

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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STATE OF ILLINOIS
Pollution Control Board

IN THE MATTER OF:)
)
WATER QUALITY STANDARDS AND)
EFFLUENT LIMITATIONS FOR THE)
CHICAGO AREA WATERWAY SYSTEM)
AND THE LOWER DES PLAINES RIVER:)
PROPOSED AMENDMENTS TO 35 Ill.)
Adm. Code Parts 301, 302, 303 and 304)

R08-09
(Rulemaking - Water)
Subdocket C

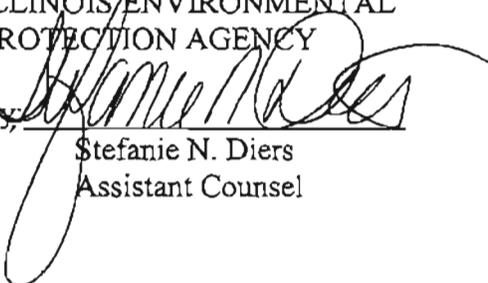
NOTICE OF FILING

To: John Therriault, Clerk
Marie Tipsord, Hearing Officer
James R. Thompson Center
Illinois Pollution Control Board
100 West Randolph Street, Suite 11-500
Chicago, Illinois 60601

SEE ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that I have filed today with the Illinois Pollution Control Board ILLINOIS EPA'S PRE-FILED QUESTIONS FOR SCUDDER MACKEY, DR. DAVID ZENZ, SCOTT B. BELL, ADRIENNE D. NEMURA AND JENNIFER WASIK a copy of which is herewith served upon you.

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: 
Stefanie N. Diers
Assistant Counsel

Dated: February 22, 2011
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THIS FILING IS SUBMITTED ON RECYCLED PAPER

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**ILLINOIS EPA'S PRE-FILED QUESTIONS FOR MWRDGC'S WITNESS SCUDDER
MACKEY**

The Illinois Environmental Protection Agency ("Illinois EPA" or "Agency"), by and through its attorneys, hereby submits pre-filed questions to MWRDGC witness Scudder Mackey. The Agency reserves the right to ask additional follow-up questions if necessary.

1. You stated that the LimnoTech "Habitat Study" underwent rigorous peer-review.
 - a) Could you describe exactly what you mean by that?
 - b) Who was involved with the review?
 - c) Who those individuals are associated with?
2. Have you ever sampled fish on the CAWS?
3. On page 6 of your pre-filed testimony, you quote yourself from previous pre-filed testimony (November 9,2010), suggesting that sustainable fish communities cannot be established in the CAWS, due to nearshore habitat limitations, and furthermore state that sustainable fish communities could not be established "irrespective of how much improvement there is in the water quality". Please explain what you mean by a sustainable fish community?
4. Since proposed dissolved oxygen standards are based on the presence or

absence of early life stages, do you think it is important to know if fish are reproducing in particular areas of the CAWS?

5) Could you explain what you mean by the statement: "All of the CAWS segments are fundamentally limited by the irreversible functional limitations of the CAWS"?

6. Do you believe that habitat is equally limiting in all segments of the CAWS?

7. For all fish collected from 2001 to 2007, 86.1 % were classified as tolerant and 11.7 % were classified as moderately tolerant. Do you think that the poor correlation of the "combined fish metric" to 0.0 was due to the fact that fish communities in the CAWS are currently dominated by tolerant fishes?

8) In paragraph 1 on page 179 of the report attached to your Pre-filed testimony it is stated: "As can be seen from this study, supplemental aeration stations are not an efficient way to combat storm loadings." What is meant by "storm loadings"?

9) On page 179, continuing into page 180 of the report it is stated: "Further, while in theory, the combinations of flow augmentation and new supplemental aeration stations listed in Table 6.1 can achieve 100% compliance with the IEPA proposed DO standards, this will be hard to achieve IN PRACTICE because of two issues found in developing the integrated strategy ...The first problem is how to establish an operation procedure for turning on the aeration stations ... Such operations are easy to identify after the fact as was done in this study...." Then in paragraph 1 on page 180 it is stated: "The second problem is illustrated by the need for a new aeration station on the North Branch Chicago River for WY 2003 [model dry year] on top of those needed for WY 2001 [model wet year]. That is, the five new upstream aeration stations (identified for

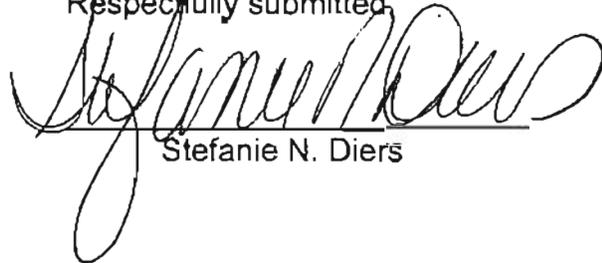
WY 2001) and revised operations at the Devon Avenue in-stream aeration station could not bring the area near River Mile 332.99 into compliance with the IEPA proposed DO standards 100% of the time and a new aeration station was needed for this location in WY 2003.” In these statements, is it being assumed that compliance with the proposed DO standard would precede the construction and an operational testing period of new supplemental aeration systems?

10) At various locations in the testimony, aeration rates have been fixed at 80 grams/sec., in some cases 100 grams per sec.

a) Why are higher aeration rates not considered?

b) Could the use of higher aeration rates reduce the number of stations required; and if not, why not?

Respectfully submitted,



Stefanie N. Diers

Dated: February 22, 2011

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R08-09
(Rulemaking – Water)
Sub-docket C

ILLINOIS EPA'S PRE-FILED QUESTIONS FOR MWRDGC'S WITNESS DR. DAVID ZENZ

The Illinois Environmental Protection Agency ("Illinois EPA" or "Agency"), by and through its attorneys, herby submits pre-filed questions to MWRDGC's witness Dr. David Zenz. The Agency reserves the right to ask additional follow-up questions if necessary.

1. In paragraph 1 on page 1 of your Pre-filed testimony you state: "I was employed by the Metropolitan Water Reclamation District of Greater Chicago (District) in the Environmental Monitoring and Research Division. I worked on a variety of projects at the District and helped develop the design criteria for the existing District supplemental aeration stations on the Chicago Area Waterway System (CAWS)." Then in paragraph 1 on page 2 of your Pre-filed testimony you state: "The District asked AECOM to perform these cost estimates in response to the Dissolved Oxygen (DO) water quality standards currently proposed for the CAWS by the Illinois Environmental Protection Agency (IEPA)."

a) What existing District supplemental aeration stations did you help develop?

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i) Please describe your involvement in the Side-stream Elevated Pool Aeration (SEPA) system on the Calumet River system; and what is SEPA and what does it do.

ii) Please describe your involvement with in-stream aeration stations on the Chicago River system; and what are in-stream aeration stations and what do they do?

b) Why did the District install the existing supplemental aeration systems?

c) How would you rate the successfulness of the SEPA system's performance in maintaining existing water quality standards on the Calumet River System?

d) Is the existing SEPA system capable of maintaining DO levels above existing DO water quality standards 100% of the time; and if not, do you know what % of the time the existing SEPA system is unable to maintain DO levels above existing DO water quality standards?

e) How would you rate the successfulness of the in-stream aeration station system's performance in maintaining existing water quality standards in the Chicago River System?

f) Is the existing in-stream aeration system capable of maintaining DO levels above existing DO water quality standards 100% of the time; and if not, do you know what % of the time the existing in-stream aeration system is unable to maintain DO levels above existing DO water quality standards?

g) You've already given us some information on what you believe it might cost to install and operate a supplemental aeration system sufficient to meet the **proposed** D.O. standards, for which we have specific questions later. Please give

us an estimate on what it would cost to install and operate supplemental aeration systems capable of maintaining D.O. levels in the Chicago River and the Calumet River systems at the **existing** D.O. standards 100% of the time? Rough estimates of costs are sufficient.

2. Have you determined the cost of complying with the current WQS?

3. Has the cost of complying with the current WQS been factored into your final cost analysis? Shouldn't the cost of complying with the current standards be subtracted from the total cost of complying with the proposed standards?

4. In paragraph 1 on page 4 of your Pre-filed testimony you state: "Based upon the results provided by Marquette University, the operation of supplemental aeration stations is expected to be relatively infrequent. "What does "relatively infrequent" mean?

5. Further on in paragraph 1 on page 4 of your Pre-filed testimony you state: "Achieving compliance with the standards will require a complex waterway DO monitoring network and facilities operation plan ... costs for a monitoring network and operational plan have not been included in this cost estimate."

a) What do you mean by "complex DO monitoring network"?

b) Why wouldn't the existing supplemental aeration system monitoring network and operation plans and practices serve as models for plans and costs for monitoring and operating future supplemental aeration systems?

6) Further on in paragraph 1 on page 4 of your Pre-filed testimony you state: "Providing and maintaining the monitoring network and operation plan given the infrequent use of the aeration stations includes significant challenges that are currently not defined".

- a) What do you mean when you say “infrequent use”?
- b) What “significant challenges” do you foresee?
- c) Are you stating that the uncertainties of monitoring and operational costs are the sole reason you are at best only able at this time to provide a Level 5 cost estimate with a range of -30% to +50%?
- d) How many years now have you been looking at supplemental aeration?

7. In the last paragraph of page 2 of your Pre-filed testimony you state: “It should be noted that these DUFLOW model runs do not account for changes in CAWS DO behavior that may result from changes in Lake Michigan Diversion that may occur in the future.”

- a) Please explain what changes in Lake Michigan Diversion may occur in the future?
- b) Why would you not take known changes in Lake Michigan Diversion into consideration in your present analysis?

8. On pages 3 and 4 of your Pre-filed testimony you state: “Any additional hours of operation of the existing Devon and Webster Avenue aeration stations or the existing Sidestream Elevated Pool Aeration (SEPA) stations required beyond their operation during Water Years 2001 and 2003 were provided by Marquette University for use in estimating the additional cost of operating these existing stations.” Then, on page 5 you state: “Marquette University determined that additional operation of the existing Devon and Webster Avenue aeration stations was not needed to comply with the IEPA standards.”

- a) Why was the analysis restricted to water years 2001 and 2003?

b) The first statement is a little unclear or contrary to the second statement in regards to additional hours of operation of the existing Devon and Webster stations. Please clarify whether the Devon and Webster stations will need to operate for additional hours.

9) In bullet No. 1 and 2 on page 3 of your Pre-filed testimony you state:

“supplemental aeration technology considered was ceramic disc diffusers installed in the waterway with an on-shore blower facility... aerated flow augmentation technology considered was force-main aeration of pumped flow using a U-tube aerator and high purity oxygen.”

a) What other aeration technologies did you consider?

b) What are the costs of such other aeration technologies?

c) Where do ceramic disc diffuser and U-tube/high purity oxygen technologies rank with other aeration technologies with respect to cost?

10) Do these aeration requirements and cost figures take into account the completion of the TARP reservoirs?

a. When will TARP be finalized? For the Thorton Reservoir? For the McCook Reservoir?

b. When TARP is finalized, will these supplemental aeration stations be necessary?

c. How long would it take to construct the supplemental aeration?

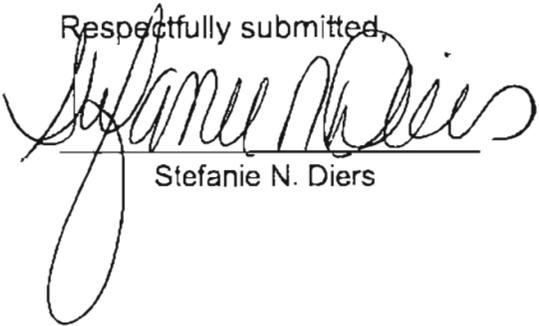
11) On page 9 of your pre-filed testimony, you state, “The time period during

which the wet-weather provision would apply, during and after each even, measured in hours, would depend on specific rainfall amounts." In Table 6, the maximum duration is listed in days. Can you explain the discrepancy?

12) In Table 2, Flow Augmentation is shown. Can you show us where in Table 4 Is the cost of the flow augmentation?

13) Is flow augmentation used in the cost estimate for the District's proposal?

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Stefanie N. Diers', written over a horizontal line.

Stefanie N. Diers

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R08-09 (Sub-docket C)
(Rulemaking – Water)

**Illinois EPA's Pre-Filed Questions for Metropolitan Water Reclamation
District of Greater Chicago Witness Scott B. Bell**

The Illinois Environmental Protection Agency ("Illinois EPA"), by and through its attorneys, hereby submits its Pre-Filed Questions for the Metropolitan Water Reclamation District of Greater Chicago ("MWRDGC") witness, Scott B. Bell, who submitted Pre-filed Testimony for the March 9 and 10, 2011 hearings in the above-captioned matter. Illinois EPA reserves the right to ask additional follow-up questions as necessary.

Questions for Scott B. Bell

1. Page 3 of your testimony states that "...physical habitat, not water quality, is the most limiting factor for fish in CAWS today." Page 11 of your pre-filed testimony states that "...physical habitat is relatively more important (i.e., more limiting) to fish in the CAWS than DO."

- a. What do you mean by "more limiting"?
- b. What do you mean by "most limiting"?
- c. What do you mean by "relatively more important"?
- d. Do all of these terms mean the same thing?

e. Do you agree that it is necessary to perform controlled experiments that manipulate the relative amount of each potentially limiting factor while holding constant all other factors to establish the most limiting factor to a population of organisms?

2. Do you equate the statistical concept of relative importance in regression with practical importance?

a. Is every result that is statistically "significant" of practical importance?

b. Is it possible for a relationship between or among variables to lack statistical significance and yet still be of practical importance?

c. If examination of the correlation between two variables fails to find a statistically significant amount of correlation, does that mean that no practically important relationship exists between the two?

3. On page 2 of your pre-filed testimony, you state in the first paragraph that "These data were evaluated using analytical methods appropriate for this type of ecological evaluation."

a. Please explain why you feel these methods are appropriate.

b. Have you ever developed a "system-specific habitat index" before?

c. Have you ever developed a "combined fish metric" before?

d. Was the index published?

e. Have you sampled and studied fish populations in the CAWS?

f. Who is the "expert review panel" you refer to on page 1 of

Attachment 2 to your pre-filed testimony?

4. How do you compare a system-specific index to the Clean Water Act aquatic life goal?

5. Is it your opinion that the "severe" physical habitat limitations you refer to on page 2 of your pre-filed testimony historically have always outweighed the influence of water quality in the CAWS?

6. Page 2 of your pre-filed testimony states that, in a multiple linear regression analysis, six habitat variables accounted for 48% of the variability in fish data.

a. Do you agree that 48% is statistically biased high?

b. Please define the "adjusted r-squared" mentioned on page 111 of the CAWS Habitat Evaluation Report (Public Comment #284). Why doesn't your testimony mention this concept?

c. Is it valid to generalize from these amounts of explained variance in the fish-versus-habitat regression results?

d. Do you believe that the amounts of explained variance from the fish-versus-habitat regression analysis indicate that improvements to water quality in the CAWS will not likely improve fish conditions?

e. Isn't it correct that when the six selected habitat variables were regressed against the "combined fish metric" for the year 2008 fish samples, the amount of explained variability dropped to 29%? Why does the testimony rely on the 44% result of the original regression and not from this 29% result that was intended to verify the original regression model?

7. Page 9 of the pre-filed testimony states, "When the key DO variable...was added to the regression equation with the six key physical habitat variables, the r-squared of the resulting regression equation was only increased by 4%."

a. Isn't the influence of adding this single dissolved-oxygen variable greater than the influence of at least two of the six habitat variables that were selected?

b. Do you agree that Table 6-4 on page 114 of the CAWS Habitat Evaluation Report shows that adding the "Percent Macrophyte Cover" variable to the regression model only increases the adjusted r-squared value by 2%?

c. Doesn't adding the habitat variable "Percent of Vertical Walls" to the regression model only increase the adjusted r-squared value by 1%?

d. Doesn't including dissolved oxygen cause a greater increase in the amount of explained variance than including either of at least two of the habitat variables that were included in the final model?

8. Page 9 of your pre-filed testimony and page 125 in the CAWS Habitat Evaluation Report indicate that a single measure of dissolved oxygen explained 27% of the variance in fish data. The CAWS Habitat Evaluation Report does not appear to provide the individual bivariate correlation or regression results for the relation between each of the six habitat variables chosen to be most important to fish in the CAWS and "combined fish metric". Of these six habitat variables, did any of them explain individually as much as 27% of the variability in the "combined fish metric"?

9. The regression analysis relied on 81 fish samples from 23 sites; however, 49 of the 81 fish samples were from only seven sites. (See Table 3-1 on p. 52 of Habitat Evaluation Report).

a. Isn't it correct that 27 of the observations came from only a single waterbody, the Chicago Sanitary and Ship Canal?

b. Do you believe that one should be cautious about generalizing to all of the CAWS from a regression for which 1/3 of the observations are from a single waterbody (the Chicago Sanitary and Ship Canal) and for which more than half of the observations are from only seven sites?

c. Isn't it reasonable to be skeptical when generalizing from the results of these fish samples that future improvements in water quality will not provide appreciable benefit to the fish in CAWS?

d. Haven't improvements in water quality in the CAWS clearly improved its biological condition over the past 40 years?

e. How likely is it that if the study were repeated in the CAWS, the same habitat and fish variables would be picked and the same amounts of explained variance would be found between them?

10. In the first bullet on page 3 of your testimony you state, "Of the half of fish data variability not explained by the key habitat variables, most is explained by natural variation in the fish data from one sampling event to another at each location."

a. What do you mean by "most"?

b. Given your testimony that the CAWS is not a natural system, isn't it a contradiction to claim that so much of the variability in fish data is due to natural variation?

c. Even though the fish data varied considerably at each site through the 7 years, this variability was not accounted for by the six physical habitat variables in the fish-versus-habitat regression analysis or by the single dissolved-oxygen variable in the fish-versus-dissolved oxygen correlation?

d. Do you believe this "natural variability" is explained simply by fish moving to different locations in this system?

e. Could this variability also be due to sampling efficiency and precision?

f. Did you examine whether this "natural variability" could be correlated to channel depth?

g. If fish in the CAWS are more related to habitat than water quality, why are there such large year-to-year differences in fish data for several sites?

11. In the 2nd bullet on page 3 you conclude that "Various measures of dissolved oxygen were tested, including compliance with existing and proposed water quality standards, average and minimum DO, and percent of time below various DO concentration thresholds."

a. How was compliance with proposed and current standards determined?

b. Did you review the three different Secondary Contact and Indigenous Aquatic Life and General Use standards that are applicable to various segments of the CAWS today?

c. Was anything less than 100% compliance considered non-compliance?

d. What was the period of data used (e.g. one week prior to fish collection)?

e. How was compliance measured for the proposed standards? Was the proposed 7-day mean of daily minimum evaluated?

f. Was compliance with the March through July minimum of 5.0 mg/L in the CAWS Use A waters measured?

g. Was magnitude of non-compliance (how far below standard) and duration of noncompliance included in the analysis?

h. Was a multiple regression done with these dissolved oxygen variables and fish metrics, as was done for habitat variables?

12. On page 3 (2nd bullet) of your pre-filed testimony, you state: "The strongest relationship identified between any of these metrics and the combined fish metric had an r-squared value of 0.27, which is about half as good as the key variables identified in this study."

a. Is it appropriate to compare multiple linear regression with a single linear regression?

b. Were linear regressions done for each habitat variable so that the r-squared values could be compared with results for dissolved oxygen?

13. Do you agree that a fundamental aspect of multiple linear regression is that the regression coefficients do not directly indicate the relative degree to which each independent variable contributes to explaining the dependent variable? Do you agree that the regression coefficient for each habitat variable included as an independent variable in the model does not account for correlation among them?

14. Appendix D of the CAWS Habitat Evaluation Report describes a process that eliminated habitat variables from further consideration in the search for the few habitat variables that are the most important to fish in the CAWS.

a. Isn't it true that before performing the analyses that examined how habitat was related to fish in the CAWS, this part of the process eliminated from further consideration 225 of the original set of 241 habitat variables?

b. Isn't it correct that principal components analysis (PCA), which was a primary approach used to selectively eliminate habitat variables, is not based on how the habitat variables related to fish?

c. Isn't it likely that some habitat variables that are important to CAWS fish were left out?

d. By eliminating 225 of the 241 habitat variables to perform analysis on only 16 variables for how these habitat variables related to fish, isn't it a misinterpretation to claim that the final six habitat variables are the most important habitat variables to fish in the CAWS?

e. Would a different group of researchers applying the same steps of the elimination process you used be likely to end up the same final set of 16 habitat variables for analysis?

f. Why wasn't the selection of the small subset of habitat variables, from an original set of 241 candidate variables, primarily based from the start on how they related to fish?

15. On page D-6, Figure D-1, in Appendix D of the CAWS Habitat Evaluation Report, 38 variables are represented in the Scree plots. Principal-components analysis (PCA) based on a correlation matrix results in one PCA axis per each variable used in the analysis. However, Table D-2 represents 37, not 38, variables. What is the reason for this discrepancy between Figure D-1 and Table D-2? Which matrix (correlation matrix or the covariance matrix) was used in the PCA?

16. On page D-6 in Appendix D of the CAWS Habitat Evaluation Report, the description of the two vertical axes in each plot of Figure D-1 are illegible. What does each vertical axis represent in each plot?

17. Page D-5 in Appendix D of the CAWS Habitat Evaluation Report states that "...inclusion of a fifth axis did not significantly improve the variance explained." How much of the variance in the nine "Geomorphology and Hydrology Variables" did the fifth principal component explain?

a. For each of the five PCAs that were run, how much variance and what proportion of total variance did each of the principal components explain?

b. For each of the five PCAs, what type of variable loadings were used and what are the loadings of each variable on each PCA axis?

c. Page D-7 of Appendix D of the CAWS Habitat Evaluation Report indicates that several habitat variables were eliminated due to "rel. low load..."

What does "rel. low load" mean? What loading level was used to distinguish a "low load" from a higher one?

d. Couldn't some of the habitat variables that were eliminated be strongly related to fish in the CAWS despite their low PCA loadings?

18. Page 105 of the CAWS Habitat Evaluation Report states that the 16 habitat variables picked from the original set of 241 habitat variables explain "...most of the variance in the habitat data set."

a. How much variance was there in the original set of 241 habitat variables?

b. Page D-7 in Appendix D of the CAWS Habitat Evaluation Report shows that five different subsets —each having a different number of variables— were created from the 39 remaining habitat variables that were used in the PCA. What proportion of the total variance in the 39 habitat variables is represented by each of these five subsets of variables?

c. For each of the five subsets of habitat variables that were created from the 39 remaining variables and for which a separate PCA was run, what proportion of the available variance was accounted for by the variables that ended up being picked for the final set of 16 habitat variables?

19. In bullet 2 on page 3 of your pre-filed testimony you state that "The other four DO measures had r-squared values ranging from 0.02 to 0.08. This indicates that physical habitat, not water quality, is the limiting factor for fish in the CAWS today."

- a. Was a multiple regression done with dissolved oxygen and other water quality parameters such as temperature, turbidity, pH, nutrients, chloride, sulfate and metals?
- b. Isn't it correct that several water-quality variables were eliminated from the start without any consideration for how much they related to the fish data?
- c. Isn't it correct that of all of the available water-quality variables, only variables related to dissolved oxygen and temperature were actually examined for a relationship to fish?
- d. What temperature variables were considered? Was the same analysis done for the period average temperature proposal as with the maximum temperature proposal?
- e. Why didn't you compare dissolved oxygen and temperature variables to the habitat variables?
- f. Why were other water quality variables excluded from consideration in the CAWS study?
- g. Do you agree the CAWS correlation and regression analyses disregarded any variability in fish data that could be attributed to other water-quality variables?
- h. Since an objective of the study was to examine how fish relate to both habitat and water quality in the CAWS, wouldn't it have been more consistent to pick a subset of water-quality variables via a process similar to how the physical-habitat variables were picked?

i. Wouldn't it have been reasonable to begin by examining all available water-quality variables for how they related to fish variables and proceed with selection from that point forward?

j. Given that the selective-elimination process for the available habitat variables differed substantially from the process used to pick water quality variables, isn't it reasonable to interpret that any subsequent comparisons of the relative ability of the habitat or water-quality to explain the fish data are invalid "apples-vs-oranges"-type comparisons?

k. Could water-quality variables left out of the regression analysis explain some or all of the fish data variability not explained by habitat variables?

l. In Table 4-2 on page 65 of the Habitat Evaluation Report it states that "The CAWS is dominated by suspended sediments." Do you agree with this statement? If so, why was this variable not picked for inclusion in the water quality or physical habitat variables that were related to the fish data? Where are the suspended-sediment data that support this conclusion?

20. According to Table 6-4 on page 114 in the Habitat Evaluation Report, the highest r-squared value of 0.25 for a single habitat variable was for maximum depth. Other listed single habitat variables (organic sludge and macrophytes) had r-squared values of 0.15.

a. Are all of these individual values are less than the 0.27 r-squared value for dissolved oxygen?

b. Were the individual r-squared values of each of the other nine habitat variables included in this table all less than 0.15?

c. What were these r-squared values?

21. Page 7 of your pre-filed testimony states that "The CAWS Habitat Study found that channel depth, lack of off-channel areas and bank refuge for fish, vertical-walled or riprapped banks, and manmade structures in the channels were all strongly, negatively correlated with fish condition."

a. Where in the CAWS Habitat Evaluation Report does it show that each of these four habitat variables is "strongly, negatively correlated with fish condition"?

b. Where in the Report are the bivariate correlations and scatterplots that define the relation between each of these habitat variables and any of the fish variables?

22. On page 4 of your pre-filed testimony, you state in the last paragraph: "While about 75% of the CAWS are manmade, the other 25% of the waterways have been extensively modified from their original form to also support these uses." What do you base this statement on?

23. You testify on page 4 that "Many miles of the channel banks were dug into bedrock where the channels were dug in soil the banks were armored with stone and other materials to prevent erosion."

a. Is erosion considered a negative habitat attribute in most streams?

b. Could preventing erosion with these armored banks result in less total suspended solids and sedimentation in CAWS compared to other waters?

24. You testify on page 5 that 61% of the CAWS was vertical walled or covered with rip rap. What percentage was vertical walled? What percentage was riprap?

25. You conclude on page 5 that "In rivers and streams, sinuosity less than 1.2 is considered low, while sinuosity greater than 1.5 is considered high." Is this true for any size river or stream? Does distance between the two points used to determine sinuosity increase with increasing river size?

26. You state on page 5-6 of your pre-filed testimony that "Many of the channels were made to be roughly rectangular or trapezoidal in cross-section with very little of the shallow, nearshore areas, called littoral zones..." Are there areas in CAWS where the bank walls are crumbling, leaving boulders and large cobble as littoral substrate?

27. On page 6 you testify that "a large portion (approximately 78%) of the CAWS is maintained for navigation by the U.S. Army Corps of Engineers, although it has not been necessary to actually dredge these channels in many years." Does this indicate that sedimentation is not a major problem in CAWS?

28. You also testify on page 6 that "As part of the CAWS Habitat Study, substrate data from 28 stations throughout the CAWS were evaluated."

a. Was this data collected by MWRDGC from 2002 through 2008?

b. If so, are you aware that this substrate data were collected with a petite ponar dredge at only four locations at each station, center and one bank on the upstream and downstream ends of the sampling reach?

c. Can you explain why only one bank was sampled?

- d. How was it determined which bank to sample?
- e. Does MWRDGC collect fish along both banks when possible?

29. Page 65 in the CAWS Habitat Evaluation Report states, "Where large substrate (gravel, cobbles, boulders) are present in the CAWS, they appear to be important to fish." Do you know what minimum amount of available habitat space needs to be covered by these important substrates in order for fish populations to be maintained?

30. On page 6 you indicate that "Analysis conducted as part of the CAWS Habitat Study showed that there are statistically significant relationships between the concentrations of many of these chemicals and the health of benthic invertebrates..."

- a. How was health measured?
- b. Which chemicals are you referring to?
- c. What percentage of samples had a significant relationship?

31. On page 7 of your testimony you state that "The design of the waterways was intended to support their primary uses and not to mimic natural waterways." Did Illinois EPA propose a designated aquatic life use for any segment of the CAWS that represents the condition of a natural waterway?

32. You state on page 7 of your pre-filed testimony that "A portion of this fine sediment load settles to coat the bed of the waterways, while the rest remains in suspension, resulting in relatively high turbidity." What does relatively high mean?

33. On page 7 of your pre-filed testimony you state that "The CAWS Habitat Study ... found that sediment contamination was statistically correlated to poor invertebrate condition."

- a. Are you referring to Chironomidae (midge) head capsule deformities? What types of deformities?
- b. Do head capsule deformities relate directly to survival and reproduction?
- c. Are some species of Chironomidae more tolerant and so have fewer deformities?
- d. How meaningful are these results if the two regression methods indicate completely different significant parameters for Hester-Dendy samples (i.e. nickel and lead for Pearson correlation and ammonia, iron and DDx for Spearman correlation)?

34. You testify in the last sentence of page 7 that "Navigation also has a significant negative impact on fish in the CAWS. CAWS reaches with high commercial navigation were found to have statistically significant poorer fisheries condition than those reaches without high commercial navigation."

- a. Is there a relationship between poor habitat and navigation?
- b. Your conclusion on the negative impact of navigation to fish based on an experiment?
- c. If not, is it based on correlation?
- d. Do you believe that the Clean Water Act aquatic life use goal is not attainable in waters with commercial navigation?

35. On page 8 of your pre-filed testimony you state with regard to navigation that "there are also direct negative impacts on fish including propeller impacts ..." How

many fish samples show evidence of propeller impacts? Does MWRDGC routinely note the number of fish collected with evidence of propeller impacts?

36. In addition to propeller impacts, page 8 lists the following additional factors related to navigation that are "direct negative impacts on fish": increased velocities, shear stresses, wake impacts and noise of passing vessels.

a. Is it your testimony that each of these are direct negative impacts on fish in CAWS?

b. Where in the CAWS Habitat Evaluation Report does it show that these factors are causing direct negative impacts on fish in CAWS?

37. In the last paragraph on page 8 you state that "A key objective of the CAWS Habitat Study ... was to evaluate the importance of physical habitat to fish in the CAWS, relative to dissolved oxygen (DO)." Why were other water quality parameters besides dissolved oxygen not evaluated?

38. You testify on page 9 that "Multiple linear regression was used to compare habitat variables with the same combined fish metric ..."

a. Why were habitat data not analyzed by the same method as DO (i.e. simple linear regression)?

b. What was the first habitat variable selected in the multiple regression and what was the r-squared value?

c. How much did each of the subsequent habitat variables increase the r-squared value?

39. On page 9 of your pre-filed testimony you state: "This analysis showed that a set of six key habitat variables (maximum channel depth, number of off-channel bays,

percent of vertical walled banks, percent of riprap banks, manmade structures, and macrophyte cover) were the most strongly correlated with the combined fish metric.”

- a. Is it true that measurements of these six habitat variables were only done in 2008?
- b. Were these same values applied to the data from 2001- 2007?
- c. Isn't it correct that at least three of the six final habitat variables in the fish-versus-habitat regression were held constant through time at each fish-sampling location because a single measurement taken in 2008 was applied to all previous years of fish samples?
- d. Do you agree that maximum depth and percent macrophyte cover are two of the habitat variables that can readily change from year to year?
- e. Doesn't Appendix D, Table D-1 of the habitat improvement report indicate that the "maximum depth in reach" variable was obtained from the DUFLOW model output and thus was kept constant from year to year?
- f. Isn't it correct that when examined for their applicability, the six habitat variables explained only 29% or less of the CAWS fish information based on using year 2008 fish data?
- g. Isn't it correct that, if regression results are going to be used for valid prediction, then prediction error in the regression relation must be accounted for?
- h. What is the prediction error in the CAWS fish-versus-habitat regression that used the 2001-2007 fish data?

i. What is the prediction error in the CAWS regression that used the 2008 fish data?

40. On page 9 of your testimony you identify the "key" dissolved oxygen variable to be "percent of time from June through September that DO was <5 mg/L".

a. Why was this time period chosen?

b. Were other periods considered?

41. On page 10 you state that "The CART [Classification and Regression Tree] analysis was conducted using 40 physical habitat variables and six DO variables."

a. What were the six DO variables?

b. Why was temperature not included in the analysis?

c. Why were other water quality variables not included in the analysis?

d. Would you agree that out of 40 habitat variables and only 6 DO variables, that DO (% DO Jun-Sept <5 mg/l) would be the third most important variable in 64% of the samples?

e. Please explain how the CART analysis supports the conclusion that improved dissolved oxygen levels will not lead to improved aquatic life populations?

f. Why do you think that maximum channel depth has the strongest correlation to the combined fish metric of the habitat variables?

42. The first row in Table 6-4 on page 114 of the CAWS Habitat Evaluation Report indicates that the habitat variable called "Maximum depth" is the one habitat

variable—relative to the twelve variables examined—that explains the most of the variability in the "combined fish metric".

a. Does this mean that as maximum depth increases, the "combined fish metric" decreases?

b. Isn't it possible that this relationship simply reflects that it is harder to capture fish by electro-fishing in deeper water than in shallower water?

c. Isn't this relationship between maximum water depth and the "combined fish metric" consistent with the fact that—all else being equal—electro-fishing in deeper versus shallower water will yield a less reliable fish sample that, in turn, can lead to a serious underestimation of the true fish conditions?

43. What is the significance of the following conclusion from page 11 of your pre-filed testimony: "When compared to fish data from the CAWS, the index developed using these 11 habitat variables had an r-squared of 0.48." Why is this significant if the r-squared is the same for 6 and 11 variables?

44. You state on Page 11 that "For example, the Qualitative Habitat Evaluation Index (QHEI) developed in Ohio and widely used elsewhere, had an r-squared of 0.45 with its original development dataset. (Rankin, 1989)."

a. Is this r-squared value for all data statewide and all collection methods?

b. Did boat sites have an r-squared of 0.59?

c. What about boat sites within an ecoregion?

45. Who collected the habitat data that was used to calculate QHEI scores discussed on pages 11-12 of your pre-filed testimony?

a. Was this data collected using Ohio EPA and Michigan DEQ procedures?

b. Why did you conclude not to use well-designed existing habitat protocols—such as the U.S. EPA EMAP, USGS NAWQA and Ohio EPA QHEI approaches—for the CAWS?

c. Do you believe that these published physical-habitat approaches cannot distinguish between the best and worst habitat conditions that occur in CAWS?

d. Is it your testimony that none of these existing protocols has the ability to distinguish habitat differences among locations in the CAWS?

e. Did you apply the available habitat approaches to CAWS and find them to be unable to distinguish habitat differences?

f. If one or a few of the variables used in these existing approaches showed little variability in the CAWS, are there several variables still available that collectively would be able to distinguish differences in physical habitat throughout the CAWS?

g. Explain why the following variables were eliminated from regressions with fish data: flashiness, percent large substrate in deep water and percent plant debris on channel bottom.

46. Page 8 of your pre-filed testimony states, "A 'combined fish metric' was developed as part of the CAWS Habitat Study which served as a CAWS-specific index of biological integrity for fish."

a. Isn't it correct that page 1 of Appendix A of the CAWS Habitat Evaluation Report states, "It was not the objective of the Study to develop a CAWS-specific index of biotic integrity...?"

b. Was the goal of the study to pick a subset of fish variables for use in comparing to habitat data?

c. How many fish metrics were included in "the combined fish metric"?

d. How were they scored to determine the combined fish metric?

e. Why did you reduce all of the fish information available for each fish sample into a single value? Isn't it possible to examine relations between fish and their environment without reducing fish data into a single number to represent each fish sample from a site?

f. Why didn't you use one of the existing, available fish IBI (Index of Biological Integrity), such as Wisconsin or Ohio, that have been developed for large rivers?

47. Page 107 of the CAWS Habitat Evaluation Report mentions two fish variables that "had relatively weak correlation with habitat."

a. Doesn't this result indicate that the correlation between individual fish variables and individual habitat variables was examined?

b. Why weren't these correlations provided in the Habitat Evaluation Report?

48. Since the multiple fish variables available for each fish sample were reduced into a single number, wouldn't it have been more consistent to reduce the multiple habitat variables into a single habitat number (i.e. a "combined habitat metric")?

a. Wouldn't it have been more consistent to depict the water-quality data available for each fish sample as a single "combined water-quality metric"?

b. Wouldn't it have been more consistent to use PCA on the fish variables or on the water-quality variables as it was used to reduce the habitat variables?

c. Isn't it possible that important variability in the original set of 46 fish variables was not accounted for in the single fish variable that was created and used?

49. It is not clear from the CAWS Habitat Evaluation Report how the single value of the "combined fish metric" was derived for each of the 81 fish samples used in the regression analysis. Page 106 of the CAWS Habitat Evaluation Report indicates that, prior to regression with habitat variables, the already reduced subset of 12 fish variables were divided into five categories. Each fish variable was "standardized" and then the variables in each of the five categories were "summed".

a. For each fish sample, how were the raw values for each of 12 fish variables standardized? What are these standardized values and what do they represent about the fish variable?

b. After the raw values were changed into a "standardized" value, is it correct that subsets of the "standardized" values were summed and each subset represented one of the five created categories of fish variables?

c. Is it correct that only four of these five "sums" were additionally combined to yield a single overall "sum", which is called the "combined fish metric" for each fish sample?

d. What is the basis for using a single, simplified "sum" to represent all of the fish information originally available in each fish sample?

e. Can you provide examples of how the information contained in 12 fish variables was reduced into a single number for each of the fish samples?

50. What does the single "combined fish metric" of all fish variables indicate about each fish sample?

a. What is the meaning of this single number that was assigned to each fish sample and then used in regression analyses to represent all of the fish information available for each fish sample?

b. If two CAWS sites receive a different value for the "combined fish metric," what does that difference mean?

c. How large of a difference in the "combined fish metric" constitutes a significant difference?

d. If the objective was to boil down all of the fish variables into a single measure per each fish sample, then why didn't you simply use the Wisconsin large river IBI or the Ohio boatable IBI which are applicable to large rivers?

e. Did selection of the fish variables used for the fish-versus-habitat regressions in this CAWS study provide evidence of how each picked fish variable was related to a gradient of human disturbance?

f. Were any procedures used to standardize the raw values for fish samples with fewer than 50 individuals? Fewer than 200?

g. Did the CAWS Habitat Evaluation Report provide categorizations for each CAWS fish species? If not, can these be provided to demonstrate which fish species contributed to the derivation of which fish variables?

h. For deriving each of the fish variables that represent a percentage, the appropriate value for the denominator of that fraction must be used. How was the denominator determined for these variables in the CAWS Habitat Evaluation Report?

51. Attachment B to Appendix A of the CAWS Habitat Evaluation Report provides tolerance ratings for CAWS fish species. Several of the fish variables used in this CAWS habitat study depend on these tolerance ratings.

a. Is it correct that nearly half of the fish-species tolerance assignments used for this study are based on the reference titled "USGS 2008"?

b. Do you agree that this USGS 2008 resource does not provide general tolerance ratings as are required for valid derivation and standardization of the fish metrics that constitute the Wisconsin, Ohio and Illinois fish IBIs?

c. Do you agree that the tolerance classifications derived by USGS 2008 are determined largely by tolerance to only four parameters: suspended sediment, specific conductance, chloride and total phosphorus?

d. Do you agree that the following fish species rated as "Tolerant" for the CAWS study are consistently rated as being of intermediate tolerance for

Wisconsin, Ohio, and Illinois IBIs: largemouth bass, black crappie, white crappie, white bass, channel catfish, emerald shiner and blackstripe top minnow?

e. Doesn't using tolerance ratings other than those from the IBIs that the borrowed fish metrics are obtained from raise concerns about the validity of the fish variables used to derive the final "combined fish metric" for each sample?

52. Is it correct that most of the 46 fish variables that were available from CAWS fish samples were discarded from further consideration because they were statistically correlated with other fish variables? (See p. 26 of Appendix A of Habitat Evaluation Report). If so, why do you believe this was a valid approach?

a. Why was the variable that represents the total number of native fish species in the sample eliminated?

b. Isn't it unusual for a fish IBI to lack a metric that addresses total species richness?

c. Why are two of the final twelve fish variables so similar: "% lithophilic spawners by count" and "IL ratio of non tolerant coarse-mineral-substrate spawners"? (See p. 34 of Appendix A of Habitat Evaluation Report).

53. Is it correct that the statistical sample of 81 fish samples that was used to relate the "combined fish metric" to the six habitat variables was not the same statistical sample of fish samples used to correlate the "combined fish metric" with dissolved oxygen? (See p. B-6 of Attachment B to Appendix C of Habitat Evaluation Report).

a. If these two statistical samples of paired observations were not the same, then isn't there some statistical confoundment in a direct comparison of amounts of variance explained by each analysis?

b. What analysis was performed to determine that the amounts of explained variance derived from these two different samples could be directly compared?

c. If not all of the 81 fish samples that were used to derive the fish-versus-habitat regression model had corresponding dissolved-oxygen observations, how many fish samples were used to derive the regression model of the six habitat variable plus the one dissolved oxygen variable?

d. If the r-squared value increased by 4% when dissolved oxygen was added, from what specific r-squared value did it rise? Was this value the same 44% that was estimated from the fish-versus-habitat regression using all 81 fish samples?

54. Page 21 in Appendix C of the CAWS Habitat Evaluation Report states that several fish variables were correlated with dissolved oxygen, but only three correlations had r-squared values over 0.20. The CAWS Habitat Evaluation Report interprets these results as "...indicating that dissolved oxygen concentrations alone cannot serve as strong predictor of fish health." Given that none of the physical habitat variables individually have a correlation of 0.20 or greater with the "combined fish metric," is it your testimony that that none of the physical habitat variables alone can serve as a strong predictor of fish in the CAWS?

55. You conclude on pages 8-9 that "It was found that the CAWS combined fish metric was, in many cases, positively correlated with DO ..." What dissolved oxygen metrics were used in this analysis?

56. Page 57 of the CAWS Habitat Evaluation Report states, "Fish metrics from observations where standards were being attained were generally better than fish metrics where standards were not in attainment, but most differences were not statistically significant." Because CAWS fish data showed that a "better" condition existed at sites that more consistently attained water-quality standards than at sites that did not; isn't it logical to interpret that fish are at least partly limited by water-quality conditions in CAWS?

57. You state on page 2 of your pre-filed testimony that "The CAWS Habitat Study was a thorough and data-intensive examination of the relationships between fish, physical habitat, and water quality in the CAWS."

a. Where in the CAWS Habitat Evaluation Report is an examination of the relationships between habitat and water-quality variables in the CAWS?

b. Did you examine the data to discover whether there was a correlation between habitat and water chemistry?

c. Isn't it correct that correlation between habitat and water quality can confound interpretation of the correlation between fish and habitat or likewise confound interpretations of the correlation between fish and water quality?

58. Which segment of the CAWS demonstrated the greatest potential for habitat improvement?

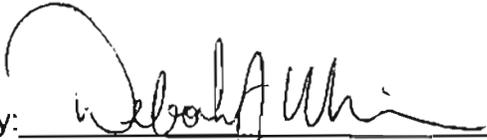
59. Where is the Digital Video survey of the entire system described on pages 4-5 of your pre-filed testimony? What about the sidestream sonar mapping?

60. Table 2-3 on page 25 of the CAWS Habitat Evaluation Report is cited as from Flotermersch et al. (2006). Illinois EPA could not find this table in Flotermersch et al. (2006). Could you verify the source of this table?

61. Page D-1 of Appendix D in the CAWS Habitat Evaluation Report states, "Matrices of Spearman correlation coefficients for each of the five habitat variable categories are included in Appendix E..." Illinois EPA could not find any matrices of correlation coefficients in Appendix E. Are they available?

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: 
Deborah J. Williams
Assistant Counsel

Dated: February 22, 2011

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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STATE OF ILLINOIS
Pollution Control Board

IN THE MATTER OF:)
)
WATER QUALITY STANDARDS AND)
EFFLUENT LIMITATIONS FOR THE)
CHICAGO AREA WATERWAY SYSTEM)
AND THE LOWER DES PLAINES RIVER:)
PROPOSED AMENDMENTS TO 35 Ill.)
Adm. Code Parts 301, 302, 303 and 304)
)

R08-09 (Sub-docket C)
(Rulemaking – Water)

Illinois EPA's Pre-Filed Questions for Adrienne D. Nemura

The Illinois Environmental Protection Agency ("Illinois EPA"), by and through its attorneys, hereby submits its Pre-Filed Questions for the Metropolitan Water Reclamation District of Greater Chicago ("MWRDGC") witness Adrienne D. Nemura who submitted Pre-filed Testimony for the March 9 and 10, 2011 hearings in the above-captioned matter. Illinois EPA reserves the right to ask additional follow-up questions as necessary.

1. What was your role in "reviewing the habitat study"? (Page 2 of pre-filed testimony).
2. What was your role in "reviewing cost estimates for addressing dissolved oxygen issues in the CAWS"? (Page 2 of pre-filed testimony).
3. One pages 2-3 of your pre-filed testimony, you state, "Because it is not possible to eliminate or fully treat these wet weather sources in the foreseeable future, the impact of these events on dissolved oxygen levels in the CAWS needs to be considered when establishing the highest attainable designated uses for these waterways."

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- a. How long do you consider the "forseeable future"?
 - b. When will TARP be finalized for the Thorton Reservoir? For the McCook Reservoir?
 - c. When TARP is finalized, will this provide "full treatment" of the CSOs?
 - d. Should MWRDGC's Long Term Control Plan be implemented prior to designation of the Wet Weather Limited Use?
 - e. Will the Wet Weather Limited Use still be necessary after MWRDGC's Long Term Control Plan is fully implemented?
4. On page 2 of your pre-filed testimony you state that "It is my professional opinion that a wet weather provision needs to be included in the water quality standards for protection of aquatic life uses in the CAWS." How will a wet weather provision help to protect the aquatic life uses in the CAWS?
5. On page 3, you state, "... dissolved oxygen criteria for the CAWS cannot be met exclusively by advanced wastewater treatment at its three major (Calumet, North Side, and Stickney) regional water reclamation plants (WRPs) or by the capture and treatment of CSOs (MWRD 2009)." Is it your testimony that if all CSOs are captured by TARP, the proposed dissolved oxygen water quality standards cannot be met during wet weather? What about the existing standards? Explain.
6. You testify that "The existing biotic community appears to tolerate periodic low dissolved oxygen levels in the CAWS that are caused by wet weather events." What do you base this conclusion on?

7. On page 4 of your testimony, you state, "Establishing a WWLU, which recognizes that there will be periods when the dissolved oxygen criteria cannot be met, will not result in degraded water quality."

a. What do you mean by degraded water quality?

b. Do dissolved oxygen values of 0 mg/L constitute degraded water quality?

8. Is it your testimony that wet weather conditions will still result in adverse dissolved oxygen conditions even if CSOs were eliminated?

9. On page 5, you state, "The WWLU designation would apply to waterway segments receiving or otherwise affected by CSOs or other wet weather flows and would remain in effect during, and up to a predefined maximum amount of time after a wet weather event."

a. What "other wet weather flows" are you referring to?

b. When TARP is fully implemented, will the pump stations discharge on a regular basis or will they be reduced to 4 or less per year?

c. Are there any waterway segments that are not "receiving or otherwise affected by CSOs"?

d. Should the CAWS be divided into smaller segments to minimize the impact of the wet weather limited use proposal?

10. Explain what is meant on page 4 of your pre-filed testimony when you state that "The proposed WWLU can be re-evaluated periodically as new data becomes available or as additional CSO and other wet weather source controls are established for this system (Lanyon 2008)."

- a. What mechanism will be used for this re-evaluation?
- b. What is the Lanyon 2008 citation in this sentence referring to?

11. Explain how “The appropriateness of the ‘trigger’ and the maximum duration for applying a WWLU designation could be re-examined periodically.” (Page 6 of pre-filed testimony).

- a. Would the re-examination be required?
- b. Who would conduct the re-examination?
- c. Should the WWLU designation have a sunset date?

12. You state on page 6 that “the designation could be re-evaluated after major changes to the operation of the CAWS (e.g., construction of additional supplemental aeration or flow augmentation facilities or full implementation of the Tunnel and Reservoir Plan [sic]).”

- a. Would the re-evaluation be required?
- b. Who would conduct the re-evaluation?
- c. Under what circumstances do you believe the District will construct additional supplemental aeration or flow augmentation facilities if the WWLU is adopted?
- d. Should a re-evaluation wait for the full implementation of TARP?
- e. Won't the capture of CSOs significantly increase in the Calumet system when the Thorton Reservoir is completed in 2014?
- f. Won't the capture of CSOs significantly increase in the rest of the system when the first phase of the McCook Reservoir is completed in 2015?

13. Will the Wet Weather Limited Use still work if the Board adopts the Agency's Aquatic Life Use designations rather than the Categories proposed by MWRDGC? Why or why not?
 - a. Explain why the WWLU is not needed for the "Category 3" waters in MWRDGC's proposal.
 - b. Does the narrative criteria applicable to these waters allow the dissolved oxygen levels to fall to zero?
14. Explain how MWRDGC's proposal to lower the dissolved oxygen requirements in the Category 2 waters (except the Cal-Sag Channel) is protective of the existing aquatic community?
 - a. How does it protect the highest attainable aquatic community?
 - b. How is this protective of early life stages of aquatic life when they are present?
15. Explain why the WWLU is a "use designation" rather than a "site specific criteria"?
16. Are the Wet Weather Limited Use triggers more complicated than necessary for the relatively small number of days per year it will be needed?
17. Did you consider simply proposing some number or percentage of excursion hours as part of the dissolved oxygen criteria for these waters?
18. Why are there no Continuous Dissolved Oxygen Monitors ("CDOMs") listed for the South Fork of the South Branch Chicago River?
19. Why are there no CDOMs listed for the Chicago River main stem?

20. Is the CDOM network you describe in your testimony a mandatory component of the Wet Weather Limited Use proposal? Are there a mandatory number of monitoring locations?

21. What procedures will be required for MWRDGC to move a CDOM? Will Agency or Board approval be required? If not, what factors will MWRDGC use to decide to make a change and to select the new location?

22. Is the rain gage network you describe in your testimony a mandatory component of the Wet Weather Limited Use proposal? Are there a mandatory number of monitoring locations? How were the locations selected? Was location of CSOs a factor?

23. Why is the rainfall gage at the Main Office location on Erie street used for five of the eight stream segments? Where physically is that gage located at the Main Office?

24. Why does the WWLU depend on MWRDGC's rain gages rather National Weather Service data?

25. What procedures will be required for MWRDGC to move a rain gage? Will Agency or Board approval be required? If not, what factors will MWRDGC use to decide to make a change and to select the new location?

26. Is snow or snow-melt a factor in the Wet Weather Limited Use designation?

27. What percentage of time are the CDOM's not operational? What percentage of the data does not meet MWRDGC's quality assurance/quality control

guidelines? How will the Agency determine that MWRDGC is not choosing to exclude data that demonstrates a D.O. violation?

28. What is the terminus of the Chicago Sanitary and Ship Canal segment as it is used in the WWLU proposal? What use designations and water quality standards should the Board adopt for the Lower Des Plaines River?

29. On page 1 of Attachment 1 to your pre-filed testimony, you state that "DO data collected from 2001 to 2008 from eight monitoring locations" were used in your analysis. Why did you limit your analysis to eight stations? How did you select the eight stations?

30. What is meant in your testimony by the term "practical maximum flow"? (See, e.g. page 4 of Attachment 1).

31. On page 5 of Attachment 1, you indicate that for rainfall events of between 0.25 and 0.49 inches, pump station CSO discharges occurred 21 percent of the time and gravity CSO discharges occurred 16 percent of the time. If CSO discharges did not occur during a large majority of the rainfall events of less than ½ inch, why is 0.25 inches an appropriate trigger for a Wet Weather Limited Use designation?

32. In Table 4 on page 10, the following Note is included at the bottom of the Table: "Note: If a CDOM monitor was not operational for a period of time, those hours would not be included in the wet weather limited use analysis."

- a. Explain what "not included in the analysis" means in this context.
- b. Explain what default conclusions are made when there CDOM data has been thrown out.

33. What time of day are rain gage measurements taken?

- a. What happens if the trigger event occurs on two different calendar days?
- b. Are the WWLU days 24-hour rolling periods or calendar days?
- c. If a 0.25 inch rainfall begins at 11 p.m. and ends at 1 a.m., what day is used for the preceding day and when does the WWLU period end?

34. You testify on page 7 that "The District would submit annual documentation of water quality data, including rainfall and CDOM data, no later than March 31 of the following year."

- a. What other data would this report include?
- b. If it rains on March 11, 2011, is it true that Illinois EPA will not be able to determine whether the dissolved oxygen standards were met on March 12th until March 31, 2012?
- c. Shouldn't MWRDGC provide notice monthly to the Agency if the dissolved oxygen standards are violated?
- d. Does it interfere with the compliance and enforcement process to only provide the Agency with annual reports?
- e. If dissolved oxygen falls below the water quality standard during dry weather, is that not reported until an annual report to be submitted in the following calendar year also?

35. On pages 11-12 of your pre-filed testimony, you discuss various "bins" and sub-divided bins into which each day of the year would be placed for compliance and "accounting" purposes.

a. What bin is a day placed in when there is no useable CDOM data on the day preceding the wet weather event?

b. What if only half of the hours that day have useable data?

c. What if there is only 1 hour of useable data in a day?

d. What happens to the hours with no CDOM data?

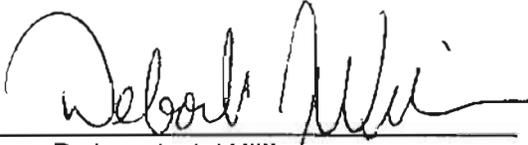
36. What is the purpose of calculating percent compliance of each of the bins?

What would that information be used for?

37. On page 13 of your pre-filed testimony you state "Under the District's proposal, this location [Main Street on North Shore Channel] will receive additional treatment which could improve dissolved oxygen conditions during dry and wet weather." What treatment is planned for North Shore Channel and why? Will installation of this treatment be a regulatory requirement?

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

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Assistant Counsel

Dated: February 22, 2011

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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IN THE MATTER OF:)	
)	
WATER QUALITY STANDARDS AND)	
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CHICAGO AREA WATERWAY SYSTEM)	(Rulemaking – Water)
AND THE LOWER DES PLAINES RIVER:)	Sub-docket C
PROPOSED AMENDMENTS TO 35 Ill.)	
Adm. Code Parts 301, 302, 303 and 304)	

ILLINOIS EPA'S PRE-FILED QUESTIONS FOR MWRDGC'S WITNESS JENNIFER WASIK

The Illinois Environmental Protection Agency ("Illinois EPA" of "Agency"), by and through its attorneys, hereby submits pre-filed questions to MWRDGC witness Jennifer Wasik. The Agency reserves the right to ask additional follow-up questions if necessary.

1. On Page 2, you state, "The District is proposing minimum dissolved oxygen (DO) criteria ... that are identical to those proposed by IEPA. The proposed criteria are 4 mg/L for CAWS Category 1 and 3.5 mg/L for CAWS Category 2." Does IEPA's proposal include a minimum 5.0 mg/L March through July and 3.5 mg/L August through February for CAWS "A" waters?

2. On Page 2, you state, "Finally, the District proposes a wet weather provision from the DO water quality standard due to the significant and unavoidable negative impact of precipitation on the CAWS." Do you mean significant precipitation events that cause combined sewer overflows?

3. On Page 2 you state that "The LimnoTech Habitat Evaluation Report ... indicates

that physical habitat explains most of the variation in the CAWS fish community ... and that factoring in DO makes very little difference."

- a. Is it true that the simple regression of DO (<5 mg/L June – September) with the combined fish metric had an r-squared of 0.27?
- b. Did the multiple regression with six habitat variables and the combined fish metric (Table 6-4 in the above mentioned report) result in the single best correlation for maximum depth with an r-squared = 0.25?
- c. Did adding five additional habitat variables to this regression increase the r-squared by only 0.23 (i.e. $0.25 + 0.23 = 0.48$)? Is it your opinion that it is appropriate to compare a simple linear regression with a multiple linear regression?

4. On Page 2 and several other places in your testimony you mention tolerance levels of fish to various stressors as part of the basis for justifying recommendations for aquatic life uses and corresponding water-quality standards in CAWS.

- a. Do you think that it is sufficient to define aquatic-life uses and to set corresponding water-quality standards based primarily on conditions that are just barely tolerated by aquatic life?
- b. Do you think that in setting an aquatic-life goal for a waterbody, it is reasonable to set such a goal at a level of conditions just slightly better than those at which a large-scale fish kill is likely to occur?

5. On Page 3 of your testimony you state, "Our proposed DO minima standards are as protective as those set forth in the Illinois General Use standards..." Are you referring to the period August through February?

6. On Page 3 your testimony you state, "Waterways in other states with similar physical characteristics to the CAWS are subject to DO minimum standards between 1-2 mg/L ..." Do some of these states have different DO standards during different times of the year? Are these standards considerably higher (i.e. 3 – 5 mg/L)? What type of fish communities are in these waterways?

7. On Page 4 of your testimony you state, "This index was used along with fish data to assess the relative importance of physical habitat compared to water quality factors in the CAWS." It appears only DO was assessed, why were other water quality variables not considered in the analysis?

8. On Page 5 you state, "A stable and tolerant fish community ..." Could you explain what is meant by stable and tolerant? Are you referring to the tolerance list in Attachment B of Appendix A?

9. Testimony mentions several times that improving dissolved oxygen conditions in the CAWS will not benefit fish in CAWS.

a. Isn't it correct that the scatterplots on pages B-5 and B-6 in Attachment B to Appendix C in the CAWS Habitat Report indicate that, for the several fish variables mentioned as follows, the better values occur in the better dissolved-oxygen conditions?

b. Specifically, on page B-5, for the plot in the middle of the left column, isn't it correct that the best values for the fish variable called "Catch per unit effort" occur on the left side of the plot, which indicates the better dissolved-oxygen conditions?

- c. Similarly, on the same page B-5, for the plot at the lower right, isn't it correct that the best values for the fish variable called "Non-tolerant mineral-substrate spawners" occur on the left side of the plot, which indicates the better dissolved-oxygen conditions?
- d. On the next page, B-6, for the first two plots across the page, isn't it correct that the best values for the fish variables called "Number of native minnow species" and "Percent intolerant species by count" occur on the left side of the plot, which indicates the better dissolved-oxygen conditions?
- e. Also on page B-6, for the plot in the middle of the left column, isn't it correct that the best values for the fish variable called "Number of native sunfish species" occur on the left side of the plot, which indicates the better dissolved-oxygen conditions?
- f. Also page B-6, for the plot at the bottom, isn't it correct that the highest values for the fish variable called "combined fish metric" occur on the left side of the plot, which indicates the better dissolved-oxygen conditions?

10. On Page 6 you state, "Lake Calumet also exhibits several shallow areas, and instream cover ..." Does Lake Calumet and the Calumet River and other waters in Category 1 have sufficient habitat for reproduction?

11. On Page 6 of your testimony you state that abundance of largemouth bass has "increased more dramatically in Category 1...than in Category 2...Waters over the past 3 decades."

- a. Isn't it correct that the CAWS habitat study rated largemouth bass as "Tolerant" for purposes of creating the "combined fish metric"—as indicated in the table of fish tolerances that is Attachment B of Appendix A of the CAWS Habitat Report?
- b. Isn't it correct that an increase in the abundance of tolerant fish should indicate a worsening condition, based on how the fish tolerances are intended to work in the "combined fish metric"?
- c. Are you saying that fish conditions have worsened over the past 30 years more in MWRDGC's proposed Category 1 Waters than in Category 2 Waters?
- d. What does an increasing abundance of fishes rated as "Tolerant" by the CAWS study indicate?

12. On Page 7 you state, "A majority of sediment samples tested from some of the category 2 waters were demonstrated to be toxic." How many samples were taken? Which category 2 waters? Were there any category 2 waters that did not exhibit toxicity?

13. On Page 7 you state, "While the habitat index scores in the upper and lower North Branch Chicago River are similar (49 and 47, respectively), ..." This seems to suggest that the habitat index is rather weak, especially considering the preponderance of vertical wall banks. Did IEPA include both the lower North Branch Chicago River and the Chicago River in Aquatic Life Use B waters?

14. On Page 8 you state, "Moreover, sediment toxicity data show that half the

sediment samples from the lower North Branch Chicago River are considered to be toxic." How many stations were looked at? How many samples were taken?

15. On Page 8 you state, "This frequency of toxic sediment is uncharacteristic of Category 1 waters, but is more often associated with waterways classified as Category 2." Were any sediment samples from the Chicago Sanitary and Ship Canal and S. Br. Chicago River (both Category 2 waters) identified as toxic?

16. On Page 8 of your testimony you states, "The fisheries management goal in Category 2 Waters would also be to maintain current fish populations..." Are the aquatic-life uses that MWRDGC is proposing for CAWS based primarily on assuring adequate conditions for ensuring that humans can enjoy fishing in the CAWS? If not, then why do you refer to one of MWRDGC's proposed aquatic-life uses a "fisheries management goal"?

17. On Page 9, you state, "In addition to significant sediment contamination, Bubbly Creek ..." Was sediment in Bubbly Creek identified as toxic in 2002, but not in 2006?

18. On Page 11, you state "Published scientific studies suggest that juvenile largemouth bass, ..., do not exhibit behavioral changes until DO falls below 2 mg/L ..., and that "all sizes of largemouth bass may briefly tolerate hypoxic exposure"..." How often does DO fall below 2 mg/L in Category 1, 2 and 3 waters? How often are hypoxic conditions found in Category 1, 2 and 3 waters?

19. Who made the decisions regard placement of water body segments in Categories 1, 2 or 3?

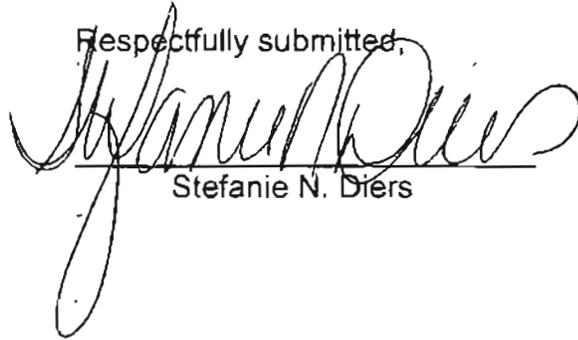
20 . Didn't the CAWS Habitat Evaluation Report show Bubbly Creek had higher

aquatic life use potential than some of the Category 2 waters?

21. Did the Lower North Branch Chicago River have higher potential than some of the Category 1 waters? What about the Chicago River Mainstem?

22. Didn't the Cal-Sag Channel have the highest potential for habitat improvement of all the CAWS reaches?

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Stefanie N. Diers', written over a horizontal line. The signature is cursive and extends below the line.

Stefanie N. Diers

Dated: February 22, 2011

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STATE OF ILLINOIS
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PROOF OF SERVICE

I, the undersigned, on oath state that I have served the attached ILLINOIS EPA'S PRE-FILED QUESTIONS FOR SCUDDER MACKEY, DR. DAVID ZENZ, SCOTT B. BELL, ADRIENNE D. NEMURA AND JENNIFER WASIK upon the person to whom it is directed by placing it an envelope addressed to:

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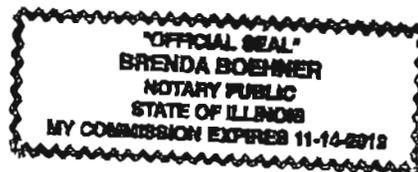
and mailing it by Overnight Mail from Springfield, Illinois on February 22, 2011, with sufficient postage affixed and by mailing it by First Class Mail from Springfield, Illinois on February 22, 2011, with sufficient postage affixed to the Attached Service List.



SUBSCRIBED AND SWORN TO BEFORE ME

This 22nd day of February 2011

Brenda Boehner
Notary Public



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