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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

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Muddy Run Project : FERC Project No.
Exelon Generation Company : P-2355-011
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DISPUTE STUDY RESOLUTION MEETING

Muddy Run Visitor Center
172 Bethesda Church Road West
Holtswood, Pennsylvania
Wednesday, March 31, 2010

The meeting, pursuant to notice, convened at 9:23 a.m.
before a Staff Panel:

- SEAN MURPHY, Federal Energy Regulatory Commission
- TOM BARRON, PENNSYLVANIA DEP
- MARK BARD, U.S. FISH & WILDLIFE SERVICE

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ATTENDEES

- 2 Tom Sullivan, Gomez and Sullivan, for Exelon
- 3 Jim Spontak, PA Department of Environmental Protection
- 4 Andrew L. Shields, PA Fish & Boat Commission
- 5 John Smith, FERC
- 6 Mike Hendricks, PA Fish & Boat Commission
- 7 Larry Miller, U.S. Fish & Wildlife Service
- 8 Julia Wood, Esq., Van Ness Feldman
- 9 Steve Kartalia, FERC
- 10 Wade Cope, SRBC
- 11 Heidi Biggs, PA Fish & Boat Commission
- 12 John Baummer, FERC
- 13 Duke Pepper, Esq., PA Department of Environmental Protection
- 14 Steve Schremer, Versar
- 15 Shawn Seaman, Maryland Department of Natural Resources,
16 Power Plant Research Program
- 17 Bob Matty, Exelon
- 18 Terry Euston, Normandeau Associates
- 19 John Clements, Esq., Van Ness Feldman
- 20 Don Pugh, American Rivers
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1 P R O C E E D I N G S
2 MR. MURPHY: Good morning, everyone. My name is
3 Sean Murphy. I'm with the Federal Energy Regulatory
4 Commission. I was tasked to head up this Panel for the

5 Dispute Study Resolution for the Muddy Run project.

6 The other two panelists, I'll let them introduce
7 themselves.

8 MR. BARRON: I'm Tom Barron, I work with the
9 water quality statements in Pennsylvania DEP, in Harrisburg.

10 MR. GARD: I'm Mark Gard, I'm the third party
11 member, I'm with Fish & Wildlife Service in Sacramento,
12 California, the instream flow program there.

13 MR. MURPHY: Pretty much this is going to be a
14 question and answer session where we ask the questions, you
15 guys give us some answers, so we have a complete
16 understanding of what's going on with this particular study.

17 Do you have a question you would like to start
18 off with?

19 MR. GARD: To start off with, I wanted to get an
20 idea of what really is the whole scope of the dispute.
21 Looking through, it seems clear that the balloon study is
22 one issue, the hydroacoustics is another; and I wasn't clear
23 from Exelon's letter, it seemed like there maybe was a third
24 issue to deal with radio telemetry on resident fish, but I
25 wasn't too clear on that. So if anybody wants to kind of

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1 summarize it, if all three of those issues are in dispute;
2 or is it just the hydroacoustics and balloon study?

3 MR. SULLIVAN: This is Tom Sullivan with Gomez &
4 Sullivan; we're consultants for Exelon. Since you referred
5 to the Exelon letter, I can tell you from our perspective,
6 anyway.

7 For us there are two issues. One is the

8 mortality study, which is the balloon tagging study. The
9 other is the entrainment study. And the entrainment study
10 could, and has been recommended to use a variety of
11 techniques; and in our letter to the Panel we tried to hit
12 on all of the techniques that have either been suggested or
13 could potentially be used. And what we saw, the pros and
14 cons of those to be.

15 So from our perspective, the dispute falls into
16 two categories. The hydroacoustics, radio telemetry,
17 netting is all a subset of the entrainment dispute.

18 MR. MURPHY: Okay. I don't know if Pennsylvania
19 Department of Protection wants to talk about what their
20 intent was in their dispute, what issues they're trying to
21 look at.

22 MR. PEPPER: My name is Duke Pepper, I'm not a
23 technical person; I'm a lawyer for Pennsylvania. And we can
24 talk about and, you know want to focus on the technical
25 details, from the -- but the scope of our dispute I think is

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1 similar to what's just been described. And with respect to
2 entrainment, the entrainment study includes a broader --
3 from our perspective, a broader array of things to capture
4 data both for migratory fish, for resident fish, and for us
5 other aquatic species, because our water quality standards
6 in Pennsylvania not only include the fish species but the
7 other aquatic organisms that would support the fish species,
8 and so it's a little bit broader than just fish for us, and
9 radio telemetry and hydroacoustics is a part of the
10 resident, the thing that distinguishes Pennsylvania's study

11 dispute request from the federal study dispute request is
12 that the federal request really, from U.S. Fish & Wildlife
13 Service really focuses, because of their authority, on
14 migratory species. The Pennsylvania focuses not on just
15 migratory, but also resident species that we protect under
16 our water quality standards.

17 MR. MILLER: Larry Miller, U.S. Fish & Wildlife
18 Service.

19 As far as the migratory fish species go, we have
20 an interest in mainly the American Shad, and American Shad
21 as being representative of two other migratory species,
22 which is the blueback herring and the alewife, and the
23 American eel, which is actually a catadromous species, a
24 catadromous migratory species.

25 As a result of the way that fish passages are

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1 installed at the hydro projects on the dams currently, in
2 the Susquehanna River, all the migratory fish species have
3 to pass by the Muddy Run Pump Storage Project at some point
4 during their life-cycle, whether they're migrating upstream
5 or migrating downstream, and would potentially be exposed to
6 entrainment and passage through the project, not just by the
7 turbines, but also through the entire project works up to
8 and including the penstock that connects the upper reservoir
9 and the lower reservoir, and the impoundment, the upper
10 impoundment itself, where they would probably have to reside
11 for some time until generation occurred, when they could
12 pass back out through; and of course that's a double-
13 jeopardy situation; they have to make the passage twice in

14 order to complete their migration and their life cycle.

15 Rivers for these migratory fish are two-way
16 streets; they're not a one-way street; they have to go in
17 and out. So they get a double exposure to passage by this
18 project and the impacts associated with it. So we were
19 hoping to get information on what the entrainment potential
20 was, and also what the result of entrainment is in terms of
21 injury or mortality to any fish that are entrained.

22 MR. GARD: I guess I can follow up with another
23 question. When I was looking at the seven study criteria,
24 it seemed like the area of dispute is mainly with the last
25 one; is that correct, from FERC and Exelon's perspective?

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1 Or are there some of the other criteria where they think
2 there's an area of dispute?

3 MR. SMITH: This is John Smith, of FERC. I just
4 wanted to ask him, did you read the last one?

5 MR. GARD: Sure.

6 MR. SMITH: The last one was a level of effort
7 and cost, and --

8 MR. GARD: Yes. Describe considerations of level
9 of effort and cost as applicable, and why any proposed
10 alternative studies would not be sufficient to meet the
11 stated information needs.

12 MR. KARTALIA: I'm Steve Kartalia with FERC, and
13 I guess now is as good a time as any to just say that I
14 think one of the things that was driving our determination
15 was maybe more than some of the agencies like DEP and
16 Interior, we were focused quite heavily on criterion 5; in

17 other words, we're looking ahead toward what studies we feel
18 are necessary to inform license requirements and conditions
19 in the next term of the license. So we are trying to limit
20 the scope of the study to what we feel is necessary to make
21 actual management decisions; and we thought that the
22 combination of literature search, more limited entrainment
23 work focused on the migratory species of interest, and then
24 an evaluation of possible enhancement and protection
25 measures going forward, that that would be adequate for us

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1 in the NEPA document.

2 So we focused quite heavily on criterion 5.

3 MR. GARD: So maybe a follow up, I've been sort
4 of looking through this all, thinking of what the license
5 requirements might be, I guess kind of the big picture thing
6 seems to be some kind of screen or something that would go
7 on, go on the project. Is that sort of what you're thinking
8 about? How the study results would go to whether there
9 would be something like that.

10 MR. KARTALIA: I guess when you're talking about
11 entrainment, there are structural and operational
12 possibilities for addressing the issue. And because of the
13 nature of the project and when it pumps, and just the fact
14 that it is there, resident species are obviously exposed
15 year round, and certain species such as shad, blueback,
16 alewife, eel, have a more limited season of exposure.

17 Looking forward, there might be some operational
18 possibilities to address migratory species; it's hard to --
19 well, at this point, the evaluation not being done yet, it's

20 hard to know what could be done year round operationally; if
21 there are ideas. We'll obviously consider everything.

22 MR. GARD: Yes.

23 MR. SMITH: Just one other category, and I don't
24 know if they're in favor currently, but behavioral devices,
25 too; so there are physical devices and behavioral devices.

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1 MR. GARD: Sure.

2 MR. PEPPER: And I will say that Pennsylvania is
3 not at this point contemplating screens as a technology kind
4 of fix, because then we would simply trade impingement for
5 entrainment. And so what we're really thinking about is
6 some kind of mitigation that would address the species, both
7 migratory, more of a federal approach -- but resident,
8 particularly, we are the only agency really that has water
9 quality standards, Clean Water Act direct authority to
10 address resident species.

11 So from our perspective, kind of from a licensing
12 and conditions, as you know I'm sure we have the ability and
13 authority to establish conditions to protect water quality
14 standards, and they would become conditions of the license;
15 and so we are looking towards the kind of conditions. And
16 the reason that we're seeking the studies isn't to put a
17 screen, but is really to answer questions that we don't have
18 answers to, which the technical staff can sort of talk to
19 you about with respect to what's happening, what's happening
20 to fish, what's happening to other species; and we do have
21 an individual who has been involved in reviewing and
22 personally involved in the entrainment and impingement

23 studies that have been done by all of the power plants under
24 Section 316b of the Federal Clean Water Act.

25 This is kind of akin to that; it's an unusual

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1 hydro project because it's an intake and pumping, so it's
2 kind of akin to noncontact cooling water intake. So we
3 thought having Heidi Biggs, who is with us, she would be
4 able to sort of address some of the issues that you might
5 have in that regard; and we also have individuals with
6 expertise in fisheries as well as radio telemetry; and I
7 guess Larry has some expertise in hydroacoustics, so.

8 But we're not looking towards screens.

9 MR. GARD: Okay.

10 MR. SMITH: That's not our focus.

11 MR. SULLIVAN: Tom Sullivan for Exelon. From our
12 perspective, and we kind of look a little bit into talking
13 about, you know, kind of the end game and PM&E metrics.

14 One of our stated goals for the project is to
15 have a comprehensive relicensing settlement for both Muddy
16 Run and Conowingo. And one of the studies that we are
17 looking at is, you know, what the potential measures are to
18 minimize entrainment at Muddy Run; that is one of the
19 studies that we'd agreed to do as part of the study plan.

20 So I think that piece of the information will be
21 available. How this plays out in the form of final PM&Es
22 for this project will be in the context of an overall PM&E
23 package; and hopefully the parties can negotiate for both
24 projects.

25 MR. GARD: So, I'm not really familiar -- what's

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1 the Conowingo project versus the Muddy Run project?

2 MR. KARTALIA: Conowingo is a separate license.
3 The Conowingo pool is actually the lower reservoir for the
4 Muddy Run project. The Conowingo dam itself is a
5 conventional hydroelectric project located down river on the
6 Susquehanna. In Maryland.

7 MR. PEPPER: It's in Maryland, and Maryland DNR,
8 the resource agencies, just to give you some background,
9 we're going to have -- we just did an amended license for a
10 project at the top end of the pool called the Holwood
11 project, owned by PPL. They are expanding that project, and
12 we did a -- we worked out with all of the resource agencies
13 a settlement that was in the context of a 401 certification.
14 Conowingo was at the very bottom; that license is open on
15 the same schedule as Muddy Run. Muddy Run is within the
16 reservoir. And there's another two dams up from Holwood;
17 that license is also reopened. And we're trying to work all
18 of those. I think the resource agencies have worked
19 together with Exelon, and it is our hope and desire that at
20 the end of the day we have a comprehensive settlement that
21 includes both federal conditions in the license and also
22 state water quality certification. So we're all headed in
23 that direction.

24 MR. GARD: Okay. I think that helps explain how
25 the study results would inform the development of license

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1 requirements.

2 MR. MURPHY: Is there somebody from the
3 Pennsylvania Fish & Boat Commission.

4 Could you tell me if there have been fisheries
5 surveys done of the Conowingo pool?

6 MR. SHIELDS: The fisheries surveys that have been
7 done, probably in the Conowingo pool, may have been done by
8 Maryland DNR, because the lower part of the pool belongs to
9 Maryland. I don't know that our fisheries managers have
10 been in Conowingo pool in the Holtwood area for some time.
11 They've worked in the other pools upstream more. It's a
12 shared jurisdictional water, reciprocal licensing agreement
13 is in place; so a license from either state allows you to
14 fish. So there's some joint management going on there for
15 the resident fisheries, but I don't recall off the top of my
16 head what level of effort our area fisheries managers put
17 into the pool recently.

18 MR. MURPHY: Is Maryland DNR here?

19 MR. SEAMAN: Yes. Unfortunately, I'm in a
20 different program. I'm with the Power Plant Research
21 Program. We don't have someone here from Fisheries; they
22 would have to answer that question.

23 MR. SHIELDS: And for the record, I'm Andy Shields,
24 Pennsylvania Fish & Boat Commission.

25 MR. PEPPER: I will tell you, Pennsylvania is in

1 a separate way working with Exelon in addition to the
2 Conowingo Dam at the bottom of the pool, Holtwood at the
3 top, and Muddy Run pulling water from the pool, there's

4 also, I think the oldest nuclear plant in the country is
5 located within the pool, and it draws noncontact cooling
6 water from the pool and discharges that noncontact cooling
7 water back into the pool. It's called Peach Bottom, the
8 Peach Bottom facility. And as part of -- we are working
9 with Exelon now to negotiate the terms of an MPDES permit
10 and a 316a study that will include a very rigorous data
11 collection effort.

12 Now it is focused more on the areas affected by
13 the plume. When Muddy Run is operating, it actually pulls
14 the plume -- Peach Bottom is downstream, pulls that plume
15 back upstream; but there's going to be, if I recall
16 correctly in the winter -- and Heidi, you may know better --
17 it's in the winter, there's electrofishing; and in the
18 spring and summer there's both seining, deep trawling -- and
19 some more?

20 MS. BIGGS: Electrofishing; and that would be
21 April through October.

22 MR. PEPPER: And there's also going to be some
23 benthic work with reference stations, and then impacted
24 stations, impacted by the plume. And that effort is at
25 least anticipated subject to our reaching resolution with

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1 Exelon, which I think is very close. It is anticipated that
2 that study will continue for a five year period. And it
3 will also include some DO measurements, and obviously
4 because temperature is an issue, temperature. So there is
5 something anticipated.

6 MR. SMITH: John Smith. Sean, this -- and the
Page 12

7 rest of the Panel, you might see this study referred to in
8 the Pennsylvania letters. They had a dispute that they
9 filed, a request for a dispute on this study, because we are
10 going to incorporate the results of this information in the
11 relicensing of the Muddy Run project, and Conowingo project;
12 and I think the agencies felt that it wasn't, the scope
13 wasn't appropriate for the relicensing studies. And
14 basically what we said is we wanted to see what that
15 information was first, and that if it wasn't an appropriate
16 scope, we would require additional field sampling in a
17 subsequent year. So that's the study that he's talking
18 about.

19 MR. MURPHY: So the five years of study have
20 passed, or have they started?

21 MR. PEPPER: It's scheduled to start this spring,
22 so -- is it April? In April, yes.

23 And what we have done, our negotiation is at the
24 point where we have reached closure on the 2010 sampling
25 protocol. We are still working, and I anticipate closure on

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1 the remaining portion in the next several months.

2 MR. MURPHY: Is the information from that study
3 going to be available in time for you to use it?

4 MR. SMITH: That was certainly our intent when we
5 issued the determination letter. I mean, we're not going to
6 have the five years, but we should have the first year.

7 MR. SHIELS: The electrofishing work is scheduled
8 for 2010, so that would be a lot of what the fisheries
9 management --

10 MR. PEPPER: Are they doing electrofishing in the
11 summer? Or is that just winter.

12 MR. SULLIVAN: April to October.

13 MR. PEPPER: Okay.

14 So from our perspective we will get information
15 on what species are in the pool, and some idea of where.
16 There are some stations that get up towards Muddy Run, but
17 that doesn't, from our perspective -- and again, we can talk
18 about it. What that doesn't tell us is what happens --
19 what's entrained. That kind of tells us what's there, but
20 it doesn't --

21 MR. MURPHY: Is there survey data available from
22 the Hol wood pool?

23 MR. PEPPER: It's the same pool. Well, above
24 Hol wood, you mean?

25 MR. MURPHY: Yes.

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1 MR. SHIELDS: We do have walleye. I know we have
2 walleye data, because we were tracking through fishway
3 counts, we were noticing that there was a strong year class
4 of walleye. In addition to the shad counts, resident fishes
5 are also enumerated, identified, enumerated. And we notice
6 that we have a conversation with our fisheries manager, who
7 also had noticed some of this electrofishing, that there was
8 a strong year class a couple of years ago.

9 So I believe there is information in the Hol wood
10 pool above. Characteristics of those pools are somewhat
11 different, and there are different inputs and different
12 withdrawals from water and different water uses; but there

13 is fisheries data, and it gets more frequent as you go up
14 the river.

15 MR. PEPPER: Just so you know, Hol twood has
16 recently received an amended license for their upgrade. And
17 as part of the settlement of that matter, we did a fairly
18 comprehensive 401 water quality certification that included
19 both migratory and resident species; and there's information
20 and requirements for passage, for example, related to
21 resident species in that license. So we're sort of focused
22 on the resident species piece at all of the licensees.
23 We're looking at that at York Haven, which is the furthest
24 north, Maryland at Conowingo, and obviously us here in Muddy
25 Run.

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1 MR. MURPHY: I was just curious, because would
2 the dataset from Hol twood or the next reservoir up provide
3 any base or background level information that could be
4 applied to what's in the Conowingo pool, to try to determine
5 if there's some kind of an effect going on there.

6 MR. SHIELDS: Well, yes and no. Unfortunately,
7 because we're a -- for years we've been denominated as a
8 sports fish agency and our main thrust and focus in
9 fisheries management was sport fishes -- most of that data
10 if not all the data collected by our area manager that I'm
11 thinking about would have been targeted for game fish. So
12 it would have been targeted for walleye and small mouth
13 bass, for the most part, which the time of year, the time of
14 day, the type of pier that you use is very specific to
15 targeting those species and handling them.

16 When they do a fisheries survey where they're
17 targeting sport fish, they may record bluegills or other
18 fish that they see or observe, but they don't bring them in
19 the boat, they don't measure them, they don't weigh them,
20 they don't get condition factors on them, and you don't get
21 a good species composition or relative abundance when you're
22 targeting a sport fish. The types of surveys that we would
23 envision to characterize an aquatic community or fishery in
24 a place like Conowingo pond would be using different types
25 of gear, different seasonal periods, and making sure you're

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1 getting both the small fish and the big sport fish.

2 And in this case, probably the non-game fishes,
3 which are almost never the target of our surveys, would be
4 the most important, because they may be the weakest swimmers
5 or the most available or the most abundant, but they would
6 never be the ones that you would get sport fish data on. So
7 I would say that--

8 MR. MURPHY: But if there's a large impact to
9 those fish, it would show up in the sport fish population.

10 MR. SHIELS: If you did something to impact the
11 forage base, or reduce it or alter it, you might see a
12 change in condition factor of the adults of the predators
13 that eat them.

14 But it would be a hard stretch, and I wouldn't be
15 able to do it, to take data from above the Holmwood Dam that
16 was collected for one purpose and make much of a statement
17 about what's going on in the pool below. Given the ecology
18 of the pools and also how the data was collected. It would

19 be hard for me to tell.

20 MS. BIGGS: Peach Bottom has actually collected a
21 lot of data over the last couple of decades, too. The study
22 that we're proposing for the five years -- I'm Heidi Biggs,
23 Pennsylvania DEP.

24 The study, this is a real comprehensive,
25 extensive study we're planning; there have been a lot of

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1 other fish collection studies done for the 316a and the
2 thermal studies. So there is that fisheries data available;
3 sometimes it's, in a certain season, the data collected in
4 the Nineties would have been June through October, I think.
5 And there are stations around the Conowingo pool, the miles
6 up, Peach Bottom.

7 So that data is available, but like Andy said
8 again, even using that to stretch to see if you can see an
9 impact from Muddy Run; that would be a stretch.

10 MR. MURPHY: Well, I'm not saying that you would
11 see necessarily an impact from Muddy Run, but if you're
12 looking at a healthy population, healthy population -- an
13 unhealthy population would be apparent.

14 MR. SHIELDS: I can give you a good example of
15 that. In looking at the fishway data, we were interested a
16 few years ago -- we became very interested in a resident
17 fish issue because Mike Hendricks, who is here with us,
18 noticed that walleye and small mouth bass at York Haven
19 passage went through the roof. That's because York Haven
20 was open as a fishway in 2000.

21 And in 2000-2001, we had numbers of walleyes

22 moving through there that were in the teens of thousands,
23 like 15,000, 13,000. And we noticed that there was massive
24 movement going from the lower river into the upper river,
25 and we could track it basically through those fishways;

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1 which leads me to my earlier statement about the walleyes.
2 We noticed there was an abundance of walleyes, and you could
3 see them after the York Haven, which was the last fishway to
4 open, opened in 2000. You could see it over a series of
5 years, almost like we were siphoning off some of those fish
6 from below as they move through and move up some.

7 What we know is that certain pools produce better
8 species. We know that channel catfish passage from below
9 York Haven Dam, through York Haven Dam, far exceeds channel
10 catfish passage at any of the other dams. So that tells us
11 that there's something unique below the York Haven Dam,
12 whether it's one dam below or two dams below, that is ideal
13 for channel cats; they're abundant and they're able to move
14 through.

15 The same thing for walleye; it's been mentioned
16 that the Holtwood pool is a walleye factory, because there
17 are more walleyes moving out of the Holtwood pool and then
18 moving up than there are coming from below Conowingo Dam.

19 We think for the reason for that -- I don't want
20 to get off topic, and I won't very far -- we think the
21 reason why there are different populations in the Conowingo
22 pool than there are in the Holtwood pool is that if you're
23 drawing fish from the dam below, and from the water source
24 below, you need to have a strong population below to move

25 them through the dam. We believe there are some things

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1 going on below the Conowingo Dam that are affecting those
2 resident species.

3 So we're not seeing large numbers of certain
4 species in the Conowingo point of order; it may be related
5 to what's below the dam or it could be related to what's
6 going on within the pool. We can't say at this point. But
7 we know when we get to talk about Holtwood, at least for
8 walleyes and small mouth bass, the numbers start to jump.
9 So we can see improvement as you go up the river. That
10 could be related to a number of factors including water
11 quality and habitat.

12 But to answer your question in a longer way,
13 there are differences between the pools, there's something
14 causing those differences, we may not be able to say exactly
15 what those causes are.

16 MR. PEPPER: We do know, in the Conowingo pool,
17 there are a couple of somewhat unique things, as I
18 understand it. One is depth, and there is evidently an
19 extremely deep channel that runs along the eastern shore of
20 the river, downstream from Holtwood. It was fascinating to
21 me that they built the Holtwood Dam immediately above that
22 channel, you know, sort of a natural tailrace. And the
23 intakes for the Muddy Run Pumped Storage are consequently
24 quite deep.

25 So that's somewhat different or quite different

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1 than the Susquehanna River generally. There's also, within
2 the pool, there's a lot going on in that pool, and for
3 example the Peach Bottom thermal discharge, which we are now
4 studying with some degree, and we're going to spend a lot of
5 time studying, doing a model and study in addition to the
6 sampling. We're doing a modeling study to develop a thermal
7 model there, so we know there's some thermal impacts.

8 We do have some impingement data from the area
9 immediately around Peach Bottom, because as part of 316b,
10 they did an impingement study, so we have the information
11 which Heidi can share if you think it's relevant, on
12 impingement there. But there are some real differences of
13 what's going on in that pool. And changes, the Holttwood
14 facility is going to be changing somewhat dramatically. It
15 will be directing a significant amount of additional water
16 down their tailrace on the eastern side of the river, which
17 is in this deeper area immediately upstream from Muddy Run,
18 as they modify their project over the next couple of years.

19 So it's a time that we're gathering a fairly
20 significant amount of data, and it's probably the only time
21 in our careers that we'll have, Holttwood which we've just
22 done, Muddy Run open, Conowingo open, and Peach Bottom, and
23 all of them are kind of on a five year window; the two
24 hydros on a five year window, and then Peach Bottom, the
25 MPDES permit is a five year permit, they plan to do

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1 significant update. So this is our opportunity to kind of

2 evaluate what's going on and establish conditions that are
3 probably going to last, in the case of the hydro facilities,
4 for decades.

5 MR. GARD: I have a question for Exelon.

6 Do you have a cost estimate for the radio
7 telemetry of the resident species? I didn't see that in
8 your March 22nd letter.

9 MR. SULLIVAN: Actually, we don't have a cost
10 estimate for the resident species for radio telemetry.
11 Because of the size of the species that we were looking at,
12 the size of the tags that we'd have to use, as I understand
13 it, that we felt the battery life was so short that we
14 didn't think that that was an appropriate methodology for
15 small resident species. So we did not cost out radio
16 telemetry for resident species.

17 MR. GARD: I was kind of confused about that with
18 the size of the fish. Looking at what Pennsylvania was
19 proposing -- granted it's for the balloon tagging, but
20 they're talking about doing balloon tagging on small mouth
21 or large mouth, 200 to 300 millimeters, and small mouth
22 greater than 300. Seems like you could do radio tags on
23 those size fish, right?

24 MR. EUSTON: Yes, it's not a problem tagging
25 them.

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24

1 The issue that we're trying to look at
2 entrainment is, if you tag a fish, they're not obligated to
3 move anywhere near Muddy Run. So you could tag a hundred
4 fish and not learn anything. That was the idea. But yes,

5 you can tag those size fish.

6 MR. GARD: Okay.

7 MR. SULLIVAN: But the issue was the battery life
8 on the tags, Terry, is that right?

9 MR. EUSTON: Well, in terms of a 200 to 300
10 millimeter fish, there are probably tags that you can
11 surgically insert; but again, the battery life is a factor;
12 the smaller the fish, the smaller the tag that it can
13 handle.

14 MR. GARD: Sure.

15 MR. BARRON: Terry, you had mentioned, they're
16 not obligated to present themselves to the Muddy Run
17 intakes. Directing my question then to the resource
18 agencies, would there be any benefit from knowing if the
19 fish are presenting or not presenting to the intakes? Is
20 that an important piece of information?

21 MR. SHIELDS: Certainly. It would not be
22 scientifically valid to prejudge what those fish may or may
23 not do until you tag them and see what they do. They're
24 swimming around the river, they're foraging, they're going
25 with the flow, against the flow; they're doing what fish do,

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1 depending on the conditions, the water temperature, their
2 activity levels are up or down. What we don't know is what
3 change these flows going in and out of Muddy Run have on
4 that natural condition, and their natural behavior. I don't
5 think anybody can say that at this point.

6 MR. BARRON: One other question, getting back to
7 Duke, you had mentioned Heidi had some information on Peach

8 Bottom impingement there.

9 Heidi, could you describe, from the information
10 if you recall, the amount of fish that were being impinged
11 at Peach Bottom, the relative flows, and how that compares
12 to Muddy Run's flows. And you're only talking impingement
13 of the new entrainment work? Or do you have entrainment
14 history for that?

15 MS. BIGGS: There is some entrainment history
16 that was booked; they studied it in 1977. I haven't been
17 able to track that down. But they studied impingement in
18 2005 and 2006.

19 The reason why -- they have screens, and they're
20 3/8th inch mesh. So the reason why we're studying
21 impingement here is the things that actually get caught on
22 the screens; anything that's smaller than 3/8th inch mesh
23 would be entrained here the way what we're looking at is
24 entrained at Muddy Run.

25 Their study showed in 2005, 2006 that they

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1 impinged approximately 221,000 fish. That's an estimate; it
2 was based on what -- the actual sampling they did, and then
3 they adjusted to see what looked like an annual year,
4 adjusted for sub-sampling and see how fishing that year
5 actually was.

6 The other thing about Peach Bottom is they
7 actually have two intakes. I'll show you a picture here.

8 (Photograph presented to Panel.)

9 Before they started operating, they realized that
10 they were going to have a lot of velocity on the intake

11 structure.

12 MR. BARRON: The picture you provided is a
13 picture of Peach Bottom's intake structure?

14 MS. BIGGS: That's Peach Bottom's intake
15 structure, and you'll see that there are two forebays there.
16 And at the end is their outer intake. This is the inside
17 intake, and that was the original intake. And it's not
18 flush to the shoreline, as you'll see. So they realized
19 that this was going to create really high velocities, and so
20 as fish are traveling down the stream, they're going to be
21 pulled into there very quickly. So it's going to high
22 levels of impingement based on that inner intake.

23 So they decided to create the outer intake to
24 reduce velocities so there would be less impingement. And
25 they're still seeing some impingement, the impingement study

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1 done in 2005 and 2006 was done on the outer intake. So once
2 fish are swept into that system, even if they end up in that
3 forebay between the inner and the outer intakes, they're
4 still -- there's no way for them to escape, so they're
5 pretty much committed to the system. So they assumed
6 mortality.

7 But that was, the estimate for the outer intake
8 was 221,000 fish. That was a lot of gizzard shad, and then
9 a lot of channel catfish, and the species went down from
10 there; American shad and walleye were fairly significant,
11 since American shad are only present at certain times a
12 year.

13 They had also determined that if that intake, the

14 outer intake, hadn't been built, that the impingement on the
15 inner intake would probably have been about 1.5 million fish
16 in a year -- that's again an estimate -- and there's
17 concern, too, there, but basically that's what they decided,
18 based on what they collected on the outer intake.

19 The intake velocities, to the outer intake -- I
20 think during the study they measured, the outer intake was
21 0.3 feet per second, the inner intake was 1.2 foot per
22 second, and the standard we use for impingement is 0.5 feet
23 per second, because EPA determined by compiling a few
24 studies that 0.5 feet per second would allow 96 percent of
25 the fish that they tested -- their swimming speed would

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1 allow them to escape impingement. So 0.5 is usually what we
2 look at as meeting the standard, or that you'll be producing
3 impingement, for the most part.

4 I don't know what Muddy Run, what the velocity
5 is, but that would probably be a major impact on what's
6 actually entrained in that system.

7 MR. BARRON: What is the depth of these intakes?

8 MS. BIGGS: I'm not actually sure, but it's
9 considered a surface -- a surface withdrawal, so that's
10 where it's different at Muddy Run. I don't know if Exelon
11 can verify on that.

12 So that the intake velocity is a function of the
13 pool elevation, so that's affected by Muddy Run. And their
14 maximum through-screen velocity for the outer intake is 1.2
15 foot per second. That's based on worst case conditions at
16 the full elevation; it's down to 104, which is the lowest it

17 can be when Muddy Run can still operate.

18 So that's about as high as it can be there, but
19 it's withdrawing from the surface, it's not a deep water
20 withdrawal like Muddy Run is.

21 MR. PEPPER: In terms of differences, I think, if
22 I recall correctly, there are eight intakes from Muddy Run.
23 I think the velocities are probably larger, and they are
24 obviously quite deeper. So while we have some, there is
25 some relevance to the Peach Bottom study, what we don't know

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1 is what happens as a result of the depth, what happens as a
2 result of pumping, what happens as a result of the up and
3 down.

4 So those are questions for which we don't have
5 answers; that is part of the basis for a desire for the
6 study.

7 MS. BIGGS: The other thing I can just mention
8 about the impingement at Peach Bottom is looking to the
9 data, the majority of fish that were collected there were
10 less than six inches long. So they were fairly small fish;
11 and a lot of them even smaller than that. Smaller fish are
12 younger and they have, they're less likely to have -- the
13 faster swimming species will be able to avoid impingement.

14 And Peach Bottom's designed intake flow is around
15 3500 CFS, whereas Muddy Run is -- up to 28,000 CFS. So
16 again, I don't know what the intake velocity would be; but
17 just knowing, based on the flows, then they're pulling that
18 up in a few hours and that's why the velocity is so great.

19 MR. GARD: Maybe that's a question for Exelon;

20 just on a rough basis, based on the cross-sectional area,
21 28,000 CFS, and what kind of order of magnitude velocities
22 are we looking at?

23 MR. SULLIVAN: I can't say that we have the
24 calculation, that we've done it today. I think you could
25 assume that they would be considerably higher than what

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1 Heidi just referred to at Peach Bottom.

2 One part of the study that we have agreed to do
3 is to collect velocity information in front of the intakes.
4 I mean, we can do the theoretical calculation now based on
5 the drawings, and I don't have that number with me today,
6 but we have agreed to basically do ABCP multi dimensional
7 velocity readings out there as part of this. So that we can
8 characterize kind of what the physical conditions are at the
9 intake.

10 And just to go to a point on the depth, and Heidi
11 mentioned and Duke has mentioned it, too, Peach Bottom, as I
12 understand it is a surface intake. The intake at Muddy Run
13 on the river side is 50 feet deep, so there's a difference
14 in terms of, you know, just the physical characteristics of
15 where they're located, as well.

16 MR. PEPPER: But we do have, and I think there
17 may be some relevance, there was, if I recall correctly, a
18 study done on -- or two studies done on shad which would not
19 typically be at that depth, several years ago, and I think
20 Andy may have, there may be some relevance in terms of
21 depth. One of the things obviously we don't know is, based
22 on the flows -- I mean, Peach Bottom -- Muddy Run can pump

23 down a gigantic lake by four feet in a day, so it's pretty
24 significant. But the information on shad, there was radio
25 telemetry studies done --

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1 MR. SHIELDS: Yes.

2 MR. PEPPER: -- at Muddy Run.

3 MR. SHIELDS: I think it's relevant to the
4 discussion about radio telemetry of any species, and also
5 we're going to hear more about the depth of the intakes.
6 We've heard about the depth of the intakes previously, and
7 there is some argument that while the depth -- the intake is
8 so deep that there's really not many fish down there, where
9 they're pulling off the bottom of the river. Someone can
10 correct me if I'm wrong, but I think those depths are in
11 excess of 50 feet where these intakes are at the bottom of
12 the river.

13 In the radio telemetry study that Exelon
14 conducted in 2001, and another radio telemetry study most
15 recently in 2008, these were adult shad that were tagged and
16 released and purportedly wanted to migrate up the river and
17 go past Muddy Run. They were actually withdrawn up into the
18 tubes and brought up into the reservoir based on the tagging
19 locations. Almost 6 percent in 2001 and almost 4 percent in
20 2008 of those adult shad were somehow withdrawn from depths
21 of greater than 50 feet, which we would not expect them to
22 be swimming at, and they were drawn up through the tubes and
23 entrained. What is not clear is what the fate of those fish
24 was. But we do know they made at least one trip up. We
25 don't know what happened after that; if we do, I don't

1 recall it.

2 I think that's relevant, and it's relevant
3 because we don't know what's going on with the resident
4 fish, but we can't necessarily presume that they're not at
5 the depth of those intakes.

6 MR. MURPHY: Part of my job is to play devil's
7 advocate. What was the mortality of the control group of
8 fish that wasn't actually allowed to proceed upstream, that
9 were held to see what the effects of holding and
10 transporting the shad were?

11 MR. SULLIVAN: Well, there is a mortality. The
12 numbers that I'm quoting you are quoted from the report; and
13 it's agreed upon that these are the fish that make it to the
14 project. So the fish that don't make it to the project are
15 eliminated from the discussion. So we're not taking a
16 percentage from all the fish, because when you do radio
17 tagging, a certain number of the fish turn tail and run,
18 they die, they spit up or regurgitate the tag; so it's not
19 those fish. These are the ones it's agreed upon have made
20 it to the project, so they count. They're the real study
21 fish.

22 So this is the number of the real study fish that
23 made it to the project. So typically in these radio
24 telemetry studies you may lose 10 percent or 20 percent;
25 Terry would know the number, as to what you often lose when

1 you tag fish. They're not available to the study; these are
2 the ones that made it to the study area.

3 MR. MURPHY: Andy, you said 6 percent in 2001.
4 What was it in '08?

5 MR. SHIELDS: It was 3.9 percent. It was 5.5
6 percent in 2001 and 3.9 -- 9 of 232 that made it to the
7 project area.

8 And why that's relevant to us is, for shad we
9 know what comes through the Conowingo Dam. So we can put a
10 finite number on what was counted in that given year when
11 that study was done. So we can extrapolate that percentage
12 to real world numbers of shad, because they all had to be
13 counted as they went through the dam.

14 What we can't do is get a feeling, until at least
15 we understand what's going on with the resident fish, we
16 have no way of knowing what the scale is. So we know the
17 scale can be significant on shad because if it's 3.9 percent
18 of 100,000 shad, which can be a typical run, that's a large
19 number of fish. So.

20 MR. MILLER: Larry Miller, U.S. Fish & Wildlife
21 Service. In preparing for this meeting I went out and
22 actually polled some of my fellow Fish & Wildlife Service
23 folks that work on hydro licensing to see if there were any
24 other pumped storage projects where this type of work had
25 been done; and the only one I was able to locate was on the

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1 Connecticut River, and it was the Northfield Mountain
2 project.

3 And they actually did do an entrainment study

4 there for shad. And the results of that study indicate that
5 a significant number of those shad could be entrained at
6 that particular project, anyhow. The numbers were 1,175,000
7 eggs, because they looked at Lepikko plankton. 2.7 million
8 yolk sac larvae. 10,500,000 post-yolk sac larvae -- and
9 this is actually the life stage that the agencies stock into
10 the river to actually restore fish. And upwards of 37,000
11 late summer or pre-migratory and fall migratory juvenile
12 shad, which are the larger shad. So there were 37,000 of
13 those.

14 So there is definitely a potential for
15 entrainment. Now, unfortunately, the study I'm sure
16 actually observed other fish species, including resident
17 fish species and the samples that they collected, but they
18 did not report that in this particular study. But I'm sure
19 that they were there, because many of them were likely in
20 the water stream at the same time as these animals were.

21 And particularly for these migratory fish that
22 are passing downstream, you know, we talk about velocities
23 and the fact that oh, they can swim against that velocity --
24 you have to remember that these fish are migrating out with
25 the flow. They are going with the flow. Their behavior

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1 dictates that they move with the flow. So if there's a flow
2 that's heading up into that project, they are going to go
3 with it. That's their behavior at this time of year.

4 So the species and time of year are very critical
5 components that you need to consider when you're looking at
6 whether or not entrainment is indeed occurring at a

7 particular facility, because some species, that's what
8 they're looking for.

9 MR. GARD: What methods did they use in that
10 study?

11 MR. MILLER: In that study they actually used
12 plankton mats, I believe at the upper part of the -- in the
13 upper reservoir at the -- you know, call them the intake
14 structure or the outflow structure depending on what
15 direction the water is flowing, because of this pumped
16 storage project. They lowered down on a sled, and I believe
17 they also use some sort of entrainment netting technique. I
18 haven't gotten -- I haven't had a chance to really read the
19 entire report I just recently got, but that the information
20 is germane to what it is that we're talking about here,
21 particularly the American shad.

22 But there has been one study done. But even in
23 that study they didn't venture an estimate on how many of
24 those critters were actually killed, because they didn't do
25 any sort of "blue tag study" or entrainment passage and re-

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1 entrainment and back passage study.

2 MR. SULLIVAN: Tom Sullivan for Exelon. Relative
3 to shad, just so that we're clear, in terms of adult shad we
4 had, as the folks from DEP and Fish and Boat have mentioned,
5 we have done two pretty comprehensive radio telemetry
6 studies for adult shad up-migrating. We will be doing this
7 year a radio telemetry study for juvenile shad now
8 migrating.

9 So in terms of, at least those two life stages,

10 that's not in dispute or contested. We've done two of those
11 studies, we plan on doing another one.

12 MR. GARD: Question for Exelon, without getting
13 into some of the weeds here on the balloon study, You're
14 saying that the study plan had a total of 600 fish that were
15 going to be balloon tagged? Was that 600 for each of -- for
16 the pump and the release, or 600 total for the two different
17 parts of the study?

18 MR. EUSTON: The original thought was because of
19 the logistic problems with, Muddy Run is unique in that it
20 has trash racks at both tends, which is different than a
21 conventional entrainment study, which is the vast majority
22 of stuff that has been done.

23 So there was an initial feasibility portion; if
24 that could be done then the idea was to do 600 in each
25 direction.

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1 MR. GARD: So it's a total of 1200 fish?

2 MR. EUSTON: Yes.

3 MR. GARD: Say you've got fairly good cost
4 estimate for that, and I'm trying to get an idea, then what
5 the cost is for what DEP was recommending; which if I added
6 it up right, I got 3750 fish.

7 Do you have a breakdown of the -- your cost,
8 \$180,000 per operational mode. How much of that is the cost
9 of the tags and how much of it is the initial tagging? And
10 how much of it is the retrieval part of it?

11 I'm trying to figure out, so if you go from 1200
12 to 3750, I'm assuming it's not just multiplying it all the

13 way up, but that there's some efficiencies of scale there?

14 MR. SULLIVAN: I can't answer that directly,
15 other than because some of these were to be done in
16 different seasons. You know, there's a lot of set-up and
17 tear-down associated with that, so I don't think there would
18 be a lot of economies of scale.

19 MR. GARD: Okay.

20 MR. SULLIVAN: One other thing on the cost. Two
21 other factors on the cost. One is, as Terry had alluded to,
22 on the balloon tag study when we had originally contemplated
23 it, what we had committed ourselves to do was a feasibility
24 study. We're not sure how this would physically work or be
25 able to be done. That means that there's a high uncertainty

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1 around the cost for the study itself; and I don't suspect
2 that uncertainty to bring the cost down.

3 The other part of the cost, and Terry pointed it
4 out to me earlier this week, and we hadn't included it in
5 the letter, is that recognize that the costs themselves are
6 study costs. And that's the same for all of the studies.
7 These don't include any operational costs that would be
8 incurred by the plant, by either having to alter operations
9 or shut down operations during construction. Those are not
10 in those costs, but I can tell you they would be significant
11 costs.

12 MR. GARD: So I guess just conservatively we
13 could say it's roughly triple the cost if we went with what
14 DEP was suggesting.

15 A question for DEP: I'm trying to understand

16 what the rationale is for recommending 150 fish treatment,
17 75 controls for the adult American eels versus 100 for all
18 the other ones.

19 MR. SHIELDS: I don't recall.

20 MR. GARD: Okay.

21 MR. SHIELDS: Hate to say it, but I just don't
22 recall.

23 MR. GARD: No problem.

24 MR. BARRON: Tom Barron, Pennsylvania DEP.

25 I'd like to revisit the behavior. Larry, you

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1 described some of the fish where apparently the behavior is
2 to follow the flow in their out-migrations.

3 MR. MILLER: Yes.

4 MR. BARRON: Do we have any sense from anybody in
5 the discussion today, do we have any sense on how a fish
6 behaved? We heard some discussion of the balloon-tag
7 impingement at Peach Bottom. Now that's a study where
8 intake is going all the time; they're not a peaking unit, so
9 they're just pretty much continuous, right?

10 Here at Muddy Run we're presented with a
11 different situation, where it's sometimes there's no flow;
12 it's not operating. At other times, it's a withdrawal and
13 other times it's a discharge. So do we know, are there any
14 other studies out there that you're aware of that have
15 explored the behavioral fish, how they react to these types
16 of unexpected situations at a pumped storage facility like
17 that?

18 MR. MILLER: You mean as far as when they switch
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19 from one mode to the other? Whether it's resting, pumping,
20 or generating?

21 MR. BARRON: Yes.

22 MR. MILLER: Not to my knowledge, not that I know
23 of.

24 MR. BARRON: What I'm getting at is, at Peach
25 Bottom the fish could sense that flow and avoid it.

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1 MR. MILLER: Correct.

2 MR. BARRON: And have some intent.

3 MR. MILLER: I can only speak towards the
4 migratory fish. And you have to look at it in the context
5 of the cumulative influences upon migratory fish; one of
6 which is that essentially this project sits right downstream
7 from the tailrace from Holttwood Dam, and that all fish that
8 would -- you know, if they were migrating out from the upper
9 watershed, they'd likely, if Holttwood is using passage
10 through their turbines or their bypass structure or facility
11 or measure puts fish in the tailrace, they have to pass
12 directly in front of the intake at Muddy Run.

13 Now the species of interest to us, which are
14 American shad -- because remember when I say American shad,
15 we're kind of using those as a surrogate for two other
16 anadromous species; the Blueback herring and the alewife,
17 and American eel. Now the American eel would be out-
18 migrating as adults. They normally migrate, based on what
19 we know of their behavior, at night, in the evening when in
20 fact Muddy Run historically has been pumping up, actually
21 withdrawing the water at that time. So they would be in

22 larger numbers in front of the project at that period of
23 time when they are actually doing the pumping.

24 The same would be true for juvenile American shad
25 that would be up-migrating, because they do that at night,

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1 too. Because normally their behavior is actually to try to
2 go to the surface and go over obstructions at the surface,
3 because if you think about historically the only structures
4 that you probably have to go over would be beaver dams or
5 log jams or something like that. And usually there's flow
6 going over the top of those; there's no substructure that's
7 drawing water off at the lower portion there. So they would
8 normally try to go over the top. But they will sound;
9 they'll go down, they'll go with the flow, they've been
10 demonstrated to do that, most anadromous species including
11 salmon, will sound down if they need to, if that's where the
12 flows are, and able to go out during the night.

13 And in particular you heard them mention, you
14 heard Andy mention the American shad adult studies that were
15 done, and that -- there were I believe about 4 percent
16 entrained from the 2008 study, which is the one I'm most
17 familiar with. But if you look at the data, you'll see that
18 most of those entrainments occurred in June, in the June
19 period when the American shad adults would have spawned and
20 would be heading back out.

21 So they would then be in a downstream mode. In
22 addition, the flows in the river during that particular
23 period of time were less than what the pumping capacity was
24 of the Muddy Run Pumped Storage Project. So those fish

25 would have a huge influence, because more of the actual

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1 flow, the natural flow of the river would be headed up into
2 the Muddy Run Pumped Storage Project. So they essentially
3 have no other flow indicator downstream, moving flow
4 indicator other than what's going up into Muddy Run.

5 So their behavior at that time would be to say,
6 'this is the way to go' potentially, you know, and 'we're
7 going to go up.' And that's when most of the entrainment
8 actually occurred during the 2008 study that was referenced
9 earlier. So yes, the behavior of the fish is very
10 important.

11 Now as far as resident species goes and what
12 their behavior is, I can't -- I couldn't speak to that.

13 MR. PEPPER: And as far as we know, there have
14 not been studies that have evaluated resident species in
15 terms of behavior; and that's part of the reason we're
16 seeking a study. I mean, there seems to be a recognition at
17 both FERC and Exelon that studies are appropriate for
18 migrating species. But the migrating species are there for
19 a period of time and are important; the resident species are
20 there all the time, and there seems to be less interest in
21 evaluating, just trying to determine what's happening with
22 them.

23 I guess our view is the fact that there haven't
24 been studies at all, and there's not really anything to
25 compare to, is why we're seeking this study here.

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1 MR. GARD: I have a question for Exelon.

2 Do you have a cost estimate yet for the radio
3 telemetry study for out-migrating adult eel?

4 MR. SULLIVAN: We do. I don't have it with me,
5 unfortunately. I don't have the cost with me. I can
6 probably make a phone call and get that cost today, if you'd
7 like that.

8 MR. GARD: Okay, that would be great.

9 MR. KARTALIA: I just wanted to mention some
10 pumped storage work that I'm aware of from, that did look at
11 resident species that you might want to consider. It was
12 done at the Corps of Engineers' Richard B. Russell project
13 on the Savannah River. The lead investigator and report
14 writer was John Nessler at Waterways Experiment Station.
15 There might be something in there that helped estimate
16 behavior or describe behavior of resident species around the
17 pumped storage; although it's a project that goes across the
18 width of the river as opposed to coming off one bank of the
19 river, like Muddy Run. So the design of it is not similar,
20 but some of the species composition is similar. Just for
21 what it's worth.

22 That is one study that, when the time comes for
23 us to prepare a NEPA document, that's one study that we
24 would probably be reviewing.

25 MR. SMITH: Who is the author?

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1 MR. KARTALIA: John Nessler. {ph}

2 MR. BARRON: Do you know how that compares -- you
3 said it was different, that it was across the river versus
4 along the side.

5 MR. KARTALIA: Right.

6 MR. BARRON: How about elevations?

7 MR. KARTALIA: It's about 200 foot of head
8 difference. So last, Muddy Run it's -- I want to say
9 somewhere in the neighborhood of 30,000 CFS hydraulic
10 capacity, I think.

11 Well, let's see, I think it's 7500 and eight
12 turbines. It's a lot of flow and it's -- again, there are
13 some alosids there, but they're landlocked Blueback herring,
14 not migratory. And then there are a lot of other species
15 that would be of interest in the Susquehanna also occur in
16 the Savannah; but it's not a -- like all these studies,
17 there's no exact surrogate for the project you're looking
18 at, but it might be something to look at. It's out there in
19 the literature as something to be reviewed, anyway.

20 MR. GARD: I actually had some follow up
21 questions about what's in the literature. There seemed to
22 be a couple of references here which I'm not familiar with.
23 Looking through the study plan.

24 Frankie, et al., 97 and EPRI 97. I take it
25 you've looked at those?

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1 MR. KARTALIA: Some of them, yes.

2 MR. GARD: So did any of those look at projects
3 where there was this kind of level of head, what was it, 400
4 feet of head or so we're talking about, Muddy Run?

5 MR. EUSTON: 325.
6 MR. GARD: 325 feet of head.
7 MR. KARTALIA: I think in EPRI 97, I don't think
8 there's one in there that is over 250.
9 MR. SMITH: I know there's one in Colorado, but I
10 don't remember the head on it.
11 MR. KARTALIA: There's also one, I know in the
12 early Nineties there was entrainment work done at Duke
13 Power's Bad Creek Project in South Carolina, the Jocassee
14 Reservoir. That's a thousand foot of head there, so you
15 might want to get a report on that project.
16 MR. GARD: What project is that again?
17 MR. KARTALIA: It's Duke Power's Bad Creek, and
18 it's pumped storage.
19 MR. GARD: Bad Creek?
20 MR. KARTALIA: Bad Creek, yes, and it's on Lake
21 Jocassee in South Carolina.
22 MR. GARD: Another question. In these two
23 reports, were any of the studies using this balloon
24 technology? Or were they from mostly netting studies.
25 MR. KARTALIA: Well, EPRI 97 reviews a lot of

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1 studies that looked at both mortality, usually estimated by
2 balloon tagging and tracking methods. And then some of them
3 also were accompanied by netting.

4 EPRI 97 is one of the more well-known reviews of
5 multiple studies.

6 MR. SHIELDS: EPRI has quite a series of
7 documents; some of them build off of other ones, and so

8 there's a number of EPRI documents.

9 MR. KARTALIA: And there are also other documents
10 that were prepared -- the EPRI 97 was prepared by Alden Labs
11 for EPRI. All their labs published some other papers using
12 similar projects, or maybe the same group of projects. They
13 got published in a lot of different places.

14 During the early Nineties there were lots and
15 lots of entrainment and mortality studies being conducted,
16 and EPRI 97 is just one of the reports that kind of
17 summarized the findings.

18 MR. GARD: Okay. I was just trying to figure
19 out, because it seemed like there was -- it's getting close
20 to when -- apparently when the balloon studies were kind of
21 starting off; it seems like the paper I found on it was '92,
22 so I was just kind of curious to see.

23 MR. KARTALIA: One thing I'll add: If you do
24 look at a lot of those, there's quite a lot of variance, a
25 lot of test group variance, a lot of control group

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1 mortality. It's hard to find real super-clear patterns; but
2 -- which I think is why the literature review kind of came
3 into favor as opposed to -- there was lots of site-specific
4 work up until about the mid-Nineties, and then there were so
5 many projects that had been done and reviewed, that people
6 kind of started going towards, favoring the literature
7 review approach, because often at an individual site we
8 didn't get a particularly scientifically satisfying answer
9 because of all the variance.

10 I think that is one of the factors why FERC sort

11 of moved toward the literature view approach.

12 MR. GARD: And this was even with the balloon
13 studies, too? There was a lot of variance?

14 MR. KARTALIA: Yes. And the studies, you know,
15 it's not a bash on the people conducting the studies, I
16 think it's the nature of the study that there's a lot of
17 people scratching their head at the end. It's sometimes
18 hard to make sense of what the numbers mean.

19 MR. BARRON: From the review of these studies, if
20 you go down the road during the study, could it address any
21 of these logistics issues that have been identified for
22 placing the sample and the safety issues, and things that
23 were brought out in the Exelon comments? Do those studies
24 give us any better understanding how we could do it
25 differently?

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1 MR. KARTALIA: I don't know. As someone that
2 does a lot of the studies, maybe Terry would be better at
3 answering that. I've reviewed a lot more of them than I've
4 participated in.

5 MR. EUSTON: We've gotten pretty creative at some
6 of this stuff that can be done. We've only worked at one --
7 well, we did some work at Richard B. Russell, but that was
8 I think more in generation mode than in pump mode. We did
9 some work at Northfield, which Larry mentioned, but it was a
10 separate piece; and that's where we really ran into the
11 logistics issues.

12 I think Muddy Run has a tunnel somewhere in
13 excess of a thousand feet total between the bottom of the

14 towers and the river discharge location. Northfield was
15 substantially longer; but they're both convoluted, it's not
16 a straight shot like at a convention hydro.

17 So the problem was fish got hung up in the plant.
18 When you retrieved fish you had no idea if it got hit by
19 anything or it was a result of the racks at year-end. It
20 was a pilot level study, and the pilot-level study said
21 'don't go any further because you can't recover enough fish
22 to get any kind of an answer that would be satisfying.'

23 But we've worked at high head sites with these as
24 well as low head sites. That's basically it; you just don't
25 know until you get there what logistics issues you have to

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1 overcome, but you can -- based on what we've seen at the
2 conventional sites, you can pretty well project the problems
3 you're going to have at something like this one.

4 MR. PEPPER: Well, I guess what I'm unclear about
5 is, there's already a commitment to do juvenile American
6 shad, and I don't understand the difference in logistics
7 with other fish, particularly other fish that many of which
8 -- I don't think most of them are smaller, and many of them
9 are larger. So if there's not -- the study can be done for
10 shad; I don't understand the logistics. Maybe I'm just
11 missing something.

12 MR. MURPHY: I think what their point was on that
13 was the fish size for shad is similar, but with their clear
14 impetus for going downstream, the juveniles at that point,
15 you're pretty sure that when you stick a tag in it that the
16 battery isn't going to run out before it gets past the Muddy

17 Run intake. But with the residents of the same size, you
18 put the fish in there with the tag and you're not sure that
19 the fish is going to make it past the Muddy Run before the
20 battery runs out, because you're not sure if the fish is
21 even interested in going downstream.

22 MR. SHIELDS: We understand that there's some
23 logistical issues with smaller fish, but many of the fish
24 that we would tag would also be larger fish. And part of
25 the idea is to determine what is happening, and we recognize

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1 that we may not get -- but we believe we would get more
2 information than zero information. And many of the fish, if
3 I understand it correctly, that we're asking to tag are
4 quite a bit larger.

5 MR. GARD: I had another question for FERC on the
6 EPRI 97 and the other study, of the literature reviews.

7 Did any of those look at gills?

8 MR. KARTALIA: I can take a quick glance. I
9 can't recall --

10 MR. SHIELDS: The one study that was done at
11 Luray, was in the EPRI document.

12 MR. KARTALIA: Okay.

13 MR. SHIELDS: That was a conventional low head,
14 very low head study.

15 MR. KARTALIA: It seems like a lot of the --

16 MR. SHIELDS: Yes, St. Lawrence and Boharn Warr
17 {ph} were in there also.

18 MR. KARTALIA: Okay.

19 And also, there's eel turbine mortality study at

20 FDR, there's a lot on the St. Lawrence?

21 MR. SHIELDS: Yes.

22 MR. KARTALIA: So I think some of the main
23 numbers that are kicked around for eel turbine mortality is
24 from the St. Lawrence at FDR.

25 MR. SULLIVAN: We just did one in France last

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1 year, too, that hasn't hit the stores yet; but yes, there
2 has been -- Boharn Warr did a similar study to ours. Ours
3 at FDR, we did the balloon tag study at FDR.

4 MR. SHIELDS: And a lot of FERC, either EAs, EISs,
5 or license orders, we've referenced numbers for mortalities
6 at conventional projects. So that shouldn't be too hard to
7 find that.

8 MR. MURPHY: I guess I'm still searching for the
9 red flag that you guys are saying to make resident fish so
10 important.

11 MR. SHIELDS: We don't know the species that are
12 being impacted, we don't know the size of the fishes that
13 are being impacted, we don't know what time of the year
14 might be more critical than another time of the year. We
15 don't know what influence that has on the ability for other
16 fish to forage on this fish, or for them have their behavior
17 disrupted as they take a ride up and maybe a ride back.

18 We know that fish probably -- I don't know the
19 origin of all the fish that show up in Muddy Run Reservoir,
20 but we believe that Muddy Run Reservoir gets stopped on
21 those that do survive that maybe make a one way trip, get
22 into Muddy Run Reservoir. And then there's a fishery

23 developed there, that fishery is not really open to the
24 public because of safety issues.

25 The water fluctuates in the Muddy Run Reservoir

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1 by many feet every day. So if you're in the Muddy Run
2 Reservoir; let's say you make the trip from the river up and
3 you survive it, and you would like to reproduce, your
4 opportunities for reproduction are gone because water levels
5 change so much that your eggs or your fry would be dried
6 out, or you would succumb to predation.

7 So on the Muddy Run side of things, in the
8 reservoir side, we believe that the pumping and the moving
9 of fish in and out, the water level fluctuation removes that
10 as a viable fishery; certainly the public doesn't have
11 access to it. On the river side, we hear from anecdotal
12 reports that we have from our area fisheries manager that
13 years ago when the Fish and Boat Commission stocked hybrid
14 striped bass, hybrid striped bass are a combination of a
15 white bass and a striped bass, that they are a very
16 voracious predator, but they also are a scavenger, an
17 opportunist. That hybrid striper fishing was very good in
18 the area below the Muddy Run discharge.

19 And we can presume a couple things. One of them
20 is that it may be that injured or dead bait fish or forage
21 fish are coming down and are now made available. That
22 suggests to us that there was something going on because of
23 Muddy Run that was evidenced at the end point, which was
24 observation by fishermen. The fishermen knew to show up
25 because the fish were there.

1 For the resident fish in particular, we feel that
2 there are a lot of presumptions or assumptions that could be
3 made, but there are no real data and no real facts to guide
4 us as to what the level of impact is on the resident fish.
5 And so all the concerns that we have related to resident
6 fish are really a series of questions; what's going on with
7 the species, what's going on with the size classes, how does
8 that affect their ecology, how does it play into the rest of
9 the system. We can't put a number on anything, and we can't
10 put a value judgment on: 'Well, only carp get killed, the
11 rest are okay.' Or, 'only gizzard shad get killed, but
12 walleyes are okay.' We just, we don't have any information
13 to make those value judgments.

14 MR. PEPPER: Well, and we also, for purposes of
15 establishing conditions that would address mitigation for
16 impacts, if we don't know what the impacts are, we don't
17 know what type of conditions would be appropriate to
18 mitigate for the impacts that are occurring. As I said
19 earlier, we're not talking about putting screens and
20 converting an entrainment issue to an impingement issue, but
21 we are expecting mitigation, and we're just trying to sort
22 out what effect should we be mitigating, to address.

23 MR. MURPHY: I guess I'm just looking for
24 something like fish kills or depressed fishing, fishermen
25 are complaining because there's no, something available

1 there. It's something that is raising the red flag for you
2 other than we think there's possibly something going on,
3 leaving us to try to prove a negative.

4 MR. SHIELDS: Well, one of the things that's, the
5 reason why this is logistically difficult is Exelon has
6 expressed concerns, as I mentioned earlier, with the
7 intakes. Things happen under water out of sight that,
8 unless you have a way to measure them, you can't make a
9 determination as to what's happening.

10 If some of these things were done -- and say the
11 discharge was only into two feet of water and it was crystal
12 clear, you might have a visual cue as to what's going on
13 when fish come back out of the discharge. But because we're
14 discharging into depths of greater than 50 feet, in a river
15 system that has its flow being reversed at least once a day,
16 Lord only knows what type of eddies and spirals and vortices
17 are taking place down at the bottom, which causes fish that
18 are entrained, either injured to be taken by predators or
19 killed, maybe not to come to the surface before some other
20 predator or scavenger takes advantage of that.

21 Now if you happen to be a catfish or a scavenger
22 that does take advantage of that, that might be okay for
23 you, but it might be disrupting the ecology of other
24 species. Just because there aren't any bodies that are
25 visible to us at the surface where we live, I don't think

1 should be presumed that there aren't bodies down there or
2 there isn't injury to the ecology of the fish. It's just,
3 the logistics of it make it difficult for us to make those

4 types of observations; at both ends, at the upstream end, in
5 the reservoir, and at the downstream end for the intakes in
6 the river.

7 MR. PEPPER: And our responsibility, as you may
8 know -- the State's responsibilities for these kind of
9 issues has changed, most particularly since 1994. Beginning
10 in the mid-Eighties, states started to look at not just
11 pollutant impacts in their water quality certification
12 decisions for FERC licensed projects, but also impacts to
13 physical and biological characteristics. And there's been
14 some dispute between FERC and states and project sponsors
15 over the years in that regard, that has resulted in a number
16 of U.S. Supreme Court cases that I think have made it
17 clear that states have certain responsibilities and
18 authorities to evaluate impacts and to establish conditions
19 that become part of licenses.

20 That is relatively new, and certainly with
21 respect to these projects, this is the first time that
22 states have been in a position, Pennsylvania and Maryland,
23 to be responsible to exercise that authority. That
24 authority absolutely clearly includes protecting the
25 existing and designated uses; and so we're simply trying to,

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1 given that authority, starting from where we are, gather the
2 information to be able to exercise it in a meaningful and
3 defensible way. So that's the -- this isn't driven by the
4 fact that we've seen dead fish; it's driven by the fact that
5 we have a responsibility to protect water quality standards
6 from impacts. When an MPDES permitting contacts, which is a

7 normal Clean Water Act thing, we do that once every five
8 years. We have no permitting here. The only opportunity
9 for us to establish conditions is once every thirty years.
10 So we're seeking to gather information to appropriately
11 condition the license for the next thirty years.

12 MR. CLEMENTS: Just for the record, this is John
13 Clements, Counsel to Van Ness.

14 When you get a license, it's not fixed in stone
15 for thirty years; every license has mandatory conditions
16 that FERC imposes that allow FERC to reopen the license at
17 the request of federal or state agencies, or on its own
18 motion to modify license conditions over time, depending on
19 changes and circumstances that may occur -- or if policies
20 change or laws change -- so that the door doesn't slam when
21 the license is issued. There's a lot of openings in it.

22 MR. PEPPER: Well, the difference is that FERC
23 makes that decision; states have really only one opportunity
24 to make a decision; and the opportunity is in the context of
25 a water quality certification; which we have independent

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1 authority and we recognize that. We're trying to
2 participate in the pre-licensing process so that we don't
3 wait until one year out, and then say "Oh, hey great, you
4 did all that stuff. You've got one year to go and there's
5 all these things." So we recognize we have independent
6 authority; we're trying to sort of inform the FERC licensing
7 process here in our exercise of that authority. So that's
8 why we're seeking studies.

9 MR. GARD: Larry.

10 MR. MILLER: In addition to that, the request or
11 the opportunity to request information from the project
12 occurs once every thirty years, and that's the only time,
13 and that's what this whole study request is about.

14 MR. GARD: To kind of change the subject here, a
15 question for Exelon. Looking through what you talked about
16 in your latest letter here on hydroacoustics, you're citing
17 the FERC 95. Have you looked at some of the more recent
18 work, especially like out of Columbia on hydroacoustics and
19 some of the techniques they're using to discriminate between
20 fish and background noise from bubbles and debris, and
21 discriminating different types of species of fish?

22 MR. SULLIVAN: I don't know that we have the
23 folks here that could answer that today. Clearly for Terry
24 and I, we're the technical branch of this, and I don't think
25 either of us know. I guess I do have a question.

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1 We're assuming that some type of netting
2 verification is going to be required. Do you know, did
3 those Columbia studies have that component?

4 MR. GARD: From at least what I've seen in the
5 literature, they don't do a net verification study.

6 MR. SULLIVAN: Okay.

7 MR. GARD: I mean, there was some -- a good
8 article that I found, I think it was cited in the Johnson,
9 et al. report that Fish & Wildlife Service cited; this was
10 Thorn and Johnson 93 Reviews in Fishery Science. They had
11 some comparison there. It's a good basic-- they go through
12 and look at, Review of Hydroacoustic Studies for Estimation

13 of Salmonid Downriver Migration Past Hydroelectric
14 Facilities on the Columbia and Snake Rivers in the 1980s; a
15 real good review paper.

16 And they have some data that they present
17 comparing sonar estimates and estimates derived from net
18 sampling. So that would be one thing you could look at.

19 MR. SULLIVAN: One of the things we would be
20 curious about is -- as I say, somebody else on our staff may
21 have looked at this, but one of the things we'd be curious
22 about is, you know, what's the accuracy of the -- the
23 reported accuracy, if you don't do field truthing of the
24 hydroacoustic study. And how verifiable is that accuracy?

25 We'll talk with the folks in our shop to see if

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1 that was looked at, but I think that's how the discussion
2 typically goes in our shop when we have the discussion.

3 MR. SHIELDS: I was just going to say, those
4 studies, they probably had a pretty good idea of what they
5 were looking at, and had pretty good confidence what the
6 species were. Whereas I don't think anyone knows here what
7 we're looking at.

8 MR. PEPPER: Well, one thing we will know over
9 time is, we're going to be doing a significant amount of
10 gathering of data within the pool over the next five years.
11 So I think we're going to have some pretty good sense in the
12 lower pool of species composition.

13 MR. GARD: I guess another thing I was thinking,
14 I don't know if Exelon has looked at alternatives to the
15 netting. If you look at sort of these projects altogether;

16 the balloon studies, you've got radio telemetry as part of
17 it, you've got the radio telemetry for American eel and
18 potentially radio telemetry for resident species; have you
19 looked at how that could be used for ground truthing of the
20 hydroacoustics?

21 MR. SULLIVAN: I don't know that we -- well, let
22 me step back. Yes, I believe that we have considered that
23 some of that, some of the radio telemetry work we have
24 committed ourselves to could be used for some of that. I
25 don't know that we've quantified that.

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1 The problem that we have is that, you know, you
2 don't know necessarily, especially if you're trying to
3 identify the species and life stage. I guess we're
4 skeptical that without some type of ground truthing of what
5 it is that's going through when you're seeing the
6 hydroacoustic readings, it's going to be very difficult to
7 separate those images.

8 MR. SHIELDS: I don't know if you guys were going
9 to ask this question of us or not, but we mentioned in the
10 beginning of the meeting that we also looked at that
11 criteria by -- how the information would inform our decision
12 on licensing.

13 MR. SULLIVAN: Right.

14 MR. SMITH: And I think it's really important to
15 think about that. In the days when all these studies were
16 being done, the compensation for individual fish, the total
17 number and the species that were involved, was the 'in'
18 thing to do. So all these entrainment studies were being

19 done; Michigan, Wisconsin, they all had -- their
20 recommendations were they wanted \$30,000 for this many fish,
21 \$100,000 mitigation for this many fish.

22 And the Commission, there's been some court
23 cases, and after those court cases, which I don't think I --
24 I don't know them that well myself, but it came back to us
25 that it really depended on the effect on the fishery,

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1 whether there was an observed effect or not, and that we
2 weren't doing this one-for-one money compensation or
3 mitigation for each individual fish.

4 That's one of the reasons we got away from just
5 doing the netting studies. Because a lot of the arguments
6 would be: Did you sample the right unit? Did you sample
7 enough units? There was arguments over the total number,
8 whether it was an accurate representation of the total
9 number and of the correct species and all that.

10 So our line of thinking was, because that
11 potential mitigation wasn't in the Commission's realm
12 anymore; the things that were still in play were
13 operational, physical structures like barriers or things
14 like that.

15 So how much information is needed to make a
16 decision like that? And we felt that you could characterize
17 a, in general terms based on the literature, some likely
18 effect of a project of this magnitude -- which might be
19 quite high, might not be. But you could make that
20 characterization, and it would be sufficient to justify some
21 measure; either a screen or an operation measure, or

22 something like that.

23 If the agencies are still coming at it from an
24 in-kind -- not sure in-kind is the right word -- but every
25 fish, there's some mitigation that should be there for the

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1 loss of that fish, that's kind of counter to what our
2 thinking was when we asked for the information the way we
3 asked for it.

4 MR. SHIELDS: The other side of that, though, is
5 if you --

6 MR. PEPPER: Well, let me be clear, we are not
7 asking for compensation by fish; we're looking at impacts to
8 the communities and how to mitigate the specific impacts --
9 you know, if it's an impact to spawning, spawning impacts --
10 so just to be clear, we're not looking at dollars -- you
11 know a walleye of this size is 68 cents -- and I remember
12 those.

13 MR. SHIELDS: Yes. I wasn't clear, when you
14 mentioned mitigation, what that mitigation could possibly
15 be.

16 MR. PEPPER: Yes, right.

17 MR. SHIELDS: Is it stocking, is it --

18 MR. PEPPER: Exactly. We're unclear about what
19 to mitigate.

20 MR. SHIELDS: And the other side of that is, and I
21 recognize that there's a quandary for all of us here. If
22 you go too far down the road that this is a population
23 effect. Has a population effect been determined? That's
24 one end of the spectrum.

25 The other end of the spectrum is, 10 cents for

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1 fish and 20 fish are killed. Those are the two polar
2 opposites. It's not -- if you wanted to determine a
3 population effect, none of us have enough time or money to
4 do it. Or lifetime left.

5 So we're somewhere in between that, where we're
6 not interested in dollars or pennies for a fish, and we're
7 not interested in making people study things ad nauseum.
8 We're trying to get somewhere in the middle to figure out
9 how can we make a best estimate of what the impact is for
10 our trust resources.

11 So that quite literally for me personally I can
12 go back to our executive director and say "This is or isn't
13 an appropriate response for this project." That's what it
14 boils down to for me.

15 MR. PEPPER: And it's an interesting issue in
16 that -- you mentioned screenings, for example. You know,
17 under 316b, which was one of the drivers for some of the
18 work that we've done, the courts have been very clear that
19 restoration kinds of mitigation is not allowed; you have to
20 look at technology. And so utilities have been very
21 concerned, because the technology that that drives is closed
22 loop pooling, which is wildly expensive.

23 We don't have that constraint here where we're
24 looking at effects; we can actually look at restoration kind
25 of mitigation; and so if it's a spawning effect you can look

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1 at trying to provide some additional restoration activities
2 to provide more spawning. Depending on the life stage and
3 effect, getting some sense of that, we can kind of tailor
4 mitigation; and part of what we're trying to do here is
5 figure out what should we be tailoring towards.

6 MR. SPONTAK: If I can add to that, this is Jim
7 Spontak from DEP.

8 Operational changes we see as very limited at
9 this facility, except for maybe certain times of the year or
10 certain times of the day when the operations can be changed.
11 And as Duke already said, I think somebody else mentioned
12 before, putting a screen in front of this thing just changes
13 it from entrainment to impingement, so that is really not an
14 option that we see as viable.

15 So the only thing we are left looking at is the
16 mitigation or what really is the effect on the fishing.

17 MR. GARD: Well, it seems like some of the
18 behavioral things or options to this, it's a study that's
19 just been done, was done out in California where they were
20 looking at a combination of bubbles and sound and light, I
21 believe; and found that was a pretty effective nonstructural
22 barrier.

23 I guess getting back to this criteria 5, looking
24 at it, it seems like there's two parts to it. So there is,
25 what is the nexus between proper project operations and

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1 effects, which seems pretty clear. I mean, the project

2 could be entraining fish, and that could be causing
3 mortality. And then the second part is, how the study
4 results would inform the development of license
5 requirements.

6 So is FERC more concerned with that second part,
7 then? You're looking at --.

8 MR. KARTALIA: I would say yes, more focused on
9 the second half. Because I think most people in the room
10 would agree that the amount of water that flows through the
11 project in a river so full of fish, there's probably -- we
12 know entrainment is happening.

13 MR. GARD: Sure, yes.

14 MR. KARTALIA: And we know with that amount of
15 head and back and forth, there's probably substantial
16 mortality. I would say, you know, a review of the
17 literature doesn't make that a wild statement.

18 But the second half of 5, what to do about it
19 over the next license term would drive what we see as the
20 scope of this study.

21 MR. SMITH: And I just would add that from the
22 Agency's perspective of looking at what the appropriate
23 level of mitigation is, it's tricky to figure out what the
24 appropriate scope is. I mean, we've mentioned things like
25 operational, which we feel -- the telemetry studies, get at

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1 that, at least for those species.

2 If you're not netting every single intake or
3 you're not able to count and identify everything that's
4 going in there, but it's not clear how you would ever get at

5 the mitigation. I used the dollars part, but -- which we're
6 not doing anymore. Which we don't do anymore.

7 MR. SULLIVAN: You're right. I'm not sure we
8 have a dispute.

9 MR. SMITH: What's that?

10 MR. SULLIVAN: I'm not sure we have a dispute.

11 MR. SHIELDS: It's the process.

12 MR. SULLIVAN: Well, I think --

13 MR. SHIELDS: The process has kind of bound us in.

14 MR. SULLIVAN: Into where we are, right.

15 MR. SHIELDS: Aren't we all thinking about where
16 we want to be when this is over? Besides lunch?

17 MR. SULLIVAN: Right.

18 (Laughter)

19 MR. SHIELDS: We're all thinking about where we
20 want to be, but the process does not allow us to do that at
21 this point; so we're trying to get a fax to allow us to make
22 a decision to be where we want to be.

23 MR. BARRON: What part doesn't allow you to get
24 to that?

25 MR. SULLIVAN: Well, within the FERC process --

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1 MR. CLEMENTS: Speak now or forever hold your
2 peace. That's the process.

3 MR. SHIELDS: Within the FERC process, we are in
4 the study framework right now. We have to come up and
5 devise ideas of things we need to get studied that we think
6 are important so we can make determinations later. You guys
7 are working with us for the next two years, and we've got

8 this small window to have these studies done; and hopefully
9 we can agree what's important and what isn't important, get
10 the study done. Then we have data that makes sense to all
11 of us. And then we can make a recommendation, they can make
12 a recommendation, we compromise, and our arbiter says this
13 is what we're going to do for the next thirty years, and
14 this is how we solve the problem.

15 Because we're kind of stuck in that framework,
16 we're forced to ask questions on things that we may not know
17 at the end if that piece of data is going to be helpful in
18 making a PM&E decision. And I understand why we have the
19 process, but if it were more open, because we're all kind of
20 wanting to jump to the chase, we could say "Here's the
21 chase. What are we going to do, what's the end result?
22 Should we put our time and effort towards that, and can we
23 get to that route quicker without as many studies?"

24 If we had that option, some cases we'd want to
25 exercise that, some projects we might not want to exercise

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1 that, nor would you.

2 MR. SULLIVAN: And I don't disagree with you,
3 Andy. I think part of where we are in the process right now
4 -- I mean, we're very focused on kind of where the endgame
5 is going to be. We think that there are a number of studies
6 that we're doing this first year that will help inform
7 basically settlement discussions. And we think that the
8 habitat studies that we're doing both in the pond at
9 Conowingo and downstream will help, we think the krill
10 surveys will help, we think the radio telemetry work that

11 we're doing will help.

12 And at the end of the day, as I mentioned a
13 little while ago, what we're looking to do is come to a
14 comprehensive settlement. And by its very nature, that
15 comprehensive settlement is going to involve trade-offs
16 because different resources, depending on what has more
17 importance to other folks.

18 I think the crux of where we are on this right
19 now is that on the entrainment mortality studies, that
20 there's enough uncertainty around the results, and the price
21 tag is so high that it really won't help inform those PM&E
22 discussions. That even after we've spent the money and done
23 the work that there will be enough uncertainty around that
24 that we'll be back at a table with a lot more data but the
25 same arguments.

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1 And from our perspective -- if we're not focused
2 on compensation, and if we're focused on habitat or if we're
3 focused on stalking, we're doing some of those studies now,
4 and it almost seems like we need to do some additional
5 amount of that work in like year two to help inform
6 settlement discussions. I may be speaking a little out of
7 turn, but -- and obviously it depends on the cost, but from
8 our perspective that would be a better use of resources,
9 financial resources than doing a study that we're pretty
10 sure we're going to argue about when we're all said and
11 done.

12 MR. SMITH: If the population of the community --
13 if the fish community assemblage, its composition and the

14 condition factors and all of that, were what you would
15 classify as good or excellent -- if it were already like
16 that, would you be still concerned of the losses from the
17 pond? Or is it related to the condition and the health of
18 the fishery?

19 MR. SHIELDS: I don't understand.

20 MR. SMITH: Well, I mean, FERC would say we would
21 have a hard case to make -- if the fishery was in great
22 shape and we really had a whole bunch of years of data and
23 we had good condition factors, and people came from all over
24 the world to fish here, it would be hard for us to justify
25 an operational measure or a different fish screen to prevent

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1 entrainment at any particular project.

2 But some states might argue, "Well, it's still a
3 resource of the state that's being killed, and we want some
4 compensation for that."

5 I'm just asking, is that --

6 MR. PEPPER: Well, I wouldn't frame what we're
7 seeking as compensation, I guess, because I just want to
8 stay away from the old -- when I hear 'compensation' I think
9 the old 'dollar per fish.' But what I would say is, our
10 responsibility is to restore, protect and maintain uses.
11 And so when there's an impact on a use, what we're seeking
12 to do is figure out what do we need to do to mitigate the
13 impact on that use?

14 So we're simply trying to gather information to
15 see what impacts are occurring, what the extent of those, we
16 think those impacts are, to help fashion essentially the

17 remedy, the mitigation. And as these guys have both said,
18 we're sort of driven by this FERC process that's so front-
19 loaded and disputes are within a certain period of time, and
20 we go through this process that isn't necessarily driven by
21 all of the resource constraints.

22 But we are looking to mitigate for effects.

23 MR. SMITH: The reason I was asking is because we
24 -- it was our intent that the studies being done would look
25 at those, would give us information on that. Now maybe some

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1 folks think that they're not adequate to do that; but we --
2 it was our intent that this other study being done for Peach
3 Bottom could be used in this relicensing and yet it would
4 give some information to characterize the fishery, as far as
5 the condition and the health and the species composition and
6 all that.

7 And if the effort could go more into making sure
8 that that study is done right, to get that information, is
9 that a possible option, or does it not matter? In your
10 opinion, does it not matter if it's a great fishery, if
11 they're losing a million fish to entrainment it's still a
12 problem?

13 MR. SULLIVAN: Well, it matters, but then it
14 becomes relative. We would have a concern, but a concern
15 would be lessened if the population or the fisheries as a
16 whole in the pool seem to be doing well from other metrics,
17 other measures, then you would have less concern. But it's
18 still a concern because it's an unknown for us; and I can
19 just picture, as we talked about Steve mentioned the

20 velocities and flows, it's an unknown; and you haven't
21 figured out a way yet to know what that unknown is.

22 But I wouldn't say that just, some other
23 parameter, other measure, means everything is perfect; but
24 it would put it in perspective. So quite frankly, that's
25 why the study requests that you've seen aren't just on one

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1 thing. If you look at them -- well, actually if you look at
2 them, we start out in July, they were individual study
3 requests that got at different things; and as we've gone
4 through time, those study requests have kind of evolved and
5 more, through discussion, through trying to combine efforts
6 and activities into very few studies, ultimately. But I
7 think you're looking at -- when you see our study requests,
8 we're looking at this fishery over here, this impact, this
9 water quality, this sediment -- you know, there's all the
10 parts we're trying to get the complete picture.

11 MR. SPONTAK: And the study you're talking about
12 would give you the information on the fishery, but you don't
13 know if that is the correct fishery that should be there.
14 We talked about this on the way down; Muddy Run may actually
15 be selecting for certain fish, because walleyes like to move
16 around, they're sensitive to light, they like cold water.
17 They may be moving into that deep area in front of those
18 intakes at certain times of the year and getting sucked up,
19 where other fish wouldn't be.

20 And we already have evidence that this is a very
21 good walleye fishery and a nursery in the Holewood pool, but
22 should it be better or should there be bigger fish? What is

23 the size, class or are bigger fish getting sucked up or
24 smaller fish? It depends on if Muddy Run's operations is
25 selecting for certain fish, fish that want to go deep and

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1 fish that want to be in cold water. And it also varies on
2 the time of year.

3 MR. PEPPER: Well, there's also -- I will tell
4 you that it's a little complicated for us, because our scope
5 of review and authority is different in the context of the
6 Peach Bottom study than in the context of our normal water
7 quality protection. The Clean Water Act sort of bifurcates
8 the way that states protect water quality, and it does it
9 differently for thermal impacts from grandfather sources
10 versus all other impacts.

11 Everything other than thermal impacts from
12 grandfathered sources, we have to protect, maintain and
13 restore designated and existing uses. For thermal impacts
14 from grandfathered sources, it's whether the impact can --
15 you don't have to meet water quality standards if the impact
16 results in a balanced indigenous aquatic community; that's a
17 different standard. We have a dispute with Exelon right now
18 about whether there is currently a balanced indigenous
19 aquatic community in the reservoir. We're avoiding
20 litigating that dispute because of the commitments that
21 Exelon we believe is making.

22 So there's different standards, there's different
23 -- we're looking at different things in the studies. But I
24 think maybe more importantly is, we're looking at the
25 thermal impacts there, this standard. Here we're looking at

1 what's the impact on the aquatic community resulting from
2 this operation? What's the impact on species -- we don't
3 know the impact on species, we don't know on life stages, we
4 don't know on the floating -- the stuff I think of as the
5 floating stuff; the eggs and the plankton and all that.

6 And if there are impacts, then what do we do to
7 mitigate? The bigger the impact, obviously the more the
8 mitigation. If it's an impact on a certain species, we may
9 want to focus the litigation there rather than in another,
10 on something else. We may get information about what's in
11 the pool, but we won't know what this project is doing, what
12 it's affecting.

13 MR. CLEMENTS: This is John Clements again.

14 I think what you're hearing here is a difference
15 in perspective between the Commission and the DEP in that,
16 if I understand this correctly, and tell me if I'm saying it
17 -- at FERC the fact that there may be an impact doesn't lead
18 to necessarily a requirement for mitigation if conditions
19 are deemed to be sufficiently good that the project impacts
20 are minor, there may be no need for a specific mitigation
21 measure. I think I'm hearing something very different from
22 Pennsylvania, which is that if you have an impact, you have
23 to mitigate. There's not -- you couldn't find a reservoir
24 that looks good enough that you would just leave it alone.
25 If there's an impact, even if can't really quantify it to

1 your satisfaction, you need to mitigate. And I don't think
2 that's the FERC mindset.

3 MR. PEPPER: I wouldn't quite characterize it
4 that way. What we're trying to say is, we need to get a
5 study to evaluate what impact there is, based on that
6 evaluation, and we've sort of listed all the legal theory;
7 based on what that evaluation is, we have to make a
8 determination of what is the impact, is it an acceptable
9 impact, not an acceptable impact? If it's not acceptable,
10 what do we need to do? Do we need to focus this, that or
11 the other thing.

12 What we're saying is, we can't evaluate what the
13 impact is, what the scope of impact is until we see what's
14 being affected. So we're simply trying to figure out what
15 is being affected. There could be impacts that we would say
16 -- they're an impact, but they don't have -- they're not of
17 the type that we need to mitigate for. We just don't know
18 that.

19 So I don't think it's true that any impact at all
20 requires --

21 MR. CLEMENTS: I'm glad to hear that.

22 MR. SULLIVAN: Tom Sullivan from Gomez and
23 Sullivan.

24 MR. PEPPER: See, we're moving towards consensus
25 already.

1 MR. SULLIVAN: I guess that's where I'm going; is
2 that we're kind of morphing from -- well, we keep bouncing
3 back and forth between regulatory requirements and

4 settlement-type issues, and it strikes me, we've been at the
5 table with you guys for a year. You know, I'd be surprised
6 if you hadn't already started to think about a list as to
7 what you'd like to see for PM&E measures.

8 I can tell you that Exelon has already started to
9 think about a list of what's important to them technically.
10 Some of that is regardless of the studies that we're going
11 to do; some of that may be supported by the studies, and the
12 studies may turn over other things. I mean, we do this fish
13 study on Conowingo pond and we find that there's a year
14 class or a life stage that's in really short supply, that
15 could lead to some type of habitat improvement project.

16 And I guess that's kind of where we're coming
17 from, is that if you look at -- I think the study that we've
18 proposed and the study that FERC has assigned to us will
19 meet our NEPA requirements. And I think given the
20 uncertainties, I think we can make a case it would meet
21 regulatory requirements for an environmental document.

22 I think the other studies that we've proposed
23 will help inform if there's any mitigation things out there
24 that either one of us think would have value in a
25 negotiation. And I think that has value. That has value.

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1 And I guess that's the thing for us, is that we just don't
2 see where this particular physical study in the field helps
3 inform that discussion.

4 And if there's things that we're missing that
5 help inform, would help inform a settlement discussion,
6 that's a whole other discussion to have that we should have.

7 To make sure that we have the stuff that allows us to sit at
8 the table in late 2011 and start to have settlement
9 discussions. We just don't think this is one of those
10 studies, that's all.

11 MR. SMITH: Just for clarity, though, Exelon is
12 not proposing the original balloon tagging, are you? Was
13 that clear to you guys?

14 MR. MURPHY: The second study?

15 MR. SMITH: Is it clear that Exelon was not --
16 they originally proposed some level of balloon tagging, and
17 then we said we didn't feel it was needed; they're not now
18 proposing it.

19 MR. GARD: Right. Yes, I understood that.

20 MR. SULLIVAN: Now we're going back to put the
21 fine points in the things.

22 Just to be clear, what we proposed was a pilot
23 study.

24 MR. SMITH: Right, but the reason I mention it,
25 just because in the beginning we were comparing the costs, I

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1 think, of the numbers versus what Pennsylvania's numbers
2 were, and it sounded --.

3 MR. SULLIVAN: And just as an addition to this,
4 we keep throwing around cost and obviously we put some cost
5 in our letter but there's a couple of things, as the Panel
6 considers this that I think need to be considered, which
7 are: If you do pursue this study, how many units or how
8 many openings. Because there are 16 on the downstream side
9 and there's 48 on the upstream side. So how many openings

10 would you consider to be a representative sample, and what
11 would you consider to be a representative sampling
12 frequency? Because we've been involved in a lot of
13 entrainment studies in conventional projects, and those are
14 always the two catchers.

15 So you'll see, there's a footnote in our letter
16 where we've assumed a sampling frequency and we've assumed
17 it to be, I think on one unit maybe. We gave a per-unit
18 cost on a sampling frequency. Depending on what the scope of
19 that is, that can drive that cost significantly higher.

20 So as the Panel considers what the level of
21 effort cost is, that's something it seems like it should be
22 considered.

23 MR. GARD: Are there differences between each
24 unit that would make you suspect that the mortality is
25 different for different units?

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1 MR. SULLIVAN: I don't know enough about the flow
2 patterns to each unit. I mean physically, they're set up
3 physically the same; they're in different locations in the
4 river. I don't know about the hydraulics of the specific
5 openings enough to know if they would be. I do know from
6 having been involved in a number of those studies that were
7 cited in the early Nineties that that's always the point of
8 dispute. You know, you sample Unit 1 and 3, they look good,
9 but we don't know anything about 2 and 4, you know, when
10 you're all said and done.

11 So that's --

12 MR. SHIELDS: And there's also the issue of the
Page 71

13 area sample for each unit. Partial netting, full netting,
14 hydroacoustics versus netting. Sometimes you need them
15 both.

16 MR. SULLIVAN: Then there is just the physical
17 logistics here of basically if you have to do any type of
18 netting, you know, you've got a unit that basically goes,
19 generates both ways, with screens.

20 MR. SHIELDS: Now for the power reservoir, would
21 you be able to sample an actual opening? Or would you have
22 to just put a net in the forebay area, was it called
23 forebay, that area.

24 MR. SULLIVAN: The canal?

25 MR. SHIELDS: And just hope for the best. I mean,

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1 is there a way -- is the flow controlled enough coming out
2 of an opening to actually sample it?

3 MR. EUSTON: We don't know. I do know that it's
4 80 feet deep there. You know, to even be able to retrieve
5 anything out of there is a big engineering project in
6 itself.

7 MR. SPONTAK: On those towers, are there various
8 openings in them, or are they all --?

9 MR. EUSTON: The towers are configured with the
10 intakes at the bottom, arrayed like a 12-opening system at
11 the bottom. And they have a controller inside the tower
12 that just slides up and down; it opens and closes them.
13 They're all in the same --

14 MR. SULLIVAN: But each gauge is the same
15 dimensions.

16 MR. EUSTON: -- dimensions, but there's 12 of
17 them, and 4 towers. And they're at the bottom of the canal.

18 MR. MURPHY: I just have one more question for
19 you. The surveys, are they going to take depth into account
20 when they're going around, and make note of that?

21 MS. BIGGS: For the thermal studies that -- is
22 that what you mean?

23 MR. MURPHY: The fish surveys, or whatever you
24 call them.

25 MS. BIGGS: Well, there's going to be

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1 electrofishing and seining that's going to be more
2 shoreline, but the trawling -- I mean, it will be at a
3 certain depth.

4 MR. MURPHY: So there are some deep water
5 surveys.

6 MS. BIGGS: Yes, that will be in pretty much the
7 middle of the pool, as I understand.

8 MR. PEPPER: There's obviously not as much going
9 on up towards Muddy Run as down towards Peach Bottom. We're
10 really looking for the impact within and near the plume.
11 And so we're looking for impacts to species resulting from
12 the effects, the thermal effects; both exclusion and --
13 effects from the thermal effects.

14 So much of the data will be within the area
15 affected by the thermal plume, so it's not necessarily going
16 to be representative of the broader Conowingo pool,
17 particularly out by Muddy Run.

18 MR. SULLIVAN: No, but it would still give us
Page 73

19 some information --

20 MR. PEPPER: Yes. It's going to give us a ton of
21 information.

22 MS. BIGGS: It will give us information about
23 what species are there.

24 MR. PEPPER: A lot of information.

25 MR. GARD: The trawls will be midwater or

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1 benthic, bottom trawls?

2 MS. BIGGS: Well, they'll be benthic trawls, but
3 only like in the pond -- like they'll be, the pond is really
4 thick. They will be benthic. And there are several trawl
5 transects planned, and we hope to have a reference condition
6 that is out of -- the study is to compare in plume and out
7 of thermal plume. So that might be more representative. It
8 will be upstream, so. It will be more representative out of
9 plume.

10 MR. GARD: One last question for FERC. Looking
11 at the last criteria here, the alternative studies, I
12 understand a literature review is the alternative study for
13 the balloon studies. But I wasn't clear what the
14 alternative studies were for the hydroacoustics and the
15 radio telemetry of resident species.

16 MR. KARTALIA: Well, I don't know that you can
17 really characterize entrainment at a particular site by
18 looking at entrainment at other sites; so the literature
19 review really wouldn't inform the entrainment part of the
20 question.

21 MR. GARD: Right. So it's just reviewing --

22 that's just addressing what, of the fish that are entrained,
23 what percent of them die.

24 MR. KARTALIA: Right, and I guess we focused the
25 entrainment question on the two species of most concern for

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1 management purposes, and obviously it's not the only species
2 of concern for DEP, but the shad and the eel, looking ahead
3 if there was some seasonal operational measure that can be
4 implemented to deal with that seasonal exposure of those
5 species, we thought that information might be useful for
6 informing that discussion or evaluation and decision.

7 MR. GARD: So to try to understand this, on the
8 side of how many fish are getting entrained, you're looking
9 at the radio telemetry for the shad and the eel, and then
10 not --

11 MR. KARTALIA: The resident, it will remain a
12 question mark, I think.

13 MR. GARD: Okay.

14 MR. KARTALIA: And the evaluation of what to do
15 about it would be more guided by the health of the fishery
16 and things we find out from the fish aquatic survey.

17 MR. SMITH: I just want to add, though, that
18 we've asked the same additional information item, that we
19 asked Exelon to do, on a number of other projects recently.
20 And some of them are undergoing the ILP process, some of
21 them, the traditional process.

22 What we've seen in the final reports that we get,
23 once we get this literature review done, is usually some
24 fairly specific information on the mortality rates that are

25 likely to be seen.

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1 But we also get like a low-medium-high kind of
2 characterization of the total entrainment, based on the
3 configuration of the project; the head of the project, the
4 type of turbines, all of that, the flow in the river. So I
5 think we should get some information on entrainment as well,
6 and if you want to ask for some examples just so you can see
7 what this output looks like, I can give you the project
8 numbers and you can look them up.

9 But there is some general information on that.

10 MR. SULLIVAN: Just to add to that, too, in terms
11 of what Exelon has proposed, we do intend to do a literature
12 review not only for mortality but also for entrainment. And
13 I think John's characterization is correct; is that what we
14 would do is probably explain entrainment and mortality for
15 that matter, in terms of a range of what may be expected at
16 similar facilities.

17 MR. SMITH: And, you know, it could even be
18 argued that even when you have the field day that you still
19 end up characterizing it in those broad categories, because
20 people will argue over how many bays were sampled and the
21 area sample; so we found that even with the actual field day
22 you still end up in a low-medium-high kind of a
23 characterization.

24 MR. SULLIVAN: And just in terms of things to
25 supplement the literature search, too, as I said we will be

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1 taking velocity measurements out there in terms of what the
2 velocities on the intake screens are. We do have the two
3 existing adult shad radio telemetries and we've proposed a
4 juvenile radio telemetry study as well. And we will be able
5 to -- and the physical characteristics of the plant and
6 what's out there for technologies to minimize or reduce
7 entrainment and build mortality.

8 So are all the parts of it. That's kind of that
9 study. I mean, moreover as we prepare our first draft of
10 the NEPA document, we will be looking at the other studies
11 relative to kind of what we believe the fishery is about,
12 what it looks like based on the Peach Bottom study that's
13 going to be done, based on the krill studies that are going
14 to be done.

15 So that's not in dispute; we've already proposed
16 to do that.

17 SPEAKER: I'd like to get back to the previous
18 question you asked Shawn about.

19 MR. MURPHY: Name first.

20 MR. HENDRICKS: Mike Hendricks, Pennsylvania Fish
21 and Boat Commission.

22 You asked about bottom trawling that's going to
23 be done by the, in the next five years to that study through
24 DEP. I don't really think you can make an analogy between
25 that kind of bottom trawling and what's going to be around

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1 Muddy Run plant, for three reasons.

2 First of all, Conowingo pond is unique in that in
3 the summertime it stratifies with regard to oxygen, not
4 necessarily temperature, but oxygen. So any trawling that's
5 bottom trawling, it's going to be done during that
6 stratification; it's going to catch no fish, because there's
7 no oxygen on the bottom.

8 Secondly, fish like channel catfish and walleye,
9 which are two of the main species in question, like to be
10 around structure. Much more likely to find fish around the
11 structure involved in the Muddy Run intake than you are out
12 in the middle of Conowingo pond where the bottom consists of
13 mud, mud and sand.

14 Third thing is, when Muddy Run operates, it draws
15 water down from the reservoir; you know the gizzard chad are
16 sucked down with it, and that's what causes the striped bass
17 to go into a feeding frenzy. Channel cats and walleyes and
18 small mouth are also predators; they're going to be
19 attracted to that area whereas they might not be attracted
20 and abundant in the main lake.

21 So I think that's three reasons why you're going
22 to find a lot more of those fish close to the Muddy Run
23 intake than you would find out in the main lake.

24 MR. EUSTON: I'd like to just address the first
25 part of that. The trawling that's proposed for Peach Bottom

1 is essentially in the upper two-thirds of the pond, and the
2 DO depletion is the lower one-third of the pond. And I
3 know from many years of trawling out there that channel
4 catfish are one of, if not the largest catch typically out

5 there.

6 So I expect the trawling shall have a lot of fish
7 that are, as you said the focus of the study is closer to
8 Peach Bottom. So I think the furthest down they're going to
9 be trawling is at Broad Creek. And the DO depletion is
10 deeper.

11 MS. BIGGS: We are also, there's going to be DO
12 measurements during that trawling. I believe that's part of
13 the study's plan.

14 MR. EUSTON: Right, yes. That's part of the
15 surface, mid and bottom, with the trawls.

16 MR. MURPHY: We can take a short break. I guess
17 we'll reconvene after lunch. We're going to spend a few
18 minutes talking amongst ourselves. So if we come up with
19 any more questions, we'll ask them after lunch.

20 (Whereupon, at 11:35 a.m., the meeting recessed
21 for lunch, to reconvene at 1 p.m.)

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1 A F T E R N O O N S E S S I O N

2 (12:45 p.m.)

3 MR. MURPHY: All right, welcome back.

4 We came up with just a few more questions. I'm
5 going to let Tom start.

6 MR. BARRON: Okay. Our first question is, there
7 was a lot of discussion today about the studies, the depth

8 of them and what we're wondering is, how important is it to
9 have the information on the specific species, the impacts
10 that are going to be revealed from these studies, or
11 possibly not revealed; and how will that information be used
12 by the resource agencies in making decisions or setting
13 requirements in licensing or the certification?

14 MR. GARD: So maybe in other words if we found
15 out it was a 90 percent channel cats versus 90 percent large
16 mouth, what would the difference be in what PM&Es you might
17 recommend?

18 MR. MILLER: From a Fish & Wildlife Service
19 interest, it is important, particularly for the migratory
20 fish. I know that we kind of have a division here between
21 the two, it seems like.

22 And it is critically important that we have that
23 information for those species, because we will be developing
24 a fishway prescription for the project, regardless of
25 whether there's a settlement or whatever happens, we'll be

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1 filing a fishway prescription. And in that prescription
2 we'll have terms and conditions that we think will be needed
3 in order to protect migratory fish resources.

4 So as far as the timing, as far as degree of
5 entrainment, as far as behavior of the fish when they're
6 entrained or when they're trying to attempt to get past the
7 project, all of that will be used in the development of our
8 terms and condition in that fishway prescription.

9 MR. GARD: Yes, I think we were more thinking of
10 the resident species.

11 MR. PUGH: In using your example, you said
12 channel catfish and bass, I guess -- large mouth or small
13 mouth, it wouldn't matter. In using that example and
14 thinking about it, I guess the first thing would be if it
15 was entrainment and it showed that 90 percent of the fish
16 that were entrained were of a species, one particular
17 species. Then I would ask myself, what is it about that
18 species that's making it predisposed to this?

19 So then I would ask myself, well how did it come
20 to be in a location where it could be withdrawn or pulled
21 up? Is it something that's naturally occurring, is it
22 something that's behavioral that they would do at certain
23 times of the year, is it something that's occurring because
24 maybe the flow has been changed and maybe they're being
25 pushed or forced into that area.

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1 So I guess I would -- once I knew what the
2 species was, I'd consider the life history of the species
3 and what environmental things would impact or cause it to
4 respond. That might give us a clue as to what the driver is
5 that's selecting that. It could also be a durability issue.
6 It might be that certain species get pulled through and
7 survive the trip because they're more hardy, like a catfish;
8 but maybe another species that does not respond well to
9 pressure changes like a gizzard shad or an American shad,
10 may end up that it doesn't make the trip alive.

11 So I guess the first thing we would do is we'd
12 look at the species, I'd try to understand how its ecology
13 fits, try to match it up with location and opportunity, and

14 then go from there. And then maybe as we're going through
15 that process, we might not know what the end solution is;
16 but I would hope the ecology of the fish would help us get
17 there.

18 MR. GARD: I guess I can call up the next
19 question: Kind of confused; we had just in numbers here on
20 the head difference. Someone today was saying 325 feet, and
21 Fish & Wildlife Service's letter, it said 411 feet. When I
22 took the difference in base elevations from Exelon's letter,
23 I got 382 feet -- not sure what the right answer is here.

24 SPEAKER: An average.

25 (Laughter)

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1 MR. SULLIVAN: All of the above.

2 No, it's probably what, the normal high water --
3 not the normal high water; the maximum is 520. And
4 Conowingo is 108.

5 MR. EUSTON: 108, so that's the 411.

6 MR. SULLIVAN: Yes, 411.

7 MR. EUSTON: Minimum pool is 470, so it could be
8 lower, minimum pool at Muddy Run. 50 feet less.

9 MR. SULLIVAN: So 411 at max pool.

10 MR. GARD: Okay.

11 MR. SULLIVAN: And 50 foot less at minimum pool.

12 MR. GARD: So the 325 was wrong.

13 MR. PEPPER: I didn't guess that; that exists
14 somewhere in the document. I'll have to look around and
15 find that.

16 MR. SULLIVAN: This is a --

17 MR. PEPPER: I certainly didn't make a
18 calculation.

19 MR. SULLIVAN: The scoping document has some of
20 that in there.

21 (Simultaneous discussion)

22 MR. SMITH: I know from looking myself, the
23 scoping document doesn't have a clear hydraulic head range
24 statement in there.

25 It's in that ballpark.

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1 MR. BARRON: That's addressing the true
2 elevations, Conowingo pool and the reservoir. But the gates
3 are at fixed levels, where the fish would be entering or
4 exiting, are at fixed positions, right? But the head on
5 that changes.

6 MR. GARD: Right.

7 MR. BARRON: More force into the pipe.

8 MR. MILLER: Head is usually measured as the
9 difference between the upper pond level and the lower pond
10 level.

11 MR. SULLIVAN: So the vertical trip is fixed,
12 because those intakes, the pressure head is going to vary
13 based on where the pond holes are.

14 MR. GARD: I can follow up, one more.

15 So I guess this is for FERC. Based on the
16 literature you've looked through so far, do you have -- what
17 kind of estimate do you have in mortality? I mean, is it
18 100 percent, is it 3 percent? We're trying to get some
19 idea. So what the value -- I'm thinking, if it's 100

20 percent mortality and that's what the literature says, then
21 it doesn't make any sense to do the balloon study, because
22 it's just going to give the same result; but if it's 3
23 percent, then maybe you do need to do it to figure out where
24 it is within that range of 3 to 100 percent.

25 MR. KARTALIA: Well, the short answer is, I don't

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1 know what a good estimate would be yet. And one of the
2 components of the study that everyone agrees we need to do
3 is a literature search to kind of come to a consensus on
4 what that range is likely to be.

5 And as I mentioned earlier, the estimates of
6 mortality in the reviews that I've looked at are fairly
7 wide-ranging, and you end up with even ranges at the same
8 project between test groups of the same species, and with
9 the control group mortality being quite high in a lot of
10 them. It doesn't always leave you with a good sense of what
11 the number is.

12 So that would -- it's a question to be answered.
13 I don't know that we would get a real good definitive answer
14 if we did an onsite study, and I don't know if we'll get a
15 very narrow range estimate that everyone agrees on by
16 looking at the literature, either. It's kind of the nature
17 of this question. There's a lot of pretty messy data there,
18 whether you look at your onsite stuff or a review.

19 But that being said, this is higher head than
20 most studies that have been looked at; it's a lot of water,
21 moving. I wouldn't be surprised but don't know if the
22 mortality isn't well above 50 percent for a lot of the

23 species that are going through there.

24 MR. GARD: So I guess of the examples that you
25 said so far, which -- do you think the Savannah River one is

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1 kind of the most similar? What was the mortality there.

2 MR. KARTALIA: Well, it is a similar amount of
3 water, similar turbine types, I think, less head, and again
4 it would just be one that I'd review. And Bad Creek is a
5 much higher head project, that's about a thousand feet. I
6 don't think there was much survival at that project.

7 Again, I have a sense of what's there and what I
8 feel needs to be reviewed to come to estimates of these
9 numbers, but I wouldn't want to peg that number yet because
10 I really haven't done the review yet.

11 MR. GARD: Right.

12 MR. BARRON: From Pennsylvania's perspective, on
13 a true 316b evaluation at a hydro plant or an electric
14 plant, you're assuming entrainment is mortality. Either it
15 dies or it's taken out of the population for breeding
16 purposes, anyway.

17 But this being an unusual situation, it's not
18 really a 316b evaluation. Do you still have -- or would you
19 be concerned with the differences in mortality,
20 survivability?

21 MS. BIGGS: Are you asking me specifically?

22 MR. BARRON: Yes. If you could.

23 MS. BIGGS: I'm just becoming a little bit more
24 familiar with this, but the setup of Muddy Run is a lot
25 different than other power plants, and typically -- I think

1 the reason why we assume entrainment mortality is because
2 anything that's brought in with the water, taken into your
3 cooling system, is actually probably experiencing a lot of
4 heat. And so when it's discharged it's -- some studies have
5 shown that some may survive; we don't think that's very
6 widely accepted. I think we accept this entrainment
7 mortality just because of the heat, but also I would imagine
8 even if there wasn't heat, just biologically I'm thinking of
9 taking fish eggs out of the system and putting them back
10 someplace they don't belong. So depending on what the
11 habitat requirements of certain species of fish, they are
12 probably not going to survive anyway; so if they're
13 displaced, they're put someplace else.

14 MR. SULLIVAN: To just go to that point for a
15 second, remember that when we say we're taking them out of
16 the system, any organisms that are moved are moved from the
17 Susquehanna to the Muddy Run Reservoir. So they are both in
18 some type of system. It's not that they're taken out of the
19 system never to be utilized again or have any use or utility
20 again; they're in another water.

21 MR. SHIELDS: Our concern is what condition are
22 they in when they're moved. Can certainly -- I think the
23 question was, would a presumption be made that they all
24 died? I don't know if we can make that presumption yet on
25 any of the information we have. That's certainly a

1 presumption you could make, and then you could start
2 thinking about PM&E measures, if you just said they all
3 died; but then you'd have to know what the 'all' is. How
4 many is 'they all'?

5 So we still have a question, even making that
6 presumption.

7 MR. SPONTAK: I guess I would add to that that at
8 least in my view, they are taken out of the system because
9 given the large fluctuations in water level in Muddy Run
10 Reservoir, we don't believe there's any reproduction in
11 there. So any fish that's sucked up from the river that
12 gets into Muddy Run is lost to the population unless it goes
13 back down. We don't know how many of those -- how often
14 that happens. And also, since Muddy Run Reservoir is closed
15 to angling, it's lost to the angling public as well.

16 So from my perspective, I think most of the fish
17 that are entrained are probably lost to the population. We
18 know that Muddy Run Reservoir is full of fish; they had to
19 come from somewhere.

20 MR. BARRON: I had the question earlier, just
21 between us, that is: Was the balloon study going to be
22 conducted at both standing at the towers in the reservoir,
23 dropping them down to see what happened to them exiting.
24 Were they also going to be presented at the intake from the
25 river to see what the take was going up?

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1 MR. SULLIVAN: Yes, it was, the pilot program was
2 thought up to try to get them in both directions.

3 MR. BARRON: Okay.
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4 MR. SMITH: And that was our study request.

5 MR. BARRON: And now Exelon's comment was you're
6 now not going to do that balloon study.

7 MR. SULLIVAN: A couple things in context. One
8 is, we keep talking about the balloon study, and I've said
9 that a bunch of times but I feel obliged to say it again.
10 The only thing that was proposed was a pilot study.

11 In the context of all the other requests that we
12 got, and in the context of FERC's final study plan
13 determination and how we thought things could be used for
14 PM&E measures and PM&E negotiations, we didn't feel a need,
15 after we saw all of that, to basically go forward with this
16 balloon tag study. And even if we had, it's not clear that
17 once we get through the pilot program, that a full-blown one
18 is even going to be feasible.

19 MR. GARD: So just to clarify that the pilot
20 study was at 1200 fish?

21 MR. EUSTON: No, it wasn't that large.

22 MR. SULLIVAN: No. The cost and the fish that
23 you have there are for a full blown study, but we were going
24 to start with a much smaller version of that to see what we
25 had.

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1 MR. GARD: So what was the cost of the pilot
2 study? Was that -- is that --

3 MR. SULLIVAN: I don't know. We did not -- we
4 didn't cost that out separately.

5 MR. GARD: Okay. So that's not the \$180,000,
6 that was for the full study?

7 MR. SULLIVAN: That was what we believed the full
8 study would cost based on where we are today, yes.

9 MR. BARRON: And your intent of the pilot was to
10 see the fate of the fish, both directions. See the
11 mortality.

12 MR. SULLIVAN: Yes. It was to determine
13 basically whether or not the sampling was feasible. You
14 know, whether or not it was possible to go to a full blown
15 study.

16 MR. MILLER: I just wanted to make a point with
17 respect to that study, and information that was provided,
18 why we think it's important that we get that type of
19 information, regardless of how the information is collected.

20 You heard discussion about how that was
21 attempted, I believe down at the southern reservoir, and the
22 difficulties that they had because of the configuration of
23 the project in conducting the study and passing the fish
24 through, that the pipes change direction, that they
25 bifurcated and split; and that's not only going to have

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1 implications for the study, but it's going to have
2 implications for the survival of the fish, too, and their
3 ability to survive the ride, so to speak; that you would not
4 get from similar studies done at a traditional hydroelectric
5 project where it's a one-way passage down through the
6 turbine.

7 And when you look at a regular hydroelectric
8 project and you look at the thickness of the dam, which may
9 be 100 feet, so the horizontal distance that the fish

10 travels is maybe 100 feet and it may have elevation changes
11 that we've heard, of anywhere from maybe 30 feet at some of
12 these studies that have been done in the past, to as much as
13 I think I heard 250 feet; that's a totally different
14 situation than what you're seeing with the pumped storage
15 project, where things are going both ways; they're going
16 through these pipes. They're being pushed instead of drawn
17 down. Those are all different types of threats that the
18 fish have to encounter that they normally wouldn't encounter
19 in studies that have been done historically, and that's why
20 we think that it's important to get this type of information
21 at the pumped storage project on survivability.

22 MR. GARD: See, I just want to make sure -- I
23 didn't get this written down. What was the head difference
24 for the Savannah? You say 120?

25 MR. KARTALIA: Russell, I think is in the 200

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1 foot ball park, I think.

2 MR. GARD: 200?

3 MR. KARTALIA: That's -- I'm not exactly sure,
4 but I think it's in that range.?

5 SPEAKER: Steve, I think it's less than that.

6 MR. KARTALIA: Above 150?

7 SPEAKER: I think it's less than that, actually.

8 MR. KARTALIA: Really.

9 Well, that one I'm sure is available straight off
10 the Corps website.

11 MR. GARD: Okay.

12 MR. KARTALIA: They'll have at least those basic
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13 stats for that project.

14 MR. GARD: Okay.

15 MR. MURPHY: Do you remember the mortality rate
16 for that study?

17 MR. KARTALIA: It was all over the place. Which
18 again is just -- it was quite high for certain species like
19 the Bluebacks, and in pump mode and in other modes of
20 different species it was quite low; so it covered a huge
21 range.

22 MR. BARRON: And what were the requirements that
23 came out of that study?

24 MR. KARTALIA: I think -- well, the final, there
25 was a court order I think that more or less prohibited

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1 pumping during daylight hours at that particular project.

2 That's what happened there.

3 MR. MURPHY: We don't really have the luxury of
4 doing a whole lot of cost determination for this one study.
5 We're going to have to consider the feasibility more than
6 cost.

7 How possible is it to actually do that kind of a
8 study at this facility? When we deliberate.

9 MR. EUSTON: The balloon tag study or the
10 entrainment study?

11 MR. MURPHY: The balloon tag.

12 MR. SULLIVAN: You need to make sure you can
13 induct the fish behind the trash racks, so you have to
14 attach all your induction hose systems to something that
15 would fit into a stop log slot; that's the most secure way a

16 site like that with a lot of volume, and so that would have
17 to be lowered in place. Then you can induct your fish
18 behind the racks.

19 The question has always been getting the fish
20 back. Usually you can get something down to where they're
21 committed to passage. The configuration at Muddy Run in the
22 intake canal might pose a larger problem there. That hasn't
23 really been investigated, but because of that cylinder gate
24 and where the racks are, you'd almost have to -- I don't
25 know if you could induct the fish outside the racks, or if

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1 there's a way to get something down into where you could
2 recover it through -- I mean, it hasn't been looked at.

3 But that's what you're talking about, is lowering
4 some kind of structure, if that's feasible, down in so you
5 get your fish committed to going through the plant. You
6 have to put the end of the pipe right where the flow is
7 being sucked through.

8 MR. MURPHY: And normally there isn't a track
9 rack on --

10 MR. SULLIVAN: And then that's the induction
11 piece.

12 Pardon?

13 MR. MURPHY: I said and normally there isn't
14 another trash rack on the other end.

15 MR. SULLIVAN: Right. And so the recovery is
16 either going to be out in the Conowingo Reservoir where the
17 fish could end up quite a ways downstream, if you're working
18 when Holttwood is generating, for example, and Muddy Run is

19 generating, the velocity is going to take your fish
20 downstream. They're inflated, the balloon is going to
21 inflate, these fish will come up, and they have radio tags
22 on them, so you kind of know where that is; but getting them
23 through that second trash rack, you know, that was one of
24 the problems they had at Northfield, with the balloon and
25 everything.

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1 The other issue is controlling the rate of
2 inflation of the balloons; we can do that to some degree, so
3 that's else that plays into it.

4 So a feasibility study, there's just a lot of
5 start-up involved in that. I mean, those costs were for
6 once the feasibility is done, but getting the feasibility to
7 the point where you're satisfied that things are working the
8 right way is not insignificant, either.

9 MR. GARD: What's the Northfield study?

10 MR. SULLIVAN: Northfield Mountain. It's up on
11 the Connecticut River, Massachusetts.

12 MR. GARD: Is that the one that Larry, you had
13 mentioned?

14 MR. MILLER: That was where they did the
15 entrainment.

16 MR. SULLIVAN: That was the one that Larry was
17 talking about, but this was a separate study. I don't think
18 associated with that. It could have been, but I wasn't
19 there.

20 MR. MURPHY: Okay, same project, different study.

21 MR. SULLIVAN: I just assumed it was a pilot

22 study.

23 MR. MURPHY: Okay.

24 MR. BARRON: Is that where that balloon study was
25 done at, was Northfield?

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1 MR. MILLER: There was one at Northfield where
2 they passed -- it might have been Atlantic salmon smolts.

3 MR. BARRON: Yes, I think --

4 MR. MILLER: Salmon smolts, up through. And
5 that's where they get hung up inside; and they had a lot of
6 trouble recovering fish. I think it was maybe 60 percent of
7 the fish were recovered in the upper pond.

8 One thing about Northfield though, too, is that
9 you have to realize is I believe the penstock there is 8,000
10 feet long.

11 MR. EUSTON: No, it's not that long.

12 MR. MILLER: I thought that the reservoir was
13 located some distance away from the river, and the pipe that
14 connected them--

15 MR. GARD: Yes, it says --

16 MR. EUSTON: It's on the order of possibly 4,000.
17 I don't believe it's 8,000. It's longer than Muddy Run.

18 MR. MILLER: Yes. So the fish actually, the
19 balloon actually probably inflated while the fish were still
20 in the pipe.

21 MR. EUSTON: Good chance of that, yes.

22 MR. MILLER: Because of the travel time.

23 MR. EUSTON: Possible, yes -- probably.

24 MR. MURPHY: And the problem was that the balloon
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25 inflated, it caught behind the racks?

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1 MR. EUSTON: Yes. Well, the configuration is
2 different there. They have I think they call them surge
3 towers, and I think they're open, it's a pressure relief,
4 and I think there were fish that popped up inside there. A
5 lot of it had to do with a balloon inflating premature or
6 during the passage.

7 MR. MILLER: The ideal situation is for the fish
8 to actually pass through the entire structure and then the
9 balloon to --

10 MR. EUSTON: That would be what you'd want.

11 MR. MILLER: -- inflate on the back side.

12 MR. EUSTON: Yes. We have some control over
13 that, but again it takes experimentation and just seeing
14 what comes through. You take your best guess and then
15 adjust things.

16 MR. BARRON: Would that be different for
17 different fish? Size fish?

18 MR. EUSTON: Well, actually, you bring up a good
19 point, because with a small fish you're talking generally
20 one balloon and one small radio tag, and that's it. Larger
21 fish, maybe possibly multiple balloons and there you get
22 into the trash rack issue.

23 Eels are another one where, that was one of the
24 ones that was out there, but the FDR study up on the St.
25 Lawrence -- trying to bring up an eel after passage through

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1 there, there might have been nine balloons on an eel.

2 (Simultaneous discussion)

3 VOICE: They have glow sticks on them, too, so
4 they can see them at night.

5 MR. EUSTON: The eels are sort of a different
6 case. But trying to pass an adult small mouth through
7 something like that, you need a pretty good balloon to bring
8 him up after he's made it. Or a large number of balloons.

9 MR. GARD: For a point of information, Heizi, et
10 al., '92. It says that the tag inflation time can be
11 adjusted between 2 to 60 minutes depending on water
12 temperature and configuration of the study sites.

13 MR. EUSTON: Sixty minutes?

14 MR. GARD: That's what it says.

15 MR. EUSTON: I don't know where that's been done,
16 but.

17 MR. MILLER: Of course, he was trying to sell
18 that technology.

19 (Laughter)

20 MR. EUSTON: I know they've played around with
21 water temperature, things like that, for expected travel
22 time.

23 MR. GARD: What's the clear space for the racks?

24 MR. EUSTON: Five and three-quarter.

25 MR. MILLER: On the upstream side it's 5.37; on

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1 the downstream side, it's 5.75.

2 MS. BIGGS: That's based on the racks.
3 MR. EUSTON: That's the clear space in the racks,
4 yes.
5 MR. MURPHY: Anything else?
6 (No response.)
7 MR. MURPHY: Well, we've run out of questions.
8 Thank you all for coming. We're going to take a
9 look at the site now, and deliberate.
10 (Whereupon, at 1:16 p.m., the meeting concluded.)
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