

1 statement?

2 MR. HALL: The possible reasons or
3 causes of sporadically low DO concentrations are not
4 known and, in some cases, the low concentrations may
5 be a natural phenomenon.

6 A. Uh-huh. Yes, there's been some more
7 recent studies on the Lamprey River that indicate
8 that there is a -- some salinity stratification that
9 affects dissolved oxygen in the Lamprey River.

10 Q. Is that directly caused by algal
11 blooms, that salinity stratification?

12 A. The stratification itself is not caused
13 by algal blooms.

14 Q. Is the stratification a natural
15 condition in that system?

16 A. Do you consider a dam to be a natural
17 condition?

18 Q. It's part of the existing setting.
19 Yeah, let's leave the dam as part of the natural
20 condition.

21 A. I would argue that's not natural, it's
22 the existing condition. I guess flushing is an
23 important consideration related to salinity.

1 Q. So you're telling me that the dam on
2 the Lamprey River causes the stratification in the
3 system?

4 A. No. I'm asking for clarification on
5 what you mean by natural.

6 Q. Mr. Trowbridge, I asked you whether or
7 not the stratification was a natural condition, then
8 you said what about the dam. That's not natural.
9 Then I asked you if the dam causes the
10 stratification. You said, no, not really. So do
11 you want to tell me why you brought up the dam as a
12 relevant point to my question when you knew the dam
13 did not have an effect on stratification?

14 MR. MULHOLLAND: Objection to the
15 question.

16 MR. HALL: I'd like to know.

17 MR. MULHOLLAND: If you can answer, you
18 have to.

19 A. I -- I was asking you for clarification
20 of what you meant by natural condition.

21 MR. KINDER: Wait. Can I just say
22 something for the record?

23 We -- we've spent a lot of time on

1 questions where Mr. Trowbridge has ultimately agreed
2 that none of his concerns had anything to do with the
3 answer. So in terms of the timing of this
4 deposition, I just want to put you on notice that
5 we can't be held to a limitation when there's an
6 uncooperative witness.

7 MR. HALL: I'll -- for the record,
8 given the questions I have, this is probably going to
9 go for four days. So I'll be back up for -- I'll be
10 back up for a solid week and I hope we can put the
11 block of time in it'll take as necessary to get to
12 the bottom of the answers.

13 BY MR. HALL:

14 Q. Now, let's go back to my question.

15 Is the stratification condition in the
16 Lamprey River a natural condition? Yes or no.

17 A. As I asked before, what are you
18 considering to be natural? Is it natural that
19 there's a dam there?

20 MR. KINDER: Didn't we just do this?

21 Q. What part of -- you just told me that
22 was an irrelevant point to the question did you
23 not -- what are you missing, Mr. Trowbridge? Let's

1 try it one more time.

2 What specifically affects
3 stratification in the Lamprey River, do you know?

4 A. Stratification --

5 Q. Yeah.

6 A. -- is affected by flushing, it's
7 affected by topography and --

8 Q. Let's go one at a time. Every single
9 time you -- stratification. Is flushing -- is that a
10 natural condition? The amount of tidal exchange into
11 the system, is that natural?

12 A. The amount of tidal exchange is
13 natural.

14 Q. Okay. Let's go to the next one,
15 topography. The topography where the stratification
16 occurs, is it natural?

17 A. Uh-huh.

18 Q. What else? What other things affect
19 the stratification in that system?

20 A. The freshwater inflow.

21 Q. And that comes down through the system?

22 A. Uh-huh.

23 Q. Okay. And you have data showing

1 that the freshwater inflow to this system controls
2 whether and how the stratification will occur under
3 typical conditions in the Lamprey River?

4 A. I am saying that, in general,
5 freshwater inflow is an important factor in terms
6 of stratification.

7 Q. I'm asking for this particular system.
8 Under the conditions where we've got the low DO
9 occurring in the Lamprey River, are you telling me
10 that the freshwater flow is what's controlling that
11 low DO occurring?

12 A. What I'm saying is that's a factor
13 that's part of the answer.

14 Q. Okay. Now, which of these things,
15 which nonnatural factor, is causing the
16 stratification to occur in the Lamprey River, which
17 is causing the low DOs to occur in the Lamprey River,
18 which nonnatural factor?

19 A. Are you asking about the stratification
20 or about the low DO?

21 Q. A combination. Let's start with
22 stratification.

23 A. Okay.

1 Q. Which nonnatural factor is controlling
2 the stratification in the system?

3 A. I don't know.

4 Q. Do you know if any nonnatural factor is
5 controlling stratification?

6 A. I don't know. I -- the reason I'm
7 raising the issue of flushing is that it's just a
8 factor that needs to be considered related to
9 stratification.

10 Q. So when you're raising this issue,
11 you're just guessing because you just told me --

12 A. No.

13 Q. -- you don't know, right?

14 A. I am explaining the factors that are
15 involved in making that kind of assessment.

16 MR. MULHOLLAND: Can we take a short
17 break?

18 MR. HALL: Absolutely.

19 MR. KINDER: Yup.

20 (Recess taken from 9:50 a.m. until
21 9:54 a.m.)

22 MR. HALL: We're back on the record.

23 Where were we on the last question?

1 (The question and answer were read by
2 the reporter.)

3 BY MR. HALL:

4 Q. Regarding the statement that some of
5 the DO conditions in these tidal rivers, I presume,
6 may be caused by natural conditions, can you provide
7 a little more explanation as to what -- what was
8 meant by that statement, if you know?

9 A. Yeah, I don't know.

10 Q. Can you tell me what kind of natural --
11 what type of natural condition could cause low DO in
12 the system?

13 A. I think there are many, but I'm not
14 sure exactly.

15 Q. Well, tell me what they are. I mean,
16 you were very happy to give us the list of all these
17 other things that you thought were impacted, the
18 stratification in the system, so you're the scientist
19 that they hired to do the analysis of the technical
20 data. Give me an idea of what you know on natural
21 conditions that can cause low DO in a tidal estuary.

22 A. There can be low DO in some salt
23 marshes.

1 Q. And how can that affect the DO in the
2 rivers?

3 A. It can affect the river in some cases.

4 Q. How does that happen? I mean, what --
5 what allows a marsh to affect the river?

6 A. Tidal interchange.

7 Q. Okay. And when you say tidal
8 interchange, you mean the water flows into the marsh
9 at a higher DO, the marsh causes the DO to drop, and
10 then when the water ebbs back out of the marsh, the
11 water exiting the marsh is then -- has low dissolved
12 oxygen and that drops the DO in the river, correct?

13 A. That's one pathway that that can
14 happen.

15 Q. Okay. Can you give me another pathway?

16 A. Groundwater.

17 Q. Okay. Could you explain how that
18 happens?

19 A. Water moves through the ground or the
20 vadose zone and then enters the estuary through
21 subtidal exchange.

22 Q. Okay. Anything else that you can
23 think of that can cause a -- how and why does

1 stratification trigger a low DO condition in a
2 tidal system? Can you explain that to us?

3 A. Stratification results in stagnant
4 water in which the oxygen can be depleted without
5 being refreshed.

6 Q. Okay. And where -- where does this
7 oxygen deletion occur? Does it occur through the
8 entire water column in the river or does it just
9 occur in the area where the stratification is
10 occurring?

11 A. It occurs in the area where the
12 stratification exists.

13 Q. Okay. Which of the tidal rivers
14 experience significant stratification, do you know?
15 I mean, when I talk about tidal rivers -- let's go
16 one by one.

17 Do you know if the Squamscott River
18 experiences any significant stratification?

19 A. I don't know.

20 Q. Okay. What about the Lamprey?

21 A. The Lamprey does experience
22 stratification under certain conditions.

23 Q. Okay. Oyster, Oyster River?

1 A. I don't know.

2 Q. Bellamy?

3 A. I don't know.

4 Q. Winnicut?

5 A. I don't know.

6 Q. Cocheco?

7 A. I don't know.

8 Q. Upper Piscataqua?

9 A. I don't know.

10 Q. Okay. Is the -- can you explain the
11 reason you don't know? Is it -- is it because
12 research hasn't been done on that issue for those
13 rivers or you're just not familiar with what research
14 has been done for the area on that question?

15 A. To my knowledge, detailed studies of
16 stratification have not been done on those other
17 rivers.

18 Q. Okay. Is -- the only river with
19 the detailed study on stratification is the Lamprey?

20 A. Yes.

21 Q. Okay. In terms of factors affecting
22 oxygen loss in a river system, are some of those
23 factors that can -- one of them is sediment oxygen

1 demands, correct?

2 A. Yes.

3 Q. Okay. Is sediment oxygen demand
4 affected by natural as well as manmade sources?

5 A. It can be.

6 Q. Okay. For -- let's go river by river.
7 For the Squamscott River, do you know
8 how much of the sediment oxygen demand in that
9 river -- well, first question is do you know how
10 much the sediment oxygen demand is in that river?

11 A. No.

12 Q. Okay. This will be an easy one. Have
13 sediment oxygen demand studies been done on any of
14 the major tidal rivers to the estuary, to your
15 knowledge?

16 A. Not to my knowledge.

17 Q. Okay. And -- all right. So we don't
18 have sediment oxygen demand studies.

19 Do we have any idea of how much
20 sediment oxygen demand could be caused by algal
21 growth in those systems at this time?

22 A. No.

23 Q. No. Do we know how much sediment

1 oxygen demand is caused by the -- what I'll say the
2 natural runoff, leaf material and other things that
3 happen in these systems from the watershed?

4 A. No.

5 Q. Okay. So it -- if you don't know the
6 sediment oxygen demand and you -- and we don't --
7 let's take the Squamscott as an example. If we don't
8 know the sediment oxygen demand and we don't know the
9 stratification question, how do you determine the
10 Squamscott River, how much of the low DO is caused by
11 algal growth versus other natural factors -- or other
12 factors, just make it, natural or not.

13 A. Uh-huh. You're asking to determine the
14 causes of the low DO?

15 Q. No. Yeah. There's low DO in the
16 Squamscott River, right?

17 A. Yes.

18 Q. And it can be caused by a number of
19 factors, correct?

20 A. Yes.

21 Q. All right. How can we know at this
22 point in time how much of that low DO is caused by
23 algal growth versus other factors if we haven't

1 analyzed the other factors that affect DO in the
2 system?

3 A. We don't have the information to do
4 that analysis.

5 Q. All right. That's what I thought. I
6 mean, it's -- and that was one of the reasons why the
7 HydroQual study was initiated, right, to try to gain
8 some further insight as to what was affecting the DO
9 regime in the Squamscott River?

10 A. I don't know why that study was done.
11 I mean, I know it was part of a plan for the
12 Squamscott River, but I don't know the exact
13 motivation.

14 MR. HALL: Evan, could we go outside
15 for one more minute?

16 MR. MULHOLLAND: Okay.

17 MR. HALL: Off the record.

18 (Off-the-record discussion.)

19 MR. HALL: We're back on the record. I
20 think counsel for Mr. Trowbridge may have refreshed
21 his recollection as to the -- what may have occurred
22 for the -- on the last question.

23 Could you please read that question