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Docket Number: 40-8838-MLA; ASLBP No.: 00-776-04-MLA

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1 UNITED STATES NUCLEAR REGULATORY COMMISSION

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3 ATOMIC SAFETY AND LICENSING BOARD
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5 -----
6 IN THE MATTER OF: Docket No.
7 40-8838-MLA
8 U.S. ARMY ASLBP No.
9 (Jefferson Proving Ground Site) 00-776-04-MLA
10 -----

11 Madison City Hall
12 City Council Chambers
13 101 West Main Street
14 Madison, IN

15
16 Monday,
17 October 22, 2007
18

19
20 The above-entitled matter came on for
21 hearing, pursuant to notice at 10:00 a.m.

22 BEFORE:

23 THE HONORABLE ALAN S. ROSENTHAL, Chairman
24 THE HONORABLE PAUL B. ABRAMSON
25 THE HONORABLE RICHARD F. COLE

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P R O C E E D I N G S

(9:59 a.m.)

1
2
3 JUDGE ROSENTHAL: Good morning.

4 I am Alan Rosenthal. With me on this
5 platform are Richard Cole and Paul Abramson.

6 The three of us are Nuclear Regulatory
7 Commission administrative judges, and as such,
8 members of the Commission's Atomic Safety and
9 Licensing Board assigned to this proceeding
10 involving an NRC license held by the United States
11 Army.

12 Under the authority of that license,
13 many years ago the Army conducted on its Jefferson
14 Proving Ground site here in Madison the testing of
15 tank penetration rounds that contained radioactive
16 depleted uranium.

17 What is before this board today is the
18 issue of the adequacy of a field sampling plan that
19 the Army is employing in the conduct of what is
20 referred to as a site characterization.

21 Such a characterization is required in
22 connection with the ultimate determination
23 respecting what will be done with the site.

24 In other words how will the site be
25 decommissioned in light of the presence of the

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1 depleted uranium munitions that remains on it years
2 after the test activities came to an end?

3 Broadly speaking the purpose of the
4 characterization is to determine the current safety
5 and environmental significance, if any, of the
6 radioactivity associated with the depleted uranium
7 munitions still on site.

8 What brings us here today is a challenge
9 to the adequacy of the Army's field sampling plan to
10 accomplish its intended objective. That challenge
11 has been mounted by a local organization, Save the
12 Valley.

13 Asserting that the field sampling plan
14 satisfies all requirements imposed by NRC
15 regulations, and will accomplish its intended
16 purpose, both the Army and the Commission's
17 technical staff oppose Save the Valley's challenge
18 to the field sampling plan.

19 In accordance with NRC hearing
20 procedures, each of the three parties to this
21 proceeding has already submitted in writing the
22 testimony of the witnesses in support of its
23 position on the adequacy of the field sampling plan.

24 The principal purpose of this hearing is
25 to enable the members of the board to ask such

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1 questions of those witnesses as might be suggested
2 by their written prefiled testimony.

3 In that regard each party was afforded
4 and took advantage of the opportunity to furnish the
5 board with questions that the party desired the
6 board to ask of the witnesses for other parties.

7 Whether the board will ask any
8 particular submitted question of a witness will
9 depend, however, upon whether a board member regards
10 obtaining an answer to it to be of possible
11 assistance in the reaching of a decision on the
12 merits of the challenge to the field sampling plan.

13 In the view of the board there are also
14 some threshold legal questions presented by the
15 parties written submissions that might have a
16 substantial bearing upon the ultimate decision
17 regarding the adequacy of the field sampling plan to
18 accomplish its intended purpose.

19 Accordingly before starting the
20 questioning of the witnesses, the board will hear
21 oral argument from the lawyers for the parties on
22 those legal questions, which were provided to the
23 parties more than a week ago.

24 With this introduction I will now call
25 upon counsel for the respective parties to identify

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1 themselves for the record, and I'll start with Save
2 the Valley.

3 MR. MULLETT: Your Honor, on behalf of
4 intervenor Save the Valley, Inc., Michael A.
5 Mullett, counsel. And with me at counsel table is
6 Richard Hill, the president of Save the Valley.

7 JUDGE ROSENTHAL: Thank you, Mr. Mullett.

8 MR. KOPP: Your Honors, I am Frederick
9 P. Kopp. I am counsel for the Army. And with me at
10 the counsel table is Alan Wilson, the license
11 holder, the named license holder for the Army.

12 JUDGE ROSENTHAL: Thank you. And for the
13 NRC staff.

14 MR. ROTH: David Roth, counsel for the
15 NRC staff. With me is Susan Utal and Andrea Silvia,
16 also counsel for NRC staff.

17 JUDGE ROSENTHAL: Thank you.

18 All right, I think that we will turn at
19 this point to the oral argument. And counsel can
20 present the oral argument from their tables.

21 Just as a word of introduction, as I
22 indicated a few minutes ago what we are concerned
23 here with is the question as to whether the field
24 sampling plan is adequate to accomplish its intended
25 purpose.

1 Now obviously the first question is,
2 what is its intended purpose? In other words what
3 is it as a matter of law that the Army must
4 accomplish under its alternate schedule, the
5 alternate schedule which it sought, indeed which it
6 has already been provided.

7 And the second question is, assuming
8 that the Army is required at the end of the five
9 years to have a site characterization that will
10 support in full measure a decommissioning plan,
11 precisely then what must again in the context of
12 commission regulations, the site characterization
13 include? What must it demonstrate in order to
14 provide the requisite support for a decommissioning
15 plan.

16 I just might note in that context that
17 some years ago when the Army put before the staff a
18 revised decommissioning plan, the staff at that
19 point indicated that it could not act upon it in the
20 absence of a site characterization. So there is
21 obviously some link between an adequate, from the
22 staff standpoint, site characterization plan - a
23 site characterization, excuse me - and a
24 decommissioning plan.

25 So those are the two questions. Our

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1 order provided, total 20 minutes to each party to
2 address them. It might not be actually necessary.
3 These are fairly narrow questions.

4 In any event, we'll start with the
5 staff.

6 ORAL ARGUMENTS

7 MR. ROTH: Thank you, Your Honor.

8 In answer to the first question, as what
9 are the legal requirements governing the grants of
10 the alternate schedule application, the main point
11 is that there is just a three-part test that is in
12 10 CFR 40, 42 G-2.

13 JUDGE ROSENTHAL: Can everybody hear him?
14 You might want to move the microphone a little
15 closer.

16 MR. ROTH: As I was saying, the legal
17 requirement is governed by the three-part tests in
18 10 CFR 40, 42 G-2.

19 That three-part test provides that the
20 commission may approve an alternate schedule for
21 submittal of a decommissioning plan, and that
22 submittal of the plan provided that the commission
23 determines that it's necessary to have the alternate
24 schedule for the effective conduct of
25 decommissioning operations; that it presents no

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1 undue risk from radiation to public health and
2 safety; and that it's otherwise in the public
3 interests.

4 In that relative to the current field
5 sampling plan, there is not a legal requirement to
6 approve the field sampling plan as part of the
7 alternate scheduling grant.

8 JUDGE ROSENTHAL: Wait a minute. You
9 have before you I assume the license amendment that
10 was given in connection with the alternate site?

11 MR. ROTH: Yes, Your Honor.

12 JUDGE ROSENTHAL: Would you be so kind as
13 to turn to condition #13, and read it to us?

14 It's amendment #13.

15 MR. ROTH: Okay. Your Honor is correct.
16 That becomes a condition of the license as well.

17 So license condition #13 is added as
18 follows: The Army shall submit to decommissioning
19 plan for NRC review and approval under an alternate
20 schedule identified in its May 25th, 2005 field
21 sampling plan. Its responses to action items from a
22 September 8th, 2005, public meeting by letter dated
23 October 26th-

24 JUDGE ROSENTHAL: All right, you can stop
25 there. It was the first sentence that I was

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1 focusing on. If it - why doesn't that sentence
2 require the Army to have at the end of the five
3 years, in other words in the course of its alternate
4 schedule, a decommissioning plan? And if it's
5 required to have a decommissioning plan, why isn't
6 it required to have a site characterization that
7 will support that decommissioning plan, in other
8 words, that will allow the staff to conclude that at
9 least in regards to site characterization
10 requirement is concerned, it's been met?

11 JUDGE ABRAMSON: Before you - is this on?
12 Before you go down specifically answering JUDGE
13 Rosenthal's question, let me just see if I
14 understand how this all works. Because I'm trying
15 to understand how the regulation works and how the
16 license amendment works in consistency with the
17 regulation.

18 So I understand the regulation. The
19 staff or the agency is allowed to grant a license
20 extension if it's necessary for the preparation of
21 the - or necessary for decommissioning; is that
22 correct?

23 MR. ROTH: That is correct. The agency
24 in this instance can authorize an alternate schedule
25 to submit the decommissioning plan.

1 JUDGE ABRAMSON: Okay. So what happened
2 here in the staff's view is that the applicant asked
3 for a five-year extension to be able to - for the
4 time line to submit its decommissioning plan, and
5 that was granted. And it was granted because it was
6 necessary, because he couldn't get on the site to
7 characterize it up to now. Now they need to
8 characterize it before they submit it.

9 Am I correct in that summary of where we
10 are?

11 MR. ROTH: That is generally correct,
12 yes, Your Honor.

13 JUDGE ABRAMSON: Now in granting license
14 #13 you put a condition. Is the condition anything
15 more than a repetition of why you granted the
16 extension, i.e. they asked for five years, you gave
17 them five years.

18 Does it do anything more than the law
19 already did, or that our regulations already did,
20 which required them to submit a decommissioning plan
21 at the time they terminated their use of the
22 property. Didn't get that done. The situation has
23 muddled around since then. Finally they came in and
24 said we need five more years. And the staff said,
25 fine, we'll give you five years.

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1 Is there something more embedded in this
2 than that simple principle?

3 MR. ROTH: No, Your Honor, the staff do
4 not see anything more embedded in that. The
5 amendment states that they shall submit a
6 decommissioning plan for review and approval by the
7 end of 2011 or earlier.

8 JUDGE ROSENTHAL: But they can't submit a
9 decommissioning plan that has any chance of success
10 unless they have completed a site characterization
11 that the staff would deem sufficient to enable it to
12 pass judgment on, and presumably approve, the
13 decommissioning plan, is that correct?

14 MR. ROTH: That is correct.

15 JUDGE ROSENTHAL: So what we're talking
16 about here, then, is whether Save the Valley is or
17 is not correct in its contention that the field
18 sampling plan is not adequate to provide a site
19 characterization that at the end of the five years
20 would support a decommissioning plan; is that
21 correct?

22 MR. ROTH: I read it a little
23 differently.

24 JUDGE ROSENTHAL: Well, what's wrong with
25 that?

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1 MR. ROTH: Well, our regulation is going
2 to require the decommissioning plan, and when that
3 decommissioning is submitted, that decommissioning
4 plan has to be - provide enough information for the
5 NRC to adequately review it. It has to have
6 specific site characterization.

7 In our timeliness rule, and the cite
8 that I'm going to pull here is from 56 Fed. Reg. -
9 Federal Register, pardon me, 36026 at page 36027,
10 the commission has already stated that in order to
11 adequately review and approve a decommissioning plan
12 - and mind you, we don't have the plan yet - the NRC
13 must be aware of conditions at the site.

14 Therefore a due item was included in our
15 proposed rule that added to the contents of a
16 proposed decommissioning plan a description of the
17 conditions at the site for the separate buildings,
18 for the outdoor area, sufficient to evaluate the
19 acceptability of the plans.

20 A description - this description at the
21 decommissioning plan stage is not where we are right
22 now. We're only at an alternate schedule to submit
23 the decommissioning plan.

24 JUDGE ROSENTHAL: When - there has to be
25 a decommissioning plan submitted at the end of the

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1 five years; is that not true? And that's what
2 condition #13 seems to state explicitly.

3 Now if that's the case, and a
4 decommissioning plan in order to in the vernacular
5 cut the mustard has to be supported by a site
6 characterization, why then isn't the Army obliged by
7 the end of that five years to have a site
8 characterization that meets the staff's requirements
9 in terms of approval of a decommissioning plan?

10 MR. ROTH: The Army is obliged to have an
11 adequate site characterization in support of its
12 decommissioning plan upon submittal.

13 What they are not obliged to at the
14 moment is to have at this point a complete site
15 characterization -

16 JUDGE ROSENTHAL: What do you mean, at
17 this point? We're not talking about 2007. We're
18 talking about the five-year period that ends in
19 2011.

20 JUDGE ABRAMSON: Let me pick this up for
21 a second. Is there any difference in what the Army
22 is obliged to provide in 2011 than what they were
23 originally obliged to provide at the end of their
24 use of the site at which point they were required to
25 submit a decommissioning plan?

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1 Is there any substantive difference
2 between what they would have to provide then and
3 what they are now being required to provide in 2011?

4 MR. ROTH: The granting of the alternate
5 schedule does not change what they are required to
6 provide.

7 JUDGE ABRAMSON: So from a legal
8 perspective, they are in an identical position today
9 that they were in 1998 or whenever they stopped
10 using the site except that they now have a different
11 target date; is that correct? All the license
12 extension does is move that forward to 2011?

13 MR. ROTH: That's correct.

14 JUDGE ABRAMSON: That's the staff's view.
15 Thank you.

16 JUDGE ROSENTHAL: All right.

17 JUDGE COLE: Mr. Roth, the staff has
18 indicated to the Army that they must prepare a site
19 characterization plan in support of a
20 decommissioning plan; is that correct, sir?

21 MR. ROTH: That's required under 40, 42-
22 G(4), that is correct.

23 JUDGE COLE: So Mr. Roth, the staff is
24 not necessarily making a judgment on the adequacy of
25 the site characterization plan. You would make a

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1 judgment on the adequacy of the decommissioning plan
2 in accordance with condition #13 or amendment #13?

3 MR. ROTH: Correct. But I would also add
4 that the staff does make a judgment on the
5 information that is needed for decommissioning.
6 That information is described within the field
7 sampling plan, and the staff is then, using that
8 information to determine whether this is necessary
9 information for decommissioning as opposed to
10 information that would not support an alternate
11 schedule requested -

12 JUDGE COLE: So your overall judgment
13 would be with respect to the satisfactory submittal
14 of a decommissioning plan?

15 MR. ROTH: For the actual site
16 characterization, as to when it is adjudged, that
17 would be at the decommissioning plan stage.

18 JUDGE COLE: But on the basis of a
19 satisfactory decommissioning plan, you would not be
20 making an independent judgment of solely the
21 adequacy of the site characterization plan, but only
22 as it applies to the adequacy of the decommissioning
23 plan?

24 MR. ROTH: Yes, but the decommissioning
25 plan adequacy does have a line item in one of the

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1 regulations that the description of the conditions
2 of the site or separate building or outdoor area is
3 sufficient to evaluate the acceptability of the
4 plan.

5 JUDGE ABRAMSON: Let's pick up one more
6 point here, which is embedded in this entire
7 discussion. 40.42(g)(2) says, to get the extension
8 it must be necessary to accomplish decommissioning.

9 Does the staff read into that "and
10 sufficient" for decommissioning? Or does the staff
11 read it that it's necessary to get there, but it
12 doesn't necessarily have to be sufficient to get it
13 there?

14 MR. ROTH: The information provided to
15 support the schedule would not have to be all the
16 information that is going to be used to produce the
17 decommissioning plan. The information to support
18 the alternate schedule would just describe what is
19 necessary to get the alternate time.

20 JUDGE ABRAMSON: Yes. So I'm trying to
21 make a distinction that an engineer or a scientist
22 would make, and that I think a lawyer should make,
23 and that is, there's a difference between something
24 that is necessary and sufficient, i.e. it's
25 necessary to characterize the site, and it's

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1 necessary therefore to do some testing to be able to
2 characterize the site.

3 The type of testing that needs to be
4 done is not spelled out in this, and to spell it out
5 in detail would be to require that it be spelled out
6 in detail, that the site characterization plan would
7 spell out everything that must be done to in the end
8 have a site characterization that satisfies the
9 requirements to build the decommissioning plan would
10 be a requirement that it be sufficient.

11 And I'm trying to distinguish and
12 understand whether the lawyers think that this is a
13 valid distinction between a regulation that requires
14 something to be necessary, and a regulation which on
15 the other hand might have required something to be
16 necessary and sufficient.

17 Is this a distinction the staff has
18 made, or makes, in its review - in its presentation
19 here today?

20 MR. ROTH: The regulation, as we're all
21 aware, does not use the word, sufficient. If the
22 commission wished to have sufficiency as part of
23 this rather than necessary, the commission could
24 have added that, just as the commission did with
25 42.4(g)(4)(I). That's where the description to be

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1 sufficient shows up.

2 JUDGE ROSENTHAL: All right, Mr. Kopp.

3 ORAL ARGUMENT ON BEHALF OF THE U.S. ARMY

4 MR. KOPP: Your Honor, I believe that the
5 NRC staff counsel has adequately identified the
6 three points that need to be considered in granting
7 the alternative schedule, so I won't belabor that.

8 I would just observe that actually STV's
9 contention is more or less a tacit admission that
10 more site characterization does need to be done.
11 They have presented no evidence that the alternate
12 schedule will present a risk to human health.

13 And therefore I would suggest that
14 really we are passed the consideration of whether
15 the requirements of 40.42(g)(2) have been met.

16 But we do share the concern of STV and
17 the NRC staff, and indeed, the licensing board, that
18 at the end of the process, the end of the five
19 years, the plan be sufficient to close out the
20 license.

21 I think though that the key here is that
22 because of the terms of the license amendment and
23 the way it is being handled, the board should not
24 ignore that in fact it creates a rather symbiotic
25 relationship between the NRC staff and the Army, in

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1 that we are not coming back in five years and
2 saying, here's our information, like it or lump it.
3 We are coming back at discrete intervals, at least
4 yearly, saying, here's the information we've
5 garnered.

6 And the staff then turns around and
7 says, okay, we have requests for additional
8 information. We may or may not be satisfied with
9 what information you've garnered so far. Please
10 consider this. Please provide us information for
11 that.

12 So that at the end of the five years,
13 with this interrelationship, with this exchange of
14 here's the information, and the staff saying, here's
15 further information that we would like, we will have
16 achieved a site characterization which the staff
17 will find sufficient and adequate to close out the
18 license.

19 JUDGE ROSENTHAL: Do you think it's your
20 obligation to have a site characterization at the
21 end of the five years that the staff would find
22 sufficient to, as you put it, close it out?

23 MR. KOPP: We are certainly pursuing
24 that. That is our philosophy in what we are doing.
25 We are trying to supply that information.

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1 JUDGE ROSENTHAL: All right, it's your
2 philosophy. What I'm asking you is, do you think
3 in light of condition #13 of - amendment #13, that
4 that is more of an obligation that simply something
5 you would like to do?

6 MR. KOPP: I agree. I think that is our
7 obligation. I think we are obliged to proceed with
8 the view that we need to supply adequate
9 information.

10 I think part of the problem we have here
11 in meeting the requirements, or not meeting the
12 requirements, but the divergent opinion we have on
13 whether the Army will fulfill its requirements under
14 42 - I mean 40.42(g)(4) and (5) as far as the
15 sufficiency of the site characterization is really
16 pinpointed in the initial statement filed by Save
17 the Valley here.

18 They envision the conceptual site model
19 as a hypothesis, and each of field sampling
20 activities as experiments to verify that hypothesis.

21 I would respectfully suggest that what
22 we're engaged in here is not experimental science
23 but applied science, and in that regard, we rely
24 upon the expertise that the NRC staff and other
25 scientific institutions have garnered over the last

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1 60 or 70 years. They know what specific factors
2 they need to do their RESRAD modelings and so forth,
3 to approve a decommissioning plan, and that's what
4 they are aiming for. Whereas the STV approach seems
5 to be that we want to verify that previous body of
6 information.

7 And that's why I say, we're engaged in
8 an applied science here. It's kind of like road
9 engineers. We want to make sure that the road we
10 lay out supports the load that's going to be on that
11 road. Whereas the STV is somewhat interested in how
12 the road surface and the temperature affects mileage
13 and cars.

14 JUDGE ROSENTHAL: What do you, or what
15 does the Army, see as the ultimate objective of the
16 site characterization? To determine for example
17 whether there is some impact on the aquifer, and if
18 so what it is?

19 MR. KOPP: As it is set up now in the
20 requirements for decommissioning, we have to satisfy
21 the staff that the residual dose exposure to humans
22 will be less than 25 millirems per year, and that's
23 our focus. That is what we need to concentrate on,
24 to submit an effective decommissioning plan.

25 We need to show that the dose exposure

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1 to humans, we need to concentrate on dose modeling
2 in that regard.

3 JUDGE ABRAMSON: Let me just pick this
4 up.

5 Staff, is that an accurate assessment of
6 what the staff will ultimately require in the
7 decommissioning plan, that it concentrates purely on
8 dose to humans?

9 MR. ROTH: Dave Roth with the staff.

10 When the applicant submits his
11 decommissioning plan, it ultimately goes for some
12 form of license termination. In the end they have
13 to meet the requirements of subpart E of Part 20,
14 which have the dose releases.

15 Accordingly, when the staff receive and
16 review a decommissioning plan, it has to have a
17 sufficient site characterization to support the
18 staff's review of the applicant meeting those dose
19 limits.

20 JUDGE ABRAMSON: And those are dose
21 limits to humans, only, is that correct? Or are they
22 - is it broader than that? Is there environmental -
23 what's the right word - is that environmental
24 pollution equivalent requirement?

25 MR. ROTH: Those are for people only,

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1 Your Honor.

2 JUDGE ABRAMSON: Okay, thank you.

3 Mr. Kopp, what is the difference between
4 what you were required to provide under your
5 original license, in terms of the decommissioning
6 plan, and what you are now required to provide in
7 2011? Is there anything substantively different?

8 MR. KOPP: Substantively there is no
9 difference. The factual difference comes from the
10 parameters that the staff would like to plug in to
11 their models, their computer-generated formulas and
12 so forth, and they wanted something more site
13 specific than the generic textbook type parameters
14 that were originally discussed.

15 JUDGE ABRAMSON: Originally between the
16 Army and the staff?

17 MR. KOPP: Between the Army and the NRC
18 staff.

19 JUDGE ABRAMSON: So when you originally
20 thought about submitting a decommissioning plan, the
21 Army was not aware that they needed to provide a
22 more detailed site specific characterization?

23 MR. KOPP: That is correct.

24 JUDGE ABRAMSON: And that is what has led
25 to this.

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1 But the content, your requirements, the
2 content of the decommissioning plan, the legal
3 requirements for a decommissioning plan and its
4 content, have those legal requirements changed
5 between the time you terminated your license in '94
6 and today?

7 MR. KOPP: They have not.

8 JUDGE ABRAMSON: So what's happened is,
9 you've gotten an extension to 2011 to submit it
10 because you didn't have information that was
11 necessary to enable you to submit it; is that
12 correct?

13 MR. KOPP: Correct.

14 JUDGE ROSENTHAL: Anything further, Mr.
15 Kopp?

16 MR. KOPP: I really don't have anything.

17 JUDGE ROSENTHAL: Mr. Mullett.

18 ORAL ARGUMENT ON BEHALF OF SAVE THE VALLEY

19 Mr. MULLETT: Thank you, Your Honor. Can
20 you hear me okay?

21 JUDGE ROSENTHAL: Yes.

22 MR. MULLETT: There are two things that I
23 want to suggest for your consideration.

24 The first sort of procedurally. It
25 seems to me that in effect there is an invitation

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1 here to reconsider and rewrite the board's order of
2 May 1st, 2007, that the legal issues here are
3 equally applicable to the question of contentions as
4 they are to the question of evidence at the hearing.

5 And in terms of the framework being
6 advanced by the staff and the Army, you would
7 essentially not have the hearing opportunity that we
8 are here to take advantage of; that you've
9 essentially got a situation here where the board and
10 staff, or the Army and the staff are confusing, and
11 why they are doing this is not clear to me, the
12 plans for the site characterization with the results
13 of the site characterization.

14 I certainly agree with what Judge
15 Abramson is suggesting, that come 2011, that as far
16 as the results fo the site characterization that
17 would be required, that the situation would then be
18 no different in 2011 than it should have been in
19 2004 or 1999.

20 But to assure that the results are what
21 are required, that's where the plan becomes so
22 critical. And the question, and certainly as I read
23 the order of May 1st, 2007, what the board clearly
24 recognized is, the question is, here, not whether
25 the results are sufficient to support the

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1 decommissioning plan, but whether or not the plan
2 can be reasonably expected to produce the results
3 necessary to support the plan. And that's the
4 distinction that is being missed here.

5 Now I would certainly not try to tell
6 the board what they've written, particularly when
7 I'm going to be mentioning decisions that JUDGE
8 Rosenthal probably - well, I know knows a lot more
9 about, how much he actually wrote or how much other
10 people wrote, I'm not in a position to say of
11 course. But if we look at the situation with Yankee
12 Atomic, if we look at the situation with the
13 Connecticut Yankee cases, I think we have a very
14 precise analogy to the circumstance that we have
15 here in the nuclear licensing context.

16 The whole issue of what constitutes an
17 adequate site characterization plan for purposes of
18 reviewing admissibility of contentions was addressed
19 I think as concretely and as authoritatively as
20 could be done in those cases. We've got a
21 commission decision affirming Judge Rosenthal's
22 admission of contentions in that particular case.

23 And it seems to me that what the
24 commission said was that we are not going to adopt a
25 generic bright line rule. We are going to adopt a

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1 case-specific fact-sensitive rule that is very much
2 associated with the specific circumstances at the
3 site, and where we are in the process.

4 And what it seems to me the commission
5 clearly said in - this is CL-05-15 in the matter of
6 Yankee Atomic, which

7 JUDGE ROSENTHAL: Do you have a cite for
8 those pages?

9 MR. MULLETT: I do here, Your Honor.
10 It's stated 6/29/05, it's docket number 50-29 OLA.
11 And I think I have the Westlaw.

12 MS. PARISH: It's 61 NREC 365.

13 MR. MULLETT: Thank you. That is I
14 believe correct.

15 JUDGE ROSENTHAL: Did the court reporter
16 get that reference?

17 MR. MULLETT: And the basic idea is that
18 at the point in time that you are looking at the
19 decommissioning plan, you don't have to have all the
20 results in hand. There may be a certain refinement
21 of results that needs to take place during the
22 decommissioning process. But as far as having the
23 methods and the plans nailed down, and all you are
24 into is a situation where you are sort of tying up
25 the loose ends, refining the details; that certainly

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1 is the expectation that would to me come from this
2 order.

3 JUDGE ABRAMSON: Mr. Mullett, are these
4 cases you're talking about cases that were
5 challenges to a decommissioning plan per se, or were
6 they challenges like this which take place before
7 there's a decommissioning plan?

8 MR. MULLETT: Well, here's the rest of
9 the analogy, Your Honor.

10 JUDGE ABRAMSON: Answer my question
11 first, before you tell me.

12 MR. MULLETT: These are not alternate
13 schedule cases. They are, to my knowledge, there is
14 no alternate schedule cases.

15 JUDGE ABRAMSON: So these are cases where
16 a decommissioning plan had been submitted, and there
17 were challenges to the - what do I want to say? - to
18 the satisfactoriness of the decommissioning plan?

19 MR. MULLETT: Well, no, it's the
20 satisfactoriness of the results; that's the
21 distinction, the distinction between the plan and
22 the results.

23 And if you go look at Connecticut Yankee
24 -

25 JUDGE ABRAMSON: I'm sorry, the results

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1 of actual decommissioning, or -

2 MR. MULLETT: No, the results of the site
3 characterization.

4 JUDGE ABRAMSON: Which were embedded in
5 the decommissioning plan?

6 MR. MULLETT: Right.

7 JUDGE ABRAMSON: So there are challenges
8 to a decommissioning plan arguing that the site
9 characterization was insufficient. Is that -

10 MR. MULLETT: That the results of the
11 site characterization were insufficient. The
12 description, you're characterizing the site, you're
13 describing the site, and there are a variety of
14 details that we can get into.

15 JUDGE ABRAMSON: I understand. I
16 understand.

17 But I'm trying to understand where the
18 process was at that point. And what you're saying
19 is, these were all challenges after an actual
20 decommissioning plan had been submitted?

21 MR. MULLETT: That's correct.

22 JUDGE ABRAMSON: And you will have - do
23 you have any reason to believe you will - that Save
24 the Valley will not have that opportunity here when
25 a decommissioning plan is actually submitted?

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1 MR. MULLETT: Yes, there is. And I think
2 that in terms of the Connecticut Yankee case, that
3 certainly is the one that gives rise to the concern,
4 certainly in relationship to the May, 2007 order
5 that goes along with it.

6 IN the matter of Connecticut Yankee
7 case, which is 54 NRC 33, as opposed to things in
8 the context of the LPP versus the LTR, the time to
9 litigate the plan is at the time the plan is before
10 the staff.

11 JUDGE ABRAMSON: The plan meaning the
12 decommissioning plan. Let me get an answer to this
13 question. The word you are using, plan, has a very
14 specific meaning, and I want to make sure I
15 understand it. This is the actual submitted
16 decommissioning plan? Your concern, I understand,
17 is the site characterization component of the plan.

18 But the plan term that is being used
19 here is not a plan to characterize the site. The
20 plan term that is used in the cases you're citing I
21 believe is the decommissioning plan, not a plan to
22 characterize the site.

23 MR. MULLETT: Well, but the argument that
24 we would make, Your Honor, certainly in terms of the
25 way this case has been structured, certainly in

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1 terms of the way this structure, this particular
2 docket has been set up, is that the site
3 characterization plan is a prerequisite to the
4 decommissioning plan.

5 JUDGE ROSENTHAL: If let's say in 2011 a
6 decommissioning plan is filed, submitted to the
7 staff as part of an application to terminate the
8 license. And you look at that plan, and you
9 conclude that the plan is deficient because it's not
10 supported by what you regard as an adequate site
11 characterization.

12 Now, doesn't the commission staff have
13 the first notice in the Federal Register of the
14 receipt of the decommissioning plan as part of an
15 application to terminate the license, doesn't it
16 have to provide a notice of opportunity for hearing?
17 And if so, wouldn't then Save the Valley have the
18 opportunity to come in and say, well, as we told you
19 years ago, we didn't think that that field sampling
20 plan was adequate to support a decommissioning plan,
21 and here we are.

22 In other words I'm now beginning to
23 wonder what we're doing here. I mean if what you're
24 saying is they had to have an adequate plan, that
25 you are not concerned at this juncture particularly

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1 with an adequate site characterization plan, which
2 is a field sampling plan in this instance. You will
3 have an opportunity down the road, I think, if you
4 don't like the results of the field sampling plan in
5 terms of the site characterization, you would have
6 an opportunity to at that point litigate it.

7 In other words I'm raising now a course
8 that had not occurred to me until this discussion as
9 to whether it's premature; whether at this juncture
10 what we ought to be doing is saying, okay, let's see
11 how the Army's field sampling plan plays out. The
12 plan is not set in concrete. I gather that in terms
13 of what tests are conducted it may depend upon the
14 results of other tests and all of this.

15 And five years from now they'll be
16 submitting as they are required to submit under
17 condition #13 a decommissioning plan, and then we
18 see where we are in terms of whether there is a site
19 characterization that will support it.

20 MR. MULLETT: Well, Your Honor, what I
21 would do in this regard is, if I may respectfully,
22 quote from the May 1st order, and particularly the
23 very last sentence there, last two sentences: It can
24 seriously be gainsaid then pursuant to the grand
25 licensing amendment, the licensee must submit a

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1 decommissioning plan by 2011 that would be found
2 satisfactory by the NRC, because this in turn will
3 hinge upon the completion of an adequate site
4 characterization, as intervenor's admitted
5 contention reflects. There must be assurance that
6 there are not activities required to obtain such a
7 site characterization beyond those called for in the
8 approved FSP which can reasonably be expected to
9 become part of the FSP as it evolves.

10 JUDGE ROSENTHAL: No, I know we said
11 that, and I probably wrote that language myself.
12 But I'm not divinely inspired any more than my
13 colleagues are.

14 JUDGE ABRAMSON: Speak for yourself.

15 (Laughter)

16 JUDGE ROSENTHAL: And I'm now, as I said,
17 this discussion this morning is raising a question
18 in my mind as to whether that was right.

19 MR. MULLETT: Well, the other thing I
20 would say, in this order you've got a quotation I
21 think is quite relevant from the SER, they say: the
22 activities described by the Army in its SFP and
23 addendum as supplemented in its follow up responses
24 should provide adequate site characterization
25 information such that the Army could submit an

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1 acceptable decommissioning plan within five years,
2 and are therefore necessary for the effective
3 conduct of decommissioning operations.

4 And I think that that highlights the
5 same point. And the question is whether or not this
6 site characterization plan as proposed is able to
7 meet that particular standard. Is it able to meet
8 the standard of providing the information necessary
9 to have an adequate site characterization.

10 JUDGE ABRAMSON: Mr. Mullett, when we met
11 with all of you here some 15 months ago, one of the
12 things we asked if that you all talk with each
13 other, because in our view, at that point, there was
14 on the table a plan to develop a plan for site
15 characterization which was going to evolve. And you
16 all proceeded along that line.

17 You were unable to reach agreement on
18 how to continue to proceed, and so you asked that we
19 take this to litigation on these contentions
20 relating to the adequacy of a plan to develop a
21 plan.

22 But nowhere have we discussed the
23 principle that we are discussing this morning, which
24 is, what is actually at the end required and whether
25 or not there is some requirement before we get to

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1 the end of the license extension that there be
2 something specific in the plan to develop the plan.

3 MR. MULLETT: Well, I think again, if you
4 look at Yankee Atomic, the answer to that question
5 is that it depends on where you are in the process;
6 it depends on what the situation is.

7 Here with the situation we have in this
8 particular case, where the licensee has submitted,
9 you know, two previous decommissioning plans and has
10 basically been instructed that there is a necessity
11 to do site characterization as a prerequisite to
12 submission of a new plan, that that's very relevant
13 in this particular case to evaluating that question
14 you asked.

15 JUDGE ABRAMSON: Is it your view that the
16 requirement to develop site characterization is
17 unique to this facility?

18 MR. MULLETT: The requirement to develop
19 site characterization is not unique to this
20 particular facility.

21 JUDGE ABRAMSON: Is it not accurate to
22 state that one could not possibly come up with any
23 decommissioning plan for any facility that was
24 contaminated with radioactive materials without
25 characterizing the site?

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1 MR. MULLETT: I would certainly not-

2 JUDGE ABRAMSON: And is not in fact that

3 what our requirement requires, and what our

4 regulations require in (g)(4), 40.42(g)(4), that

5 there be satisfactory - a description of the site

6 sufficient to enable the staff to evaluate it?

7 That's what (g)(4) says?

8 MR. MULLETT: Well, again, the difference

9 between a plan and the description I think is

10 significant.

11 JUDGE ROSENTHAL: I would like to get

12 down to the bedrock here. You're claiming that the

13 field sampling plan is inadequate -

14 MR. MULLETT: That's correct.

15 JUDGE ROSENTHAL: - to accomplish an

16 intended purpose.

17 MR. MULLETT: That's correct.

18 JUDGE ROSENTHAL: State for me precisely

19 what you deem to be that ultimate purpose? In other

20 words, what is the standard that we are going to be

21 considering your claim of inadequacy against? Is it

22 that this plan is inadequate unless there is

23 assurance that at the end of the day, i.e. 2011, it

24 will produce as a result a site characterization

25 that beyond peradventure will meet the site

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1 characterization elements of decommission plan
2 approval? Or is it something else?

3 MR. MULLETT: No, Your Honor, I think
4 that what we've read from your May 1st order, what
5 we've read from the staff's SER would be our view.
6 We have a difference from what's been said here in
7 terms of 20.1403 you have the second requirements,
8 not just the 25 millirem requirement. You have to
9 do the failure of institutional control scenario,
10 and it's our view that you also have to provide the
11 information necessary to support an EIS because
12 you've got a restricted release situation here,
13 because you've got a license amendment if you go on
14 and read it that specifically requires an
15 environmental report sufficient to support an EIS.

16 So we think that information needs to be
17 done, and certainly one of our major concerns here
18 is the extent to which they have - the extent to
19 which they have essentially ignored that or eschewed
20 that.

21 So the question in terms of your May 1st
22 order here, the clause in the parentheses, or which
23 can reasonably be expected to become part of the FSP
24 as it evolves, in terms of the way in which the FSP
25 has been defined, we don't see those additional

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1 elements in the definition of the purpose. And
2 therefore it wouldn't evolve to meet that intended
3 purpose.

4 JUDGE ABRAMSON: Mr. Mullett, let me
5 interrupt you for a second, because I'm concerned
6 about something you said.

7 You said that Save the Valley's view is
8 that ultimately the decommissioning plan must
9 consider failure of institutional controls, i.e. the
10 inadvertent intruder - the intruder scenario, long
11 term on this site; is that what you're concerned
12 about, among other things, so that you're concerned
13 that this plan ultimately must deal with the
14 possibility that 20,000 years from now or 50,000 or
15 500,000 years from now somebody wanders onto the
16 site and goes hunting and could get exposed to
17 radiation beyond some limit?

18 MR. MULLETT: I don't think it's that
19 long a period of time into the future under the
20 regulations, Your Honor. But I thin 20 CFR 14.03
21 has multiple requirements in a particular, looking
22 at 1,000 years, and in particular, looking at the
23 first 100 or so years under the guidance documents
24 under the -

25 JUDGE ABRAMSON: So your view at this

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1 point is that you don't see any indication in the
2 plan to develop a plan that it's going to cover
3 these issues.

4 Is that where you are really going?

5 MR. MULLETT: Well, that's part of it.
6 That's part of it. It's not all of it, but that's
7 certainly where our testimony goes with regard to
8 the extent to which we see no effort here to address
9 that; to the extent to which we see no effort to
10 address the requirements for an EIS, the information
11 requirements for an EIS.

12 The site characterization is going to
13 have to provide the information necessary to support
14 an EIS, because we are dealing with a restricted
15 release situation, Your Honor.

16 JUDGE ABRAMSON: And when you looked at
17 the Connecticut Yankee and the other, Yankee Atomic
18 case, was that the other one, both of which were
19 challenges at the stage of a submittal of a
20 decommissioning plan, but challenges to a site
21 characterization, pieces of a decommission?

22 MR. MULLETT: But they had not had a
23 prior hearing opportunity, Your Honor.

24 JUDGE ABRAMSON: I understand that. I
25 understand that. But is it - am I correct in

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1 understanding that you somehow view that this
2 process would - would eliminate Save the Valley's
3 right to challenge the decommissioning plan when
4 it's ultimately submitted?

5 MR. MULLETT: Well, I would want to
6 distinguish between the decommissioning plan and the
7 site characterization information, and the extent to
8 which as far as the site characterization
9 information is concerned, because of this process,
10 because of the alternate schedule and the hearing
11 opportunity associated with the alternate schedule,
12 I would be concerned on the basis of the Connecticut
13 Yankee case that we would not have the opportunity
14 to challenge the plan.

15 JUDGE ABRAMSON: I understand that. I
16 understand that.

17 MR. MULLETT: Okay.

18 JUDGE ABRAMSON: So where we are now is
19 we have a plan to develop a plan. We have a plan
20 that is in very preliminary stages. It's what, a
21 year and a half into its five years? It's got some
22 elements; it's not done.

23 And what I think - let me make sure I've
24 got this absolutely right. Save the Valley is
25 concerned that because we're now having a hearing at

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1 this stage, when it comes to submittal of a
2 decommissioning plan, Save the Valley would be
3 prohibited from challenging the ultimate site
4 characterization because it had an opportunity early
5 on to challenge the plan to get to site
6 characterization, and that would somehow eliminate
7 its right to challenge the ultimate site
8 characterization?

9 MR. MULLETT: Well, I think we're getting
10 into semantic confusion here.

11 JUDGE ABRAMSON: I don't think this is
12 semantics at all.

13 MR. MULLETT: No, no, no, I'm not
14 suggesting it's semantics. I'm saying, when we talk
15 about the plan - when we talk about the plan we need
16 to distinguish between the site characterization
17 plan and the decommissioning plan.

18 I'm certainly not suggesting that this
19 hearing opportunity would foreclose us from
20 challenging the decommissioning plan in 2011.

21 JUDGE ABRAMSON: And that decommissioning
22 plan will be built upon whatever the results of the
23 ultimate site characterization are.

24 MR. MULLETT: That's the question, Your
25 Honor.

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1 JUDGE ABRAMSON: I understand, and that's
2 where I'm going with this. Your concern is that
3 because you have now an opportunity to challenge the
4 way site characterization is being planned, that
5 that would preclude you somehow from challenging the
6 ultimate results of that site characterization,
7 which will be an element of the decommissioning
8 plan. And let's use the term decommissioning plan
9 when we describe that. And let's use the term,
10 plan, or let's use the term, site characterization
11 plan to describe site characterization.

12 Because the cases you are citing are
13 challenges to a decommissioning plan. They are
14 challenges to the site characterization elements
15 which were ultimate site characterizations presented
16 as a component of a decommissioning plan.

17 MR. MULLETT: I agree. I agree with
18 that.

19 JUDGE ABRAMSON: And so those cases to me
20 are entirely different than where we are in this
21 stage, which is, you're uncomfortable with or you
22 are challenging the way site characterization is
23 being planned.

24 MR. MULLETT: Well, if I could, Your
25 Honor, just briefly, the reason I cite these plans

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1 as in terms of criteria for the standards of
2 adequacy of a site characterization plan. That's
3 what those cases address.

4 So as far as what the standard is for
5 adequacy of a site characterization plan, those
6 cases address that.

7 The other thing, though, you look at
8 Connecticut Yankee particularly in terms of
9 procedural posture and what gets said there, again,
10 it relates to a decommissioning plan; it doesn't
11 relate to a site characterization plan. I agree
12 with that.

13 But certainly one reading of that case
14 is that you don't challenge the plan at the time
15 that you are evaluating the results. If you have a
16 prior opportunity to challenge the plan, you need to
17 challenge the plan at that time.

18 JUDGE ABRAMSON: Okay, I understand.

19 JUDGE ROSENTHAL: Would you agree that
20 they would be foreclosed, Mr. Roth?

21 MR. ROTH: No, they would not at all be
22 foreclosed.

23 JUDGE ROSENTHAL: Okay, anything further,
24 Mr. Mullett.

25 JUDGE ABRAMSON: Certainly this board -

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1 it is not this board's intent by its prior rulings,
2 I think JUDGE Rosenthal would agree, it's not our
3 intent to imply in any way the fact that you are
4 having a hearing on the challenge to the site
5 characterization plan would somehow eliminate your
6 right to challenge the decommissioning plan.

7 And I think if you'll look at the record
8 we have explicitly stated that not only in our prior
9 discussions with you 15 months ago but probably in
10 writing.

11 MR. MULLETT: Well, if I could just add
12 one thing, Your Honor, to close on that particular
13 point, when you look at Yankee Atomic - and again,
14 you guys know how to - you wrote it.

15 JUDGE ROSENTHAL: We weren't dealing
16 there with a schedule.

17 MR. MULLETT: I agree, absolutely. There
18 isn't a case dealing with a schedule.

19 JUDGE ROSENTHAL: I can't understand, Mr.
20 Mullett, myself -- obviously I would be very
21 unlikely to sit on the board several years now when
22 this comes up again, and also I'm not the
23 commissioners who have the ultimate say.

24 But offhand I can't understand how
25 possibly your challenge to the plan, to the adequacy

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1 of the plan - I'm talking about the field sampling
2 plan, you're challenging the field sampling plan,
3 you've challenged it. If we were to reject that
4 challenge, we say, well, the plan as we see it,
5 contrary to Save the Valley, is adequate or
6 competent, whatever the objective is at this point.
7 I don't see how that could conceivably foreclose you
8 when the decommissioning plan comes up from coming
9 in and saying, well, that old board might have
10 thought this plan was good enough. But the fact is
11 the results are not sufficient. In other words the
12 ultimate site characterization is not sufficient to
13 support a decommissioning plan, and therefore, we
14 are availing ourselves of the opportunity to
15 challenge the decommissioning plan, and we are free
16 to challenge it on the basis that it didn't produce
17 a result that will support a decommissioning plan.

18 I mean I just don't see how there is any
19 possibility of your being foreclosed from doing
20 that, and I think Mr. Roth agrees.

21 MR. ROTH: Correct, Your Honor.

22 JUDGE ABRAMSON: And certainly we can
23 clarify that in any subsequent order. If there is
24 anything we said, if there is anything we said in
25 prior orders that would imply that, we will

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1 certainly clarify that that's not what we intend.

2 MR. MULLETT: Well, Your Honor, again,
3 just briefly, in terms of the whole question of
4 what, you know, the necessary standard means, the
5 whole questions of what the third criteria,
6 otherwise in the public interest, means, in this
7 particular context of the alternate rule, to my
8 knowledge those are not decisions or issues that
9 have been authoritatively decided heretofore.

10 Looking at Connecticut Yankee in terms
11 of the extent to which practical considerations are
12 ones that need to enter in that -

13 JUDGE ABRAMSON: Let's ask about
14 statutory construction. We've got a statute that
15 says, must be necessary. Do you read that to mean
16 necessary and sufficient? How would you as a lawyer
17 -

18 MR. MULLETT: Well, the other word that
19 matters there is effective, and that's the other
20 word that's in that particular language.

21 So when you say it's necessary to
22 effective decommissioning, that's where in terms of
23 that line of questioning that was asked earlier, you
24 can't just have any old plan and satisfy the
25 requirement.

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1 So when you combine necessary and
2 effective together -

3 JUDGE ABRAMSON: All right, let's pursue
4 this as lawyers, scholarly lawyers, looking at a
5 statute. We have a regulation - okay, thank you,
6 JUDGE Rosenthal, scholarly lawyers looking at a
7 regulation.

8 We have a phrase that says, necessary to
9 effective decommissioning. And then your contention
10 is, or your argument is, that somehow, necessary to
11 effective decommissioning should mean necessary and
12 effective - necessary and sufficient for effective
13 decommissioning? Is that what you're suggesting to
14 us?

15 MR. MULLETT: Well, what it seems to me,
16 Your Honor, is that you're in a situation where the
17 activities to be performed would be those required
18 for an effective decommissioning. And to the extent
19 there are additional activities -

20 JUDGE ABRAMSON: How do you read that -
21 let's just talk about statutory construction. Do
22 you believe the commission would have said necessary
23 and sufficient if they meant it?

24 MR. MULLETT: Well, to the extent that it
25 would be superfluous here, given the wording that is

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1 there, not necessarily.

2 JUDGE ABRAMSON: Okay. I'm at a complete
3 loss to understand why the words, sufficient, would
4 be superfluous. Necessary for - let me finish -
5 necessary for effective decommissioning means you
6 can't - this step is fundamental for an effective
7 plan. It doesn't mean this step is everything. It
8 means this step is necessary.

9 You're suggesting that it means not only
10 this step is necessary to get effective
11 decommissioning but you're suggesting that because
12 it says, effective decommissioning, the word
13 necessary should mean everything that is necessary.
14 Is that what you're suggesting? Certainly that's
15 what you're implying?

16 MR. MULLETT: Everything that would be
17 required.

18 JUDGE ABRAMSON: I see. So do you think
19 that the commission is capable of writing everything
20 that is necessary?

21 MR. MULLETT: Well, I think as far as
22 leaving that to a case-specific fact-sensitive
23 determination, the commission made the decision that
24 that's what they were going to do.

25 Now you couldn't have a generic bright

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1 line rule because of the variations that you
2 experienced with sites across the board.

3 JUDGE ABRAMSON: Is that the entirety of
4 your argument on how this regulation should be
5 construed?

6 MR. MULLETT: The other part of it that I
7 think needs to be factored into is the otherwise in
8 the public interest, the third criterion of 40.42,
9 and clearly when it says, otherwise in the public
10 interest, that means it's a requirement that's in
11 addition to and separate from one and two.

12 And in this particular situation, and
13 this is where I think this case is special, perhaps
14 not unique but special, the extent to which we've
15 had such a long delay, and the extent to which the
16 site characterization has been the key consideration
17 with regard to that delay, the extent to which it
18 would be otherwise in the public interest that
19 everything that would be required for site
20 characterization get done in this five-year period I
21 think clearly fits within the otherwise in the
22 public interest requirement of 40.42.

23 JUDGE ABRAMSON: Yet the plain language
24 of G2 is that the commission may issue a license
25 extension or may grant an extension if three

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1 criteria are met.

2 MR. MULLETT: And the third one is -

3 JUDGE ABRAMSON: And the third one is
4 otherwise in the public interest.

5 Now how can it not be in the public
6 interest to permit the licensee sufficient time to
7 characterize this site?

8 MR. MULLETT: Well, Your Honor -

9 JUDGE ABRAMSON: That's all we're talking
10 about. It's a license extension.

11 MR. MULLETT: Well -

12 JUDGE ABRAMSON: The public interest is
13 to let them do the job.

14 MR. MULLETT: The question is, how much
15 do they get done within five years. I mean it could
16 be three years, it could be two years. Five years
17 in the context of the timeliness rule is a very long
18 time. And in terms of a situation where this site
19 was - it ceased operation in 1994, the extent to
20 which we are now 13 years past that point when the
21 whole process, even for complex sites, was supposed
22 to be done within six years.

23 We're really in overtime here, Your
24 Honor.

25 JUDGE ABRAMSON: And I appreciate the

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1 angst of the community and the angst of JUDGE
2 Rosenthal, both of whom have suffered through this
3 thing for many, many years.

4 But this is a site where the agency is
5 being asked to consider in the end leaving it fenced
6 off and permitting no access, because anybody who
7 goes on this site takes a risk of being exposed to
8 UXO. Isn't that right?

9 So is there in fact some kind of urgency
10 here? Or are we talking about 1,000 years? You
11 mentioned to me 1,000 years I got to start worrying
12 about.

13 What is indeed the urgency other than
14 people's attention spans?

15 MR. MULLETT: Well, Your Honor, I think
16 that from the perspective of Save the Valley, from
17 the perspective of the community the issue is, what
18 are we dealing with here as far as the long-term
19 risk? What are we dealing with here that would be
20 revealed by this site characterization process if it
21 were done properly and correctly.

22 JUDGE ROSENTHAL: You're saying, I gather
23 in essence, that particularly given the lengthy
24 delay, which as Judge Abramson notes, is a matter of
25 concern to me at least, that it's in the public

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1 interest to have this site characterization
2 completed in the five years in such a way that there
3 would be no question about a decommissioning plan
4 being viable in 2011; is that in essence what you're
5 saying in terms of the public interest?

6 MR. MULLETT: Absolutely, Your Honor.
7 And I don't think it's your personal concern or my
8 personal concern, I think it's the commission's
9 concern underlying the timeliness rule, when they
10 enacted it in the first place.

11 And the other thing I would say is, that
12 from a practical standpoint, trying to litigate the
13 plan at the point in time when the plan has been
14 fully implemented, that's going to be a very
15 difficult burden in terms of basically asking people
16 to go back and redo things that have already been
17 done.

18 JUDGE ROSENTHAL: I think we've got your
19 position.

20 I'll give Mr. Roth two minutes if he
21 wants to respond to anything that Mr. Mullett has
22 had to say. I'm not insisting that you do it. The
23 time is available, but there is no constitutional
24 requirement.

25 (Laughter)

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1 MR. ROTH: Thank you, Your Honor. Let me
2 consult with co-counsel for a moment.

3 (Counsel consult)

4 MR. ROTH: Thank you, Your Honors, for
5 the opportunity, but nothing more to add right now.

6 JUDGE ROSENTHAL: Mr. Kopp?

7 MR. KOPP: I have nothing more to add,
8 Your Honor.

9 JUDGE ROSENTHAL: All right. I think
10 that that terminates the oral argument segment of
11 today's proceedings.

12 The next order of business will be the
13 admission of the exhibits. And Parish is one of our
14 law clerks that is here today. The other one is Ms.
15 Krause, will now address the matter of getting the
16 exhibits formally introduced into evidence.

17 JUDGE COLE: Do you have a microphone? I
18 can hardly hear you.

19 MS. PARISH: Is that better?

20 JUDGE COLE: That's better.

21 MS. PARISH: If the staff would bring
22 their two copies of the exhibit forward.

23 We can just place them in the front
24 there. Just on the floor.

25 JUDGE COLE: We could probably go to hand

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1 truck.

2 MS. SILVIA: We would just like to add
3 that on Mr. Peckenpaugh's testimony there is a
4 slight correction to be made. Since he's filed the
5 testimony his job title has changed. It's his
6 answer one of the initial testimony. He is now a
7 hydrogeologist, and his office has also changed.
8 He's still in the Office of Federal and State
9 Materials in environmental protection, division of
10 waste management and environmental protection.
11 However he is now in the decommissioning and uranium
12 recovery licensing directorate, in the reactor
13 decommissioning branch.

14 MS. PARISH: Otherwise, is your exhibit
15 list accurate?

16 MS. SILVIA: Yes.

17 MS. PARISH: Have all the exhibits been
18 stamped in the manner prescribed?

19 MS. SILVIA: Yes.

20 MS. PARISH: Does the board accept these
21 exhibits?

22 (The board affirms)

23 MS. PARISH: Thank you.

24 Would the Army bring their two copies of
25 the exhibits?

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1 MR. KOPP: And I have previously
2 submitted the binders.

3 MS. PARISH: Yes. If all the parties
4 could return to me the stamps at the end of the
5 discussion.

6 Mr. Kopp, is your exhibit list correct?

7 MR. KOPP: Yes, it is.

8 MS. PARISH: And have all the exhibits
9 been stamped in the manner requested by the board?

10 MR. KOPP: Yes, they have.

11 MS. PARISH: Does the board accept the
12 admission of the Army's exhibits?

13 JUDGE ROSENTHAL: Yes.

14 MS. PARISH: Would Save the Valley bring
15 their exhibits forward?

16 MS. SILVIA: Your Honors, we would like
17 to object to one figure contained in Dr. Henshel's
18 testimony. It's in her surrebuttal on page 8,
19 answer 10.

20 The figure has no foundation. It does
21 not specify the references. The units for the
22 uranium concentration are not provided.

23 JUDGE ROSENTHAL: We will take the
24 objection under advisement.

25 I might point out that this case is not

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1 going to a jury. It's being heard by three members
2 of this board.

3 I think that we're in a position to
4 evaluate the testimony that's been offered in terms
5 of whether it has a sufficient foundation.

6 So we will note the objection, and we'll
7 take it into consideration when we go over the
8 evidence.

9 MR. MULLETT: Your Honor, I would simply
10 point out that we did - there was a problem
11 converting - with the PDB conversion from
12 WordPerfect as far as a table on page 8 of Dr.
13 Henshel's direct testimony. We supplied earlier the
14 correction for the word processing problem as far as
15 that particular table is concerned. It doesn't go
16 to the content; it goes to the formatting and the
17 headings and that type of thing.

18 And I believe I've made the changes in
19 the exhibits, so that the corrected table has been
20 inserted in. I provided copies. I think everybody
21 has a copy of the corrected table and the correct
22 format.

23 Otherwise it is as previously served.

24 MS. PARISH: Excellent. And the exhibit
25 list is correct, that you submitted is correct?

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1 MR. MULLETT: Yes.

2 MS. PARISH: And all the exhibits have
3 been received?

4 MR. MULLETT: They have.

5 MS. PARISH: Does the board accept the
6 admission of Save the Valley's exhibits?

7 JUDGE ROSENTHAL: I take it that the
8 court reporter got down specifically the exhibit
9 that was subject to the objection?

10 MS. PARISH: Does the board accept the
11 admission of Save the Valley's exhibits?

12 JUDGE ROSENTHAL: Yes, it does.

13 Now I take it that that concludes this -

14 MS. PARISH: That concludes this.

15 JUDGE ROSENTHAL: Now our order of
16 October 11 indicated that we were not going to
17 commence the questioning of the witnesses until
18 after a luncheon recess.

19 However it is only 11:20, and if there
20 is no objection on the part of the parties, and the
21 witnesses are here, I think we would just as soon
22 start at this point, and then perhaps take a
23 luncheon recess in an hour or so.

24 Any objection to that? Hearing none, I
25 would like to have the - we're now dealing with the

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1 first panel.. That's the panel that's dealing with
2 the biota and air sampling.

3 Our order identified a number of
4 witnesses for the - one for Save the Valley, and
5 several for the staff and the Army.

6 I will ask at this point, counsel,
7 beginning with Save the Valley, then the Army, then
8 the staff, introduce their witnesses. And I will
9 then administer the oath to them collectively.

10 MR. MULLETT: All of the witnesses at the
11 same time, Your Honor?

12 JUDGE ROSENTHAL: This is just the ones
13 on the biota panel. I gather that in your case it's
14 just Dr. Henshel?

15 MR. MULLETT: Dr. Henshel.

16 JUDGE ROSENTHAL: All right, Dr. Henshel,
17 if you'd remain standing.

18 And Army?

19 MR. KOPP: Your Honor, we have Mr.
20 Anagnostopoulos, Mr. Skibinski, and Mr. Barta here
21 for the Army.

22 JUDGE ROSENTHAL: Okay, please stand.

23 And for the staff?

24 MR. ROTH: For biota and air sampling, we
25 have mr. Dale Contra, Mr. Adam Schwartzman, Dr. Tom

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1 McLaughlin.

2 JUDGE ROSENTHAL: Okay.

3 Lady and gentlemen, if you would raise
4 your right hand?

5 Whereupon,

6 HAROLD W. ANAGNOSTOPOULOS

7 JOSEPH N. SKIBINSKI

8 MICHAEL L. BARTA

9 DALE CONTRA

10 ADAM SCHWARTZMAN

11 TOM McLAUGHLIN

12 were called as witnesses and, after having been duly
13 sworn, were examined and testified as follows:

14 JUDGE ROSENTHAL: Thank you very much,
15 and you may resume your seats.

16 All right. Shall we start with Dr.
17 Henshel? Dr. Henshel, if you would, the witness
18 table over here.

19 Maybe each of the other two parties
20 might supply what they regard as their principal
21 witness to join Dr. Henshel over at the table?

22 MR. KOPP: Your Honors, for biota or air
23 would be the first topic?

24 JUDGE ROSENTHAL: Biota, at this point.
25 Principal witness on biota for the Army and for the

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2

MR. KOPP: For the Army it would be Mr.

3

Barta, Your Honor.

4

JUDGE ROSENTHAL: Okay, if he would be so

5

kind as to join Dr. Henshel.

6

MR. ROTH: And that is Dr. Tom

7

McLaughlin for the staff.

8

JUDGE ROSENTHAL: Let me have it again.

9

It's Dr. Henshel, and for the staff it's Dr.

10

McLaughlin is the staff, and for the Army it's -

11

mR. ROTH: Mr. Barta.

12

JUDGE ROSENTHAL: Mr. Barta, okay. Thank

13

you all for coming. Not that you have any choice.

14

(Laughter)

15

JUDGE ROSENTHAL: Do you want to start.

16

JUDGE COLE: Just a few questions.

17

Dr. Henshel, one of the central points

18

in contention here is the alleged absence of

19

depleted uranium in deer samples.

20

And also I think the parties are in

21

general agreement that natural uranium is ubiquitous

22

in the area. And this particular area was subjected

23

to the addition of depleted uranium.

24

Could you tell me what depleted uranium

25

is as used in this case?

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1 DR. HENSHEL: Depleted uranium is the
2 residual combination of isotopes of uranium that are
3 left after the enriched uranium has been processed.
4 Should I go into more detail?

5 JUDGE ABRAMSON: Do you know what
6 percentage is left, what the percentage is left of
7 the fissionable uranium in the depleted uranium that
8 is actually being used here?

9 DR. HENSHEL: If I'm remembering
10 correctly, it's down to below .3 percent on the U-
11 234, is that correct? 235, sorry.

12 JUDGE ABRAMSON: Let me just make sure,
13 is the Army on board on that? Is that about what
14 the content was on the DU?

15 MR. BARTA: I don't remember the
16 specifics.

17 JUDGE ABRAMSON: Does Army have a witness
18 here who can tell us what the specifics are?

19 Pick up a microphone.

20 JUDGE ROSENTHAL: Let's get the
21 microphone, and identify yourself by name for the
22 benefit of the reporter.

23 MR. ANAGNOSTOPOULOS: Mr. Anagnostopoulos
24 is my name. I certify health businesses. I consult
25 with the Army.

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1 Natural uranium would have about .0711
2 percent of U-235 in it. Depleted uranium typically
3 is around .02 percent uranium 235, and it varies.
4 It depends on the batch and the lot of depleted
5 uranium.

6 JUDGE ABRAMSON: And so in the shells
7 that were actually used here we only know that it
8 was less than .03, and we don't know whether it's
9 .021 or .027?

10 MR. ANAGNOSTOPOULOS: We would not know
11 exactly, and it varies from lot to lot.

12 JUDGE ABRAMSON: Okay. But it would
13 definitely be below .03?

14 MR. ANAGNOSTOPOULOS: Yes.

15 JUDGE COLE: Does the Army have a policy
16 of generally using a certain depletion rate or lower
17 in its projectiles and munitions?

18 MR. ANAGNOSTOPOULOS: I can't answer
19 that, Your Honor. I have no idea.

20 JUDGE COLE: Dr. Henshel, on page I guess
21 it's page 19 of your surrebuttal of October 2nd, you
22 in question and answer 26, you refer to both
23 enriched and depleted uranium.

24 By that did you perhaps mean natural
25 uranium rather than enriched uranium? Or just

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1 enriched compared to depleted?

2 DR. HENSHEL: I was just comparing
3 enriched compared to depleted, just because that's
4 the most extreme of the ratios, whereas natural
5 uranium to depleted uranium in terms of the specific
6 activity is more like 60 percent of the natural
7 uranium for depleted.

8 JUDGE COLE: So when you made a
9 comparison of enriched uranium -

10 DR. HENSHEL: I said that it was anywhere
11 from 6 to 20 percent, as opposed to 60 percent. So
12 in the enriched uranium versus the depleted
13 uraniums, I took the extremes. And the two extremes
14 that I could find for specific activities gave you -
15 sorry, it's 1/6th to 1/20th of the enriched uranium,
16 and for the natural uranium, it's closer to just
17 over half.

18 Depleted uranium has a specific activity
19 that is just over one-half of the specific activity
20 of natural uranium, but has a specific activity that
21 is between 1/6th and 1/20th of enriched uranium.

22 JUDGE COLE: What enrichment did you use
23 when you described enriched uranium?

24 DR. HENSHEL: I took from what I could
25 find in the literature the variable levels, because

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1 there is always a range given.

2 JUDGE ABRAMSON: What is the relevance of
3 enriched uranium to this situation? I understand
4 you're trying to make a comparison, but what's it
5 got to do with what we're dealing with?

6 DR. HENSHEL: In terms of the potential
7 for radioactivity and health effects, the general
8 assumption is that enriched uranium will have some
9 health effects. In the literature that is always
10 going to -

11 JUDGE COLE: But how would enriched
12 uranium get into this scenario?

13 DR. HENSHEL: It doesn't, and I wasn't
14 talking about it from that perspective. I was
15 simply talking about it from a health perspective,
16 that even in the extreme comparison, depleted
17 uranium still has some radioactivity left that can
18 have effects. That's all.

19 JUDGE COLE: That's why it's regulated?

20 DR. HENSHEL: Excuse me?

21 JUDGE COLE: I think that's probably why
22 it's regulated.

23 DR. HENSHEL: Okay.

24 JUDGE COLE: Now the identification of
25 depleted uranium at the site has been a problem

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1 also. And the linchpin of that issue is that they
2 have not demonstrated that depleted uranium has been
3 found, for example in the deer samples.

4 And you have disputed that. And the
5 different testimony that I read indicated that
6 depleted uranium has not been found.

7 And you say that it has been found, but
8 you fail to identify the samples that contain the
9 depleted uranium that you refer to.

10 Could you help us out here?

11 DR. HENSHEL: Okay. My comment is first
12 that the deer sample results are such that it's -
13 how to phrase this - the deer sample results were
14 insufficient to even assess what's in there.
15 Because the results are so poorly done.

16 And when you look at the duplicates, the
17 duplicates fall so far over 50 percent of the
18 samples, of the duplicate samples, fail to match
19 their own criteria for quality control for the
20 analysis.

21 So to begin with what I say is, I think
22 the deer sample results should be thrown out. If
23 you are going to accept the deer sample results at
24 all, then to say that there is a difference between
25 the populations is inappropriate, because it's-the

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1 results have failed to prove that the populations
2 are different; that's number two.

3 And number three, if then you even talk
4 about what's in the populations, whether or not
5 there is depleted uranium, to say that there is no
6 depleted uranium there has been failed to be
7 demonstrated, because it's not clear that the - how
8 do I say this? - that the ratios are all clear.

9 Now I am not the expert on the ratios,
10 and I would prefer to defer those discussions to Mr.
11 Norris.

12 JUDGE ABRAMSON: Is Mr. Norris here
13 today?

14 DR. HENSHEL: Yes.

15 JUDGE ABRAMSON: Okay, let's pursue this
16 for a moment.

17 How do we determine whether there is
18 depleted uranium in the deer samples?

19 DR. HENSHEL: Well, to begin with I would
20 want to see deer samples that match quality control
21 before you even accept the samples.

22 JUDGE ABRAMSON: And assuming that we had
23 a sample of deer tissue, how would you determine
24 whether there was depleted uranium in it or not, or
25 whether what you were seeing was natural uranium?

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1 And if you want to have your colleague respond and
2 let's hear from him.

3 Mr. Norris, if you're the expert on
4 that, let's get you sworn in.
5 Whereupon,

6 CHARLES H. NORRIS
7 was called as a witness and, after having been duly
8 sworn, was examined and testified as follows:

9 JUDGE ABRAMSON: Mr. Norris, the question
10 is, how does one determine whether there is or is
11 not - assuming you got a properly quality controlled
12 sample of deer tissue, how does one determine
13 whether or not that sample contains depleted uranium
14 as opposed to natural uranium?

15 MR. NORRIS: Well, there's a theoretical
16 way, and there's the approach that was taken for
17 this. Ultimately -

18 JUDGE ABRAMSON: Describe them both then,
19 please.

20 MR. NORRIS: Yes. Ultimately the way to
21 determine whether you have depleted uranium, or how
22 much of the uranium that the deer has in it is
23 depleted as opposed to natural is to compare in some
24 manner the isotope ratios of the uranium that are in
25 the deer tissue.

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1 So that -

2 JUDGE ABRAMSON: And specifically you're
3 looking at the isotope 235 because it's depleted in
4 the deer, or are you looking at something else?

5 MR. NORRIS: Well, looking at 235, if you
6 are using an analytical technique, and comparing the
7 proportion of the 235 to the other uranium isotopes
8 is probably the best way to do it. That isn't
9 available in the deer tissue study.

10 JUDGE COLE: Why wouldn't it be
11 available, sir?

12 MR. NORRIS: The - using the activity
13 ratio method that they did, with the low
14 concentrations, doesn't give you a reliable
15 measurement of the U-235 concentration in the
16 tissue. It gives you a less than this amount, but
17 there is such a universe in the less than amount
18 that you don't know what the specific concentration
19 is.

20 JUDGE COLE: But they use the ratio of
21 Uranium-238 and uranium 234 on these tests, right,
22 sir?

23 MR. NORRIS: That was the approach that
24 was taken, yes.

25 JUDGE COLE: Why did the use uranium 234

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1 and not uranium 235, since it's uranium 235 that is
2 the isotope that is responsible for it being
3 depleted uranium?

4 JUDGE ABRAMSON: Well, maybe we should
5 ask the Army.

6 MR. NORRIS: I am unsure as to exactly
7 the entire process by which they selected the
8 methodology they did.

9 JUDGE COLE: It probably had something to
10 do with ease of measurement of one isotope versus
11 another. But do we have somebody who can answer
12 that question?

13 MR. ANAGNOSTOPOULOS: This is Mr.
14 Anagnostopoulos. When you create depleted uranium,
15 you are removing the uranium 235 and using it for
16 other purposes. So the depleted uranium is of
17 course depleted in uranium 235.

18 That process, using gaseous diffusion,
19 which is the most common here in the United States,
20 and almost exclusively in the United States, will
21 also deplete the uranium 234 as well. So depleted
22 uranium will be lower in U-235 and U-234.

23 The hook or the key is that the specific
24 activity of uranium 234 is much much higher than the
25 other two isotopes. So even though there is less of

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1 it there, you can detect it quite easily.

2 JUDGE ABRAMSON: So you can detect at
3 smaller concentrations?

4 MR. ANAGNOSTOPOULOS: Exactly, yes, thank
5 you. And so therefore because U-235 is so scarce in
6 the natural uranium, and then you've removed the U-
7 235, if you are trying to look at it by mass methods
8 it's very very difficult at low concentrations.

9 However the U-234 activity is much
10 easier to detect, and that's why we use that ratio.

11 JUDGE ABRAMSON: And how much is the U-
12 234 depleted in DU, since we started asking about
13 235, and we were on the wrong track.

14 MR. ANAGNOSTOPOULOS: Because U-234 and
15 U-235 are roughly the same atomic mass, they would
16 be depleted roughly by the same amount.

17 JUDGE ABRAMSON: And what's the initial -
18 I'm not familiar at all with the initial
19 concentration of U-234 in natural uranium, because
20 we always talk about 235.

21 How much is it initially, and what's it
22 depleted to?

23 MR. ANAGNOSTOPOULOS: Well, by activity,
24 the U-238 and U-234 are roughly the same in natural
25 uranium. By mass, I can't recall, I think U-238 is

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1 92 percent, and U-235 would be .07 percent, so the
2 difference would be U-234.

3 JUDGE ABRAMSON: Okay. And so - but the
4 specific activity of the 238 and the 234 are about
5 the same in natural uranium; is that what I heard?

6 MR. ANAGNOSTOPOULOS: No, no. The
7 specific activity are orders of magnitude different.
8 U-234 I think has two orders of magnitude higher
9 specific activity.

10 JUDGE ABRAMSON: But the total activity
11 is about the same?

12 MR. ANAGNOSTOPOULOS: Correct. The
13 activity ratio would be roughly the same. I think
14 it's 49.2 percent, and 48 -

15 JUDGE ABRAMSON: And so when the U-234 is
16 - when you get depleted uranium, what is the total
17 activity ratio? If they are about equal in natural
18 uranium, what are they in depleted uranium?

19 MR. ANAGNOSTOPOULOS: I can't recall,
20 Your Honor, I'd have to look at my testimony.

21 JUDGE ABRAMSON: Well, let's have one of
22 his counsel find the testimony, and let's see what
23 the number is.

24 If there is anybody here who is not
25 familiar with this process, what's going on here is

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1 that the judges are trying to figure out what's
2 going on. (Laughter.) Our process shifts this
3 burden from the lawyers to the judges.

4 MR. ANAGNOSTOPOULOS: Actually, Your
5 Honor, I don't think I have this in my testimony.
6 It was in my original response to the contentions,
7 and I think that some items were removed, and so I
8 don't have that material in my testimony.

9 JUDGE ABRAMSON: Does anybody have the
10 original testimony? Does the Army have the original
11 testimony?

12 MR. KOPP: I don't think he's referring
13 to the testimony. I think he's referring to
14 responses we filed to the original contentions, and
15 I do not have those with me.

16 JUDGE ABRAMSON: Can you get your hands
17 on them by after lunch?

18 MR. KOPP: Well, Mr. Mullett informs me
19 he has them electronically.

20 JUDGE ABRAMSON: Okay, good.

21 MR. ANAGNOSTOPOULOS: I have them as well
22 on my computer.

23 JUDGE ABRAMSON: Okay, so get your
24 computer and let's see it. Do you have your
25 computer here with you?

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1 MR. ANAGNOSTOPOULOS: I do.

2 JUDGE ABRAMSON: All right. We will be
3 pursuing this to the ground. (Laughter.) Bad pun.
4 No pun intended.

5 JUDGE COLE: While he is doing that, I
6 could probably ask Dr. Henshel a question.

7 In some part of your submittals here you
8 indicated that the depleted uranium, you indicated
9 it could be or would be moving offsite.

10 What evidence do you have that that is
11 in fact occurring, if you have any?

12 DR. HENSHEL: At this point there is no
13 direct evidence for the DU itself, although the
14 hearsay evidence from Tom Simon both directly and
15 Charlie Morris. So the Fish & Wildlife Service, I
16 guess he's a surveyor, and he was the sampler, and
17 the item sampler, and then confirmed when talking to
18 Joe Robb from Fish & Wildlife Service, that there
19 are people that have collected things offsite.

20 It's not clear - excuse me, collected
21 UXO explicitly, and they have seen the UXOs, at
22 least some of the UXO that was brought to them.

23 It is not clear what else they had. All
24 he said was he had many types, and he had many.

25 JUDGE ABRAMSON: Are there people who

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1 went onsite and got the UXO and took it off?

2 DR. HENSHEL: Oh, not, they found it on
3 the -

4 JUDGE ABRAMSON: Or they missed the site
5 when they shot it?

6 DR. HENSHEL: I'm sorry, no, they found
7 it on their property and they found it after
8 flooding. So the -

9 JUDGE ABRAMSON: After a flooding?

10 DR. HENSHEL: Yes.

11 JUDGE ABRAMSON: And they think - the
12 theory is - and we don't have this testimony in
13 front of us, right? These people have never been
14 brought forward?

15 DR. HENSHEL: I have the hearsay
16 testimony that I reported in my surrebuttal I
17 believe. Because I had just heard about this -

18 JUDGE ABRAMSON: We never had these
19 witnesses made available to us?

20 DR. HENSHEL: Well, this is the - I've
21 been talking to Dr. Simon and Mr. Morris most
22 recently as they were finishing up their sampling.
23 And they started to talk to me about it a little bit
24 more.

25 I had heard they were starting to do it

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1 some time during the summer or the early spring.

2 JUDGE ABRAMSON: Is Army and/or staff
3 aware of these samplings that are going on? Army?

4 MR. KOPP: Yes.

5 JUDGE ABRAMSON: Staff? Are staff
6 experts aware of this sampling that is being done by
7 Fish & Wildlife?

8 DR. McLAUGHLIN: No.

9 JUDGE ABRAMSON: No? Okay. I assume
10 that that will be looked into by both?

11 DR. KINDLER: At any rate, so it was only
12 as I was starting to actually talk to Dr. Simon
13 recently about other issues related to Jefferson
14 Proving Ground for use for my class, because I'm
15 using his samples for my class to use, and that's
16 when I started getting more information.

17 JUDGE ABRAMSON: Let me just make sure I
18 understand this right. What you are hearing from
19 these people is that UXO was carried offsite by
20 flood? Are the floods, are the velocity -

21 JUDGE COLE: UXO or projectiles?

22 DR. HENSHEL: Well it's not clear. He's
23 seen UXO.

24 JUDGE ABRAMSON: But he's claiming he
25 found some sort of a piece of - whole projectiles,

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1 or pieces of projectiles?

2 DR. HENSHEL: Pieces of UXO that were
3 large - the landowner believed it was a rock. It
4 was a fossil, and Dr. Simon said, that's not a
5 fossil, and pointed out the brass fittings on it.

6 JUDGE ABRAMSON: This is something that
7 staff and applicant need to look into when there is
8 more hard data. But we don't have these witnesses
9 here.

10 DR. KINDLER: But right now if you drive
11 up you can see the evidence of the flooding. The
12 flooding went at least as high as about six feet.
13 You can still see the vegetation on the fence. And
14 it washed away pieces of the fence. So it was a
15 fairly significant flood.

16 JUDGE COLE: But are there any incidents
17 where people found depleted uranium projectiles?

18 DR. HENSHEL: As I say I don't know,
19 because what was brought was this thing that the guy
20 thought was a fossil.

21 JUDGE ABRAMSON: And we don't have these
22 witnesses in front of us.

23 DR. HENSHEL: So I can't say. All I can
24 tell you is what I heard. Sorry.

25 JUDGE COLE: A considerable portion of

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1 the depleted uranium used in the military is in
2 projectile form is in the 30 millimeter and less, is
3 that correct? 30 millimeter diameter projectiles?
4 Or is that classified?

5 DR. HENSHEL: I've seen pictures of them.
6 They are green things.

7 MR. KOPP: I am informed by Mr. Cloud
8 that at JPG they did, what, 125?

9 MR. CLOUD: 105 and 120 millimeter only.

10 JUDGE COLE: So you were using the large
11 ones?

12 MR. CLOUD: Yes, sir.

13 JUDGE COLE: Okay, thank you.

14 JUDGE ABRAMSON: When those munitions
15 strike the ground, do they fragment or do they
16 largely stay in one piece?

17 MR. CLOUD: A combination of both. They
18 can fragment. They can bend. They can stay totally
19 intact.

20 JUDGE ABRAMSON: But it's not impossible
21 that there could be small fragments?

22 MR. CLOUD: That is possible. We did not
23 do any hard fragment testing.

24 JUDGE ABRAMSON: Okay.

25 DR. HENSHEL: Your Honor, could I finish

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1 my answer, though, since all I addressed was one
2 part of the possibility of things being washed
3 offsite.

4 I think the other issue is the point
5 that we have requested, that if there is any DU
6 being washed off, either in dissolve phase,
7 particulate phase, or larger fragments, there is
8 still a possibility that it could continue to
9 corrode and into the food chain outside of JPG, or
10 that what is entering the food chain within JPG
11 could be also moved offsite, either due to flooding
12 or just movement of the animals. And that's one fo
13 the reasons why we would like additional analysis,
14 additional sampling, especially because within the
15 biota, you get bioaccumulation, which is what the
16 offending graph was all about, was to point out the
17 bioaccumulation -

18 JUDGE ABRAMSON: We understood your
19 graphs on that.

20 JUDGE COLE: Question for the Army. To
21 what extent is the Army taking into account the
22 aspects of flooding?

23 DR. HENSHEL: As far as I know, no, but
24 I'm not the one to answer that.

25 JUDGE COLE: I'm asking the Army.

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1 JUDGE ABRAMSON: Have you found your
2 ratios for us, yet?

3 MR. ANAGNOSTOPOULOS: I have, Your Honor.

4 JUDGE ABRAMSON: Okay, let's go back to
5 that. The point I'm - what I'm trying to understand
6 is this: the detection of depleted uranium in deer
7 tissue is made by looking at the ratio of the
8 activity from U-234 to the activity of U-238; is
9 that correct?

10 MR. ANAGNOSTOPOULOS: That's correct.

11 JUDGE ABRAMSON: And in natural uranium
12 those activity ratios are more or less the same. So
13 the question is, what are they in depleted uranium?

14 MR. ANAGNOSTOPOULOS: In depleted uranium
15 the typical activity for uranium 238 is 87.4
16 percent, and for U-234 about 11.4 percent.

17 JUDGE ABRAMSON: So about a factor of
18 eight, more or less.

19 MR. ANAGNOSTOPOULOS: Correct.

20 JUDGE ABRAMSON: So when you looked at a
21 deer tissue sample, are you finding enough activity
22 to be able to determine what the - what portion of
23 the activity comes from depleted uranium and what
24 portion comes from natural uranium?

25 MR. ANAGNOSTOPOULOS: We are not, Your

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1 Honor. We are finding levels of uranium, total
2 uranium, in deer tissue that are essentially at the
3 natural background. They are very low, and
4 therefore, the analytical precision is also low.
5 The error in the count rates for the sample is
6 proportionately high. And it's very difficult to
7 make any conclusions at those levels.

8 JUDGE ABRAMSON: So when you say at the
9 natural background, you take the deer tissue, you
10 look at the activity from uranium isotopes, and you
11 get a small number, and you are not able to break
12 that down meaningfully into whether it's 234 or 238;
13 is that correct?

14 MR. ANAGNOSTOPOULOS: We are not able to
15 make a strong conclusions of the presence of
16 depleted uranium in any of the samples because the
17 results of both 238 and uranium 234 are at the
18 detection limit of the analytical method, or even
19 below the analytical detection.

20 JUDGE ABRAMSON: Okay, and if the - now
21 you said earlier that they were at the natural
22 background level, and help me understand the
23 distinction between being at the natural background
24 level and being at the limits of detection of your
25 instrumentation, because to me you're saying two

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1 different things.

2 MR. ANAGNOSTOPOULOS: Well, particularly
3 for water and soil samples, the analytical detection
4 limit is roughly about what you would expect to see
5 in background.

6 And so it can be somewhat lower
7 depending on your count times and the sample output
8 that you collected. But for water and for soil
9 samples, typically you would expect to see .3, 3.3
10 picocuries per gram of soil. And we can achieve a
11 detection limit for alpha spectroscopy that's lower
12 than that, anywhere from .2 to 1, 1.5 picocuries per
13 gram. So they are both in the same range, in the
14 same order of magnitude.

15 JUDGE ABRAMSON: And for tissue samples
16 you use the same technology?

17 MR. ANAGNOSTOPOULOS: We use the same
18 technology, but you see a burden even from natural
19 uranium intake in deer that's lower than that, quite
20 a bit lower than that, I believe, Mike, .4, .5
21 picocuries per gram in deer tissue?

22 JUDGE ABRAMSON: So what you're telling
23 us is, the amount of radiation attributable to
24 uranium and uranium isotopes in the deer tissue
25 samples is lower than you would find in soil, and is

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1 lower than your instrument is capable of resolving?

2 MR. ANAGNOSTOPOULOS: In many cases, yes.

3 JUDGE ABRAMSON: And therefore you are
4 not able to conclude one way or the other whether
5 the deer tissue - whether the deer uptake of uranium
6 is due to depleted uranium or natural uranium?

7 MR. ANAGNOSTOPOULOS: We have two issues
8 I believe. First of all we are not seeing elevated
9 levels of total uranium. And if there was an
10 exposure to depleted uranium, which is a point
11 source of very high concentration of all the
12 isotopes, you would expect to see an elevated total
13 uranium level in the deer tissue.

14 JUDGE ABRAMSON: But that, you would
15 expect to see that if they were actually uptaking DU
16 somehow in their digestion process, is that right,
17 or ingestion, whether it's breathing or eating
18 something that got it into them.

19 Now when you say that the deer tissue
20 teaches you that it's not uptaking DU, what samples
21 of deer tissue do you have that you can compare
22 these to that tell you this is the same as what they
23 would see in the natural environment?

24 MR. ANAGNOSTOPOULOS: That's a difficult
25 question because uranium is ubiquitous in the

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1 environment, but it's concentration can also be
2 highly variable. So the best piece of information
3 would be comparison to other similar populations
4 here at the site.

5 JUDGE ABRAMSON: Other similar
6 populations, meaning other deer populations?

7 MR. ANAGNOSTOPOULOS: Other deer
8 populations.

9 JUDGE ABRAMSON: And what you're saying
10 is, you see in all those deer populations the number
11 if below your instrumentation for accuracy purposes,
12 below what your instrumentation is able to measure?

13 MR. ANAGNOSTOPOULOS: Not categorically.
14 What we're seeing is that amongst all the deer, the
15 total uranium concentration in the tissues is
16 roughly the same, and in many cases it's very low,
17 near the detection limit. And when you would
18 attempt to look at the U-234 to U-238 ratio, and you
19 propagate the errors of each one of those
20 measurements, you get a very large error in the
21 estimate, and therefore you cannot conclusively
22 determine whether there is DU there or not.

23 JUDGE ABRAMSON: Okay.

24 Dr. Henshel, that sounds to be
25 relatively consistent with that you're saying, that

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1 they can't tell. Is that correct?

2 DR. HENSHEL: Number one, correct, with
3 regard to that, thank you. And the second point is
4 that they don't have a background population to
5 compare against, because it's really not at all
6 clear that the deer are not traveling around the
7 site.

8 JUDGE ABRAMSON: Okay, and where would
9 one go if one wanted to get deer tissue? Would one
10 go to Pennsylvania, or would one have to go some
11 place where the natural uranium concentration in the
12 soil and the rest of the ecosystem was roughly
13 comparable to this? How would one get what one
14 might call the control sample for deer?

15 DR. HENSHEL: One tries to find a similar
16 geology as possible. So one would assume that some
17 place in either southern Indiana, maybe Kentucky,
18 but also untouched by depleted uranium, and clearly
19 not within air dispersion range, would be a place to
20 go.

21 But if they had air measurements to
22 check the dispersion in air, we might be able to say
23 that other parts of the Muscatatuck watershed would
24 have deer that they could use.

25 JUDGE ABRAMSON: Okay, so let's set aside

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1 the air question for a moment. How would you
2 propose that they overcome the instrumentation
3 limits here?

4 DR. HENSHEL: Can you defer to Mr. Norris
5 please on that?

6 JUDGE ABRAMSON: Certainly.

7 How would you, Mr. Norris, propose that
8 these instrumentation limits be overcome? Or are
9 they insurmountable?

10 MR. NORRIS: I would have to consult with
11 laboratories to find out how to do it. I'm not a
12 specific laboratory chemist. The technology that
13 they're using is at its limit. You -

14 JUDGE ABRAMSON: We're talking
15 picocuries. We're talking very very tiny numbers,
16 right?

17 MR. NORRIS: We are talking small
18 numbers, there's no question about it. With respect
19 to the population, one thing that enters into is
20 that the nominal background population that was used
21 for this deer sampling is a population that had been
22 baited with corn as a diet for several weeks before
23 they were harvested, which creates some issues with
24 respect to whether or not uranium in their diet had
25 -

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1 JUDGE ABRAMSON: Do we think that
2 uranium, and maybe this is for Dr. Henshel, once
3 uptaken, in the diet of a deer, somehow flushes
4 right through?

5 DR. HENSHEL: Well, it depends on which
6 part of the deer you're talking about. The point at
7 which the uranium ends up longest is the bone and
8 the kidney, and the bone being the most structurally
9 important. And therefore as long as they are not
10 calcium deficient it will stay there.

11 Now I do not know whether they get
12 calcium deficient in the winter, and they start
13 flushing what's in their bones, recently put, comes
14 back out. Does what goes into the bone? Is what
15 comes out most recent - first when you're deficient
16 in calcium.

17 JUDGE ABRAMSON: LIFO.

18 DR. HENSHEL: Kidney, it's interesting,
19 because I was just looking at some modeling about
20 where it goes after you take it in. I was
21 specifically looking at the air pathway in this
22 model.

23 And the kidney increase can take
24 actually some time after exposure, so it would
25 depend on the age of the deer whether or not you'd

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1 expect to see the kidney concentrations to start
2 increasing.

3 JUDGE ABRAMSON: I assume that the human
4 population doesn't eat the bone. When humans eat
5 deer, is the kidney part of the diet, does anybody
6 know?

7 MR. BARTA: Mr. Barta. I think it's
8 mainly the muscle tissue and the liver, rather than
9 the kidney and the bone.

10 JUDGE ABRAMSON: Okay. So muscle tissue
11 and liver. And recognizing that the NRC's
12 regulations are concerned with the dose to the human
13 population, what can you tell us, Dr. Henshel, about
14 the nature of the uranium residual pattern in muscle
15 tissue? Once in muscle tissue does it stay a long
16 time? Or does it flush out because they've been
17 eating corn?

18 DR. HENSHEL: I think it's going to have
19 a lower residence time. But I don't - I didn't have
20 that model, so I couldn't tell you exactly what the
21 pattern was doing.

22 But based on the fact that uranium does,
23 to a limited extent, model the necessary metals,
24 i.e. calcium, magnesium, and calcium, magnesium is
25 something that will come in, participate in the

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1 physiology of the muscle, and then can move back out
2 as needed, depending on what's happening.

3 I think it's more of a transitory issue
4 in the muscle.

5 JUDGE ABRAMSON: What is it chemically
6 most similar to?

7 DR. HENSHEL: The muscle?

8 JUDGE ABRAMSON: No, the uranium. What
9 is it chemically most similar to that's in an
10 ordinary diet?

11 DR. HENSHEL: Well, in one study that I
12 looked at it actually compared it best to aluminum,
13 which might explain one of the reasons why in the
14 Iraq tests they're seeing the neurotoxicity being
15 the most sensitive, and one of the first indicators
16 of uranium toxicity, because aluminum accumulates in
17 the brain.

18 JUDGE ABRAMSON: But we didn't hear talk
19 about brain. We're talking about muscle.

20 DR. HENSHEL: No, no, I understand that.
21 I'm just saying that as far as I've seen, in one
22 study that looked at the chemical characteristics of
23 uranium and compared it to, translated out, there
24 were like three different types of metals. Aluminum
25 seemed to be one of the ones that it sort of

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1 correlated best with, which would make sense given
2 that it's got multiple valence states as does
3 aluminum.

4 However, I will also point out that when
5 it's in its divalent state it's going to mimic
6 calcium as well, so it's not just going to mimic
7 aluminum. Okay?

8 JUDGE ABRAMSON: Yes, I appreciate that,
9 thank you.

10 MR. BARTA: Can the Army make some
11 comments?

12 JUDGE ABRAMSON: Absolutely. We got you
13 all here, because we want to hear what you all have
14 to say.

15 MR. BARTA: Mr. Barta again. The Army
16 would contain that the baiting had little if any
17 effect on the tissue concentrations.

18 JUDGE ABRAMSON: Because? Don't just
19 give me conclusions. Tell me why.

20 MR. BARTA: Sure, Your Honor.

21 In the fall there was little if any
22 baiting. There was only salt put out. And in the
23 fall we were able to collect approximately 12 deer.
24 All the deer from the DU impact area were collected
25 in the fall. So there was little baiting there. We

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1 are collecting the deer that are closest to the DU
2 impact area, or in the DU impact area.

3 You would expect if there was any uptake
4 we would see higher concentrations in those deer
5 than in the deer in the nearby background - nearby
6 hunting zones.

7 JUDGE COLE: Is the vegetation or the
8 food supply for the deer any different in the DU
9 impact area than off the - than the nearby zones
10 where you're collecting? In other words are they on
11 pretty much the same diet?

12 DR. FINK: It's possible. You know the
13 habitat varies. So for some deer it's probably the
14 same; for others it probably differs.

15 JUDGE COLE: But you don't recall any
16 significant difference between the area, the DU
17 area, and the area outside of that?

18 MR. BARTA: I don't, but we didn't check
19 on that specifically.

20 JUDGE ABRAMSON: You didn't go wandering
21 around on the site?

22 MR. BARTA: I helped collect some of the
23 samples, but we were just focused on collecting the
24 deer.

25 I would also add that we had a hard time

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1 collecting deer in some of the nearby hunting zones
2 and in the background hunting zones, presumably
3 because the deer hunts had just occurred a week
4 earlier. And so some of the deer were skittish, and
5 also a number of deer had already been harvested.

6 And when you look at the results, even
7 if there had been some flushing in those deer
8 collected in February, where the bait was more
9 extensively used, you would expect to maybe even see
10 lower concentrations of uranium compared to the deer
11 collected from the DU impact area.

12 But there is really an overlap between
13 all three areas.

14 JUDGE COLE: What do you mean an overlap
15 between all three areas?

16 MR. BARTA: For instance, there are no
17 clear trends like if we were seeing uptake of DU we
18 might expect to see the highest concentrations in
19 all four tissue types in the DU impact area. But
20 instead what we see is, your max detect for liver
21 was in the background hunting zone, and your max
22 detect for kidney might be in your nearby hunting
23 zone, and your max detect in bone might be in the DU
24 impact area.

25 So there is a lot of overlap suggesting

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1 that it's really - we're seeing the natural uranium
2 uptake.

3 JUDGE COLE: So you didn't distinguish
4 whether it was natural uranium or depleted uranium.
5 Just total uranium was mixed.

6 MR. BARTA: Based on the information we
7 have, we don't think it indicates that DU was
8 present in any of the deer tissues. And that's
9 obviously a point of contention.

10 JUDGE ABRAMSON: And that hypothesis, or
11 that - the foundation for that thought is that if DU
12 were being uptaken you'd see elevated activities,
13 and you're not seeing elevated activities. At least
14 you're not seeing anything that takes your
15 instrumentation much above its lowest detection
16 limit, is that correct?

17 MR. BARTA: That's correct.

18 JUDGE COLE: Do you know the range of
19 natural uranium that is prevalent over at the
20 Jefferson site?

21 MR. ANAGNOSTOPOULOS: I don't. We can
22 certainly go back and look at historical soil
23 samples and get that information for you very
24 quickly.

25 The literature suggests that

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1 geologically globally .3 to 3.5 picocuries per gram
2 typically for total uranium is a normal value.

3 JUDGE COLE: Did you find anything
4 significantly different from that in the depleted
5 uranium site?

6 MR. ANAGNOSTOPOULOS: In the DU impact
7 area? Oh, yes, certainly. There's been thousands
8 of picocuries per gram seen in the DU impact area.

9 JUDGE COLE: In the soil?

10 MR. ANAGNOSTOPOULOS: In the soil.

11 Just to complete some of my earlier
12 comments, I have the deer sampling report here in
13 front of me, and nearly every analysis for uranium
14 isotopes in the tissues were flagged either a U or a
15 J code, which is essentially at or below the
16 detection limit. So these results were very very
17 small.

18 For example in the DU impact area the
19 average -

20 JUDGE ROSENTHAL: Is this a report that's
21 in the record?

22 MR. ANAGNOSTOPOULOS: It's in the deer
23 sampling report which certainly is.

24 Sir, the DU impact area for bone, the
25 average concentration was 0.02 picocuries per gram.

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1 So again, fairly low.

2 Back to this idea of flushing, typically
3 uranium in the body, in the mammalian type of
4 system, will turn over very slowly. Without a
5 chelating agent, without something to complex that
6 uranium metal and get it to move through the body,
7 it will have a typically long residence time. So
8 you really have to make the uranium flush out of the
9 system.

10 JUDGE ABRAMSON: Would corn do that?

11 MR. ANAGNOSTOPOULOS: I don't think corn
12 would do that, no. And if it were the case that
13 corn over the space of a week or even two weeks
14 would do that, then one would expect to see
15 differences in the deer that were baited with corn
16 versus the deer that were not baited with corn.

17 And I'm just glancing at the data now,
18 and I really see -

19 JUDGE ABRAMSON: But if all that data is
20 on the low level of your instrumentation
21 detectivity, how could you tell whether there were
22 differences? Or could you tell? Give me an answer,
23 don't raise your eyebrows.

24 MR. ANAGNOSTOPOULOS: Could I say, that's
25 a good question. We have the results we have in

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1 front of us, and all I can say is that I see no
2 indication that there is a difference between of the
3 populations of what we could detect.

4 DR. HENSHEL: May I add, please?

5 JUDGE ROSENTHAL: Please.

6 DR. HENSHEL: Okay, number one, there are
7 seasonal differences in the collected deer. And
8 that indicates that there is also differences in
9 their recent diet.

10 So and I agree, of course, that uranium
11 stays in the body for awhile, especially in kidney
12 and bone, for example; it flushes through other
13 parts more quickly. It flushes through liver, for
14 example, relatively quickly in a matter of no more
15 than weeks, and usually more like days or something,
16 before it's going to disappear from the liver.

17 JUDGE ABRAMSON: So if you had - if you
18 were not at your instrument's detection level, you
19 might see a difference in the concentration in the
20 liver -

21 DR. HENSHEL: If it's recent.

22 JUDGE ABRAMSON: - as compared to the
23 kidney.

24 DR. HENSHEL: Correct, kidney would be
25 more of a long term exposure, and liver would be

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1 more of a short term exposure indicator, okay. So
2 one nice way to use those is to look at the
3 differences in recent exposure.

4 I don't know that you would do it there,
5 but one uses hair for humans to look at overtime
6 exposure for example.

7 JUDGE ABRAMSON: So I see on CSI.

8 (Laughter)

9 DR. HENSHEL: In seasonal, when one
10 considers winter, deer switch to things like bark
11 and other parts of the vegetation that they don't
12 eat when there is nice soft vegetation around. And
13 because we do not have sampling, we do not know
14 where the uranium has gone in higher concentrations
15 and lower concentrations. We don't know how that
16 plays out against the rest of these questions.

17 And that's one of the problems, that we
18 think there needs to be better sampling.

19 JUDGE ABRAMSON: Is it your view that the
20 path into humans, let's set aside air for a moment,
21 is it your view that the path into humans includes
22 something other than deer?

23 DR. HENSHEL: Yes.

24 JUDGE ABRAMSON: And what would those be?

25 DR. HENSHEL: Well, it could be any of

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1 the other biota that could be affected by what's
2 onsite. And I think the most specific concerning
3 pathway for me, only because of what I've heard from
4 my students, would be probably the aquatic pathway
5 is the greatest concern, and because there is also -

6 JUDGE ABRAMSON: Just give me, walk me
7 through the very simple elements of how the aquatic
8 pathway would lead to the human population, from,
9 you know, from what to what?

10 DR. HENSHEL: Oh, okay, so from the deer
11 it dissolves out and migrates into the water column,
12 A, and B, it also can move into the water phase as
13 sediment attached -

14 JUDGE ABRAMSON: Assume it starts in the
15 water. It's in the water. How does it get to the
16 human?

17 DR. HENSHEL: Oh, very easily, I'm sorry.
18 It accumulates into - it can go directly into
19 something like crayfish or fish through the gills;
20 it could also go through the invertebrates that are
21 even smaller, get taken up by the larger
22 invertebrates and vertebrates and thus into the
23 humans.

24 JUDGE ABRAMSON: So into the human it's
25 through fish consumption, or is through crayfish

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1 consumption? What is the path to humans?

2 DR. HENSHEL: Any, both, potentially;
3 also whether or not mollusks are not allowed to be
4 picked up. The students don't seem to think that
5 that is an issue necessarily. So I think that there
6 are still people that are collecting mollusks
7 against the law.

8 I also know that people shoot whatever
9 deer are around as soon as it's in season, and they
10 do collect - I was surprised, but they do collect,
11 for example, squirrels, et cetera. You know, I get
12 surprised by Indiana.

13 JUDGE ABRAMSON: But if I were to say, if
14 I were to look at elements - let's start with the
15 premise that what we are concerned with at this
16 agency is radiation does to people.

17 DR. HENSHEL: Correct.

18 JUDGE ABRAMSON: And so we're concerned
19 with the pathways that might get radiation to
20 people. What you're proposing is, we should be
21 looking at crayfish and fish harvested from these -

22 DR. HENSHEL: At the very least, yes.

23 JUDGE ABRAMSON: At the very least? And
24 perhaps squirrels or some other - I don't know
25 whether they eat raccoons, whatever else might get

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1 there.

2 DR. HENSHEL: Rabbit.

3 JUDGE ABRAMSON: Rabbit, okay. So those
4 would be three things you'd like to see added to the
5 sampling plan to detect whether there's sufficient
6 amounts of depleted uranium - what the level of
7 depleted uranium is in those potential food sources.

8 DR. HENSHEL: And I actually, being a
9 bird person myself, and having looked at
10 bioaccumulation into birds for a number of years
11 now, I know that bioaccumulation including through
12 the insectivorous pathway as well as through grains
13 and nuts can be significant.

14 JUDGE ABRAMSON: What birds are eaten
15 here? Wild turkey, do you have wild turkey in this
16 area?

17 DR. HENSHEL: Wild turkey on site
18 specifically, yes.

19 JUDGE ABRAMSON: Okay.

20 DR. HENSHEL: And offsite, I'm not sure
21 what else. And I think I'd have to look and see.

22 But I do think that considering more
23 than just deer is an important factor.

24 JUDGE ABRAMSON: Now has the Army looked
25 at these food chains? Or is the Army considering

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1 looking at these food chains? Are they part of the
2 plan?

3 MR. BARTA: The Army contends that the
4 deer pathway is the major pathway, and that for
5 ingestion to humans, and that certainly these other
6 pathways could exist. But for instance for deer -
7 for turkey, the amount of turkey consumed compared
8 to deer would be less at JPG just because of the
9 hunting limits.

10 JUDGE ROSENTHAL: What about these
11 aquatic species?

12 JUDGE ABRAMSON: Are there bass, or
13 other game fish in these streams or rivers that
14 people might want to get?

15 MR. BARTA: You are not permitted to fish
16 in the streams that leave the DU impact area on
17 site. You know, we also think if DU was migrating
18 offsite we would have seen it in the water and
19 sediment, and that would be a potential trigger to
20 collect biota. Because that would suggest it's a
21 significant pathway potentially.

22 JUDGE ROSENTHAL: Are you testing those
23 waters?

24 MR. BARTA: Yes, the waters are tested on
25 a regular basis.

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1 JUDGE ROSENTHAL: Just one question. I
2 think after Judge Cole's question, we'll take a
3 luncheon break.

4 JUDGE COLE: With respect to the finding
5 concerning depleted uranium in deer, there has been
6 some criticism in the record as to the sample size,
7 that, and some other samples for uranium, and also
8 the counting times, and that in view of the fact
9 that there's significant comment about the
10 statistical significance of the depleted uranium in
11 the deer samples in that it just was not
12 significantly - wasn't statistically significant.
13 So you say that there are none there.

14 Did you consider the possibility that
15 sample size and count times, different techniques,
16 might improve your statistics there sufficient
17 though so that you might find something there? How
18 do you respond to that?

19 MR. ANAGNOSTOPOULOS: There is a cost
20 benefit in all of the sampling that we do,
21 particularly when you deal with radioactive count.
22 And you have to balance the count time versus the
23 sample size, versus your quality control
24 requirements for the sample, and choose an optimum
25 method, count time and sample size that's going to

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1 yield you the best result.

2 Sample size becomes difficult, because
3 as you collect a larger sample, particularly for
4 alpha spec, you must process the sample in order to
5 remove all of the carbon-containing components. And
6 you do what's called a fusion technique in order to
7 isolate the radioactivity and count it.

8 So as you increase the sample size, you
9 also increase the processing, cost, time, expense,
10 and some of the other nonradioactive components that
11 can affect the result.

12 And what can happen is, you'll wind up
13 with a smeared spectrum, and your quality actually
14 goes down in your result.

15 And that's been looked at. We've
16 considered those components. Increasing count time
17 works to some degree, but there is a point of
18 diminishing return. And after so many additional
19 minutes you really don't get much bang for your
20 buck.

21 So then you have to go and look at other
22 analytical techniques, which we discussed at length.

23 But I think the linch pin of this whole
24 argument again is not whether or not the ratios are
25 there or not there, but are we seeing elevated

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1 levels of uranium, because we have very strong, very
2 concentrated point sources of uranium, and as that
3 uranium starts to move, the total uranium content in
4 the media that it's moving through will go up.

5 And I think that is where we need to
6 focus our time, energy and effort is in that total
7 uranium result.

8 And we have seen in characterization
9 data at the JPG site, when DU is present, it's
10 fairly easy to detect. The ratios are clear, the
11 signal is strong, the total uranium is elevated, and
12 we can make decisions on that information.

13 JUDGE ABRAMSON: This is in soil samples,
14 I assume?

15 MR. ANAGNOSTOPOULOS: This is in soil,
16 and it's in vegetation.

17 JUDGE ROSENTHAL: I think we'll take a
18 luncheon break at this point. It seems that there
19 are enough eating places in close proximity that one
20 hour should be sufficient.

21 So we'll resume at quarter after 1:00.

22 (Whereupon at 12:13 p.m. the proceeding
23 in the above-entitled matter went off the record to
24 return on the record at 1:15 p.m.)

25 JUDGE ROSENTHAL: If everybody would

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1 resume their seats, we can get started again. I
2 think that it's very likely that we're going to this
3 afternoon on to Panel 2, so I think what I'm going
4 to ask that those witnesses who have not already
5 been sworn in, I think I think I'll swear you all in
6 now if they're all here. Yes?

7 MR. MULLETT: Our witness just went out
8 to the car to get some additional material when I
9 advised that you were probably going to --

10 JUDGE ROSENTHAL: Okay. Well, then
11 we'll wait a while.

12 MR. MULLETT: He'll be back shortly.

13 JUDGE ROSENTHAL: All right. We'll wait
14 then until after we finish with Panel 1. So the
15 Panel 1 witnesses, I see, are all here.

16 MS. SILVIA: Your Honors? Ms. Condra
17 from the staff has joined the Panel because the
18 discussion before lunch was addressing that he --

19 JUDGE ROSENTHAL: All right. He has not
20 been sworn in yet?

21 MS. SILVIA: He has been sworn in.

22 JUDGE ROSENTHAL: All right. He has
23 not?

24 MS. SILVIA: He has been.

25 JUDGE ROSENTHAL: Has. Okay. Fine.

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1 All right.

2 JUDGE ABRAMSON: All right. Let's rock
3 and roll.

4 JUDGE ROSENTHAL: Let's go. Where were
5 we?

6 JUDGE ABRAMSON: Well, While we're
7 waiting for my colleagues to get their -- to recall
8 where we were, I have a question for -- probably for
9 the Army and then we'll pursue it around. What
10 we're hearing is that the levels of uranium in the
11 deer are so low that they're at the threshold
12 capability of the instrumentation. And I think, and
13 correct me if I'm wrong, that if -- that it's the
14 Army's view that if there were any DU being uptaken
15 by deer, we would have detected materially higher
16 levels. Is that correct?

17 MR. BARTA: That's correct.

18 JUDGE ABRAMSON: And that there is no --
19 what's the right word -- control group population we
20 could have used for deer to determine whether the
21 levels of activity in the deer tissue that we're
22 seeing would be representative of just natural
23 uranium in the environment, because even if you
24 found one, you couldn't detect anything any lower
25 than what you're detecting now? Is that correct?

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1 MR. BARTA: That's correct.

2 JUDGE ABRAMSON: Okay.

3 MR. CONDRA: Can I --

4 JUDGE BURNETT: Please. State your name
5 every time you speak up so we know who's who.

6 MR. CONDRA: This is Dale Condra. If
7 you look at some of the deer data that was presented
8 in Volume I, Depleted Uranium Impact Area
9 Characterization Report, 1996, the data indicates
10 that Uranium 238 and 234 are clearly detectable when
11 they -- they don't present the uncertainties but
12 they present the uncertainty of the total uranium,
13 and that uncertainty is about 33 percent. And so
14 that means that none of the uncertainties of the 234
15 or 238 could be greater than 33 percent.

16 So this is good statistical data that
17 says that clearly they found uranium in this case.
18 When you go through and do the 238:234 ratio, it's
19 less than one and statistically less than one. So
20 it clearly indicates that can detect uranium and in
21 the cases of the data that we have, they have not --

22 JUDGE ABRAMSON: Say again? The 234:238
23 activity ratio was less than one?

24 MR. CONDRA: The 238:234 ration is less
25 than one, which indicates that it's not depleted

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1 uranium.

2 JUDGE ABRAMSON: It's less than one and
3 it would --

4 MR. CONDRA: It's less --

5 JUDGE ABRAMSON: -- and it would be --
6 and I thought I understood earlier that the 234:238
7 activity were more or less equal. Is it in, in
8 fact, a little bit less than one, the ration
9 238:234?

10 MR. CONDRA: It depends on the media.
11 If you're talking about sole, it should be
12 approximately 1:1 in the natural area.

13 JUDGE ABRAMSON: Okay.

14 MR. CONDRA: But in this case, the
15 results of the deer tissue sample for the liver
16 clearly indicates that the 238:234 ratio is less
17 than one.

18 JUDGE ABRAMSON: And how do you explain
19 it being less than one when the natural isotopic
20 concentration would give you about one, and if it
21 were DU, it would be much greater than one? How do
22 you explain it turning the other way?

23 MR. CONDRA: If you look at the water
24 results, the water results show that the 234 has a
25 higher concentration in water than 238.

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1 JUDGE ABRAMSON: I see. So there's some
2 odd process, right, going on here that's causing
3 this different solubility of 234 than 238 when
4 they're chemically identical? Somebody next -- guy
5 next to you wants to say something. Let's --

6 MR. CONDRA: They're not totally
7 chemically identical.

8 JUDGE ABRAMSON: They're not. Okay.

9 MR. CONDRA: Not completely.

10 JUDGE COLE: So that the increased ratio
11 of Uranium 238:234 in water is indicative of what?

12 JUDGE ABRAMSON: It's the other way
13 around.

14 JUDGE COLE: Increase to you?

15 JUDGE ABRAMSON: No. It was the other
16 way around, wasn't it?

17 JUDGE COLE.: No. I thought he said in
18 the 238:234 ratio in water was found slightly higher
19 than one? Or did you say something else?

20 MR. CONDRA: No. The 238:234 ration in
21 water is the same as what you see in deer roughly in
22 the case of the data that I have. So -- and if you
23 measure water and look at water around the country,
24 that's fairly typical of the ratios of U-238 and 234
25 in water. The ratio is less than one.

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1 JUDGE COLE: Okay.

2 MR. CONDRA: There's plenty of studies
3 out there to back that up.

4 JUDGE COLE: If the ratio of 238:234 in
5 natural uranium is approximately one, how do you
6 account for having a ratio of less than one? What
7 happens?

8 MR. CONDRA: The 234 is slightly more
9 soluble in water -- it's a well-established fact --
10 and slightly more mobile in the 238.

11 JUDGE ABRAMSON: So a little skinnier.
12 Four out of two hundred and forty.

13 MR. NORRIS: This is Charles Norris.
14 The issue of the ratios and isotopic concentrations
15 and what is and isn't 234:238, I think, would
16 probably be addressed in Panel 3. I would like to
17 offer the observation that the deer population or
18 the deer tissue study did show a ratio of less than
19 one for samples from the area of the DU area, but
20 the samples from the control area were one rather
21 than being less than one.

22 JUDGE ABRAMSON: And when you say less
23 than one, just so we get it clear on the record, the
24 238:234 activity was less than one, ratio --

25 MR. NORRIS: Yes. And it was about .6

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1 which does reflect some surface water and some
2 ground water samples in the DU area. However, the
3 ratios, if you look at the population for the --
4 what's nominally the control population, it was one
5 which would be what you'd expect.

6 JUDGE ABRAMSON: What you're calling the
7 control population which was deer samples taken
8 which you thought had not originated or been on the
9 site?

10 MR. NORRIS: Right, what the Army called
11 were the control population, yes.

12 JUDGE ABRAMSON: Yes.

13 JUDGE ROSENTHAL: From the Army's
14 standpoint, has the biota sampling been completed?
15 In other words, is the Army now satisfied from what
16 its sampling has done to this point, deer population
17 samples that there's no necessity for further biota
18 sampling? Or is there further sampling continuing
19 which might or might not lead to a decision to
20 sample other populations?

21 MR. BARTA: This is Mr. Barta. No
22 further sampling of biota is planned at this time.
23 IF we did see some evidence of DU migrating outside
24 of the DU impact area --

25 JUDGE ROSENTHAL: Well, how would you

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1 detect that evidence if there's no sampling going on
2 or experiments?

3 MR. BARTA: There would be surface water
4 and sediment data collected.

5 JUDGE ROSENTHAL: So you'd do it in the
6 surface water.

7 JUDGE ABRAMSON: Let's pick that thought
8 up again and first for the Army and then for the
9 staff. If the future measurements taken by the Army
10 on the site and offsite indicate that there is some
11 possibility that there might be DU being uptaken by
12 either the aquatic species or the squirrels, would
13 you expect then to examine those pathways? And I'm
14 saying assuming that your plan gives you evidence
15 that indicates you need to go down that path, will
16 you go down that path?

17 MR. BARTA: We would consult with the
18 staff about the levels that we're detecting to see
19 if further biota sampling is really warranted.

20 JUDGE ABRAMSON: And staff, what's your
21 view on that.

22 DR. McLAUGHLIN: This is Tom McLaughlin.
23 We would require the licensee to report all
24 significant exposure pathways that lead to the
25 ultimate decision of the radiological dose to

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1 humans.

2 JUDGE ABRAMSON: And that will happen
3 during your iterations with the licensee during the
4 period of doing the site characterization? You
5 won't wait until the end?

6 DR. McLAUGHLIN: That's correct.

7 JUDGE COLE: The Fish & Wildlife Service
8 has also conducted and are probably going to
9 continue to conduct some studies? Is that correct,
10 sir?

11 DR. McLAUGHLIN: I don't know that.

12 JUDGE COLE: You don't know. Does
13 anybody know?

14 DR. HENSHEL: They've just finished
15 their sampling, so they have fish that they are
16 willing to let us take samples from. They have
17 crayfish that they're willing to let us take samples
18 from. Not allowed to take all of them, because
19 they're being used for what's effectively an
20 archive. So they've asked that we just take plugs
21 from the tails of the fish and the crayfish if this
22 is to be used by the Army for assessment of uranium
23 in the tissues.

24 JUDGE ABRAMSON: Is the Army in the loop
25 on this?

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1 DR. HENSHEL: Well, they -- we put it
2 into the request for this. We put it in -- we put
3 it as a recommendation in our surrebuttal after I
4 heard about this.

5 JUDGE ABRAMSON: Okay.

6 MR. KOPP: Your Honor, if I might?

7 JUDGE ABRAMSON: Please.

8 MR. KOPP: I've been informed by Mr.
9 Cloud, the Site Manager, that the studies being
10 undertaken by Fish & Wildlife are in a completely
11 different area of inspection and not necessarily
12 geographical area but a different scientific area
13 and are being conducted in coordination with a state
14 agency that has requested that. Mr. Cloud can give
15 you more details if you would like to hear from him
16 right now. He's not a sworn witness, but he is
17 here.

18 JUDGE ABRAMSON: Well, it seems to me
19 that this is between you and the staff to decide
20 whether this is indicia -- that this might provide
21 indicia of other pathways and --

22 MR. KOPP: But I don't think -- what I'm
23 getting at is I don't think that the Fish & Wildlife
24 are doing anything specifically addressed to
25 radiological uptake or uranium uptake or anything

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1 like that.

2 JUDGE ABRAMSON: I think I understood
3 that from Dr. Henshel that what they're doing is
4 they're taking samples of fish and aquatic --

5 DR. HENSHEL: Fish --

6 JUDGE ABRAMSON: -- life.

7 DR. HENSHEL: -- fish, crayfish and
8 macroinvertebrates and they're being used for other
9 purposes.

10 JUDGE ABRAMSON: And that those samples
11 that have been taken could be made available to Army
12 and staff to see whether there is a pathway.

13 DR. HENSHEL: Correct.

14 JUDGE ABRAMSON: And so I assume that
15 the Army and the staff will look at that offer and
16 see whether it's useful.

17 MR. KOPP: I would think that that would
18 be a correct assumption, yes.

19 DR. HENSHEL: Can I go back to the
20 sample size issue that we left at lunch?

21 JUDGE COLE: Sure.

22 DR. HENSHEL: I'm sorry. I wanted to
23 say something and I know everybody was hungry. But
24 you made the question about sample size, and it was
25 interpreted as size of the tissue sample and what

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1 impact that has on the analysis' analytical results.

2 The other part of sample size concerns
3 are that there's only been approximately 30 deer
4 from this one sample section -- sampling series and
5 over time, maybe no more than 50 deer all together
6 have been analyzed. And this is out of a population
7 that when I looked at the number that were culled,
8 which is between 600 and 800 a year without
9 affecting the size of the population according to
10 Joe Rob of Fish & Wildlife Service, I then went back
11 to somebody else in Fish & Wildlife Service and
12 said, what's the approximate size of the herd as far
13 as you know based on what can be culled safely
14 without damage to the size of the population. The
15 estimate was no less than 5,000 total deer, which
16 means that you're dealing with a very small sample
17 size compared to the total population, certainly not
18 a statistically significant sample size.

19 And so, therefore, it is ill advised to
20 say when you take just a small section and say that
21 most of the ones that have been sampled have no
22 significant levels of uranium, which is what they've
23 been saying --

24 JUDGE ABRAMSON: Dr. Henshel, are you a
25 statistician?

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1 DR. HENSHEL: No. I use statistics all
2 the time, though.

3 JUDGE ABRAMSON: When you talk about
4 statistical significance of a sample of 50 --

5 DR. HENSHEL: That's in a power to
6 detect any change and whether or not you're looking
7 at a potentially biased sample. Because in the 1995
8 SEG study they do report a deer that has high, so
9 there is one deer that has been collected during the
10 course of all of the collection efforts that
11 actually was high.

12 JUDGE ABRAMSON: Is that accurate Army?

13 MR. BARTA: There was no DU detected in
14 that deer, and we've been consistent. That's in our
15 reports.

16 JUDGE ABRAMSON: So what is it that Dr.
17 Henshel is referring to when she says that it was
18 high? Was it overall uranium activity was high?

19 MR. BARTA: Presumably.

20 JUDGE ABRAMSON: And when we say it was
21 high, did somebody look at the ratio of activity of
22 234:238 in that sample?

23 MR. BARTA: They did.

24 JUDGE ABRAMSON: And what was found?

25 MR. BARTA: It was not indicative of DU,

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1 and the staff issued an RAI to the Army because, you
2 know, pointing out that the total uranium
3 concentrations appeared elevated compared to some of
4 the background samples that had been collected in
5 the early 80's, and that's why we went out and
6 collected 30 deer.

7 MR. ANAGNOSTOPOULOS: This is
8 Anagnostopoulos. I would just like to dovetail on
9 that. That phenomena can happen. As I said,
10 uranium is ubiquitous in the environment, but it's
11 also highly variable, and it can depend on setting,
12 rock type strata, etcetera. There's one ground
13 water monitoring well, MWDU06, that traditionally
14 runs twice all the other monitoring wells. And
15 we've had no indication of DU in those samples, and
16 we recently did a test where we ran a new type of an
17 examination of the water sample, and we came back at
18 .72 percent Uranium-235. It's dead-on natural
19 uranium. So that phenomena can happen. It does not
20 mean it's DU.

21 JUDGE COLE: So you're ready to uranium
22 mine.

23 JUDGE ROSENTHAL: I think we'll move to
24 air sampling.

25 MR. ANAGNOSTOPOULOS: Your Honors, can I

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1 go back to one topic before I move. It was
2 something that was said at the very beginning of the
3 testimony. This is Anagnostopoulos. There was some
4 criticism about these deer sampling results and of
5 the quality of the results and the quality control
6 of the results and how we interpret those. In the
7 deer sampling report --

8 JUDGE ABRAMSON: First of all, before
9 you start down this path, is there something you're
10 going to say that's not set out clearly in your
11 rebuttals and surrebuttals? And if it isn't -- if
12 it's already covered, then, please, you're welcome
13 to do so, but be exceedingly brief. We don't need
14 to hear your regurgitate what's already in the
15 record.

16 MR. ANAGNOSTOPOULOS: We'll defer, Your
17 Honor. Mr. Barta has that in his reply.

18 DR. HENSHEL: Can I make one last point.
19 Considering that the -- you guys --

20 JUDGE ABRAMSON: I give the same
21 admonition to you, Dr. Henshel.

22 DR. HENSHEL: That's fine. I just want
23 to point out that they did point out that there is
24 clear DU in the vegetation. Deer eat the
25 vegetation. It's hard to believe there's not going

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1 to be DU in the deer whether they detected it or not
2 based on whatever the accuracy of the sampling or
3 whatever reason.

4 JUDGE ABRAMSON: Let me ask one other
5 question while we're on the deer. Assuming that we
6 have a concentration of uranium in a deer tissue, do
7 we have an idea of how that is taken up into the
8 human population when it's ingested? Is the
9 concentration then -- does all of it stay in the
10 human tissue or does one percent of it or one-
11 millionth of a percent wind up remaining when it's
12 ingested? Do we have any information on that at
13 all?

14 DR. HENSHEL: I can quickly go to the
15 computer and calculate it, if you want, based on --
16 there's a model that's online that's very easy to
17 input the data that uses the ICRP analyses.

18 JUDGE ABRAMSON: You don't recall
19 offhand what that is. Maybe you can tell us that
20 later today. We'll give you a break. After the
21 next break, you can check it.

22 JUDGE ROSENTHAL: I think we'll --

23 MR. CONDRA: Can I have one comment?
24 This is Dale Condra. On the validity of the
25 duplicate data, I used a different test to evaluate

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1 the duplicate the data. It's one recommended in
2 MarLab. And when you use the statistical method --

3 JUDGE ABRAMSON: Is this information,
4 Mr. Condra, in your replies?

5 MR. CONDRA: Yes.

6 JUDGE ABRAMSON: Then we don't need to
7 repeat it unless you're going to tell us something
8 new.

9 JUDGE ROSENTHAL: I think we can move to
10 air sampling. If there's different witnesses for
11 parties, change positions.

12 JUDGE COLE: Dr. Henshel, you raised the
13 issue of air sampling associated with controlled
14 burns at a couple of other locations in the country
15 and indicated that that would be an issue in the
16 proving ground also. And in commenting on the
17 impact of the control burn, some of the testimony
18 before us indicated that it's not anywhere close to
19 the problem that you implied might exist. Could you
20 comment on that please?

21 DR. HENSHEL: The control burn study
22 that we've all been working from is the one at Los
23 Alamos National Laboratories. It was a single burn.
24 It was a relatively small burn compared to the
25 10,000 acres that's burned annually here at

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1 Jefferson Proving Ground, even though of that 10,000
2 acres, it's only a part of the DU -- I think the DU
3 comes into it during two of the burns.

4 JUDGE COLE: I'm sorry. I didn't hear
5 what you just --

6 DR. HENSHEL: The DU area comes into
7 what's being burned during, I think, two of the
8 burns in the burn cycle, because the burn cycle is
9 broken up into five years, into five years of
10 cycling, 10,000 acres a year. And --

11 JUDGE COLE: How many acres is the --

12 DR. HENSHEL: Fifty-thousand acres,
13 50,000 for the total.

14 JUDGE COLE: Fifty thousand?

15 DR. HENSHEL: Yes. And the DU area is
16 only 2,000 of that, and I think that half of it
17 comes into one of the burn cycles, half of it comes
18 into another burn cycle, and then there's other burn
19 cycles that it's not a part of. So it's
20 approximately once every three years that the DU
21 area is being affected by a burn. Okay?

22 As pointed out by, I can't remember who
23 said it, the larger the area that's being burned,
24 the more the turbulence. So there's going to be
25 more turbulence in Jefferson Proving Ground than at

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1 Los Alamos National Labs. The other comparison area
2 has been Aberdeen Proving Ground, and they had an
3 estimate in their report of 5 x 25 acres per year
4 that were being burned, so it was significantly
5 smaller. It's an order of magnitude difference in
6 terms of size. So the amount of turbulence that's
7 being created at Jefferson Proving Ground when
8 there's a burn is significantly greater than either
9 Los Alamos or Aberdeen.

10 The concern came especially from the
11 fact that with the one burn that was assessed at Los
12 Alamos, it increased the level of DU in the soil by
13 approximately 14 percent as a general disbursement,
14 so as a result --

15 JUDGE COLE: In the plume area of the
16 burn?

17 JUDGE ABRAMSON: Yes. How far
18 downstream?

19 DR. HENSHEL: Well, they were assessing
20 at the perimeter of Los Alamos.

21 JUDGE ABRAMSON: Right at the boundary -
22 -

23 DR. HENSHEL: Yes. That's what they
24 said. They said --

25 JUDGE ABRAMSON: -- exposed?

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1 DR. HIRSHFELD: Yes. They said that the
2 amount that's in the soil at the perimeter was
3 increase by approximately 14 percent as a result of
4 that year. Now if you consider that this is only a
5 one-year thing, that's fine. But if you consider
6 this as something that's going to happen once every
7 three years, you're talking about incrementing how
8 much is in the generic soil by up to 14 percent
9 every year, which is going to accumulate over time
10 obviously.

11 JUDGE ABRAMSON: Now, in your view, is
12 that the only argument about why the Los Alamos
13 study was not applicable to JPG?

14 DR. HENSHEL: Well, I think there's
15 other issues that the JPG is -- has a different
16 configuration. JPG is very long and thin, so the
17 people that live close to the DU area are living
18 approximately a mile to two miles maximum out from
19 the DU area. Whereas in Los Alamos, it's sort of
20 more of a -- it's hard to phrase how it's -- it's
21 sort of this mostly sort of an oblong shape but it's
22 --

23 JUDGE ABRAMSON: But the distance is
24 greater or less or what --

25 DR. HENSHEL: Well, to the edges of Los

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1 Alamos from where the burns are, it seems like it's
2 greater as far as I could figure out from the
3 papers. Yes. So I think the Los Alamos, from where
4 the burn are to where the edges are looks like it's
5 a larger distance than it is normally from where the
6 DU area is to the edge of JPG, because JPG is this
7 long, thin thing.

8 So that's another concern. So when you
9 talk about dispersion, dispersion decreases with the
10 square of the distance, so being closer in means the
11 concentrations are going to be relatively higher.
12 So you've got two issues. You've got consistent
13 burning happening on an approximately three-year
14 cycle. You've got a larger area that's being burned
15 so what is in the soil then is going to be re-
16 suspended into the air in a greater amount by
17 comparison, and then the people live that much
18 closer.

19 JUDGE ABRAMSON: And was there any
20 argument about the nature of the initial
21 concentration of DU in the Los Alamos site compared
22 to JPG or --

23 DR. HENSHEL: That wasn't part of my --

24 JUDGE ABRAMSON: Okay. Let's hear from
25 the Army and from the staff about why they thought

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1 that the Los Alamos data was inapplicable here or
2 whatever you say.

3 MR. ANAGNOSTOPOULOS: This is
4 Anagnostopoulos for the Army. I'd like to disagree
5 with several points made. I've read both those Los
6 Alamos reports, and I don't recall any data on the
7 fires increasing the level of DU and soil. I
8 remember reading about how the dust flux after a
9 fire would cause the amount of suspended uranium in
10 the air to be higher and that that dose to a
11 receptor might be about 14 percent higher. That's
12 what I recall depending on the scenarios that were
13 used.

14 I also don't believe that that data was
15 collected at the boundary of Los Alamos. I believe
16 it was collected actually right in the burn areas.
17 It talks about transects at 30 meter intervals, and
18 it gives a map of several locations.

19 I believe that the Los Alamos study is
20 very useful to our purposes at Jefferson Proving
21 Grounds, because I believe it serves as an upper
22 bound, worse case estimate of what could happen.
23 And I think the news is good. In other words, when
24 they calculated they dose increment increase
25 following these fires, it was a huge fire in an

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1 aired environment. They used upper bound estimates
2 of the maximum soil contaminant concentration.

3 JUDGE ABRAMSON: Now when you say huge
4 fire, Dr. Henshel's saying that the JPG burn area is
5 greater than the Los Alamos burn area, so is that
6 accurate, or what makes this one huge, and let's
7 talk about huge in comparison to what goes on at
8 JPG?

9 MR. ANAGNOSTOPOULOS: I don't believe
10 that to be true. I'll have to go back and look at
11 my testimony, but I believe Los Alamos' fire, the
12 burnt area was about five times greater than the
13 whole DU impact area. And when the DU impact area
14 receives a controlled burn, it's not the whole
15 impact area that burns, it's actually a small
16 portion of the impact area that burns. So the land
17 area, the amount of land is different by a
18 significant amount.

19 So there are several factors in the Los
20 Alamos study that make it bounding. They use the
21 absolute worse case maximum concentration to do
22 their estimates, the soil type, the environment is
23 significantly different at Los Alamos in the
24 direction that would make that upper bound estimate
25 larger as compared to JPG. For example, there was

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1 tree thinning at Los Alamos. We don't have that
2 going on at JPG.

3 And Los Alamos is a more aired
4 environment so, therefore, there's less brush and
5 vegetation to intercept the wind and keep the dust
6 from re-suspending where that's not the case at JPG.
7 JPG is very heavily wooded, and even after a
8 controlled burn, the vegetation returns fairly
9 rapidly as you can see now, as a matter of fact.

10 So I think there are significant
11 differences, but it's useful to our purposes. And I
12 think it's also not -- not important not to talk
13 about percentages, but it's important to talk about
14 the difference in the dose to a receptor. And what
15 the Los Alamos study showed is that that dose
16 increment is fairly low, and when you compare that
17 to what you would expect to receive from the natural
18 background, one might say extremely low.

19 JUDGE ABRAMSON: Let's here from the
20 staff person before you rebut, Dr. Henshel.

21 MR. SCHWARTZMAN: The only thing I guess
22 I could add to Mr. Anagnostopoulos' --

23 JUDGE ABRAMSON: State your name please?

24 MR. SCHWARTZMAN: -- Oh. Adam
25 Schwartzman, sorry -- was that, yes, the burn areas

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1 at JPG are broken up into pieces, and they do the
2 burns in little pieces. On visiting the site --

3 JUDGE ABRAMSON: Even on an annual
4 basis, although they're burning 10,000 acres
5 annually, they're not burning all 10,000 at once?

6 MR. SCHWARTZMAN: Correct. The site --
7 on visiting the site, the size of the burn they did
8 recently was probably the size of this room, and it
9 doesn't burn all the vegetation. It just burns
10 what's close to the ground. The majority of what
11 burns is the vegetation, soil, technically, for the
12 most part, is not suspended. It's the vegetation.

13 JUDGE ABRAMSON: How do they control so
14 that it burns just the stuff close to the ground.
15 Why don't the trees and the bigger vegetation get
16 fired?

17 MR. SCHWARTZMAN: They take precautions
18 such as wind -- making sure that the wind speed and
19 conditions are such that --

20 JUDGE ABRAMSON: But it's not like
21 they're sitting out there with fire hoses --

22 MR. SCHWARTZMAN: No. And there -- but
23 there are cases where they'll, if they need to, they
24 are -- have people monitoring it, and if it gets out
25 of hands, they have certain --

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1 JUDGE ABRAMSON: And when they're
2 burning on the DU site which is, what did I hear, a
3 couple thousand acres? Is that correct?

4 MR. SCHWARTZMAN: Two thousand acres --

5 JUDGE ABRAMSON: Two thousand acres.
6 When they're burning on that DU site, isn't there
7 UXO on that site, too?

8 MR. SCHWARTZMAN: Yes. And --

9 JUDGE ABRAMSON: How do they get on
10 there to make sure they're only burning an area the
11 size of this room?

12 MR. SCHWARTZMAN: They don't. They, the
13 firefighters and staff are required to start the
14 fire from the road and monitor it from there, and
15 it's -- they use what's described in the fire
16 monitoring plan as the contain plan where they
17 attempt to contain it and make the precautions that
18 if it does get out of hand, they just let it burn,
19 but taking the precautions to make sure that the
20 fire doesn't get off the site.

21 JUDGE COLE: The source of the uranium
22 that's disbursed in these controlled burns, is it
23 fair to say that just from the vegetation that burns
24 and not from some other source?

25 MR. SCHWARTZMAN: For the most part,

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1 yes.

2 JUDGE COLE: Thank you.

3 DR. HENSHEL: May I? All right. First
4 of all, let me correct myself to one extent. Mr.
5 Anagnostopoulos --

6 MR. ANAGNOSTOPOULOS: That'll work --
7 Mr. A.

8 DR. HENSHEL: It's 14 percent increase
9 in the air, average increase in the air but the
10 average increase in the air is going to be
11 proportional to what's in the soil.

12 JUDGE ABRAMSON: Well, it's going to get
13 deposited on the soil.

14 DR. HENSHEL: Correct.

15 JUDGE ABRAMSON: Doesn't mean it's going
16 to change what's in the soil by 14 percent, right?
17 Surface deposition dust go settled, and then you got
18 --

19 DR. HENSHEL: Right. But the point is
20 that with each burn, you're seeing increments.
21 Okay. The second point is the amount that burned
22 was 3,000 hectares which is 7.5-thousand acres which
23 is less than a burn at JPG overall.

24 (Whereupon, off the record comments.)

25 DR. HENSHEL: The reason that -- when I

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1 was just down at Jefferson Proving Ground last
2 month, I talked about the burns with Joe Rob and
3 Brian, and I can't remember his last name, from Fish
4 & Wildlife who are the ones that address the burns.
5 The reason that they say that the burns have been as
6 relatively low intensity as they have and haven't
7 necessarily burned, for example, the trench area is
8 that it's been done in the spring which is always a
9 very wet time, and they're always dealing with
10 problems associated with the moisture and the
11 vegetation, and that makes the vegetation more
12 difficult to burn. They are switching it to the
13 fall to mimic --

14 JUDGE ABRAMSON: Who is they?

15 DR. HENSHEL: Fish & Wildlife.

16 JUDGE ABRAMSON: Fish & Wildlife does
17 the burning? It's not Army?

18 DR. HENSHEL: No. It's Fish & Wildlife
19 that control -- that does the burning. It's part of
20 their controlled burn, part of their management.

21 JUDGE ABRAMSON: So is Fish & Wildlife
22 cognizant of this potential radiation affect they're
23 causing?

24 DR. HENSHEL: Yes. They got an estimate
25 saying that they're --

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1 JUDGE ABRAMSON: Do they have a license
2 from the NRC?

3 DR. HENSHEL: I have no idea. We're out
4 of my league here. All right. Can I go back to
5 what they said?

6 JUDGE ABRAMSON: Yes.

7 DR. HENSHEL: Their comment was that
8 having the spring burns does not mimic what happens
9 naturally, that naturally burns occur during dry
10 periods which is the fall. And so they are
11 switching their burning period to the fall, and they
12 expect the burns to be more complete at that point
13 to burn more of the vegetation more thoroughly,
14 including potentially the trench and potentially
15 more of the trees. So they understand that it's
16 going to be a more intense fire at that point.

17 JUDGE COLE: Now when you say in the
18 trench, what do you mean?

19 DR. HENSHEL: In the DU area, there's a
20 long, thin trench that's about, what, three to five
21 feet wide or something, three to five yards, three
22 to five feet -- it's not very wide -- that was
23 actually created into a trench from the impact of
24 the UXO and UXO containing penetrators that went
25 into that area.

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1 JUDGE COLE: So it's not a stream bed or
2 a river bed that's in the area?

3 DR. HENSHEL: No. It's very much a man
4 made phenomena.

5 JUDGE COLE: Accurate fire in same
6 trench, right?

7 DR. HENSHEL: Yes. And the trench has,
8 by eye, according to Joe Rob of Fish & Wildlife,
9 doesn't burn, though he admits that he's only been
10 able to observe what he sees from the road at that
11 point, because he doesn't like to go into the burn
12 area while it's burning. But he think that that's
13 been associated with high water table in the spring
14 and, therefore, it was very wet. Same reason that,
15 you know, it's only part of the vegetation has been
16 burning up to now, because it's been essentially
17 wet.

18 And so switching it to the fall will make it a
19 more intense, more complete burn, and he does expect
20 that the trench is likely to burn at that point,
21 too, that more of the trees are likely to burn, that
22 it's going to be a regular, more intense fire at
23 that point.

24 JUDGE ABRAMSON: Do you recall anything
25 about the concentration of DU on the Los Alamos site

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1 or radioactive components on the Los Alamos site as
2 compare with what's on the -- in the DU area at JPG?

3 DR. HENSHEL: Do you have that
4 information?

5 MR. ANAGNOSTOPOULOS: I do. Your Honor,
6 in my testimony, we see at the -- in the first Los
7 Alamos paper that the concentration had a high end
8 average of 3,000 picocuries per gram. Oh, no, I'm
9 sorry that's at -- that's in actually the trench
10 area. We have 3,000 picocuries per gram in some
11 cases at JPG along the firing line.

12 JUDGE ABRAMSON: This is in the soil?

13 MR. ANAGNOSTOPOULOS: In the soil. And

14 --

15 JUDGE COLE: Now when you say in the
16 soil, that's right at the surface of the soil, or is
17 that a sample collected in a certain way and
18 measured?

19 MR. ANAGNOSTOPOULOS: That would be
20 surface soils, usually a top six inches. I'm
21 looking for that now. No. Actually, that is Los
22 Alamos -- 3,000 picocuries per gram at the firing
23 line, average -- it's in my testimony. Okay. And
24 while I have the microphone, I guess, and just to
25 respond, I also --

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1 JUDGE ABRAMSON: I'm sorry. Let's get
2 the rest of the data. Three thousand picocuries per
3 gram at Los Alamos in the surface soil?

4 MR. ANAGNOSTOPOULOS: Correct.

5 JUDGE ABRAMSON: And what is it at JPG
6 in the trench?

7 MR. ANAGNOSTOPOULOS: It's highly
8 variable, Your Honor.

9 JUDGE ABRAMSON: And what's the peak,
10 and if I had to do an average, what's the average?

11 MR. ANAGNOSTOPOULOS: I would have to go
12 back to the SEG Characterization report and pull
13 that out.

14 JUDGE ABRAMSON: Can you do that --

15 MR. ANAGNOSTOPOULOS: I can --

16 JUDGE ABRAMSON: -- without a great deal
17 of trouble? Please do.

18 MR. ANAGNOSTOPOULOS: I'll do that now.

19 (Whereupon, Mr. Anagnostopoulos
20 retrieving documents.)

21 MR. ANAGNOSTOPOULOS: This is
22 Anagnostopoulos, Your Honors. I'm looking at
23 Section 4.2 of the SEG Characterization Report of
24 1996. It indicates 60 samples were collected under
25 20 penetrators. Total uranium concentrations ranged

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1 from 1.5 picocuries per gram to 12,000 picocuries
2 per gram. The average concentration for all
3 samples is 757 picocuries per gram with a standard
4 deviation of over 2,000 picocuries per gram, so
5 highly variable.

6 And that dovetails with my experience
7 with examining penetrators at JPG. And typically,
8 when we uncover them, we find that they are in the
9 near surface soils, they have a black oxide layer
10 that's fairly tightly adherent with a yellow oxide
11 layer intermixed between the two, and that when you
12 remove the penetrator and look at the soils,
13 typically that yellow discoloration, the uranium is
14 right there next to the penetrator. In other words,
15 you don't see visually a plume of that yellow oxide
16 in the surrounding soils. It's usually in a very
17 tight layer in that area.

18 And so, therefore, the nature of the
19 contamination at JPG is also significantly different
20 from Los Alamos and from some of the other Proving
21 Grounds where they either did tests to undepleted
22 uranium where they exploded it with exploded it with
23 explosives or they hit hard targets, which would
24 aerosolize or finally disburse the DU whereas at
25 JPG, it's most soft target testing, and for the most

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1 part, the penetrators are intact.

2 JUDGE COLE: Most of the time in the
3 samples that are collected, they're above the water
4 table?

5 MR. ANAGNOSTOPOULOS: That would be
6 correct.

7 DR. HENSHEL: I would like to point out
8 that the water table at JPG changes drastically
9 depending on the season.

10 JUDGE COLE: I'm sorry, is what?

11 DR. HENSHEL: The water table at JPG
12 changes drastically depending on the season. This
13 is an area of the country, because the bedrock is
14 close to the surface and the bedrock is so hard and
15 is not absorbent, does not have a high water
16 capacity, that in the springs you get -- regularly
17 get flooding in this area, including at JPG. And,
18 you know, we had a more severe flood, I think, than
19 normal this year, but I would say the flooding this
20 leaves very visible evidence of the fact that
21 flooding occurs and that's not unusual.

22 So, therefore, you know, to see -- what
23 I would interpret this to say is what's there around
24 the penetrators is only that which has been there
25 since the last flood, because it's very likely that

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1 anything in the surface will have been washed away,
2 that's any small bits.

3 JUDGE ROSENTHAL: As a general
4 proposition, what significance does the Army attach
5 to the fact that there appears to be flooding
6 periodically on the site. I mean you've heard
7 reference to the migration of some of the munitions,
8 and is this a -- the flooding a factor that the Army
9 feels must be taken into consideration in the
10 conduct of its various testing enterprises?

11 MR. ANAGNOSTOPOULOS: Well, this is
12 Anagnostopoulos. I believe that the field sampling
13 plan, in it's objectives, discusses flooding as a
14 potential source, as a potential route, and we have
15 been monitoring surface waters and sediments and
16 soil, and there are plans in the FSP to do a more
17 detailed characterization of the sediments in the
18 surface soil. So whether there's flooding or not,
19 certainly if that is flooding and it is a mechanism,
20 it should be seen. If there is migration from those
21 flooding events, we should see that in both the
22 soils and the sediments.

23 JUDGE COLE: And have you seen it?

24 MR. ANAGNOSTOPOULOS: We have not seen
25 it so far.

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1 DR. HENSHEL: Speaking as someone who is
2 not a chemist, I still could like to point out that
3 when you have flooding, you also have dilution,
4 which for the period of time that it's diluted, it's
5 harder to detect and you need more sensitive
6 chemical methods to detect it if possible which the
7 problem then, of course, is that the biota that are
8 exposed chronically over a period of time then can
9 accumulate it and reconcentrate the uranium back
10 into the point at which it can enter the food chain.

11 JUDGE ABRAMSON: Is it your view, Dr.
12 Henshel, that if the water -- flood waters pass
13 through this region where the yellow cake is formed
14 near the shells and sweeps some of it away and
15 dilutes as you say and then deposits it downstream
16 somewhere where it gets entrained in the water and
17 picked up by biota, is it your view that somehow
18 sampling during flooding wouldn't detect that being
19 swept downstream or that sampling of the soil after
20 a flood would not detect that that there has been
21 some incremental addition because of the flooding?

22 DR. HENSHEL: I think that as soon as
23 you have dilution, you have to use either
24 concentration methods to increase the concentration
25 of your sample, which was discussed right before

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1 lunch. Or you need to recognize that you need to
2 use the most sensitive possible method for
3 detection, which has not been used here.

4 JUDGE ABRAMSON: We're going to talk
5 about all that at another time.

6 DR. HENSHEL: Yes, so -- hold on --

7 JUDGE COLE: Do we have any -- I'm
8 sorry. You were going to say something, sir?

9 MR. NORRIS: Yes, this is Charles
10 Norris. I'd like to make sure that everyone's
11 clear. There is no sampling events in the field
12 sampling plan right now under flood conditions.
13 Okay. The water samples that are being taken, there
14 is no mechanism in the field sampling plan to sample
15 the sediments that are entrained in a flood or the
16 water in a flood for this kind of pulse release or
17 uranium.

18 There is language in the FSP that if other
19 lines of evidence suggest this may be a mechanism
20 without specification of what those other lines of
21 evidence would be, that such sampling would be
22 considered through a modification to the FSP. But
23 it is not part of the FSP --

24 JUDGE COLE: Do you read that to believe
25 that the FSP is not flexible enough to accommodate

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1 such a change if it's warranted?

2 MR. NORRIS: The potential for the
3 change is there by starting with the premise that
4 some non-flood set of data will trigger the need to
5 look for it, I think, largely precludes that that
6 will ever happen. If there is a potential that
7 pulse releases from the site occurred during flood
8 events, then the way to check that is either to
9 sample during flood events or to sample downstream
10 potentially outside the DU area where deposition
11 from such flooding might occur.

12 JUDGE ABRAMSON: And you have reason to
13 believe they're not going to sample downstream, that
14 that's not part of the FSP?

15 MR. NORRIS: No. They're not sampling
16 outside the JPG at all.

17 JUDGE ABRAMSON: But if they sample
18 downstream on the boundaries of the JPG, is that not
19 sufficient as long as it's downstream? Does it have
20 to be 10 miles offsite or 1 meter offsite or is
21 onsite sufficient as long as it's downstream??

22 MR. NORRIS: You need to be certain that
23 your sampling flood event sediments, and the water,
24 the materials being conveyed with the water during
25 the flood is gone. That has to be sampled with that

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1 water. The post flood die off of water is not going
2 to have that pulse release in it anymore, and that's
3 what will be deposited onsite.

4 JUDGE COLE: With respect to the flood
5 waters and the transport of uranium, either depleted
6 or natural, what is the mechanism by which the
7 uranium would be transported during flood
8 conditions? And I'm particularly interested in, for
9 example, the surface of projectiles where you
10 indicated they had two layers, an upper layer of
11 some material which I don't know, and an under layer
12 that appears to be, say, a uranium oxide film or
13 something next to the projectile.

14 Is it such that or do we know the
15 mechanism by which that surface is scoured and
16 transported downstream? What is the mechanism of
17 transport for uranium, whether it be soil particles
18 or whether it be a skin on the surface of a
19 projectile?

20 MR. ANAGNOSTOPOULOS: I don't think we
21 have a definitive answer. We could postulate but
22 certainly we are going to be examining DU
23 penetrators in their environment right now as part
24 of the FSP, so we're going to find out. We're going
25 to look at that. But certainly you could postulate

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1 that either entire penetrators could be washed
2 downstream. That would have to be a significant
3 flood event --

4 JUDGE COLE: The 130 millimeter shells?

5 MR. ANAGNOSTOPOULOS: Yes. These 125
6 millimeter shells.

7 JUDGE COLE: That's close enough.

8 MR. ANAGNOSTOPOULOS: And they're
9 typically -- they're embedded in the ground, so it
10 would be fairly difficult for that to happen. But
11 we have seen the surrounding the soil in the
12 immediate vicinity within centimeters of a
13 penetrator being contaminated, so you might imagine
14 that some of that surface oil would be eroded away
15 and then, therefore, deposited somewhere else.

16 I'd like to agree with Mr. Norris in the
17 fact that the FSP does not include provisions to
18 sample during flood events. That's correct. I'm
19 now quite sure how we would do that. I'm not quite
20 sure how we would anticipate such an event. We are
21 looking for the results of that flood. In other
22 words, once the flood has receded and the material
23 has been deposited, we are looking for that
24 material. We are looking at soils. We are looking
25 sediments. We are looking outside of the impact

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1 area on the JPG site.

2 And, personally, I have trouble thinking
3 or postulating how the material would get off the
4 JPG site without leaving some sort of signature on
5 the JPG site in between the two. And that's what
6 we're going to be looking at. That's what we're
7 oging to be looking for.

8 JUDGE COLE: Part of your sampling
9 program?

10 MR. ANAGNOSTOPOULOS: That's correct.
11 And at some point, you know, even if it's at a low
12 concentration, at some point of interest, there
13 could be a buildup, and that buildup should be
14 readily detectable. I've done environmental
15 investigations at several sights when we do a gamma
16 walk-over survey, as described in the FSP, you tend
17 to bias your investigation towards areas that are
18 likely to contain buildups such as stream beds,
19 creek beds, sewer discharge points, down spouts from
20 buildings. And experience shows that you do see
21 higher concentrations at those points which is why
22 that's where we're going to look.

23 JUDGE COLE: Like the bottom of the
24 trench?

25 MR. ANAGNOSTOPOULOS: That would be

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1 correct as well.

2 DR. HENSHEL: There are, in the
3 government literature, and I think in the regular
4 literature, fair numbers of studies that have
5 evaluated flood events more thoroughly than is being
6 done at JPG, and I would like to see the Army use
7 those as models for how to evaluate what happens.
8 Even in Karst, there are such studies, not
9 necessarily for uranium but in this kind of case,
10 you're looking for something that's similar and not
11 necessarily the identical thing, just to hold up as
12 a model. So this is just my comment and I guess
13 part of what we're requesting.

14 JUDGE ROSENTHAL: I think that we have
15 concluded with Panel Number 1. I want to thank all
16 of the members of the panel on behalf of the entire
17 Board for their illuminating -- is there anything
18 that you wish to add briefly before -- I think we've
19 pretty well explored the various aspects of it and
20 not --

21 JUDGE ABRAMSON: If you're going to add
22 something, don't add something that we've seen in
23 writing.

24 JUDGE ROSENTHAL: We are moderately
25 literate.

1 MR. ANAGNOSTOPOULOS: Well, we had a
2 debate on the amount of area burnt, and I'd like to
3 correct that, but it's in my testimony, so we'll
4 pass on that. I would like to point out, however,
5 fairly strongly that in the area of air sampling,
6 air sampling has been done. It has been conducted.

7 JUDGE COLE: If you wanted to correct
8 something that you said previously and isn't on the
9 record here, maybe you better correct it now if you
10 can.

11 MR. ANAGNOSTOPOULOS: What I said
12 earlier was correct, Your Honor.

13 JUDGE COLE: Okay. Thank you.

14 JUDGE ROSENTHAL: Thank you and I think
15 we'll to Panel 2 and those witnesses with regard to
16 Panel 2 that have not already been sworn in, if
17 there are some, then please rise. Okay. If each of
18 you will raise your right hand. Do you swear or
19 affirm that the testimony that you are about to give
20 is the truth and the whole truth?

21 PANEL 2 MEMBERS, WITNESSES, SWORN

22 JUDGE ROSENTHAL: Thank you. And if there
23 are more than -- let's see, how many witnesses are
24 there on this panel? Five. I don't know whether you
25 can all gather. Yes. I think you can probably get

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1 seats, two of you behind the --well, I assume that
2 this is Mr. Norris, Mr. Pastorick, Mr. Peckenpaugh,
3 Mr. Eaby and Mr. Snyder. Is that correct? Okay.

4 JUDGE COLE: Mr. Norris, with respect to
5 uranium, what do you think the major problem with
6 uranium in this particular situation? Is it a
7 radioactivity problem, or is it a toxic problem, or
8 what is it?

9 MR. NORRIS: Actually, I leave the
10 definition of the problem to the health physicist and
11 the risk assessors and the biologists. My
12 understanding of it is certainly that there are
13 regulatory concerns with respect to its radioactivity
14 and the radiological effects of it. From what I read
15 in general literature, we're learning thorough the
16 decades that the radioactive metals, it turns out, are
17 often of concern for toxilological properties at lower
18 levels than we had considered them. But I'm not an
19 expert in that and, really, that's outside my area of
20 practice.

21 JUDGE COLE: All right, sir. Anybody else
22 want to answer that?

23 (No response.)

24 JUDGE COLE: With respect to karst areas
25 in general, it creates some problems for different

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1 disciplines like locating houses and roads and things
2 like that, and I was looking at a map of the site, the
3 depleted uranium test site. They show a couple of
4 tunnels and I noticed that most of the tunnels that
5 are identified on this map -- the one that I saw had
6 small red lines -- I don't remember the exhibit number
7 -- but they were generally associated with water
8 courses passing through this area.

9 Is that an indication that that's where
10 most of the karst-related problems would be or does it
11 mean something else?

12 MR. NORRIS: No. I don't think that's a
13 reasonable inference from a diagram like that. What
14 those caves were identified by what they represent are
15 karst features that are visible at the earth's surface
16 and large enough for a human to enter. And a
17 horizontal or sub-horizontal tube, if you will, cave
18 is only going to be visible at a location where the
19 land surface crosses that tube, which would be where
20 a stream or water course has cut down and exposed one
21 part of that tube. And it has then -- it flows water,
22 carries sediment out of it and is open and available
23 to enter at that point. If you go back as far as you
24 can in that cave, it may narrow down to the point you
25 can no longer go deeper, but it doesn't mean that it

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1 doesn't widen out again at greater distance and
2 continue on.

3 JUDGE COLE: All right, sir. Thank you.
4 With respect to the topography of the test site in
5 comparison to the rest of the area in the Jefferson
6 Proving Ground, could you tell me just what that
7 topography is elevation wise with respect to the rest
8 of the Proving Ground? Is it approximately level? Is
9 it slightly higher than or on an average higher than
10 most of the other parts of the proving ground? Are
11 you familiar with that, sir?

12 MR. NORRIS: Not in a great of detail, but
13 land tends to fall to the south somewhat?

14 JUDGE COLE: Towards the town?

15 MR. NORRIS: Towards Madison, yes. I
16 don't know the extent to which it may continue to rise
17 from the DU area to the north before it goes down into
18 the next drainage to the north. There is an east to
19 west role to the property that kind of forms a
20 backbone in the vicinity of the DU area such that land
21 to the east drops off to the east and -- of this
22 backbone -- and land to the west falls to the west.

23 JUDGE COLE: And how would you describe
24 that drop-off, as gently sloping or?

25 MR. NORRIS: It is gently sloping in the

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1 highlands, but when it gets to where a stream is
2 entering into it, it very quickly drops. And as you,
3 for instance, go to the east from the east side of the
4 site where Route 421 runs near the entrance -- present
5 entrance for the wildlife refuge, there's a Indiana
6 Road 220 that goes to the east. And if you go on that
7 road, within about a half, three-quarters of a mile,
8 you get on a very steep hairpin road that drops down
9 to a valley that is several hundred feet below the
10 plateau area.

11 JUDGE COLE: Got you. The highlands are
12 generally tot he northern part of the test area?
13 They're not in the depleted uranium area or is it --

14 MR. NORRIS: No. They're -- the flat
15 plateau highlands -- plateau area is probably a better
16 term than a highlands, but they do make up the DU
17 impact area except where the streams cut across it.

18 JUDGE COLE: And could you estimate the
19 range in elevation differential between the high and
20 low point on the depleted uranium test site? I mean
21 are we talking aobut 15 meters or something like that?

22 MR. NORRIS: At least 15 meters. I'm not
23 sure if you went from the highest to the lowest, but
24 it's probably on the 15 to 20 meter --

25 JUDGE COLE: I tried to get a feel for

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1 that by looking at a topical map, but I lost the lines
2 quite frequently.

3 MR. NORRIS: Yes. It's hard to see but I
4 would say at least 50 feet in the center of the
5 depleted uranium area, and by the time you get to the
6 west side, it may be a little more than that.

7 JUDGE COLE: There was some reference to the
8 area when we were talking about its susceptibility to
9 flooding and the geology underneath it would make it
10 susceptible to that. Do you have any idea of what the
11 range of water level from the ground surface is over
12 the range of the depleted uranium area?

13 MR. NORRIS: Well --

14 JUDGE COLE: You know, one point would be
15 the stream bed, you know, the water level there.

16 MR. NORRIS: -- obviously, there's the
17 stream bed there. Some wells indicate water levels
18 below that of the nearby stream level.

19 JUDGE COLE: Could mean flow the other
20 way?

21 MR. NORRIS: Well, it would mean flow from
22 the stream into the ground.

23 JUDGE COLE: Okay.

24 MR. NORRIS: I have seen wells that
25 consistently have their water level within three to

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1 four feet of ground surface up on the high areas, so
2 the range in the water elevation, if you're only three
3 or four feet below ground surface in the high areas,
4 and you're at or near stream level or slightly below
5 in the stream valleys, the elevation of the water, the
6 top water level would appear to vary essentially as
7 much as the topography does.

8 JUDGE COLE: Got you. Now with respect to
9 the flooding of the area, how often does that happen?
10 Do you have any idea or does anybody have any idea how
11 often the area is flooded? And what do you mean by
12 flooded?

13 MR. NORRIS: I don't know. I've looked at
14 10 years of stream gauging records where the U.S.G.S.
15 runs stream gauges in the general vicinity. None of
16 the data, the gauging data for the site have been
17 released yet for me to look at. Some years don't
18 appear to have any flood events of any significance.
19 Other years may have three or four years. I don't
20 know what a systematic average would be for the site.

21 MR. EABY: This is Mr. Eaby. I have been
22 out at the site and actually have observed a small
23 flood event, and we have been collecting continuous
24 electronic stage data on the Big Creek, which is the
25 main street that bisects the depleted uranium impact

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1 area.

2 JUDGE COLE: That runs from east to west -

3 -

4 MR. EABY: That's correct, sir.

5 JUDGE COLE: -- across the bottom third of
6 the area, right --

7 MR. EABY: Yes. And we have been
8 collecting for the last year, and so we have
9 elevations, or not elevations, but we have stage data
10 which is the height of the stream over that year. And
11 we've seen some of these events. We have them
12 recorded, and then I have actually been onsite when
13 they had a heavy rain event upstream offsite. And the
14 one thing about the flood is that the flooding events
15 are contained within the stream channel.

16 These streams are -- have been eroded down
17 into the bedrock surface, and in many areas, it's at
18 least 15 to 20 feet, if not deeper from the plateau
19 down to the stream valley bottom. And this flood is -
20 - the flood waters are contained within that small
21 area.

22 JUDGE COLE: So generally, they'll go over
23 the banks?

24 MR. EABY: We don't -- you don't see over
25 bank flooding in the area of the depleted uranium

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1 impact area --

2 JUDGE ABRAMSON: Doesn't that depend on
3 the rain event? I mean if you're talking about a
4 hundred year rain event, you might go over. If you're
5 talking about a five year rain event, you won't. Do
6 you have any idea what kind of events you've observed?

7 MR. EABY: I don't, sir.

8 JUDGE COLE: Now with respect to these
9 tunnels and caves, they have an entrance for humans to
10 enter the caves? What are the general elevations of
11 these tunnels with respect to water levels before and
12 during floods elevations? Do they -- with a flood,
13 would you expect water to get into these cave tunnels
14 and has anyone observed that?

15 MR. EABY: I have not observed it during
16 flood stage, but I would anticipate, at least one some
17 of the elevations of the entrances, that flood waters
18 could reach those entrances.

19 JUDGE COLE: But you haven't observed any
20 of that?

21 MR. EABY: No, I have not.

22 JUDGE COLE: But based upon your knowledge
23 of the relative elevation of the cave entrances, at
24 least some of them, and the water level during floods,
25 you would anticipate that some of them would be

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1 submerged?

2 MR. EABY: I would assume that could
3 occur, yes.

4 JUDGE COLE: All right, sir. And what do
5 you think happens when that happens?

6 MR. EABY: Well, I've seen the -- I've
7 seen two of the caves in particular that have streams,
8 and during precipitation events or periods when you've
9 had a fair amount of precipitation, there is often a
10 pretty good flow coming out of those caves, those two
11 particular caves in general.

12 JUDGE COLE: So the streams that are
13 flowing in these caves, does that generally reflect
14 something close to the water level in the stream beds?
15 Do you think that's the direction they're going or are
16 they going somewhere else?

17 MR. EABY: In these two particular caves,
18 the cave entrances are generally higher than the water
19 level in the stream, and the water from the cave
20 discharges down to the --

21 JUDGE COLE: So it's like a spring feeding
22 into the river?

23 MR. EABY: That's correct.

24 JUDGE COLE: All right, sir. Thank you.

25 (MR. NORRIS: In terms of the flooding in

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1 the caves and the flow from the caves and that sort
2 that of thing, I believe you've been given the, as
3 part of the documentation, the Shelton's cave survey
4 document where he describes the process of mapping
5 these caves, and on at least one day early in that
6 program, he does describe a --

7 MS. UTTAL: Judge, that's not an exhibit
8 as far as --

9 JUDGE COLE: I was going to say is that an
10 exhibit in the case?

11
12 MR. NORRIS: I don't --

13 MS. UTTAL: It's not an exhibit.

14 MR. NORRIS: It's not.

15 JUDGE COLE: I don't remember seeing that.

16 MR. NORRIS: Okay. Well, then you don't
17 have to --

18 JUDGE ROSENTHAL: Describe something to be
19 helpful --

20 MR. NORRIS: Well, he described being
21 unable to do cave sampling because the caves were
22 running full of water coming into the flood stage of
23 big creed, so these caves represent drainage areas
24 other than the streams that collect water --

25 JUDGE ABRAMSON: We accept the proposition

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1 that these caves can carry water.

2 JUDGE COLE: No. But I was going to say,
3 were they -- was the water getting into the cave from
4 the stream overflow or was it coming someplace else?

5 MR. NORRIS: No. It's coming from where
6 the cave gets its water and feeding into the stream.

7 DR. HENSHEL: You do have the Lewis et al
8 study which is the invertebrate cave fauna study that
9 was handed on JPG.

10 JUDGE COLE: That's an exhibit in the
11 case?

12 DR. HENSHEL: That is an exhibit in the
13 case and you do have that. So there is --

14 JUDGE ABRAMSON: Can you get the exhibit
15 number for us, Dr. Henshel?

16 DR. HENSHEL: -- some description.

17 JUDGE ABRAMSON: Get the exhibit number
18 for us, please?

19 JUDGE COLE: Easier to find if we had a
20 number.

21 JUDGE ABRAMSON: Yes. Just so we can
22 reference it. You can get it and give it to us.

23 DR. HENSHEL: Okay. Thank you.

24 JUDGE ABRAMSON: Let's pick up another
25 line of inquiry here.

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1 MS. UTTAL: Your Honor, Save the Valley
2 didn't give the staff a copy of their exhibits.

3 JUDGE ABRAMSON: Did not provide the staff
4 with a copy of their exhibits? Is that possible, Save
5 the Valley?

6 MR. MULLETT: We emailed them, absolutely
7 emailed them.

8 MS. UTTAL: You emailed them. You didn't
9 bring them to --

10 MR. MULLETT: Email --

11 MS. UTTAL: Did the --

12 JUDGE ABRAMSON: What were the
13 instructions?

14 MS. PARISH: It just said provide a copy
15 of the --

16 JUDGE ABRAMSON: It didn't say deliver
17 them in hand at the hearing?

18 MS. PARISH: No. It said parties should
19 provide electronic copies of there exhibits and
20 exhibit lists to the other parties as soon as
21 possible, at the very latest, the -- provided at the -
22 - hearing.

23 JUDGE ABRAMSON: Okay. Let's pick up
24 another line --

25 MS. PARISH: Physical copies are not

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1 required.

2 JUDGE ABRAMSON: Okay. Physical copies
3 are not required according to our rulings. Mr.
4 Norris, as I understand the process for development of
5 this site characterization, there's going to be some
6 initial well siting, and it's going to be staged in
7 from the initial well locations and initial stream
8 gauging and sampling. Then they would -- the Army
9 proposes to go decide what should be next. Is there
10 a flaw in that general concept? Would you propose
11 doing something other than building on your current
12 experience to develop what you should do next?

13 MR. NORRIS: I think building on your
14 experience to determine what to do next is
15 appropriate, but when you have a very limited time
16 period to characterize a very complex site, in order
17 to accomplish what needs to be done in five years, you
18 need to prioritize your sequence of collecting
19 experience in order to get the data that you need in
20 the optimum fashion.

21 And for instance, I have advocated that
22 stream surveys and gauging should have been part of
23 the process of installing the initial wells in order
24 to optimize the location of those wells, tying the
25 stream and the groundwater systems together and then

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1 build on that knowledge base to figure out where else
2 you need to put your wells in.

3 JUDGE ABRAMSON: And is your -- is there
4 some indication you have that they -- that the Army
5 will not use the information they get from the wells
6 and the stream gauging to decide where next to sample?

7 MR. NORRIS: Right now the evidence we
8 have is that they will do so if it is necessary to
9 characterize the site. Now that to me --

10 JUDGE ABRAMSON: And what else -- okay,
11 and I understand that. But if it is necessary to
12 characterize the site, to me as a lawyer, putting my
13 lawyer's hat instead of my scientist hat for a second,
14 says exactly what is required, is if it's necessary,
15 and it doesn't say they won't do it. It just simply
16 says when they're doing the testing, when it's
17 necessary to do something, they'll do it.

18 Now so put on your -- let's read it
19 explicitly hat and not quarrel with whether you think
20 they're going to do it whether it's necessary or not.
21 Tell me why you think that might not lead to or will
22 not lead to doing the things that are necessary?

23 MR. NORRIS: The collection of hydrologic
24 data from your wells, the collection of elevations,
25 not just stages from your stream gauges are absolutely

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1 necessary to characterize the site.

2 JUDGE ABRAMSON: Wait, wait. Okay. So
3 now let's hear from the Army. Are they -- do you
4 agree or disagree with that statement? Are they -- do
5 you need to collect both elevation and flow data from
6 your stream gauging, and if so, are you intending to
7 do it. And if not, why is not necessary?

8 MR. SNYDER: This is Steve Snyder. We are
9 intending to do it. It is valuable to do it. We have
10 stage data. We will survey those stage points and all
11 of that stage data becomes elevation data.

12 JUDGE ABRAMSON: Mr. Norris, if that's the
13 case, what is missing other than timing from your
14 perspective?

15 MR. NORRIS: It, in my mind, is not just
16 timing. Timing is absolutely critical with the
17 characterization of this site in a five-year period
18 and to acquire the knowledge base you need to know
19 what additional characterizations you then
20 subsequently need to collect. They've got a year's
21 worth of staging data. They now have wells in the
22 ground that they could have hydraulic conductivity
23 measurements taken on. They could have water
24 elevations to be correlating with stream elevations.
25 They could be doing the basic hydrogeology that will

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1 tell them how to get additional wells, if they're
2 needed, installed in time to assess that data in time
3 to finish an assessment and be ready with a plan in
4 five years.

5 JUDGE ABRAMSON: Have you done some sort
6 of event tree analysis that leads you to believe that
7 their plan is not under any circumstances going to
8 lead to a complete characterization at the end of five
9 years? It seems to me you're implying -- in fact,
10 you're really, in essence, explicitly stating that the
11 process that they're taking cannot lead to a
12 sufficient site characterization at the end of five
13 years. And to me, that tells me you've gone down
14 every possible event tree analysis figuring out if
15 they did this now, then they're going to have to do
16 that in three months in order to get this done in six
17 months, in order to five years out have a complete
18 plan. Is that the sort of analysis you've done?

19 MR. NORRIS: No. I worked more from the
20 hydrologic and hydrogeologic cycles that need to be
21 assessed in order to know whether you have, in fact,
22 a good characterization of the site. And you have to
23 --

24 JUDGE ABRAMSON: Cycles meaning time
25 period?

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1 MR. NORRIS: Time periods.

2 JUDGE ABRAMSON: Okay. Are those annual
3 cycles or are they quarterly cycles? What are the
4 cycles?

5 MR. NORRIS: They are no less than annual,
6 but they are not necessarily annual, because if you
7 have, for example, a year of unusual drought, then
8 that does not give you -- it's very valuable data, and
9 I would love to have typically a normal year, a wet
10 year and a drought year -- but if all you have
11 available in your final attempt to characterize the
12 site is a year's worth of data that's a drought year,
13 you don't have what it takes. You have to organize a
14 plan like this around the hydrologic cycles for the
15 express purpose of getting a sufficient variety of
16 data, hopefully more than once cycle, to give you
17 confidence in what your interpretation --

18 JUDGE ABRAMSON: Are the hydrologics
19 driven by meteorologic cycles?

20 MR. NORRIS: Yes.

21 JUDGE ABRAMSON: And do you know something
22 that I don't about our ability to predict when a
23 hundred-year flood's going to happen or when a five-
24 year flood's going to happen? I mean just because
25 it's a five-year flood doesn't mean it's going to

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1 happen once every five years near as I recall.

2 MR. NORRIS: No. That's absolutely
3 correct.

4 JUDGE ABRAMSON: So if you're going to
5 sample things over a year, you might have a hundred-
6 year flood, you might have a thousand-year flood, you
7 might have nothing more than a one-week flood? Is
8 that right?

9 MR. NORRIS: That's correct which is why
10 a single cycle, you want nothing less than a cycle,
11 but I don't recommend a program that's only going to
12 give you a cycle. I want -- if I've got five years to
13 characterize a complex site and to try to understand
14 that site enough that I'm comfortable projecting how
15 that thing is going to behave centuries down the road,
16 then I want as many multiple cycles on that site I
17 have to have --

18 JUDGE ABRAMSON: Okay. And I can --

19 MR. NORRIS: -- as many multiple cycles as
20 I --

21 JUDGE ABRAMSON: -- yes, we can appreciate
22 that. So in the ideal world, you'd have all your
23 instrumentation in at the end of the first month and
24 you'd measure things for five years, right? Then you
25 have the maximum possible -- well, you'd get it in the

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1 first day and then you measure them for five year less
2 a day, and then you maximize the information you get.

3 Are you concerned at all with the
4 inability of scientists to get onto this site to
5 measure things because of UXO? Do you think there's
6 a practical consideration here?

7 MR. NORRIS: There is definitely a
8 practical consideration that has to slow down the
9 process if you're moving into and collecting data from
10 the area from areas that have UXO.

11 JUDGE ABRAMSON: And if I understand you
12 correctly, all of you were telling us that we don't
13 know the -- how the ground is cracked up and
14 fragmented, what the flow paths are underground? Is
15 that correct?

16 MR. NORRIS: That basically is correct.
17 There is no detail there that allows us to consider
18 the site characteristics.

19 JUDGE ABRAMSON: So the logical extension
20 of that principle is that it's not possible on day one
21 to go in and sink a bunch of wells, because you don't
22 know where to sink them?

23 MR. NORRIS: That's correct. You have to
24 sequentially go in in a program that is designed to
25 identify for you as quickly as possibly those variety

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1 of features that you need to be able characterize.

2 JUDGE ABRAMSON: I understand that. Let
3 me ask the staff. Staff, you're in the mode here of
4 watching what the applicants do, what the licensee's
5 doing and trying to determine whether they're, in the
6 end, going to wind up with enough data to enable you
7 to decide whether they've adequately characterized the
8 site from a hydrogeologic point of view. Do you have
9 any discomfort over the time period that may be left
10 at the end after they've figured out where everything
11 goes, do sampling?

12 MR. PECKENPAUGH: My name is John
13 Peckenpough, NRC staff. And as a scientist, we always
14 have discomfort when we see the timeline approaching
15 and when we've got maybe three and half or four years
16 at most left, so we're concerned about that. But I
17 have another concern also about getting quality data.
18 And, if possible, I'd like to address that, too, but
19 I'll let -- I'll leave that up to you if you're
20 willing to listen to it.

21 JUDGE ABRAMSON: Please?

22 MR. PECKENPAUGH: Okay. It pertains to
23 the Save the Valley's concern that the Army would
24 initially go out and do either what's referred to as
25 low flow measurements on the stream or seepage runs

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1 along the stream to decide if they are gaining and
2 losing portions of the stream. And to be -- the
3 staff's initial position on this a few years ago was
4 that was a good idea. But as we evaluated things
5 further, we realized that there are some problems with
6 that, and one of the major problems is that there are
7 no gauges on the two streams that flow through the DU
8 area. The --

9 JUDGE ABRAMSON: And is it not practicable
10 to do -- to get gauges there because of the UXO?

11 MR. PECKENPAUGH: No. That's not the
12 reason. They just were never installed but that part
13 of the Army's program is that they, through the
14 encouragement and the request of the NRC, that they
15 increase the timeline or they -- we asked them to
16 install the stream gauges sooner than they had
17 initially planned to do that. And they did. They
18 were installed last -- September of 2006. And so for
19 the past year, they've been gathering stage
20 information, continuous stage information on these
21 seven streams, I believe, and two springs that flow
22 from caves along Big Creek.

23 JUDGE ABRAMSON: Do we have any idea of
24 what, as Mr. Norris puts it, the hydrogeologic cycle
25 has been during the period that they've had this in?

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1 Have we had a lot of big floods? Have we had dry?
2 What have we had?

3 MR. PECKENPAUGH: Well, eventually, you
4 can ask the Army, because they're -- they've had a
5 chance to look at the data, but just having visited
6 the site last September as well as June of this year
7 and then as late as yesterday, there's been a -- there
8 have been some rainfall events.

9 And Big Creek, and I assume to a certain
10 degree, Middle Fork Creek, which is to the south and
11 which is a much smaller stream in the DU area -- in
12 fact, Middle Fork Creek actually starts on the
13 Jefferson Proving Ground area whereas Big Creek starts
14 about six to seven miles, maybe eight miles up
15 gradient, up north -- but they're both relatively
16 small, fairly immature streams. And as you go further
17 west across the site, obviously, the channels get
18 deeper within the area and then outside of the site to
19 the west, they deepen some more as they turn
20 eventually southward and flow into the Ohio River.

21 So what I want to go back to is the
22 critical thing is that to do seepage or low flow
23 measurements, you have to have an idea of what the low
24 flow conditions are. And until approximately where
25 we're at right now, we don't -- we didn't really know

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1 what they were, because there was no flow measurements
2 ever performed on either of these streams. For
3 example, we were out there yesterday, and it was
4 difficult to tell if there was any flow in some cases.

5 JUDGE ABRAMSON: Is it your view that this
6 has taken an inordinately long time to get to this
7 stage where we've got -- we we're starting to get --
8 where we got the instrumentation in and started to get
9 the measurements?

10 MR. PECKENPAUGH: No. The normal
11 procedure to do -- is to gather a number of months of
12 this type of data so you can develop a rating curve,
13 and normally that would take a year, possibly longer
14 depending upon what the flow conditions have been.
15 And what the rating curve does is that takes a stage
16 value, an elevation and you're able to convert that
17 into a flow value, cubic feet per second or second
18 feet per day. And this is important.

19 And the way the Army does this is on a
20 monthly basis for the past year, they've been going
21 out and convecting, I'll say, gauging the streams,
22 doing a current meter analysis on the streams to see
23 what the flow is. They wade across the channel in
24 different places. They -- with this current meter,
25 they get the flow volume, and from that, you're able

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1 to calculate actually a flow volume for a stage and
2 then develop this rating curve over time.

3 And this lets you, in the future, you
4 don't have to do as -- you don't have to do the
5 current meter measurements as frequent, because you've
6 developed a rating curve. And all this is important
7 because it tells you what the flow volume is, the
8 amount of water that's flowing to an area in the
9 stream.

10 JUDGE ROSENTHAL: Let me ask you a global
11 question going to the relationship between the staff
12 and the Army. You've indicated you made suggestions
13 to the Army and they complied with them. Now I would
14 assume that the staff has a fairly good idea as to
15 what it wants to see at the end of the five-year
16 period in terms of a site characterization, as the
17 staff clearly wants to see something that it hopes
18 will enable it to approve a decommissioning plan. So
19 is the staff working on a, not a daily, on weekly or
20 a monthly basis with the Army seeing what the Army is
21 doing, make recommendations and all of this with the
22 staff having in mind what it wants to see in terms of
23 a site characterization in 2011? Is that a reasonable
24 way of describing the relationship between staff and
25 the Army?

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1 MR. PECKENPAUGH: Yes. It -- I would have
2 to say it isn't daily, but we do, on frequent
3 occasions, we have telephone conferences with them.
4 The project manager is more involved with them by, I
5 think, either on a weekly or a bi-weekly basis. And
6 on occasions, I've gone to the site to visit it. For
7 example, I went last September to see the installation
8 of the stream gauges and the one gauge in one the
9 caves. In the spring, I went to visit the
10 installation of some of the monitoring wells.

11 JUDGE ROSENTHAL: So I'm gathering from
12 what you said earlier that UXO was not an issue in this
13 specific area?

14 MR. PECKENPAUGH: No. I didn't say that.
15 And UXO is an issue. It's pretty prevalent in the
16 site and you have to be very careful. Basically, you
17 don't walk anywhere that hasn't been surveyed and
18 checked by the UXO experts, of which I'm not that type
19 of person.

20 JUDGE ROSENTHAL: That leads to this
21 question. I mean I go back in this case to the year
22 2000, and I recall sometime down the line when the
23 staff asked the -- or indicated that in order to
24 approve a decommissioning plan, there would have to be
25 a site characterization. My recollection is that the

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1 reason, at that time, that the Army did not pursue the
2 revised decommissioning plan but instead came up with
3 the application for this possession-only license was
4 that doing the characterization of the site would be
5 too dangerous for its personnel and for personnel of
6 its contractors.

7 Now obviously, at some point subsequently,
8 the Army had a change of mind in that regard, because
9 it's engaging in a site characterization. But I'm
10 wondering what -- I mean here it was several years ago
11 they weren't willing to conduct a site
12 characterization at all apparently, sought the POLA
13 because of the dangers, and now the site
14 characterization is being conducted.

15 I was just wondering what kind of a impact
16 is that UXO having, or the presence of it, on, really,
17 the ability to conduct a site characterization that
18 will, in fact, present a pretty good characterization,
19 if I may put it that way, of the site? I don't know
20 whether that's a question that should be directed or
21 the Army -- start with the Army.

22 MR. PECKENPAUGH: Obviously, the Army
23 should also answer that, too, but just from my
24 personal observation having visited the site four
25 times, the UXO does have an impact on where you can do

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1 some of the field work.

2 JUDGE ROSENTHAL: What's the -- what rare
3 the limitations?

4 JUDGE ABRAMSON: What's the nature of the
5 impact?

6 JUDGE ROSENTHAL: Yes, the limitations
7 that the presence of the UXO is having with respect to
8 the conduct of the site characterization? What is it
9 they can't do that if these munitions were not UXO and
10 you didn't have the explosive problem? What are the
11 things that they could do that you would insist,
12 perhaps, that should be done that cannot be done
13 because of the dangers stemming from the UXO?

14 MR. PECKENPAUGH: I think the -- one of
15 the Army contractors would like to discuss that.

16 JUDGE ABRAMSON: Let's hear it.

17 MR. SNYDER: Steve Snyder. I'm conducting
18 a similar study at the Alabama Army Ammunition Plant.
19 It's karst. It is heavily wooded, off of the roads.
20 I'm using the same techniques to locate wells on
21 fracture traces and using geophysics. On that site,
22 the only difference between this site and that site is
23 -- well, let me start over. I am drilling on the
24 roads. I'm doing my testing on the roads where, at
25 Jefferson Proving Ground, the corridors are cleared,

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1 generally cleared. We still have to have with us
2 experts to clear the areas before we do anything
3 intrusive.

4 At Alabama Army Ammunition Plant, I'm
5 working on the roads. Occasionally, I will go cross
6 country from road to road to walk a trace. I can't do
7 that easily at Jefferson Proving Ground. It would
8 take considerably longer, but the --

9 JUDGE ABRAMSON: How does that hinder your
10 efforts?

11 MR. SNYDER: It has not hindered my
12 efforts. Initially, when I was developing this
13 technique, I was concerned about being able to see
14 more of the site. As -- over the years, I am very
15 comfortable with staying on the roads and working from
16 that advantage point. I can actually see more terrain
17 from the roads because they're cleared. You get off
18 the roads, you're in the woods, you can't see much
19 anymore.

20 JUDGE ABRAMSON: Do you expect eventually
21 to need to sink wells that are not sinkable on the
22 roads, eventually have to do wells and stream gauging
23 and other things off the roads?

24 MR. SNYDER: I will say that at this
25 point, we don't anticipate it. We would first have to

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1 determine -- the purpose of all of this investigation
2 is to develop a site conceptual model. How is the
3 ground water moving? How does the surface water
4 interact with the ground water? How does the water in
5 general interact with the DU, and how is it
6 transported? We can determine all of those things
7 with our study using the roads, using the areas that
8 we have access to.

9 JUDGE ABRAMSON: And why is it do you
10 think that Save the Valley's expert, Mr. Norris,
11 thinks that you can't do it with just what you're
12 sinking from the roads? Or maybe I'll let Mr. Norris
13 tell us that, but first let's hear from you.

14 MR. SNYDER: I suspect that any plan that
15 we came up with --

16 JUDGE ABRAMSON: Let's not go down that
17 path.

18 MR. SNYDER: Okay.

19 JUDGE ABRAMSON: Let's not go down that
20 path. Give me some -- well, let's turn to Mr. Norris.
21 Mr. Norris, why do you think that they will need or
22 that they should have gone off road to sink additional
23 wells or for certain testing and what sort of testing
24 and why?

25 MR. NORRIS: The well locations that they

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1 are picking right now are using a combined technology
2 that can't identify the caves that we know real estate
3 there because they're visible and can be gone into.
4 The biggest cave on the JPG system is over 900 feet
5 long. It doesn't show up on their fracture trace. It
6 would never be, even if a road ran across it, would
7 never be something to penetrate with a well because
8 it's invisible to the technology that they're using.
9 That's why I have trouble with the combination of air
10 photography and EI implemented the way that they've
11 done it.

12 JUDGE ABRAMSON: So in your view, any
13 plan, any model that's based on wells that don't - any
14 model that does not incorporate these subterranean
15 flow paths of caves will be inaccurate in its modeling
16 of the interactions between surface waters and ground
17 waters?

18 MR. NORRIS: The program --
19 characterization program has to be able to identify
20 the major conduits, the conduits that are controlling
21 the hydrogeology on that site. Endeavor know that
22 near surface open caves rae not identifiable. There's
23 no reason --

24 JUDGE ABRAMSON: And in your view, they
25 are fundamental to the characterization of the flow

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1 patterns?

2 MR. NORRIS: Well, they, the ones that are
3 near surface and exposed are characterized because we
4 know where they are. We know where the water is
5 flowing through them. But the characterization
6 program doesn't see that. We see that because we walk
7 the streams.

8 JUDGE ABRAMSON: I'm sorry.

9 MR. NORRIS: The concern is caves --
10 analogous caves that are below stream level or back
11 away from the streams that we don't see visually with
12 our eyes, they are going to be no more visible than --

13 JUDGE ABRAMSON: Let's make sure I
14 understand you. You're saying that as far as you
15 know, the site characterization, the models that will
16 be built on the site characterization that the Army is
17 undertaking will account for the caves you already
18 know about. What we're worried about is inability to
19 detect caves we don't already know about, because the
20 testing program is not capable of detecting them. Is
21 that correct?

22 MR. NORRIS: That's correct.

23 JUDGE ABRAMSON: Okay. Mr. Snyder, what
24 about it? This is the sort of thing that might, might
25 lead to the plan -- an argument that the plan is

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1 incapable of satisfying its obligation at the end of
2 five years.

3 MR. SNYDER: The caves that we know about
4 that have been mapped on the site are above the
5 ground water table. They are not part of the ground
6 water system. They do collect water that seeps into
7 the ground either through sinkholes or through the
8 residual and collect into the caves, run out to the
9 ground surface as somewhat like springs to the stream.

10 Our electrical imaging technique that we
11 used to locate fractures that conduct ground water are
12 electrically conductive. That means that they're full
13 of moisture, they're full of water and clay. Solid
14 bedrock has a very low conductivity because there's
15 very little moisture. A fractured zone has high
16 conductivity because it's full of water. A cave is
17 full of air which has no conductivity, so obviously it
18 would not be detected by our method.

19 There really is no need to detect those
20 caves.

21 JUDGE ABRAMSON: Because?

22 MR. SNYDER: Because they're above the
23 water table. We know where they are. We are sampling
24 the water from those caves and the sediment from those
25 caves. They are -- they will be characterized as part

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1 of our field sampling.

2 JUDGE ABRAMSON: So caves that are above
3 the water table that you have not detected -- there
4 are caves above the water table that we -- that are
5 known and there must be some caves above the water
6 table that are not know. Is that accurate?

7 MR. SNYDER: That's likely.

8 JUDGE ABRAMSON: Okay. And for the caves
9 that are above the water table, what they serve to do
10 is to channel, if you will, the rain water into either
11 above ground flow paths or subterranean flow paths,
12 correct?

13 MR. SNYDER: Correct.

14 JUDGE ABRAMSON: There may be additional
15 above water table flow paths that you don't know about
16 and you're telling me that the electrical conductivity
17 measurements will not detect them because they have no
18 conductivity? Is that correct?

19 MR. SNYDER: That's correct.

20 JUDGE ABRAMSON: Okay. Do -- is it your
21 view that those are not material to determining the
22 ultimate flow of DU entrained in water offsite?

23 MR. SNYDER: It is not necessary to
24 measure every single pathway.

25 JUDGE ABRAMSON: Obviously. Do you think

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1 there are no material pathways at that -- of that type
2 that you haven't discovered or that your plan will not
3 discover?

4 MR. SNYDER: Well, I'm not sure I
5 understand your question. There are sufficient
6 pathway caves that we know about that we will sample.
7 Some of those caves are immediately under the DU area,
8 immediately under the high concentration areas. We
9 will sample those. They are the worse case. If those
10 caves are not carrying DU or do not show any influence
11 from the DU, then it's very unlikely that others will
12 whether we know --

13 JUDGE ABRAMSON: Okay. So that describe -
14 - that will enable you to determine how the DU gets
15 from the site down into the ground water, into the
16 under -- into the aquifers? Is --

17 JUDGE ROSENTHAL: I think this might be a
18 good time to take a break.

19 JUDGE ABRAMSON: Okay. That's fine. We
20 can take this up --

21 JUDGE ROSENTHAL: We'll take a 15 minute
22 break, and we'll resume at 3:15.

23 (Whereupon, off the record at 2:59 p.m.
24 and back on the record at 3:15 p.m.)

25 JUDGE ABRAMSON: On the record. Back to

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1 order, gentlemen.

2 JUDGE COLE: Just a couple of additional
3 questions. Getting back to trying to visualize the
4 state in my mind, can it be said that with the
5 exception of the -- Is it the Big River that
6 originates six miles north and east of the depleted
7 uranium site that all other surface waters that leave
8 the site originate on the site, the head waters of all
9 those exiting other than the Big River, originate on
10 the site or the Big Creek? Is that true?

11 JUDGE ABRAMSON: That's for Mr. Norris.

12 JUDGE COLE: Or for any of them.

13 MR. PECKENPAUGH: (Off microphone) My name
14 is Jon Peckenpough. I'll attempt to answer that at
15 least. I believe about --

16 (On microphone) My name is Jon
17 Peckenpough. I'll attempt to answer that and then
18 other can answer. If I remember right, I think there
19 are about six streams north and south across the site
20 and the only one that originates on the site is Middle
21 Fork Creek which is just in extreme part of the DU
22 area. All the others originate off the site.

23 JUDGE ABRAMSON: Let's talk about the DU
24 area though, just the DU area.

25 MR. PECKENPAUGH: Okay. Just in the DU

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1 area, there are only two streams and the Big Creek
2 originates offsite by six to eight miles or so.

3 JUDGE ABRAMSON: And the other one
4 originates?

5 MR. PECKENPAUGH: On the Jefferson Proving
6 Ground site but outside of the DU area.

7 JUDGE COLE: And how far outside and in
8 which direction?

9 MR. PECKENPAUGH: The interesting point
10 about Middle Fork Creek is it has several different
11 tributaries, I think about three different branches
12 that go together and from -- I'd have to ask. Maybe
13 less than a mile to the east, one of the tributaries
14 originates and there's about two miles --

15 JUDGE COLE: To the east?

16 MR. PECKENPAUGH: To the east of the DU
17 area. There's about two miles east of the DU area
18 until you get to the boundary.

19 JUDGE COLE: So the general flow of
20 surface water with respect to the DU site is in which
21 direction?

22 MR. PECKENPAUGH: Well, it would be kind
23 of --

24 JUDGE COLE: From east to west?

25 MR. PECKENPAUGH: Right. Kind of east to

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1 west to northeast to southwest, but it's --

2 JUDGE COLE: From northeast to southwest.

3 MR. PECKENPAUGH: Yes, but definitely east
4 to west. There's no question about that.

5 JUDGE COLE: All right, sir. Thank you.

6 Mr. Norris, you have some convictions
7 about the existence of deep karst networks in the area
8 and I'd like to know something about your foundation
9 for that view.

10 MR. NORRIS: Sure. There are several
11 lines of evidence that indicates the possibility and
12 the probability of the karst networks extending below
13 the surface drainage. First of all, one line of
14 evidence is that the visible above-water table caves
15 are not seen on their photos. They don't have a
16 fracture trace associated with their formation.

17 So they formed at some depth not in
18 response to dissolution coming down from the surface
19 and creating that karst feature. They formed in
20 subsurface and have been eroded up to nearly the
21 existing ground surface right now. In some cases,
22 their tops have collapsed and there will be a sinkhole
23 that ties into them, but they don't lie on fracture
24 traces that are the types of features that are being
25 observed or being drilled right now.

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1 If you look at the regional map, the caves
2 in the Silurian that are mapped west of the site are
3 mapped at the top of the Silurian outcrop. The
4 Silurian is an age of rock that builds across the
5 site. Within the DU area, those caves are
6 stratographically deeper. They're within the middle
7 of the Silurian and by the time you get to the next
8 drainage over Indian-Kentuck (phonetic), the Indian-
9 Kentuck drainage, those caves are mapped at being at
10 the bottom of the Silurian. So you have wherever the
11 Silurian is exposed as you move from west to east, the
12 caves systems are moving down stratographically
13 through the Silurian age rocks.

14 JUDGE ABRAMSON: Now when you say down
15 through the Silurian age, is it also topographically
16 down? That is, are they deeper on the east than they
17 are where they pass under the site so that they might
18 carry water west and east?

19 MR. NORRIS: The elevations of the mapped
20 caves east of the site are at a lower elevation than
21 the caves on the site. So, yes, there is the
22 potential for transport through sub watertable caves
23 from the site to the east even though the surface
24 drainage goes east to west and that obviously is one
25 of my primary concerns.

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1 JUDGE ABRAMSON: And does the aquifer --
2 For which way does the aquifer under the site
3 generally flow? West to east? Is that north to
4 south?

5 MR. NORRIS: In the very shallow area,
6 it's from shallow. From the plateau area in the
7 vicinity of the streams, it's going to tend to flow to
8 the streams. The caves that you see are emptying into
9 the streams.

10 JUDGE COLE: Which would be east to west
11 or east to north?

12 MR. NORRIS: Northeast to southwest.

13 JUDGE COLE: Northeast to southwest.

14 MR. NORRIS: The concern and the problem
15 when you get into karst areas is that once you get
16 below local stream level, once you get below the
17 watertable, then you have the potential for competing
18 pathways underground to alternative discharge points
19 and Big Creek has been described in multiple documents
20 on the site and by some of these witnesses'
21 conversationally as a place that's being a losing
22 stream. Middle Fork is at places being a losing
23 stream. That means that the water in that stream is
24 not being fed by groundwater. It is feeding
25 groundwater. It is going into groundwater and can

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1 discharge at the surface only at some other surface
2 water discharge point.

3 JUDGE ABRAMSON: Or can it carry it down
4 into a deeper aquifer?

5 MR. NORRIS: It can go to a deeper
6 aquifer. Ultimately, it's going to find its way to
7 the surface.

8 JUDGE ABRAMSON: But that could be 500
9 miles away or can it?

10 MR. NORRIS: Well no. I think the
11 furthest you can reasonably postulate would be the
12 Ohio River. I doubt that there are karst drainage
13 systems. I can't envision it being geologically
14 possible for a 500 mile away discharge. Ten or 15
15 miles away maybe.

16 JUDGE ABRAMSON: And how would one detect
17 the existence of these lower flow beds, deeper flow
18 beds?

19 MR. NORRIS: Well, first is identify the
20 places where you have surface water evidence that
21 something underneath you is taking water. So mapping
22 the losing reaches of the streams is a start point.

23 JUDGE ABRAMSON: And is that being done?

24 MR. NORRIS: Not yet. There is discussion
25 that this may be done at some point. Mr. Peckenpaugh

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1 was suggesting that they needed a year's worth of
2 gauging data to be able to determine when the stream
3 was flowing low. In order to make this kind of
4 survey, you need to make it during a low flow
5 conditions.

6 JUDGE ABRAMSON: Would you agree with
7 that?

8 MR. NORRIS: You do need to make during
9 low flow conditions, but you certainly don't need a
10 year's worth of data to know when the stream is
11 flowing low.

12 JUDGE ABRAMSON: Actually, all we're
13 interested in is is the stream losing water. Does it
14 need to flowing low to be losing water or you can't
15 detect it if it's at full flow?

16 MR. NORRIS: If it's flowing at a normal
17 or higher rate, you may not be able to detect it. If
18 it's flowing at low rates, you can do it. You
19 identify -- I mean, were it my program the stream
20 surveys would have been the first step.

21 JUDGE ABRAMSON: Okay, but they're now
22 going on.

23 MR. NORRIS: And identify where the stream
24 is losing water, then do a die trace test where you
25 put die in the water going in and see if it's coming

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1 out the stream a hundred yards further away or a half
2 a mile further away or two miles further away to be
3 sure that it isn't the stream itself or the valley
4 that the stream is on that is causing that. But then
5 you start at that point and you are -- literally you
6 have a recharge point in some kind of a conduit at
7 that point and you start mapping away to find out
8 where that water is going.

9 JUDGE ABRAMSON: Okay. So let's hears
10 from Mr. Snyder now. What are you going to do once
11 you determine that there are what they call losing
12 streams? I've heard of losers, but this is a new
13 kind.

14 MR. SNYDER: Yes, these are the big
15 losers.

16 We have not determined that there are
17 losing streams. That will be part of our
18 characterization.

19 JUDGE ABRAMSON: It is part of what you're
20 going to do.

21 MR. SNYDER: Certainly.

22 JUDGE ABRAMSON: And when -- And if you
23 find losing streams, then what? Is it your plan to
24 figure out where it went?

25 MR. SNYDER: If it is necessary to

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1 characterize the site and the migration of DU, yes.

2 JUDGE ABRAMSON: And how would you
3 determine whether it's necessary to determine the
4 migration of DU?

5 MR. SNYDER: The entire program that
6 proves out and develops our site conceptual model
7 starts with DU in the soil. Our program looks at the
8 migration of DU through surface water through the
9 soils and into the groundwater through the caves into
10 the surface water over land into the surface water.
11 We're going to measure sediments to determine if it's
12 migrating with soil particles or as particulate.
13 We're measuring surface water to determine if it
14 migrates with surface water and we are looking at cave
15 streams, migrating, measuring concentrations in cave
16 streams and deposits from cave streams to determine if
17 it migrates in that interim zone above the watertable
18 and then wells in fracture zones. We'll look at
19 groundwater flow.

20 JUDGE ABRAMSON: So if you find DU in the
21 streams near the area where they're losing flow, then
22 what?

23 MR. SNYDER: And if they are losing flow.

24 JUDGE ABRAMSON: And if they are losing --
25 Yes, let's assume that they are -- Let's assume you

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1 find they're losing flow at a rate enough to be
2 material and there is DU in the stream at that area.
3 Then what?

4 MR. SNYDER: Then we would develop a study
5 that would determine where it's going. There is a
6 deeper -- In that case, there would be a pathway that
7 we would need to identify and characterize.

8 JUDGE COLE: With respect to --

9 MR. NORRIS: Can I?

10 JUDGE COLE: I'm sorry. Go ahead.

11 MR. NORRIS: Can I comment on just one
12 part of what he said?

13 JUDGE ABRAMSON: Sure.

14 MR. NORRIS: Because it is a measure, I
15 think, of the cart before the horse problem and a
16 failure to understand that sequencing does matter. If
17 you're only going to look for where that conduit flows
18 assuming you identify a losing reach of the stream, if
19 the prerequisite for mapping where that conduit flows
20 is that you have DU in the surface water of the
21 stream, you are saying that that is the only place
22 that that conduit can receive DU. If that conduit is
23 starting at that stream, let's say it starts under Big
24 Creek and that conduit does go to the east and it goes
25 from Big Creek under the DU area and discharges, then

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1 there is the potential for that conduit to be picking
2 up DU under the entire DU area where it's traveling
3 underneath. Just because it's taking water at Big
4 Creek does not mean that that's the only place it's
5 taking water and that's the only water that's feeding
6 it.

7 So the sequencing matters. You need to
8 know where the conduits are flowing, what they're
9 flowing underneath and then worry about where the DU
10 is on the ground.

11 JUDGE ABRAMSON: In essence, what we're
12 concerned with is does the DU get offsite and how and
13 your proposition here is that the stream that the
14 conduit might have been identified by the fact that
15 the stream was losing water, but that the conduit may
16 be getting its DU by direct seepage through the site
17 or some other karst that's taking it down on the site
18 itself on the DU portion of the site. Is that
19 correct?

20 MR. NORRIS: Yes.

21 JUDGE ABRAMSON: Mr. Snyder.

22 MR. SNYDER: It's difficult to
23 characterize our whole procedure through these
24 questions. So let me back up just a little bit. The
25 entire program includes putting wells in fractured,

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1 controlled flow paths. Those flow paths are the same
2 paths that we're talking about that may be receiving
3 stream water and causing a losing stream.

4 JUDGE ABRAMSON: But isn't that only the
5 case if you happen with your well hit one of those
6 underground pathways? Is it not possible that there's
7 no well through one of these underground pathways or
8 is this hit or miss as you will?

9 MR. SNYDER: There are multiple pathways.
10 We certainly will not sample them all.

11 JUDGE ABRAMSON: I understand that. Do
12 you think -- What gives you comfort you're going to
13 hit the important ones or you're going to find the
14 important ones?

15 MR. SNYDER: The biggest ones will be
16 visible from aerial photos and detected by the
17 electrical imaging. We have placed or plan to place
18 20 wells on 10 of those locations or 18 wells on nine
19 of those locations. It's very representative of a
20 site. The area is surrounded, the DU area is
21 surrounded, by wells on fracture-controlled features.

22 JUDGE ABRAMSON: So you have wells
23 sampling the entire periphery of the DU portion of the
24 site?

25 MR. SNYDER: Yes.

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1 JUDGE COLE: Looking at the overall area
2 again, we have the rather large Ohio River in the
3 general area and I'm sure that local geologists have
4 a pretty good idea what aquifers exist in the general
5 area of the proving grounds. What would be the
6 general direction of groundwater flow with respect to
7 the site? Do you have any idea? Do you have any
8 knowledge of that?

9 MR. SNYDER: Yes. In general, water is
10 flowing to the Ohio River --

11 JUDGE COLE: Okay. But I --

12 MR. SNYDER: -- at the deepest point. As
13 you move further up, the flow is controlled by smaller
14 and smaller streams. So through the site, there is a
15 component of groundwater that flows to Big Creek that
16 flows through the site. How large a component, we
17 have not determined yet. That will be determined by
18 our stage measurements. One of the important that
19 we're going to gain from our surface water stage
20 measurements is how much of that stream is made up of
21 groundwater and how much of it is made up of surface
22 water. We can divide that by looking at the character
23 of that graph.

24 JUDGE COLE: So with respect to this
25 current site, would it be safe to say that the general

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1 direction of overall groundwater and that includes
2 most of the aquifers underneath if there are multiple
3 aquifers would be towards the Ohio River, it being a
4 large source of --

5 MR. SNYDER: Very close to Big Creek,
6 migration would be toward Big Creek. So on the north
7 side of Big Creek, it would be in a northwesterly
8 direction. On the south side of Big Creek, it would
9 be a southeasterly direction.

10 JUDGE COLE: All right, sir.

11 MR. SNYDER: And that to a lesser degree
12 works for the other two streams that cross.

13 JUDGE COLE: I'm just thinking about maybe
14 based upon what we know about the general direction of
15 groundwater flow, what might be the prediction of any
16 underground parsed systems and could we make any
17 predictions having some knowledge of the general
18 groundwater flow directions?

19 MR. SNYDER: I think it's preliminary to
20 do that. The reason that we placed wells where we did
21 was to determine how active is the karst, how deep is
22 it. I think a lot of the opinions expressed earlier
23 are premature. We do not know the depth of karst at
24 this site. We know there are shallow caves. We know
25 in some cases those shallow caves receive some water.

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1 There are streams in them. So they are very close to
2 the watertable.

3 Incidentally, when I described my electrical
4 imaging method not being able to detect caves, I was
5 talking about dry caves. The two caves that carry
6 water that we are measuring, we did detect those caves
7 with our electrical imaging. Those are wet caves and
8 they probably have fractures below them that we were
9 able to detect. They showed up in our electrical
10 imaging as big targets.

11 JUDGE COLE: Now is this continuous
12 measurement so that when there's a storm or rainfall
13 your electrical imaging would now detect things that
14 had been dry that are now carrying water?

15 MR. SNYDER: No, the electrical imaging
16 was a survey that was done over a period of weeks. It
17 was a one time --

18 JUDGE COLE: So you picked up what was wet
19 there.

20 MR. SNYDER: A one time measurement, yes.

21 JUDGE ABRAMSON: I think that --

22 JUDGE ROSENTHAL: I think that -- Is there
23 anything you want to add before we excuse you?

24 JUDGE ABRAMSON: That's not already in the
25 reading record.

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1 (Laughter.)

2 JUDGE ROSENTHAL: Yes.

3 (Off the record comment.)

4 MR. PECKENPAUGH: My name is Jon
5 Peckenpough. I'd like to just state that I have a
6 different position than what Mr. Norris has on the
7 likelihood that there may be movement of groundwater
8 towards the east. Earlier he discussed, I think,
9 what's referred to either as a Kentucky-Indiana creek
10 area. Maybe it's Indiana Creek, Indiana-Kentucky
11 Creek. But from my evaluation of that site, it's
12 significantly different. It's to the east of the
13 Jefferson Proving Ground and that's stream, whatever
14 its name is, flow pretty much north-south towards the
15 Ohio River and it is at a deeper elevation or a lower
16 elevation.

17 But it also happens to flow through the
18 Maquoketa shale formation. It's an older formation
19 than what we see near the surface at Jefferson Proving
20 Ground, older than the formation where we see the
21 karst features. And I think in part what we're seeing
22 there is that there's a Cincinnati Ridge or Arch and
23 the western limb of that dips into this area and what
24 we're seeing is that we're getting erosion along this
25 anticline and we're getting the old rock that's closer

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1 to the surface to the east of us and it erodes more
2 rapidly than what the limestone does. So that's one
3 reason it's deeper and it has a significantly
4 different trend. It's trending north-south, whereas
5 when you get into Jefferson Proving Ground, the rivers
6 along the ones in Jefferson Proving Ground, all six of
7 them, pretty much flow northeast to southwest across
8 the site, obviously with some meanders that are joint
9 controlled.

10 If you also look at the bedding patterns
11 within this area, that gives you an idea, kind of
12 controls to a certain degree the groundwater flow
13 direction and within the Jefferson Proving Ground area
14 the Silurian Devonian rocks are sloping towards the
15 west. So my assessment is that the groundwater in
16 this area although it's somewhat premature, I have --
17 I should state that I've developed a conceptual site
18 model. I have alternative conceptual site models that
19 I'm considering. But at this point, my belief is that
20 the shallow areas where we see the karst features and
21 that as you go deeper into the limestone, there are
22 definitely fractures. There is definitely bedding.

23 But at this point, I don't -- There is no
24 evidence that I have seen that there are deeper karst
25 features. One reason I feel this at this point is

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1 based on the drilling that the Army has already done.
2 They've put in wells at six different locations and
3 having visited the site in June, I had a chance to
4 look at one of those logs. I've also had
5 conversations with Todd Eaby about some of the results
6 or possibly it may have been Mr. Snyder.

7 But what they're seeing in the logs is as
8 you go deeper in the bedrock it gets denser. It gets
9 tighter. There are less fractures and there is more
10 shale units and so forth. So you're not inclined to
11 have as high a permeability as you go deeper into the
12 bedrock. And what hasn't been pointed out in the
13 discussion today but what has been pointed out in our
14 previous written testimony is that they have bedrock
15 wells, approximately a shallow one about 50 feet below
16 the surface and a deeper one that may go down to 120
17 feet.

18 And at this point, another further point
19 is that to get the enlargement of these fractures that
20 form the karst features, you have to have energy
21 dissipation. You have to have flow from a higher
22 elevation to a lower elevation and what's controlling
23 that with the shallow karst features is Big Creek and
24 Middle Fork Creek. They're the base flow of these
25 features and what I haven't seen is what's -- at this

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1 point haven't seen what would control the development
2 of larger karst features at a lower elevation. I
3 don't see what the base flow is.

4 So at this point, my conceptual side model
5 is significantly different than what Mr. Norris has,
6 but at this point, I'm also pointing out that I'm open
7 to alternative conceptual site models. And as the
8 Army drills the additional four monitoring models that
9 they have planned later this fall, hopefully that will
10 provide some more information on that.

11 JUDGE ABRAMSON: Are these wells that have
12 been drilled or have been planned to be drilled deep
13 enough that they would detect relevant deep karst?

14 MR. PECKENPAUGH: I could answer that but
15 I think it may be better to have the Army answer it
16 because they're more familiar with what's going on.

17 JUDGE ABRAMSON: All right. Mr. Snyder.

18 MR. PECKENPAUGH: Or maybe Todd.

19 JUDGE ABRAMSON: Okay. Todd. Mr. Eaby.

20 MR. EABY: The wells that we have drilled
21 so far are significantly deeper than any of the other
22 monitoring wells that have been installed out at the
23 JPG DU impact area and we have them as deep as, I'm
24 trying to go off the top of my head, around 140 feet
25 and what Mr. Peckenpaugh had indicated is correct that

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1 as we go deeper it appears that permeability decreases
2 and the rock gets tighter and more dense and that
3 we're not seeing, you know, a development of karst
4 down that deep.

5 JUDGE ABRAMSON: And from a geography of
6 the area, is there reason to believe that the wells
7 you have drilled are representative of the subsurface
8 soils and rock formations or is it possible there are
9 material deviations from what you're seeing?

10 MR. EABY: I think that they appear to be
11 representative of the soils and rock that would be in
12 the area.

13 JUDGE ROSENTHAL: Mr. Norris, do you have
14 a brief response to Mr. Peckenpaugh?

15 MR. NORRIS: One aspect to be remembered
16 is that the wells that have been installed as pointed
17 out by Mr. Snyder, all wells were selected based upon
18 the co-existence of a fracture trace that was visible
19 on the ground surface and an electrical resistivity
20 anomaly.

21 The caves that are on the system when they
22 have water in it, Mr. Snyder shared with us, do have
23 an electrical response but they do not have an aerial
24 photo fracture trace response. That means that the
25 wells that are identified are looking at features that

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1 may very well be karst (phonetic) features but they
2 are a different type of karst feature than the ones
3 that form the visible caves and to drill for more
4 wells, on the basis of fracture traces and electrical
5 resistivity along the roads is going to be sampling
6 the same types of features but not the types of
7 features that we see that they aren't --

8 JUDGE ABRAMSON: And how, Mr. Norris,
9 would you propose that they identify appropriate
10 drilling locations other than what they're currently
11 doing?

12 MR. NORRIS: I would use two geophysical
13 techniques, an electrical technique run on a grid
14 system and a seismic technique. They look for
15 entirely different physical properties and will show
16 things like cave systems if you use a high frequency
17 geophysical technique.

18 JUDGE ABRAMSON: And I recall something
19 like this in the written testimony. Do you want to
20 add anything that will help us understand that and
21 then we'll ask Mr. Snyder to tell us what his view of
22 what we've seen in the written testimony is?

23 MR. NORRIS: The written testimony had
24 some exchanges about the use of ground penetrating
25 radar. And we do differ in terms of our belief of

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1 what the ground penetrating radar will or won't show
2 but for the deeper karst features that are below
3 stream level, 50, 60 feet below ground surface, I
4 would concur with them, the ground penetrating radar
5 won't see those. It may see shallow systems, shallow
6 -- saturated cave shallower than that, but for the
7 deeper ones I would use seismic rather than ground
8 penetrating radar.

9 JUDGE ABRAMSON: And what about what Mr.
10 Eaby advised us he's finding from the wells that they
11 have sunk that soils and the rock gets denser as you
12 go down so that the likelihood of significant karst
13 very deep is reduced. Do you agree with that or do
14 you think that the wells are not indicative or that
15 you can't draw a conclusion? Tell me what you think.

16 MR. NORRIS: Well, first of all, as a
17 general rule that is what you would expect to see is
18 that fewer fractures, I mean that's a normal sequence
19 with or without karst. But the observations that
20 they're reporting from their wells are a description
21 of the features that they drilled which are the ones
22 that are visible on air photos as well as having
23 electrical survey.

24 JUDGE ABRAMSON: Now, would you think that
25 those -- now, they're starting on a fracture, right?

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1 MR. NORRIS: Yes.

2 JUDGE ABRAMSON: And they've got
3 concurrence of the fracture and the electrical
4 indicators. Would you expect if they drilled
5 someplace that didn't have a fracture that they would
6 find things not getting more dense as you went deeper?

7 MR. NORRIS: Well, that is exactly what
8 they would find if they drilled at places where there
9 are caves because there aren't fractures where here
10 are caves and yet there are big open voids.

11 JUDGE ABRAMSON: How would one -- so
12 you're suggesting that the only way to find these big
13 flow pads which would be caves which aren't carrying
14 water at the moment but which are deep, would be to
15 use a deep seismic.

16 MR. NORRIS: Well, actually, it would be
17 a relatively shallow seismic program for --

18 JUDGE ABRAMSON: Yeah, compared to oil
19 well.

20 MR. NORRIS: -- compared to a lot of them,
21 but the important thing to understand is that the
22 fracture controlled karst features are developed and
23 are driven by surface infiltration of water. Regional
24 karst systems aren't necessarily developed from --

25 JUDGE ABRAMSON: Yeah, we understood that

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1 from your earlier discussion.

2 MR. NORRIS: Yeah.

3 MR. PASTORICK: May I have the floor for
4 a moment? I was just wondering, are we done with that
5 line?

6 JUDGE ABRAMSON: Carry on, yes.

7 MR. PASTORICK: I'm Jim Pastorick and I'm
8 STV's Save the Valleys UXO technical consultant, and
9 I've heard UXO mentioned a couple of times today
10 already. I haven't gotten any direct questions from
11 the judges but I came here all the way from
12 Washington, DC and I didn't want to leave without
13 saying something. I agree, my recollection of the
14 project is very similar to Judge Rosenthal's. In the
15 beginning, there was going to be no investigation in
16 the DU area because it was too dangerous to go into it
17 because of UXO. And that was when Save the Valley
18 came in and brought me into the project. And they
19 said, "Well, give us an opinion, is that correct"?
20 And my opinion is the same then as it was no, it's not
21 correct, and when I saw that the Army changed their
22 opinion and said, "Oh, okay, we are going to
23 characterize the DU area", I said, "Oh, good, my job
24 is done. I have nothing more to add here".

25 But however, it keeps coming up from time

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1 to time that we can't do this because of UXO, we can't
2 do that because of UXO.

3 JUDGE ABRAMSON: Well, let's stop right
4 now. I think we heard from the Army and from the
5 staff, at least from Mr. Snyder, that the UXO isn't
6 impeding or altering or minimizing his plan at all
7 because he can get what he wants from going down the
8 road. Is that correct, Mr. Snyder?

9 MR. SNYDER: (Inaudible)

10 JUDGE ROSENTHAL: Well, let me ask this.

11 JUDGE ABRAMSON: Let the record reflect
12 that Mr. Snyder said, "Yes, it is".

13 JUDGE ROSENTHAL: Is there any aspect at
14 all of the site characterization activities that is
15 being adversely impacted by the presence of UXO or is
16 this stage of the game so far as the Army is
17 concerned, there is no problem arising from the UXO.
18 They're able to do everything that they would be doing
19 were there no UXOs on site? That's the question. I
20 thought the answer to that was that the UXO is in
21 effect a no, never mind, that they are able to do --
22 accomplish whatever they are seeking to accomplish
23 notwithstanding the fact that there are UXOs on site.
24 Now, I want to be absolutely clear on that.

25 MR. SNYDER: We have certainly had to

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1 consider the presence of UXO as we designed our study.
2 I have no -- there is not point in the hydrogeologic
3 survey that UXO does anything but slow us down at this
4 point. I admit that we are not building roads, new
5 roads through the DU area off of existing roads. I
6 don't have a need to do that for investigation and
7 don't foresee that.

8 JUDGE ROSENTHAL: So when the Army
9 announced that in 2000 whatever it was, that it
10 couldn't conduct a site characterization, a site
11 characterization as called for by the staff,
12 therefore, had requested the possession only license,
13 that that was based upon erroneous evaluation of the
14 impacts of the UXO?

15 MR. SNYDER: I wasn't involved in 2000.

16 JUDGE ROSENTHAL: But there's been a 180
17 degree turn on that, wouldn't you say, from what
18 you're now telling us, yes, you have to consider the
19 UXOs but I point of fact, all it's done is slow you
20 down?

21 MR. SNYDER: Well, I think a lot of it was
22 the Army determining what the staff required of them
23 with respect to the evaluation and over time figuring
24 out how to accomplish it.

25 JUDGE ROSENTHAL: Well, in that

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1 circumstance, Mr. Pastorick, I mean, what we're being
2 told now is that the UXOs is slowing the Army down but
3 it's not having an adverse impact upon this
4 accomplishment of this objection.

5 JUDGE ABRAMSON: And so thank you for
6 coming.

7 MR. PASTORICK: Thank you. I agree with
8 that. It shouldn't have an adverse impact.

9 JUDGE ROSENTHAL: Thank you. I think we
10 can now move onto Panel Number 3. If there are
11 witnesses on Panel Number 3 that have not been sworn
12 in, would they so indicate by raising their hand.
13 Okay, would those witnesses in Panel 3 that have not
14 been sworn, if you'd raise your right hand.

15 MS. SILVA: Your Honors, we have a
16 witness, John Peckenpaugh, who is not listed on Panel
17 3 but he has provided testimony on the sampling
18 method.

19 JUDGE ROSENTHAL: Okay, he is now listed
20 on Panel 3. All right, that's perfectly fine. He's
21 already been sworn in.

22 MS. SILVA: Yes.

23 JUDGE ROSENTHAL: All right, if these
24 witnesses will raise their right hand.

25 (Witnesses sworn.)

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1 JUDGE ROSENTHAL: Thank you. Okay, the
2 panel can take your seats.

3 DR. HENSHEL: I'm not on this panel but I
4 can give answers --

5 JUDGE ROSENTHAL: Yes, this would be a
6 good time to give that.

7 JUDGE ABRAMSON: Yes, terrific, thank you.
8 And thank you for your extra work. The question that
9 we asked -- while we're waiting for your missing
10 person, we won't file a missing person's report yet,
11 Dr. Henshel, we had asked you what happens to deer
12 meat that's ingested by humans and the DU that's in
13 it? What percentage gets retained in the human body
14 and how long does it stay?

15 DR. HENSHEL: Okay, so we have two issues.
16 We have short-term and we have long-term. And the net
17 ingestion of DU in whatever form and this is coming
18 from the Royal Society report and their evaluation of
19 the literature.

20 JUDGE ABRAMSON: Give us a cite to that
21 report, please, for the record. Is it already cited
22 as a reference?

23 DR. HENSHEL: Yes, it's already part of
24 the record.

25 JUDGE ABRAMSON: Okay, fine, do you want

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1 to give us the reference then?

2 DR. HENSHEL: So ingestion --

3 JUDGE ABRAMSON: Hang on just a second,
4 let's get a reference number so we know what we're
5 talking about.

6 MR. ANAGNOSTOPOULOS: I'll get it for you.

7 JUDGE ABRAMSON: Okay, thank you.
8 Reference number, exhibit number, is there an exhibit
9 number to which it's a reference?

10 DR. HENSHEL: Okay, so -- this is part of
11 the disclosures again, but not an exhibit, per se.

12 JUDGE ABRAMSON: It's a disclosure but not
13 an exhibit, so it's not in the record. So let's get
14 a reference number. Give us the citation to the
15 reference, just read that into the record.

16 DR. HENSHEL: March 2002 health hazards of
17 depleted uranium munitions -- well, this is Part 2,
18 but I was using Part 1 for what I was --

19 JUDGE ABRAMSON: And who is the published
20 -- where does it come from?

21 DR. HENSHEL: It comes from --

22 JUDGE ABRAMSON: It doesn't sound like a
23 complete cite to me. If you were citing that in an
24 academic article, that wouldn't work.

25 DR. HENSHEL: You're right, it doesn't.

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1 Okay, Health Hazards of Depleted Uranium Munitions by
2 the Royal Society in Britain and the citation is --
3 sorry, I'm leaving through it. It's on the Royal
4 Society website which is www.royalsoc.ac.uk. I'm
5 trying to find the proper reference number.

6 JUDGE ABRAMSON: Mr. Mullett, let's find
7 the document and add it to the record, and let's go on
8 with this. Let's hear from Dr. Henshel, so we can
9 move on with the proceeding.

10 DR. HENSHEL: Thank you. Okay, so in
11 different places, the other place that I've gotten
12 information from is NIAASH though they mostly give you
13 inhalation information. Ingestion range of what is
14 retained ultimately in the kidney, which is long-term
15 is estimated from 0.2 to two percent of that which is
16 ingested. That is only --

17 JUDGE ABRAMSON: 0.2 to two percent of
18 what's ingested.

19 DR. HENSHEL: Ends up in the kidney, long-
20 term.

21 JUDGE ABRAMSON: Stays in the kidney long-
22 term.

23 DR. HENSHEL: 0.2 percent on that low end
24 approximately the same amount goes into bone and about
25 half of that will be short-term in the liver. About

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1 the same amount of that will be shorter term in the
2 upper intestine, about two to three times that will be
3 in the lower intestine and about twice that will be in
4 the colon. Those are all short term on the way out.

5 JUDGE ABRAMSON: Okay, and I assume from
6 that somebody could calculate the dose to the human
7 based on how many pico curies of radiation you're
8 finding in the deer meat.

9 DR. HENSHEL: Right, and just for a
10 comment for the inhalation pathway, it's up to 90
11 percent retained and stays in the lungs.

12 DR. RIDGE: If I could just follow up on
13 that --

14 JUDGE ABRAMSON: Thanks very much, Dr.
15 Henshel.

16 DR. RIDGE: This is Christianne Ridge. In
17 my testimony actually, I did a much simpler
18 calculation but there is federal guidance in which the
19 dose model is already completed and there's federal
20 guidance that allows you to take essentially an amount
21 that's ingested and translate that into a dose and I
22 did a relatively simple calculation in my testimony
23 that reflects that result.

24 JUDGE ABRAMSON: So in you're -- just help
25 me out so I don't have to go wade through all this.

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1 DR. RIDGE: Certainly.

2 JUDGE ABRAMSON: In your testimony you
3 assume that they had ingested x pounds of deer meat
4 per year or --

5 DR. RIDGE: Exactly.

6 JUDGE ABRAMSON: -- over their lifetime?

7 DR. RIDGE: I calculated it at an annual
8 dose.

9 JUDGE ABRAMSON: An annual dose. And how
10 did that -- and that's based on what's been measured
11 as uranium in the deer meat, what the samples have
12 shown?

13 DR. RIDGE: Yes, in -- and I had to make
14 some assumptions to make that, so let me just tell you
15 what the assumptions were. I took from the deer study
16 the highest amount of uranium that was measured in
17 muscle.

18 JUDGE ABRAMSON: Okay, yes.

19 DR. RIDGE: So the highest uranium. I
20 assumed that a person would consume -- it's in my
21 testimony but essentially I took the 50th percentile
22 amount of beef that an American consumes in a year.

23 JUDGE ABRAMSON: Right.

24 DR. RIDGE: Added it to the 50th
25 percentile of chicken that an American eats in a year.

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1 I assumed -- this is just to get a ballpark because I
2 don't know how much deer an American consumes a year.
3 I assumed that a person ate -- replaced all of the
4 beef and chicken in their diet with deer meat. I
5 believe that --

6 JUDGE ABRAMSON: This is a real hunter.

7 (Laughter)

8 DR. RIDGE: This was in essence to find
9 out how --

10 JUDGE ABRAMSON: Yeah, this is in your
11 written testimony, right, but that's okay, Alan, I
12 want to hear this number.

13 DR. RIDGE: Well, it seemed to be --

14 JUDGE ABRAMSON: Yeah, please keep going.

15 DR. RIDGE: So the -- and using the
16 federal guidance, it's an exhibit, it's commonly
17 referred to as Federal Guidance Document Number 11.
18 And these dose models are already done and they
19 provide these dose conversions factors. And the punch
20 line of that is .27 millieme per year, if you make
21 that assumption. That's actually too many significant
22 digits because there's so many assumptions but less
23 than a millirem per year.

24 JUDGE ABRAMSON: Less than a millirem per
25 year and that's assuming they've replaced all of the

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1 beef and all the chicken in their diet with deer meat?

2 DR. RIDGE: All of the beef and all of the
3 chicken in their diet with deer meat and I used the
4 highest concentration of uranium that was measured
5 into your muscle because that's the part, I assumed,
6 someone to eat. And --

7 JUDGE ABRAMSON: Okay, so less than a
8 Millie per year and what is our TEDE guideline?

9 DR. RIDGE: Decommissioning, 25 millie per
10 year.

11 JUDGE ABRAMSON: Per year, thank you,
12 that's very helpful.

13 JUDGE COLE: Just a couple of questions;
14 with respect to sample, a lot of questions about the
15 size of samples, the number of samples and how you
16 measure things in the sample, and a general question
17 about what's been recurring all along is how do you
18 measure the quantity of depleted uranium in the
19 samples you collect and I don't think that's really
20 been settled yet. And I'd like somebody to tell me
21 why that hasn't been settled. There's some size
22 samples, statistical liability of the sample, how you
23 differentiate the depleted uranium present in a
24 measurement from the natural uranium and the answer
25 being principally, "Well, we use the standard

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1 technique and the concentration of uranium in there is
2 at the detectable limit and very few, if any of these
3 samples, we found depleted uranium." Now, is that the
4 end of the story or how do we solve that problem and
5 we could be satisfied that is or is not the solution
6 to the problem?

7 MR. ANAGNOSTOPOULOS: This is
8 Anagnostopoulos. I'll start off, I guess. I was sort
9 of eluding to that in Panel 1 and again, to me the
10 lynchpin of all of this argument is really not is
11 there DU present in the sample, but what is the level
12 of total uranium? And if the total uranium seems to
13 be elevated over what you expect to see in background,
14 then we would start looking at okay, what is that
15 from? Is that a variation in the background? Is that
16 an anomaly? Is that a seam, is that something, again
17 from natural sources or are we now starting to see a
18 contribution from DU? And we have seen routinely from
19 the SEG characterization data when they went to areas
20 where there is depleted uranium and used the existing
21 analytical techniques, alpha spectroscopy, normal
22 sample sizes, commercial laboratory, they are able to
23 identify that depleted uranium is present in that
24 sample.

25 JUDGE ABRAMSON: And that's in soil

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1 samples, right?

2 MR. ANAGNOSTOPOULOS: That's in soil
3 samples. That's also in root wash water as well.

4 JUDGE ABRAMSON: Okay, now let's talk
5 about the deer which seems to be where the problem is.
6 In the deer meat samples, you're at the level of
7 detection in the instrumentation generally, except
8 with one exception; is that correct?

9 MR. ANAGNOSTOPOULOS: Correct.

10 JUDGE ABRAMSON: So that to me -- after
11 all, what we're concerned about is the pathway to the
12 human population because our agency's regulations
13 govern what the human exposure is. So we've
14 identified the deer as the most -- or the Army -- I
15 shouldn't say we. The Army has -- argues it's
16 identified the deer as the most likely pathway to the
17 human. But Judge Cole is asking about the
18 instrumentation level. So let's talk about what we
19 can say about the uncertainties from the deer
20 information, not the soil information.

21 MR. ANAGNOSTOPOULOS: Well, again, I would
22 suggest that we're almost at a technological
23 shortfall, in other words, using standard commercial
24 techniques, the level of uranium in that deer tissue
25 is so low that we are running up against physical

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1 properties that without using some new analytical
2 technique, we may not be able to draw conclusive
3 evidence from the existing techniques.

4 Now, there's been discussion about doing
5 a special alpha spectroscopy. We bantered about that
6 amongst the consultants or do you want to go to
7 something called ICP mass spec. There are advantages
8 and disadvantages to both of those techniques. For
9 example, for alpha spectroscopy, if we got better at
10 alpha spectroscopy, if we used pre-concentration, if
11 we used longer count times, greater aliquot sizes,
12 there is still always the debate about fractionation
13 of Uranium 234. So will we ever resolve the question,
14 will we ever resolve the problem? I'm not sure that
15 we will. So we can go to ICP mass spec and we can
16 say, "Okay, we're going to do that".

17 Well, will that resolve the questions?
18 Will that resolve the problem even if we use some
19 special technique like UNEP did? I don't think it
20 will. I don't think it will because there's always
21 going to be a question about what's the
22 reproducibility of that result, what's the error in
23 the measurement? And what batch of DU did that come
24 from? Did it come from a batch of DU with a lot less
25 U235 than another batch? So there's never going to be

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1 a clear answer.

2 There's a range of answers and there's
3 always uncertainty in those measurements. So again,
4 to me I fall back upon is the level of uranium
5 elevated or not? I think that is the primary question
6 and if that question is, yes, then we can start
7 looking into whether or not DU is present and we have
8 shown that we can figure that out.

9 JUDGE COLE: So do your tests in this
10 indicate that the level of uranium, albeit depleted or
11 natural, elevated or not?

12 MR. ANAGNOSTOPOULOS: We have not seen
13 indications that we have elevated levels of uranium in
14 the environmental samples. Now, there is a caveat.
15 In 1990 -- October of 1999, I believe it is, there was
16 a water sample. It was SWDU005 that exhibited a
17 level of total uranium in water that was much, much
18 higher than all the surrounding samples and all the
19 historical samples. And the April 2006 ERM report
20 trending section discusses this. It's there and they
21 went out and found that there was a DU penetrator in
22 the creek bed, in the stream, in the water, near that
23 sampling location. So that penetrator was collected.

24 The sediments at that very same location
25 were analyzed as part of the routine ERM monitoring

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1 and they did not exhibit elevated levels of uranium.
2 The water samples -- two water samples downstream of
3 that location and their sediment samples were examined
4 and they were not elevated. The next round and all
5 subsequent rounds of sampling did not find elevated
6 levels of uranium, total uranium.

7 So the problem with that one sample was,
8 is there was no isotopic done. It was just gamma
9 spectroscopy. That was incapable at the time of
10 answering that DU question and that is not our
11 protocol today.

12 JUDGE COLE: So did you then remove the
13 projectile from the screen or left it there for
14 sampling.

15 MR. ANAGNOSTOPOULOS: It was before my
16 involvement but the report says the projectile was
17 removed and subsequent water samples were normal.
18 That is the only occasion, your Honors, that I have
19 seen.

20 MR. NORRIS: Your Honor, could I offer
21 some partial comment to that?

22 JUDGE COLE: Sure.

23 MR. NORRIS: One can't make a
24 determination of background concentrations if there is
25 a mix of natural and depleted uranium in a sample.

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1 You have to be able to distinguish between natural and
2 the depleted uranium in order to make the
3 determination that I am looking at a background
4 sample. If I'm looking at a sample that has
5 consistently had one pico curie per liter, or .2 pico
6 curies per liter, over a five-year period that doesn't
7 tell me that that's background unless I know there's
8 not depleted uranium in that sample.

9 JUDGE COLE: Well, couldn't we use a ratio
10 of Uranium 238 to 234 to determine whether there's
11 depleted uranium there?

12 MR. NORRIS: That is what should be being
13 done. It should be being done in a manner that allows
14 not a black/white gate of natural uranium versus
15 depleted uranium but how much of each is in there. If
16 you have a water sample from this site, a groundwater
17 sample, if you look at most of the groundwater samples
18 from this site in the monitoring wells that are being
19 taken most of them have a ratio of about .6 for
20 whatever --

21 JUDGE ABRAMSON: Of what to what?

22 MR. NORRIS: Of U238 to U234. So the
23 samples groundwater from this site generally is
24 enriched with respect to U234 over what the nominal
25 natural ratio of one would be. Surface waters are

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1 often in that same range of about .6, .56 to .63. If
2 one has a sample of groundwater that goes from .63 to
3 one, that is an indication that you now have a partial
4 mix. If natural uranium in groundwater is .6 --

5 JUDGE ABRAMSON: We understand the
6 principle, where are you going?

7 MR. NORRIS: The point is that to say you
8 don't need to worry about whether or not depleted
9 uranium is in the sample before -- if there isn't --
10 if it doesn't have a departure of total uranium from
11 background, requires that you know what background is
12 which requires that you have made a determination on
13 a population of samples that you can say with
14 reliability there is no depleted uranium in that
15 sample.

16 JUDGE ABRAMSON: We understood that and we
17 think we've heard testimony ad nauseam now that the
18 ratio in water is going to be about .6 because of the
19 way the isotopes get dissolved. Please.

20 MR. CONDRA: This is Mr. Condra. Whether
21 you're doing alpha spec or ICPMS, when you analyze a
22 sample, you get a certain concentration of 238, a
23 certain concentration of 235 and 234 and that's the
24 only empirical data that you have to make a decision.
25 And so when you get through with the analysis, you can

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1 say that the ratios are what they are for that sample,
2 and in my professional opinion, you can't say that
3 part of that is natural and part of that is depleted.
4 You have what you have when you complete the
5 measurement.

6 JUDGE COLE: So, sir, ideally, I would
7 have thought that if we know what the Uranium 238
8 concentration is in both depleted and in natural
9 uranium and you know what the Uranium 234
10 concentration is in depleted uranium and in natural
11 uranium, that different combinations of those two, we
12 could then develop a graph that says when the ratio
13 between these two is such and such, the concentration
14 of depleted uranium is such and such according to this
15 graph, are you telling me that that graph does not
16 exist?

17 MR. CONDRA: I'm saying that when you
18 finish your analytical measurement, you know what you
19 know and you can make assumptions but you cannot be
20 absolutely certain other than the fact that I have so
21 much 238, 235 and 234 in that sample, and if you say
22 there is, then you're making another assumption that
23 there's no matrix effects and no interaction of the
24 uranium in the matrix.

25 JUDGE ABRAMSON: Let's come at this

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1 another door. What we heard was to expect the
2 activity of 238 to be about the same as the activity
3 of 234 once it's been -- before it's been depleted and
4 about eight times when it's been depleted; is that
5 correct? Is that what I heard?

6 MR. ANAGNOSTOPOULOS: That's correct.

7 JUDGE ABRAMSON: And so if we took a
8 sample of water and found that the activity of U238 in
9 that sample was five times the activity of U234,
10 you're telling me you would not -- that would not
11 advise you that there was at least some depleted
12 uranium in that water sample, that there's some other
13 way, say natural uranium could have got that way?

14 MR. CONDRA: I'm saying that when you get
15 through calculating the ratios from your measurement,
16 you can tell whether it's natural or depleted. So if
17 you're telling me that it's natural or depleted. So
18 if you're telling me that it's five times what you
19 would expect or that ratio of 238 to 234 is five, then
20 yes, that's depleted uranium and some enrichment.

21 JUDGE ABRAMSON: That's, I think, what
22 Judge Cole was trying to ask. So you are saying that
23 we could, in fact, once we knew the numbers, compute
24 how much came from DU and how much came from natural
25 uranium once we made the sample measurements, did the

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1 calculations, is that right? No?

2 MR. CONDRA: I'm saying that you can say
3 that sample has DU in it.

4 JUDGE ABRAMSON: Yes.

5 JUDGE COLE: But not the quantity relative
6 proportion to the --

7 MR. CONDRA: Right, you can say that it's
8 DU or natural, but I don't believe there's a --

9 JUDGE COLE: It's a qualitative
10 assessment, not a quantitative assessment.

11 MR. CONDRA: It's a quantitative
12 assessment of the activity of the 238 and the 234. So
13 you can say from that measurement, just like if you
14 look at the soil data, you can clearly say that some
15 of these are depleted samples. So if it's there and
16 you can measure it, you can tell that it's depleted or
17 natural, but I don't believe that you can say what
18 fraction come from what part. You can only say that
19 that sample is depleted or natural.

20 JUDGE ABRAMSON: Or that that sample
21 evidenced the presence of some depleted. I mean,
22 suppose instead of five, which is maybe close to
23 eight, suppose it was two? Would you not think now
24 there's some contribution from natural and some
25 contribution from depleted?

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1 MR. ANAGNOSTOPOULOS: This is
2 Anagnostopoulos. Let me try to answer that for you.
3 It depends.

4 JUDGE ABRAMSON: Fine, tell me on what?

5 MR. ANAGNOSTOPOULOS: It depends because
6 you need to look at not only the estimate which is the
7 results of your counting, but the error in that
8 estimate.

9 JUDGE ABRAMSON: Okay.

10 MR. ANAGNOSTOPOULOS: And that has been
11 the rub, that has been the major point of contention,
12 that's been the major point of discussions and
13 negotiations with STV since last summer and it's a
14 point that we can't seem to get across to STV. And
15 that is, is that whenever you make a measurement of
16 radioactivity, it's not a true count of what is there.
17 It is an estimate, just like when you collect soil
18 samples.

19 JUDGE ABRAMSON: Okay, I understand and so
20 there is uncertainty with that and so you can only
21 make an estimate of the ratios within a certain
22 uncertainty.

23 MR. ANAGNOSTOPOULOS: Exactly, correct and
24 the lower the concentration in a sample, the lower the
25 count rate. The lower the count rate, the higher the

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1 error in that estimate or the uncertainty in that
2 estimate relative to the actual estimate itself is
3 going to be.

4 JUDGE ABRAMSON: And in our water samples,
5 are you near the level of your instrumentation's
6 capability?

7 MR. ANAGNOSTOPOULOS: That is correct, we
8 are.

9 JUDGE ABRAMSON: Okay.

10 MR. ANAGNOSTOPOULOS: That is why when the
11 level of total uranium is elevated compared to what
12 you'd expect in the natural background, we can make
13 that depleted uranium decision much easier because the
14 error the estimate when compared to the estimate
15 itself is much, much lower.

16 So we can create the chart that you were
17 talking about but what would the error bars be? They
18 would be quite large.

19 JUDGE COLE: So what you're really telling
20 me is we collect a lot of samples, we measure a lot of
21 activity and we currently do not have available to us
22 for use in this program tests and measurements that
23 are going to tell us what fraction of the total
24 uranium activity in here is associated with depleted
25 uranium and what fraction is associated with natural

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1 uranium.

2 MR. ANAGNOSTOPOULOS: This is
3 Anagnstopoulos. I can say to that, yes, I have
4 contacted laboratories. I have attempted to do so and
5 there are several issues. There's technological
6 issues. There are non-standard methods that are not
7 commercially available to us that might achieve that
8 goal and even if we were to achieve that goal, we
9 would still be fighting the issue of U234
10 fractionation, what does it really mean, and we would
11 still be fighting the what is really depleted and how
12 much is it depleted and what batch did it come from?

13 JUDGE COLE: So my ideal chart will have
14 so many bars on it associated with different
15 interferences that it would be very difficult to make
16 any definitive statements as to the fraction of
17 depleted uranium is there and the fraction of natural
18 uranium is there.

19 MR. ANAGNOSTOPOULOS: I believe that to be
20 the case. And again, my lynchpin, my point is, do we
21 need to do that and is it worth the expense because,
22 again, if depleted uranium from these intense point
23 sources of thousands of pico curies per gram of
24 Uranium 238 start to move, the concentrations locally
25 will be elevated. They will be quite high and we can

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1 easily detect that using our current techniques.

2 JUDGE COLE: So you're saying our
3 inability to make these exact measurements is not a
4 serious problem.

5 MR. ANAGNOSTOPOULOS: I believe it is not
6 and that has been a major point of contention.

7 JUDGE COLE: Is it a major problem? It
8 went from serious to major, or is it a big problem?

9 MR. NORRIS: As indicated, it is correct,
10 a major point of contention is whether or not the
11 effort or the expense is being put into being able to
12 make a chart or series of charts like you're talking
13 about.

14 JUDGE COLE: Ideal world.

15 MR. NORRIS: Well, it's more than an ideal
16 world, though, because the ultimate objective over the
17 next five years is to be able to come to a decision
18 with respect to exposures that people are going to be
19 -- have in the future and over a long time period.
20 The FSP as been described today, has a number of
21 activities that are not going to be undertaken unless
22 depleted uranium is seen in some medium at some point.

23 And in order to determine whether or not
24 those activities need to be undertaken, you do need to
25 know, is depleted uranium there. Otherwise you're

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1 going to be in a position where you put parameters
2 into your model for which you have only a zero in
3 terms of what the model predicts you should be seeing
4 today. If the model predicts you should be seeing
5 today not zero but .5, then you constrain your model
6 back to something that duplicates a .5 that you
7 actually are seeing today and you have much more
8 confidence in its ability to predict at least some
9 point into the future.

10 JUDGE ABRAMSON: Mr. Norris, if we're at
11 the limits of our instrumentation, how do you propose
12 that we overcome that? Modeling is anybody's guess.
13 What do you do when you're at the limits of your
14 instrumentation?

15 MR. NORRIS: Well, as was pointed out,
16 we're at the limits of the instrumentation with
17 standard practices and commercially available
18 products. If you use a combination of alpha
19 spectroscopy for the U234/U238 ratio, and ICPMS to get
20 mass concentrations of your various ratios, that has
21 been done at low level concentrations, that has been
22 done at mixes.

23 JUDGE ABRAMSON: Has it been done in the
24 field in this kind of circumstance? Is this a proven
25 technique?

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1 MR. NORRIS: Well, it's been published in
2 the UN in their studies in Serbia, their field data.
3 It isn't a standard inexpensive approach that need be
4 done for routine monitoring, but I think it is
5 important that it be done at this stage for this
6 purpose of the FSP so that the modeling isn't just
7 grabbing at whatever numbers are available, that there
8 is some kind of constraint.

9 MR. ANAGNOSTOPOULOS: Your Honors, this
10 Anagnostopoulos again. I'm familiar with those UNEP
11 reports. I've read them in detail. I've talked to
12 several people involved with those reports and I
13 contacted a person very cognizant of what the
14 capabilities are in the United States at Idaho
15 National Lab and I can say based on those
16 conversations that there is no laboratory in the
17 United States that's commercially available to the
18 Army that can replicate those UNEP techniques and we
19 have no idea of what the cost for that replication
20 would be and when we were done, we would still be
21 stuck with the fractionation issue and with the how
22 much depleted is depleted uranium issue as well.
23 Those UNEP report estimates were exactly that,
24 estimates, with no understanding of what the error in
25 that estimate was.

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1 So I'd like to just finish by saying that
2 what Mr. Norris is asking for in the models can be
3 done. The debate is at what level are we going to try
4 to identify that depleted uranium, because it can be
5 done right now with existing techniques and it is
6 being done. The debate is, and I'll repeat this
7 phrase from the 2006 negotiations, say the Valley is
8 asking us to find atoms of depleted uranium. And I
9 don't think we can do it. And I'm not sure what the
10 benefit of doing that is.

11 JUDGE COLE: One question, a general one,
12 we're having difficulty identifying the fraction of
13 depleted uranium present in any samples that we
14 collect, correct? No, are we in a position where we
15 might not be able to have to worry about that because
16 the total amount of uranium that both depleted and
17 natural in this environment that we're worried about,
18 is such that it will not create a problem, a public
19 health problem for the people that are receiving the
20 dose associated with this total uranium, not splitting
21 up the natural uranium from the site and the depleted
22 uranium? Is it a non-problem because the total dose,
23 even though we only are interested in what's being
24 caused by the depleted uranium, is the total dose
25 sufficiently low where it's a no, never mind?

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1 MR. ANAGNOSTOPOULOS: This is
2 Anagnostopoulos. I believe we can say that and I base
3 that on the fact that several NRC documents have
4 promulgated default site specific screening levels for
5 uranium in soil. And those use receptors and modeling
6 scenarios that are very, very conservative and those
7 limits are in the area of 50 pico curies per gram for
8 total uranium to 1,000 pico curies per gram depending
9 on the scenario. And we're talking about levels right
10 now that are one pico curie per gram.

11 So whether you're looking at what are the
12 license requirements in are action level of 35 pico
13 curies per gram in soil or if you're looking at some
14 of these NRC default screening levels, we certainly
15 can see orders of magnitude below those levels that
16 cause a health concern.

17 JUDGE COLE: So you're saying it's in
18 effect a no, never mind, although we would care
19 anyways.

20 JUDGE ABRAMSON: Well, let's remember.
21 Let's come back to the basic premise of this
22 proceeding and that is can this plan evolve to a plan
23 that gives adequate information for site
24 characterization and if -- and so while this may seem
25 like a laughing matter from the perspective of it's a

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1 no, never mind, if in the end, what we're trying to do
2 is develop a plan that would detect levels that are
3 sufficient that require protective measures, which I
4 think is perhaps a better way to phrase all this, can
5 the Army develop a plan that will detect -- that will
6 determine -- that will characterize the site
7 sufficiently to know whether there are levels that
8 satisfy -- that will fail to satisfy the regulatory
9 limits of 25 millie per year to the maximumly exposed
10 individual. Have I characterized that right?

11 Can the Army develop such a plan and what
12 we're hearing here is, "We're doing this plan, we're
13 working this way, we're going to make additional tests
14 if we need to make them, and at the moment, the level
15 seems so low that we are not going to run into a
16 problem developing a decommissioning plan that -- or
17 developing a site characterization that indicates we
18 have this kind of a problem."

19 Is that what I'm hearing as opposed to,
20 "It's a no, never mind"? Let's hear from the Army
21 because it's the Army who's on the hook here. Is the
22 Army -- is this a proper characterization of were the
23 Army -- what the Army is finding? That to date, at
24 least, the indications are that the levels that we're
25 finding are so low that we're not going to have

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1 difficultly making a site characterization that
2 indicates we do or don't need to take these further
3 corrective actions? Is that where we are?

4 MR. ANAGNOSTOPOULOS: Your Honor, this is
5 Anagnostopoulos again. I'm an Army contractor but I
6 can render a technical opinion and I believe that the
7 existing techniques now will see uranium movement at
8 levels that will allow us to take protective action
9 well before there's a health risk to members of the
10 public.

11 JUDGE COLE: Do you want to say something,
12 Mr. Norris?

13 MR. NORRIS: Yes, if I could.

14 JUDGE ROSENTHAL: I think the Board
15 probably has completed -- maybe the word is exhausted
16 its questions, so we'll wind up any way you want.
17 This is your -- is there something that you want to
18 say in conclusion briefly, any of you, we'll hear from
19 you now. Mr. Norris.

20 MR. NORRIS: Only that my opinion is the
21 ability to five years from now effectively predict,
22 reliably predict exposures down the road based on data
23 that are collected before most of this material has
24 even disintegrated from the penetrators yet, is going
25 to be largely dependent upon the ability to reliably

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1 know the degree to which DU is today on the move
2 independent of the levels that it's on the move today
3 relative to any standards that apply in the future.

4 JUDGE ROSENTHAL: Anybody else have
5 anything to say?

6 MR. ANAGNOSTOPOULOS: Yeah, this is
7 Anagnostopoulos. I'd just like to reply to that. We
8 have no idea how those penetrators are corroding right
9 now. We're going to go find out. We're going to go
10 look at that. That is an element of the FSP.

11 JUDGE ROSENTHAL: Okay, I think that
12 probably concludes it. Well, this is the miracle of
13 the ages.

14 JUDGE ABRAMSON: No, it isn't, your Honor.

15 JUDGE ROSENTHAL: I have to say that Judge
16 Abramson was a better Judge than certainly I was as to
17 the length of time that this was going to take. I had
18 no expectation that we would conclude this in a day.
19 Needless to say, we did not ask every question that
20 has been proposed by the parties, but as I had noted
21 in my introductory statement, the purpose of this was
22 to allow the members of the Board to ask the questions
23 that we felt were necessary in order for us to render
24 what we hope will be an informed decision.

25 Now, in that regard, the Board will enter

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1 an order in the course of the next several days which
2 will set a schedule for the filing by the parties
3 contemporaneously of proposed findings of fact and
4 conclusions of law and without at this point
5 indicating a precise time, I can assure you that we
6 will provide a liberal period of time. I mean, the
7 one thing that differentiates this case from the
8 typical case where an applicant is seeking a license
9 to do something, operate a facility, this case is on
10 a 2011 track and so we don't regard it as being quite
11 on the critical path that many of our cases are on.

12 Now, we will allow a response of the
13 parties to the other parties proposed findings and
14 conclusions of law, but we'll probably put a page
15 limit on that and moreover, we would expect that it
16 will not simply be a repetition of your own proposed
17 findings and if there's something that you can say in
18 addition to what you put in your own proposed findings
19 that focus on the weakness as you see it in the
20 proposed findings and conclusions of law of one of the
21 other parties, that will be helpful.

22 But simply repeating what you've said in
23 your own findings which happen to be counter to what
24 was said in the other party's findings is simply going
25 to produce more paper, and goodness knows there have

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1 been enough trees already sacrificed in the cause of
2 this case.

3 JUDGE ABRAMSON: Yeah, furthermore, any
4 such reply should not be taken as an opportunity to
5 raise something we have not already heard in this
6 hearing.

7 JUDGE ROSENTHAL: That's right. This is
8 not an opportunity to raise new issues. You've all
9 had the opportunity to file up through surrebuttal.
10 So I think from that standpoint, you've developed your
11 cases and now it's simply what you'd like to see
12 included in our decision. So as I say, I would think
13 that that order will be out within the next several
14 days and once again, on behalf of the Board, I want to
15 thank all of the counsel for their presentations this
16 morning, to all of the witnesses, even Mr. Pastorick
17 who came a long distance and didn't have much of an
18 opportunity to make a large contribution but we
19 appreciated his presence as well.

20 So with that note, the hearing is
21 concluded. Thank you very much.

22 (Whereupon, at 4:37 p.m. the hearing in
23 the above-entitled matter concluded.)
24
25

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CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: U.S. Army Jefferson Proving
Ground

Docket Number: 40-8838-MLA

Location: Madison, Indiana

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.



James Salandrio
Official Reporter
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