published article by Jackson and Funk, which was included in Mr. Klocek's pre-filed testimony, is an excellent start for mayflies, but it does not establish the same relationship between toxicity and temperature for other organisms.

Similarly, the effect of hardness and sulfate have not been evaluated for

aquatic species at colder temperatures to my knowledge.

MS. LIU: Question 23. The Board's rules contain specific procedures under deriving acute aquatic toxicity criterion dependent on water chemistry. Section 302.618.

23A. Is it possible to develop a water quality standard equation for chloride similar to the equation used for the Iowa standard that incorporates site-specific hardness and sulfate as well as temperature?

MR. HUFF: As noted in the previous response, I do not believe we have sufficient data at this time to develop such an equation, but clearly that should be a direction that Illinois should proceed with in the future.

MS. LIU: 23B. If it is possible to do a multiple regression analysis on hardness and sulfate, could one be done for temperature to develop a slope that can be used to derive an equation-based standard that is dependent on hardness, sulfate and temperature?

MR. HUFF: Again, additional temperature data would need to be collected and

the relationship with sulfate and hardness would have to be confirmed with both temperatures.

MS. LIU: Question 24. And you touched on this earlier, but I'd like you to mention it again.

The Jackson and Funk 2019 report cited by Mr. Klocek uses linear regression to describe the relationship between temperature and acute chloride toxicity for four genera of mayflies across a range of temperatures.

Could any of this data be used to develop a mathematical relationship for an equation based on an equation-based standard that is dependent on hardness, sulfate and temperature?

MR. HUFF: Jackson and Funk evaluated the acute toxicity of four species of mayflies at various temperatures. The mathematical model for the four species evaluated could be developed, but would it apply to other aquatic species? Jackson and Funk did not vary the hardness or sulfate. So to develop a relationship, one would have to assume the same correlation developed at colder temperatures.

MS. LIU: Under statewide

applicability of general use water quality standards. Question 25.

The Technical Support Document states that the derivation of the proposed chloride water quality standards followed the US EPA protocol from 1985. For the site-specific rule for the Chicago Sanitary and Ship Canal that was adopted in R08-9, CITGO used a different US EPA method.

Will you please explain why a method different from the one used for the CSSC, the Chicago Sanitary and Ship Canal, site-specific rulemaking is used for this rulemaking for General Use Waters rulemaking.

MR. HUFF: In the Chicago Sanitary and Ship Canal site-specific, the species not present in the winter months in the CSSC were removed from the list of species. Recognizing the extent of species likely present somewhere in Illinois, no species were removed from the list of this proceeding.

MR. RAO: Question 26. To select a temperature at which to conduct laboratory tests on aquatic life that is representative of a winter

temperature in Illinois, Huff & Huff used the 75th percentile of all Illinois stream temperature data.

26(a). Based on information in the table, can you identify the locations where the readings were obtained?

MR. HUFF: The Agency has a listing of the location codes that could be used for that purpose. The data includes the entire database. So I presume it's representative of the entire state.

MR. RAO: 26B. So do these locations cover the State of Illinois from north to south?

MR. HUFF: That is my understanding of the watershed network, yes.

THE VIDEOGRAPHER: 26C. Please explain how the 75th percentile is considered representative of all of Illinois during the months of December through April.

MR. HUFF: The intent for the period specified was to incorporate the snowfall period in Illinois. When snowfall occurs, the runoff with the de-icing salts in streams will be at

temperatures less than 10°C in the vast majority of events, if not all events. However, changing the proposed winter standard to when actual stream temperatures are less than or equal to 10°C would eliminate many of the concerns raised in a variety of pre-filed questions.

MR. RAO: 26D.

MS. LIU: Would you be proposing language along those lines to revise your current proposal?

MR. HUFF: Yes, I would.

MR. RAO: 26D. Please describe how much the ambient water temperature varies from northern Illinois to southern Illinois from month to month during the months of December to March.

MR. HUFF: Clearly, on average, it is colder in the northern part of the state on average. Again, the intent of the proposal was to capture the snowfall season. Removing the months from the proposal and going to a water quality standard when the stream temperature is less than or equal to 10°C would eliminate, I believe, the concern over warmer temperatures in the southern portion of the state and the warmer water on

average in March and April.

MR. RAO: 26E. Given this range in temperature, would a standard based on tests at 10°C still be considered representative of southern Illinois waterbodies?

MR. HUFF: I believe it would be representative of southern stream temperatures when snow melt occurs, which was the intent. Dischargers would still have to meet the non-winter proposed standard, and but for de-icing practices, I see no reason these dischargers would discharge at higher chloride concentrations during the winter months.

MS. ZALEWSKI: 27A. Other than streams in the Greater Chicago Area, please list the rivers or streams that could be classified as "urban streams" in Illinois.

MR. HUFF: The Agency publishes every two years a list of impaired streams and the causes of impairment. Many cities in Illinois have smaller streams that receive stormwater runoff and all of these streams readily exceed 500 mg/L during snow melt periods following salt application. In addition, I believe the impaired

list is biased as the stream sampling tends to occur during non-storm events. An example of this bias can be seen by noting the Salt Creek in DuPage and Cook Counties is absent from the list, yet continuos monitors by the DuPage River Salt Creek Workgroup and then that data was included in the Technical Support Document clearly shows the chloride exceedances. A list of impaired waterways will be forwarded electronically to the Board.

MS. ZALEWSKI: B I think you might have answered, but I'll read it just in case.

Are you aware of chloride monitoring data for other urban streams within Illinois that are General Use Waters that demonstrate concentrations above 500 mg/L during certain times of the year?

MR. HUFF: The list -- the 303(d) list which I'll provide the Board there are currently 47 stream segments on 31 streams that are listed as impaired for chlorides.

MS. ZALEWSKI: Okay.

MR. ETTINGER: Excuse me again. Was that list submitted as part of the documents that

didn't come in within 24 hours?

MR. HUFF: Yes, sir.

MR. ETTINGER: Thank you.

MS. ZALEWSKI: C. Do you know of chloride monitoring data for urban streams in other states with winter climate conditions similar to Illinois?

MR. HUFF: Corsi, et al. published an article entitled "River chloride trends in snow-affected urban watersheds increasing concentrations outpace urban growth rate and are common among all seasons" in late 2014. A copy of that will be submitted as well to the Board.

MS. ZALEWSKI: And that article discusses other states besides Illinois?

MR. HUFF: Yes.

MS. ZALEWSKI: Okay. 28. The Statement of Reasons states, "Both the Illinois EPA and US EPA were approached about the possibility of conducting colder temperature toxicity testing without success."

A. Would you please comment on estimating the costs and time to conduct additional studies at a range of temperatures.

MR. HUFF: Assuming the same four species are sufficient as what we studied, I would estimate the cost for a range of temperatures at $250,000 and require approximately 18 months to complete. For reference, the research conducted for this petition required approximately $100,000 and nearly two years to complete. With the knowledge gained at the colder temperatures for these organisms, the time period could be shortened. For each additional species studied, I would estimate an additional $40,000. Note, this cost is for temperature studies only, not sulfate or hardness. Glodcidia testing may be more complex and, therefore, more expensive.

MS. ZALEWSKI: B. I'm not sure if you answered, but you may have.

Would you please comment on estimating the additional costs and time to derive acute and chronic chloride water quality standards if additional information were available for acute toxicity across a range of temperatures?

MR. HUFF: Assuming the same approach is utilized as utilized in this petition, I would estimate three months and $25,000. If

outreach to the Illinois EPA is included, I would add six additional months and an additional $50,000. If outreach to the US EPA is to be included, I would add several more years and add at least an additional $100,000 to the above estimates.

MS. ZALEWSKI: C. Would you please comment on estimating the additional costs and time to derive an equation-based water quality standard for chloride standard similar to Iowa's that includes provisions for site-specific hardness and sulfate concentration, with the addition of a temperature component.

MR. HUFF: Again, if assuming the same four species are to be utilized, a series of tests at varying temperatures, hardness and sulfate would be necessary. I would think 18 months of research and 3 months for the equation development at a cost on the order of $500,000 which includes the temperature studies that was described under question 28A.

MS. ZALEWSKI: Are you -- is there a way you elaborate how you came up with these numbers, even later on?

MR. HUFF: Yes, most of these were just projected from the $100,000 and the number of variables that you're adding because where we had only one variable, temperature, you introduce hardness in there. Now, the complexity goes up by the square of the number. So you're running four times as many tests. You now put sulfates in there. You're at 16 tests for where we were running one.

MS. ZALEWSKI: Okay. Thank you.

MR. RAO: Moving onto questions on TSD Table 1. Chloride Genus and Species Mean Acute Values.

The acronyms are GMAV and SMAV. Question 29.

Please describe how a GMAV is calculated from multiple SMAV's by use of geometric means.

MR. HUFF: The geometric mean for the three species of daphnia was computed and then adjusted by a factor 1.3 for 10°C based on the ratio of the NOEC for the ceriodaphnia results in 10 and 25°C from New England Bioassay. The use of the 1.3 factor was based on best professional

judgment.

MR. RAO: Question 30. The SMAV's and GMAV's used for three of the four most sensitive genera sphaerium, ceriodaphnia and neocloeon, in TSD Table 1 were based on one test value each from NEB and INHS.

30A. Please comment on the variability in results that may be observed in toxicity testing of a particular species done in different laboratories under the same conditions.

MR. SOUCEK: I can provide a couple of examples. I have seen data that I cannot cite because the data is preliminary and not published for seven-day sodium chloride toxicity tests for a single species for five experienced laboratories use the same protocol and generated 20 percent effect concentration values that varied by more than a factor of two. And, furthermore, for another example for the mayfly and neocloeon, the 96-hour LC50 we generated at 25°C were about 5.5 fold greater than that produced with the same species by Jackson and Funk 2019. Conditions were not identical, but the hardness of the dilution water was similar.

MR. RAO: 30B. Please comment on whether one study per species or genera is sufficient, especially for the most sensitive species when used as a basis for deriving a water quality standard.

MR. HUFF: So we looked at four of the most sensitive species when we conducted our study and in all cases temperature had an effect on ameliorating the toxicity at colder temperatures. So I believe it is sufficient. Certainly more studies would be preferable, but the data was consistent across the four species we evaluated.

MR. RAO: 30D. Please cite to some established protocol, from US EPA or elsewhere, where substituting the GMAV from several previous tests with the GMAV from a single new test is prescribed. If not, could you please elaborate more on why this approach is appropriate?

MR. HUFF: The focus of our effort was to see if chloride exhibited the same degree of toxicity at colder temperatures and our research clearly shows chlorides are less toxic at colder temperatures. As the data we generated

were the only 10°C data available at the time, substituting these results in Table 1 for the same species allows us to calculate winter standards.

If we have the toxicity values for most of the other species the same as the 25°C test, the calculated results were conservative. The substitution we did was based on the similarity of the organisms and, again, best professional judgment and not out of any US EPA guideline.

MS. LIU: Under the species in the Technical Support Document Table 1, question 31, in the table, some of the species ranked by GMAV appear to be out of order.

31A. For -- can you help me with the pronunciation hyalella.

MR. ETTINGER: Hyalella.

MS. LIU: Hyalella.

MR. ETTINGER: We have the same problem.

MS. LIU: Hyalella. The SMAV and GMAV for the #20 ranked hyalella azteca does not appear to agree with the SMAV and GMAV for the #6 ranked hyalella azteca.

Should both hyalella azteca along with the Burlington strain be considered under one rank for the genera hyalella?

MR. HUFF: Do you want to answer that?

MR. KLOCEK: We will update Table 1 with corrections requested normalizing our results adding in temperatures and incorporating the 10°C results from Jackson and Funk.

MS. LIU: 31B. In the Stephan 2009a list, although green sunfish and bluegill have individual SMAV's, they have one GMAV since they belong to the same genera. However, in Table 1, they're ranked separately. Should they be ranked together?

MR. HUFF: They should be ranked together and the corrected Table 1 will reflect that.

MS. LIU: 31C. Fingernail clam is included in the table. However, it doesn't appear to be from Stephan 2009a. This is the musculium species.

Would you please elaborate why it was added and the source of the values for the

SMAV and GMAV.

MR. KLOCEK: Yes, we're removing that in the corrected Table 1.

MS. LIU: 31C and it should be D. Sorry. Rank 24 is omitted from the list. Additionally, some of the species appear out of order based on GMAV as shown below. Should the ranks be renumbered?

MR. KLOCEK: Yes. We're correcting that on Table 1.

MS. LIU: Question 32. Would you please describe why the 48-hour and 96-hour LC50 results, while for different durations, both translate into a species mean acute value.

MR. HUFF: This is based on ASTM E729 manual. Section 11.7 duration of test Section 11.7.1 "Whenever possible, the exposure duration should be sufficient to ensure that a time-independent toxicity level can be determined or estimated mathematically. In any case, daphnids and larvae of midges and phantom midges should be exposed to the test material for 48 hours. All other species should be exposed for at least 96 hours.

MS. LIU: Question 33. The values from the New England Bioassay reports were reported in g/L of sodium chloride. The Technical Support Document converted g/L sodium chloride to mg/L as chloride to arrive at the LC50 hours -- LC50 values.

Would you please confirm the conversion was based on the ratio of atomic mass of sodium to chloride.

MR. HUFF: Yes, it was although depending on who was doing the conversion, there may have been fewer significant digits than the 0.60662 that you utilized.

MS. LIU: Question 34. The TSD Table 1 also adjusted the SMAV's and GMAV's for musculium, hyalella, daphnia, sphaerium, and ceriodaphnia, Illinois Natural History Survey and New England Bioassay.

34A. Footnote one for the fingernail clam notes that it was adjusted to 10°C by multiplying by a ratio of 1.75 based on the sphaerium results. The 1.75 ratio appears to be from the INHS report, is that correct?

MR. HUFF: Yes, the source of the

musculium data was from the INHS report and were considered for inclusion. Musculium has been removed from the revised Table 1 submitted electronically on January 22nd, 2019. We'll resubmit that.

MS. LIU: 34B. Footnote two for daphnia states "Adjusted to 10°C based on ceriodaphnia dubia results by multiplying times 1.3." You mentioned earlier 1.3 was the best professional judgment value, could you describe your process of going through that.

MR. HUFF: If you look at the results of the acute toxicity of 25°C versus 10°C, that ratio difference for ceriodaphnia was on the order of 1.9 or 2.0 depending on which test. The 1.3 was the difference in the no observable effect concentration for the ceriodaphnia 1.3. So just because of the similarity of these other organisms we said "Let's just apply a conservative 1.3 to it." I will also offer in revised Table 1 we have taken that back out and gone back to the 25°C data for those other species.

MS. LIU: Thank you. 34C. For footnote two, adjustments were made to all three

daphnia species based on the results of the ceriodaphnia dubia.

Would you please cite to some established protocol from US EPA or elsewhere that prescribes the adjustment of the GMAV of one genera based on another genera. If not, would you please further elaborate on the appropriateness of your approach.

MR. HUFF: Again, that was based on best professional judgment that we saw this temperature difference in all the species that we tested and thought from a similarity, but, again, we have taken that out in the revised statement.

HEARING OFFICER KLEIN: So I think we're at about an hour-and-a-half in. So how about we take a break, come back in 15 minutes and then we can start with the Board Question 35.

(Whereupon, a break was taken after which the following proceedings were had.)

HEARING OFFICER KLEIN: Before we start up again, I just want to note for the record that we have been joined by Chairman Katie Papadimitriu and Board member Brenda Carter and

Chairman Papadimitriu's attorney advisor Tanya Rabczak and they are all located in the Springfield office.

So we left off at Question 35. So, Alisa, you may go whenever you're ready.

MS. LIU: Under normal rising acute values based on hardness and sulfate in Question 35 in the Stephan 2009 --

HEARING OFFICER KLEIN: Can you guys put yourself on mute in Springfield. There we go. Thank you.

MS. LIU: Question 35. In Stephan 2009a and c, the GMAV's and SMAV's were normalized to hardness and sulfate. The method that he used is different than the approach that I think you might be thinking of using as you contemplate revisions to the tables and the calculations.

Would you please comment on revising TSD Table 1 to use the normalized acute values of the species tested by the Illinois Natural History Survey, New England Bioassay, Jackson and Funk consistent with the way shown in Stephan 2009c by first dividing the acute values by the exponential term using the hardness and

sulfate levels and the test waters, then normalize the data to 300 mg's/L hardness and 65 mg/L sulfate for consistency with the existing Stephan 2009 values used in the table by multiplying by the exponential term.

MR. HUFF: Yes. We'll revise Table 1 and we'll submit a separate Table 3 of just our data plus Jackson and Funk that will show their results in a normalized result.

MS. LIU: When you do it, will you please make sure you're doing the normalizing the way they do it in Stephan 2009 by dividing first and then multiplying?

MR. HUFF: We'll go back and look at that and try to do that, yes.

MS. LIU: I understand that you're filing something with the Board yesterday that we weren't able to utilize in the hearing today.

Prior to the next hearing, we can develop questions based on that that will describe the normalizing question maybe in a little more detail.

MR. HUFF: That -- that will be fine.

MS. LIU: In general, 35B, would you please comment on how using the normalized acute values might change the ranks and the calculation of the final acute value and the final chronic value, the CMC and the CCC presented in Table 2 of the Technical Support Document.

MR. HUFF: I believe with the normalized values we will end up with basically four new species at the bottom of the rank. So they will all be at the higher temperature where we're setting at 10°C because at 10°C normalized data will move up in the acute toxicity value that's there. The result when you normalize it, you will see an increase of about 50 percent in the acute value on a normalized basis.

MS. LIU: Question 36A. Please comment on recalculating the CMC and CCC presented in the Technical Support Document Table 2 based on normalized and non-normalized values as done in Stephan 2009a and c and use of the equation whereby the CMC and the CCC are then normalized by dividing by the exponential term at 300 hardness and 65 sulfate to arrive at the base number that is used in the equation format for the Iowa

standard.

MR. HUFF: We will try to do that, yes, ma'am.

MS. LIU: Question 36B. Please comment on what statewide default values for hardness and sulphate may be used in Illinois if you were to turn the equation into a single value number.

MR. HUFF: The mean value from the data I received from the Agency yesterday in hardness for Illinois streams was 286.8 mg/L and the sulfate was 86.8 mg/L. Those mean values would seem appropriate under that methodology.

MS. SANTOS: Can you please repeat the sulfate?

MR. HUFF: 86.8 mg's/L.

MS. LIU: I will drop the next question because you will be doing recalculations. So it doesn't apply now.

MR. RAO: Moving onto Other Acute Toxicity Testing on mayflies At Various Temperatures With Linear Regression Analysis.

Question 37. The Jackson and Funk 2019 acute toxicity test examined acute

responses to elevated sodium chloride concentrations at 5, 7.5, 10, 12.5, 15, 20, 25°C.

37A. Please comment on providing a table similar to Table 2 of Jackson and Funk 2019 showing species, genera, temperatures, and electrical conductivity with the 96-hour LC50 acute values converted to chloride concentrations. Please also comment on including the normalized acute values as done in Stephan 2009 for hardness and sulfate.

MR. HUFF: We will provide data separately for the Jackson and Funk and our work in one and then we'll incorporate that into Table 1 in a normalized fashion as well.

MR. RAO: 37B. Please comment on why the acute values from these four new genera of mayflies from Jackson and Funk 2019 were not added to TSD Table 1 along with the acute values provided by INHS.

MR. HUFF: We didn't get the Jackson and Funk article until long after the Technical Support Document was completed. We have incorporated that now into the Table 1 that we will submit.

MR. RAO: 37C. Please comment on the effect of adding the 10°C data for the neocloeon genera from Jackson and Funk 2019 to the INHS 2017 data would have on the calculation of the SMAV and the GMAV used in TSD Table 1.

MR. HUFF: I don't think it will have a significant effect because they're not going to be one of the four most sensitive organism species.

HEARING OFFICER KLEIN: Before you continue, Mr. Huff, can you please remove that paper from the microphone to make sure it's not clogging the sound.

MR. HUFF: Sorry.

MR. RAO: 37D. Please comment on any effect of adding the 10°C data for all four genera would have on the TSD's calculation of the Final Acute Value and Criterion Maximum Concentration.

MR. HUFF: Same answer. I don't think it will have a material effect just based on where it shows up in the ranking normalized.

MR. RAO: Moving onto TSD Table 2. Recalculation values. Question 38.

TSD Table 2 is entitled "Recalculation Values for Chicago Sanitary and Ship Canal," is this title correct?

MR. HUFF: No.

MR. RAO: If not, is the table addressing values for all Illinois waters?

MR. HUFF: Yes, that was the intent.

MR. RAO: Okay. We're going to skip 39. I think you're going to provide the revised table later. Moving onto Question 40.

Due to the limitations of the text editor, the format of the mathematical terms in Table 2 doesn't seem to appear as intended.

Based on the US EPA 1985 guidelines, please comment on whether the equations in our pre-filed questions, I'm not going to read this equation right now, below appears as intended.

MR. HUFF: The equation that underlie the output in the data table was correct. The mathematics that we put down to show how we were doing that the second and third lines of the S squared calculations were shown incorrectly and that's been corrected as well on the table we'll

be submitting.

MR. RAO: Thank you.

MS. LIU: Question 41 under acute and chronic ratio. The Technical Support Document Table 2 gives an acute chronic ratio of 3.178. Did you mean 3.187?

MR. HUFF: You can answer that.

MR. KLOCEK: Yes, the last two digits were transposed.

MS. LIU: 41B. Will you comment on how this would alter the final chronic value?

MR. HUFF: With the revision noted in the previous question, the calculation, the CCC value will increase -- or will decrease by 0.2 percent before rounding.

MS. LIU: Under derivation of an alternative final chronic value, Question 42, Stephan 2009a described an alternative approach to deriving the final chronic value "Justified on the basis of the good science clause in the 1985 guidelines."

42A. Would you please comment on how the four most sensitive species would be different than TSD Table 1 and 2 based on the

GMAV's for the calculation of the final acute value versus the predicted genus mean chronic values for the calculation of the final chronic value using the alternative method.

MR. HUFF: Our testing failed to show chronic toxicity for the duration of the test for the standard -- the toxicity test while some chronic effects were observed when exposed to elevated chlorides for up to seven weeks. We elected to use the extended testing and the spike testing as part of our sensitivity analysis and relied on the calculated acute-chronic ratio. And without chronic data at 10°C for all the species, I'm not clear how I would implement that alternative approach.

MS. LIU: I think the alternative approach was more based on incorporating the vertebrae and invertebrate acute-chronic ratios rather than just the invertebrate chronic ratio that you utilized to calculate the predicted chronic values. I see where your explanation is going. It's a slightly different way to do it mathematically. I was wondering if you would look at that procedure and try that out as well.

MR. HUFF: I'll do my best, yes, ma'am.

HEARING OFFICER KLEIN: Under the heading technical feasibility and economic reasonableness, Question 43, as noted in the Statement of Reasons, the Board is required to take into account the "technical feasibility and economic reasonableness of measuring or reducing the particular type of pollution."

Would you please address the technical feasibility and economic reasonableness of the proposal.

MR. HUFF: Going from a not-to-exceed winter water quality standard to a four-day chronic and a higher acute winter water quality standard will benefit all urban streams in Illinois without impacting the aquatic communities in these streams. The non-winter chronic water quality standard is more restrictive than the current 500 mg/L not-to-exceed standard and from the stream work that the DuPage River Salt Creek Workgroup has conducted as referenced in Steven McCracken's written comments will benefit these receiving streams.

Given the current peak chlorides and urban streams during snow melt, I do not believe the current water quality standards are attainable. Adopting a winter standard will allow many urban streams to achieve the water quality standards through the best management practices currently being implemented.

In conclusion, I would say there will be a positive economic impact on the Illinois economy if a winter chloride standard is adopted. I believe the proposed standards are technically feasible for many urban streams, but there will continue to be urban steams that will have a difficult time meeting even the proposed standards.

MR. ETTINGER: Excuse me.

HEARING OFFICER KLEIN: Yes.

MR. ETTINGER: Do you want me to go with that now or should I wait because I have other questions about that later?

HEARING OFFICER KLEIN: You can ask the questions now.

MR. ETTINGER: Okay. Your understanding is that the 500 mg/L now is a

not-to-be-exceeded standard?

MR. HUFF: Correct.

MR. ETTINGER: Correct. So there is no chronic standard currently in Illinois?

MR. HUFF: Correct.

MR. ETTINGER: Okay. What is a permit writer supposed to do, to your understanding, if there is no chronic standard or the standard is missing?

MR. HUFF: Well, if -- if you're talking about when a permit writer goes through a reasonable potential to exceed a water quality standard on a point source discharger as opposed to let's say a municipal system with storm sewers, he would go through and if there is a reasonable potential with that discharge exceeding 500 mg/L with a not-to-exceed standard, I believe he would put a daily maximum limit on that discharger to assure that 500 mg/L would not be exceeded under his analysis.

MR. ETTINGER: Okay. Specifically, in a situation, though, in which there is no chronic standard, is the permit writer to attempt to use -- write a permit based on a narrative

standard?

MR. HUFF: I don't believe so. But that's a question better asked of the Agency.

MR. ETTINGER: I'm just trying to understand the predicates for your conclusion.

The current -- if there is no numeric standard as to a particular component that might be relevant to a permit, in general, is one supposed to write a narrative -- you'd write a limit based on a narrative standard, to your knowledge?

MR. HUFF: Not -- I don't believe so. There is a numerical standard in the case of chlorides. That's what they would address is my understanding.

MR. ETTINGER: Okay.

HEARING OFFICER KLEIN: Can we continue?

MR. ETTINGER: He said what he could.

MS. ZALEWSKI: Okay. We're onto number 44 under Chloride Best Management Practices and Offsets. In R08-9(d) --

MS. BROWN: I --

HEARING OFFICER KLEIN: Sorry. Is there a question in Springfield?

MS. BROWN: Yes. Melissa Brown on behalf of the Illinois Environmental Regulatory Group.

Mr. Huff, can you please just elaborate on the technical feasibility and economic reasonableness of the proposed summer standard?

MR. HUFF: I think the summer standard is going to be difficult in a lot of streams to achieve those numbers. So, again, I just simply propose what the US EPA had published as a summer standard to start a dialogue on the summer numbers.

MS. BROWN: So then you don't think it's technically feasible now currently, the summer standard?

MR. HUFF: The summer standard? I think there will be streams in Illinois that will find that very difficult to achieve and certainly in the spring months as it's written right now where you continue to have a contribution from de-icing whether from retention basins or

groundwater, there is typically a tail in the spring months where the chloride drops over time.

MS. BROWN: Okay. Thank you.

MS. ZALEWSKI: Okay. 44. In R08-9(d), Mr. Huff testified regarding a chloride offset program with the Illinois Toll Highway Authority.

A. Please provide further elaboration on these efforts.

MR. HUFF: So I will submit to the Board in the next submittal fairly extensive information on the memorandums of agreement that the tollway has entered in with two communities and the full description from the tollway on their program.

MS. ZALEWSKI: B. Were local communities able to apply to the Illinois Toll Highway Authority for funding to purchase new equipment to reduce salt usage in their communities to offset increased salt usage by the tollway where the same watersheds were affected?

MR. HUFF: Yes, the tollways program was developed and focused on offsetting new salt loadings at the watershed level. Thus, all

communities adjacent to the Elgin-O'Hare West Airport Corridor have been made aware of the program, though primary focus for achieving offsets has occurred within the project area where an entirely new facility is being constructed which is east of I-290 to O'Hare and north to I-90 and south to I-294.

MS. ZALEWSKI: C. How much funding were the communities able to acquire for these offset agreements, how were the amounts determined, and how was it allocated among BMP measures?

MR. HUFF: The tollway has not established a monetary cap for funding communities as part of the program. The focus of the tollway program is to achieve an approximate 20 percent chloride use reduction with its partnering communities. This reduction amount was established with a goal of increasing winter snow and ice removal operational efficiencies within a community that could be achieved while maintaining safety for the motoring public.

MS. ZALEWSKI: D. Can you name some of Illinois's communities that have these types of

offset agreements?

MR. HUFF: There are currently two communities that have partnered with the tollway as part of the offset program. They are Wood Dale and Bensenville and I will submit those agreements -- additional agreements that are currently in negotiations between the tollway and the partnering communities.

MS. ZALEWSKI: Thank you. E. Were the agreements or resulting BMP initiatives made part of the MS 4 permits?

MR. HUFF: The winter operations BMP's have not been specifically included in the tollways' MS 4 permit and I'm not sure about the communities.

MS. ZALEWSKI: F. Do you know if there are similar offset agreements in other states?

MR. HUFF: I am unaware of any offset programs in the United States.

MS. ZALEWSKI: G. What other sources of funding are communities able to use for implementing chloride BMP's?

MR. HUFF: My understanding is that

nearly all of the BMP's implemented by communities have been funded completely at the local level. That rate of funding depends on the financial strength of each community.

MS. ZALEWSKI: 45A. Please comment on whether all municipalities and other entities discharging to urban waterways have developed and implemented BMP's to reduce de-icing salt usage.

MR. HUFF: BMP's have been implemented at different rates depending on the community, the watershed where it resides and how progressive the public works director in those communities are. In the DuPage River Salt Creek Workgroup, aggressive implementation has been ongoing for more than a decade with a high-degree of participation by the municipalities.

To my knowledge, all of these communities in the DuPage River Salt Creek Workgroup Watershed have implemented BMP's including training, collaboration, pavement temperature monitoring and advanced water forecasting servicing. Liquid use has been increasing each year to where pre-treating and pre-wetting are currently wildly practiced in

these basins. Anti-icing is increasing annually.

Similar efforts in the Hickory Creek Basin, the Lower Des Plaines Basin, the Chicago Area Waterway System, Lake and McHenry Counties have also been ongoing, but for not as long as the DuPage River Salt Creek Workgroup area.

MS. ZALEWSKI: B. Can you comment on whether it would be premature to draw broad conclusions on the effectiveness of BMP's to reduce salt usage to meet the chloride standard?

MR. HUFF: The focus of the regulating community has been to reduce salt usage on an annual basis and progress has been made in reducing salt on this basis. The problem is that the standard is not an annual standard. It is a not-to-exceed number. The question then becomes under extreme conditions; freezing rain, dropping temperatures, high wind conditions, et cetera, how effective liquids training and weather tracking will be under these extreme conditions.

The answer is that the regulated community for safety purposes will need to apply copious salt to keep the roads, parking lots and

sidewalks safe during these extreme events. I believe you can look at the trends in the DuPage River Salt Creek Workgroup Basin and that data was provided in my Technical Support Document and it is apparent that the 500 mg/L maximum on Salt Creek in the east branch of the DuPage River will not be achieved through BMP's given the high participation rate currently existing in those basins.

I want to stress that encouragement of BMP's is absolutely a correct step to take. My point is we are striving for a target that will not be achievable in many urban streams, nor is it necessary to protect our streams during winter months with that 500 mg/L standard.

MS. ZALEWSKI: Thanks.

MR. RAO: Question 46A. Please comment on whether other sources besides sodium chloride tend to be more or less toxic to aquatic life.

MR. HUFF: David?

MR. SOUCEK: Yes. In general, sodium chloride tends to be less toxic to aquatic

life than magnesium chloride and potassium chloride, but this can vary by species. For example, ceriodaphnia dubia and lampsilis siliquoidea, a fresh water mussel, have been found to be much more sensitive to potassium chloride than to sodium chloride by Mount, et al 2016 and Wong, et al, 2018. However, sodium chloride and potassium chloride have comparable toxicity on a Muller basis to the mayfly neocloeon triangulifer, a study that we established in Soucek, 2018.

It's been found that both ceriodaphnia dubia and the mayfly neocloeon triangulifer are more sensitive to magnesium salts than sodium salts and Mount, et al, from 2016 found that calcium has a toxicity that lies for C. Dubia -- excuse me -- calcium chloride has a toxicity that lies between that of sodium and magnesium salts.

MR. RAO: 46B. Do you know if any of the chloride BMP's currently being prescribed consider the toxicity of other salts? If not, should they?

MR. HUFF: Calcium chloride and magnesium chloride are both used typically either

for pre-wetting or during colder pavement temperatures when sodium chloride is either less effective or not effective at all depending on the temperature. There are corrosion issues with magnesium chloride so it is typically not used on bridges. Both magnesium and calcium chlorides are considerably more expensive than sodium chloride, but necessary at colder pavement temperatures and can significantly reduce total chlorides applied as opposed to sodium salts during cold temperatures.

MR. RAO: Question 47. In your testimony, you referred to a Connecticut Department of Transportation study.

47A. That study I think was based on the use of sand-salt mixture compared to salt?

MR. HUFF: Yes.

MR. RAO: Are Illinois roadway authorities considering alternatives other than sand-salt mixture to reduce salt usage in urban areas?

MR. HUFF: Most of the best management practices being implemented in Illinois

are directed to more efficient application of salt such as pre-wetting to reduce bounce off the roadway, anti-icing prior to the storm to prevent ice formation on the surface, annual calibration, computer application based on vehicle speed, plowing first before applying salt and tailoring a salt application rate to the pavement temperature and predicted pavement temperature.

Essentially, nearly all these efforts are tailored towards optimizing the salt application rate and reducing losses due to bounce so there is no change in the effectiveness. The addition of carbohydrates such as beet juice reduces salt applied, but contributes to the organic loading and you see pretty common in both the anti-icing and in the pre-wetting where they're using a 10 to 20 percent mixture of some carbohydrate with the salt for the liquid portion.

MR. RAO: You already talked about salt alternative options being considered here.

Are there any studies conducted to evaluate the effectiveness of these alternatives compared to sand-salt mixtures?

MR. HUFF: Are there any studies?

There has certainly been a lot of work done. So I would say, yes, there is a fair amount of data that's out there. When you apply straight carbohydrates, they tend to be very slippery and increases accidents. So the City of Chicago tried that at one point in time on a narrow area. So they kind have gone to mixtures. You have a lot of proprietary mixtures of the salt in various carbohydrates from the vendors of the de-icing chemicals today.

MR. RAO: 47C.

HEARING OFFICER KLEIN: Sorry. Before you go on, Mr. Huff, you noted that the City of Chicago focused in on an area.

Was that part of a program or a study that they did that has a report?

MR. HUFF: It was around City Hall actually and they never did it again after that day because they had a series of accidents from the slipperiness of all of the beet juice that they put down. I mean, the City is doing other work, but there was no report on that one. They just stopped that one.

MS. ZALEWSKI: Is there anything in

the record that applied the beet juice -- I mean --

HEARING OFFICER KLEIN: Is there anything you can, like, submit?

MR. HUFF: Let me see what I can find.

MR. RAO: Thank you. 47C. Please clarify whether it is your opinion that "Highway de-icing practices cannot be simply changed" or is it the consensus of roadway authorities in the state?

MR. HUFF: This is my opinion having worked for the Tollway, the Skyway, the Illinois Department of Transportation, county and municipal highway projects for many years. Every roadway expansion has to address the impact of the associated de-icing practices and alternatives are evaluated including organics such as acetates. And in every case, more efficient application of salt has been shown to be the only viable alternative.

MS. LIU: Question 48. As Laura argues in pre-filed testimony, based on that, would you please clarify whether the SMAV used in

your proposal needs to be revised considering more recent studies that she cited.

MR. HUFF: We use the 2009 species list as a starting point and added 10°C temperature information that we had. So with respect to the glochidia, the research out there at 10°C is not available.

MS. LIU: Question 49. Would you please comment on Ms. Barghusen's concern regarding the lack of studies to demonstrate that the proposed standard affords adequate protection to the glochidia.

MR. HUFF: Mussel glochidia have been shown to be among the most sensitive organisms to chloride. All studies so far have been conducted at or near 21°C. However, Gillis reported LC50 values in the natural waters over 3 times higher than what they got in the laboratory reconstituted water which could not be explained simply with respect to hardness. So, clearly, additional research is warranted with respect to glochidia sensitivity to chlorides and natural waters in addition to tests at 10°C.

MR. RAO: I think that completes our

questions. Thank you very much.

HEARING OFFICER KLEIN: Thank you. We will now go to the IEPA questions. You guys are on mute, Springfield.

MS. DIERS: Thank you. Can we have about five minutes just so I can talk to my technical folks before I start asking our questions?

HEARING OFFICER KLEIN: Yeah. Mr. Huff, do you have a problem with that?

MR. HUFF: No.

HEARING OFFICER KLEIN: Okay. We can come back in five minutes.

MS. DIERS: All right. Thank you.

HEARING OFFICER KLEIN: Off the record.

(Whereupon, a break was taken after which the following proceedings were had.)

HEARING OFFICER KLEIN: All right. We can go back on the record. All right. IEPA, you may begin your questions.

MS. DIERS: Stefanie Diers from Illinois EPA. I'm going to strike our question

one. I believe it was already asked and answered. So I'm going to go to question two.

On page three of your pre-filed testimony, you state that work plans were submitted to US EPA but that you heard nothing back from them.

Did you follow-up with US EPA concerning the work plans that you sent?

MR. HUFF: I did not.

MS. DIERS: You also state that you sent your work plans to Illinois EPA and did not receive any comments, did you follow-up with them?

MR. HUFF: No, I did not say that. I said I received a phone call from Scott Twait and then Scott indicated there would be a follow-up letter from the Agency commenting on the work plan and nothing ever arrived.

MS. DIERS: Okay. So going on that, that addresses question three where we state on page 4 of your pre-filed testimony, you state that you spoke to Scott Twait at Illinois EPA and were told the Agency would like to see more testing at more temperatures.

A. Why were additional

temperatures not tested to appropriately derive a slope, an associated final acute equation, and final chronic equation for the proposed chloride standards, as described in US EPA guidance?

MR. HUFF: Twofold. One, I was strictly looking at the de-icing winter practices and, second, was strictly budgetary considerations and I offered if Scott could come up with the money that we would be more than happy to run the additional tests.

MS. DIERS: B. Would the 10°C chloride water quality standards be protective of aquatic life at temperatures slightly above 10°C?

MR. HUFF: So the proposal I have placed forward before the Board has resulted in some confusion. There is a summer proposal considerably more restrictive then the current 500 mg/L standard. The only significant variable is the highway de-icing practices which occurs as defined episodic events. The winter standard was intended to address these episodic events. Snow is in a solid form of water, which means that it exists at a temperature at or below 0°C. Snow melt caused by salt application will result in the

formation of a liquid at temperatures at or below 0°C.

Runoff from highways and parking lots when salt was applied will be at temperatures below 10°C and this winter standard was intended to address these scenarios. Now, if the stream temperatures are above 10°C, the pavement temperature will certainly be above 10°C and the salt application would be minimal during these scenarios. Salt is primarily applied to break the bond between the pavement and ice formation.

From the number of questions I received regarding the winter temperatures, it is clear that the consensus of participants would prefer a water quality standard based on temperature, not seasons. I would have no objections to changing the approach to a temperature-based standard in the case of the data we have that when the stream is at or below 10°C.

MR. ETTINGER: May I follow-up on that, please?

HEARING OFFICER KLEIN: Yes.

MR. ETTINGER: As a general question, did you consider the effect of chloride

entering streams through groundwater?

MR. HUFF: Antidotically? I believe that would be an issue in March, April and into May and sometimes into June where the other proposed standard, the summer standard, would apply in the latter two months of that.

MR. ETTINGER: Antidotically, so you considered it antidotically, is that what your answer is? I'm sorry.

MR. HUFF: Not specifically. But you would have to meet from that groundwater migrating into the streams in May and June the proposed 230 mg/L chronic standard.

MR. ETTINGER: Well, could -- we've had some warm winters in the past, too. Could you have groundwater enter in February during a relatively warm winter also?

MR. HUFF: During a warm winter?

MR. ETTINGER: Yes.

MR. HUFF: I think it depends on how much salt has been applied. Right. If you're not applying salt because you have warm weather, you're not going to get that groundwater with the elevated chloride.

MR. ETTINGER: I guess my question is, though, we have situations -- have had situations, my recent memory, in fact, in which we had snowstorms in December and then an absurdly warm January by historical standards.

Could you not see salt entering the stream in January, in using my example, at relatively warm temperatures?

MR. HUFF: The temperatures would be below 50°F. So below 10°C. Groundwater is not going to be above that temperature at that time of year period.

HEARING OFFICER KLEIN: Ms. Yang?

MS. YANG: To follow-up on Mr. Ettinger's comments on groundwater migration, have you or would you consider that factor in relationship to different permeabilities of soils that are found in Illinois?

MR. HUFF: Frankly, I don't think it's relevant. If you have a water quality standard, you're striving to meet that standard independent of what the geology in the State of Illinois is.

MS. YANG: But do you recognize how

on certain soils at high porosity and groundwater be impacted as opposed to soils with lower permeability?

MR. HUFF: It would contribute at a faster rate in the more permeable soils.

MS. YANG: Okay. Would that -- would you consider looking into that impact as an additional study to this proposal?

MR. HUFF: The short answer is no. I don't think it's relevant. What we were trying to do is establish whether chlorides are less toxic at colder temperatures. That's what our study was about.

MR. ETTINGER: Just to be clear as to what we said before. Your testimony is, is that groundwater has never been above 50°F in January or February or March in the history of Illinois?

MR. HUFF: Well, you're -- I don't think it would occur. I have never seen such data that would suggest otherwise.

MR. ETTINGER: Thank you.

HEARING OFFICER KLEIN: Okay. Ms. Diers, you can continue.

MS. DIERS: Okay. Question C. Would chloride toxicity be further mitigated at test temperatures below 10°C?

MR. HUFF: Based on the work of Jackson and Funk with mayflies where they tested the toxicity of temperatures at 5°C all the way up to 25°C, I would say toxicity is further mitigated at colder temperatures below 10°C, yes.

MS. DIERS: Question 4. Did you share the regulatory proposal with US EPA before filing the petition with the Illinois Pollution Control Board?

MR. HUFF: No.

MS. DIERS: Why not?

MR. HUFF: Well, I tried to follow the Illinois Pollution Control Board's procedures for filing and budgetary contributions as well.

MS. DIERS: Have you talked to US EPA to see what you have proposed is approvable by US EPA?

MR. HUFF: I have not, no.

MS. DIERS: That takes care of Question 5.

Did you share the regulatory

proposal with Illinois EPA before filing your petition with the Board?

MR. HUFF: No, I, again, tried to follow the Pollution Control Board's procedure for filing a regulatory rule change.

MS. DIERS: Question 7. Did you conduct any outreach with stakeholders concerning your proposal before you filed it with the Illinois Pollution Control Board?

MR. HUFF: I presented to the DuPage River Salt Creek Workgroup twice during the project at its public meetings as well as to the Hickory Creek Watershed. Both groups have environmental stakeholders as members. In addition, I sent out to the clients that funded the research for progress reports along the way.

MS. DIERS: So did you talk to anybody in central or southern Illinois, communities or anything, about your proposal?

MR. HUFF: No, I did not.

MS. DIERS: And why did you not talk to other communities throughout the State of Illinois before filing your proposal?

MR. HUFF: I basically went off my

outreach when I put together my consortium with the organizations that I had some familiarity with.

MS. DIERS: Would you agree if you're doing a statewide water quality standard that you should talk to other people throughout the state to see what the impact of the proposal might be?

MR. HUFF: Well, again, my primary focus was on the colder temperature in urban areas which is primarily northeast Illinois.

MS. DIERS: Question 9. As drafted, this proposal contains a statewide water quality standard. Did you look at chloride impacts and road salt usage in central and southern Illinois?

MR. HUFF: No, I did not. I mean, salt usage is salt usage. You have a storm and you have the appropriate temperatures they're going to be putting salt down at the same rates as what would be applied here on an individual storm event. They would just have fewer of them.

MS. DIERS: Ten. Please describe how temperature and weather from northern, central and southern Illinois vary.

MR. HUFF: It's colder and likely more snow the further north one is in Illinois. With respect to stream temperature, again, my focus was on the episodic salt application events which can occur over the months proposed. However, I have no objections to a cold temperature standard based on the stream temperatures. So we'd have a winter temperature that would apply when the stream was at or below 10°C.

MS. DIERS: Eleven. Does your research consider the difference in temperature and snowfall events for the southern half of the state as compared to the northern half of the state?

MR. HUFF: Yeah. Our research again looked at the temperature effects on chloride toxicity. The proposed winter water quality standard was developed to address the episodic snow events with the proposed summer standard serving as the controlling standard in areas not dominated by urban snow removal practices.

MS. DIERS: Twelve. It appears that the cold water temperature standards were

developed to coincide with periods when road salt usage is expected in northern Illinois.

Did you consider invariant sources of chloride from coal mines and water treatment plants in the downstate area?

MR. HUFF: One would expect the coal mines and water treatment plants to discharge chloride mass independent of snowfall events. One would not expect these industries to increase chlorides in the winter just because there was a higher water quality standard in the winter. The proposed summer standard, which is less than 50 percent of the current standard, would seem to be controlling for these industries. Again, I would have no objection to a winter standard based on stream temperature independent of the month.

MS. MEYERS: Can I ask a follow-up question?

HEARING OFFICER KLEIN: Yes, go ahead.

MS. MEYERS: Stacy Meyers, Openlands. But you do recognize that it's not an either/or situation in that if there are other chloride discharges into the streams, that would

be in addition to instead of -- in lieu of salt on roads, right?

MR. HUFF: I'll see if I can paraphrase. Do I recognize that there are other sources of salt that would be --

MS. MEYERS: That those sources of salt don't act independently of road salt, but would be combined with road salt as far as impacts in the waterways, correct?

MR. HUFF: Strictly during the winter episodic events?

MS. MEYERS: Any time that you have multiple sources of chlorides they would combine an effect, correct?

MR. HUFF: Correct, but they would also have to meet the summer proposed standard and what would cause those same dischargers to suddenly triple or whatever their salt loading in the winter?

My point is that their salt contribution would be independent of the stream temperature, independent of the month of the year.

MS. MEYERS: But this standard is for salt, correct?

MR. HUFF: It's for chloride.
MS. MEYERS: Thank you.
MS. DIERS: Question 13. On page six of your pre-filed testimony, you indicate that Illinois EPA provided you with Illinois stream temperature data from 2002 to 2016 and you state in "Using just the data from December 1st to April 30th yielded a 75th percentile temperature of 9.3°C.

Based on these results, a temperature of 10°C was selected for conducting winter temperature toxicity testing."

Question A. Is it appropriate to combine winter data, December, January and February, with spring data, March and April, and use the 75th percentile temperature to justify inclusion of March and April as months suitable for the 10°C standard?

MR. HUFF: Again, my intent with winter standard was to address snowfall de-icing practices, which are episodic events, and I believe would predominantly occur when the stream temperatures are less than 10°C independent of the month. The months were combined to address the

snowfall months. Again, if a snowfall occurs when pavement temperatures are above 0°C, salt application declines very significantly to hills and where snow may blow back onto the roadway. Such events would not be expected to cause a spike in chlorides in the receiving streams.

MS. DIERS: B. By including temperature data from winter months, would there be a bias towards a colder 75th percentile result?

MR. HUFF: Certainly. But, again, the intent was to focus on stream conditions that occur after snow melt when salt application is necessary. Inclusion of March and April was intended to cover the period when salt would be applied in snow events when temperatures are at or near 0°C, which I believe was important to the Agency when writing future NPDES permits where chloride limits are being considered.

MS. DIERS: C. Using the same dataset referenced in this petition, what are the 75th percentile temperatures of each individual month?

MR. HUFF: So November 10.8°C; December 5.7°C; January 3.1°C; February 4.3°C;

March 8.8°C; and April 15.7°C.

MS. DIERS: D. Are there any differences in stream temperatures between northern Illinois and southern Illinois?

MR. HUFF: The logical answer is, yes, but, again, the proposed winter standard was intended to cover episodic salt application events for highway and parking lot de-icing.

MS. DIERS: E. Are there any locations in Illinois where water temperatures in December through March are routinely above 10°C?

MR. HUFF: I have not evaluated this and I don't believe it's relevant. Salt application associated with snow events would be minor when temperatures are above 10°C. Again, I have no issues with a chloride standard based on actual stream temperatures.

MS. DIERS: Question 14. On page 6 of your pre-filed testimony, it states that "The Agency has a protocol for computing the 75th percentile temperature and a similar approach for pH for computing seasonal water quality standards for each specific waterbody for ammonia and a similar approach was used for developing winter

chloride standards."

Have you looked at ammonia water quality standards in Section 302.212(b)?

MR. HUFF: Yes.

MS. DIERS: A. In those equations, what is T and what is pH?

MR. HUFF: Temperature is T and pH is the pH of the stream both at the time of sampling.

MS. DIERS: B. When using those equations to determine compliance in the receiving stream, the Agency uses the pH and temperature at the time of ammonia sample. Were you instead referring to how the Agency calculates permit limits based on ambient data (75th percentile temperature and 75th percentile and 50th percentile pH) located at 35 Ill. Adm. Code Part 355?

MR. HUFF: Yes, I was.

MS. DIERS: Fifteen. The proposed regulatory language in Section 302.214(a) requires a zone of initial dilution (ZID) for the acute chronic water quality standard and requires a ZID for the chronic chloride water quality standard.

Did you intend to require a ZID for the acute chloride water quality standard and a mixing zone or allowed mixing for the chronic chloride water quality standard?

MR. HUFF: Yes, I did.

MS. DIERS: Sixteen. The proposed regulatory language in Section 302.214(b) requires a ZID for the acute chloride water quality standard and allows no mixing for the chloride -- for the chronic chloride water quality standard.

Did you intend to require a ZID for the acute chloride water quality standard and a mixing zone or allow mixing for the chronic chloride water quality standard?

MR. HUFF: Yes, I did.

MS. DIERS: Seventeen. In the proposed regulatory language in Section 302.214(b)(2), there is a statement that the samples for determining compliance must be collected in a manner that assures a representative sample.

Did you intend for this requirement to be in Section 302.214(a)(2) also?

MR. HUFF: Yes, I did.

MS. DIERS: Is it your intention -- this is 18. I'm sorry.

Is it your intention that these proposed chloride water quality standards are the general use standards or is it your intention that the proposed standards replace chloride standards in Section 302.407(g)(2) and Section 303.449 for the site specific standard for the Chicago Sanitary and Ship Canal?

MR. HUFF: Yeah, my intent was to replace both the general use, the Chicago Area Waterways and Lower Des Plaines and the site specific on the Chicago Sanitary and Ship Canal.

MS. BROWN: Can I follow up?

MS. DIERS: Mm-hmm.

MS. BROWN: Hi. Melissa Brown with the Illinois Environmental Regulatory Group again.

Are you aware of the pending chloride time-limited water quality standard proceedings in front of the Board?

MR. HUFF: Yes, I am.

MS. BROWN: And what's your understanding of how your proposal, if adopted, would affect -- excuse me -- the pending petitions

for the timing of the water quality standards?

MR. HUFF: I think they're somewhat independent of each other and I think based on the data I've seen there may be some watersheds depending on what the ultimate winter number is. They could drop the request for a variance, but there is also a large number of those watersheds that will still have to proceed with the time-limited water quality variance.

MS. BROWN: Thank you.

HEARING OFFICER KLEIN: Ms. Rabczak?

MS. RABCZAK: I have a follow-up. The reverse question. Tanya Rabczak with the Board. Chairman, I have a question.

If the Board adopts the time-limited water quality standards, how would that affect pending rulemaking?

MR. HUFF: How will that affect?

HEARING OFFICER KLEIN: Pending rulemaking.

MR. HUFF: My -- my proposal?

HEARING OFFICER KLEIN: Yes.

MR. HUFF: I really believe they're independent of each other. If the Board adopts

time-limited water quality variances, if a watershed now meets the new winter standard, they would drop the need for having the variance. But those watersheds that are still over whatever is adopted here in the way of a winter chloride will still have to proceed with a time-limited water quality variance and aggressively implement and report the best management practices.

MS. RABCZAK: Another question I have is can you please clarify the scope of regulated entity under your proposal versus the regulated entity under the time-limited water quality petition that we have for chloride.

MR. HUFF: I'm sorry. Can you repeat that?

MS. RABCZAK: Could you please clarify the scope of the regulated entity under your proposal versus the proposal in the time-limited water quality petition for chloride?

MR. HUFF: I believe that the scope of my proposal would basically apply to every operation that practices de-icing practices in the State of Illinois because that's going to affect their water quality standards whereas the

time-limited water quality variances are based on specific watersheds where data exists that they are above currently the 500 mg/L standard.

And if the Board were to adopt a new winter standard, each of those watersheds would have to go back and determine whether they needed to continue with that variance because they don't need the new winter standard or whether if they feel comfortable they meet the winter standard, they would drop the variance.

MS. RABCZAK: So your proposal has a broad -- a much broader scope of regulated entities than the current time of the water quality standards?

MR. HUFF: Yes, I would agree with that. Yes.

HEARING OFFICER KLEIN: Ms. Diers, you can continue.

MS. DIERS: Question 19. On page eight of your pre-filed testimony, you state in that "From the Technical Support Document, each exceedance was generally less than a week duration which formed the basis for asking Dr. Soucek to run the third series of toxicity testing with the

exposure to elevated chloride for seven days followed by returning the chlorides to a lower concentration over a period of days."

Is this representative of discharge from an industry that has a consistent discharge of chloride?

MR. HUFF: Again, the intent was to look at de-icing runoff durations. I would not expect an industry to increase its chloride discharge during the winter season because the water quality standard increased. If industry achieved a proposed summer water quality standard or even the existing water quality standard, there is no reason to expect they would suddenly begin in the winter months to discharge more chlorides but for their own pavement de-icing practices.

MS. DIERS: Question 20. On page 94 of the regulatory petition, it states that "Using the toxicity data published in the 1988 Ambient Water Quality for Chlorides and then modifying the results for certain species based on the current 10°C research, winter water quality criteria for chlorides can be derived. Table 1 presents a listing of the chloride genus and species mean

acute values ranked from the most tolerant -- most tolerant chlorides to the least tolerant species."

A. However, Table 1, page 95 of 404, is not from the 1988 National Criteria, rather it appears this is a dataset used in the 2009 Iowa chloride standard with the exception being the inclusion modification of GMAVs for the organisms recently tested in support of this petition, is that correct?

MR. HUFF: Yes, it is.

MS. DIERS: B. Was the dataset from Iowa ultimately used as the baseline for deriving the cold temperature standards?

MR. HUFF: The 2009 dataset was ultimately used as the dataset as this dataset was agreed upon by Iowa and Stephan's of US EPA as desirable to incorporate in more recent toxicity data than was available in 1988.

MS. DIERS: Then why were the 1988 National Criteria proposed for the General Use standards, whereas a modified dataset of the 2009 Iowa standard was used in derivation of the cold temperature standards? That's still in B.

MR. HUFF: Because for the summer I

really -- my focus was on the winter, but I thought if the Board was going to open up proceedings on chlorides, it was appropriate to have a discussion on summer as well and the 1988 National Criteria was the most recent actually published document from EPA where they have specific water quality criteria. So that's what I used for the summer.

MS. DIERS: So in C, why was the cold water temperature database not appropriately identified as the 2009 Iowa dataset in the petition?

MR. HUFF: I'm sorry. Could you repeat that question?

MS. DIERS: It's question C. Why was the cold temperature database not appropriately identified as the 2009 Iowa dataset in the petition?

MR. HUFF: That was just a mistake on our part.

MS. DIERS: D. The 2009 Iowa chloride standards are hardness and sulfate-dependent. Why were hardness and sulfate not incorporated into the new standards proposed

by this petition?

MR. HUFF: Well, I think because Illinois currently has a chloride standard of 500 mg/L without regard to the sulfate or hardness. When the Agency proposed a chloride standard for the Chicago Area Waterway, they again went with 500 mg/L without consideration of hardness or sulfates and I was just trying to keep this simple.

So I have absolutely no reservations about incorporating sulfate and hardness into a water quality standard and I have reservations that the data doesn't exist at colder temperatures and we're making the assumption that the current relationship between sulfate and hardness that was established at higher temperatures would hold at colder temperatures.

MS. DIERS: Twenty-one. The GMAVs in Table 1 were ascertained from the 2009 Iowa dataset and are normalized to a hardness of 300 mg/L and a sulfate of 65 mg/L which appears to inflate the reported GMAV values compared to the non-normalized GMAVs that are representative of the actual reported literature values.

A. Was it your intent to incorporate the hardness and sulfate dependent toxicity of chloride into the GMAVs?

MR. HUFF: We use that Table 1 in a normalized fashion and then plug in our 10°C. I think the intent was that those normalized hardness and sulfate are closer to what there is in Illinois as compared to what the researchers were doing -- using for their hardness and sulfate.

MS. DIERS: B. The use of the hardness and sulfate normalized GMAVs in Table 1 may lead to the derivation of less stringent acute and, via the ACR approach, chronic standards.

Was an attempt made to report the GMAVs in a non-normalized format?

MR. HUFF: We -- we did not normalize our results that were put into Table 1. Had we normalized those, they would have resulted in higher proposed numbers. I think our intent when we resubmit Table 1 we will normalize the data and then we will also compute the CMC and the CCC based on the mean concentrations of hardness and sulfate in Illinois.

MS. DIERS: Twenty-two. On page 94 of the petition, you state that the 1988 Ambient Water Quality for Chlorides was used as the initial source of toxicity data, however, the species list on page 95 of your petition does not match the species list in the 1988 National Criteria document.

Why is the species list different from the 1988 National Criteria document?

MR. KLOCEK: The 1988 dataset contained 12 taxa used for the GMAV. The 2009 dataset initially contained 29 taxa reflecting newer data than available in 1988. More recent databases are available since 2009.

However, the 2009 dataset and procedure utilized by Iowa had been approved by the US EPA. I do not believe the expanded dataset would materially change our calculations for a winter standard.

MS. DIERS: Twenty-three. I'm not going to ask you. We already talked about that earlier.

MR. KOCH: Ask it.

MS. DIERS: Nevermind. My technical person would like me to ask you 23.

During the Chicago waterway hearings, US EPA took the position that the Iowa standard was no longer approvable. Have you communicated with US EPA about their position concerning Iowa's chloride standard?

MR. HUFF: No. Again, my focus was strictly on the temperature effects of chloride toxicity.

MS. DIERS: If you are aware that US EPA would no longer approve the Iowa standard, why was it used to support your petition?

MR. HUFF: Well, again, we focus on the research that shows that chlorides are less toxic in the winter. The Iowa methodology in the Stephan 2009 were just offered and I guess in a convenient way to calculate out what a winter standard would be.

MS. DIERS: Twenty-five. I'm going to skip 24. We talked about that.

Twenty-five. Have there been any other studies since the 2009 Iowa derivation?

MR. HUFF: Yes, and some of those

studies were included in the literature review, Laura Barghusen's testimony and Roger Klocek's testimony.

MS. DIERS: Twenty-six. On page 5 of your pre-filed testimony, you state that in "As the four most sensitive species drive the derivation of the FAV, and subsequently the CMC and CCC, the work plans selected the four species most sensitive to chlorides for toxicity testing.

The approach was to substitute the results for these four species and similar organisms in the list of the genus mean acute values (GMAV) leaving the remaining species results as published without temperature adjustment and then recompute the new FAV with this mixed temperature list."

A. Have the four species most acutely sensitive to chloride been tested under cold temperatures?

MR. KLOCEK: Our tests on sphaerium and ceriodaphnia represented two of the four most sensitive species on the list of the Iowa taxa. Neocloeon was added as a taxon acutely sensitive to chloride at standard test temperatures 25°C.

The fourth taxon is villosa, a mussel, and was not tested by us. We chose to avoid testing mussel glochidia as being difficult to obtain regularly and also due to the elevated cost for glochidia testing. Few labs regularly test glochidia which added to our decision to test only non-glochidia bearing taxa. We believe that obtaining data to show that lower temperature ameliorated the effects of chloride toxicity would be sufficient to apply the effect across broad taxa designations.

MS. DIERS: B. It seems when using the non-normalized Iowa dataset and supplementing it with cold temperature test results lampsilis and physa are among the most acutely sensitive taxa.

Why were these genera not selected for cold temperature testing?

MR. KLOCEK: We used the 29 taxa normalized data list as it represents the same list we used during the Chicago Ship Canal proceedings in 2011. Originally, we used a non-normalized list in 2011 but received a comment that we should use normalized data. Hence, we

used the normalized value list for the current petition, for the standard temperature data, and non-normalized for the species we tested at 10°C.

By not normalizing the 10°C data, the results are more conservative. We did this because the relationship for hardness and sulfate have not been established at 10°C, thus requiring an assumption that the same relationship at 25°C holds at 10°C. We would not have chosen to test lampsilis mussels or any other mussels due to limited funding and the high cost of glochidial testing.

MS. BARGHUSEN: I'm Laura Barghusen, B-A-R-G-H-U-S-E-N, from Openlands.

Are you aware of whether the GMAVs or FMAVs for mussels in the database presented in Table 1 included early life stages of mussels in computing the values?

MR. KLOCEK: I don't believe they did.

MR. HUFF: Talk --

THE COURT REPORTER: I didn't hear that.

MR. KLOCEK: I don't think they

included glochidia in the 2009 lampsilis mussel test. I think it was just juvenile mussels.

MS. BARGHUSEN: Thank you.

HEARING OFFICER KLEIN: Let me take a check here. It's 1:10 and I don't know if it's past people's lunchtime, but we can take a break here and then reconvene at 2:00 or we can power through. We're approaching the end of IEPA's questions. So I don't know if --

MR. HUFF: Power through.

HEARING OFFICER KLEIN: Power through them then we'll take a break for lunch, does that work?

MS. SANTOS: That's fine.

MS. DIERS: Question 27. Would you agree the new acute toxicity data for chloride is available and is unaccounted for in the dataset used in this petition?

MR. KLOCEK: We agree that new data exists that was not accounted for in our petition but virtually all of the new data was conducted at warmer temperatures. It is our contention that data from chloride toxicity tests conducted at cooler temperatures will show that chloride

toxicity is ameliorated by cooler temperatures across broad taxa lines as demonstrated by our own data and other data presented in our petition. We will amend Tables 1 and 2, with the recently published paper on mayflies with the 10°C results and normalize our data.

MS. DIERS: Twenty-eight. Would the incorporation of new acute toxicity data modify the standards proposed in this petition?

MR. HUFF: There are a number of approaches to developing water quality standards and the available literature continues to evolve. Certainly, whatever approach in dataset that is selected will yield somewhat unique water quality standards. With the incorporation of the mayfly data in there, which is normalized, it won't have a material effect on the final calculated values.

MS. DIERS: Twenty-nine. Would you agree the new chronic toxicity data for chloride is available and is unaccounted for for the derivation of chronic standards proposed by this petition?

MR. HUFF: Well, again, our focus was on the colder temperature 10°C. In the first

round of testing, we did a 10°C. We failed to show any chronic effects. We extended that testing for longer term exposure and the spike concentrations of chloride where some chronic effects were observed. We ended up using the ACR to derive the chronic standard and use our test results to compare with the computed chronic standard as part of the sensitivity analysis and the Technical Support Document. I am unaware of any additional chronic toxicity data generated at colder temperatures, but look forward to seeing such information.

MS. DIERS: I'm going to go to B. Would the incorporation of new chronic toxicity data allow for the derivation of chronic standards that may be derived using GMCVs in lieu of the ACR approach? It's 29B.

MR. KLOCEK: Well, yes, it's possible that that could be done.

David, do you have a take on that also that with the incorporation of new chronic toxicity data allow for the derivation of chronic standards that may be derived using GMCVs in lieu of the ACR approach?

MR. SOUCEK: I mean, I think we've -- we've decided that there aren't sufficient cold temperature chronic data out there, but if there were that we had from the eight -- eight families, then, potentially, yes, that would be the case.

MS. DIERS: Okay. I'm going to strike C. We have already talked about 30. The Board asked that earlier. So I'll go to 31.

Both the 1988 National Criteria document and the 2009 Iowa standard included a GMCV for pimephales (fathead minnow) of 433 mg/L, which was the second most sensitive GMCV in the dataset. The ceriodaphnia GMCV equals less than 419 mg/L). Yet, the cold temperature chronic standard was developed using an invertebrate ACR that is twofold less protective than the vertebrate ACR.

A. Why was temperature-dependent chloride testing not conducted on --

MR. KOCH: Pimephales.

MS. DIERS: -- pimephales?

MR. KLOCEK: We selected the most

sensitive species based on the acute toxicity test as likely that almost all cold-blooded vertebrates and invertebrates on any chloride toxicity list would show amelioration of chloride toxicity when tested at cooler temperatures.

MS. DIERS: B. Does the invertebrate ACR result in a chronic cold temperature standard that's protective of pimephales and other vertebras?

MR. KLOCEK: A vertebrate ACR should be used for vertebrates. The pimephales chronic value of 413 mg/L is based upon one study from 1985. More recent data from Elphick 2011 shows a chronic value of 704 mg/L with an ACR of 5.8 conducted at 25°C.

MS. DIERS: Thirty-two. Was any consideration given to testing vertebrates, for example, fish, under cold temperatures?

MR. HUFF: Not -- not as part of our study. We just didn't have the budget for it.

MS. DIERS: Thirty-three are you aware of any -- I'm sorry.

MR. KOCH: 32A.

MS. DIERS: 32A. I'm sorry. I

jumped ahead.

Is there any evidence that suggests vertebrate sensitivity to chloride is temperature variant.

MR. HUFF: Cool temperatures, slow metabolism of any cold-blooded organism and slow metabolism can ameliorate effects of toxicity compared to toxicity at higher temperatures.

MS. DIERS: B. Is there any evidence to suggest that invertebrates would be the most sensitive organism under cold temperatures?

MR. HUFF: Invertebrate taxa are considered the most sensitive organisms to chloride at lab temperatures and show a higher tolerance of chloride at 10°C. It is expected that fish will show a similar amelioration to chloride toxicity at cooler temperatures.

If this were not correct, one would expect to see fish kills associated with de-icing runoff, which I am unaware occurs. I would also note Mr. McCracken's written comments in these proceedings regarding elevated winter chlorides and aquatic community health.

MS. DIERS: C. Could other temperature invariant taxa such as vertebrates be more sensitive under cold temperatures?

MR. KLOCEK: I would refer back to the response for question 32B.

MS. DIERS: Thirty-three. Are you aware of any Illinois invertebrates with lifecycles that require or prefer temperatures of 10°C or lower for completing mating, egg --

MR. KOCH: Deposition.

MS. DIERS: -- deposition -- I'm sorry -- and development of offspring?

MR. KLOCEK: Yes.

MS. DIERS: Is there any chloride toxicity data for these taxa? That would be 33A.

MR. KLOCEK: The fingernail clam, sphaerium simile has toxicity data at temperatures of 25°C and 10°C. This clam can incubate live young in gill marsupium and release them during winter much like some of the winter brooding freshwater mussels incubate glochidia larvae in gill marsupium and release them during winter. There is a large amount of recent toxicity data for mussels tested at 25°C but no data for mussels

tested at 10°C.

MS. DIERS: B. Would the proposed cold temperature chloride standards be protective of invertebrates that utilize cooler temperatures to complete their life cycles?

MR. KLOCEK: Based on sphaerium and other invertebrate data, we believe that the proposed chloride standard would protect sensitive invertebrates that use cooler temperatures to complete their reproductive cycle.

Again, I would refer you to Mr. McCracken's written comments on the actual stream biology data.

MS. DIERS: Question 34. You mention that the ACR of 3.187 was ascertained from the 2009 Iowa chloride standard and that this ACR was solely developed from invertebrate data.

A. What was the justification for developing the chronic standard using the invertebrate ACR, while dismissing the vertebrate ACR of 7.308?

MR. HUFF: We tested four sensitive species based on an acute toxicity and all were invertebrate taxa. Thus, we used the 2009

invertebrate ARC for these test results.

MS. DIERS: B. Is it appropriate to use the acute to chronic ratio (ACR) when enough data is available to compute the -- compute the chronic standard without the ACR?

MR. KLOCEK: We do not believe there is sufficient chronic data at 10°C and the standard testing has to be extended at 10 C -- 10°C to find any chronic effects. Based on this, using the ARC is appropriate and the sensitivity analysis that we referenced in the Technical Support Documents confirm that the ACR approach yielded conservative results.

MS. DIERS: C. Would it be more appropriate to rank GMCVs, calculate an FCV, then adjust the FCV with a multiplier ascertained from the paired cold temperature and warm temperature tests conducted in support of this petition?

MR. KLOCEK: Possibly. But pairing the warm and cool temperature data together would diffuse the effect that cool temperature has on mitigating chloride toxicity. Because of the large difference in cool and warm temperature testing values, it is more appropriate to keep the

cool temperature values separate in this petition.

MS. DIERS: That's all we have.

HEARING OFFICER KLEIN: Okay. So it is 1:20. We can take a break for lunch. Be back here by 2:20. Does that work? Can we do 45 minutes? Would it be all right with a 45-minute lunch and maybe see if we can try to finish this up today?

MR. HUFF: 2:05?

HEARING OFFICER KLEIN: 2:05.

MR. ETTINGER: Depends what you mean by this up.

HEARING OFFICER KLEIN: Sorry?

MR. ETTINGER: Depends what you mean by this up.

HEARING OFFICER KLEIN: That's fair. All right. So be back at 2:05.

(Whereupon, a break was taken after which the following proceedings were had.)

HEARING OFFICER KLEIN: If we can go on the record. Before we start with questions, a couple of things that I need to address.

First, Ms. Diers, can you guys

unmute Springfield?

MS. DIERS: Sorry.

HEARING OFFICER KLEIN: Can you please introduce who the technical advisors are with you because I think they made comments or were saying stuff so just for the court reporter.

MS. DIERS: They are -- I'll let them introduce themselves and tell you their positions here at the Agency.

MR. KOCH: Brian Koch. Last name is spelled K-O-C-H. I work in the water quality standards section and I'm the technical advisor.

MR. TWAIT: Scott Twait, T-W-A-I-T. I'm the manager of the water quality standards section.

HEARING OFFICER KLEIN: Great. Thank you. And then before we also begin, we need to do a step that we should have done at the beginning, but could the court reporter please swear in the three witnesses.

WHEREUPON:

JAMES HUFF, ROGER KLOCEK and DAVID SOUCEK called as a witness herein, having been first duly sworn, deposeth and saith as follows:

HEARING OFFICER KLEIN: All right. Great. Thank you.

So now, Ms. Yang, you can proceed with IDNR's questions.

MS. YANG: Thank you. My name is Virginia Yang, spelled Y-A-N-G. I'm legal counsel for the Illinois Department of Natural Resources and I'm providing comments on behalf of the Illinois Department of Natural Resources as well as Illinois Nature Preserve Commission.

HEARING OFFICER KLEIN: Can you folks mute in Springfield?

MS. DIERS: Yes.

MS. ZALEWSKI: Waive if you can't hear us. Okay?

HEARING OFFICER KLEIN: Sorry, Ms. Yang. You can proceed.

MS. YANG: Before I start with the questions and comments from the Illinois Department of Natural Resources, I have a few questions just to clarify some of the concepts and terminology that has been used and in your comments earlier this morning you use the terms episodic snowfall events and winter weather

conditions.

Can you explain the intent of that or what the criteria of that is, those concepts?

MR. HUFF: So the concept is that during the winter when we have storms and salt is applied there is a period of time where the snow melt will carry high levels of sodium chloride into the receiving streams and it's an episodic event. It goes up fairly rapidly and then it will have a tail coming down and that episodic event may last one day, seven days and really in extreme cases on bigger streams it can last longer than seven days.

MS. YANG: Are you only considering snowfall or other conditions of winter?

MR. HUFF: Well, freezing rain. Whenever -- whenever de-icing salt would be applied.

MS. YANG: Okay. And did you look into the differences of these events in the northeastern part of the state as opposed to central Illinois and southern Illinois?

MR. HUFF: No, I looked at -- the

episodic events will occur wherever they are applying de-icing salt and they apply those throughout the region. It's more the frequency of which they're applied in the south as opposed to the north.

MS. YANG: Okay.

MR. ETTINGER: Sorry. Could I follow up on that?

Is it your understanding that the only thing that would cause an episodic event is road salt?

MR. HUFF: Well, it's not strictly roads. Right. I have parking lots, any kind of de-icing practice that would occur.

MR. ETTINGER: For example, have you studied how hog lagoons might be emptied or controlled -- other controlled lagoon discharges?

MR. HUFF: I have not.

MR. ETTINGER: Thank you.

MS. YANG: Okay. I'm going to go through the comment -- the questions and comments that were developed by IDNR as well as Illinois Nature Preserve Commission and the format that we used was a question and then in order to give a

basis for that question, we developed a comment just to show what our thinking was for that question.

So I'm just going to go through -- there are like five or six of these and ask you to comment on DNR's recommendation. Okay. So the first --

HEARING OFFICER KLEIN: Ms. Yang, you don't have to read them all.

MS. YANG: Okay.

HEARING OFFICER KLEIN: They are in the record as if read. So --

MS. YANG: I will just read the question then and cite to the comment.

HEARING OFFICER KLEIN: Yup. That works.

MS. YANG: All right. The first concept talked about range of chloride sensitivity for Illinois aquatic species and life stages. The question is, how does a petitioner address the range of chloride sensitivity exhibited by Illinois aquatic species and life stages? And then the comment is that Illinois aquatic life is represented by approximately 217 extant species of

fish, 65 mussels, 32 benthic crustaceans, and hundreds of aquatic insects and other invertebrates, plants and algae. All of these species and their life stages vary in sensitivity to chlorides.

The comment of the approach to deriving water quality standards based on laboratory toxicity tests using a limited number of representative species, like that used by the petitioner, is being re-evaluated by many professional scientists and science-based organizations which we cite in our comment and we also cite that these organizations and professionals nationally and worldwide are making advances in modernizing water quality criteria methods, including expanding the definition of acceptable data beyond the limited toxicity test protocols.

So I'd like you to comment on DNR's recommendation that petitioner incorporate the full range of chloride sensitivity exhibited by Illinois aquatic life by means of utilizing more contemporary and community-based methods such as SS -- SSD's which are species sensitivity

distributions in developing the chloride standard.

MR. HUFF: Again, I think our purpose was to determine whether chloride exhibits less toxicity in colder temperatures and that's where our focus was. We selected from the acute toxicity list, from the Iowa list, the four most sensitive species and ran the colder temperature studies with those four species. These results were then incorporated into the 2009 Iowa chloride dataset and only adjusted the toxicities for the species that we tested as a conservative approach.

The Iowa listing is believed to be similar to the Illinois species where chloride toxicity data are available as the majority of data was generated in higher temperatures, the computed water quality standard is conservative and these alternative methods, I believe, will require more data at the colder temperature in order to carry those out.

MS. YANG: The next question deals with protection of Illinois aquatic life for mortality and other sublethal responses. The question is how does the petitioner ensure the proposed chloride standards are protective of

Illinois's aquatic life given that mortality and other sublethal responses that occur at chloride concentrations less than those required to produce the LD50?

LD50 is the median lethal dose of the amount of the substance required to kill 50 percent of exposed individuals. We note in our question that both lethal and sublethal responses can reduce the likelihood of population persistence and in the context of protected species would be prohibited as "take" as defined by the Illinois Endangered Species Protection Act.

We would like petitioner to comment on IDNR's recommendation that there is an evaluation of chloride sensitivity at lethal endpoints below the LD50 sublethal endpoints for aquatic life including protected species.

MR. HUFF: So in addition to running the acute toxicity tests, which you're referring to with the LD50, we ran chronic tests to evaluate the sublethal effects to ensure the proposed chloride standards are protective of Illinois aquatic life. We ran those tests.

MS. YANG: Was that -- was there

consideration of Illinois protected species during those tests?

MR. HUFF: Again, we used the four most sensitive species from the acute toxicity list which were generated where they were made available from Iowa.

MS. YANG: The third topic concerns impacts of increased chloride concentrations in Illinois surface water and groundwater. The question is to what extent will the proposed chloride standards contribute to increased chlorides in Illinois surface water and groundwater? We note that chloride concentrations are increasing in Illinois surface waters and groundwater and we specifically cite to the Class 3 groundwater requirements under 30 Ill. Adm. Code 62.230 Class 3 special resources groundwater that impacts IDNR's protected and dedicated lands under the Illinois Natural Areas Preservation Act and we would like petitioner's comment on DNR's recommendation as to further evaluation of the contributions of proposed chloride standards to the observed trends of increasing chlorides in Illinois surface water and groundwaters.

MR. HUFF: So I think your question assumes that if the Board were to adopt the winter and summer numbers that there would be an increase in chlorides and I would argue that just the opposite is going to happen. We're going to continue to reduce chlorides to meet the more restrictive summer numbers and we don't currently meet the 500 mg/L in urban areas now in the winter and this will allow those watersheds an opportunity, through best management practices, to either get closer to or to achieve those.

The proposed non-winter acute standards is less than half the current chloride water quality standard in Illinois. So you wouldn't expect an increase in chloride from that. Non-urban areas, if the stream achieves this non-winter standard, there is no technical reason one would experience an increase in chlorides during the winter months.

In urban areas, the existing 500 mg/L standard is not being currently achieved and even the proposed winter standards are not being achieved strictly due to the de-icing practices with sodium chloride. A change in the winter

standard will provide a target for watersheds that can be achieved through the implementation of BMP's in many of our streams.

In summary, the proposed water quality standard will result in an overall reduction in chloride concentrations in Illinois surface and groundwater.

MS. YANG: The fourth topic concerns the once per three-year exceedance which is insufficient to protect Illinois aquatic life. The question is, what is the justification for the once per three-year exceedances under the proposed water standards and its impact on aquatic life? We would like you to comment on DNR's recommendation that petitioner estimate frequency and intensity of exceedances in Illinois waters and evaluate the responses of the Illinois aquatic life to these exceedances.

MR. HUFF: So I would refer to the comments of Steve McCracken as submitted in this regulatory proceeding from the DuPage River Salt Creek Workgroup where he has gone out and collected biological stream data throughout the watershed and he is seeing in the west branch of

the DuPage River where they have chloride levels above 500 mg/L in the winter, but lower than the 233 mg/L in the summer where they have put a biological community there as part of the support for what we're doing.

The intent of the once per three years was they announced we're having more and more intense storm events. It's much like the hundred year rain events that we seem to have every year now and there will be snow events with dropping temperatures and freezing rains that will require salt applications for longer duration than the typical storm events and I was just trying to allow for an accommodation of these extreme events. These events already occur and the chloride data was presented in the Technical Support Document as several of the watersheds clearly show these periodic spikes.

MS. YANG: Do you have a comparable study or are you aware of any ongoing studies for central Illinois and southern Illinois?

MR. HUFF: With respect to chlorides in their streams, I am not aware of any studies.

MS. YANG: Okay. Fifth topic would

be adverse effect of Illinois aquatic life to chlorides under increased water temperature. The question is, how would water temperatures above those in the experiments used to derive the proposed chloride standards impact Illinois's aquatic life?

The comment says that the petitioner used laboratory toxicity experiments at 10°C to derive winter period chloride standards with the following assumptions. One, that the test conditions are representative of water temperatures through Illinois winters and, two, that sensitivity of aquatic life to chloride decreases with temperature.

The comment we have is that Illinois stream and river temperatures exceed 10°C and 28 percent of EPA's winter period records. During the most recent 11 years, it exceeded 15°C in nearly 10 percent of those records.

So the question is, we would like a comment regarding the petitioner's evaluation of chloride sensitivities in Illinois aquatic life and all seasonal ranges of temperatures incurring in all Illinois waters.

MR. HUFF: So the winter standard proposed was, again, intended to address these episodic snow melt, runoff events. The runoff temperature streams will be below 10°C during such events. If a stream achieves the proposed non-winter standard, then when stream temperatures are above 10°C, the chlorides would be less than the lower non-winter standard during those periods of time. The proposed winter standard could also be limited to when the stream temperatures are less than 10°C as opposed to the seasonal approach. This change would seem to alleviate a number of concerns for the current proposal.

MS. YANG: Sixth question is -- concerns the impact on early aquatic life stages during winter season. The petitioner account -- does the petitioner account for the sensitive life stages of Illinois's aquatic life when delineating the temporal extent of the winter standards period?

The comment talks about the life stages of Illinois aquatic life most sensitive to chloride will be present during the winter period. The eggs -- fish eggs and larvae are present in

Illinois waters in early spring, which is within the petitioner's proposed water period at water temperatures below 15°C and these aquatic -- early aquatic life stages are more sensitive to chloride than that of the adult.

DNR would like a comment regarding petitioner to evaluate the timing of sensitive life history stages and incorporating the relative stages into the development of those proposed chloride standards.

MR. HUFF: I think if we go instead of a seasonal water quality standard we go to the 10°C specific stream temperature, unless when the winter chloride standard would apply, that would alleviate some of the concern in that question.

Again, we selected four sensitive species that -- and show that in all four cases that chloride toxicity is reduced as the temperature -- 10°C temperature as opposed to 25°C and we would expect that same relationship to hold for all aquatic species.

MS. YANG: Next question concerns the impact arising from varied sources of chlorides. The question is, how do the proposed

standards address the varying sources of chloride in Illinois?

And the comment is because of these multiple forms of chlorides, the differing toxicities, the multiple sources of chlorides statewide and regionally, differs in abundance with those compounds, we believe it is critical to understand the chlorides from these other elements and the relative toxicity testing of such compounds.

We would like a comment regarding the estimate of the spatial temporal prevalence and toxicity of chlorides other than sodium and use of these estimates to evaluate impact on Illinois aquatic life.

MR. HUFF: Dr. Soucek provided an answer to one of the other questions, the relative toxicity of the other forms of chlorides or potassium chloride, magnesium chloride. Our current standard is 500 mg/L. The proposed summer acute standard is less than 50 percent of the current general use water quality standard. The proposed winter standard is --

MR. ETTINGER: Wait. Did you mean

to say that your proposed standard is less than 50 percent of the current --

MR. HUFF: No, the chronic standard is. Sorry. Yes. I caught that.

MR. ETTINGER: Sorry. Perhaps -- sorry for interrupting, but do you want to start over and say what you meant to say?

MR. HUFF: Sure. The proposed summer chronic standard is less than 50 percent of the current general use water quality standard. The proposed winter standard is focused upon winter de-icing practices which is predominantly sodium chloride. The seasonal spikes in chlorides are from sodium chloride. There is no reason to expect a change in any -- any forms of chlorides discharged by other sources as a result of this proposal.

MS. YANG: Last question concerns water quality impacts upon semi-aquatic communities and types of habitats. The question is, does the petitioner account for water --

MS. LIU: Ms. Yang?

HEARING OFFICER KLEIN: Sorry. We have a question.

MS. YANG: Okay.

MS. LIU: May I follow up on your earlier question? You mentioned agricultural sources of chloride. Are there episodic events associated with applications of potassium chloride fertilizer that would impact streams similarly to the way urban streams are impacted by de-icing practices?

MR. HUFF: I don't believe that during the winter months that there would be application of the potassium to the agricultural fields. So there is certainly potentially episodic events from such applications when that's applied either in the fall or in the spring months, but those would then be compared to the summer standard.

MS. LIU: Thank you.

MR. ETTINGER: I'm sorry. Do you mean to say you don't believe agriculture in Illinois receives application of fertilizer or other things in the month of April?

MR. HUFF: No. During the winter months, potassium chloride -- the source of potassium -- I don't believe is applied during the

winter months.

MR. ETTINGER: But winter months, in your answer now, does not include April or March or it does?

MR. HUFF: It would be when the temperature is less than 10°C in the stream.

MR. ETTINGER: Okay. So your testimony is that you don't believe that fertilizer or pesticides are ever applied at less than 10°C?

MR. HUFF: My answer was potassium chloride.

MR. ETTINGER: Potassium chloride. Thank you.

MS. YANG: My question -- so the question is, does the petitioner account for water quality changes that may occur in semi-aquatic community-types/habitats, such as wetlands, and the biota that inhabit them if the proposed chloride standards are approved?

MR. HUFF: Point source discharges in Illinois are generally to streams in Illinois, not wetlands or fens. Design practices for new and expanded roadways specifically address the

impact on fens and wetlands during the alternatives evaluation, with avoidance of roadway drainage the preferred approach. Where fens and wetlands are already impacted by de-icing runoff, the proposed standard would have no impact over the no action alternative.

MS. MEYERS: I have a follow-up question to that.

HEARING OFFICER KLEIN: Go ahead.

MS. MEYERS: Do we anticipate there will be new or widened roads throughout northeastern Illinois and other urban places in our state over time?

MR. HUFF: I have no idea.

MS. MEYERS: Do we think that the only roads that are probably going to exist are the roads that we have today?

MR. HUFF: I would say we're substantially built out.

MS. MEYERS: Are you familiar, for instance, with Quintin Road?

MR. HUFF: Yes.

MS. MEYERS: And that is a road that's going to be widened?

MR. HUFF: Yes.

MS. MEYERS: And there is right next to it wetlands that are a part of the federal wetland mitigation bank or project?

MR. HUFF: Yes.

MS. MEYERS: And that there is something called salt splash or spray?

MR. HUFF: Yes.

MS. MEYERS: And when roads are widened, that salt splash and spray can impact adjacent wetlands and other natural areas?

MR. HUFF: Unless they reduce the speed limit to reduce the spray, that's correct, which is what has been proposed on Quintin Road.

MS. MEYERS: We can go into that further. However, suffice to say that, isn't it probable that with roads that are widened throughout northeastern Illinois or added throughout northeastern Illinois or where there are wetlands present, that this could, in fact, impact more wetlands than it presently does?

MR. HUFF: Theoretically possible, yes.

MS. YANG: I have no further

questions.

HEARING OFFICER KLEIN: Okay. Then moving on I was thinking we would go with Openlands's pre-filed questions, does that work?

MS. BARGHUSEN: Okay. I'm Laura Barghusen, B-A-R-G-H-U-S-E-N, from Openlands and I will be asking some pre-filed questions of Mr. Huff and Dr. Klocek.

My first question is for Mr. Huff. In your testimony, you state that there is no basis for believing that BMP's by themselves will result in achieving a 500 mg/L not-to-exceed winter standard. Smaller streams still have peak chloride concentrations in excess of 1,500 mg/L and it is not realistic to expect a 67 percent reduction in salt usage that would be required during the worst runoff events in order to achieve compliance. That's from page two, paragraph two of Huff testimony. I believe the efforts will fall far short of achieving a 500 mg/L not-to-exceed chloride level from page three, paragraph two.

So the question is, what is your basis for stating that the BMP's can't result in

meeting these standards everywhere in the state?

MR. HUFF: As noted in my testimony, urban streams are currently experiencing peak chlorides in excess of 1,500 mg/L. If you assume the background chlorides in the same streams are only 200 mg/L, then the de-icing practices are contributing 1,300 mg/L during these events.

To be successful then, the regulated community would have to cut salt application by 84 percent not on an annual basis, but on these bad storm events through best management practices. For that to be possible suggests the regulated community is currently wasting 84 percent of the salt it applies. The DuPage River Salt Creek Workgroup has been a leader in implementing BMP's for more than a decade and the stream data continues to show violations of the current water quality standard and, at best, a modest reduction in peak chloride concentrations. That's the basis.

MS. BARGHUSEN: Okay. And so that defines BMP as just reduce salt application?

MR. HUFF: Well, there is a lot of tools in a best management practice toolkit,

whether that's applying salt based on the pavement temperature and the predicted temperature overnight if it's going on there to more accurate weather forecasting and use of liquids, those types of things.

MS. BARGHUSEN: Okay. Question 2. In your testimony, you state that "I reached out to US EPA at the end of the UAA proceedings about the possibility of funding coal temperature toxicity testing as they had recently funded chloride toxicity testing on several aquatic species."

My question is, what were the studies regarding recently funded chloride toxicity testing by the US EPA?

MR. HUFF: I'd like Dr. Soucek to answer that.

MR. SOUCEK: My laboratory was supported to research the toxicity of chlorides to various species. The original project I did for the Iowa chloride standard was funded with Region 5 funds that were sent directly to Great Lakes Environmental Center but I was a subcontract on that. The grant was received in 2008 and we

published a paper on that in 2011.

Then I received another grant from Region 5 funds Great Lakes Restoration Initiative funds in 2012. Those fund were, again, passed from Region 5 through USGS, a different entity, to be -- and those funds we developed methods for full life chronic toxicity testing with this mayfly neocloeon triangulifer and for that project we published a paper with chronic chloride toxicity data at 25°C and that paper was published in 2015 and then finally I received another grant in 2013, again, Great Lakes Restoration Initiative Funds, from Region 5 passed through USGS to study the influence of dilution water chemistry on acute major ion toxicity including sodium chloride and other chloride salts and we published those results in 2018.

MS. BARGHUSEN: Thank you. To your knowledge, did any of the studies include the following on glochidia of fat muckets, that would be Wang, et al, 2018, acute toxicity of sodium chloride and potassium chloride to a unit of mussel, lampsilis siliquoidea in water exposures, was that, to your knowledge, part of the recently

funded chloride toxicity testing?

MR. HUFF: I have no knowledge on where that funding came from.

MS. BARGHUSEN: Okay. Thank you. Were you aware of the study as you were working on your petition?

MR. HUFF: No.

MS. BARGHUSEN: Okay.

MR. HUFF: No, I wasn't.

MS. BARGHUSEN: And did you -- were you aware of -- well, I think did you utilize the study by Gillis, which presents data showing that the glochidia of two species present in Illinois waters (the wavy-rayed lamp mussel and northern riffleshell) have significantly lower acute tolerances to chloride than the ones presented in your petition?

MR. HUFF: Our research was on the temperature effect on the toxicity of chlorides to the four sensitive aquatic species. What our research showed is that temperature is an important variable in the toxicity of chloride. Gillis noted that the glochidia were significantly less than sensitive to salt than natural waters

that could not be attributed to the hardness difference alone. To EC50 and natural water from the Grand River for P --

MR. KLOCEK: Fasciolaris --

MR. HUFF: -- Fasciolaris 3,416 mg/L of chloride was three times higher than the reconstituted water. These studies were all conducted at 21°C and, again, our focus was on the 10°C results that we could find.

MS. BARGHUSEN: Thank you. Were the studies that you referenced, Dr. Soucek, were they in process or were they complete when you originated the cold water studies presented in your petition?

MR. SOUCEK: The studies that I mentioned, two of them were completed. The one on the -- for the development of the data for the Iowa chloride standard and the -- the one on the development of the chronic toxicity testing method for the mayfly those were complete. The third one was maybe in process and almost finishing up when we started doing the initial work for this cold temperature study.

MS. BARGHUSEN: And how did you

consider the results of those completed studies in your proposal?

MR. SOUCEK: Well, we used the previous study that I did to form reference points for the temperatures -- for the treatment levels, the chloride concentrations that we used to test the mayfly and the fingernail clam and the amphipod.

MS. BARGHUSEN: Okay. Thank you. Okay. Question -- the next question is in the petition for the proposed chloride standard.

In reviewing Table 1, chloride genus and species mean acute values the four most sensitive species are listed as the mayfly, the water flea species, the lampsilis mussel and the fingernail clam.

So the questions are, some of these may already be answered, but I'm going to read them through.

Are you aware that the 2011 Gillis report that the toxicities for these species are significantly lower than the numbers in Table 1 of the four sensitive species in the Huff proposal?

MR. HUFF: Again, the purpose of our research was to look at temperature effects on the toxicity of chloride studies. Gillis's studies were conducted at 21°C and at a hardness between 95 and 115. So Table 1 the value you're looking at has already been normalized.

MS. BARGHUSEN: And assessing the toxicity of sodium chloride to the glochidia of fresh water mussel -- I'm sorry. That's just the study name. Going onto the next one.

Are you aware that the northern riffleshell, the wavy-rayed lamp mussel and the fat mucket live in Illinois waters?

MR. HUFF: Yes, I am.

MS. BARGHUSEN: And have you read as part of your literature review of the Gillis 2011 report, which is referenced in your literature review, that the acute threshold for these species is much lower than the species mean acute value in Table 1 of the Huff proposal?

MR. HUFF: Well, again, we took that Table 1 from Iowa and then what we tried to do was plug in our results that were at 10°C into that. So we didn't try to modify the other data that was

in there. On the Gillis study, she tested the same species in the natural water and obtained an EC50 that was fourfold higher. The natural water had higher hardness, the increases in EC50 was much greater than accounted for for hardness alone in the natural waters.

MS. BARGHUSEN: And did the values you state in this table reflect the acute mean values for glochidia and juvenile mussels?

MR. HUFF: Again, at 10°C, that work hasn't been done. So the answer is it hasn't been established.

MS. BARGHUSEN: In your opinion, the studies such as the two published by Wang, et al, demonstrate that more stringent chloride thresholds are necessary to protect all life stages of these and other mussels.

MR. HUFF: Our research again was focused on the effective temperature. Wang did not address temperature effects using 23°C for his test. Wang demonstrated that hardness is a critical variable on chloride toxicity for fat mucket, glochidia and juveniles.

MS. BARGHUSEN: In the petition for

the proposed chloride standard, the US EPA used a protocol to compute the seasonal water quality standards for each specific waterbody for ammonia. It states that the Huff proposal is premised upon a similar approach to develop winter chloride standards.

My question is, are you aware how variable the temperatures are across the state as compared to addressing the seasonal figures for a specific waterbody? Don't the temperatures in southern Illinois vary widely from the ones in northern Illinois?

MR. HUFF: So, again, the purpose of the proposed winter time period was to reflect when snowfall potential is present. Runoff from snow melt events where sodium chloride is applied would have temperatures well below 10°C and the receiving streams during such events would also be expected to be less than 10°C. However, I have no objection to a winter water quality standard that applies only when the waterbody temperature is at or below 10°C which would eliminate the concern over temperature differences across the state.

MS. BARGHUSEN: Okay. According to

a map presented on the USGS website, there is softer waters present in southern Illinois when compared to northern Illinois. The questions are, are you aware that studies like the two referenced by Wang have found that softer waters result in lower chloride toxicities as have been demonstrated in the fat mucket mussel?

MR. HUFF: Yes.

MS. BARGHUSEN: And would you agree that aquatic life will be less protected from chlorides overall in southern Illinois than northern Illinois in softer waters?

MR. HUFF: If what?

MS. BARGHUSEN: Just in general if there is chlorides in the water.

MR. HUFF: If there are chlorides in the water? So they'd be more sensitive chlorides in the water because of softer water.

MS. BARGHUSEN: In southern Illinois?

MR. HUFF: In southern Illinois.

MS. BARGHUSEN: So you agree with that?

MR. HUFF: I agree with what I just

said, that they are more susceptible to chloride in softer water that's present in those streams.

MS. BARGHUSEN: Okay. Are you aware of places mapped as having harder water such as McHenry County that are using water softeners that contain chlorides?

MR. HUFF: So water softeners are regenerated with a sodium chloride brine and the backwash from this regeneration contains high concentrations of chlorides which would be predominantly sodium chloride. However, this source of chlorides, our streams, would not have a seasonal component. So if the summer water quality standards are achieved, this source would not be a factor in determining whether the winter standards would be achieved. It's not a variable. It's a relatively constant load to the streams.

MS. BARGHUSEN: How did you account for these variables in your analysis and proposal?

MR. HUFF: Our work was directed at the toxicity of chlorides at colder temperatures and then we used the results to derive an alternative winter water quality standard based on these results. These variables such as water

softeners, softer water, are not relevant to attempting to adjust the current chloride standards for the lower toxicity at colder temperatures. We recognize that hardness particularly plays an important role in chloride toxicity, but the relationship at colder temperatures have not yet been established.

Until that work is completed, I believe our cold temperature work offers the best current signs for adjusting develop -- for adjusting a winter standard. Once the hardness work is completed at colder temperatures, the chloride standard should be revisited. With respect to the summer standard, the standards offered with the most recent recommendation from the US EPA in final form, we recognize there has been a significant amount of work on chloride toxicity in warmer temperatures and the proposed summer limits were offered to begin a discussion on the appropriate summer limits.

MS. BARGHUSEN: All right. It appears that in the Huff petition and accompanying materials that fat mucket glochidia were not tested at 10°C. Why?

MR. HUFF: The testing on glochidia is a relatively new research area. We selected four species from the 2009 Iowa listing that were the most sensitive from an acute toxicity point of view and conducted our research on those.

MR. ETTINGER: Then we have if you're assuming that this adds protection to more sensitive species, then why are the figures still so much higher than the ones found for acute toxicity for glochidia in Gillis and Wang?

MR. HUFF: Well, again, I'm not sure that data has been normalized. It hasn't been run at 10°C on there. So I think it's like comparing apples to oranges.

MS. BARGHUSEN: Okay. Now, I have some questions for Dr. Soucek. The first one is in -- in your testimony you talked about the chloride toxicity to fingernail clams as well as two other non-mussel species that were studied. Your pre-filed testimony indicated a finding that the fingernail clam did not get relief in terms of chronic chloride toxicities at the lower temperature which was 10°C.

So the questions are, do you

think this means that the lower temperature would not protect fingernail clams from the chronic effects of chloride that might be seen at higher temperatures?

MR. SOUCEK: Pardon me. While the process of developing water quality standards or criteria uses toxicity test results with a relatively limited number of species --

HEARING OFFICER KLEIN: Sorry. Mr. Soucek, can you slow down a little bit?

MR. SOUCEK: I apologize. I'll start over. While the process of developing water quality standards or criteria uses toxicity test results with the relatively limited number of species to estimate safe levels for others, I do not believe it is prudent to use the specific result of a single test with a single species to predict specific responses or potential trends in responses of other distantly related species.

Since fingernail clams are not mussels, which mussels are an order of unionidae, fingernail clams belong to a different order of Bivalvia Veneroida. In other words, as different anatomically as mayflies are from dragon flies or

amphipods from decapods or mice are from cats, I will not be comfortable applying trends in the result of fingernail clam studies to mussels.

Just to further illustrate this in a 2015 publication we compared the influence of chloride on nitrate toxicity to genetic strains of the same species of hyalella azteca and amphipod and found that while varying background chloride concentration in the dilution water had a very strong effect on nitrate LC50 for one strain, about a tenfold change in the LC50, it had no influence whatsoever on the nitrate LC50 for the other strain.

So these are the same species and very different -- very different trends in responses based on water quality. So I think it's difficult to predict from one species to the other and particularly from one family -- one order to another family.

MR. ETTINGER: Excuse me. Could I follow-up on that? Were you finished with your answer to that part of the question?

MR. SOUCEK: Yes.

MR. ETTINGER: I'm interested in

this study on nitrate and chloride. Could you describe that a little bit more?

MR. SOUCEK: Yeah, we looked at the influence of background chloride concentration or relatively low concentrations from 5 mg/L up to about 100 mg/L and using these genetically distinct strains of amphipods, so this is the US lab strain and the Burlington strain, these are two different -- the two different strains that are used in most toxicity tests and we looked -- we use these different chloride concentrations in background dilution water to assess acute and chronic nitrate toxicity.

What we found was that if you change chloride in the background water from 5 mg/L to about 100 for the one strain of hyalella you get a change in LC -- in LC50 of about a tenfold difference, whereas with the other strain it was basically a flat line. No matter what the background chloride concentration, the LC50 was the same for nitrate.

MR. ETTINGER: So I'm trying to understand. So as to some strains, the combination of nitrate and chloride is more toxic

than just chloride alone?

MR. SOUCEK: No, it was more a matter of if the chloride was too low -- so it's the opposite trend. For the one strain when chloride was too low, nitrate toxicity was much higher whereas if chloride got up above 20 up to 100 nitrate toxicity it decreased.

MR. ETTINGER: Okay. So chloride will actually reduce nitrate toxicity in some cases and the absence of chloride would increase nitrate toxicity in some cases?

MR. SOUCEK: Over the range of chloride concentrations that we tested.

HEARING OFFICER KLEIN: Which are actually lower than we're looking at here?

MR. SOUCEK: Correct.

MR. ETTINGER: Thank you.

MS. BARGHUSEN: Okay. Moving onto the next question.

How was it decided to limit the representation of mussels in the 10°C testing solely to the fingernail clam?

MR. SOUCEK: Fingernail clams were not chosen to represent mussels. They were chosen

because that particular species, sphaerium simile, was previously shown to be sensitive to sodium chloride in tests conducted in my laboratory, Soucek, et al, 2011, and it's a species -- it's a species that I've used on multiple occasions for toxicity testing.

I chose the three species we used because they were relatively sensitive and I have worked with them a lot. Introducing a new variable like cold temperature can make experiments difficult. So for this study, I thought it best to work with species with which I'm familiar.

MS. BARGHUSEN: How did you account for softer waters in different parts of the state in your findings on mussel species sensitivity?

MR. SOUCEK: Again, I did not conduct any tests with mussel for this study. I was given sufficient funds to do a relatively limited number of tests with three chosen species. We chose a moderately hard water to conduct the testing with all three species. Having published a number of papers on the influence of hardness on major ion toxicity, I'm well-aware of that effect.

We simply didn't have the funds to do the testing on multiple hardness levels.

MS. BARGHUSEN: This last one is in your experience as a toxicologist, is it your opinion that at 10°C, you would likely see a similar influence of hardness on chloride toxicities to mussels as seen at warmer temperatures?

MR. SOUCEK: I would be interested in conducting studies to determine whether this is the case. I have not seen data of this sort. Having worked on major ion toxicities since 2003, I have observed that while, in general, increasing hardness ameliorates sodium and salt toxicity to most species, this is not always the case and the degree to which it occur varies.

Furthermore, different species respond differently to different salts. We're talking potassium versus sodium versus magnesium and making sweeping generalizations is not prudent. In the absence of any data on the effect of low testimony on hardness amelioration of salt toxicity, I would not be comfortable guessing what might happen.

MS. BARGHUSEN: Thank you. And you're familiar that Wang found the correlation of mussels and chloride toxicities at warmer temperatures?

MR. SOUCEK: The correlation between what?

MS. BARGHUSEN: I'm sorry. Hardness and chloride toxicity, that chloride toxicity varied with hardness at warmer temperatures? You're familiar with that research?

MR. SOUCEK: Yes, I'm familiar with that. That's been shown with lots of species.

MS. BARGHUSEN: Okay. Thank you. I think that's it. Thank you.

MR. SOUCEK: Thank you.

HEARING OFFICER KLEIN: Okay. I'll check on the time here. Do you want to take a ten-minute break and start up with Sierra Club's questions?

MR. ETTINGER: If you would like to take a ten-minute break, we can do that.

HEARING OFFICER KLEIN: I'm fine going forward. Everyone can talk? Yeah? Okay. We can keep going. Mr. Ettinger, you can go

ahead.

MR. ETTINGER: I guess these quite aren't on my script, but I kind of want to see what we're doing here.

Do I understand before I ask you a bunch of questions about months of the year, that the months of the year proposition is off the table now and you're going to go back and get us a new proposal that deals with 10°C?

MR. HUFF: Yes.

MR. ETTINGER: Okay. So that's off the table. Then I also heard you say that you just wanted to begin the discussion as to offseason temperature standards. We've had some discussion -- I guess we'll have some discussion in the future, but is that part of your proposal anymore?

MR. HUFF: Well, I just felt if the Board was going to open up a proceeding on the winter chloride, they ought to look at the summer chloride as well.

MR. ETTINGER: I agree they should, but I'm asking what your proposal is now as opposed to --

MR. HUFF: I have a proposal that in the petition as is from US EPA their 1988 document is kind of a starting point.

MR. ETTINGER: I guess I'm just -- we're -- it's nice to have discussions. I'm just trying to figure out what's formally before the Board and as of right now what's formally before the Board is a winter proposal that's going to be modified and a summer proposal based on a 1988 US EPA document, is that correct?

MR. HUFF: Yes, sir.

MR. ETTINGER: Okay. Have you -- do you have any reason to believe that US EPA would approve a standard based on its 1988 document?

MR. HUFF: I have no opinion one way or the other. I don't have that experience.

MR. ETTINGER: Okay. Now, I'll go to my pre-filed questions.

On page three, what is the basis for your statement that as to impaired waters any future growth involving additional roadways, parking lots or driveways will be virtually impossible?

MR. HUFF: As I understand the

regulations, a new discharger cannot further degrade an impaired waterway. So where a stream has been identified as impaired for chlorides, the applicant for a new facility would have to offset the de-icing salt it will need to manage snow and ice on its property. With the existing dischargers already committed to implementing best management practices, additional offsets will need to be found beyond BMP's already committed to by the existing dischargers. I think new growth will find it near impossible and certainty cost-prohibitive to find chloride offsets to purchase.

MR. ETTINGER: And this is your -- based on your understanding of the current Pollution Control Board regulations involving new -- new or increased discharges?

MR. HUFF: Yes.

MR. ETTINGER: Page four. Please detail the documents and studies that are the basis for the conclusion that summer values of less than 200 mg/L appear to be more important in supporting benthic communities.

MR. HUFF: This is based on personal

communication with Steven McCracken of the DuPage River Salt Creek Workgroup, which is correlated water quality with the aquatic community quality. This organization has found that summer chlorides less than approximately 200 mg/L is important in maintaining a healthy aquatic community.

MR. ETTINGER: And I presume that some -- that those studies should be considered by the Board in setting summer standards?

MR. HUFF: Was that a question? I'm sorry.

MR. ETTINGER: Well, do you believe that those studies that you referred to by Mr. McCracken should be considered when the Board undertakes to set the summer standard?

MR. HUFF: It seems reasonable to me, yes, sir.

MR. ETTINGER: Maybe it appeared somewhere, but I didn't really see the mathematical calculation that you used for the four species. Is that produced somewhere in the documents?

MR. HUFF: At Table 1 and Table 2.

MR. ETTINGER: I didn't really see

how the formula was run. It's there, though?

MR. KLOCEK: But it's going to be replaced because there are errors with it.

MR. ETTINGER: Okay. So we're going to see a new calculation?

MR. KLOCEK: Yes.

MR. HUFF: Off the record.

HEARING OFFICER KLEIN: We can go off the record.

(Whereupon, a discussion was had off the record.)

HEARING OFFICER KLEIN: We can go back on the record.

MR. ETTINGER: On page -- on page 13, we ask how is it anticipated that the standard can be exceeded once every three years on average will affect NPDES permit writing?

MR. HUFF: The intent of this provision was simply to acknowledge that more intense storms are occurring and for safety reasons salt will be necessary to reopen roads and businesses in larger quantities. I believe the sole impact would be to not list these receiving streams as impaired from such events.

HEARING OFFICER KLEIN: So you'd anticipate that dischargers who were not having these episodic discharges, but were having continual discharges, would not have different permit limits than they have now?

MR. HUFF: Correct.

MR. ETTINGER: Okay. Statement of reasons. I put down statement of reasons. That's probably why.

On page two, can you elaborate on why you consider the fact that elevated winter chloride levels are present in waterways with moderately impacted aquatic communities "support the position that elevated winter concentrations are less destructive to aquatic communities?"

MR. HUFF: Our research clearly demonstrated that temperature is a critical factor with respect to chloride toxicity. To see if this finding is supported by actual stream work, I turn to Steven McCracken of the DuPage River Salt Creek Workgroup.

What their extensive work has shown is that summer chloride concentrations have a significant effect on the aquatic community

quality while winter chloride concentrations do not as long as the summer chlorides are down below that approximately 200 mg/L.

MR. ETTINGER: Have you considered how groundwater discharge into these waterbodies might be affected by elevated use of chloride in the winter?

MR. HUFF: I'm not quite sure of the relevance of considering groundwater. We have monitoring data in the streams. So to the extent that groundwater is contributing chlorides, it's picked up in the stream data that was presented in the Technical Support Document.

MR. ETTINGER: Well, let's --

MS. BROWN: We have a follow-up.

HEARING OFFICER KLEIN: There is a follow-up.

MS. BROWN: Yes. Melissa Brown with Illinois Environmental Regulatory Group.

The McCracken studies that you have been referencing, are they in the record?

MR. HUFF: They are not.

MS. BROWN: Will you be able to provide copies of those studies and put them in

the record?

MR. HUFF: I believe so. The ones that have been finalized they're on their website.

MS. BROWN: And have those studies been included in peer reviewed publications?

MR. HUFF: Some of that work has been that I'm aware of, yes.

MS. BROWN: Okay.

HEARING OFFICER KLEIN: Can you identify what some of it is has been published?

MR. HUFF: I will follow up on that when I pull that material together.

MR. ETTINGER: Thank you. I'll ask it.

What do you consider sufficient monitoring to determine that streams that are currently not listed as impaired due to chlorides are actually unimpaired, as you contend?

MR. HUFF: The Agency has encouraged continuous conductivity monitors to collect better data with respect to snow melt runoff. This is a very good approach. As the routine stream monitoring is bias towards nicer weather, episodic spikes are easily missed in the winter months.

Grab samples are to be collected. Depending upon the size of the stream, they need to be collected during or immediately after temperatures warm to generate sufficient runoff.

MR. ETTINGER: With regard to the Section B of the statement of reasons on page five, what chronic chloride water quality criteria are you referring to in the last sentence of Section B?

MR. HUFF: The ones we develop my point was simply to note our chronic standard is conservative.

MR. ETTINGER: Conservative compared to what?

MR. HUFF: In that we only adjusted the temperature for the species we tested plus in the original submittal of three daphnia as well. So all the rest are still the test results on toxicity from the 23 to 25°C.

MR. ETTINGER: Section D. You raise the issue of the need for a spring standard for water temperatures near 15°C.

Do you have plans to test organisms at this temperature and make a proposal

for a standard?

MR. HUFF: Financial support from the regulated community will be dependent upon the outcome of these proceedings. If a winter standard is not achieved, then there will be insufficient financial support from the regulated community to fund additional research.

However, if a winter chloride standard is the outcome of these proceedings, then I believe there would be sufficient support to continue to evaluate 15°C and on a personal note, I will not be involved upon completion of this proceeding because I'm going to retire.

MR. ETTINGER: Can I object to that? On page six, have you compiled the data to show that de-icing chloride spikes are less than 96-hour episodic events as stated?

MR. HUFF: Section 4 the Technical Support Document presented data on this question. In general, the larger the drainage area, the longer the duration of the spikes, but at lower concentrations. Smaller streams tend to be flashier, higher peak, but shorter duration.

MR. ETTINGER: Please explain the

statement that "If exposure is extended, chronic effects can be observed, but at higher chloride concentrations of exposure."

MR. HUFF: The higher concentrations of chloride refers to the 10°C versus the chronic effects found at 25°C.

MR. ETTINGER: Regarding the C. Dubia 96-hour chronic toxicity testing at 10°C, did all chronic indicators show no change, independent of chloride levels?

MR. HUFF: Correct.

MR. ETTINGER: I'm going to skip this. I'm going to drop the next given the fact that the monthly is dead. We did not take into account -- this is on the Technical Support Document.

Were tests done in anything other than moderately hard water?

MR. HUFF: No.

MR. ETTINGER: What is the definition of moderately hard water that was used, that we're using here?

MR. HUFF: David, can you answer that?

MR. SOUCEK: Yes, the US EPA method documents for acute toxicity testing I think the wet testing documents moderately hard water is between the range of, I believe, 80 to 120.

MR. ETTINGER: Section 5.1. Are there conditions in which chlorides could be elevated in Illinois streams longer than 35 days?

MR. HUFF: If you're talking about from de-icing practices or just in general?

MR. ETTINGER: I'm talking about in general.

MR. HUFF: Oh, absolutely.

MR. ETTINGER: What strain of hyalella is likely to be present in southern Illinois?

MR. HUFF: I'll let David answer that one.

MR. SOUCEK: I have a masters student Kali Major working in my lab at Natural History Survey collected hyalella specimens from Jackson County, Coles, Edgar, Perry, Saline and Gallatin Counties in Illinois and sequenced their cytochrome c oxidase 1 genes and published those results in Major, et al, 2013. All the specimens

she collected from those counties in southern Illinois belong to what she called the flat branch strain which is genetically distinct from both the Burlington stain that was used in this study and the US lab strain, which is the most commonly tested strain. I then later published a paper in 2015. I described this flat branch strain of hyalella azteca as a new species called hyalella wellborni. Just antidotically this species is widespread throughout central and southern Illinois.

MR. ETTINGER: Are you using this strain for testing now?

MR. SOUCEK: We tried to culture that one. It was a lot harder to culture in the laboratory than the other strains are. We tried to, but we're not currently at this time.

MR. ETTINGER: It's just a wild, southern boy or what's the --

MR. SOUCEK: It doesn't reproduce as much and it can go a couple generations it seems like and then it just loses vitality.

So it's something that I would like to continue working on because it's a pretty

widespread strain, but the other two are much easier to work with.

MR. ETTINGER: I think we're done.

HEARING OFFICER KLEIN: Done. All right. Let's see. 3:20. Let's take a ten-minute break and then we'll reconvene and figure out how we want -- where we want to go from there, does that sound good?

MS. MEYERS: Sounds great. Thank you.

HEARING OFFICER KLEIN: Off the record.

(Whereupon, a break was taken after which the following proceedings were had.)

HEARING OFFICER KLEIN: We can go back on the record.

MR. ETTINGER: I believe Dr. Skrukrud would go first. So maybe we need to move you to where the court reporter can hear you better.

MS. BARGHUSEN: Do you want to go --

THE COURT REPORTER: How about right there.

HEARING OFFICER KLEIN: Can the reporter please swear the witness in.

WHEREUPON:

CINDY SKRUKRUD

called as a witness herein, having been first duly sworn, deposeth and saith as follows:

HEARING OFFICER KLEIN: All right.

MR. ETTINGER: Let me say one other thing. We tendered corrected testimony. There was one paragraph which I handed to Mr. Klein. There is one paragraph where we made a correction and you're free to ask about that, but it has to do with paragraph five, I believe.

HEARING OFFICER KLEIN: Have you provided a copy to Mr. Huff?

MR. ETTINGER: I have not.

MS. SKRUKRUD: I can share mine with him. I gave you a second copy. I can give that to Jim.

HEARING OFFICER KLEIN: All right. Mr. Huff, that's an amended copy. So if there's no objection, I will enter the amended testimony into the record. It's entered. Mr. Huff, you can proceed.

MR. HUFF: Dr. Skrukrud, question one. Bullet one of your pre-filed testimony indicates that the petition makes little sense as applied as it focuses on highway de-icing practices.

Is not highway/pavement de-icing the primary winter source of chlorides in Illinois streams.

MS. SKRUKRUD: Chlorides from winter de-icings are a major source of chlorides in Illinois waters. Bullet one raises the issue that there are other sources of chloride pollution to Illinois waters that need to be considered in this rulemaking including water softener discharges and discharges from industrial sources like oil fields and coal mines.

As an example, the Pond Creek Coal Mine in Williamson County is proposing to discharge 2.7 million gallons per day of groundwater infiltration into their underground mine. They're proposing to discharge it into the Big Muddy River. Discharges would contain an average of 2,237 mg/L of chloride and 1,940 mg/L of sulfate.

MR. HUFF: So would there be a seasonal component that a coal mine -- the oil and gas or water softeners that you've lifted up?

MS. SKRUKRUD: No, I don't think there would be a seasonal component for those.

MR. HUFF: So would not they be controlled by the proposed summer standard then? If they met the summer standards, would you expect them to discharge more in the winter?

MS. SKRUKRUD: Your question is, yes, I think they would need to comply with the summer standards and in terms of changing their operations, I'm not an expert on coal mines. So I would just be speculating.

MR. HUFF: Okay. That was really question two. Question six. While acknowledging the proposed summer quality standards are from the US EPA, you express concern they are not restrictive enough.

What would you propose for summer chloride standards and what would be the impact on the Illinois economy.

MS. SKRUKRUD: I don't have a proposal for the summer standards. As we consider

this rulemaking, we need to develop standards protective of Illinois aquatic species in all life stages and I have not analyzed the impact on the Illinois economy.

MR. HUFF: That's all the questions I have for Dr. Skrukrud.

HEARING OFFICER KLEIN: Does anyone else have questions? All right. Ms. Laura Barghusen -- oh, there is a question.

MS. PAPADIMITRIU: Martine, this is Chairman Papadimitriu. May I ask a few questions?

HEARING OFFICER KLEIN: Yes.

MS. PAPADIMITRIU: Thank you. Mr. Huff, good afternoon.

MR. HUFF: Good afternoon.

MS. PAPADIMITRIU: I have two questions that you may have covered this morning. I was at another hearing. So I apologize if this is duplicative.

What is the basis for your belief that the current chloride standard will not be achievable in the future?

MR. HUFF: So this question is for me.

HEARING OFFICER KLEIN: It's for Mr. Huff.

MR. HUFF: The DuPage River Salt Creek Workgroup has been implementing best management practices for over a decade. They are about 12 years in. They have a very high participation rate. I believe every municipality within those drainage basins has implemented best management practices. If you look at the data submitted with the Technical Support Document, you can see maybe a declining trend in chlorides on an annual basis, but it's -- it's slow-going and you have these larger storms like what we're experiencing today that the BMP's aren't going to be sufficient to cut the salt usage down on those most intense storms.

The BMP's are doing a fine job on more efficient salt application on an annual basis, but the streams are just too far away to achieve a 500 mg/L not-to-exceed basis where they already have a background chloride, say, on the order of 200 mg/L and they're spiking up in these bad storms to like up to 1,500 mg/L.

MS. PAPADIMITRIU: Okay. And second

question, is it my -- is my understanding correct that you're seeking a permanent standard?

MR. HUFF: Yes.

MS. PAPADIMITRIU: In perpetuity?

MR. HUFF: Well, I believe chlorides are like every other pollutant. As we develop more science, we need to go back and revisit these and there is a mechanism. There is a triennial review of the water quality standards. Here, we really need to do additional temperatures. We need to do sulfate and -- and hardness testing at colder temperature and that -- that data has not been assembled yet. So I would liken these as almost an interim standard. When that work is done, then we'll be in a basis to make a more refined chloride standard.

MS. PAPADIMITRIU: So from your answer, and I don't want to put words in your mouth, it sounds like a temporary standard, one longer than three years, but shorter than forever, might be acceptable to you?

MR. HUFF: Absolutely.

MS. PAPADIMITRIU: Okay. Thank you. That's all I have. Thank you.

HEARING OFFICER KLEIN: Okay. So we can move on now to Ms. Barghusen. If the court reporter can swear her in.

WHEREUPON:

LAURA BARGHUSEN

called as a witness herein, having been first duly sworn, deposeth and saith as follows:

HEARING OFFICER KLEIN: Ms. Barghusen, actually, I'm going to backtrack because I didn't provide Ms. Skrukrud this opportunity.

Was there an opening statement that you wanted to make.

MS. SKRUKRUD: No, that's fine.

HEARING OFFICER KLEIN: Sure?

MS. SKRUKRUD: Yes.

HEARING OFFICER KLEIN: Sorry. Ms. Barghusen, if you have an opening statement, you can make it now.

MS. BARGHUSEN: I do not have an opening statement.

HEARING OFFICER KLEIN: Mr. Huff, you can proceed to questions.

MR. HUFF: Thank you. On page one,

you state that a more lenient study for chlorides would ultimately result in greater pollution in these waters. The proposed summer chronic standard is more restrictive than the current standard. So presumably the statement refers to the proposed winter standard.

As no urban stream in Illinois currently meets the 500 mg/L chloride standard during snow melt periods, a condition that has existed for more than 40 years, can you explain how the proposal will result in greater pollution in urban streams.

MR. ETTINGER: I'm going to object to the question as based on a legal conclusion that's not correct, but, with that, she should do the best she can.

MS. MEYERS: Thank you, Albert.

MS. BARGHUSEN: My thought was that the chlorides would enter the waterways at the amount permitted, or at least that they could, and in some cases would and I was also assuming that people, government and industry would work to meet a permitted standard and that the standard would be met.

MR. HUFF: Question two. Is the substance of your testimony that the Illinois Pollution Control Board should reject the proposed summer/winter chloride standards and simply maintain the 500 mg/L chloride standard?

MS. MEYERS: I would object to that as to provide a legal conclusion, but, Laura, if you want to answer, you can.

MS. BARGHUSEN: Yeah, I really am not suggesting what standard we should use. I'm merely providing testimony on the current petition and whether I think it would be protective of certain creatures that I have studied.

MR. HUFF: Question six. On page four, you also cited a study by Wallace and Biastoch that found a threshold for diversity in abundance at chloride concentrations between 50 and 90 mg/L.

Did this study look at seasonal chlorides, maximum chlorides or summer chlorides?

MS. BARGHUSEN: This study found that there was a threshold for diversity in abundance of macroinvertebrates at chloride levels between 50 and 90 mg/L. The study consisted of

monthly grab sampling. So it was a sample taken at one specific time at 20 sites across the Toronto region. The total number of samples taken was 321. The samples were taken in 2002 and then again in 2012.

So all months were represented by those samples in those two years. Summary statistics were then calculated for the study. The authors report that the median chloride levels were significantly higher in 2012 at 159 mg/L than they were in 2002 at which time they were 92 mg/L. They attributed this to the increasing salinization of the rivers and stream between those years. They sampled macroinvertebrates in 2002 and then in 2012 at 51 sites across the same ten watersheds in the Toronto area during the months of June to September.

At the same time that they sampled the macroinvertebrates, they took specific conductance at the sites and then related that to chloride levels in regressions that they had run previously so that they could convert the specific conductance into an estimated chloride level. And so that data was collected in the June to

September months and the chloride levels used were the ones measured as specific conductance and converted the chlorides during the macroinvertebrate sampling at each site.

And the reason I included this study in my testimony is because it raises issues of community shifts in aquatic life at lower -- at levels lower than the ones we're considering here and because it also raises the issue which is discussed in the same study in the discussion of seepage of chlorides into soil and groundwater that then can be released into streams and rivers all year as groundwater is released raising the chloride levels all year round and it -- it cites a study that Williams, et al, did that showed chloride contamination and groundwater in springs in the greater Toronto area.

And then to quote the threshold study in a discussion retention of chloride and groundwater in soils prolongs exposure beyond winter and early spring and leads to elevated concentrations during summer when reproduction may be occurring. And they cite that to another study, Findlay and Kelly 2011.

MR. HUFF: Thank you. Question 8. In a Gillis article, he noted that the poor quality of the glochidia survival, 77.4 percent control, may have impacted the low EC50 that he reported of a 168 mg Cl-/L and Wang found the EC50 and low hardness water was 441 mg/L. Significantly higher than Gillis. And those results were 20 degrees.

So is that correct, that statement, that the Gillis one basically had a problem with his control that he had in his paper?

MS. BARGHUSEN: Yes, I think that those things that you said are true. However, if you look at the data that's presented in both the Gillis paper and in the two papers by Wang, et al, I think you see really many results that indicate a low chloride toxicity, acute chloride toxicity, in mussel glochidia. And from my way of thinking, the fact that it's repeated over studies gives it more credibility.

So, for example, I can read them to you. So the acute EC50's, meaning the concentration with 50 percent of the glochidia are effectively dead, of mussel glochidia in Gillis,

et al, 20 -- or just Gillis, I'm sorry, 2011 and Wang, et al, 2018, are reported in their publications as follows.

For the fat mucket in 2008, tested in reconstituted moderately hard water of 95 to 115 mg CaCO3/L there was an acute EC50 of 168 mg Cl-/L in glochidia from Cox Creek -- and I think that's the one you were referencing.

MR. HUFF: Right, that's the one that controls.

MS. BARGHUSEN: And then they did another one where the fat mucket in 2009 tested in reconstituted moderately hard water of 95 to 115 hardness, the acute EC50 was 1,430 mg Cl-/L from glochidia from the Maitland River. The Plain Pocketbook tested in reconstituted moderately hard water at 817 mg Cl-/L. These are acute toxicities. The wavy-rayed lamp mussel in 2008 tested in reconstituted moderately hard water at 113 mg Cl-/L. The wavy-rayed lamp mussel in 2009 tested in reconstituted moderately hard water with an acute EC50 of 285 mg Cl-/L. The northern riffleshell tested in reconstituted moderately hard water with an acute EC50 of 244 mg Cl-/L.

So those were among tests that Gillis reported and then looking at Wang, et al, with tests on fat mucket. Glochidia they did it in moderately hard reconstituted water and got an EC50 for the glochidia of 728 mg Cl-/L. They also tested the glochidia at different hardnesses in the Columbia Environmental Research Center well water and at 50 degrees hard, as you noted, they got an EC50 of 441 mg Cl-/L. At 100 hard, they got an EC50 of 544 mg Cl-/L.

Once they were up to 200 hard, they got an EC50 of 1,288 mg Cl-/L and once they were up to 300 hard, they got an EC50 of 1,597 mg Cl-/L. I think it's important to remember when considering these that the concentrations at which half of the test animals effectively die that a protected standard would presumably have to be lower than that and that even if you take the very highest one at 300 hardness, you get a value -- and cut it in half, say, you'd still get a value of 798.5 mg Cl-/L, which would be still lower than either the summer or winter acute in the proposal and you note that -- I think you asked me really about the poor quality of the glochidia and so I

think that the fact that there have been several tests of acute chronic chloride -- I mean, acute chloride toxicity in which glochidia from several different mussel species have repeatedly tested below the proposed acute winter and summer standards is relevant and I think -- let's see. And Gillis -- can you tell me this question number again? It's eight, right.

MR. HUFF: Eight.

MS. BARGHUSEN: Eight. Okay. Good. And Gillis did comment that the natural river water that she tested did offer more protection than the reconstituted water. She wasn't sure exactly why that was. She noted that the natural river water was harder than the reconstituted water that's usually used in chloride and other contaminant testing and that this could be part of the reason since harder water offers protection, but she thought that that couldn't really account for the great difference that she was seeing and she thought other water chemistry factors might also have contributed to the reduced toxicity of chloride in the natural water that she tested.

But basically it was unclear why

the natural water was affording protection in that test and she did talk about the advantages of using reconstituted water in the tests that they provide consistency. A lot of the tests that are done are done in reconstituted waters so you can compare them between tests -- or between studies and so they permit comparison between studies and between species and then notes that there is a disadvantage that they may not necessarily predict how an organism is going to respond to that contaminate in its natural environment. She said on the other hand one disadvantage of natural water exposure is other contaminates may be present which can contribute to toxicity. So to sum up --

MR. HUFF: Just -- I'm sorry. I thought you were done.

MS. BARGHUSEN: To sum up, I think the repeated tests at sort of accepted ways of testing glochidia in -- through methods that are often used and repeated tests that are giving comparatively low chloride toxicities should be taken into account.

MR. HUFF: So you noted that those

were lower than the proposed winter toxicity.

Were any of those tests done at colder temperatures or were they all above 20 degrees?

MS. BARGHUSEN: Yeah, these tests were all above 20 degrees.

MR. HUFF: So it's really not appropriate to compare to the winter proposed standard?

MS. BARGHUSEN: Well, I don't know because they haven't been tested at 10°C.

MR. HUFF: Question 14. On page 7, you describe the translocation of the northern riffleshell mussels into the Vermillion River.

Can you describe the peak chlorides recorded in this watershed where the mussels were translocated?

MS. BARGHUSEN: No, I have not studied the chlorides in the Vermilion basin.

MR. HUFF: So do you think they considered that before they translocated those mussels?

MS. MEYERS: Objection. She just said she wasn't aware.

HEARING OFFICER KLEIN: Sustained.

MR. HUFF: I have no further questions. Thank you.

HEARING OFFICER KLEIN: Okay. Can we go off the record real quick.

(Whereupon, a break was taken after which the following proceedings were had.)

HEARING OFFICER KLEIN: Okay. So during that break, we discussed the next steps for the hearing. What we have decided is that the March 6th hearing is going to be canceled. I will issue a hearing officer order to that effect. Then I will schedule a prehearing conference in approximately 30 days at which time we will expect or see if Mr. Huff has filed a modified proposal and, if not, then check on the status of that.

And if we are far enough long, schedule -- potentially schedule subsequent hearings at that prehearing conference. Tomorrow's continuation is canceled because it is unnecessary. Today's transcript should be available sometime next week and it will be available on COOL, the clerk's online filing

system, and it can be viewed and printed by anybody.

Is there anything else that needs to be addressed at this time? Hearing none, I would like to thank everyone for braving the weather and making the trip downtown and participating in this first hearing and it is now adjourned. Thank you.

STATE OF ILLINOIS)
) SS.
COUNTY OF COOK)

I, Steven Brickey, Certified Shorthand Reporter, do hereby certify that I reported in shorthand the proceedings had at the hearing aforesaid, and that the foregoing is a true, complete and correct transcript of the proceedings of said hearing as appears from my stenographic notes so taken and transcribed under my personal direction.

Witness my official signature in and for Cook County, Illinois, on this _____ day of _____, A.D., 2019.

_____
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