

<p>1 NOTICE OF INTENT TO FILE MAINE WASTE DISCHARGE 2 LICENSE/MAINE POLLUTANT DISCHARGE ELIMINATION SYSTEM 3 PERMIT APPLICATION 4 AND NOTICE OF PUBLIC INFORMATIONAL MEETING 5 6 IN RE NORDIC AQUAFARMS, INC. 7 8 Public Meeting At The Troy A. Howard Middle School 9 10 Reported by Robin J. Dostie, a Notary Public and 11 court reporter in and for the State of Maine, on 12 October 4, 2018, at the Troy A. Howard Middle School, 13 173 Lincolnville Avenue, Belfast, Maine, commencing 14 at 6:00 p.m. 15 16 <u>REPRESENTING NORDIC AQUAFARMS, INC.</u> 17 JOANNA TOURANGEAU, ESQ., DRUMMOND WOODSUM 18 ERIK HEIM, NORDIC AQUAFARMS 19 ELIZABETH RANSOM, RANSOM CONSULTING 20 NATE DILL, RANSOM CONSULTING 21 DAVID NOYES, NORDIC AQUAFARMS 22 CARTER CYR, NORDIC AQUAFARMS 23 24 25</p> <p style="text-align: right;">1</p>	<p>1 is the MEPDES permit application public information 2 meeting. This is one of several information meetings 3 that will be held for the overall project. The 4 overall project will also require a federal permit 5 under the U.S. Army Corps of Engineers for the intake 6 and outfall construction on the bottom of Belfast Bay 7 and for impacts to protected resources like wetland. 8 We will also be applying in the future for a Site 9 Location of Development Act Permit and a Natural 10 Resources Protection Act Permit from the DEP. Under 11 the Natural Resources Protect Act, we will also be 12 required to obtain a Significant Groundwater Wells 13 permit. All of those three permits at the state 14 level that are indicated up there will also require 15 that we do additional meetings like the one we're 16 having tonight. So those meetings will have 17 additional meetings like this where we will be 18 answering questions about all of the other aspects of 19 the project. Once we get through and into that state 20 level and federal level process, we will also be 21 submitting applications at the city of Belfast level 22 to comply with all of the local ordinances and there 23 will be a public process associated with those 24 applications as well, so this is the first of what 25 will be many opportunities for public questions</p> <p style="text-align: right;">3</p>
<p>1 TRANSCRIPT OF PROCEEDINGS 2 MS. TOURANGEAU: Good evening. Welcome. My 3 name is Joanna Tourangeau. I am an attorney from 4 Drummond Woodsum who is here tonight on behalf of 5 Nordic Aquafarms. I am an environmental permitting 6 and compliance lawyer based out of Portland who has 7 been working in this field for 15, 16, 17 years, 8 something like that. I stopped counting. I started 9 in 2000. 10 Also with me tonight is Erik Heim, the 11 President of Nordic Aquafarms. He's worked on three 12 similar projects. He is going to give an overview of 13 the project, the treatment systems, the discharge 14 quantities and quality. To his left is Elizabeth 15 Ransom from Ransom Consulting. She has 30 years 16 experience with environmental assessments and 17 projects. She is going to give an overview of the 18 discharge permit parameters and the Belfast Bay 19 background conditions. To her left is Nate Dill, 20 also from Ransom Consulting with 13 years experience 21 and he is going to present modeling of conditions 22 with the discharge in Belfast Bay. 23 We are here tonight to talk first about the 24 overall public process for the project. I am going 25 to give that overview and what we are doing tonight</p> <p style="text-align: right;">2</p>	<p>1 regarding our proposed project. 2 Tonight, we are here to talk about the 3 discharge from the project that is being proposed in 4 our draft application. The public information 5 meeting is required by DEP to be held in advance of 6 us submitting our application while the application 7 is still in draft form. We are required to submit to 8 DEP a rough estimate of the number of people that are 9 here tonight, so if you haven't signed in on the 10 sign-in sheet that will very much help me in terms of 11 counting how many folks were here tonight. 12 We are also having a court reporter here 13 tonight, Robin Dostie, thank you, who is making a 14 transcript of the entire hearing. This is in part 15 because the main purpose of this meeting is for us to 16 answer questions about the discharge to Belfast Bay 17 and one of the things that I will need to do is 18 create is a list of the questions about the discharge 19 that were asked at tonight's meeting and ensure that 20 we provide a narrative response to those questions 21 and hopefully we will be able to answer all of the 22 questions that are had here tonight as well and that 23 will be in the transcript. To the extent there is a 24 question that comes up that we cannot answer tonight, 25 we will pull that question out of the transcript and</p> <p style="text-align: right;">4</p>

1 then provide a narrative response in our application.
 2 Please understand the application is still in draft,
 3 that's the point of this meeting, so there may be
 4 some changes from the information that we present
 5 tonight in response to the comments, the questions
 6 that we receive. We understand that the city of
 7 Belfast has also asked that there be an additional
 8 public meeting following our submission of our
 9 application to the DEP and we support that request.

10 Copies of our application will be submitted
 11 on or around October 19 will go to the DEP's office
 12 in Augusta. A copy will go to the city of Belfast.
 13 You can review those in either location. I have been
 14 advised by the DEP that it will also go on their
 15 website as will all comments and other written
 16 materials on the application under what's labeled on
 17 their website as the major projects section, so if
 18 you wish to review it on the internet it's available
 19 there as well.

20 Tonight, we are hoping to keep our
 21 presentation to approximately one hour. As I
 22 mentioned earlier, we have a court reporter here, we
 23 also have an ASL interpreter for those who require
 24 that assistance. This meeting is also being
 25 broadcast live on the regular channel that is used

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1 for city meetings. There are 200 copies of the DEP
 2 fact sheet regarding all of the public process that
 3 is required for submission of the MEPDES permit,
 4 which is what this is, that are in the back and in
 5 the front, that's where the sign-in sheets are also
 6 located. Many of you picked that up. It's the
 7 two-page flier that some of you might have picked up
 8 and that gives you all of the contact information for
 9 DEP and how to participate in the application as it
 10 goes forward.

11 So what is this permit for? I'm going to go
 12 backwards actually. We are planning to take a bio
 13 break at 8 o'clock so that folks can have a minute.
 14 I am not going to base it on when we finish our
 15 presentation or where we are in the questions, but
 16 when it gets to be 8 o'clock I'm going to interrupt
 17 whoever is kind of up and we're going to take a quick
 18 5 minute bio break and come back and we have the room
 19 until 9.

20 So what is this permit for? In 1972, the
 21 Clean Water Act made it illegal to discharge any
 22 pollutant from point source into navigable waters
 23 without a permit. The State of Maine regulates such
 24 discharges under their MEPDES program and that is the
 25 program that we have in draft application form that

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1 we are here to discuss tonight. What that meant for
 2 Belfast is that discharges like those that were
 3 historically associated with the chicken farms are
 4 now illegal, so there will not be those kinds of
 5 contaminants going directly into Belfast Bay.

6 I am going to turn it over at this point to
 7 Mr. Heim to start off with a general discussion of
 8 the project.

9 MR. HEIM: Good evening. I am going to just
 10 give a brief overview of the project.

11 AUDIENCE MEMBER: We can't really hear you.

12 MR. HEIM: You can't hear us?

13 AUDIENCE MEMBER: No.

14 MR. HEIM: Okay. I understand we have to
 15 have it almost in our mouth for it to work properly.

16 AUDIENCE MEMBER: And if you could step back
 17 so we can have eyesight of interpreter.

18 MR. HEIM: So -- yeah, can you all see the
 19 screen?

20 AUDIENCE MEMBER: Maybe go behind the
 21 podium.

22 MR. HEIM: I'll go behind here. Okay. I'll
 23 hide behind here so everybody can see. I realize
 24 that not everybody has maybe been to our meetings, so
 25 I'm going to give just a brief overview of what we

7

1 are talking about.

2 AUDIENCE MEMBER: Can't hear you.

3 MR. HEIM: Can't hear you. Okay. I'm going
 4 to try and speak as loud as I can. So our production
 5 is dependent on clean water and that means we have an
 6 interest in keeping it clean and that's also part of
 7 the purpose of what we're going to be talking about
 8 today and how we are going to achieve that. And for
 9 those of you who haven't been to these meetings just
 10 a short explanation of what we're talking about.

11 This is an indoor operation where we have an
 12 operation that goes from salmon eggs to what we call
 13 smolt, that would be small salmon, and then take them
 14 through the growth stage to harvest size. And this
 15 facility would basically produce filets and so-called
 16 head-on gutted fish. Only fresh product only going
 17 by road transport to Northeast region. Today most of
 18 the salmon is flown in by airplane to the U.S. from
 19 abroad.

20 The benefit of having all of this in one
 21 place is traceability. You can trace every step of
 22 the process, you know exactly where it comes from and
 23 that is something that consumers increasingly are
 24 concerned with. All of this is based on so-called
 25 recirculation systems. This means that we

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1 recirculate water in the system and clean it
2 continuously and one of the benefits of that is that
3 you reduce water usage. Historically, they were
4 using flow through systems for land-based systems.
5 It required a lot more water than we do today. And
6 the alternative is sea pen production, which is not
7 that common in the U.S. anymore. I believe the only
8 place left is northern Maine. Beyond that, a number
9 of other countries do still work with sea pen
10 production.

11 Okay. I am just going to explain how we
12 ended up here. We did a scientific search of the
13 entire coastline from Washington D.C. up to Canada.
14 We had a long list of criteria that are important in
15 terms of deciding a good site. In every case there
16 is trade-off in terms of sites. One of the reasons
17 we ended up in this water, the region, is clean
18 water, cold water. It's excellent conditions for
19 salmon. And also the other issues that we looked at
20 is what's a nice community for employees to move to
21 and work in, is there power access, what's the
22 proximity to larger consumer markets so we can
23 deliver fresh product, high quality fresh product.
24 All of these considerations came together. We
25 probably walked 20 sites in Maine and this particular

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1 industry and we wanted to do things differently and
2 typically a lot of the things that have been
3 associated with salmon production are related to sea
4 pen. So a couple of the things that are important is
5 that when you're talking about discharge today we're
6 going to talk about the advance technology that's
7 already been used in industrial wastewater treatment
8 across the globe, but we are one of the first
9 companies really investing in this because we believe
10 it is the future. And the other thing is a lot of
11 the things that you filter out from a discharge is
12 high in nutrients and that's a resource. And if you
13 look at the industry today, the byproducts value
14 added processing is a part of the future because it
15 creates value in jobs also and that's exactly what
16 we're doing in this project.

17 Everything we take in or release for water
18 is also treated for bacteria and pathogens. One of
19 the most important things for us is to prevent stuff
20 in the bay coming into our facility. That's the
21 source of disease for us, so we treat that vigorously
22 on the way in and we do the same on the way out. So
23 that's also something that's different from sea pens
24 where you're basically open to free movement of these
25 things. And we also have extensive barriers to fish

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1 area and this site was the one where all these things
2 came together in a good way. So that means it's not
3 easy to find good sites for these kind of projects.

4 In terms of why should this be interesting
5 for Maine, and more specifically Belfast, it's a
6 matter of creating jobs. It's a lot of business for
7 vendors, companies locally and in Maine, and that
8 also means indirect job creation in other companies.
9 We have a number of academic institutions in Maine
10 who work with aquaculture and obviously there is
11 synergies in terms of that whole academic branch in
12 Maine, also given the political interest in growing
13 the aquaculture sector for Maine in the future. So
14 there is a number of things that come together and of
15 course there is also the value creation that also
16 means tax revenue, which is significant. I believe
17 this project will by far be the largest taxpayer in
18 Belfast as well. So we look at the holistic picture
19 of this in terms of this and look at it up against
20 the disadvantages and what we'd be working to do is
21 minimize disadvantages and this is the first part of
22 the impacts that come along with that.

23 So I think one important thing to just go
24 through is we are not a sea pen operation. We are a
25 company that sort of went against the incumbent

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1 escape, which has been a traditional challenge to
2 some extent in sea pen operations and so that's also
3 an issue that's addressed. Typically, sea pens have
4 been treating for sea lice and parasites. We filter
5 them out before they can reach our fish, so we don't
6 use those kind of medications. That's another
7 benefit. And obviously we develop this on private
8 property while other operations are in open water
9 public space and domain. Finally, there is the issue
10 of what you give your fish. There is a great
11 variation in practices in this area. Our focus is a
12 high quality product and that means what you feed
13 your fish will determine the quality of your product
14 you get out the other end. We're going to get back
15 to that also.

16 So a little bit about the timeline. We've
17 been -- we started this process last winter.
18 Currently, we are working our way through permitting,
19 that also requires engineering, so that's currently
20 ongoing. And this project is then planning on
21 working through all of this towards next summer where
22 engineering is basically going to put us in a place
23 where it's possible to start construction, that's the
24 rough timeline.

25 And that, I believe, Elizabeth, are you

12

1 going to do the permits thing?

2 MS. RANSOM: Sure.

3 MR. HEIM: I will get back to the specific
4 water treatment and discharge figures after Elizabeth
5 is done her part.

6 MS. RANSOM: Good evening. Am I able to be
7 heard? Is this close enough?

8 MS. TOURANGEAU: Speak up too.

9 MS. RANSOM: Okay. And I apologize, folks,
10 for the thumping background. There is nothing we've
11 been able to do about that. I do apologize.

12 So what does this permit regulate? As
13 Joanna mentioned earlier, the reason we have a MEPDES
14 permit process is due to the Clean Water Act. In the
15 early '70s there was a list of things in particular
16 that we knew we wanted to keep out of our waters
17 whether it was rivers or oceans and there were
18 various types of pollutants that were described.
19 When we think of pollutants there are two types of
20 pollutants that we can list. One are things that are
21 considered toxic and there is an actual toxic
22 substances list that was created in 1977.

23 AUDIENCE MEMBER: It's very hard to hear
24 you, Elizabeth.

25 MS. RANSOM: I'm sorry, I'm not quire

13

1 some of the key nutrients that are typically

2 regulated and looked at under the MEPDES permit

3 include total suspended solids, biological oxygen

4 demand, nitrogen, and phosphorous. So what are

5 those? So TSS is the amount -- is an actual

6 measurement of the amount of solids in water that can

7 be trapped by a .2 micron filter, so that's a really

8 small filter. And the good thing about this is it

9 allows us to actually take a measurement from a

10 laboratory that is standardized and tell you, jee,

11 what kind of an impact are we having? So is my

12 treatment system working the way it's supposed to and

13 taking those solids out before we discharge something

14 to sea. Because think about it, we all know what TSS

15 or too much TSS looks like. How many go swimming in

16 the bay after a storm and it kicks up a lot of stuff

17 and we can see floaty things when we're out there in

18 the bay, that's TSS. That's things like

19 phytoplankton, silt, decaying plants, animal waste,

20 sewage, there is a lot of things that can go into TSS

21 and that's one of the parameters that Nordic is going

22 to need to monitor when they have a discharge. If

23 TSS is too high, over time the solids that come out

24 of the TSS are obviously not good for marine life and

25 can cover the benthic communities at the bottom of

15

1 sure --

2 MS. TOURANGEAU: Talk right into the mic.

3 MS. RANSOM: There we go. So there are two
4 types of pollutants that are typically regulated
5 under a discharge permit. One of those would be the
6 types of things that we think of as toxic substances.
7 Those are things like pesticides, heavy metals,
8 things that we can all kind of relate to as being
9 clearly not good for us. But it also regulates
10 non-conventional pollutants such as nutrients and
11 that is what this facility is producing. It's
12 compounds like oxygen, nitrogen, and phosphorous,
13 things that are necessary for life, but if we have
14 too much of them they're harmful too. How many of us
15 have been to a doctor and had somebody say you need
16 to reduce your cholesterol and stop eating so much of
17 X? We obviously need carbohydrates and protein to
18 survive, but obviously too much of a great thing
19 isn't great for us, so that's what we're here to talk
20 about tonight. Nordic Aquafarms waste stream will
21 discharge low levels of residual nutrients, not
22 toxic, but that nutrients still is something that is
23 regulated under the MEPDES process.

24 So what are those nutrients? I'm going to
25 talk about what some of those key things are. So

14

1 the bay, so we want to keep TSS low.

2 So then we also want to look at something

3 like biological oxygen demand. This is a general

4 parameter that is commonly put onto a discharge

5 permit. I would gather that it's something that your

6 local wastewater -- municipal wastewater treatment

7 plant also monitors. It's a measurement of the

8 amount of dissolved oxygen needed by aerobic

9 organisms to break down the organic matter in water

10 over time. So when BOD levels are high the oxygen

11 levels decrease because the oxygen that's available

12 in the water is being consumed. So when DO goes down

13 some of our most beloved sea creatures are not really

14 happy. So those levels of DO, for example, are

15 things that lobsters don't like. So we want to keep

16 BOD low and in turn we want to keep DO in the right

17 range.

18 So another vital thing that we'll be

19 measuring is nitrogen. Nitrogen is the most abundant

20 element in the earth's atmosphere. We all need

21 nitrogen for production of amino acids and the

22 building blocks for protein. Plants also need it for

23 photosynthesis. And in sea water we have a lot of

24 different sources of nitrogen. There is agricultural

25 runoff, there is point discharges such as wastewater,

16

1 there is general runoff from lawns and other
2 development and then there is atmospheric deposition.
3 In fact, the majority of the nitrogen that we have in
4 sea water is naturally occurring from atmospheric
5 deposition. But if we have too much nitrogen it can
6 lead to increased plankton and combined with too much
7 phosphorous it can lead to algal blooms. So this is
8 a parameter that obviously we want to make sure we
9 monitor going forward and that the discharge is
10 monitored for going forward so we know there is not
11 too much nitrogen being released to the bay.

12 And another parameter that you'll commonly
13 hear when people are talking about in particular
14 algal blooms is phosphorous. It's also another
15 common earth element and it's found in sea water and
16 it's essential for plant life, but, again, too much
17 of the phosphorous can also add to the potential for
18 the algal blooms and the degradation of the water
19 quality, so that's something we're going to be
20 looking to keep monitoring from the facility. Common
21 sources of phosphorous include also things like
22 agricultural runoff and lawn fertilizer and animal
23 waste.

24 So, again, we are primarily interested in
25 having on the permit the things that would be coming

17

1 none of those were exactly in the point of where this
2 project is planning to discharge, so we've started to
3 establish a dataset for this project. We've gone out
4 over the past few months and started to collect some
5 data.

6 So just real briefly, a summary is the TSS
7 we've found to be in the range of 6.9 to 11
8 milligrams per liter. And, again, for those who
9 aren't used to thinking in those terms that's parts
10 per million. BOD is currently low. We've been at or
11 near the laboratory detection limit of 2 milligrams
12 per liter. Phosphorous has ranged from .012 to .024
13 milligrams per liter. And nitrogen has ranged from
14 .17 to .08 milligrams per liter out in the area of
15 the discharge. And then we've taken some additional
16 samples of nitrogen and phosphorous up close to the
17 Little River Dam because we frequently see some of
18 these parameters are higher in fresh water than they
19 are in the ocean itself and we did, in fact, find
20 that the nitrogen kind of right off from the Little
21 River is a little higher. It was up to a .78
22 milligrams per liter. And I don't expect everybody
23 to memorize those numbers, but I think you're going
24 to find those ranges come in handy later as we start
25 talking about what's coming from the discharge

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1 from the facility as nutrients. We're trying as a
2 part of the process that Erik will be talking about
3 to do a good job of treating for those and also by
4 removing as much of the solids as possible we're
5 going to keep some of those things down even before
6 it gets into the treatment plant in some ways because
7 a lot of those solids are things that can be reused
8 and recycled.

9 And Erik is now going to come up and tell
10 you a little bit -- oh, actually, before he does,
11 I've got one more very important slide. Sorry.

12 So what are the levels out there now?
13 That's a really important starting place, right. We
14 have a bay that I think most of the people in this
15 room really love and want to keep looking good. And
16 so one of the things we need to do is we need to
17 understand what are background conditions, how
18 healthy is the bay now and that way we know going
19 forward if we're having an impact. There are places
20 in the bay where there are regular datapoints that
21 have been collected over the years. There are
22 certain stations where data goes back, you know, you
23 can look back to certain academic studies that have
24 gone back to the 1970s. There are other places where
25 the EPA has collected some data in the 2000s, but

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1 itself.

2 And with that, I think Erik is going to come
3 back and tell you a little bit more about the
4 treatment process.

5 MR. HEIM: Thank you. So we're going to
6 talk through a little bit what we are doing for
7 treatment of the discharge and the technologies
8 behind that. And an interesting sort of history both
9 in the U.S. and Europe when you look at how companies
10 generally in various industries have moved through
11 these processes. If you look at most permits today
12 in Maine none of them contain requirements for
13 phosphorous and nitrogen, for example. But this is a
14 change that's coming politically in the U.S. and
15 we've seen in the U.S. and we've seen the same in
16 Europe as well and it's important because all of
17 these things do influence ecosystems.

18 I'm going to take you a little bit through
19 the process in rough steps. This is the wastewater
20 treatment process and typically you would have
21 industrial companies who are discharging and applying
22 various levels of wastewater treatment. You can have
23 municipal infrastructure doing the same and so are
24 we. The basic component coming into this is
25 basically feed and feces from fish, and I'm going to

20

1 talk briefly about feed afterwards, but that's really
2 the basis for the discharge and this is what contains
3 the various nutrients that we're talking about.

4 So this is a multi-step process and the
5 important thing is to address the issues that
6 Elizabeth was just talking about. The first step is
7 nitrogen. In this case, we are one of the few
8 companies in the world who implement denitrification
9 as it's called. It's a filter system populated by
10 bacteria that breakdown by nitrogen in very simple
11 terms. So in this case, this is a part actually of
12 the production environment so it's continuously
13 reducing nitrogen in the fish tanks before discharge.
14 This facility reduces 85 percent of nitrogen produced
15 in the fish tanks. We are not familiar with anyone
16 doing this. That's the pretreated water and in those
17 fish tanks there is also a treatment process removing
18 CO2 and other types of substances, but the pretreated
19 water goes to the wastewater plant. So typically you
20 will see in lots of wastewater treatment plants
21 potentially also drinking water in some cases are
22 treating for P reduction and this is also the case
23 here. There is a process in the wastewater plant
24 that reduces phosphorous by 99 percent before the
25 water is discharged.

21

1 water and that will pretty much take out every bug
2 you can think about in this case, but the primary
3 strategy we have is to never let bugs in the first
4 place from the bay in the system. That's why we also
5 treat the intake water and that's also why the risk
6 of discharging anything of bacterial nature is very
7 low in this process.

8 Just a final step in terms of the treatment
9 process. So there are solids coming out of various
10 parts of this treatment process. All these solids
11 they go through a special dewatering process and what
12 you end up with is a sludge very high and rich in
13 nutrients. And this sludge is in Maine's case going
14 to biogas production. Other cases we see, for
15 example, Norway, it's used for fertilizer, other
16 types of projects, but in Maine we are sending it to
17 biogas production. And the -- yeah, and that
18 basically means none of this is going into the ocean.
19 It's being recycled.

20 Just about -- a few words about the feed
21 profile. So any time you calculate your discharge
22 you start with parameters related to the feed. How
23 much feed are you using, what the are nutrient
24 profiles that you're looking at for your feed and
25 that's the whole basis for what we do also. And in

23

1 Then there is something that is quite unique
2 to this industry, which is membrane microfiltration.
3 Now, this goes down to a mesh size of 0.4 micro.
4 That means it also takes out bacteria. That gives an
5 idea how finely mesh this is. So this is part of
6 what takes out almost all particles and bacterial
7 elements that might be there in the first place.

8 And then there is a final step which is
9 called UV light dosing. UV neutralizes pathogens and
10 there is a very strong dose that basically is
11 treating every drop of water going through the
12 system. It's the same with the intake water as well.
13 So the combination of the system is really what
14 addresses some of the issues that Elizabeth was
15 talking about and what I'm going to do then is to
16 take it a little bit further so you can see what this
17 means. And an additional question is in a facility
18 like this you are dealing with live creatures, so
19 everything in this facility has backup systems.
20 Should the power go out, they will kick in
21 immediately and that's also the case for this.

22 Just to show you a little bit more about
23 microfiltration. Like I was saying, 0.4 micro. It's
24 very, very finely meshed. And then the final step is
25 the 300 micro dose of UV light going through this

22

1 the industry today there is a wide variety of feed
2 ingredients you can choose from and there is also new
3 ones coming into the industry on a continuous basis.
4 So this basically means that any producer can almost
5 tailor their feed in any way they want. So in our
6 calculations, we take in the feed types and ranges
7 that we are interested in looking at --

8 AUDIENCE MEMBER: The slide is gone.

9 MR. HEIM: Oh, what happened?

10 AUDIENCE MEMBER: I hope this doesn't happen
11 with the fish farm.

12 AUDIENCE MEMBER: Maybe dim the lights so we
13 can see the slides better.

14 MR. HEIM: Can we reduce the lights?

15 MS. RANSOM: I'm sure we can.

16 MR. HEIM: We can try to see if we can make
17 that happen. So when we start sourcing our feed, so
18 we pretty much know the profile of the nutrients in
19 the feeds that we're going to be looking at, but we
20 have a lot of choices in terms of ingredients. So
21 the U.S. in terms of the feed producers we are
22 talking to, all of them are highly focused on being
23 USDA, FDA and ISO compliant in terms of anything they
24 use in their feeds. So everything is following
25 federal law in the U.S. and basically as the same

24

1 with the food products we eat ourselves. It's highly
2 regulated in the U.S. as it is Europe. So this is
3 just to let you know that this is how the process
4 works. You start with the amount of feed, the feed
5 profile and then you get to the sort of composition
6 of feed that you're looking for.

7 Just a couple of words also, medications is
8 a chemical that's also included in the application.
9 Now, the way this works in the U.S. you have to list
10 every conceivable substance you will ever use and
11 that's why we also then list every conceivable and,
12 for example, some substances we will change over time
13 for various reasons so we have to list alternatives
14 also. All of this will be included in the
15 application. This is just some internal comments
16 related to that, for example, antibiotics are not
17 used in the industry anymore, at least not in Europe,
18 but there could be a contingency case where you would
19 need to use if for a short period of time for fish
20 welfare purposes and so these are the kind of things
21 we will list in the application. Any use of these
22 will be handled through a U.S. veterinary according
23 to U.S. law just so we are clear on that.

24 Okay. I'm going to get right into the
25 actual discharge and give you the factual figures.

25

1 These figures are based on the total future
2 production of 33,000 metric tons. When we start
3 production, Phase 1, the figures will be half of
4 this. And TSS, as Elizabeth described, this facility
5 reduces 99 percent of the gross discharge through the
6 wastewater treatment. That leaves 185 kilos per day
7 or also in the concentration as commonly used as 6.3
8 milligrams per liter. The background value in the
9 bay is 6.9 to 11. That means the water we are
10 discharging has a lower level of TSS than the bay.

11 The next one is BOD as this one explains.
12 This facility discharges 162 kilos per day fully
13 developed. That's a 99 percent removal of BOD or
14 also 5.5 milligrams per liter. The background value
15 in the bay is approximately 2. That means our
16 discharge at the pipe is slightly higher and as the
17 modeling will show in the next part of the
18 presentation that is diluted quickly to background
19 values in the bay.

20 Phosphorous. 99 percent removal. 5.8 kilos
21 per day or 0.2 milligrams per liter. Background
22 values are 0.12 to 0.24, slightly higher than the bay
23 background values. Again, the modeling will
24 demonstrate how quickly this is diluted a short
25 distance from the pipe end.

26

1 Nitrogen. 85 percent removal. It's the
2 most difficult one to remove as all wastewater plants
3 know. Our benefit here is we can remove it
4 continuously in the production, otherwise we would
5 require a pretty large holding tank structure to
6 reduce this. 673 kilos per day, concentration of 23
7 milligrams per liter. Background measured is .17 to
8 .48. Again, most of the modeling we have done that
9 you will see is based upon nitrogen because it is a
10 bit higher than the background and we want to show
11 what that means. Important thing in nitrogen is
12 ammonia. It's the most harmful element in nitrogen.
13 Total discharge per day is 0.7 kilos per day or 003
14 milligrams per liter. The background levels in the
15 bay are higher than this concentration.

16 So how much nitrogen is this really? We
17 have looked at studies done on the bay before that
18 have mapped out the various sources. I believe this
19 was touched upon earlier by Elizabeth. Based upon
20 that study, this total discharge makes about 0.75
21 percent of the nitrogen coming into this bay. So
22 that gives you an idea of the amount in relation to
23 the natural sources or other input sources that are
24 coming into the bay today.

25 Just before we look at more of the modeling

27

1 of this, one of the important things that we do in
2 Europe and we will be doing here it's also dependent
3 on DEP requirements and what they're asking is
4 monitoring of this, so we have self-imposed
5 monitoring programs and there will be DEP
6 requirements related to those. Most of these factors
7 are measured by sensors and also manual lab tests on
8 a regular basis. There are kept logs for this. They
9 can be audited at any time by the authorities. And
10 obviously we have a self-interest in monitoring these
11 and making sure that we comply with the law. As in
12 Europe, there is a penalty if you don't stick to the
13 permits that you receive.

14 So that leaves us really with the next step,
15 which is the modeling that has been done for the bay.
16 This has been done by Ransom. It's also being
17 quality assured independently by the Ramboll
18 Environmental, a large environmental company in the
19 U.S. Their report on that will also be submitted
20 with the application.

21 So I'm going to turn over to you.

22 MR. DILL: Thanks, Erik. Can you all hear
23 me all right?

24 AUDIENCE MEMBER: Fine.

25 MR. DILL: So my job here, I guess, to give

28

1 you kind of a little bit of introduction has been to
 2 come up with an assessment or prediction of what's
 3 going to happen with this discharge when it goes out
 4 into the bay. And I think one thing that's important
 5 to understand going into this is that we've just --
 6 we've just learned from what Erik and Elizabeth
 7 talked about that the water that is actually being
 8 discharged is really very, very clean. And so when
 9 we talk about what happens after that, it's -- we're
 10 looking at how that water is getting mixed with the
 11 water that's in the bay and how that is even further
 12 getting diluted and so any components that are in
 13 that water the concentration of them is going to be
 14 reduced significantly.

15 So to kind of start with the end result
 16 here, I think we're looking at this figure here and
 17 what this is showing you -- and I think I have a
 18 laser here I can point to. This location right here
 19 is where the outfall -- there will be a pipe that
 20 extends off-shore here underneath the water and near
 21 the bottom it will be discharging the effluent from
 22 that, the wastewater from that pipe right around in
 23 this area. It's about a thousand meters off-shore
 24 here. And one of the things that we've looked at is
 25 what are the populations that are nearby that might

29

1 be sensitive to this. And so we now from -- we know
 2 from the state they have records that document in the
 3 past at least there had been some eel grass here and
 4 eel grass is one of the things that's known to be
 5 sensitive to nitrogen concentrations. So one of the
 6 things we looked at is, you know, what's the impact
 7 going to possibly be there. And so what this figure
 8 is showing you here, this blue -- this little blue
 9 area here, you know, some of the lighter blue to a
 10 darker blue is an estimate of the nitrogen
 11 concentration. I apologize, it's kind of hard to
 12 read what this shows here, but on the dark blue end
 13 of it on the edge of it, which I'm kind of trying to
 14 circle with the laser here, that's a value of about
 15 .3 milligrams per liter of nitrogen, which is -- has
 16 been shown in other estuaries, not necessarily in
 17 Belfast Bay, but, you know, we don't really have that
 18 type of information for this specific location, that
 19 if the nitrogen concentration stays below that level
 20 it doesn't really have any impact. And so we can see
 21 here it's not even really getting close to these
 22 areas. So that's kind of the end of all of the work
 23 that I did that has shown, you know, that has shown
 24 this and so I'm going to try to explain how we got
 25 there so you can understand a little bit.

30

1 My task has been to try to predict what's
 2 going to happen in this very, very complicated
 3 natural system. There is all sorts of factors that
 4 complicate this. There is just simply the
 5 understanding of the physics of the flow of the
 6 water, the, you know, factors like the weather that
 7 we can't predict and sort of just the chaotic nature
 8 of what happens in natural systems. And so the --
 9 different than a lot of sort of other -- you might
 10 think of more traditional engineering where, you
 11 know, you might be able to calculate very precisely
 12 the flexion in a steel beam if you know what the load
 13 is on it. Trying to predict what's going to happen
 14 in a system like this is much more complicated. We
 15 take a similar approach. We look at what physics
 16 says and physics, you know, we have laws of physics
 17 like the Newton's second law, conservation of
 18 momentum, conservation of mass. We can use those to
 19 write down mathematical equations and then we can
 20 simplify those equations so that we can solve them
 21 and we use computer programs to solve them. And so
 22 what we have done here is a computer model that
 23 basically solves the equations that describe the
 24 physics of water flowing in the bay. And so, you
 25 know, it's what -- how is that water driven by the

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1 tides, by the gravity, from the moon and the sun and
 2 how is that water forced by water that is flowing
 3 down the river and coming into the bay and then how
 4 is that water constrained by the depth, you know, and
 5 the geometry of the shoreline of the bay. And so we
 6 make, you know, sort of the best attempt that we can
 7 to be able to understand to solve those equations to
 8 be able to predict what those currents are going to
 9 be.

10 And what this is -- what this is showing
 11 here is this is a computer model called ADCIRC that
 12 we ran and I think if I click, will it...

13 MS. RANSOM: I can do that.

14 MR. DILL: Oh, there it goes. It goes. So
 15 what this is showing here is this is the results from
 16 the model simulation that -- this is, I guess, for
 17 perspective here, Belfast is up here, this is
 18 Islesboro down here, I think this is North Haven, so
 19 this is kind of the upper Penobscot Bay. And I might
 20 have to click again. Oops. If I can make it...

21 MS. RANSOM: If it's easier, I could do it.

22 MR. DILL: There it goes again. What this
 23 is showing, you can see there is little pink arrows
 24 here and the color is indicating how fast the current
 25 is flowing and the little pink arrows are indicating

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1 what direction it's going. And so what this is
 2 showing is this is about a two day period where you
 3 can see how -- it gives you an idea of how the
 4 currents circulate around in the bay and you can see
 5 it's pretty complicated. So once we've calculated
 6 that we kind of have an estimate of how that water
 7 moves around and what we can do is we can use the
 8 computer again to go on to this next one here to kind
 9 of put little -- put little tracers that will move
 10 around with that current. And so what animation
 11 showing you is just what would happen if you were to
 12 kind of scatter, you know, a bunch of, you know, ping
 13 pong balls around the bay and watch them go during
 14 that same time period. And you can see what happens
 15 is -- let me see if I can get it to go again. If you
 16 kind of keep your eye on -- maybe pick sort of an
 17 orange one or red one from here and just kind of
 18 follow it you will see they kind of move back and
 19 forth as the tide goes and then they also kind of
 20 tend to drift. And you can see how they kind of get
 21 stirred up and you can imagine how -- you can kind of
 22 see now how they're getting mixed up and so what
 23 we're trying to do is predict how that mixing happens
 24 and we use these little, you know, numerical drifters
 25 to do that. And you can actually -- you can actually

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1 see a lot about, you know, what's going on there by
 2 looking at this picture. You can, you know, you can
 3 get an idea of, you know, if you were to fall
 4 overboard and off of your boat and just drift with
 5 the tide for a couple of days where you might end up.
 6 All right. So that was showing -- if I
 7 could -- I'll go back and I'm going to play this one
 8 more time. This is kind of showing what happens if
 9 you put a whole bunch of ping pong balls all over the
 10 place and just let them drift around and how they mix
 11 together. But in order to -- in order to predict,
 12 you know, estimate what's going to happen with the
 13 discharge that's being continuously released, instead
 14 of scattering the ping pongs all over in the
 15 beginning and see where they go, we kind of take ping
 16 pong balls and we just kind of release them one at a
 17 time after another continuously. And in this
 18 simulation -- in this case, we ran the simulation for
 19 a month doing that and you can see that after about
 20 two weeks in that simulation the, you know, they move
 21 with the tide, they move with the current and they
 22 drift and they move back and forth and you kind of --
 23 the ping pong balls also kind of spread out naturally
 24 because of the turbulence of the water and other
 25 effects.

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1 And once -- and what we've seen in this case
 2 after about two weeks you kind of reach this sort of
 3 equilibrium where the rate that the ping pong balls
 4 are being distributed into the bay is -- it matches
 5 the rate that they're sort of disbursing and
 6 diffusing and so you kind of reach this sort of quasi
 7 steady state. So that's what we're looking for and
 8 once we've done that -- this is another -- let's see.
 9 Oops. We can use those ping pong balls to represent
 10 something like -- something that's in the discharge
 11 water. And, you know, for example, the nitrogen --
 12 the amount of nitrogen. And then we can go back and
 13 after we've looked at where they've all spread out,
 14 we can calculate what that nitrogen concentration is
 15 and we can estimate what it's going to be.

16 And let's see if I can get this to -- oh,
 17 you know what, it's really hard to see here because
 18 the nitrogen concentration, this is about .5
 19 milligrams per liter and this is that value of about
 20 .3 that the eel grass might be sensitive to and if
 21 you look really hard here --

22 MS. RANSOM: Do you want me to play it from
 23 your animation?

24 MR. DILL: Yeah. If you could play the one
 25 on the USB stick, I think it might be a little better

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1 quality.

2 MS. RANSOM: Yeah, it might work a little
 3 bit easier for us.

4 MR. DILL: That's my heart thumping that you
 5 can all hear.

6 MS. RANSOM: There we go.

7 MR. DILL: It looks like it's fading away.
 8 So what we're looking at here is this is about 25
 9 days of what the tide does and this is based on a --
 10 this is actually based on tidal observations from the
 11 Fort Point Tide Station for a time period in 1999.
 12 We simulated that time period because there was data
 13 collected at the tide station there and we were able
 14 to compare that to the hydrodynamic model and
 15 demonstrate that it actually reproduces the same tide
 16 level. If you -- I think one of these will make it
 17 play in a loop. I don't know...

18 MS. TOURANGEAU: I'm just going to hang out
 19 here and make it...

20 MR. HEIM: That one next to it.

21 MR. DILL: Turn repeat on. Yup. So this
 22 little red dot moving up and down here is just
 23 showing you the time and what you can see here is
 24 this is that nitrogen concentration. And so we're
 25 looking at now the nitrogen concentration is varying

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1 over time. And one thing that we've noticed from
 2 this that we learned from this is that when the tide
 3 is -- tide range is larger, so when we have a spring
 4 tide the currents are stronger and that -- that tends
 5 to spread out the discharge more and so it keeps
 6 that -- the concentration to that -- below that level
 7 that -- below that .3 level that we can't even really
 8 see it on here. And so you'll watch as it comes back
 9 from the beginning here, we really don't see much --
 10 we really don't see much going on here when the tide
 11 is big. It's just kind of getting washed out, you
 12 know, you can imagine it's kind of getting smeared
 13 out. And then when you get up here when the tide
 14 range gets a little bit smaller you start to see
 15 that -- you start to see the concentration show up a
 16 little bit here. And then during that neap tide you
 17 start to see the concentration because the currents
 18 aren't moving much, but then when it gets back to a
 19 spring tide again it spreads out more.

20 And I'm going to just jump back again and
 21 so -- oh, yeah, we need to go back to the PowerPoint.
 22 Sorry. So the information that we have on how the
 23 nitrogen affects things like the eel grass bed is
 24 based on measurements that are taken over time at
 25 multiple sites, but, you know, different samplings

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1 over a period of time and some statistics that are
 2 done based on those measurements and other
 3 observations about how, you know, how wildlife is,
 4 you know, living within the water. And so those
 5 statistics use a median value, so if you were to keep
 6 taking samples over time, if you took a sample every
 7 day for the next hundred days or if you took a sample
 8 every hour for the next few days and you measured all
 9 those values of nitrogen because it changes all of
 10 the time, it's constantly varying from all of the
 11 other different types of sources, and were to find
 12 the value that was the median value, so an average
 13 value, we calculated that average -- that median
 14 value and that's what is shown here. So if you look
 15 at those -- the results from that animation and you
 16 were to average that over time this is the result
 17 that you'd get. And that average value is the value
 18 that we have -- that we actually have that we can
 19 correlate with other sorts of things that would lead
 20 to impacts. And so that's what this is showing here.
 21 That's the average over that entire simulation.

22 And I'm going to just jump back ahead here.
 23 So what I just talked about was what happens in what
 24 we call a far field, so when the discharge is
 25 released into the bay and now it's being driven by,

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1 you know, what's happening to it is largely driven by
 2 the currents. It's the -- the actual outfall itself,
 3 the structure that the water is coming out of doesn't
 4 really have any affect on the mixing. It's really
 5 what's going on naturally. It's the tidal currents
 6 and other factors, it's the wind, it's the waves that
 7 are controlling that. So but what happens right near
 8 the -- right near the outfall, this is where the
 9 concentration is of that wastewater are highest and
 10 so we used it on another model and this model is
 11 called CORMIX and this is a model that's used -- sort
 12 of a standard model that's used for wastewater
 13 discharges all over the country. It's developed and
 14 approved by the EPA. And what this does is this
 15 model looks at the physics of what happens when that
 16 water comes out of the -- out of the end of the pipe
 17 and it's got a lot of momentum and you can kind of
 18 envision, you know, the water coming out and it's
 19 pushing against the existing water and it's creating
 20 a whole lot of turbulence and it's mixing it all
 21 together and so that's what this model shows. What
 22 we do -- what this model does is it calculates a
 23 dilution and a dilution is a specific number that is
 24 the ratio of -- sort of the ratio of the amount of
 25 one substance or one volume of water mixed in with

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1 another volume of water. So you can imagine if you
 2 took like a cup of orange juice, for example, and put
 3 it into an empty gallon jug and -- who knows how many
 4 cups there are in a gallon? I think it's 16.

5 AUDIENCE MEMBER: 16.

6 MR. DILL: 16. So then if you filled that
 7 jug the rest of the way up with water you'd have a
 8 dilution of 16. So what we're looking at here is
 9 that dilution number. Once you understand what that
 10 dilution number is, if you know the concentration of
 11 something, which we're already in this case if we're
 12 looking at nitrogen or phosphorous or TSS or BOD
 13 those concentrations are already very, very small.
 14 So that orange juice has already been diluted 100
 15 times or more and then you're diluting it even more.
 16 And so this -- that dilution number really tells you
 17 how much that, you know, that substance is being
 18 reduced in concentration. So this -- what this
 19 figure is showing is that just in that initial area
 20 right outside the outfall -- and this is actually
 21 what -- this is a -- if you can imagine that you were
 22 looking down -- looking down from above, this is sort
 23 of a plan view, a bird's eye view of what the
 24 discharge looks like, and you can imagine the
 25 currents flowing in this direction and so, you know,

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1 the tidal current changes, so we do this with
2 different currents flowing in different directions,
3 but this is just one example. So the current is
4 flowing this way and the discharge is being, you
5 know, ejected perpendicular to the current and you
6 can see that the momentum from the discharge is
7 pushing it out here and it's mixing with the ambient
8 water. And then finally, the current kind of takes
9 over and moves it along here. And once you get out
10 in this area, which is only -- this is only -- this
11 is like less than 10 meters away from the outfall
12 pipe, that dilution -- dilution is already more than
13 20 and this is actually what's showing is this the
14 concentration. So the concentrations here are only 5
15 percent of what they are down here. And that's just
16 within the first 10 meters of this. That's the plan
17 view.

18 We can also look at it as if you were
19 standing on the bottom looking -- sitting on the
20 bottom of the bay looking out at the pipe and so this
21 is upward, you know, the surface of the water is up
22 here. And, again, the current is going in this
23 direction. The discharge in this case it's -- the
24 water is a little bit fresher than sea water and so
25 fresh water tends to float so it wants to rise and so

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1 you can see it's rising up because of the buoyancy
2 and the current is also pushing it down. And, again,
3 once we get, you know, about 10 meters away, so 10
4 meters off the bottom and sort of 10 meters
5 downstream those concentrations are already less than
6 5 percent of what the concentration was that was
7 coming out of the pipe.

8 And, you know, I think that's all -- that's
9 all I had, I think. I'll hand it back over to you,
10 Elizabeth.

11 MS. RANSOM: So what does that mean really?
12 You know, part of what we're trying to help people
13 understand is that we are starting with fairly low
14 concentrations due to the level of treatment that
15 Erik is doing in the facility itself. And once they
16 get there, they're going to be further diluted by the
17 dynamics of the bay itself.

18 So we hope that through this presentation
19 you've come to understand that the treatment systems
20 that are being used by Nordic Aquafarms are
21 state-of-the-art. They're proven technologies for
22 other industries that are being combined in new ways
23 to make Nordic Aquafarms discharge one of the
24 cleanest of its kind. This discharge will meet or
25 exceed all of the applicable DEP standards and there

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1 will be ongoing testing to demonstrate that is stays
2 that way over time. This discharge will meet the
3 sensitivity parameters that DEP and other
4 organizations in New England have established for eel
5 grass, which is a noted sensitive receptor that
6 exists in the bay.

7 And I think with that, I'm going to turn
8 this back to Joanna, who will start laying out some
9 ground work for questions.

10 MS. TOURANGEAU: So momentarily, we are
11 going to switch to the question and comment period
12 for the discharge license process. I am going to
13 need a couple of minutes to shift things around.
14 We're going to move this podium back here and turn it
15 around. I'm going to ask folks that want to ask
16 questions about the MEPDES licensing to form a line
17 here and be prepared to state your name and ask your
18 question. I am -- we have this space until 9
19 o'clock, so we have plenty of time for questions, but
20 I am going to ask that we limit the discussion
21 tonight to the purpose of this meeting for the DEP,
22 which is to address comments to the discharge permit.
23 I understand that folks very likely have significant
24 additional questions about other aspects of the
25 project. Like I said earlier in the beginning of the

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1 meeting, there will be additional public
2 informational meetings to address and city meetings
3 to address all of those issues.

4 I am going to run a clean meeting tonight.
5 I am going to invite you all to be civil and
6 courteous to address your questions and to provide
7 your name so that the court reporter can get the
8 information. We will make every effort to answer
9 your questions tonight. As I also said earlier, if
10 we cannot answer your question tonight it will be
11 pulled out of the transcript and put into a list of
12 questions with narrative responses that go with our
13 application to the DEP. Please use your time not to
14 provide significant comments about other parts of the
15 project, but limit your comments to the discharge
16 licensing aspects of the project. If you are not
17 doing that, unfortunately I will interrupt you so
18 that people that do have those questions can use the
19 time that we have set aside.

20 At this point, I am going to start moving
21 things around and then we will be ready for
22 questions. I am going to stand up and try to direct
23 traffic with the questions because we only have two
24 microphones, so I am going to give one of those
25 microphones to the podium for folks to use and I am

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1 going to pass this one around like a baton so that
2 folks that are answering questions can have it.
3 AUDIENCE MEMBER: Are we going to be able to
4 go take a bathroom break?

5 MS. TOURANGEAU: Absolutely. It's going to
6 take a second, so. Yup. We're going to do another
7 one at 8, but this will take probably two minutes.

8 (Break.)

9 MS. TOURANGEAU: All right. It looks like
10 we have a pretty long line here, so let's start
11 moving back so that we can get to the questions and
12 see if we can keep on track here. So like I said a
13 few moments ago, I am going to field questions as
14 they come in and try to pass them off to the correct
15 person to the best of my ability, okay. Please,
16 please if you don't mind, state your name before you
17 start and if you have a complicated name that's hard
18 to spell, if you wouldn't mind helping out the court
19 reporter we would very much appreciate it. All
20 right.

21 AUDIENCE MEMBER: Paul Bernacki, Belmont,
22 Maine. B-E-R-N-A-C-K-I. Hi, Nate. Paul Bernacki,
23 nice to meet you in-person.

24 MR. DILL: Nice to meet you, Paul.

25 AUDIENCE MEMBER: (Paul Bernacki.) My

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1 tonight. I tried to make it light.

2 MR. DILL: Okay.

3 AUDIENCE MEMBER: (Paul Bernacki.) Thank
4 you, Nate.

5 MR. DILL: So I think the first thing that
6 you mentioned to address has to do with the
7 stratification in the water column. And I'm just
8 going to go through these and then I can hopefully
9 recall them again. The second thing has to do with
10 seasonal changes. I guess that is in some way
11 related to the stratification. Periods of slack
12 tide, wind forcing and then localized tests --
13 localized observations, I think, I'll put it that
14 way.

15 So to go back to the -- to go back to
16 stratification, so there is sort of a wealth of data
17 in Penobscot Bay at large that demonstrates that
18 stratification is significant in the estuary, so what
19 that means is you have -- you tend to have -- you
20 tend to have water that varies with the season, so I
21 guess we'll start with the -- with the spring season.
22 The spring season you tend to have a lot of water
23 coming down the river. That water is fresh water.
24 The fresh water is buoyant. It tends to float on top
25 of the denser salt water and so what happens is you

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1 questions are for Nate about his presentation about
2 tidal flow.

3 MR. DILL: Nice to me you too, Paul.

4 AUDIENCE MEMBER: (Paul Bernacki.) What
5 I'll do is I will as part of a sentence give you a
6 series and I know you can keep up with me. So I'll
7 give you a series of point issues that I'd like you
8 to just respond to instead of grilling you in some
9 way.

10 MR. DILL: Of course.

11 AUDIENCE MEMBER: (Paul Bernacki.) First is
12 summer, winter, thermocline, seasonal, and climate
13 variation, water solidity issues, especially in the
14 subbay of the Little River estuary area, periods of
15 slack tide especially during the summer when the tide
16 ranges are a lot less and the flow is less, wind
17 forcing such as the northeast storms and the
18 prevailing summer southwest storms and how those
19 affect your modeling and have you actually done any
20 localized multi-water level drifter tests to prove
21 out the model as opposed to just doing a mathematical
22 model based upon the tide station at Fort Point which
23 is about 7 -- 6 or 7 miles away by water and is
24 really close to the eastern Penobscot Bay channel,
25 which is much deeper. That's enough for the meeting

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1 end up having multi-layers of water flowing and, you
2 know, from other modeling and other data that I've
3 seen out there this tends to create a sort of
4 circulation in the bay where water on the surface
5 tends to be transported out of the bay towards the
6 ocean and water near the bottom tends to be
7 transported more up the bay and that creates sort of
8 a circulation, which to some extent increases mixing
9 in some ways, but also because of the stratification
10 it limits water from mixing within different layers.
11 And so as we go on into the summer season you get
12 less fresh water but the sun starts to heat up the
13 water at the surface, so warmer water like fresh
14 water is less dense than colder water and so, again,
15 you start of maintain that stratification. And then
16 as you get into the fall and, you know, the water is
17 still pretty warm, you also sort of maintain that
18 stratification, eventually you get colder weather and
19 the colder weather starts to reduce the temperature
20 of the water at the surface. And as you go and
21 transition into the wintertime, so this is, you know,
22 mid-winter, late winter, what happens is the water is
23 cold at the surface. Everything is frozen in the
24 watershed, so there is not a lot of water coming down
25 the river and during the wintertime you get more of a

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1 complete mixing so there is less stratification.
 2 And so what have we done to address this?
 3 In the CORMIX modeling where we look at the near
 4 field, that initial mixing, that is in large part
 5 dependent on the stratification in the water column
 6 and the density difference between the discharge
 7 water and the ambient water. And so depending on how
 8 strong that stratification is and how -- and how
 9 different that density is between the effluent or the
 10 discharge water and the ambient water that initial
 11 mixing behaves differently. And so when you have
 12 times of the strong stratification what happens is
 13 the water -- the water is released near the bottom
 14 and so it's -- that water is fresher so it's less
 15 dense, but as it mixes with the denser water that's
 16 around it, it becomes more and more dense as it's
 17 rising in the water column. And under certain
 18 conditions -- and this also depends on the current
 19 speed, so it varies with the tide whether it's slack
 20 tide or high tide and the tide is going back and
 21 forth throughout the day this tends to vary, that
 22 discharge that's coming out will become trapped. It
 23 will either rise all the way up to the surface in
 24 some cases or it will be trapped within a layer below
 25 the surface but near the surface. And so what we've

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1 done -- looking at the CORMIX results, we understand
 2 that this is going to be a buoyant discharge and that
 3 in many cases under most conditions through the
 4 seasons it's going to tend to stay in the upper part
 5 of the water column. It may come up to the surface
 6 and remain in a layer that's 5, 10 meters thick
 7 initially. And we're talking just initially within
 8 the first couple of hours after it's ejected from the
 9 pipe. And that -- and then during other time periods
 10 the current -- the tidal currents may be strong
 11 enough, the stratification may be weak enough that
 12 there is enough turbulence all the way through the
 13 water column that it might mix all the way from the
 14 bottom to the top. And so we've got to kind of
 15 understand that from the CORMIX modeling. We have a
 16 lot of detailed calculations from the CORMIX
 17 modeling.

18 What makes this very complicated is that it
 19 changes with the season and it changes with the tide
 20 and so as the tide transitions from slack tide to a
 21 full flood or a full ebb, the state of that behavior
 22 is going to change and that actually will tend to
 23 increase the dispersion and mixing of the effluent.
 24 So that -- I think that kind of addresses the -- I
 25 think somewhat addresses the thermocline, the

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1 stratification issue and the seasonality.
 2 I think I'll also talk a little bit about
 3 the tidal periods here. So you mentioned slack tides
 4 in the summer, that's a time when the stratification
 5 is strong and during slack tides there is not going
 6 to be a whole lot of ambient turbulence to mix things
 7 up, but that condition is only going to last for a
 8 couple of hours and then the current picks up and it
 9 will tend to increase that mixing. That's what we're
 10 seeing from the model.

11 So I'm going to move on here to wind. Wind
 12 forcing. So the two-dimensional model that we
 13 showed, the one where I showed the current arrows and
 14 then ultimately the ping pong balls and the ones that
 15 we used to calculate that nitrogen concentration,
 16 that model can be forced with wind. In this case, we
 17 did not force it. It can also be forced with waves.
 18 In this case, we did not apply any wind in the model
 19 and the reason for that is because wind can have a --
 20 wind can have a significant effect on those currents
 21 and it can have an effect on the, you know, the
 22 surface currents more so than the bottom currents,
 23 but it can actually create, you know,
 24 three-dimensional circulation in cases. Wind tends
 25 to create more circulation. It tends to create more

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1 turbulence in the water which leads to more mixing
 2 and wind also creates waves and waves tend to create
 3 turbulence in the upper layer of the water and that
 4 also tends to create more turbulence. So by not
 5 including wind in the model we have essentially made
 6 a conservative prediction. If we were to include
 7 wind and we were to include sort of naturally
 8 variable wind, we would see that you would -- that
 9 that -- that that area where those ping pong balls
 10 are moving would tend to spread out and mix more
 11 horizontally. That model is two-dimensional, so it
 12 doesn't -- it calculates a depth average current. So
 13 it doesn't -- it doesn't -- it doesn't calculate the
 14 current at different depth layers in the model. And
 15 so because of that -- and that's just a
 16 simplification of the model. It makes it easier for
 17 the model to solve the problem. Because of that,
 18 when we calculated the concentration we assume that
 19 all of the, I'll call them, ping pong balls were in
 20 the upper layer of the water column. So we assume
 21 that they aren't mixing all the way down to the
 22 bottom and so, you know, in some cases when the
 23 stratification is strong that's pretty reasonable.
 24 In other cases when there is more -- less
 25 stratification or there is more vertical mixing

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1 that's a conservative assumption we would tend to --
 2 we would tend to over estimate the concentrations
 3 from what you would see.
 4 And I think it's also important to kind of
 5 reflect back on the fact that that vertical mixing
 6 and how strong that tendency to be trapped within the
 7 layer varies with the tide. So on one tide, you
 8 know, on one portion of the tide you may have the
 9 effluent being sort of trapped near the surface, but
 10 then when the tide changes and the current speed
 11 picks up it's all going to get mixed. And so as you
 12 go further in time, if you look at a ping pong ball
 13 that was released, you know, within an hour or two we
 14 can see from the CORMIX modeling that it may be
 15 stratified -- trapped in the stratification, but when
 16 you look two days later, the tide has changed four
 17 times already, there's a good chance it's going to be
 18 pretty well vertically mixed.
 19 And then I guess I'll go to your final
 20 question, have we done any localized tests. I'm
 21 looking at where things would go and the answer is --
 22 the answer is -- the answer is no, not really. We
 23 have the -- we have the water level data from core
 24 point. We worked with the available data that we
 25 have for this analysis. And so the -- and what we

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1 have is water level data that was -- the closest data
 2 that we have that we can use to validate our model
 3 that's sort of a standard practice with this model is
 4 that you take the model results, you compare them to
 5 observations and then you demonstrate that the model
 6 is able to reproduce things that were actually
 7 observed and that gives you some level of confidence
 8 that the model is reasonably predicting other things
 9 in other areas where you haven't observed it. And
 10 that's really the -- the point of the model is to
 11 provide us with information in areas where we don't
 12 have observations. It is helpful the more
 13 observations you have the better confidence you can
 14 have in your model, but also the more observations
 15 you have the less you need the model. So I guess
 16 that's -- that's my response.
 17 AUDIENCE MEMBER: (Paul Bernacki.) Just one
 18 follow-up.
 19 MR. DILL: Sure.
 20 AUDIENCE MEMBER: (Paul Bernacki.) Can you
 21 tell me what the planned temperature of the outflow
 22 water will be? Range?
 23 MR. DILL: I might not get this right. I'm
 24 going to say is it 13 centigrade, I think is the --
 25 is that...

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1 MS. RANSOM: Give or take.
 2 MR. DILL: Yeah, 13 to 16.
 3 MR. HEIM: 13 to 16 Celsius.
 4 MR. DILL: So if you multiply it by 9/5 and
 5 add 32.
 6 AUDIENCE MEMBER: (Paul Bernacki.) And the
 7 salinity is still the stated three parts salt water
 8 to one part fresh water?
 9 MR. HEIM: Mid 20s. Mid 20s parts per
 10 thousand.
 11 AUDIENCE MEMBER: (Paul Bernacki.) What is
 12 that?
 13 MR. DILL: The salinity of the discharge
 14 water is about 20 parts per thousand. Mid 20s parts
 15 per thousand. And that's, yeah, approximately what
 16 you'd get if you approximately mix one part fresh
 17 water with two parts salt water.
 18 AUDIENCE MEMBER: (Paul Bernacki.) Two
 19 parts or three parts? Two parts or three parts?
 20 MR. DILL: Approximately two parts salt
 21 water and one part fresh water.
 22 AUDIENCE MEMBER: (Paul Bernacki.) And so
 23 the -- all of the water that's going into the
 24 various -- the smolt grow out and the grow out, all
 25 of those water temperatures will be combined in an

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1 average temperature by the time they get to the
 2 outflow?
 3 MR. DILL: That's my understanding, yes.
 4 AUDIENCE MEMBER: (Paul Bernacki.) That's
 5 my understanding. Okay. Thanks, Nate.
 6 MR. DILL: You're welcome.
 7 MS. TOURANGEAU: Mr. Bernacki, can I also
 8 add to that to say that Nate did a wonderful job
 9 briefly summarizing two memorandums that are in that
 10 draft application, one on the near field modeling,
 11 one on the far field modeling and a pier review that
 12 was done by Ramboll kind of looking at both of those
 13 modeling reports. So that will all be in the actual
 14 application when it goes in and that will give a much
 15 more fulsome answer to your very helpful questions.
 16 Thank you.
 17 AUDIENCE MEMBER: Hi. My name is Lawrence,
 18 L-A-W-R-E-N-C-E, last name is Reichard,
 19 R-E-I-C-H-A-R-D. I am from Belfast. And in the
 20 spirit of full disclosure, I am a columnist for the
 21 Republican Journal newspaper here in Belfast. My
 22 question is all of the facts and figures and the
 23 presentation that we've seen here this evening seem
 24 to be based on best case scenarios where nothing goes
 25 wrong. As Mr. Heim knows, I was recently in Norway

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1 and Denmark and I spoke -- while on that trip, I
 2 spoke with Professor Are Nyland of the University of
 3 Bergen, and that's A-R-E, last name N-Y-L-A-N-D. And
 4 he said that regardless of what precautions are taken
 5 in filtering and such there is always a possibility
 6 of virus and disease in a land-based fish farm. And
 7 if and when there is an outbreak of virus or disease
 8 in a land-based fish farm then those fish will --
 9 those tanks -- the affected tanks will have to be
 10 drained, all of the fish in them, probably hundreds
 11 of thousands, will have to be slaughtered and then
 12 those tanks will have to be cleaned.

13 My question is -- and I also I also -- I
 14 also spoke with Bent Urup, who I believe invented the
 15 RAS system that will -- that Nordic Aquafarms would
 16 use here in Belfast if they're successful. And he
 17 said that the cleaning mechanisms that Nordic intends
 18 to use here would not be sufficient to deal with the
 19 outbreak of a virus or disease, thus the tanks would
 20 have to be cleaned. My question is what chemicals
 21 will be used to clean the tanks if and when there is
 22 an outbreak of virus or disease in the tank?

23 MS. TOURANGEAU: Should I refer to Ian?

24 MR. HEIM: Yeah, go ahead.

25 MS. TOURANGEAU: So we are privileged

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1 salmonicida. And these things would eradicate those
 2 diseases as effectively as the polio vaccine did for
 3 polio in the United States. So I think if you're
 4 concerned about that one of the things that you'll
 5 need to make sure of is that the fish are vaccinated
 6 before they go in. And of course like any other form
 7 of farmed animals, if the animal has had an accident
 8 they go on to veterinary care and of course there
 9 will be antibodies used in that.

10 Now, looking at those filtration systems, I
 11 don't see how they can make those comments about them
 12 not being adequate without actually looking at the
 13 discharge rates, looking filter efficiency based on
 14 that science, which I don't think are available yet.

15 AUDIENCE MEMBER: (Lawrence Reichard.) I
 16 didn't say that.

17 MR. BRICKNELL: Well, I thought you said
 18 that you were looking at the chemicals that were
 19 going to be cleaning it and you were saying that the
 20 diseases were going to occur.

21 AUDIENCE MEMBER: (Lawrence Reichard.) And
 22 you said yourself that that is possible.

23 MR. BRICKNELL: It is, but you're going now
 24 through a .4 micron filter. Well, that's about the
 25 quarter of the size of the bacteria, so all of the

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1 tonight that Mr. Ian Bricknell, who is a fish disease
 2 and sea life expert with 40 years of experience from
 3 the University of Maine has volunteered his time
 4 tonight to answer those kind of questions. Come on
 5 up Mr. Bricknell. B-R-I-C-K-N-E-L-L.

6 MR. BRICKNELL: Well, thank you for that
 7 question. That was really interesting. I'm a fish
 8 disease person. My PhD is in aquatic physiology and
 9 I've studied fish diseases for 39 years now. I know
 10 I look very young and dapper, that's just the way it
 11 is, but. It's all of the foreman I use.

12 But one of the things to bear in mind with
 13 this is it's like any farm, there is always a risk of
 14 disease. You're on the coast, a storm will throw up
 15 wild sea water, those aerosols can enter any farm and
 16 there is a risk to that. But of course that risk
 17 assessment is always part of any biosecurity plan and
 18 I'm sure that's been taken into account. So when it
 19 actually comes to the chance of those outbreaks
 20 occurring you can reduce that markedly by ensuring
 21 that the fish that are being ground are vaccinated
 22 against those diseases. And most of the common viral
 23 and bacterial diseases in salmon farming, and there
 24 are very, very good vaccines available. I know, I
 25 had a patent on one back in 1989 for aeromonas

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1 bacteria will be trapped in those filters under those
 2 situations. I mean, this is the way sterile blood
 3 products are made, for example, for transfusion of
 4 plasma or saline. They are often ultra filtered to
 5 remove all those bacteria.

6 AUDIENCE MEMBER: (Lawrence Reichard.) So
 7 you yourself said that disease outbreak is possible.
 8 Can you answer the question, what chemical will be
 9 used to clean the tanks in the event of a disease
 10 outbreak? You have not answered the question.

11 MR. BRICKNELL: Well, I'm not -- I'm not the
 12 person who is going to discuss their biosecurity
 13 for cleaning the tank because it's --

14 AUDIENCE MEMBER: (Lawrence Reichard.)
 15 Well, that was the question.

16 MR. BRICKNELL: Well, I'm talking about the
 17 actual disease component that you are suggesting.
 18 Now, there are many things you can clean the tank
 19 with, hydrogen peroxide, hypochlorite, iodofols.
 20 There is books on this. I mean, it's a standard
 21 thing. This is something that any veterinarian could
 22 advise you on as part of their training.

23 AUDIENCE MEMBER: (Lawrence Reichard.) Are
 24 you aware that there was a study released just this
 25 summer that linked the use of hydrogen peroxide,

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1 which is the most common chemical used to clean fish
2 tanks that this was linked to the -- to death of
3 crustations?

4 MR. BRICKNELL: It depends on the study
5 you're talking about. Do you have the author's name?

6 AUDIENCE MEMBER: (Lawrence Reichard.) Are
7 you aware of any such study?

8 MR. BRICKNELL: Well, it depends on the
9 concentration. If you take crustations and put them
10 in a hydrogen peroxide solution they will die.

11 AUDIENCE MEMBER: (Lawrence Reichard.)
12 Well, yeah, I suppose that's true.

13 MR. BRICKNELL: It is very true.

14 AUDIENCE MEMBER: (Lawrence Reichard.) Yes.
15 So they -- so hydrogen peroxide is toxic to
16 crustations.

17 MR. BRICKNELL: It's toxic to you. If you
18 go and eat hydrogen peroxide you will be dead in half
19 an hour.

20 AUDIENCE MEMBER: (Lawrence Reichard.)
21 Okay. Well, I'd still like to know what Nordic
22 Aquafarms intends to use to clean those tanks.

23 MR. BRICKNELL: Well, I'll push it back to
24 you.

25 MS. TOURANGEAU: Thank you, Dr. Bricknell.

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1 are doing is to prevent that as much as possible.

2 Now, in terms of cleaning it really depends
3 on what you are looking at. There is no one answer
4 to that. There is a variation of cleaners you can
5 use and they will all be listed in our permit
6 application. Hydrogen peroxide, generally something
7 we avoid. I am not a big fan of it, but it is
8 something that is used in the industry. We will be
9 looking at other substances and there is going to be
10 a range of them listed in the application. So I
11 would advise that you take a look at that when it
12 comes. It always will depend on the circumstances of
13 what we are dealing with.

14 What I can say is we run our facilities in
15 Denmark for three years, we have never had disease.
16 So the point here is really to reduce the risk of
17 disease and that's what the whole set up is designed
18 for also here in Belfast. It's just like flying an
19 airplane, there is always a risk it will fall down
20 from the sky but I still fly, you know, because the
21 risk is much lower than it was many decades ago. So
22 that's where the industry and we are going is the
23 preventative measures.

24 And I'd like to say finally it's impossible
25 for a professor in Norway who doesn't understand our

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1 Erik.

2 MR. HEIM: So just a couple of comments.
3 First of all, Bent Urup has not designed our systems.
4 We were involved in an investment project with him in
5 Denmark and he has no --

6 AUDIENCE MEMBER: We can't hear you.

7 AUDIENCE MEMBER: Can't hear you.

8 AUDIENCE MEMBER: Use the mic.

9 MR. HEIM: I'm sorry. Bent Urup has not
10 been involved in any designs that we are looking at
11 in Norway for further developments and also in the
12 U.S. just to make that clear. He was involved in an
13 early investment we did in Denmark and did designs
14 for that. We are way beyond that level today just to
15 set the record straight on that. He has no
16 involvement in our business. He was an early
17 entrepreneur that was involved in our Danish
18 operation and is now currently doing other things
19 just to set the record straight on that.

20 In terms of cleaning, so in terms of
21 pathogens in general the main thing is to keep them
22 out and that's what the system is designed for and
23 then you always have worst case scenarios with
24 humans, animals or anyone that you can never be 100
25 percent sure about preventing disease. So what we

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1 designs and what we've done to comment on our
2 technology. We are way beyond what you typically see
3 in small facilities in Norway today in terms of these
4 technologies.

5 AUDIENCE MEMBER: My name is Mary Bigelow.
6 That's B-I-G-E-L-O-W. I live in Belfast. I want to
7 thank you for this presentation. I've been hungry
8 for numbers for months, so I'm glad to finally see
9 some numbers. So thank you.

10 One question I do have, even though I
11 totally am encouraging you guys, will there be a
12 sampling manhole which the state or the
13 municipalities could have access to without having to
14 ask permission from Nordic Aquafarms? Is there any
15 plan for such a thing?

16 MR. HEIM: So the discharge data? I'm
17 sorry, you mean discharge data?

18 AUDIENCE MEMBER: (Mary Bigelow.) No, a
19 sampling manhole so that if --

20 MR. HEIM: What's that?

21 AUDIENCE MEMBER: (Mary Bigelow.) -- if,
22 for example, heaven forbid you didn't last at this
23 site and somebody else bought it --

24 MR. HEIM: Yeah.

25 AUDIENCE MEMBER: (Mary Bigelow.) -- and

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1 then we suspected they weren't behaving themselves,
2 it's really sometimes good for the municipality to
3 have a manhole outside the property of the industrial
4 plant, which has -- which can be accessed, padlocked
5 and what not that would permit sampling by the state
6 or the municipality.

7 MS. TOURANGEAU: So our MEPDES permit should
8 it issue will have sampling criteria --

9 AUDIENCE MEMBER: (Mary Bigelow.) Yup.

10 MS. TOURANGEAU: -- and will require
11 quarterly testing that will go to a state accredited
12 lab with chain of custody and all those things. The
13 DEP will be able to come on site at any time and
14 validate those data. And, you know, the manhole, I'm
15 not sure that that idea would work because the
16 discharge system will run from the wastewater
17 treatment plant on land via pipe out to an outfall,
18 so what we are talking about are monitoring stations
19 that are around the outfall, but a manhole would have
20 to go down through the water to the pipe, so I'm not
21 sure that I 100 percent understand your question.

22 AUDIENCE MEMBER: (Mary Bigelow.) Where I'm
23 coming from is I'm a former chief operator of a
24 wastewater treatment plant in Vermont and not in my
25 town but in a different town there was a terrible

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1 whether or not that might be something where there
2 are either university or community or other
3 representatives that are involved in that and so that
4 would allow for some impartial non-paid by Nordic
5 people to be having a way to get at the evidence
6 directly as to what's going on versus having
7 something that comes through a Nordic monitored
8 program.

9 AUDIENCE MEMBER: (Mary Bigelow.) In
10 extreme cases such as what happened in this adjacent
11 town in Vermont, they ended up putting a sampling
12 device down the manhole and they could say X number
13 of gallons at such and such concentration during this
14 hour, this hour, this hour. It did not leave any
15 room for the industry to say, oh, it's background,
16 it's not me, it's my neighbor. It's just right on
17 the pipe.

18 MS. RANSOM: I understand. I'd be
19 interested in actually getting some of the details
20 from you and perhaps we can kind of take it
21 off-line --

22 AUDIENCE MEMBER: (Mary Bigelow.) Yup.

23 MS. RANSOM: -- because obviously this pipe
24 is going to be under, you know, buried and, you
25 know --

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1 problem with a very green supposedly producer dumping
2 large amounts of cream, milk and sugar down the drain
3 and they could never catch them. And they finally
4 ended up having to put manholes in because the
5 industry denied everything and as soon as they got
6 those manholes in there was peace in the kingdom.

7 MS. TOURANGEAU: Hmm. I think that our
8 equivalent of manholes here would be the kind of
9 background monitoring system that we're talking about
10 including as part of the permit that would be -- and
11 maybe I'll turn it over to Elizabeth to talk about
12 that a little more because I'm not familiar with the
13 specifics, but I think that would be the equivalent
14 of the manhole.

15 MS. RANSOM: I do know, Mary, there has been
16 some discussion about, you know, we've started, as I
17 said, to get some background data from the bay
18 itself --

19 AUDIENCE MEMBER: (Mary Bigelow.) Yup.

20 MS. RANSOM: -- because obviously not only
21 do you want to know what they're putting into the
22 pipe, but you want to understand what the effects are
23 out in the bay. So there has been some discussion
24 about maybe having some of that sampling not just
25 done by Nordic and the people Nordic pays for but

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1 AUDIENCE MEMBER: (Mary Bigelow.) Sure.

2 MS. RANSOM: -- with a significant water
3 column above it, so we --

4 AUDIENCE MEMBER: Couldn't it be on land?

5 MS. RANSOM: Yeah, that's what I -- I'd be
6 curious, like I said, to get some details from you
7 when we can talk about it.

8 AUDIENCE MEMBER: (Mary Bigelow.) Okay.
9 And I really applaud the work you've done tonight.
10 Thank you.

11 MS. RANSOM: Thank you, Mary.

12 AUDIENCE MEMBER: Good evening. My name is
13 Chris Wright. That's with a W. I'm going to ask a
14 different question, but I guess thinking about the
15 concern for what happens and what are the chemicals
16 or whatever that are used or if there is a virus or
17 bacteria that slips through the filters, the
18 ultraviolet, et cetera, of course, it's in
19 everybody's interest -- everybody's interest that
20 that not happen. But in the event that it does
21 happen, we would like to know what is used to clean
22 such large tanks with very large amounts of water,
23 10s of thousands of fish. We need to know what
24 happens if that happens and that's not out of the
25 realm of possibility. I don't think anybody would

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1 ever say it is. So that's -- that's my most
2 important question.

3 MS. TOURANGEAU: I can turn this over if you
4 want more detail, but I do know that the -- one of
5 the components that will be an exhibit to the
6 application to the DEP when it's submitted is a
7 chemical list and that chemical list will include
8 every chemical that will be used at the facility
9 including all of redundant chemicals meaning, you
10 know, certain ones need to be rotated and used
11 differently for cleaning products so that, you know,
12 resistance doesn't build and that kind of thing. And
13 I'm not a scientist, so others can -- David Cyr
14 can...

15 MR. NOYES: Hi. My name is David Noyes.

16 MS. TOURANGEAU: David Noyes, sorry.

17 MR. NOYES: I'm the CTO for Nordic
18 Aquafarms.

19 AUDIENCE MEMBER: We can't hear you.

20 MR. NOYES: So I've spent about a decade now
21 working in RAS facilities and I can assure you that
22 the majority of the cleaning is done with elbow
23 grease and manpower. But recently there have been a
24 lot of fantastic robotic cleaners that allow
25 continuous non-stop cleaning of the tanks and so you

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1 healthy to always think about worst case scenarios.
2 I mean, anybody working with either humans or animals
3 should take that into consideration. So our primary
4 source of potential disease is the bay just to make
5 it clear because eggs we bring in go through
6 quarantine and health certificate testing with
7 veterinaries in Maine, so these are isolated systems.
8 So if we were to come in a scenario where a disease
9 comes in it depends on what it is. Typically, what
10 you will see in the industry if there is a detection
11 of disease you will take in a veterinary --
12 authorized veterinary right away to assess the
13 appropriate way of dealing with it. And in the U.S.
14 one form of treatment can potentially be described
15 depending on what it is. It's difficult to
16 generalize because it can be different things.

17 Worst case scenario in the industry is they
18 slaughter out the fish from a tank due to disease
19 situation and that's typically that our slaughtering
20 facility is or the processing facility is prepared to
21 do. And, again, what the -- what is done with that
22 depends on what it is. One way of dealing with it is
23 to grind it up and also put it in diluted acid
24 solution to neutralize bacteria in it. This is a
25 common practice in the industry. And this happens in

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1 don't have to get to that level. We've employed them
2 recently out at the USDA and I absolutely advocate
3 for them because they save an immense amount of
4 manpower and basically allow you to achieve this
5 magnificent amount of constant cleanliness in the
6 tanks and the systems to prevent any buildup of any
7 organics.

8 AUDIENCE MEMBER: (Chris Wright.) I'm
9 sorry, that doesn't answer my question at all. That
10 sounds great that there are ways to clean the tanks
11 that are on a scheduled regular basis. What I'm
12 asking you is what happens if the facility in Belfast
13 faces a viral or bacterial outbreak and things have
14 to be cleaned up? What do they clean it up with and
15 it would really not -- we don't want to hear about a
16 list of chemicals. We'd like to know what the
17 chemicals are, but aside from that what happens to
18 all of the fish and all of that water that is now
19 infected? And we don't have to -- this doesn't have
20 to be hypothetical. I'm sure there are cases in the
21 industry someplace that you can refer to.

22 MR. HEIM: Sure. Just a couple comments in
23 the case --

24 AUDIENCE MEMBER: Louder.

25 MR. HEIM: Okay. So and I think it's very

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1 sea pens as well. In terms of the tanks, typically
2 if you have a tank with disease, you will empty it
3 out, it will go through the same biosecurity measures
4 that we just discussed and given the strength of
5 those we are not in the situation where we need to
6 disinfect with chemicals this water because we have
7 high grade water filtration equipment in this
8 facility that will take bacteria, that will take
9 virus. Typically, what we will do is to empty the
10 tank and let it sit dry for a longer period of time
11 and you would dry clean it out with chemicals
12 depending on what you have that are approved in the
13 U.S. for this purpose. And that means that you're
14 not really discharging large amounts of this cleaner
15 out into the ocean. You will let the tank sit dry
16 probably for a number of weeks, maybe months
17 depending on what it is. So every scenario here, I
18 mean, there is experience in the industry with
19 dealing with various kinds of virus if they should
20 occur and the answer to each situation is a different
21 solution depending on what it is.

22 AUDIENCE MEMBER: (Chris Wright.) So do I
23 understand you correctly that the water might
24 actually be evaporated so you're not dealing with
25 hundreds of thousands of gallons of infected water?

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1 MR. HEIM: In the cases where you cannot
2 efficiently treat -- let me make it clear, there are
3 first of all, vaccinations to prevent this for a
4 number of the common diseases. In the worst case
5 scenarios where you cannot treat there will be a
6 solution to do a short-term treatment solution for
7 this. Your alternative then is to take out the fish
8 and you would empty out the tank, the water would go
9 through those biosecurity measures I just described,
10 which is drinking water grade cleaning equipment. In
11 other words, it's safe to drink that water basically
12 if it hadn't been for the salinity. It's typically
13 the type of treatment you would also be using for
14 drinking water in some areas to prevent virus and
15 bacteria infections. And that results in emptying
16 out the tank, you let it dry out and you can do
17 surface cleaning or equipment cleaning with the
18 appropriate cleaner that a veterinary prescribes.
19 That's the way it is. And that also means that
20 you're not really emptying huge amounts of cleaners
21 into the ocean. This will dry out and be washed out
22 afterwards with water, probably -- probably weeks or
23 months after a dry out period. But, again, it
24 depends what it is, yup.

25 AUDIENCE MEMBER: (Chris Wright.) Thank

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1 good observation that the -- the Penobscot Bay is not
2 a small bay. There are a lot of small bays where the
3 amount of water that comes in and out with the tide
4 can go all the way out in the ocean on one tide and
5 then get washed down the shore. Well, this is a
6 very, very large bay and even though the tide range
7 is very large, the -- there is not enough -- it's not
8 enough of an excursion to actually push it all the
9 way out of the bay on every tide. So you see -- but
10 you do see over time, you know, up to two weeks that
11 those -- that those particles do actually migrate
12 away from Belfast Bay and, you know, but there will
13 also be other things that are migrating in from other
14 places, so it's -- and if you -- if you watch it more
15 carefully there tends to be some circulations. And
16 this has been documented in some other studies too
17 where in one case, you know, and there is some
18 conflicting evidence and I think it probably has to
19 do with differences in the river discharge,
20 differences in the stratification and the densely
21 driven currents in the bay that sometimes you
22 might -- you might find that there is sort of a
23 circulation that goes counterclockwise, you know,
24 around Islesboro and then other times you might see
25 circulation go the other way around Islesboro. And

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1 you. I have one more quick question on the ping pong
2 balls. So it seemed to me watching those ping pong
3 balls that they didn't actually leave the bay; is
4 that correct? I mean, and what I was paying
5 attention to at that point when I was watching the
6 ping pong balls was solids. So those solids will all
7 stay in the bay or generally stay in the bay?

8 MR. DILL: Yeah, so that's a good
9 observation. The tidal excursion -- so if you were
10 to put a ping pong ball in the bay out there now and
11 watch it go for a couple of days it's not going to
12 leave the bay. It depends on where you put it
13 though. Over time with the tidal current and the
14 other -- there is actually a residual current and I
15 don't know if you were watching it you could see some
16 of the redder or oranger ones that started out more
17 north in the bay. Those -- they migrate and they
18 migrate slowly and what we saw that if -- when you
19 look in Belfast Bay itself, so if you look at a
20 drifter that was placed in Belfast Bay it takes
21 about -- after about two weeks or so it will find its
22 way out into -- into the sort of mid-Penobscot, lower
23 Penobscot Bay. This depends a lot on what the river
24 currents are doing. It depends a lot on what the
25 winds are doing. But, yes, you're right, it is a

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1 actually if you look at the results just from the
2 simulation that we did it was about a month long
3 simulation you can see that actually some of those
4 particles that go counterclockwise around Islesboro
5 they start drifting counterclockwise and there are
6 some other ones that start drifting clockwise around
7 Islesboro. The ones that tended to be further to the
8 south tended to go clockwise and the ones that were
9 to the north tended to go kind of up in the Belfast
10 Bay and then come down around the west side of
11 Belfast Bay.

12 AUDIENCE MEMBER: (Chris Wright.) You know,
13 I guess my concern was so the solids that come out
14 of -- if they don't go say make their way out to the
15 ocean some percentage of them ends up in the bay.

16 MR. DILL: Yeah. I think that if the --
17 well, actually what we see from the information is
18 that the amount of solids that will be coming out of
19 the discharge is less than what is currently in the
20 bay. So this system -- the proposed system is
21 filtering solids out of the bay.

22 AUDIENCE MEMBER: (Chris Wright.) Thank
23 you.

24 MR. DILL: You're welcome.

25 AUDIENCE MEMBER: I'm Natalie Charles. I

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1 live in Belfast. Natalie is N-A-T-A-L-I-E. The
 2 historical and recent status of Penobscot Bay lists
 3 it as Maine's largest and most productive fishery and
 4 estuary system. It is also known as one of the most
 5 significant estuaries on the eastern seaboard. It
 6 can produce high quantities of wild fish, but has
 7 been severely mismanaged detracting each of the
 8 regional ecosystems, the economy and the culture.
 9 The waters and rivers have been cleaned considerably
 10 since the days of chicken processing and many
 11 industrial polluters have gone out of business, left
 12 the area or reduced their outflow. At this critical
 13 time, you are proposing to locate a 7.7 million
 14 gallon per day outflow pipe deep within the estuary
 15 not even close to deep ocean currents. Can you
 16 please provide scientific evidence -- hard scientific
 17 evidence to support your claim that the overflow
 18 would indeed be in deep ocean currents and have no
 19 negative impacts on the bay and its recovery. And I
 20 would like to see scientific articles and I'm happy
 21 to leave my email address here.

22 MS. TOURANGEAU: Thank you.

23 AUDIENCE MEMBER: (Natalie Charles.) You're
 24 welcome.

25 MS. TOURANGEAU: Could you -- would you mind

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1 estuary that -- the discharge within the estuary --
 2 and this is pretty much every wastewater discharge is
 3 like this, I'm not aware of any, you know, there may
 4 be some locations where the deep ocean is right next
 5 to the shoreline that you can actually discharge
 6 wastewater into the deep ocean. You know, the
 7 analysis of the concentrations and the dilutions
 8 indicates that it's not -- that the concentrations of
 9 nitrogen aren't going to be high enough to impact,
 10 you know, what evidence we have that suggests we're
 11 at a threshold level. So even that discharge into
 12 the estuary it should be sufficient and that's what
 13 we're looking at. And I don't know if you can maybe
 14 reiterate your question.

15 AUDIENCE MEMBER: (Natalie Charles.) Well,
 16 if there were -- you could send, again, articles,
 17 peer reviewed articles that prove what you're saying,
 18 that agree with what you're saying that would be
 19 helpful.

20 MR. DILL: Okay.

21 MS. TOURANGEAU: Thanks, Nate.

22 AUDIENCE MEMBER: Hi. I always like to just
 23 sigh hi to everyone in the room so I feel a little
 24 bit more human. My name is Ethan Hughes and I'm a
 25 resident of Belfast and I also have a background in

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1 writing your email address down for me?

2 AUDIENCE MEMBER: (Natalie Charles.) Sure.
 3 That would be great.

4 MS. TOURANGEAU: Do you mind if I proceed to
 5 other people while you're --

6 AUDIENCE MEMBER: Do you want to answer her
 7 question? She had several questions there I thought.

8 MS. TOURANGEAU: I thought she had asked for
 9 more scientific articles on those issues to be
 10 emailed to her.

11 AUDIENCE MEMBER: (Natalie Charles.) If you
 12 could address what you can that would be great.

13 MR. HEIM: Well, I guess the water questions
 14 is more -- I think we have addressed it, but we can
 15 summarize it again.

16 MR. DILL: I'm not sure if I heard the first
 17 part of your question. The -- you did ask to provide
 18 evidence that the discharge would be in deep ocean
 19 currents. I think the answer to that question is no.
 20 In order to reach deep ocean currents you would have
 21 to go hundreds of miles off shore and that -- it's
 22 just simply not practical to put a pipe hundreds of
 23 miles off-shore. And from what -- from what -- what
 24 we've done -- in the analyses that we've done that's
 25 not necessary. The -- within the -- within the

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1 science conservation and long explanations are
 2 typical in the field of science. We have given the
 3 respected time for answers from many of your experts
 4 even when they're not answering our questions. I ask
 5 you to please give me the same respect. I want a
 6 reminder to Nordic and Erik that you are guests in
 7 our country and not the other way around and please
 8 honor your hosts. I appreciate the local police
 9 presence just in case Nordic gets a little out of
 10 hand.

11 MS. TOURANGEAU: We're wild. We're wild and
 12 crazy.

13 AUDIENCE MEMBER: (Ethan Hughes.) It would
 14 be great if you were wild enough to do wild salmon,
 15 but that's another conversation. I just want to note
 16 the elephant in the room that there is it a power
 17 imbalance with citizens and corporations. You can
 18 stop our sharing, but we can't actually stop yours.
 19 And I just want to invite that it would be wonderful
 20 for Nordic to start having a equal power sharing with
 21 the citizens. That would be great.

22 And so now I have a question for Erik
 23 specifically. Thanks. So you seem very sure about
 24 the safety of this experiment and I actually admire
 25 that confidence, but why does the President of the

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1 International Salmon Farming Association, John
2 Davidson, in his report of 2016 state that he is --
3 the entire association is against land-based
4 aquafarms because of disease, effluence, carbon
5 footprint. They say no to raising Atlantic salmon to
6 adults. It's illegal to be organic when they're in
7 the tanks and there is cramped conditions for the
8 fish. The Scottish salmon producer organizations
9 also frame it as Atlantic salmon land-based is an
10 environmentally unfriendly option, not financially
11 viable. I urge you to read these reports for the
12 sake of the bay and for Belfast to balance your
13 confidence with some of this humility that there is
14 actually other world experts that are coming up with
15 very different conclusions than Nordic. And, yeah, I
16 think that would be great. I can point you to those
17 write-ups.

18 And now I'm going to tend with my question.
19 So the way you frame this experiment it sounds great.
20 Jobs, clean tax, clean water, tax support, great
21 filtration, cutting edge, economic boom. The
22 population density in Europe is much higher, so
23 actually you had a concern about less flying by being
24 in Maine, why not go to Norway? Surely you don't
25 want to rob the Norwegian's of this incredible

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1 if you look in general we are taking water and
2 putting water back, as long as you don't add things
3 that eventually harm an ecosystem that's been our
4 goal and what's what we're aiming for.

5 As far as the other comments are concerned
6 why not Norway. We are expanding in Norway. There
7 are farms the same size being permitted in Norway
8 right now. The reason we're here is that the CO2
9 equation you're referring to, when you buy a salmon
10 from Norway it's three times higher than if you
11 produce it locally because of airfreight. And over
12 90 percent of the salmon sold in this country are
13 airfreighted into this country with three times the
14 CO2 than if you produce it locally, so there is an
15 environmental argument for that.

16 As far as -- as far as comments from some of
17 these people, it's important to be aware of that the
18 sea pen industry has been fighting land-based because
19 they perceive it as a threat. In Norway, they
20 perceive land-based to be a threat to the natural
21 advantage of Norway salmon production. They don't
22 like people coming into this industry because it's a
23 competitive concept, so you will definitely find
24 people in the industry who will talk against
25 land-based, but you will also find many environmental

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1 opportunity if it's so incredible. Why come to
2 Maine? Well, Norway is too regulated for a farm of
3 this scale that's experimental. You don't have the
4 permits. So for an entire country you're going to do
5 10 times the amount that are permitted in Norway in
6 just one town. So Norway is too strict for your
7 experiment, so you have come to Maine because the
8 U.S. offers less strict environmental, socioeconomic
9 and hydraulic restrictions and also regulations for
10 7.7 million gallons a day of effluent into the bay is
11 okay in the United States, so welcome. And here is
12 my question. Tell me, Erik, will 7.7 million gallons
13 of effluent released daily into the bay have no ill
14 effect? 7.7 million gallons daily have no ill effect
15 to the bay and its ecosystem?

16 (Applause.)

17 MR. HEIM: Well, I believe that's what we've
18 been trying to answer today.

19 AUDIENCE MEMBER: Please hold the microphone
20 up.

21 MR. HEIM: Yeah. So in the end I don't
22 think the quantity of water matters, it's what it
23 contains and that's what we've been trying to focus
24 on today. So and that's been very important for us
25 to address that exactly what that contains. So and

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1 organizations who praise land-based including the
2 Atlantic Salmon Federation, who has been quite clear
3 about their view on this, and also the Monterey
4 Seafood Watch, who also rates seafood in terms of
5 standard sustainability. So I think like anything,
6 there is always going to be people who have different
7 views and that's fair, we respect that and I'm
8 familiar with all of them. And we do read them and
9 we do talk to what they write and we do listen to
10 them and we have dialogue with them and that's fair.
11 I think that's the way it needs to be. Just like sea
12 pen is a big discussion topic in the U.S. and has its
13 own issues as far as I'm concerned.

14 AUDIENCE MEMBER: (Ethan Hughes.) Yeah.
15 Thanks. You're really articulate, but you didn't
16 answer my question. And I also wanted to add you
17 said as long as you're putting water back into the
18 bay, but there will be another hundreds of millions a
19 year of gallons of fresh water that are coming from
20 aquifers into the bay, so that's a new water coming
21 in.

22 MR. HEIM: So that additional -- I can
23 answer that additional question. We did address that
24 in the earlier meeting. So if you look at the Little
25 River, it's the end of a big watershed. And this is

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1 something that's been mapped by Ransom over here.
 2 This watershed empties into that area of the Little
 3 River. Some of it goes surface, some of it goes
 4 through the ground. All of it empties out in the bay
 5 in this area. So we are just taking a part of that
 6 water that was otherwise going to the ocean,
 7 borrowing it for a while, treating it and sending it
 8 in the same way it was going in the first place.

9 AUDIENCE MEMBER: (Ethan Hughes.) Some of
 10 those are protected deep wells aquaculture, you know,
 11 I mean, they're not moving into the bay. They're
 12 in -- that fresh water is protected and sealed.

13 MR. HEIM: We can have Ransom, who has been
 14 doing the modeling and investigation on that.

15 AUDIENCE MEMBER: (Ethan Hughes.) I
 16 actually want to ask you the question again. Just
 17 tell me will the 7.7 million gallons of effluent
 18 cause no harm to the bay, yes or no?

19 MR. HEIM: I cannot see that with what we
 20 described today that it will cause harm to this bay.

21 AUDIENCE MEMBER: (Ethan Hughes.) Okay.

22 MR. HEIM: That's why we have also got
 23 independent parties to review that to conclude on
 24 that because for me personally that's also priority.
 25 It's bad business for us if we cause harm to the bay.

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1 are written in the State of Maine do not yet actually
 2 contain limits for nitrogen and phosphorous within
 3 the permits. There are generally limits provided for
 4 BOD and TSS and then there is a requirement to
 5 monitor for those compounds but there are not
 6 generally limits set. That being said, the trend at
 7 the moment is to start adding those limits. So we
 8 would not be surprised to find a requirement in the
 9 actual permit that's written for this project. But
 10 if you look up and down the coast, I think you'll
 11 find the majority of the permits that are out there
 12 from primarily municipal treatment plants, but also
 13 some of the other industry permits that are out
 14 there, I think you'll find the majority do not
 15 actually contain a limit for nitrogen and
 16 phosphorous.

17 AUDIENCE MEMBER: (Andy Stevenson.) Okay.
 18 All right. So that answers my question. We're
 19 talking about permits for primarily publicly owned
 20 treatment plants?

21 MS. RANSOM: That's correct.

22 AUDIENCE MEMBER: (Andy Stevenson.) Okay.
 23 Second, Mr. Heim, you talked also about the
 24 monitoring about the reporting program which is great
 25 and the fact that DEP and U.S. EPA can come and look

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1 AUDIENCE MEMBER: (Ethan Hughes.) And
 2 that's the reason I'm very suspicious because there
 3 is no way to do 7.7 million without impacting the
 4 system, so I hope you do some more research. Thank
 5 you for your time.

6 MR. HEIM: Okay. Yup.

7 MS. TOURANGEAU: Thank you, Mr. Hughes.

8 AUDIENCE MEMBER: Do you want to...

9 MS. TOURANGEAU: Um... How are folks
 10 feeling? Should we take a quick break? Is everyone
 11 all right?

12 AUDIENCE MEMBER: No.

13 MS. TOURANGEAU: Keep going.

14 AUDIENCE MEMBER: Good evening. I'm Andy
 15 Stevenson. I'm a resident here in Belfast. And I
 16 have a couple of questions and I'd like to start with
 17 Mr. Heim. In your presentation earlier you mentioned
 18 and I think I either heard it wrong or I didn't
 19 understand it completely, but you said that none of
 20 the permits in Maine have limits for nitrogen or
 21 phosphorous. Did I misunderstand what you meant?

22 MR. HEIM: I can answer that briefly or
 23 actually, Elizabeth.

24 MS. RANSOM: Yeah, I can answer that. Hi,
 25 Andy. The majority of permits -- MEPDES permits that

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1 at your records and your reports at any time. Would
 2 there be any interest in having the public be able to
 3 come in and look at those records as well?

4 MR. HEIM: Well, what I would expect is that
 5 the DEP eventually will define what is required and
 6 what they'd like to see. I don't know the procedures
 7 of the DEP in terms of making public records, but
 8 certainly that could be a part of the procedure so
 9 that the public would have access to whatever report.
 10 I don't know, again, but maybe Joanna can comment on
 11 that.

12 MS. TOURANGEAU: All of the testing and
 13 monitoring and sampling results that are submitted to
 14 the state, anything that's submitted to the DEP
 15 that's required as part of any monitoring program
 16 will automatically be a public record.

17 AUDIENCE MEMBER: (Andy Stevenson.) Okay.
 18 All right. And would be available from DEP but not
 19 necessarily from Nordic?

20 MS. TOURANGEAU: It varies. Sometimes
 21 they'll put it right up --

22 AUDIENCE MEMBER: (Andy Stevenson.) Yeah.

23 MS. TOURANGEAU: -- and sometimes they'll
 24 ask the regulated entity to make it available.

25 AUDIENCE MEMBER: (Andy Stevenson.) Okay.

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1 MS. TOURANGEAU: It varies. And we'll know
2 more when a permit -- when and if a permit issues.

3 AUDIENCE MEMBER: (Andy Stevenson.) Okay.
4 So on that point, I would suggest that Nordic
5 consider having those records available at Little
6 River at the facility as part of your public or your
7 community outreach program.

8 Moving on. Mr. Dill, man, I've got to tell
9 you, I'm a water quality monitor and I love the
10 little ping pong balls. That was neat. But the ping
11 pong balls are only showing us what's happening on
12 surface, correct? I mean, it wasn't a full water
13 column modeling simulation.

14 MR. DILL: The hydrodynamic model, the far
15 field model is a two-dimensional depth average model,
16 so it's an estimate of depth average currently.

17 AUDIENCE MEMBER: (Andy Stevenson.) Okay.
18 Okay.

19 MR. DILL: We made an assumption that based
20 on the CORMIX results which does give you
21 three-dimensional information that the -- in order to
22 calculate the concentrations that the ping pong balls
23 would all stay within the upper 10 meters of the
24 water column --

25 AUDIENCE MEMBER: (Andy Stevenson.) Okay.

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1 been gathered over the course of the past several
2 months and we will be continuing to gather data as
3 the project goes on so that we can, you know, have an
4 understanding of not just one elevation surface or
5 bottom but several elevations.

6 AUDIENCE MEMBER: (Andy Stevenson.) Would
7 you be able to tell us a little bit more tonight if
8 time allows about the monitoring and assessment that
9 you plan to do between now and the time you start
10 construction given that a permit might be granted?

11 MS. RANSOM: I think some of that will be
12 something that comes out through the draft permit
13 process through discussions with DEP. Obviously we
14 want to make sure that whatever we're proposing is
15 something that they feel is a good thing as well. So
16 but what that might look like is you would look at,
17 again, multiple depths, also multiple seasons and as
18 we've been doing you would be looking at that during
19 different portions of the tidal cycle because
20 obviously things that you're seeing during an ebb
21 tide might be different than during a flood tide.

22 AUDIENCE MEMBER: (Andy Stevenson.) Right.
23 Okay. As far as monitoring the effects of the
24 effluent on the marine environment I'd like to offer
25 a wild suggestion tonight, which is that in addition

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1 MR. DILL: -- so they're not mixing down
2 into the deeper parts of the bay.

3 AUDIENCE MEMBER: (Andy Stevenson.) Okay.

4 MR. DILL: And we think that that's a
5 conservative assumption because over time you would
6 tend to get more mixing especially in the sort of far
7 field time scales when you're looking at days to
8 weeks rather than just the first, you know, hour or
9 so after the effluent leaves the pipe.

10 AUDIENCE MEMBER: (Andy Stevenson.) All
11 right. Then would it be accurate to say that there
12 has not yet been any modeling or actual sampling
13 information about water quality below let's say that
14 10 meter or that level?

15 MS. RANSOM: Actually, I can take a piece of
16 that. So there are in addition to sort of some of
17 the publicly available data for, I mean, I think it
18 even goes to even -- some of the samples maybe go as
19 deep as 100 and -- about 60 meters down, but we've
20 established some sampling stations where we've been
21 looking at the water quality at 5 meter intervals
22 from the surface down to the depth of where the
23 discharge pipe is proposed.

24 AUDIENCE MEMBER: (Andy Stevenson.) Okay.

25 MS. RANSOM: So we have some data that has

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1 to what I'll call mechanical sampling or chemical
2 sampling or automated sampling or even hand sampling,
3 Nordic Aquafarms considers putting in what I would
4 call a three-dimensional biological sampling
5 operation, which would essentially be a full water
6 column installation of kelp, seaweed, muscles grown
7 on ropes vertically and clams caged on the bottom as
8 a way to reassure people over the long haul that the
9 viability of the bay as a source for additional
10 aquaculture or any other harmonious installation
11 could be preserved.

12 MS. RANSOM: I think that's an interesting
13 concept. I think we'd have to obviously get some
14 input from some of the folks at DEP. I know, for
15 example, the clam flat at the discharge area has been
16 closed for some time, so I think that particular
17 piece might, you know, require some additional input,
18 but I'd be happy to speak with you further about what
19 you're proposing.

20 AUDIENCE MEMBER: (Andy Stevenson.) Okay.
21 Well, the people who know it far better than I are a
22 group called GreenWave and I believe they're in
23 Connecticut. They focus mostly on the West Coast,
24 but they've developed this concept and I'm sure they
25 would be happy to talk with you.

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1 MS. RANSOM: Awesome. Thank you.
 2 AUDIENCE MEMBER: (Andy Stevenson.) Yeah.
 3 All right. I think that's it and I want to thank you
 4 all for the opportunity to talk tonight. Thank you.
 5 AUDIENCE MEMBER: Hello. My name is Audra
 6 Novine McTague. A-U-D-R-A, M-C-T-A-G-U-E. And my
 7 question is regarding the time frame of your
 8 research. You said that the research that you
 9 presented was for the time period of one month and
 10 I'm assuming you guys are going to be here longer
 11 than that. And it is critical for operations like
 12 these to look at a time frame that is long-term and I
 13 mean 20 years or more. And so I'm wondering if
 14 you've done this research and what you have found.
 15 MS. RANSOM: Great question. Let me do some
 16 clarification.
 17 AUDIENCE MEMBER: Can you repeat the
 18 question?
 19 MS. RANSOM: I'm sorry.
 20 AUDIENCE MEMBER: Can you repeat the
 21 question? I couldn't hear.
 22 MS. RANSOM: Sure. Her question was that
 23 she had understood from the presentation that we had
 24 been gathering data for about a month and that given
 25 the longevity of the project it was important to have

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1 a much longer time frame of monitoring in order to
 2 understand potential impacts and I'm paraphrasing a
 3 bit there, but I think that's the gist of it.
 4 MS. TOURANGEAU: Is that accurate?
 5 AUDIENCE MEMBER: (Audra McTague.) Yes.
 6 MS. RANSOM: So first of all, we've been as
 7 a consultant gathering data over the last several
 8 months, but there are -- and the reason for that is
 9 because we wanted to get some things as we narrowed
 10 down sort of where might that pipeline actually go,
 11 we wanted to narrow down things that were right at
 12 that discharge point. There have been, however,
 13 studies that have been going on in the bay since the
 14 1970s and so there is a dataset for other areas
 15 within the bay that we can use to start establishing
 16 what does it look like historically, how has it
 17 changed, what are the different effects you might see
 18 at different times of the year, what are the
 19 different effects you might see upgrade or downgrade
 20 and upflow or downflow during different tide cycles.
 21 And so we've not only looked at our own dataset, but
 22 at some of the data that exists from other studies.
 23 So we have data that comes from the 1970s. We have
 24 data that comes from, you know, 2001 through 2010
 25 provided from another study. So those datapoint

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1 however some of them are, you know, maybe a kilometer
 2 from where we're discharging, so we're just now
 3 starting to make sure we gather data that is closer
 4 to the point that we're discharging so we have a more
 5 in-depth understanding of the place we're going to be
 6 proposing. And then as we mentioned, the intent is
 7 to have that be something where we can keep making
 8 comparisons going forward and the ultimate program is
 9 something that we expect the state is going to want
 10 to weigh in on and help us develop something that
 11 they feel is a sound approach to monitoring. But,
 12 you know, the permit process doesn't just stop when
 13 Erik gets his permit. He is required in his permit
 14 should they issue one to keep monitoring his
 15 discharge for as long as that plant operates and
 16 there, you know, there will be things that keep going
 17 into next decades.
 18 AUDIENCE MEMBER: (Audra McTague.) Based on
 19 the these studies, what do you expect the long-term
 20 effects of your discharge to be?
 21 MS. RANSOM: That's a good question. You
 22 know, we are looking at various different parameters
 23 and we have, you know, tried to the best of our
 24 ability to predict what we think is going to happen
 25 over time and, you know, obviously as we mentioned

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1 some of the things he's discharging are actual
 2 improvements over what the bay has right now. So,
 3 you know, is, you know, I think we showed earlier a
 4 statistic that says his discharge is going to
 5 ultimately be less than one percent of the run-off
 6 that is currently coming into the bay for nitrogen.
 7 And so, you know, is he going to have a strong impact
 8 on the bay with anything he is discharging? No,
 9 because that bay is many trillions of gallons of
 10 water and he's discharging, you know, a small
 11 fraction into that. But over time, you know, you
 12 have things that are being discharged in one specific
 13 area over time we hope to see that, you know, the
 14 things that he's improving because he's treating and
 15 cleaning will potentially show some improvements and
 16 we hope that the things that we are discharging are
 17 not going to have the negative impacts. And, you
 18 know, we think that with the studies we've done, the
 19 modeling we've done, we've demonstrated that there
 20 should be no negative impacts. But, you know, we're
 21 going to keep monitoring to make sure that that's
 22 true.
 23 MR. DILL: Can I say something about the
 24 modeling? I think you -- you mentioned -- you did
 25 mention the one month time frame and I think that may

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1 be because of the modeling that we showed it was a
2 one month long simulation. Actually, the model
3 simulation was actually 45 days. It was actually a
4 little more than a month, but the initial part we
5 just kind of cutoff because when you -- with this
6 kind of modeling you have to spin up the tidal
7 forcing, you know, so it's initially the water is
8 perfectly still and it takes a couple weeks for the
9 hydrodynamics to create a realistic current. At that
10 point, then you can -- then we -- we compared the
11 water levels to -- the observed water levels and
12 showed that they were pretty accurately reproduced
13 and so the currents are pretty accurate.

14 And I think one of the questions that I had
15 going into this was, well, how long does the water in
16 Belfast Bay stay in Belfast Bay. And so this is, you
17 know, typically you might call this a residence time.
18 So trying -- so this is one thing that we -- that we
19 really wanted to understand because this is -- this
20 is actually really important for understanding what
21 these impacts are. And if you look at the results of
22 that, you know, if you look at the tidal currents and
23 the result of that simulation and one of the reasons
24 why we do a one month long simulation is that's the
25 amount of time it takes for the moon to go through a

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1 circulated up from on the west side of Islesboro. So
2 that was able to sort of answer that question that
3 you've got about this two week time frame and so then
4 if you look at what the impact is on the
5 concentration in the area, after -- after two weeks
6 of a continuous release, you have a good
7 representation of what the long-term impact is going
8 to be and that was kind of the first slide that I
9 talked about that showed a very small light blue area
10 and so that was, you know, and with looking at
11 nitrogen, because in this case nitrogen is really the
12 thing we're most concerned about. TSS we're not so
13 concerned about because it's actually lower than
14 what's in the bay now.

15 So that -- so I guess to answer your
16 question that impact area is very small where you
17 would see that elevated nitrogen concentration and it
18 wasn't anywhere near where some of the sensitive
19 population of eel grass were that we had. So I hope
20 that answers your...

21 AUDIENCE MEMBER: (Audra McTague.) Thanks.

22 MS. TOURANGEAU: I am going to say I see we
23 still have quite a long line. I just want to flag
24 for folks that we're getting -- we've got 45 minutes
25 left for the room, so if you are kind of not getting

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1 full cycle and so you go through a full spring neap
2 tidal cycle, which is really representative, you
3 know, it's sort of enough -- a long enough period of
4 time to represent what a long-term simulation of the
5 tides would be. So like, for example, the reason why
6 NOAA, the National Oceanic and Atmospheric
7 Administration, collected tide data at Fort Point
8 during that time period was so that they could then
9 do an analysis on that and use that analysis to
10 predict tides any time in the past, any time in the
11 future. And so that -- that -- that one month long
12 simulation is sufficient to give you a representation
13 of what those tidal currents are doing. And what we
14 saw from that simulation is that it -- when you --
15 when you release particles that are sort of scattered
16 throughout the bay they tend to take about two weeks
17 until they move, so if you saw that animation I was
18 showing that had the different colored dots floating
19 around, if you look for about two weeks of that
20 simulation and you say you picked -- you tracked a
21 couple of the particles and you watch them with your
22 eyes they were in Belfast Bay, about two weeks later
23 they're out of Belfast Bay and there is new ones that
24 have come in from up the river or from the other side
25 of Islesboro or there may be some of them that even

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1 to your question quickly, can you please try to. And
2 I apologize, we are just running out of time a little
3 bit.

4 AUDIENCE MEMBER: Yeah, my name is James
5 Merkel. I live in Belfast. And for full disclosure,
6 I am running for city council, Ward 5, a write-in
7 candidate. And what really concerns me is the lack
8 of transparency and public engagement. I know this
9 is the fourth information meeting where we're allowed
10 to ask questions and you're the expert. And I used
11 to be in your shoes as a former marketer of military
12 hardware and I had all of the answers and the people
13 asking me didn't and so this is a very hard scenario,
14 but we were begging, this whole community, for an
15 engagement and this is still you're the expert and
16 we're asking questions, so I'll participate in that.

17 But several questions, I want to start with,
18 again, on the currents. Now, I'm a sailor, so I'm
19 out there quite a bit. On an -- I'm usually running
20 back into the harbor with the tailwind, you know, out
21 of south, that's normal. And I know you left this --
22 the wind out, but it's quite significant and
23 Wejisue's (phonetic) report from 1999 says the
24 currents out in that bay are really affected by
25 salinity and that's from the Penobscot. There is a

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1 longshore current coming down the whole coast and
 2 it's also these other currents that wrap around
 3 Islesboro and it's very complex and it's even
 4 dependent on the wind direction, so I see that plume
 5 coming right into the -- past the park of the city,
 6 past the boathouse right into the harbor. You know,
 7 your ping pong balls are kind of showing it with the
 8 wind forcing that, which you didn't study. That's a
 9 quite common wind. And on the outgoing tide it's
 10 going to go right past Bayside and Kelly's Cove and
 11 these are beaches that people enjoy.

12 Now, Bayside has 1.6 pounds of nitrogen.
 13 You're talking about 1600, so that's what, my math, a
 14 thousand times more than Bayside Sewer. And Belfast
 15 City has 108 pounds of nitrogen versus your 1600, so
 16 this is like Belfast having a population of 98,000
 17 people. It's like Portland putting their waste
 18 stream into, you know, equivalent to Belfast city's
 19 waste stream into our -- it's not a deep ocean
 20 current. I've heard Erik say it in three -- in two
 21 meetings so far that you're going for deep ocean
 22 currents. This is a deep estuary. It's a deep
 23 estuary where you are. And I saw your ping pong
 24 balls and I see your numbers, but I'm still saying
 25 would these citizens be sitting down and nodding

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1 matter that you're adding more to an already
 2 collapsed system. You know, you're saying, well,
 3 it's small, but it's more to an already collapsed
 4 system, so I don't get it.

5 MS. RANSOM: So I'm not a hundred percent
 6 sure of the question in there.

7 AUDIENCE MEMBER: (James Merkel.) Well, the
 8 question is how -- what guarantee when you're, you
 9 know, 10 to 15 Belfast city sewers and, you know,
 10 what happens if the beaches are smelly?

11 MS. RANSOM: So --

12 AUDIENCE MEMBER: (James Merkel.) You know,
 13 what -- what...

14 MS. RANSOM: -- the amount of nitrogen that
 15 currently is going in from other sources, the amount
 16 that --

17 AUDIENCE MEMBER: (James Merkel.) I heard
 18 you, yeah.

19 MS. RANSOM: -- is less than 1 percent is --
 20 of that point source discharge, that 4.3 percent is
 21 going to go up by about three-quarters of a percent
 22 with this discharge. That's a pretty small amount.
 23 And when you look at the fact that the bay contains
 24 trillions of gallons of water --

25 AUDIENCE MEMBER: (James Merkel.) But what
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1 along because you can present data in very many
 2 different ways, but to putting 10 to 15 times more --
 3 doubling the -- 15 times more sewage from Belfast Bay
 4 into -- and my children swim in those beaches, so
 5 like what guarantee do we have that the beaches
 6 aren't becoming horrible? Like, I mean, I don't know
 7 if there was -- if there was 15 sewers like just put
 8 into the Belfast Bay right in this estuary, I don't
 9 think I'd ask my boy to swim there. I think we'd go
 10 somewhere else, you know.

11 I mean, there is a lot of ways to present
 12 data, but this is another way to look at it and I'm
 13 just not clear. I need to have a gut feeling. I am
 14 a scientist too, but was looking at 1.6 from Bayside
 15 versus 1600 and I'm looking at 1600 versus 108 in
 16 nitrogen and we already have a closure. Our bays are
 17 closed for shellfish, toxic algae bloom, biotoxin.
 18 It's currently closed. And, you know, you say
 19 dilution is your solution to pollution and I teach
 20 sustainability at a university and we've been
 21 teaching that for 30 or 40 years. Like you say,
 22 well, we have the water so we can use it, but we at
 23 home turn the faucet off when we brush our teeth and
 24 when we do dishes and you're saying, well, it doesn't
 25 matter. So I just don't get this that it doesn't

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1 happens if it's smelly at the beach, you know, I want
 2 to know. And, for example, like --

3 MS. RANSOM: Jim, I don't -- honestly, I
 4 don't think there is going to be any problems --

5 AUDIENCE MEMBER: (James Merkel.) You don't
 6 think so, right? Right.

7 MS. RANSOM: -- at the beach.

8 AUDIENCE MEMBER: (James Merkel.) No, I
 9 understand you don't think so. And then just the
 10 last question is Moulton Bay, Port Moulton Bay --

11 MR. DILL: I just wanted to respond to your
 12 question quickly.

13 AUDIENCE MEMBER: (James Merkel.) Yeah.

14 MR. DILL: Municipal sewage is much, much
 15 different than the water that's being proposed to be
 16 discharged here, so when you're talking about
 17 comparing the sewer discharge from a municipal sewage
 18 system, municipal wastewater treatment plant, you're
 19 not comparing apples to oranges.

20 AUDIENCE MEMBER: (James Merkel.) Right.

21 MR. DILL: And when you're talking about
 22 closures of shellfish bay -- shellfish areas and what
 23 drives largely the wastewater treatment discharge is
 24 bacteria concentrations, not nitrogen. And so that's
 25 the thing that you're concerned about at the beach

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1 when it comes to a municipal sewer discharge, so it's
2 not an apples to oranges comparison.

3 AUDIENCE MEMBER: (James Merkel.) No.

4 MR. DILL: I just wanted to make that clear.

5 AUDIENCE MEMBER: (James Merkel.) Sure.

6 And the other question I have is about the smell and
7 the pheromones and kairomones that are in that water.
8 Like Moulton Bay recently did a study in Nova Scotia
9 finding 56 percent decrease in bearing lobster --
10 lobsters bearing eggs and 40 percent reduction in
11 regular lobsters because they're sense field -- they
12 find their bait by antennas. They have to smell
13 their bait and if your whole world smells like salmon
14 you can't find a trap or you can't even find the food
15 for yourself to eat, so this Moulton Bay study was 11
16 years and it's quite conclusive. And I don't know if
17 you have read it. They give -- they say the things
18 that really affect it are sulfides and ammonium,
19 toxic and -- and they have behavioral effects on
20 adults and other lobsters at various stages.

21 MS. RANSOM: Jim, remember the -- among the
22 numbers from this facility are .003 --

23 AUDIENCE MEMBER: (James Merkel.) Right. I
24 saw that, but --

25 MS. RANSOM: -- so that's pretty low.

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1 That's about where we are, okay. So I've been along
2 the whole coastline in Norway, I never really
3 detected any smell outside of these facilities. The
4 only thing that you need to be concerned about is how
5 you handle your sludge waste because if you extract
6 and dispose of it here it will start smelling, so
7 that's why you need to contain it and make sure it's
8 not exposed to oxygen. I have never walked along any
9 land-based facility where there is a strong smell
10 coming from the ocean.

11 AUDIENCE MEMBER: (James Merkel.) I guess
12 what I would like to see too though if you would
13 study or show some peer study that would look at the
14 plume and its affect on lobster harvest.

15 MR. HEIM: Okay. Well, we look at the
16 receptors of the population.

17 MS. RANSOM: Actually, I can take a little
18 bit of that question on lobster and I think that's
19 something that's near and dear to every Mainer. One
20 of the primary things from a discharge that can have
21 a strong impact on lobster growth is actually your
22 dissolved oxygen. The lobsters are quite sensitive
23 particularly in their juvenile stage to the DO
24 levels. And so at a DO level, for example, of 2 1/2
25 milligrams per liter, the juveniles show a 30 percent

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1 AUDIENCE MEMBER: (James Merkel.) -- but
2 how about the sulfides? But what about the sulfides?

3 MS. RANSOM: Hydrogen sulfide.

4 AUDIENCE MEMBER: (James Merkel.) Yeah.

5 MR. HEIM: I think -- I am not familiar with
6 that particular study, but this is not a sea pen
7 operation.

8 AUDIENCE MEMBER: (James Merkel.) Oh, I
9 know very clearly, but the plume is going to have
10 odor of salmon. I mean, it's going to smell of
11 salmon. It's going to have that odor.

12 MR. HEIM: We have no odor in our farms.

13 AUDIENCE MEMBER: (James Merkel.) It's
14 going to have --

15 MR. HEIM: This water is clean.

16 AUDIENCE MEMBER: (James Merkel.) What
17 about -- can it -- are the pheromones taken out,
18 kairomones?

19 MR. HEIM: Again, if you take --

20 AUDIENCE MEMBER: (James Merkel.) I know
21 what a .4 micron is is what you're saying, right?

22 MR. HEIM: Yeah, exactly. So if you -- if
23 you have taken the perspective that this is going
24 into trillions and trillions of gallons in a bay,
25 it's like taking a couple drops of water in a bucket.

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1 reduction in their growth. And adults are sensitive
2 too, you know, you start getting up to, you know, 3
3 1/2 milligrams per liter and even adults show, you
4 know, some distress. The discharge from Nordic's
5 facility is going to be at 4 1/2 give or take, if I'm
6 not mistaken, and that level is actually a level
7 that's considered safe for marine life, so that it's
8 not a level that you would expect to see an impact to
9 lobsters. But the primary -- I mean, obviously there
10 is a variety of different things. If there were high
11 TSS the lobsters are going to be sensitive to that
12 too, but really here out of the discharge numbers
13 that we're looking at from this facility the primary
14 thing that we'd be focused on for the lobsters is the
15 DO and that is one of the things that's -- there is a
16 number of studies I could share with you on that.

17 AUDIENCE MEMBER: (James Merkel.) Right.
18 And the odor plume is what they really seem to single
19 out in the Moulton Bay study was the odor plume, it
20 affects their antennae and their ability to find food
21 because their whole world smells like salmon. And
22 maybe you don't smell it up above, but it could be
23 down in the waterfall, that smell.

24 MR. HEIM: What's the case example this is
25 based on?

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1 AUDIENCE MEMBER: (James Merkel.) Pardon?
 2 MR. HEIM: What is the case example that is
 3 based on?
 4 AUDIENCE MEMBER: (James Merkel.) Port
 5 Moulton Bay. It's an 11 year study. It's near pens,
 6 but pen is a, you know, it's putting out the salmon
 7 smell, you know, your pipe is going to put out a
 8 salmon smell.
 9 MR. HEIM: What is -- what's going to smell
 10 is your -- basically your waste coming from the farm.
 11 Your feces, feed particles, wasted feed coming out,
 12 that's what really smells and that's not going into
 13 the bay here.
 14 AUDIENCE MEMBER: (James Merkel.) Right.
 15 The last time I cooked salmon and I washed my hands
 16 20 times and they still smelled like salmon.
 17 MR. HEIM: Well, if you open up the fish --
 18 AUDIENCE MEMBER: (James Merkel.) I was
 19 swimming in -- I was camping in grizzly bear
 20 territory in DC --
 21 MR. HEIM: Yeah.
 22 AUDIENCE MEMBER: (James Merkel.) -- and I
 23 washed them 20 times before I went to bed that night,
 24 I still smelled like salmon.
 25 MR. HEIM: Certainly if you open up a salmon

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1 it will smell like fish, but --
 2 AUDIENCE MEMBER: (James Merkel.) And your
 3 hands will -- and the smell is -- that's what's
 4 affecting the lobsters, so I just really urge you to
 5 look at that and maybe answer it. I'll -- I have 76
 6 questions, but I'll give them to you in writing.
 7 MR. HEIM: That's fine.
 8 AUDIENCE MEMBER: Good evening. I'm Ellie
 9 Daniels and I live in Belfast and I too have a
 10 disclosure that I am running as a write-in for Ward 1
 11 on the Belfast City Council. I admit I'm really
 12 disappointed not to hear more about feed tonight
 13 because everything that I try to research about what
 14 the salmon are going to be fed tells me that it makes
 15 a very big difference in what gets out in the
 16 effluent. So I guess you have a resident expert
 17 here.
 18 MR. DEMOS: I'm not an expert. I'm a
 19 representative for Skretting, it's a feed --
 20 AUDIENCE MEMBER: We can't hear you.
 21 MR. DEMOS: Okay. I am a representative for
 22 Skretting Global Feed Company. I live in Newport.
 23 I've sailed Penobscot Bay for 38 years. I've
 24 protested the tanks in Searsport, so I'm passionate
 25 about the bay. As far as fish feed is concerned

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1 allow me to read the statement because I'm not an
 2 expert, but we have experts, we have PhDs and so
 3 forth.
 4 AUDIENCE MEMBER: We can't hear you.
 5 AUDIENCE MEMBER: Hold the mic up.
 6 MR. DEMOS: We screen for pesticides and
 7 heavy metals. We have never added growth hormones,
 8 sex hormones, nor do we use raw fish as an
 9 ingredient. We don't use antibiotics to our
 10 non-medicated feed. We are USDA compliant, FDA
 11 registered and have all the third-party
 12 certifications. Our feed meets all of the
 13 requirements around the globe including the European
 14 Union. All our ingredients used in the manufacturing
 15 of Skretting feeds are approved by the American Feed
 16 Control of Fishes and Canadian Feed Inspection
 17 Agency. Our feed plants are regularly inspected by
 18 the Canadian Feed Inspection Agency and the FDA. Our
 19 plants are ISO 9001 GMP, BAP is best aquaculture
 20 practices, HACCP, I don't know what that stands for
 21 but it's one of our certifications. We have a global
 22 audit team, which is a part of the supplier approval
 23 program. Their role is to visit the suppliers and
 24 ensure that they're complying with the food safety
 25 requirements. Testing for contaminants are also an

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1 integral part of the process. We reject any raw
 2 materials that don't comply with the standards. I
 3 have a quality assurance report if anybody is
 4 interested and if there are any questions, please.
 5 AUDIENCE MEMBER: (Ellie Daniels.) Oh, I
 6 have questions. You're telling me about your
 7 certifications and I do appreciate that, but what is
 8 in the feed? What are the salmon going to be fed
 9 specifically?
 10 MR. DEMOS: Well, there is fish meal --
 11 AUDIENCE MEMBER: (Ellie Daniels.) Oh.
 12 MR. DEMOS: -- there is fish oil, but here
 13 is the thing, it depends on the feed.
 14 AUDIENCE MEMBER: (Ellie Daniels.) That's
 15 what we want to know.
 16 AUDIENCE MEMBER: We need you to tell us.
 17 AUDIENCE MEMBER: (Ellie Daniels.) Erik,
 18 can you answer what specifically your fish are going
 19 to be fed?
 20 MR. DEMOS: It depends on the type of feed
 21 you're feeding. We have organic feed. We have low
 22 phosphorous feed. We have all kinds of different
 23 feed, so.
 24 AUDIENCE MEMBER: (Ellie Daniels.) I would
 25 specifically like to know specifically what Nordic

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1 Aquafarms is going to feed their fish.
 2 MR. HEIM: Okay. I can speak about that.
 3 So we're not even close to making a final feed
 4 selection here. Right now, we're focused on the --
 5 AUDIENCE MEMBER: Hold the microphone up.
 6 MR. HEIM: Okay. We're not even close to
 7 making a final feed decision in the U.S. We are just
 8 making that in Norway, it would start up in two
 9 months over there. So generally what you will see in
 10 the feed, it's a growing amount of vegetable
 11 proteins --
 12 AUDIENCE MEMBER: (Ellie Daniels.) What
 13 kind of vegetables, please?
 14 MR. HEIM: There could be a whole range of
 15 vegetable proteins involved in their feed.
 16 AUDIENCE MEMBER: (Ellie Daniels.) Are
 17 there soy proteins?
 18 MR. HEIM: There can be soy. There are
 19 substitutes for soy. Any time you look at these
 20 proteins you want to be looking at where they're
 21 sourced from, how sustainable are they, for example,
 22 soy bean is something I'm also looking to reduce
 23 because among other things you look at how this is
 24 grown in Brazil with deforestation, not a big fan.
 25 You want to look at who has produced it, where it is

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1 the feed company in the end to see what their
 2 sourcing practice is. There are many practices
 3 regarding that. And then there is also alternatives
 4 coming into the business now in terms of algae and
 5 also insect proteins. Many good substitutes are
 6 coming in.
 7 AUDIENCE MEMBER: (Ellie Daniels.) Well,
 8 they're just coming and I understand --
 9 MR. HEIM: They are coming in.
 10 AUDIENCE MEMBER: (Ellie Daniels.) -- that
 11 there is no quantity at all that has been done yet.
 12 MR. HEIM: No, but we're not buying feed
 13 until two or three years from now, right, so in the
 14 next couple of years --
 15 AUDIENCE MEMBER: (Ellie Daniels.) Yeah.
 16 Okay.
 17 MR. HEIM: -- you're going to see a lot of
 18 developments in this industry. And the reason why is
 19 that this industry needs to meet the challenge of an
 20 extremely fast growing global aquaculture industry
 21 because that's where growth in seafood is coming from
 22 in the next decades and their challenge is to meet
 23 that industries needs in a sustainable matter, so
 24 there is an enormous amount of R&D going on in this
 25 industry right now.

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1 produced to make sure that this is a safe, good
 2 product. Same with protein as other sources of
 3 vegetable protein as well.
 4 AUDIENCE MEMBER: Like corn? Is there corn
 5 in the feed?
 6 MR. HEIM: There can be, yes. Again, you
 7 always look at the sourcing of these things.
 8 AUDIENCE MEMBER: (Ellie Daniels.) Are
 9 there animal byproducts in the feed?
 10 MR. HEIM: That is used in some feeds, yes,
 11 it depends.
 12 AUDIENCE MEMBER: (Ellie Daniels.) And how
 13 are animal byproducts certified in feed?
 14 MR. HEIM: That is an issue we will be
 15 looking into in the U.S. Our concern is the sourcing
 16 of it and to be sure that is a safe, good sourcing.
 17 For example, we know that in the U.S. antibiotics is
 18 used in animal feeds in some cases. This is not
 19 something we see in Europe, so obviously that's one
 20 thing we're going to be looking at that we want to
 21 make sure that every source we have is antibiotics
 22 free in terms of that.
 23 AUDIENCE MEMBER: (Ellie Daniels.) And
 24 where will you source your fish meal?
 25 MR. HEIM: That's up to a discussion with

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1 AUDIENCE MEMBER: (Ellie Daniels.) Yes,
 2 it's very profitable. I can see that from --
 3 MR. HEIM: Actually, feed is a fairly low
 4 margin business. You have powerful buyers. They are
 5 pressing the feed companies on the margins, so it's
 6 not as profitable as you might think to be honest,
 7 so. Yeah.
 8 MS. TOURANGEAU: We are getting -- I
 9 appreciate, Miss Daniels, that you have questions
 10 about the specifics about the feed and I appreciate
 11 --
 12 AUDIENCE MEMBER: (Ellie Daniels.) Well, I
 13 appreciate the answers.
 14 MS. TOURANGEAU: -- and I'm hoping that we
 15 can move to questions about the discharges. We're
 16 running short on time.
 17 AUDIENCE MEMBER: (Ellie Daniels.) I do
 18 have questions about the discharge. Specifically,
 19 how big is the diameter of this effluent pipe and
 20 will there be one effluent pipe or two effluent pipes
 21 and how many water intake pipes?
 22 MS. TOURANGEAU: So I'm going to preface
 23 letting you answer by saying that this permit is not
 24 for the construction of the intake and the outfall.
 25 That will be covered as I addressed in the first part

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1 in the other permits that are issued and you can
2 answer it really quickly, but.

3 MS. RANSOM: Ellie, I can give you a brief
4 discussion on that. As Joanna mentioned, we are
5 going to be covering that in more detail when we get
6 to the Army Corps permitting and there will be a lot
7 more detail provided and some of that is still
8 ongoing engineering. But one of the things that
9 CORMIX modeling does look at is what are the best
10 ways for that pipe end to appear so that the dilution
11 you receive is the best possible that you can and so
12 we're looking at anywhere from a 30 to 36 inch
13 diameter pipe at the moment and there could be
14 multiple ports particularly in the beginning when the
15 flows are lower and there could also be diffusers
16 involved. And all of those things will be looked at
17 and engineered over the next few months to make sure
18 that by the time we get to the Army Corps public
19 meeting we have more answers for you.

20 AUDIENCE MEMBER: (Ellie Daniels.) Okay. I
21 do want to know because it seems to be a moving
22 target and I'm interested in the plume related to
23 discharge and ports, is this the same as baffles,
24 meaning that along the termination of the pipe you
25 have multiple places that the effluent --

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1 to at mean low water, so the flats don't count
2 essentially in our distance calculation. So if it's
3 dry to some degree that doesn't -- so when we're
4 talking about depths, for example, that 35 foot depth
5 at the pipe outfall is at mean low water. So, yes,
6 it's counting in our distance, but it's not counting
7 in our depth distance. So the idea is we've looked
8 at over time with the modeling different scenarios
9 for what happens if you put the pipe at 500 meters,
10 what happens if you put the pipe at 1,000 meters,
11 what happens if you put the pipe out at 1500 meters
12 and we've optimized through the modeling scenarios,
13 you know, where do you see change occur and how do we
14 make sure that that discharge isn't coming right back
15 into the bay and the reason you don't have the pipe
16 at, you know, 20 meters is because you're going to
17 get better effects by going further out, but you also
18 don't want to go so far out that you're, you know,
19 getting to the other side of the bay. So part of
20 what we've done -- why the number of changes and why
21 we have a draft application process is so that we can
22 understand the science before we settle on a number
23 and obviously in early meetings we hadn't done the
24 engineering yet and so we're working on it.

25 AUDIENCE MEMBER: (Ellie Daniels.) I have

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1 MS. RANSOM: And we're about to get out of
2 my realm of engineering.

3 AUDIENCE MEMBER: (Ellie Daniels.) Okay.

4 MS. RANSOM: But there are things, for
5 example, like a duck bill where you can have
6 something that opens when the flow reaches a certain
7 level --

8 AUDIENCE MEMBER: (Ellie Daniels.) Exceeds
9 a certain --

10 MS. RANSOM: -- and then comes back down,
11 yes.

12 AUDIENCE MEMBER: (Ellie Daniels.) Okay.
13 Well, early on in this process we were told that the
14 pipe would be a mile and a half out in the bay and
15 then we heard a mile and now we're hearing about it
16 in meters. And so I had used my trusty iPhone, same
17 thing with the kilos to pounds. I really think that
18 an American permit might put American measures on
19 these things so that we could understand them more.
20 But I did use my phone, so I see now that you're
21 talking about .62 miles out and my neighbor who lives
22 down there on the shore talks about a half a mile of
23 flats at low -- low tide. It's a very shallow bay
24 out there, so we're not very far out.

25 MS. RANSOM: I can tell you that this refers

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1 one last question that I don't believe anybody has
2 addressed.

3 MS. TOURANGEAU: I --

4 AUDIENCE MEMBER: (Ellie Daniels.) Excuse
5 me, other people have been able to get to the end of
6 their --

7 MS. TOURANGEAU: I hear you and I am going
8 to interrupt you just briefly to say that right now
9 for the last two at about 15 minutes per person. We
10 have seven people in line and about 20 minutes left,
11 so I'm going to ask people to keep it short and
12 apologize to people that are at the end of the line.

13 AUDIENCE MEMBER: (Ellie Daniels.) We all
14 are aware that there is a second large salmon farm
15 that is applying -- going through its discharge
16 permit right now up in Bucksport and I am wondering
17 if you know how the DEP will be handling the fact
18 that two large facilities will be discharging into
19 the bay and if there is some kind of a plan for a
20 cumulative effect study related to two facilities.

21 MS. TOURANGEAU: It's not truly relevant to
22 our permit, but I do -- I am aware that the DEP has
23 issued a draft permit for that project that has been
24 circulated, so that I'm sure when our permit comes in
25 that that will be taken into consideration.

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1 AUDIENCE MEMBER: (Ellie Daniels.) Thank
 2 you. Just a procedural question. Someone had to
 3 submit their email in order to get a scientific
 4 study. We all submitted emails here, will we all
 5 receive scientific responses to those questions?
 6 MS. TOURANGEAU: We -- like I said at the
 7 beginning of the meeting, I am going to pull the
 8 questions on the permitting criteria out and there
 9 will be narrative responses if they're not addressed
 10 in the transcript.
 11 AUDIENCE MEMBER: (Ellie Daniels.) Thank
 12 you.
 13 AUDIENCE MEMBER: Good evening. My name is
 14 Don Perkins. I run the Gulf of Maine Research
 15 Institute down in Portland and I would note I've done
 16 that for 24 years now. I have been watching the
 17 evolution of the aquaculture industry in Maine since
 18 the late 1980s with the first salmon farms. I was a
 19 co-founder of Friends of Casco Bay and so I have a
 20 deep interest in water quality and we're actively
 21 involved in understanding and stewarding the
 22 ecosystem along the coast of Maine as well as
 23 supporting the growth of a sustainable seafood
 24 industry. So I've been watching this. I've been
 25 watching the evolution of the RAS industry for the

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1 past few years. We at GMRI from an economic point of
 2 view are interested in aquaculture as a
 3 diversification opportunity along this coast. And I
 4 came up here tonight -- I'm actually on vacation, but
 5 I came up here tonight having listened to this from a
 6 distance to just share an observation from the
 7 outside.
 8 Number one, how you all decide as community
 9 to deal with this project is -- that's a local
 10 question and you have a healthy political process
 11 here to do that. I would note from a distance and as
 12 a party that has no dog in this fight, no financial
 13 relationship, no business relationship with Nordic,
 14 that this -- this is a state-of-the-art project.
 15 It's been engineered thoughtfully. I had an
 16 opportunity to grill them about their environmental
 17 impacts. The concentrations of nutrients going into
 18 the bay are small. The number of gallons is a big
 19 number, but it's trivial in the context of the volume
 20 of Belfast Bay. They are engineering -- and I've
 21 been in touch -- I've tracked this through the marine
 22 construction industry, friends in Norway who are very
 23 familiar with the evolution of RAS in Norway.
 24 Objectively, this is the best practice project. It's
 25 being introduced into a state that's known nationally

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1 for having best practice --
 2 AUDIENCE MEMBER: What's your question?
 3 AUDIENCE MEMBER: Yeah, what's your
 4 question?
 5 AUDIENCE MEMBER: (Don Perkins.) I'm going
 6 to get to it. I'm going to get to it. -- best
 7 practice regulatory practices. And so I think, you
 8 know, time will bear out examining this, but the
 9 engineering side has been very well done. I think to
 10 me the big risk question and where my question goes
 11 is on the operational side. Once you've built a
 12 state-of-the-art facility then it's a matter of how
 13 well you operate it. And I'm interested, Erik, in
 14 how you think about, you know, who you're going to
 15 hire, what kind of training and what kind of risk
 16 management you're going to do once it's built. Thank
 17 you.
 18 MS. TOURANGEAU: Thank you.
 19 MR. HEIM: And I totally agree. This kind
 20 of operation that we're looking at --
 21 AUDIENCE MEMBER: It's not related to
 22 effluent, so why can he ask that question? It's not
 23 related to effluence. You just shut Ellie down.
 24 MR. HEIM: I'll answer it briefly because it
 25 also does relate to your discharge. So, yes,

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1 recruiting and training and people is a really
 2 important part of operations discipline. Operations
 3 discipline also goes into your practice and how you
 4 develop your protocols and your practices related to
 5 monitoring and following-up and making your discharge
 6 structure. So all of these things are linked
 7 together. So, for example, in terms of the water
 8 treatment plant, we have a CTO, David, down here, who
 9 has many years of experience. He will be one of the
 10 key people overseeing also the -- all of the
 11 wastewater plants and that experience is highly
 12 important and it's important to have people with
 13 discipline and competence to operate these things.
 14 So that's the short answer and I could talk about a
 15 lot more about the production side, but I'm not going
 16 to do that right now. But, yes, it is true,
 17 operations excellence is extremely important.
 18 AUDIENCE MEMBER: Good evening. My name is
 19 Paul Dean and I live in Belfast. You may not be able
 20 to answer these questions. I have three. The first
 21 one, I don't know if the effluent line will be
 22 pressurized or not. And I heard earlier tonight, I
 23 thought, it's quite noisy in here, that the testing
 24 would be done quarterly on the effluent that comes
 25 out of it and then I heard about the possibility of

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1 the public sampling out further on the line. If that
2 line is actually pressurized, you should be able to
3 bring sample points up from it and sample on a more
4 regular basis. I'm speaking tonight more that I can
5 be on record with the DEP that I would encourage the
6 testing be done on a more regular basis so that, you
7 know, things that -- we'll know what will actually go
8 out in the bay. I haven't heard anything about pH,
9 but that would be another one.

10 That puts into effect that this is a -- with
11 the DEP I have to mention about catastrophic tank
12 failure. If you build this site will there be a berm
13 around it to be able to take the waters from one or
14 two tanks actually breaking down and what the
15 emergency procedure would be for something like that?

16 Last and not least, but on this line that
17 goes out, if it plugs, and I'm hearing things moving
18 and stuff in the line, I'm hoping that you're
19 planning to develop an emergency procedure because
20 you have fish that would be dying shortly in the
21 tanks without that outflow and what would you do in
22 that emergency? And thank you very much.

23 MS. TOURANGEAU: Sir, I am not sure that I
24 captured your last question about the fish dying in
25 the tanks. Were you saying in the --

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1 need to meet so that the monitoring is actually
2 conducted much more frequently than just monthly.

3 And as far as the public sampling piece
4 goes, I think we're still working on developing what
5 that might look like in terms of, you know, who might
6 be working and participating on that and what that
7 might involve and there certainly are both groups and
8 individuals that expressed interest in joining that
9 in some fashion.

10 As far as the questions about the tank
11 collapse procedures and clogs in the effluent line,
12 that actually somewhat gets back to Don's question
13 previously. A lot of what we are -- we're all, you
14 know, concerned about is risk management and when
15 there is human error that's when we have the most
16 risk and I certainly see this in my business as an
17 environmental consultant as well. I send somebody
18 into the field and they are more likely to get
19 injured if they aren't following appropriate
20 procedures. So it does in a lot of ways fall back to
21 do you have appropriate procedures in place for these
22 emergency situations and one of the things that
23 actually is frequently requested in a draft permit is
24 to see within a given time period from the issuance
25 of that permit your plans for dealing with those

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1 AUDIENCE MEMBER: (Don Perkins.) If the
2 outflow of the, you know, the effluent line stops,
3 plugs up.

4 MS. TOURANGEAU: Okay.

5 AUDIENCE MEMBER: (Don Perkins.)
6 Possibility. Everything is a possibility at times
7 and we can go from there.

8 MS. RANSOM: I can take a crack at some of
9 those. Some of them will be partial answers and
10 we'll hopefully get to some more detailed answers for
11 you. Right at the moment I think the design is a
12 little bit unclear still as to whether or not we're
13 having a gravity flow or a pumped flow down the pipe
14 and so I hope you'll come and repeat that question
15 when we're doing our Army Corps permitting.

16 As far as the frequency of monitoring goes,
17 there are certain parameters that get monitored in
18 the plant daily, probably hourly, and that's ongoing
19 throughout. Obviously this is -- these are living
20 creatures that need the water quality to stay good
21 within the plants and so some of that monitoring is
22 conducted and logged with equipment, not manually, so
23 that we can take those readings more frequently. But
24 in addition, the permits are usually issued with
25 monthly, weekly, and daily maximum values that you

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1 emergencies and so those are things that will be
2 developed. The facility will have best management
3 practices that their employees will be trained to
4 follow and those will include things like cleaning
5 pipes so that we hopefully don't have a situation
6 that requires an emergency because the pipe is
7 clogged. So, yeah, there is going to be a procedure
8 for dealing with those kinds of emergency situations.

9 AUDIENCE MEMBER: Hi. My name is Shay
10 Conover. I'm from Islesboro. And I agree,
11 aquaculture done well is going to be an important
12 part of the future of Maine's coastal economy. My
13 husband and I are farm managers on the aquaculture
14 lease site that was shown just south of the map of
15 the discharge site and we also farm muscles on a site
16 a couple miles away on Islesboro.

17 I have two questions. The first is just a
18 clarifying question wondering if the water quality
19 models that you have done, are those based on Phase 1
20 or Phase 2 discharge?

21 MS. TOURANGEAU: Both. I can answer that
22 one.

23 AUDIENCE MEMBER: (Shay Conover.) Thank
24 you. I thought I just missed that and I wanted to
25 clarify.

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1 And then the second, I guess, is our largest
 2 concern is Penobscot Bay for us is great in growing
 3 shellfish because while it -- because of it it is
 4 great, clean water, a lot of the reasons why you want
 5 to come here. We also are very fortunate in
 6 Penobscot Bay in that where there are often
 7 particularly in the summertime large amounts of time
 8 where we're -- folks are closed and other parts of
 9 the state for algal blooms, particularly red tide,
 10 and more Downeast in domoic acid. Penobscot Bay
 11 really has not had any of those closures this season
 12 and at the same time, you know, the coast of Maine
 13 has very clean water but potentially different mixes
 14 of nitrogen and the phosphorous and water
 15 temperatures are all very complex. But I'm
 16 interested in how, you know, what you are bringing
 17 into the water and how that might, you know, even
 18 slightly change our mix and potentially increase the
 19 amount of time where other farmers nearby may be
 20 closed to harvest is a concern.

21 MS. RANSOM: Hi. I'll try to take that one.
 22 So one of, you know, as we went through the
 23 presentation, obviously some of the critical factors
 24 to whether you develop things like algal blooms are
 25 things like your nitrogen and phosphorous discharge.

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1 The -- the facility is taking denitrification
 2 seriously because obviously they want to be a good
 3 steward of this water and we fully believe that the
 4 discharge is not going to have a significant change
 5 to the nitrogen values that you have in the bay now,
 6 that the facility is going to be able to monitor
 7 their discharge as they start up. It's not like --
 8 so we've shown numbers tonight for the full facility,
 9 so all that modeling and all those numbers that we
 10 showed you were for 33,000 metric tons at full
 11 capacity of this facility, but the facility is not
 12 going to get there over night. There is not going to
 13 be 33,000 metric tons of fish in the first year. It
 14 takes a long time to grow a salmon and it's going to
 15 take a long time to build this facility. So there is
 16 going to be many years of monitoring data that we'll
 17 have accumulated to see how they're doing and in the
 18 first months of operation they're going to have a
 19 small discharge with a small amount of nitrogen
 20 coming down the pipe and we're going to see how the
 21 bay responds to that. And as they grow, we'll
 22 continue to add to that dataset, so by the time they
 23 get to a full build-out situation we're going to have
 24 a pretty good understanding how that impacts the bay
 25 and whether you're seeing any impacts down in your

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1 portion of the bay. And so we've tried with the
 2 information we have to place this pipe in a way
 3 that's going to not cause an impact to the bay, but
 4 we're also going to have a lot of time over the next
 5 few years to show that we're right and make sure
 6 that, you know, we don't get to a full phase facility
 7 without understanding the potential impacts of where
 8 it goes.

9 AUDIENCE MEMBER: (Shay Conover.) Right. I
 10 mean, I think local farmers don't have the economic
 11 ability to run that kind of experiment. I guess the
 12 other piece is just -- that might be helpful is to
 13 have some kind of comparative table to understand --
 14 it was helpful to get the background levels in
 15 Penobscot Bay, I think that would be helpful to have
 16 that compared to other regions where there are
 17 aquaculture farms and how it would be -- we'd be able
 18 to more easily compare kind of environmental factors
 19 that other farmers are dealing with would be very
 20 helpful.

21 MS. RANSOM: Just real quick on that is one
 22 of the things that there is a lot of information for
 23 is some of the more closed estuaries, so you'll find,
 24 for example, in Great Bay at the Maine/New Hampshire
 25 border there is a fair bit of shellfish farming there

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1 and there are a number of studies for that area. One
 2 of the things that's better about Penobscot, I guess,
 3 would be to say it's a bit more open. There is a bit
 4 more circulation happening and so your numbers up
 5 here tend to be better than what you might find in
 6 some of those other situations.

7 MR. NOYES: I just had one quick follow-up
 8 question. What are you growing in that lease site?
 9 Are you growing sugar kelp on your lease site, that
 10 one that was plotted?

11 AUDIENCE MEMBER: (Shay Conover.) Sorry.
 12 Currently --

13 MR. NOYES: Sugar kelp and muscles.

14 AUDIENCE MEMBER: (Shay Conover.)

15 Currently, it's blue muscles, but it's permitted to
 16 grow sugar kelp as well as blue muscles.

17 MR. NOYES: Okay. And sugar kelp would be
 18 removing some of those nutrients we discussed?

19 AUDIENCE MEMBER: (Shay Conover.) Yes.

20 MR. NOYES: Okay. Thank you.

21 MS. TOURANGEAU: I'm going to just ask too
 22 if your information is on the sign-in sheet we would
 23 love to connect with you about monitoring.

24 AUDIENCE MEMBER: (Shay Conover.) Yup.
 25 That would be great.

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1 MS. TOURANGEAU: Thank you.
 2 AUDIENCE MEMBER: Hi. My name is Amy Green
 3 and I actually live in Monroe. I would love to live
 4 in Belfast where you have multiple job opportunities
 5 ready, but I haven't actually found affordable
 6 housing here. So the rezoning of your residential
 7 land into this massive industrial project was a shock
 8 for me to find out about.

9 And I did want to talk about the effluent
 10 from the run-off that would happen when you replaced
 11 40 acres of woodlands with 18 football fields of
 12 impervious surface, pavement, rooftop, so that's a
 13 lot of run-off. Projections for our area of
 14 rainfall -- and I know that there are engineering
 15 practices for huge industrial areas. I don't live in
 16 a huge industrial area on purpose. I know this is a
 17 very -- it's almost as though folks are speaking like
 18 you're going to be exploited anyway, isn't it nice
 19 that it's so green and proper.

20 MS. TOURANGEAU: So we are looking for
 21 questions on the discharge.

22 AUDIENCE MEMBER: (Amy Green.) My question
 23 is how are you treating the run-off that will be
 24 gathered from rainfall off of here, that is my
 25 question.

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1 MS. TOURANGEAU: So that will be addressed
 2 in the site location of the Development Act Permit
 3 and the Natural Protection Act permits, which are
 4 still forthcoming. Right now, tonight, we're talking
 5 about the discharge from the wastewater treatment
 6 facility at the project.

7 AUDIENCE MEMBER: (Amy Green.) I was
 8 interpreting that as discharge as well.

9 MS. TOURANGEAU: The storm water doesn't go
 10 in there.

11 AUDIENCE MEMBER: (Amy Green.) It doesn't.
 12 Okay. Thank you.

13 MS. TOURANGEAU: Yup.

14 AUDIENCE MEMBER: Hi. My name is Joelle
 15 Gaseidnes and I live in Belfast.

16 THE REPORTER: Could you spell your last
 17 name for me, please?

18 AUDIENCE MEMBER: (Joelle Gaseidnes.) Sure.
 19 G-A-S-E-I-D-N-E-S.

20 THE REPORTER: Thank you.

21 AUDIENCE MEMBER: (Joelle Gaseidnes.) My
 22 question really is only about climate change and the
 23 warming of the Gulf of Maine, which is the second
 24 most quickly warming body of water on the planet.
 25 And I'm curious if you could just speak a little bit

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1 to what extent that's being factored into planning if
 2 the project goes well you'll be here 30, 40 years
 3 from now and the water will be a very different
 4 temperature, so that's my question.

5 MR. HEIM: Is your question the impact for
 6 the production, is that what you're thinking or?

7 AUDIENCE MEMBER: (Joelle Gaseidnes.) I
 8 just want to hear more about production as well as
 9 the models that you discussed regarding effluent
 10 using today's temperatures and today's scenarios --

11 MR. HEIM: Yup.

12 AUDIENCE MEMBER: (Joelle Gaseidnes.) --
 13 but what does that look like when the water is
 14 warmer?

15 MR. HEIM: Exactly. So this is, I think,
 16 it's not directly related to discharge, but it's sort
 17 of interrelated. This is a concern I have for this
 18 industry when you look at so much of the seafood
 19 production in the world being dependent on the ocean
 20 conditions we have today. So one of the benefits of
 21 this production is that we have temperature control.
 22 We can -- we can adjust pH, we can adjust the oxygen
 23 levels in the water, all of these factors that can be
 24 influenced by climate change we can adjust and that's
 25 one of the big benefits of this production. Much

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1 more difficult to do if you are in the ocean. And
 2 that's what scares me, you know, when you look at
 3 coastlines change in temperatures and all of these
 4 conditions, new species coming in, current species in
 5 some cases disappearing. It's scary. So our
 6 contribution to this in terms of our surroundings is
 7 to minimize any contribution and impact to that
 8 process and I think the whole industry has a common
 9 responsibility. As of today, I am not familiar with
 10 anyone who has gone as far as us to do that, but I am
 11 sure this industry will be moving in that direction
 12 in the years to come because it's necessary.

13 AUDIENCE MEMBER: (Joelle Gaseidnes.) Yeah,
 14 I think my -- I mean, I appreciate that. My question
 15 was more specifically regarding you -- what is coming
 16 out in the effluent, coming into the bay --

17 MR. HEIM: Yup.

18 AUDIENCE MEMBER: (Joelle Gaseidnes.) --
 19 it's assuming a certain temperature, it's assuming a
 20 certain mixing --

21 MR. HEIM: Yup.

22 AUDIENCE MEMBER: (Joelle Gaseidnes.) --
 23 according to temperature and stratification according
 24 to temperature.

25 MR. HEIM: Yup.

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1 AUDIENCE MEMBER: (Joelle Gaseidnes.) And
2 as the bay warms does that stratification change?
3 Does the way in which it mixes become more favorable
4 or less favorable?

5 MR. HEIM: I think you can answer that,
6 Nate.

7 MR. DILL: I think I have a very quick
8 answer to this question. The modeling that we have
9 done considers a full seasonal changes and the -- and
10 actually the data that was collected that we've used
11 or sort of the best dataset that we've used we've
12 looked at data, you know, going all the way back into
13 the '70s. But one of the most comprehensive datasets
14 on stratification in the bay was from '70s and the
15 climate has changed significantly since then I would
16 think in terms of climate variables if you look at
17 long-term average temperatures and things. What's
18 actually -- what's actually important for the -- for
19 the physical behavior of the discharge is what is the
20 temperature now today and we have looked at a range
21 of temperatures that go from right around 0 to
22 degrees to probably around 60 degrees in term of the
23 ambient temperature in that modeling. Those
24 variations -- just the seasonal variations are much,
25 much larger --

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1 reverse -- you have a reverse of temperatures in the
2 summertime when you have very cold, maybe, I don't
3 know, 30 degree water toward the bottom. We're
4 not -- I'm sorry, I just mixed my Celsius and
5 Fahrenheit.

6 AUDIENCE MEMBER: (Joelle Graseidnes.)
7 Yeah.

8 MR. DILL: Yeah. Sorry. Around 30 --

9 AUDIENCE MEMBER: (Joelle Graseidnes.)
10 You're using what my grandfather used to call a super
11 cool thing.

12 MR. DILL: Around 30, yes, 30 to 60 degrees
13 in terms of Fahrenheit. I was giving the low end of
14 Celsius and the high end of Fahrenheit to give the
15 full range. But anyway, the point that I'm trying to
16 make is that those seasonal variations are much
17 bigger than any variation that we're going to see in
18 terms of long-term temperature. And what's actually
19 really important for the physical behavior of the
20 plume is what is the -- what is the current
21 temperature of that season, not so much the average
22 over the long-term 30 year period, so.

23 AUDIENCE MEMBER: (Joelle Graseidnes.)
24 Thank you.

25 MS. TOURANGEAU: I'm going to thank all of

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1 AUDIENCE MEMBER: (Joelle Graseidnes.)
2 You're talking Celsius, right?

3 MR. DILL: No. No. Fahrenheit. I just --

4 AUDIENCE MEMBER: (Joelle Graseidnes.) No.
5 Zero degrees?

6 MR. DILL: Yeah, the water gets pretty cold
7 in the wintertime.

8 AUDIENCE MEMBER: (Joelle Graseidnes.)
9 Okay.

10 MR. DILL: Yes, very cold.

11 AUDIENCE MEMBER: (Joelle Graseidnes.)
12 Okay. Wow.

13 MR. DILL: And there --

14 AUDIENCE MEMBER: (Joelle Graseidnes.) Like
15 below freezing?

16 MR. DILL: Yes. Yes. The surface -- the
17 surface water of the bay gets --

18 AUDIENCE MEMBER: (Joelle Graseidnes.)
19 Okay.

20 MR. DILL: -- down to freezing temperatures
21 in the wintertime, yes.

22 AUDIENCE MEMBER: (Joelle Graseidnes.) All
23 right.

24 MR. DILL: So, now, maybe not at the bottom,
25 it might be warmer. You have -- you have a

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1 the people that have been coming along for managing
2 their time so well. There is a gentleman who has to
3 clean up after us who has stayed late because school
4 closed early today and it's closed tomorrow, so he
5 has given us some leeway. I want to use it as wisely
6 as we possibly can, so please keep up the good work.
7 Thank you.

8 AUDIENCE MEMBER: My name is Suzanne Stone.
9 I live in Belfast. I haven't heard any studies about
10 the dissolved organic carbon levels. I know that the
11 high DOCs are causing dead spots in our ocean and I'm
12 wondering if you've been studying those levels and
13 how much are they coming out in the effluent and the
14 discharge.

15 MS. RANSOM: Could you repeat that for me?

16 AUDIENCE MEMBER: (Suzanne Stone.) Yeah. I
17 am asking about if your studies have been concerned
18 with the dissolved organic carbon levels in the
19 effluent as they're causing dead zones in our ocean.

20 MS. RANSOM: We have not specifically
21 sampled for dissolved organ carbon levels. If you
22 have specific studies and references that you'd like
23 to provide with us, we'll be happy to look at that.

24 AUDIENCE MEMBER: (Suzanne Stone.) I was
25 thinking they would be part of the samples that are

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1 studied.

2 MS. RANSOM: Yeah, I'd very much like to --
3 if you could provide us with the studies, I'd very
4 much like to see what exactly they are monitoring by
5 what method and so forth so that perhaps if it seems
6 like something we should be adding to the monitoring
7 program we can consider that.

8 AUDIENCE MEMBER: (Suzanne Stone.) Thank
9 you.

10 MS. RANSOM: So if you can provide that it
11 would be great. Is your email contact information
12 available?

13 AUDIENCE MEMBER: (Suzanne Stone.) I will
14 write it down.

15 MS. RANSOM: Thank you.

16 AUDIENCE MEMBER: Hi. I'm Camille Giglio
17 and I'm a resident of Thorndike.

18 THE REPORTER: Could you spell your last
19 name for me, please?

20 AUDIENCE MEMBER: (Camille Giglio.)
21 G-I-G-L-I-O.

22 THE REPORTER: Thank you.

23 AUDIENCE MEMBER: (Camille Giglio.) I would
24 love to know what are your plans for filtering out --
25 thanks to Ellie we know that there is a potential for

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1 crop there is no non-GMO soy that exists, so that's
2 another factor to keep in mind when thinking of the
3 feed. And I meant to ask this in my second part of
4 the question is vaccine run-off from -- you ensured
5 us that you're vaccinating all of the fish.

6 MR. HEIM: Yes.

7 AUDIENCE MEMBER: (Camille Giglio.) The
8 potential of vaccines coming into the water and into
9 our bay and water supply, what are the plans for
10 filtering that out as well of the water?

11 MR. HEIM: Yeah. So vaccines are
12 administered not in the tanks. They go through a
13 vaccination process. Basically they're pumped and go
14 slide through a vaccination machine, they give them a
15 small needle and they go back in.

16 AUDIENCE MEMBER: (Camille Giglio.) Right.
17 But their bodies are actually detoxing the vaccines
18 into the water and if you're talking about hundreds
19 of thousands of fish --

20 MR. HEIM: The benefits --

21 AUDIENCE MEMBER: (Camille Giglio.) -- it
22 accumulates quite a bit.

23 MR. HEIM: Yeah. So the benefit
24 typically -- we have a gentleman here who wants to
25 say something.

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1 corn and soy in the feeds for the salmon, which is a
2 pretty known kind of thing. I would love to know
3 your plans for filtering out GMOs from this feed and
4 the plans as far as the effluent and what gets
5 through the UV filtration system and the other
6 filters you're using. So along with the GMOs there
7 is known carcinogens in GMO feed and so I'd love to
8 know your plans for filtering out those things from
9 the water as well.

10 MR. HEIM: So in terms of GMOs they're not
11 allowed in Europe, so we have no GMO issues where I
12 come from and it's something we've become more
13 familiar with here in the U.S. That's is a big
14 discussion.

15 AUDIENCE MEMBER: (Camille Giglio.) Yup.

16 MR. HEIM: So we have had discussions with
17 this with our feed companies.

18 MR. DEMOS: No GMOs.

19 MR. HEIM: There is no GMOs in the feed.
20 We -- I mean, you can get feed with GMO for sure, but
21 we are making a conscious choice in terms of the
22 quality of the product to say away from ingredients
23 with GMOs just to make that clear.

24 AUDIENCE MEMBER: (Camille Giglio.) Okay.
25 Just from -- I'm sure you already know, but soy as a

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1 MR. BRICKNELL: I have actually spent a lot
2 of time developing fish vaccines. Every single fish
3 that gets a vaccine, the salmon anyway, will be
4 injected either by a machine or by hand and their
5 bodies will process it, but what you're doing is
6 you're taking a bacteria or virus is grown in a
7 laboratory quite naturally and the whole organism is
8 going in and you're tricking the immune system into
9 thinking it's got an infection, it breaks it down
10 just as it would any natural infection.

11 AUDIENCE MEMBER: (Camille Giglio.) Yeah.

12 MR. BRICKNELL: There will be none of that
13 excreted from the fish into the water. It's all
14 processed by it's macrophages and it's put into a
15 tissue called the pronephros at the top of its kidney
16 and in the spleen and it becomes part of the fishes
17 immune system.

18 AUDIENCE MEMBER: (Camille Giglio.) Right.
19 I know what a vaccine is. I -- I -- as far as I
20 know, vaccines still come out of our bodies and
21 they're in our water supply.

22 MR. BRICKNELL: No, it doesn't.

23 AUDIENCE MEMBER: (Camille Giglio.) Okay.
24 Thank you.

25 AUDIENCE MEMBER: Yes, my name is Robin

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1 Duffy, D-U-F-F-Y. I live in Belfast. I'm a
2 homeowner and taxpayer here. I think one thing that
3 would be great is you guys keep referencing a lot of
4 studies, but you're not making those available to the
5 mass public. So any presentation I've ever been to
6 where studies are referred to they're always given at
7 the end of a slide or at the end, so it would be
8 great if you could actually provide us with those
9 like on a website or on the city website, I'd really
10 appreciate that.

11 MS. TOURANGEAU: Can I respond to that
12 really quickly?

13 AUDIENCE MEMBER: (Robin Duffy.) Sure.

14 MS. TOURANGEAU: The reports that accompany
15 the modeling, which I think is where you're hearing
16 those studies, have the citations to the studies in
17 them and those will be in the application when it's
18 submitted.

19 AUDIENCE MEMBER: (Robin Duffy.) Okay.
20 Great. Thank you. You spoke about the BOD levels
21 and how much harm can come to the lobster population
22 if it's high and you said that you're going to
23 control for the level of DO, am I correct about that
24 so far?

25 MS. RANSOM: Close. BOD and DO are

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1 lobstermen, lobster people make their living and we
2 have this community here, do we really want to take
3 this risk? Do you really want our community to take
4 the risk because I know you made a joke and said
5 you'd be happy to get on the plane, you still fly,
6 you take the risk. I don't think that our community
7 would want to take that risk, so that's one question
8 I had for you.

9 MR. HEIM: Yup. Okay. So it's more
10 discussion of probabilities. That's what I'm trying
11 to get at. So if you take, for example, BOD, this is
12 reduced in two stages in the system --

13 AUDIENCE MEMBER: (Robin Duffy.) I think
14 people can't hear you.

15 MR. HEIM: Okay. If you take a sample of
16 BOD it's reduced in two stages in the system. First
17 it's reduced in the tanks because we have filtration
18 in the tank system also.

19 AUDIENCE MEMBER: (Robin Duffy.) Right.

20 MR. HEIM: And there is a secondary
21 reduction in the wastewater treatment plant, so there
22 is two stages of that. So what would happen if you
23 get a pressure loss anywhere in the piping, you would
24 drastically reduce the pumping right away, stop
25 feeding the fish so you would reduce your water need

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1 interrelated --

2 AUDIENCE MEMBER: (Robin Duffy.) Right.

3 MS. RANSOM: -- so it's a little confusing.
4 The parameter I was speaking about with regard to the
5 lobsters in particular was the DO. There are a
6 number of studies about DO and lobster shell growth.

7 AUDIENCE MEMBER: (Robin Duffy.) Okay.

8 MS. RANSOM: And the -- the BOD number is
9 more of a general indicator --

10 AUDIENCE MEMBER: (Robin Duffy.) Okay.

11 MS. RANSOM: -- for the health of the
12 ecosystem.

13 AUDIENCE MEMBER: (Robin Duffy.) So the DO
14 is more specific?

15 MS. RANSOM: Correct.

16 AUDIENCE MEMBER: (Robin Duffy.) Okay. So
17 Erik said that like with flying there is always a
18 risk for anything, correct? I wanted to know like
19 let's say that there is a pipe failure because I
20 think that may happen as we just saw recently in the
21 Carolinas there were all these CAFOs with all the --
22 the pig overflow, I mean, things do happen, right.
23 Hurricanes happen, all kinds of issues happen. If
24 there is pipe failure and high levels of DO, do you
25 reach our working waterfront where fishermen and

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1 quickly in the system. So you would very quickly be
2 able to reduce your water exchange in the system and
3 that's how we would deal with a situation like that.
4 And if you have a pressure loss you identify the
5 application and you fix it. So if, for example, the
6 discharge pipe had a pressure loss that would not
7 result in more BOD because it's already been reduced
8 in the facility. If we have a pipe failure for
9 whatever reason on the site we will be in a situation
10 where we would have to take out the feeding of that
11 part of the system, reduce the water cycle right away
12 and if we stop feeding we can actually shut down that
13 pipe and repair it right away. That being said,
14 these are industrial grade pipes, it takes a lot for
15 them to truly fail on a larger scale, so. And we
16 have a professional contractor here in Maine,
17 Cianbro, who is also present who has a long, long
18 experience in building piping systems. So you are
19 likely in very good hands with Maine experience and
20 also doing business. But you're right, everything
21 like this is things we have to think through and plan
22 for and also always think how do we avoid the
23 situations in terms of how we design and how we
24 build. It's an important part of the design process.

25 AUDIENCE MEMBER: (Robin Duffy.) Okay. I

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1 had just a couple other questions. Are you planning
2 on processing fish on site and, if so, do you intend
3 to use the Belfast sewer system for disposing of
4 processing fluids?

5 MR. HEIM: There is a separate treatment
6 plant for fish processing.

7 AUDIENCE MEMBER: (Robin Duffy.) Okay.

8 MR. HEIM: So that comes before the
9 wastewater treatment system.

10 AUDIENCE MEMBER: (Robin Duffy.) Okay.

11 MR. HEIM: So this is also part of the
12 application, so everything we have from the
13 processing plant goes to a separate treatment process
14 and that is also -- that was before the wastewater
15 treatment process.

16 AUDIENCE MEMBER: (Robin Duffy.) Okay. And
17 then finally I --

18 MS. TOURANGEAU: Is it going to Belfast?

19 MR. HEIM: Hmm? No, it's not.

20 AUDIENCE MEMBER: What?

21 MR. HEIM: It's going through
22 multiple treatment stations.

23 MS. TOURANGEAU: She asked if it was also
24 going to Belfast and I asked Erik to answer that
25 question.

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1 MR. HEIM: No, it's not going to Belfast.

2 AUDIENCE MEMBER: (Robin Duffy.) And just
3 as a final comment, I just wanted to say I think any
4 pollution into our waters is too much pollution.

5 AUDIENCE MEMBER: Hi. Bethany Allgrove. I
6 live in Lincolnville. I'm really curious, how do you
7 calculate discharge if you don't know what you're
8 feeding the fish?

9 MR. HEIM: So the first step is to calculate
10 the amount of feed you will use then we know this
11 based upon so-called feed factor, how much -- how
12 much feed we will use for every pound of salmon
13 produced, so that helps us calculate the exact amount
14 of feed we will use.

15 AUDIENCE MEMBER: Please hold the microphone
16 closer.

17 MR. HEIM: Okay. And the next step in that
18 process is to look at the typical feed profile that
19 we would use and so what we've done there is to find
20 interval of various nutrients in the feeds that are
21 available in the market and we set the max values for
22 the values in the feeds, that gives us a big interval
23 to move inside of in terms of composing a final feed.
24 And that's how you get to the figures you see here,
25 which are the max discharge figures, not the average,

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1 the maximum. That gives a lot of room for us to play
2 with the final feed composition at the end before, so
3 it could considerably be that the final feed that we
4 end up with will reduce this discharge quite a bit
5 potentially.

6 AUDIENCE MEMBER: (Bethany Allgrove.) But
7 you said things were still being developed for
8 feed --

9 MR. HEIM: What?

10 AUDIENCE MEMBER: (Bethany Allgrove.) You
11 said new feeds are being developed. If we're not
12 going to know what we're feeding them until 2020, but
13 you're submitting application data in 2018, what's
14 the process for updating the permit and the public
15 information on those updates?

16 MR. HEIM: I think you will see that
17 producers can change their feeds over time. That's
18 very common. That is partly because the feed
19 industry is developing, new options become available.
20 So for us it's a matter of saying conservative
21 assumptions in terms of what we know are available
22 feeds, that gives us room to define a final feed in
23 the end with what we see is available in the market a
24 year or two from now. And it's conceivable that, you
25 know, after one year of operations we may adjust that

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1 because we see new options in the market. That's
2 why, you know, saying that we will use this feed
3 today, in four years we may have a very different
4 feed in operation, but the limitations we always will
5 work with is the assumptions that discharge is based
6 upon and that's what we need to operate within.

7 AUDIENCE MEMBER: (Bethany Allgrove.) So I
8 heard conservative figures and maximum figures and
9 then I'm still trying to figure out where the numbers
10 come from.

11 MR. HEIM: Yeah. So conservative maximum is
12 sort of the same thing for us. We set maximum
13 levels --

14 AUDIENCE MEMBER: (Bethany Allgrove.) Okay.

15 MR. HEIM: -- that are conservative for us.
16 That means we have a lot of room to wiggle in in
17 terms of adjusting feed formulas in the end and
18 that's important for us.

19 MS. RANSOM: I can maybe help. I think if
20 I'm understanding you, you're wondering, well, what
21 happens if the number we put up today for the total
22 nitrogen, for example, has to change because his feed
23 source changes and that feed has a different amount
24 of nitrogen coming out of that. The answer to that
25 is he's put out a maximum that he believes his feed

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1 will be that number or less. So the way the
2 permitting works is he's going to have a permit where
3 there is going to be a level set that says this is
4 how much nitrogen you're allowed to have come out of
5 your facility daily, weekly, monthly, and he's going
6 to have to adhere to that. So as long as the food
7 choices get better and his feeds improve it's fine.
8 You know, maybe he is instead of discharging 5
9 milligrams per liter of something he's now
10 discharging 3, that's fine, he will meet his permit.
11 But if he wants to go over that in the future, he
12 would have to reapply for a new permit because he
13 would then, you know, in theory be violating the
14 permit by discharging too much. So he can -- he can
15 come up with assumptions now that are based on
16 realistic understanding of what the feed sources are,
17 but when the final formulations come out as long as
18 they leave him with the discharge that's lower he's
19 okay.

20 AUDIENCE MEMBER: (Bethany Allgrove.) Okay.
21 That answers my question. Thank you. I'm also
22 asking if you can provide the ping pong balls. I'd
23 like to see those -- I'd like to see what's coming
24 from Bucksport added to the ping pong balls that are
25 going to be in Belfast and then after their two weeks

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1 where they leave the bay, I want to see them in
2 Lincolnville. I'm very concerned about the beach
3 qualities for Bayside and for Lincolnville, so if we
4 can get the study expanded to show how it's going to
5 affect all of Penobscot in a cumulative manner that
6 would certainly help a lot of the concerns that the
7 whole mid-coast has, not just Belfast.

8 MR. DILL: I can --

9 MS. TOURANGEAU: Okay. I'm getting the
10 heads-up. We've got one more person after her, do we
11 have time to and then take this gentleman quickly?

12 AUDIENCE MEMBER: (Custodian.) Very
13 quickly.

14 AUDIENCE MEMBER: (Police Officer.) It
15 could be a 15 minute question.

16 MR. DILL: With the ping pong ball, so there
17 was -- first there was the animation that showed that
18 has ping pong balls everywhere, that's not really
19 representative of the discharge. We were starting
20 them all over the place. We did another simulation
21 where the ping pong balls were being released
22 steadily from where the discharge location is and we
23 ran that long enough so that they were essentially
24 spreading out to the point that any impact they would
25 have is minuscule. Dilutions, you know, of orders of

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1 magnitude of like 10,000, so where it would be
2 impossible to even measure the impact. And that area
3 where you get that distance where you get to that
4 area was totally shown within those figures, so
5 you're so far away at that point that there is
6 really -- there is really no impact essentially.

7 AUDIENCE MEMBER: (Bethany Allgrove.) Okay.
8 So and that information will be in the permit, the
9 study?

10 MR. DILL: Yes.

11 AUDIENCE MEMBER: (Bethany Allgrove.) Okay.
12 Thank you.

13 AUDIENCE MEMBER: Hi. My name is Sid Block,
14 B-L-O-C-K. I appreciate your patience. I'll help
15 you clean up. I'm from Northport and my question, I
16 had hoped somebody would ask, but nobody did. I
17 don't understand why the pipe and the discharge are
18 coming out so close to Northport along Bayside as
19 opposed to going more directly out into the center of
20 the -- of the bay. You're going right past the
21 residential area and a community area with a beach
22 and your dock and things like that as opposed to
23 going directly out into the bay, so that is my
24 question and a good comment.

25 MS. TOURANGEAU: I'm going to take a quick

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1 shot at that and grab me if I'm wrong. I believe
2 what we did was look for access to the bay that got
3 us to the deepest area quickest.

4 AUDIENCE MEMBER: (Sid Block.) Okay.

5 And --

6 MS. TOURANGEAU: Is that right?

7 MS. RANSOM: Yes.

8 AUDIENCE MEMBER: And my quick comment since
9 Mr. Heim did mention the benefits of this even though
10 this was a discharge situation is that before I lived
11 in Northport I lived in Belfast and I do not remember
12 when MBNA came to Belfast or Front Street Shipyard
13 came to Belfast that my property taxes ever went
14 down.

15 AUDIENCE MEMBER: That's right.

16 MS. TOURANGEAU: Thank you all.

17

18 (Hearing concluded at 9:17 p.m.)

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<p>1 CERTIFICATE</p> <p>2 I, Robin J. Dostie, a Court Reporter and</p> <p>3 Notary Public within and for the State of Maine, do</p> <p>4 hereby certify that the foregoing is a true and</p> <p>5 accurate transcript of the proceedings as taken by me</p> <p>6 by means of stenograph,</p> <p>7</p> <p>8 and I have signed:</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13 Court Reporter/Notary Public</p> <p>14</p> <p>15 My Commission Expires: February 6, 2019.</p> <p>16</p> <p>17 DATED: October 16, 2018</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p>5.5 26:14</p> <p>5.8 26:20</p> <p>500 119:9</p> <p>56 105:9</p> <p>< 6 ></p> <p>6 46:23</p> <p>6.3 26:7</p> <p>6.9 19:7, 26:9</p> <p>60 90:19,</p> <p>137:22,</p> <p>139:12</p> <p>673 27:6</p> <p>6:00 1:14</p> <p>< 7 ></p> <p>7 46:23</p> <p>7.7 77:13,</p> <p>82:10, 82:12,</p> <p>82:14, 85:17,</p> <p>86:3</p> <p>70s 13:15,</p> <p>137:13,</p> <p>137:14</p> <p>76 110:5</p> <p>< 8 ></p> <p>8 6:13, 6:16,</p> <p>45:7</p> <p>85 21:14, 27:1</p> <p>< 9 ></p> <p>9 43:18</p> <p>9. 6:19</p> <p>9/5 55:4</p> <p>90 83:12</p> <p>9001 111:19</p> <p>98,000 101:16</p> <p>99 21:24, 26:5,</p> <p>26:13, 26:20</p> <p>9:17 156:18</p> <p>< A ></p> <p>A-R-E 57:3</p> <p>A-U-D-R-A 93:6</p>	<p>A. 1:8, 1:12</p> <p>ability 45:15,</p> <p>95:24,</p> <p>108:20,</p> <p>131:11</p> <p>able 4:21,</p> <p>13:6, 13:11,</p> <p>31:11, 32:7,</p> <p>32:8, 36:13,</p> <p>45:3, 54:6,</p> <p>65:13, 88:2,</p> <p>91:7, 99:2,</p> <p>120:5,</p> <p>124:19,</p> <p>125:2,</p> <p>125:13,</p> <p>130:6,</p> <p>131:17, 148:2</p> <p>above 40:22,</p> <p>68:3, 108:22</p> <p>abroad 8:19</p> <p>Absolutely</p> <p>45:5, 70:2</p> <p>abundant 16:19</p> <p>academic 10:9,</p> <p>10:11, 18:23</p> <p>access 9:21,</p> <p>64:13, 88:9,</p> <p>156:2</p> <p>accessed 65:4</p> <p>accident 59:7</p> <p>accompany</p> <p>145:14</p> <p>according</p> <p>25:22, 136:23</p> <p>account 58:18</p> <p>accredited</p> <p>65:11</p> <p>accumulated</p> <p>130:17</p> <p>accumulates</p> <p>143:22</p> <p>accurate 90:11,</p> <p>94:4, 97:13,</p> <p>157:5</p> <p>accurately</p> <p>97:12</p> <p>achieve 8:8,</p> <p>70:4</p> <p>acid 71:23,</p>	<p>129:10</p> <p>acids 16:21</p> <p>across 133:11</p> <p>across 11:8</p> <p>Act 3:9, 3:10,</p> <p>3:11, 6:21,</p> <p>13:14, 134:2,</p> <p>134:3</p> <p>actively 121:20</p> <p>actual 13:21,</p> <p>15:5, 25:25,</p> <p>39:2, 56:13,</p> <p>60:17, 87:9,</p> <p>90:12, 96:1</p> <p>ADCTRC 32:11</p> <p>add 17:17,</p> <p>55:5, 56:8,</p> <p>83:2, 84:16,</p> <p>130:22</p> <p>added 11:14,</p> <p>111:7, 153:24</p> <p>adding 87:7,</p> <p>103:1, 141:6</p> <p>addition 90:16,</p> <p>91:25, 126:24</p> <p>additional</p> <p>3:15, 3:17,</p> <p>5:7, 19:15,</p> <p>22:17, 43:24,</p> <p>44:1, 84:22,</p> <p>84:23, 92:9,</p> <p>92:17</p> <p>address 21:5,</p> <p>43:22, 44:2,</p> <p>44:3, 44:6,</p> <p>47:6, 49:2,</p> <p>77:21, 78:1,</p> <p>78:12, 82:25,</p> <p>84:23</p> <p>addressed 12:3,</p> <p>78:14,</p> <p>116:25,</p> <p>120:2, 121:9,</p> <p>134:1</p> <p>addresses</p> <p>22:14, 50:24,</p> <p>50:25</p> <p>adequate 59:12</p> <p>adhere 153:6</p> <p>adjacent 67:10</p>
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