BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
STANDARDS FOR THE DISPOSAL OF	)	R 20-19
COAL COMBUSTION RESIDUALS IN	)	(Rulemaking – Land)
SURFACE IMPOUNDMENTS: PROPOSED	)	
NEW 35 ILL. ADM. CODE 845	)	
	)	

NOTICE OF FILING

PLEASE TAKE NOTICE that I have filed today with the Illinois Pollution Control Board the attached **PREFILED QUESTIONS OF ELPC, PRAIRIE RIVERS NETWORK, AND SIERRA CLUB TO DAVID HAGEN,** copies of which are attached hereto and herewith served upon you.

Dated: September 10, 2020

Respectfully submitted,

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PREFILED QUESTIONS OF ELPC, PRAIRIE RIVERS NETWORK, AND SIERRA CLUB TO DAVID HAGEN

Groundwater extraction wells

1. In your "cases" for sites 1, 2, and 3, you reference groundwater extraction wells. Please explain how a groundwater extraction well works.

2. Do groundwater extraction wells need to be operated? Please explain your answer and provide examples.

3. If so, and the groundwater extraction wells are not operated as needed, how may that affect the functionality of the groundwater extraction wells?

4. Do groundwater extraction wells need to be maintained? Please explain your answer and provide examples.

5. If so, if that maintenance is not provided, how may that affect the functionality of the groundwater extraction wells?

6. Do groundwater extraction wells need to be inspected? Please explain your answer.

7. If so, if such inspections do not take place or take place too infrequently, how may that affect the functionality of the groundwater extraction wells?

8. Do groundwater extraction wells involve any parts that at times need replacement? Please explain your answer and provide examples.

9. If so, and those parts are not replaced when necessary, how may that affect the functionality of the groundwater extraction well?

10. Must entire groundwater extraction wells sometimes be replaced? Please explain your answer.

11. Can changes in environmental conditions – including but not limited to increased severity and frequency of storms or floods; increased drought; changes in groundwater elevation, groundwater flow direction, or groundwater flow rate; or increased fractures in the subsurface – affect the functionality of groundwater extraction wells? Please explain your answer.

12. Do contaminant plumes at times move in multiple directions?

13. Do contaminant plumes at times migrate in unanticipated directions?

14. Do contaminant plumes at times migrate at unanticipated speeds?

15. Do groundwater extraction wells sometimes need to be added in order to capture contaminant plumes that migrated in a different direction or speed than anticipated?

16. Would it be prudent to set up a system of groundwater extraction wells that does not anticipate the need for future operation, maintenance, inspection and/or replacement of those wells? Please explain your answer.

17. Please identify the typical annual operating, maintenance, inspection and replacement costs associated with groundwater extraction wells.

<u>Selection of remedy criteria</u>

18. On page 3 of your testimony, you describe the criteria to be met for a groundwater corrective action remedy as "inclusive of: protect health and the environment; attain the GWPS; control sources; remove contamination released from the CCR impoundment; and comply with waste management standards."

    a. With regard to controlling sources, the criteria for selection of remedy set out at proposed Part 845.670 states: "Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Section 845.600 of this Part into the environment." 845.670(d)(3). Did you take into account the full proposed standard in conducting your analyses for sites 1, 2 and 3?

    b. With regard to removing contamination, the criteria for selection of remedy set out at proposed Part 845.670 states: "Remove from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems." 845.670(d)(4). Did you take into account the full proposed standard in conducting your analyses for sites 1, 2, and 3?

19. Did you make a determination in your analysis of which "case," for each site, reduces or eliminates, to the maximum extent feasible, further releases of constituents into the environment?

    a. If so, which "case" did you find reduces or eliminates, to the maximum extent feasible, further releases of contaminants into the environment? Please explain how you came to that conclusion.

    b. If not, how would you go about determining which method reduces or eliminates, to the maximum extent feasible, further releases of constituents into the environment?

20. Did you make a determination in your analysis of which "case," for each site, removes from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems?

    a. If so, which "case" did you find removes from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems?

    b. If not, how would you go about determining which case removes from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems?

21. Were the simulations discussed on pages 3-9 and Appendix B of your testimony run in steady state?

22. Why did the simulations you discuss on pages 3-9 and Appendix B of your testimony use 10 mg/L boron to saturate the CCR material? Please explain the basis for that 10 mg/L concentration.

23. If a concentration higher than 10 mg/L boron were used to saturate the CCR, would that affect the outcome of the simulations?

24. Why did you use simulations that "saturate" the impoundment with boron, rather than other methods of establishing contaminant mass within an impoundment?

25. What was the total mass of boron in the simulated impoundment at the end of "operation" for Site 1?

26. What was the total mass of boron in the simulated impoundment at the end of "operation" for Site 2?

27. What was the total mass of boron in the simulated impoundment at the end of "operation" for Site 3?

28. Have you measured, estimated, or reviewed estimations of the total mass of boron in real CCR surface impoundments that have characteristics the same or similar to modeled "sites" 1, 2, and 3? If so, please state how much total boron mass you found or estimated to be in those impoundments.

29. Did the simulations you completed for "sites" 1, 2, and 3 include evaluations of concentrations of any CCR constituents other than boron?

    a. If not, why not?

    b. Why did you choose to model boron rather than other constituents known to leach from CCR?

30. On page 4 of your testimony, the "present concentration in alluvial aquifer" diagram for Site 1 shows a concentration of about 4 mg/L for boron. Please provide the basis for that concentration.

31. What are the differences between the site 1 "impoundment" you simulated and impoundments where boron concentrations far higher than 4 mg/L have been detected in groundwater monitoring wells?

32. Please provide the basis for the thickness of the "vertical layers" modeled for "sites" 1, 2, and 3.

33. Had you assumed different thicknesses of the "vertical layers" of the simulations, described in Appendix B, could that change the outcome of your simulations?

34. In Appendix B, you state that "all model results shown in the report are concentrations from Layer 4."

    a. Why did you select layer 4 for the model results?

    b. In your simulations, do other layers also have concentrations of boron in the groundwater? If so, how do they compare with the concentrations in layer 4?

35. Appendix B of your testimony shows that you assumed a recharge rate of 2 inches/year for site 1 and 14 inches/year for sites 2 and 3. Why did you assume those recharge rates in the simulations?

36. Had you assumed different recharge rates, could that change the outcome of your simulations?

37. Appendix B of your testimony shows that you assumed a vertical conductivity rate of 10 ft/day for site 1, 50 ft/day for site 2, and 20 ft/day for site 3. Why did you assume those vertical conductivity rates in the simulations?

38. Had you assumed different vertical conductivity rates, could that change the outcome of your simulations?

39. Appendix B of your testimony shows that you assumed a horizontal conductivity rate of 1 ft/day for site 1, 5 ft/day for site 2, and 2 ft/day for site 3. Why did you assume those horizontal conductivity rates in the simulations?

40. Had you assumed different horizontal conductivity rates, could that change the outcome of your simulations?

41. Appendix B of your testimony shows that you assumed a pond operating recharge rate of 60 inches/year for site 1, 175 inches per year for site 2, and 100 inches/year for site 3. Why did you assume those pond operating recharge rates in your simulations?

42. Had you assumed different pond operating recharge rates, could that change the outcome of your simulations?

43. Appendix B of your testimony shows that you assumed a 30 inches/year pond out of service recharge rate for all three "sites." Why did you assume that pond out of service recharge rate in your simulations?

44. Had you assumed different pond out of service recharge rates, could that change the outcome of your simulation?

45. Appendix B of your testimony shows that you assumed a 460 feet above sea level river stage for site 1, a 440 feet above sea level river stage for site 2, and a 415 feet above sea level river stage for site 3. Why did you assume those river stages in your simulations?

46. Had you assumed different river stages, could that change the outcome of your simulations?

47. Appendix B of your testimony shows that you assumed a constant head of 480 feet above sea level for site 1, 475 feet above sea level for site 2, and 435 feet above sea level for site 3. Why did you assume those constant head elevations in your simulations?

48. Had you assumed different constant head elevations, could that change the outcome of your simulations?

49. Appendix B of your testimony shows that you assumed a 1.0 L/Kg Kd for boron in CCR and a .1 L/Kg Kd for boron in the aquifer. Why did you assume those Kds in the simulations?

50. Have you measured the Kd of boron in any impoundments in Illinois? If so, please provide the results of those measurements.

51. Had you assumed different Kds for boron in CCR or in the aquifer, could that change the outcome of the simulations?

52. Appendix B of your testimony shows that you assumed an aquifer porosity of 0.35 for "sites" 1, 2, and 3. Why did you assume that aquifer porosity rate in your simulations?

53. Had you assumed a different aquifer porosity, could that change the outcome of the simulations?

54. Appendix B of your testimony shows that you assumed an aquifer bulk density of 1700 kg.m^3. Why did you assume that aquifer porosity rate in your simulations?

55. Had you assumed a different aquifer bulk density, could that change the outcome of the simulations?

56. Appendix B of your testimony shows that you assumed a riverbed conductance rate of 1.0e6 ft^2/day in your simulations. Why did you assume that riverbed conductance rate?

57. Had you assumed a different riverbed conductance rate, could that change the outcome of the simulations?

58. What distance between the impoundment and the river is assumed for each "site" in your simulations?

59. Have you measured the distance between CCR surface impoundments and surface water bodies in Illinois? If so, please provide those distances.

60. Are you aware of CCR surface impoundments in Illinois that are located more than 500 feet from the nearest surface water body? If so, please identify them.

61. For "case 1" for site 2, on page 7 of your testimony, you state that "boron mass is removed through natural groundwater flow to the river and no active source controls are put into place." Under this scenario, following capping, nothing is done to impede the flow of boron through groundwater into the river, correct?

    a. What is the source of the "boron mass" referenced in the above statement?

    b. Are there methods or technologies that can reduce or eliminate the mass of boron that flows through groundwater into the river? If so, please describe.

62. For "case 2" for site 2, you state on page 7 of your testimony that "the remaining boron mass is removed by natural groundwater flow to the river." What is the source of the "remaining boron mass?"

a. Under this scenario, following removal, is anything done to impede the flow of boron through groundwater into the river?

b. Are there methods or technologies that can reduce or eliminate the mass of boron that flows through groundwater into the river? If so, please describe.

63. For "case 1" for site 3, you state on page 8 of your testimony that "boron mass is removed through natural groundwater flow to the river and no active source controls are put into place." Under this scenario, following capping, nothing is done to impede the flow of boron through groundwater into the river, correct?

    a. What is the source of the "boron mass" referenced in the above statement?

    b. Are there methods or technologies that can reduce or eliminate the mass of boron that flows through groundwater into the river? If so, please describe.

64. For "case 2" for site 3, you state on page 9 of your testimony that "the remaining boron mass is removed by natural groundwater flow to the river." What is the source of the "remaining boron mass?"

    a. Under this scenario, following removal, is anything done to impede the flow of boron through groundwater into the river?

    b. Are there methods or technologies that can reduce or eliminate the mass of boron that flows through groundwater into the river? If so, please describe.

<u>Groundwater pumping and treatment</u>

65. On pp. 9-10 of your testimony, you reference several "remedy classes," including "Hydraulic Control (groundwater pumping and treatment); Engineered Barriers (slurry walls, sheet-pile walls, etc.); In-situ Treatment (using amendments such as emulsified vegetable oil to create a reducing condition); and MNA." Please describe groundwater pumping and treatment.

66. Do groundwater pumping and treatment systems need to be operated? Please explain your answer.

67. If so, and the groundwater pumping and treatment systems are not operated as needed, how may that affect the functionality of the groundwater pumping and treatment system?

68. Do groundwater pumping and treatment systems need to be maintained? Please explain your answer and provide examples.

69. If so, if that maintenance is not provided, how may that affect the functionality of the groundwater pumping and treatment system?

70. Do groundwater pumping and treatment systems need to be inspected? Please explain your answer.

71. If so, if such inspections do not take place or take place too infrequently, how may that affect the functionality of the groundwater pumping and treatment system?

72. Do groundwater pumping and treatment systems include any parts that at times need replacement? Please explain your answer and provide examples.

73. If so, and those parts are not replaced when necessary, how may that affect the functionality of the groundwater pumping and treatment system?

74. Can changes in environmental conditions – including but not limited to increased severity and frequency of storms or floods; increased drought; changes in groundwater elevation, groundwater flow direction, or groundwater flow rate; or increased fractures in the subsurface – affect the functionality of groundwater pumping and treatment systems? Please explain your answer.

75. Would it be prudent to set up a groundwater pumping and treatment system that does not anticipate the need for future operation, maintenance, inspection and/or parts replacement? Please explain your answer.

76. Please identify the typical annual operating, maintenance, inspection and replacement costs associated with groundwater pumping and treatment systems.

77. On page 14 of your testimony, you note that pumping and treatment "often requires higher levels of long-term management, increases the potential for exposures and has reliability concerns." You also note that pumping and treatment involves "added components required for remedy construction…."

    a. Please explain how pumping and treatment "increases the potential for exposures."

    b. What "reliability concerns" are you referring to in this statement?

    c. What "added components" are required for pumping and treating?

<u>Slurry walls</u>

78. Please describe what a slurry wall is and what it does.

79. Do slurry walls need to be operated? Please explain your answer.

80. If so, and the slurry wall is not operated as needed, how may that affect the functionality of the slurry wall?

81. Do slurry walls need to be maintained? Please explain your answer and provide examples.

82. If so, if that maintenance is not provided, how may that affect the functionality of the slurry wall?

83. Do slurry walls need to be inspected? Please explain your answer.

84. If so, if such inspections do not take place or take place too infrequently, how may that affect the functionality of the slurry wall?

85. Do slurry walls include any parts that at times need replacement? Please explain your answer and provide examples.

86. If so, and those parts are not replaced when necessary, how may that affect the functionality of the slurry wall?

87. Can changes in environmental conditions – including but not limited to increased severity and frequency of storms or floods; increased drought; changes in groundwater elevation, groundwater flow direction, or groundwater flow rate; or increased fractures in the subsurface – affect the functionality of slurry walls? Please explain your answer.

88. Would it be prudent to put in place a slurry wall without anticipating the need for future operation, maintenance, inspection and/or parts replacement? Please explain your answer.

89. Please identify the typical annual operating, maintenance, inspection and replacement costs associated with slurry walls.

Sheet-pile walls

90. Please describe what a sheet pile wall is and what it does.

91. Do sheet pile walls need to be operated? Please explain your answer.

92. If so, and the sheet pile wall is not operated as needed, how may that affect the functionality of the groundwater pumping and treatment system?

93. Do sheet pile walls need to be maintained? Please explain your answer and provide examples.

94. If so, if that maintenance is not provided, how may that affect the functionality of the sheet pile wall?

95. Do sheet pile walls need to be inspected? Please explain your answer.

96. If so, if such inspections do not take place or take place too infrequently, how may that affect the functionality of the sheet pile wall?

97. Do sheet pile walls include any parts that at times need replacement? Please explain your answer and provide examples.

98. If so, and those parts are not replaced when necessary, how may that affect the functionality of the sheet pile wall?

99. Can changes in environmental conditions – including but not limited to increased severity and frequency of storms or floods; increased drought; changes in groundwater elevation, groundwater flow direction, or groundwater flow rate; or increased fractures in the subsurface – affect the functionality of sheet pile walls? Please explain your answer.

100. Would it be prudent to put in place a sheet pile wall without anticipating the need for future operation, maintenance, inspection and/or parts replacement? Please explain your answer.

101. Please identify the typical annual operating, maintenance, inspection and replacement costs associated with sheet pile walls.

<u>In-situ treatment</u>

102. Please describe what in-situ treatment is and what it does.

103. Do in-situ treatment systems need to be operated? Please explain your answer.

104. If so, and the in-situ treatment systems are not operated as needed, how may that affect the functionality of the in-situ treatment system?

105. Do in-situ treatment systems need to be maintained? Please explain your answer and provide examples.

106. If so, if that maintenance is not provided, how may that affect the functionality of the in-situ treatment system?

107. Do in-situ treatment systems need to be inspected? Please explain your answer.

108. If so, if such inspections do not take place or take place too infrequently, how may that affect the functionality of the in-situ treatment system?

109. Do in-situ treatment systems include any parts that at times need replacement? Please explain your answer and provide examples.

110. If so, and those parts are not replaced when necessary, how may that affect the functionality of the in-situ treatment system?

111. Can changes in environmental conditions – including but not limited to increased severity and frequency of storms or floods; increased drought; changes in groundwater elevation, groundwater flow direction, or groundwater flow rate; or increased fractures in the subsurface – affect the functionality of in-situ treatment systems? Please explain your answer.

112. Would it be prudent to set up an in-situ treatment system that does not anticipate the need for future operation, maintenance, inspection and/or parts replacement? Please explain your answer.

113. Please identify the typical annual operating, maintenance, inspection and replacement costs associated with in-situ treatment systems.

<u>MNA</u>

114. On page 10 of your testimony, you cite US EPA 1999 for the proposition that "Where conditions are favorable, natural attenuation processes may reduce contaminant mass or concentrations at sufficiently rapid rates to be integrated into a site's soil or groundwater remedy." Are conditions favorable for natural attenuation where the contaminant plume is expanding vertically or horizontally?

115. Are conditions favorable for natural attenuation where monitoring reveals the presence of CCR contaminants that are not being attenuated?

116. Are conditions favorable for natural attenuation where there is an increasing concentration, over time, in downgradient groundwater monitoring wells?

117. Is natural attenuation appropriate if the vertical and horizontal extent of the plume has not been defined?

118. Is natural attenuation appropriate if the extent of the plume cannot be defined?

119. Is natural attenuation appropriate if the capacity of the aquifer to attenuate contaminants within the plume is unknown?

120. Is natural attenuation appropriate if there is insufficient space between the contaminant source and groundwater discharges areas to allow a monitoring system to be established, including sentry wells located ahead of the leading edge of the plume?

121. Is natural attenuation appropriate for sites that have anything other than a low potential for contaminant migration?

122. Is natural attenuation appropriate where cross media transfer of contaminants from groundwater to surface water is occurring?

123. Is natural attenuation appropriate where there are current receptors of the contaminant plume, including surface waters, wetlands, or water supply wells?

124. Is natural attenuation appropriate if there is insufficient distance between the contaminant source and potential receptors to allow contaminant concentrations to be reduced to safe levels prior to reaching those receptors?

125. Is natural attenuation appropriate if it does not prevent the migration or expansion of the contaminant plume?

126. Is natural attenuation appropriate if it cannot achieve the remediation objectives within a reasonable timeframe as compared to other alternatives?

127. Is natural attenuation appropriate if conditions allow contaminants that have adsorbed to solids to be remobilized in groundwater?

128. Arsenic can be remobilized in groundwater under certain conditions, correct?

129. Which other CCR constituents that are subject to sorption can be remobilized in groundwater?

130. Do dispersion or dilution change the mass of contamination?

131. Boron and sulfate are highly mobile constituents, correct?

132. Does that mobility, or other characteristics of boron or sulfate, limit whether MNA should be used for CCR contaminant plumes containing boron or sulfate?

133. According to US EPA, should natural attenuation be the sole, default, or presumed remedy for a contaminated site?

<u>CCR and water:</u>

134. The graphs on page 17 of your testimony showing monitoring wells at the Hennepin West Ponds 1 and 3 appear to include monitoring only through 2013. Why did you only include monitoring results up through 2013?

135. Have you reviewed more recent groundwater monitoring data from those impoundments? If so, please describe whether GWPS for boron has been consistently achieved at any of those wells.

136. Are there other monitoring wells that may be impacted by Hennepin West Ponds 1 and 3? If so, please identify them and explain why you did not include data from those wells in your testimony.

137. The graphs on page 19 of your testimony showing monitoring wells from the Hennepin ash ponds 2 and 4 appear to show data only through 2014 for some wells and 2016 for other wells. Why did you only include monitoring results up to 2014 for wells 3R and 5R and only through 2016 for wells 10, 12, 13, and 15?

138. Have you reviewed more recent groundwater monitoring data from those impoundments? If so, please state whether GWPS for boron has been consistently achieved at all monitoring wells.

139. Are there other monitoring wells that may be impacted by Hennepin West Ponds 2 and 4? If so, please identify them and explain why you did not include data from those wells in your testimony.

140. On page 20 of your testimony you discuss CCR surface impoundments "located on high permeability alluvium." Even if the percentage of groundwater flowing through the CCR is small, will the high permeability and relatively high gradient of groundwater flow result in a rapidly moving plume of CCR-contaminated groundwater downgradient of the CCR surface impoundment, once groundwater moves through the ash into the high permeability alluvium? Please provide the basis for your answer.

141. Even if the "contribution of CCR constituents" is "small," does that prevent that contribution from exceeding groundwater protection standards for CCR constituents?

142. Is it your opinion that industrial wastes should be left buried in highly productive aquifers if the waste has a lower permeability than the surrounding geology?

143. On page 20 of your testimony, you state that "Flooding/rising and receding groundwater associated with flood events does not create an unacceptable risk and may not contribute to exceedences [sic] of GWPS's." What do you mean by "unacceptable risk"?

144. Can flooding/rising and receding groundwater contribute to exceedances of the groundwater protection standards?

145. For closure by removal, is it correct that before the excavation of the CCR commences, standing water is removed from the impoundment and active dewatering of the CCR impoundment begins? If not, please explain your answer.

146. Have you considered the effect that dewatering the CCR has on the ability of redox-sensitive constituents to migrate from the impoundment?

147. Have you reviewed groundwater monitoring data for redox-sensitive constituents at sites where removal is underway or has been completed? If so, please describe.

148. On page 24 of your testimony you discuss Ash Pond D at the Hutsonville site and mention a groundwater collection system along the south boundary. Please briefly describe that "groundwater collection system" and state whether it includes any of the

remedy types discussed earlier in your testimony (groundwater pumping and treatment, engineered barriers, in-situ treatment, or MNA).

149. Also on page 24 of your testimony concerning Hutsonville Ash Pond D, you state that "antimony, arsenic, boron, chromium, cobalt, lead, mercury, and thallium had exceedances over proposed GWPS's," and that "only boron consistently exceeded the proposed standard." Do any of the other constituents you mention sometimes exceed the proposed GWPS for that pollutant in wells that may be affected by leachate from Ash Pond D?

150. In your testimony on page 25 you show data from two monitoring wells for Hutsonville Pond D. Are there additional monitoring wells that may be impacted by leachate from Hutsonville Pond D? If so, please identify them and explain why you did not include data from those wells in your testimony.

151. On page 27 of your testimony, concerning ash ponds at the Venice plant, you state that "antimony, arsenic, boron, chromium, cobalt, and lead had exceedances over the proposed GWPS's," and that "only boron consistently exceeded the proposed standard." Do any of the other constituents you mention sometimes exceed the proposed GWPS for that pollutant in wells that may be affected by leachate from those ash ponds?

152. On page 27 of your testimony, you show data from two monitoring wells for Venice ash ponds. Are there additional monitoring wells that may be impacted by leachate from those ash ponds? If so, please identify them and explain why you did not include data from those wells in your testimony.

153. On page 28 of your testimony, you state that "[t]he concept of 'unimpacted background' may be valid for site-wide evaluations…." Why is that so?

154. Does quarterly monitoring provide more opportunity to understand seasonal variation in Illinois than semi-annual monitoring? If your answer is no, please explain.

155. Is the evaluation of concentrations of CCR constituents in groundwater hindered by more frequent measurements of groundwater levels in site monitoring wells?

156. Does measurement of groundwater levels in monitoring wells inform understanding of the fate and transport of CCR constituents in groundwater? If your answer is no, please explain.

157. On page 29 of your testimony, you state that "the more comparisons conducted the more it 'increases the accumulative risk of making a false positive mistake.'" Is the converse also true – that is, the fewer comparisons conducted the less the accumulative risk of false positives?

158. What is the design lifespan of a soil layer?

159. Does a soil layer require ongoing maintenance and inspection to remain effective?

160. If soil layers are not maintained or inspected, how can that affect the soil liner?

161. Do the Hydrologic Evaluation of Landfill Performance (HELP) model evaluations discussed on pages 33 and 34 of your testimony assume that the soil liners remain intact?

162. Why did the HELP model evaluations discussed on page 34 assume a 1% slope?

163. Was any HELP modeling of the cap conducted based on slopes up to a 5% grade, as allowed by proposed Part 845.750 under certain conditions?

164. Does the slope grade affect the volume of precipitation that filters through the cover system? If so, please explain.

165. Did the HELP model evaluation of different protective soil layer thicknesses take into account varying weather conditions (i.e., winter versus spring or summer)?

166. On page 34 of your testimony, you state that the models assumed "a material below the geomembrane exhibiting a permeability matching or greater than that of the cover soil . . . . If the permeability of the material below the geomembrane was lower than the cover soil, the expected percolation would be less than the results provided in this table." Were any HELP model runs completed that included an assumption that the material below the geomembrane had a permeability lower than the cover soil? If so, please discuss the results.

Dated: September 10, 2020

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CERTIFICATE OF SERVICE

The undersigned, Jennifer Cassel, an attorney, certifies that I have served by email the Clerk and by email the individuals with email addresses named on the Service List provided on the Board's website, *available at* https://pcb.illinois.gov/Cases/GetCaseDetailsById?caseId=16858, a true and correct copy of the **PRE-FILED QUESTIONS OF ELPC, PRAIRIE RIVERS NETWORK, AND SIERRA CLUB TO DAVID HAGEN**, before 5 p.m. Central Time on September 10, 2020. The number of pages in the email transmission is 22 pages.

Dated: September 10, 2020

Respectfully submitted,

/s/ Jennifer Cassel________________

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