

RAS 9330

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Louisiana Energy Services

Docket Number: 70-3103-ML

DOCKETED
USNRC

February 14, 2005 (8:00am)

Location: Hobbs, New Mexico

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Date: Tuesday, February 8th, 2005

Work Order No.: NRC-186

Pages: 873 - 1168

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UNITED STATES OF AMERICA
 NUCLEAR REGULATORY COMMISSION

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ATOMIC SAFETY AND LICENSING BOARD
 (ASLB)

+ + + + +

HEARING

In the Matter of:

LOUISIANA ENERGY SERVICES, L.P.	Docket Nos.
(National Enrichment Facility)	70-3103-ML
	ASLBP No.
	04-826-01-ML

Tuesday, February 8th, 2005

Conference Room
 Lea County Event Center
 5101 Lovington Highway
 Hobbs, New Mexico

The above-entitled matter came on for hearing, pursuant to notice, at 9:00 a.m.

BEFORE:

G. PAUL BOLLWERK, III	Chair
PAUL B. ABRAMSON	Administrative Law Judge
CHARLES N. KELBER	Administrative Law Judge

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Also Present:

BETHANY ENGLE
GEORGE A. HARPER, P.E.
ROGER L. PEERY
ALAN TOBLIN
ROD KRICH
JAMES PARK
GEORGE RICE

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R-Rejected
W-Withdrawn
TUA-Taken under advisement

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P-R-O-C-E-E-D-I-N-G-S

9:26 a.m.

1
2
3 CHAIR BOLLWERK: All right, if we could
4 come to order please. Let's go on the record. Good
5 morning everyone. We're here to resume the hearing on
6 environmental contentions on the Louisiana Energy
7 Services case.

8 Those of you who are in the room probably
9 noticed a group of lawyers and others standing over
10 here having a discussion. And what we were
11 discussing, frankly, was the question that we raised
12 and talked a little bit about yesterday afternoon with
13 respect to the contention we're scheduled to hear this
14 morning, which is Contention EC-4, dealing with the
15 environmental impacts, potentially, of the
16 deconversion process for the facility.

17 The discussion we were having was whether
18 there was a need for a proprietary or a closed
19 session, or a session on proprietary information that
20 would be closed.

21 I think the result of that was we've at
22 least reached a tentative agreement that we're going
23 to move forward with here and see how it works out.
24 That would require -- not require that we close the
25 hearing.

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1 So we're going to try to move forward.
2 What we will do is go ahead and bring the LES
3 witnesses up and have them sworn in. And then there
4 will be certain representations that will be made with
5 respect to the testimony that's going to be introduced
6 on the question of what LES will or will not do with
7 the conversion facility.

8 They're considering at least, in terms of
9 a Memorandum of Understanding they currently have in
10 place. So why don't we go ahead and bring the
11 witnesses up and we can move from there.

12 MR. REPKA: Okay. We'll call the LES
13 witnesses on this Contention. NIRS/PC EC-4 Mr. Rod M.
14 Krich and Mr. Paul Schneider.

15 MR. LOVEJOY: Your Honors, I was curious,
16 were we going to deal with the motion in limine prior
17 to the witnesses or wait until Dr. Makhijani?

18 CHAIR BOLLWERK: Let me see what the
19 party's preference is. I mean we could do it either
20 way. I don't know if there's an advantage one way or
21 the other, but --

22 MR. REPKA: I think our preference would
23 be to deal with the motion at the outset, at this
24 point, as you outlined yesterday because certain of
25 the issues that are addressed in the testimony of the

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1 nearest witness relate to matters that this Panel
2 would speak to --

3 CHAIR BOLLWERK: All right.

4 MR. REPKA: -- if they're in but not if
5 they're out.

6 CHAIR BOLLWERK: Okay.

7 MR. CUMMINGS: The Staff would agree.

8 MR. REPKA: Well, actually I don't agree.
9 I think we'll be in a better spot if we hear these
10 witnesses and then deal with the issue of Dr.
11 Makhijani's testimony when he's on the stand, or just
12 before his testimony.

13 CHAIR BOLLWERK: All right.

14 JUDGE KELBER: I tend to agree with that
15 view.

16 CHAIR BOLLWERK: Well, given that Mr.
17 Lovejoy's the one that's been here at a little
18 disadvantage and he got this at the last minute, we're
19 going to go ahead and follow his preference.

20 What I see is the possibility that once we
21 make that ruling we may need to take a break and allow
22 some people an opportunity to prepare. And we're
23 certainly prepared to do that.

24 MR. CURTISS: That's fine. I think if Mr.
25 Lovejoy envisions asking questions about those issues,

1 I think we'd preserve our objection to that when we
2 get to that issue with this Panel.

3 I don't see any reason, objections already
4 been raised.

5 CHAIR BOLLWERK: Right. I'm sorry, go
6 ahead.

7 JUDGE ABRAMSON: I'm sorry. Counselor, I
8 don't see any reason why you can't frame your
9 objections at the time that the questions are raised
10 in a way that the Board can deal with them at that
11 point.

12 MR. CURTISS: That's what we intend to do.

13 JUDGE ABRAMSON: That may work as a
14 precursor to deal with a motion in limine.

15 MR. CURTISS: That's what we do intend to
16 do.

17 CHAIR BOLLWERK: All right, so we're all
18 on the same page. At least what we're going to do at
19 this point, we're going to move forward with these
20 witnesses and see how that plays out.

21 All right. Let me swear the --
22 everything's ready then? Let me swear the witnesses
23 in. Gentlemen if you could raise your right hand
24 please.

25

1 Whereupon,

2 ROD M. KRICH

3 PAUL G. SCHNEIDER

4 were called as witnesses by Counsel for the Applicant
5 and, having been duly sworn, assumed the witness
6 stand, were examined and testified as follows:

7 MR. REPKA: Okay, gentlemen, first I'll
8 just ask you to identify yourselves for the record.
9 I'll start with Mr. Krich.

10 WITNESS KRICH: Rod Krich, Vice President
11 for LES.

12 WITNESS SCHNEIDER: Paul Schneider,
13 Consultant.

14 MR. REPKA: Okay, Mr. Krich, I will start
15 with you. Do you have in front of you a document
16 dated January 7th, 2005, entitled pre-filed testimony
17 of Rod M. Krich on behalf of Louisiana Energy Services
18 LP, regarding Contention NIRS/PC EC-4, impacts of
19 waste storage?

20 WITNESS KRICH: I do.

21 MR. REPKA: Do you recognize that
22 document?

23 WITNESS KRICH: I do.

24 MR. REPKA: Was it prepared by you or
25 under your supervision?

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1 WITNESS KRICH: It was.

2 MR. REPKA: Do you have any corrections
3 that you need to make to this document?

4 WITNESS KRICH: No, I don't.

5 MR. REPKA: Do you accept this -- is it
6 true and correct to the best of your knowledge and
7 belief?

8 WITNESS KRICH: Yes.

9 MR. REPKA: And do you accept this as your
10 testimony?

11 WITNESS KRICH: Yes, I do.

12 MR. REPKA: Okay. I'll ask that this
13 document be admitted into the record of this case as
14 if read as the direct testimony of Mr. Krich.

15 CHAIR BOLLWERK: Mr. Krich, would you move
16 the microphone closer? The -- there's two over there.
17 Can you also take the one? If you both need a
18 microphone maybe that's the easier way to do it.

19 That one actually works. You can use that
20 one and you can move the other one over.

21 WITNESS KRICH: Okay.

22 CHAIR BOLLWERK: They're both operating,
23 right?

24 WITNESS KRICH: They're both operating?

25 CHAIR BOLLWERK: Just turn it.

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1 MR. REPKA: There's a switch on the bottom
2 somewhere. Does that work? It's always the
3 technology, isn't it?

4 CHAIR BOLLWERK: Can you hear okay?

5 MR. REPKA: Okay. I was going to ask
6 first the direct testimony, to deal with that first
7 being accepted into the record as if read.

8 CHAIR BOLLWERK: All right. Any
9 objections from my other parties?

10 (No response.)

11 CHAIR BOLLWERK: All right. Hearing no
12 objections then, the pre-filed testimony of Rod M.
13 Krich on behalf of Louisiana Energy Services regarding
14 contention NIRS/PC EC-4, impacts of waste storage,
15 dated January 7th, 2005, will be adopted into the
16 record as if read.

17 (Whereupon, the pre-filed direct testimony
18 of Mr. Rod Krich was inserted into the record as if
19 having been read.)

January 7, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:)	
)	Docket No. 70-3103-ML
Louisiana Energy Services, L.P.)	
)	ASLBP No. 04-826-01-ML
(National Enrichment Facility))	

PREFILED TESTIMONY OF ROD M. KRICH
ON BEHALF OF LOUISIANA ENERGY SERVICES, L.P.
REGARDING CONTENTION NIRS/PC EC-4 ("IMPACTS OF WASTE STORAGE")

I. WITNESS BACKGROUND

Rod M. Krich ("RMK")

Q1. Please state your name, occupation, and by whom you are employed.

A1. (RMK) My name is Rod M. Krich. I am Vice President of Licensing, Safety, and Nuclear Engineering for Louisiana Energy Services, L.P. ("LES"), the license application in this matter. I am presently "on loan" to LES from Exelon Nuclear, where I am Vice President Licensing Projects. As an Exelon employee, I also have assisted in the Yucca Mountain Project licensing effort, and served as the lead on strategic licensing issues related to the development of a new approach to licensing advanced reactors, such as the Pebble Bed Modular Reactor.

Q2. Please describe your current responsibilities.

A2. (RMK) I am responsible for leading the effort on behalf of LES to obtain a license from the U.S. Nuclear Regulatory Commission ("NRC"), as well as other necessary state and federal permits, to construct and operate the proposed National Enrichment Facility ("NEF"), a gas centrifuge enrichment facility that would be located in Lea County, New Mexico and provide

enrichment services to U.S. nuclear utilities. I also am responsible for implementing the Quality Assurance Program and ensuring that engineering products and services provided by contractors are of sufficiently high quality to be accepted by LES.

Q3. Please summarize your educational and professional qualifications.

A3. (RMK) I hold a B.S. in mechanical engineering from the New Jersey Institute of Technology and an M.S. in nuclear engineering from the University of Illinois. I have over 30 years of experience in the nuclear industry, covering engineering, licensing, and regulatory matters. This experience encompasses the design, licensing, and operation of nuclear facilities. A detailed statement of my professional qualifications is attached hereto.

Q4. Are you familiar with the proposed National Enrichment Facility ("NEF") and the operations that will take place there?

A4. (RMK) Yes.

Q5. What is the basis of your familiarity with the NEF?

A5. (RMK) As Vice President of Licensing, Safety, and Nuclear Engineering for LES, I have the overall responsibility for licensing and engineering matters related to the NEF project. In this capacity, I oversaw preparation and submittal of the NEF license application, as well as the engineering design of the facility processes and safety systems. As a result, I am very familiar with the NEF license application, and the NRC requirements and guidance related to the contents of such an application. Further, I serve as LES's lead contact with respect to matters related to the NRC Staff's review of the NEF license application. Finally, I am also responsible for the preparation of all state and federal permit applications related to the NEF.

II. RESPONSE TO NIRS/PC CONTENTION EC-4

Q6. What is the purpose of your testimony?

A6. (RMK) The purpose of my testimony is to discuss the manner in which LES addressed in its Environmental Report ("ER") the environmental impacts associated with the construction, operation, and decommissioning of a deconversion facility for the depleted uranium hexafluoride ("DUF₆") expected to be generated by the NEF. Specifically, I will discuss the basis for my conclusion that the ER appropriately evaluates the environmental impacts of a facility for the deconversion of depleted uranium hexafluoride generated by the NEF. I will also express an opinion on the appropriateness of NRC's reliance in its Draft Environmental Impact Statement ("DEIS") for the NEF on previous evaluations of the environmental impacts of a deconversion facility.

Q7. How much capacity will be required in a deconversion facility for the deconversion of the depleted UF₆ to be generated by the NEF?

A7. (RMK) Over the projected 30-year life of the NEF, the plant is conservatively estimated to generate 15,727 48Y cylinders of depleted uranium hexafluoride. Each cylinder will normally contain 12.5 MT (13.8 tons) of UF₆ or about 8.5 MTU (9.4 tons). Thus, we expect to generate 196,588 metric tons of depleted UF₆ or about 7,800 MT of DUF₆ per year. This is the capacity that would be required in a deconversion facility for processing the DUF₆ from the NEF.

Q8. Would you describe LES's plans for the deconversion of the DUF₆ to be generated by the NEF?

A8. (RMK) As set forth in the License Application, LES has identified two plausible strategies for the deconversion of DUF₆ from the NEF. Specifically, section 4.13.3.1.3 of the ER, entitled "Depleted UF₆ Disposition Alternatives", identifies a "preferred" plausible strategy that calls for the depleted UF₆ to be transported from the NEF to a private sector deconversion facility for deconversion of the depleted UF₆ to U₃O₈. Section 4.13.3.1.3 also identifies as plausible a strategy that calls for the depleted UF₆ to be transported from the NEF to a DOE

deconversion facility, either at Paducah, KY or Portsmouth, OH for the deconversion of the depleted UF_6 to U_3O_8 .

Q9. With respect to the private sector option, have you identified a site for the location of this facility?

A9. (RMK) No, a site has not yet been identified. If we pursue the private sector option, that decision would be made at some future point, upon identification of the company selected to build the facility.

Q10. In the event that you elect to pursue the private sector option, have you identified a specific final form of the depleted uranium?

A10. (RMK) If we pursue the private sector option, it is our intent, as reflected in section 4.13.3.1.3 of the ER, to convert the DUF_6 to U_3O_8 . We do not intend to convert the DUF_6 to UO_2 or to a metal form.

Q11. What is the basis for your decision to convert the DUF_6 to U_3O_8 ?

A11. (RMK) The U_3O_8 form is recognized by the NRC as the more stable physicochemical form and the more compatible, as regards to safety, with the long-term disposition of tails (See LES Exhibit 19). In fact, NRC has recommended U_3O_8 as a waste form for long term storage and disposal, as it is thermodynamically stable and relatively insoluble (See LES Exhibit 20). DOE has also identified conversion to U_3O_8 as the preferred alternative in its Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269) (April 1999) (See LES Exhibit 18).

Q12. In the event that you elect to pursue the private sector option, have you identified a specific conversion process for conversion of DUF_6 to U_3O_8 ?

A12. (RMK) No, we have not selected a specific process.

Q13. Have you determined whether the deconversion of DUF_6 to U_3O_8 would employ the process that results in anhydrous hydrofluoric acid ("HF") or either the Framatome or Cogema processes that result in aqueous HF?

A13. (RMK) No decision has been made as to which of these processes would be employed. In fact, the process to be employed would depend upon the specific company selected to build the facility and the process employed by that company.

Q14. Would you describe how the ER addresses the environmental impacts of a deconversion facility for the DUF_6 to be generated by the NEF?

A14. (RMK) The approach that we have taken is reflected in section 4.13.3.1 of the Environmental Report (*See* LES Exhibit 14), entitled "Radioactive and Mixed Waste Disposal Plans", which provides as follows:

"The environmental impact of a UF_6 conversion facility was previously evaluated generically for the Claiborne Enrichment Center (CEC) and is documented in Section 4.2.2.8 of the NRC Final Environmental Impact Statement (FEIS) (NRC, 1994a). After scaling to account for the increased capacity of the NEF compared to the CEC, this evaluation remains valid for NEF. In addition, the Department of Energy has recently issued FEISs (DOE, 2004a; DOE, 2004b) for the UF_6 conversion facilities to be constructed and operated at Paducah, KY and Portsmouth, OH. These FEISs consider the construction, operation, maintenance, and decontamination and decommissioning of the conversion facilities and are also valid evaluations for the NEF." (*See* LES Exhibit 14, p. 4.13-3)

This statement reflects a conclusion that I reached that the environmental impacts associated with the deconversion of depleted uranium hexafluoride had previously been evaluated thoroughly by the NRC and DOE, that these previous evaluations appropriately bound the impacts that might be associated with a private sector deconversion facility and, for these

reasons, it was appropriate to rely on those evaluations in the LES Environmental Report for the National Enrichment Facility. In addition, this statement is supported by the guidance in the Commission's Order of February 6, 2004, where the Commission said that "The NRC staff may consider the DOE EIS in preparing the staff's EIS."

Q15. Taking each of the environmental evaluations which are referred to in section 4.13.3.1 of the ER, beginning with the FEIS for the CEC (*See* LES Exhibit 15), could you explain why you believe it was appropriate to rely on this analysis in support of your conclusion that the environmental impacts associated with a private sector deconversion facility have been appropriately addressed?

A15. (RMK) Yes. In the case of NRC's FEIS for the CEC facility, that analysis addressed the environmental impacts of a deconversion facility in section 4.2.2.8, entitled "Radiological Impacts of DUF_6 Conversion and U_3O_8 Disposal" (*See* LES Exhibit 15), as well as in Appendix A, entitled "Assessment of the Environmental Impacts of Depleted UF_6 Disposition" (*See* LES Exhibit 15). The analysis performed by the NRC assumed a representative deconversion site and plant, with a population surrounding the plant of approximately 400,000 people (*See* LES Exhibit 15, Section A.1.1, p. A-2). The capacity of the deconversion plant analyzed by the staff was assumed to be 5,700 metric tons of UF_6 per year (*See* LES Exhibit 15, Section A.1.1, p. A-2). The staff's analysis estimated release rates of uranium to the atmosphere and surface water and estimated dose to the maximally exposed adult and to the critical individual (assumed to be an infant located at the nearest residence, which was assumed to be 0.5 km or 0.31 mile from the CEC facility) (*See* LES Exhibit 15, Section A.1.4, pp. A-4-5). The analysis also considered direct and skyshine radiation from cylinders stored at the conversion site (*See* LES Exhibit 15, Section A.1.4, p. A-6). Based upon this analysis, the staff concluded that for both the maximally exposed individual and the surrounding population, the exposures would be only a small fraction

of both background radiation and applicable limits, including the limits specified in 10 CFR Part 20 (100 mrem per year limit for releases related to routine operations), 40 CFR Part 61 (limit of 10 mrem per year annual effective dose equivalent), and 40 CFR Part 190 (25 mrem limit for routine releases to the general environment). Specifically, the staff found that the total effective dose equivalent, or "TEDE" (accounting for atmospheric, liquid, and direct pathways) for a deconversion facility was estimated to be 2.6 mrem, while the maximum annual tissue TEDE was estimated to be 2.9 mrem to the thyroid, both of which are significantly lower than the applicable regulatory limits and background radiation (See LES Exhibit 15, Section A.1.5, p. A-6). On this basis, the staff concluded that "operation of the DUF₆ conversion plant is expected to have negligible radiological impacts on the environment" (See LES Exhibit 15, Section A.1.5, pp. A-6-7). The CEC FEIS also considered both the radiological and nonradiological impacts of transportation associated with the transport of radioactive materials, concluding that the radiological impacts were well within regulatory limits for workers and well below background levels for members of the public. Similarly, the NRC concluded that the nonradiological impacts were also small.

Q16. Section 4.13.3.1 of the LES ER (See LES Exhibit 14) indicates that the CEC analysis was "scaled" to account for the larger NEF. Would you explain how you "scaled" the FEIS for the Claiborne Enrichment Center to account for the capacity of the deconversion facility that will be required to support the NEF?

A16. (RMK) The evaluation of the environmental impact of a deconversion facility performed for the CEC was based upon a deconversion facility that would process 5,700 MT DUF₆ per year, compared to a deconversion facility for the NEF project that would need to process approximately 7,800 MT DUF₆ per year. On this basis, if you assumed conservatively that the calculated doses in the CEC FEIS were doubled to account for the larger NEF plant -- a

conservative assumption in view of the fact that DUF_6 generated by the NEF will be approximately 37 percent more than the plant assumed in the CEC analysis -- the environmental impacts of such a deconversion facility would still be small and well within regulatory limits (*i.e.*, 5.2 mrem total effective dose equivalent, 5.9 mrem effective dose equivalent to the thyroid).

Q17. The statement that you referenced from section 4.13.3.1 of the Environmental Report indicates that you also relied on the FEISs published by DOE related to the environmental impacts of a deconversion facility. Would you explain what you relied on in these FEISs in reaching your conclusion that the ER appropriately evaluates the environmental impacts of a facility for the deconversion of the DUF_6 to be generated by the NEF?

A17. (RMK) DOE has published FEISs which address the environmental impacts of deconversion facilities to be constructed and operated at two specific sites, Portsmouth, OH ("Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site") (*See* LES Exhibit 16) and Paducah, KY ("Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah Kentucky Site") (*See* LES Exhibit 17). Each of these site-specific EISs in turn explicitly incorporates by reference the "Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride" ("PEIS") published by DOE in April of 1999 (*See* LES Exhibit 18). As the PEIS was the first step of a tiered environmental review undertaken by DOE of the environmental impacts of the management, deconversion, and disposal of depleted uranium hexafluoride, I relied on the PEIS, as well as the site-specific EISs for Paducah, KY and Portsmouth, OH, in reaching the conclusion that the environmental impacts of constructing, operating, and decommissioning a deconversion facility had been appropriately evaluated.

Q18. What conclusions did you reach relative to the analysis undertaken by DOE in its two site-specific EISs and in its PEIS?

A18. (RMK) First, if LES should elect to send its depleted uranium hexafluoride to one of the two DOE facilities (in Portsmouth, OH or Paducah, KY), the environmental evaluations published by DOE, including the Programmatic Environmental Impact Statement and the site-specific EISs for the Portsmouth and Paducah sites, contain a comprehensive evaluation of the environmental impacts associated with the construction, operation, and decommissioning of these two facilities. These EISs comprehensively evaluated a wide range of environmental impacts, including human health and safety during construction and facility operation, as well as during transportation and in accident conditions. The EISs evaluated air quality and noise, water and soil, socioeconomics, ecology, waste management, resource requirements, land use, cultural resources and environmental justice. Importantly, the site-specific EISs for these two sites analyzed the environmental impacts associated with expanding conversion facility operations at each site beyond that needed to process DOE's DUF₆ to process additional DUF₆ that might be transferred to DOE at some time in the future by a commercial enrichment facility. In this regard, the site-specific EISs specifically analyzed the environmental impacts of two options: (i) extending the operational period for the deconversion facilities; or (ii) increasing plant throughput. In each case, the two site-specific EISs contain a thorough evaluation of the potential environmental impacts associated with each of these options (See LES Exhibit 16, Sections 2.2.7, 2.4.2.17, and 5.2.8; and LES Exhibit 17, Sections 2.2.5, 2.4.2.17, and 5.2.6). Thus, with regard to the option of transferring NEF's DUF₆ to a DOE deconversion facility, I concluded that the environmental impacts of this option have been thoroughly evaluated in the site-specific EISs for the construction and operation of deconversion facilities at Paducah, KY and Portsmouth, OH.

Q19. Do these EISs bound the environmental impacts of the private sector deconversion option, if LES should elect to pursue this option?

A19. (RMK) If LES should elect to pursue its "preferred" strategy of transporting the depleted uranium hexafluoride from the NEF plant to a private sector deconversion facility, the environmental evaluations published by DOE, comprising the site-specific EISs for the Paducah and Portsmouth sites and the Programmatic Environmental Impact Statement, appropriately address and bound the environmental impacts that might be associated with the construction, operation, and decommissioning of a private sector deconversion facility. Understanding that if LES elects to pursue a private sector deconversion facility, further environmental evaluation would be undertaken of the site-specific impacts of such a facility as part of the licensing process, the DOE Programmatic EIS and site-specific EISs (as well as the NRC FEIS for the CEC facility) adequately address the potential generic environmental impacts of such a facility in a way that "bounds" or "envelopes" those environmental impacts.

Q20. What is the basis for your conclusion that the DOE PEIS is sufficiently representative of, and hence bounding for, the environmental impacts that might be associated with a private sector deconversion facility?

A20. (RMK) As I indicated earlier, the NEF facility is conservatively estimated to generate 15,727 cylinders of DUF_6 , during its 30-year licensed life, or approximately 196,588 metric tons of DUF_6 . Assuming that the private sector deconversion facility is of a size that would accommodate the DUF_6 generated during the 30-year licensed life of the NEF, the environmental evaluations undertaken by DOE, which analyzed a facility to deconvert 61,422 cylinders of DUF_6 or approximately 739,000 metric tons of DUF_6 (See LES Exhibit 18, Section S.1.1, p. S-2) -- or nearly four times the capacity that would be required by LES in a private sector facility --

clearly bound the generic environmental impacts of a deconversion facility that might be built for the NEF DUF₆.

Q21. Would you describe the generic environmental impacts that, based upon the much larger deconversion facility analyzed by DOE in its PEIS, you believe are bounding for a private sector deconversion facility?

A21. (RMK) Yes. First, by way of context, it is important to understand that in analyzing the environmental impacts associated with a deconversion facility, DOE's PEIS assessed the impacts using representative or generic environmental settings, settings which, in turn, were based upon the three sites at which DOE's DUF₆ is currently stored. The range of environmental conditions present at these three existing DUF₆ storage sites -- Paducah, KY, Portsmouth OH, and Oak Ridge, TN -- was determined by DOE to be representative of potential sites for a deconversion facility. On this basis, DOE's analysis assumed as representative a population within a radius of 50 miles ranging from 500,000 to 880,000 (See LES Exhibit 18, Vol. 1, p. 5-2; Vol 2, Appendix F, pp. F-4, F-17). In my judgment, this is a reasonable range of environmental conditions for DOE to employ, and could reasonably be expected to encompass any site that might be selected for a private sector deconversion facility for NEF's DUF₆. For example, if a deconversion facility is located in the vicinity of the NEF, the range of population assumed in DOE's analysis is clearly bounding, as the population in the vicinity surrounding the NEF is less than 100,000.

Q22. Based upon the representative environmental settings analyzed by DOE, what conclusions did DOE's PEIS reach relative to the environmental impacts of a deconversion facility and why do you believe these conclusions are "bounding" or "conservative" relative to the environmental impacts that might result from LES's private sector deconversion facility?

A22. (RMK) DOE evaluated a comprehensive range of environmental impacts that, in my opinion, would encompass the type of impacts that might be associated with a private sector

deconversion facility. These include the human health and safety impacts of a deconversion facility during both normal operation and accident conditions for both radiological and chemical exposures. DOE also evaluated the human health and safety impacts during transportation, both by truck and rail, including normal operation and assumed accident conditions. DOE also evaluated environmental impacts associated with air quality, water and soil, socioeconomics, ecology, waste management, resource requirements, land use, cultural resources, and environmental justice (See LES Exhibit 18, Vol. 1, Chapter 5). In short, I concluded that DOE's PEIS comprehensively evaluated all of the relevant environmental impacts that might be associated with the construction, operation, and decommissioning of a deconversion facility. I also concluded that, considering that the size of the deconversion facility evaluated by DOE in the PEIS was approximately four times the capacity that would be required for a facility for NEF's DUF₆ (740,000 MT DUF₆ versus 196,588 MT DUF₆), the environmental evaluation in the PEIS could be considered as bounding of any environmental impacts that could reasonably be expected if LES elects to pursue the private sector option

Q23. You indicated earlier that LES has not selected a specific deconversion process for conversion of DUF₆ to U₃O₈. Recognizing that such a decision has not yet been made, how were you able to conclude that the environmental evaluations upon which you relied were adequate to bound the environmental impacts of the alternative deconversion processes, any one of which might be employed?

A23. (RMK) DOE's Programmatic Environmental Impact Statement states that it considered two basic deconversion processes that might be employed for deconverting DUF₆ to U₃O₈: a process that would upgrade the concentrated HF to anhydrous HF and a process that would neutralize the hydrofluoric acid (*i.e.*, aqueous HF) by the addition of lime to form a solid fluoride salt (calcium fluoride) (See LES Exhibit 18, Vol. 2, pp. F-11-12). In this regard, the PEIS

explicitly states that "The environmental impacts of both options (production of anhydrous HF for commercial use and neutralization of HF to CaF₂) were considered in this PEIS" (See LES Exhibit 18, Vol. 1, p. 2-9). These two processes bound the three options described above, since the Framatome and Cogema processes both result in aqueous HF which can then be neutralized to CaF₂. Likewise, the CEC FEIS considered the different deconversion processes and based its evaluation on a representative one.

Q24. Did you reach any conclusions with regard to the adequacy of the existing environmental evaluations related to the transportation activities associated with a deconversion facility?

A24. (RMK) The impacts associated with transportation are addressed extensively in DOE's PEIS, specifically in Appendix J (See LES Exhibit 18, Vol. 2, Appendix J). The analysis contained therein explicitly states that it addresses the environmental impacts associated with the transportation of depleted UF₆ cylinders, as well as the transportation of U₃O₈. The analysis also addresses the environmental impacts associated with the transportation of chemicals required for or produced during processing, such as hydrogen fluoride and ammonia, as well as any low-level radioactive waste, low-level mixed waste, and hazardous chemical waste generated during operations. The analysis also addresses the impact of transporting large quantities of calcium fluoride. Finally, the analysis indicates that transportation impacts were evaluated for distances ranging from 155 to 3,100 miles [250 to 5,000 km], a range that would certainly bound transportation distances that might be involved in a private sector facility (See LES Exhibit 18, Vol. 2, Appendix J, p. J-10).

Q25. In reviewing this analysis, did you conclude that it encompassed the types of material and the distances that such material might be transported if LES were to pursue the private sector deconversion option?

A25. (RMK) Yes, these are the types of materials that would be transported if we were to pursue the private sector deconversion option, although the quantities of such materials that we would be transporting if we were to pursue this option would be proportionally less than the quantities associated with the size of the deconversion facility and the volume of DUF₆ to be processed at that facility analyzed by DOE in its PEIS.

Q26. Did the PEIS appropriately evaluate the transportation modes that might be used if you were to pursue a private sector deconversion facility?

A26. (RMK) Yes, the PEIS explicitly evaluated both truck and rail transport modes (*See* LES Exhibit 18, Vol. 2, Appendix J, pp. J-8-9), the modes that we might consider if we were to pursue the private sector option.

Q27. Would you therefore consider the analysis of transportation impacts in the PEIS to bound any transportation impacts that might be associated with a private sector deconversion facility?

A27. (RMK) Yes, I believe the DOE analysis of transportation impacts in the PEIS, which encompasses both normal operations and accident conditions and which addresses the radiological and chemical impacts associated with each, bounds the transportation impacts that might be experienced with a private sector deconversion facility.

Q28. Did you reach any conclusion as to the adequacy of the existing environmental analyses for the environmental impacts associated with the decontamination and decommissioning of a deconversion facility?

A28. (RMK) Yes. The two site-specific EISs each analyze the environmental impacts associated with the decontamination and decommissioning of a deconversion facility (*See* LES Exhibit 16, section 2.4.2.15; LES Exhibit 17, section 2.4.1.15). The analyses considered the human health and safety impacts, both for the on-site workforce and the off-site public. The analyses also considered impacts associated with air quality, waste management, and

socioeconomics. In the case of radiation doses, the analyses indicated that the decontamination and decommissioning activities could be undertaken in a manner that would comply with all applicable regulatory standards. The analyses also estimated total waste volume that would be generated in the decontamination and decommissioning of the facility, noting, for example, that "of the total materials generated during the D&D of the conversion facility, both LLMW and hazardous wastes would make up 2% to 3% of the total, and LLW would constitute about 6% to 7% . The majority of the D&D materials (approximately 88% of the total) would be 'clean'" (See LES Exhibit 16, section 5.9.5, p. 5-142; LES Exhibit 17, section 5.9.5, p. 5-124-125). Based upon the comprehensiveness of DOE's analysis and, again, because the size of the deconversion facility evaluated by DOE would be a larger facility than compared to that required for NEF's DUF₆, I concluded that the environmental evaluation undertaken by DOE would clearly be bounding for a private sector deconversion facility, should LES decide to pursue this option.

Q29. Based upon your conclusion that the existing environmental impact statements appropriately bound the environmental impacts of a deconversion facility for NEF's DUF₆ -- whether at a private sector facility or at one of the DOE deconversion facilities -- was it appropriate, in your judgment, for the NRC, in its Draft Environmental Impact Statement ("DEIS"), to rely on these EISs in discussing the environmental impacts of a deconversion facility?

A29. (RMK) Yes, the EISs cited in the NRC's DEIS clearly bound the environmental impacts of a deconversion facility, whether a private sector or DOE facility, for the DUF₆ that will be generated by the NEF.

Q30. Does this conclude your testimony?

A30. (RMK) Yes.

RESUME

Rod M. Krich
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Liste, IL 60532
(H) 630 428 1967
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EDUCATION

MS Nuclear Engineering - University of Illinois - 1973
BS Mechanical Engineering - New Jersey Institute of Technology - 1972

EXPERIENCE

1998 to
Present

Exelon (formerly Com Ed)

Vice President, Licensing Projects for Exelon Nuclear, with the overall responsibility for leading Exelon Nuclear's licensing activities on future generation ventures, predominantly leading the licensing effort for a U.S. gas centrifuge enrichment plant. In addition, I have been assisting with the Yucca Mountain project licensing effort and served as the lead on strategic licensing issues with the responsibility of working with the Nuclear Regulatory Commission and the Nuclear Energy Institute on the development of a new approach to licensing new reactors.

Vice President-Regulatory Services responsible for interface with the NRC and State regulatory agencies, and regulatory programs. This responsibility covers all 12 ComEd nuclear units and the Nuclear Generation Group headquarters. With respect to regulatory programs, responsibilities include programs such as the change evaluation process (i.e., 10 CFR 50.59, "Changes, tests and experiments), the operability determination process, and the Updated Final Safety Analysis revision process). In this capacity, I was responsible for improving the relationship with the regulatory agencies such that, taken together with improved plant performance, the special scrutiny applied to the ComEd operating plants will be replaced with the normal oversight process. The Regulatory Services organization consists of a group located at the Nuclear Generation Group headquarters and a Regulatory Assurance group at each plant that has a matrix reporting relationship to the Vice President-Regulatory Services.

1994 to
1998

Carolina Power & Light Company

As Chief Engineer from November 1996 to April 1998, I was head of the Chief Section of the Nuclear Engineering Department. In this capacity, I was responsible for maintaining the plant design bases and developing, maintaining and enforcing the engineering processes procedures. In addition to the corporate Chief Section, the Design Control groups at each of the nuclear plant sites reported to me starting in February 1997.

As Manager - Regulatory Affairs at the H. B. Robinson Steam Electric Plant, Unit No. 2 (Westinghouse PWR) from February 1994 to November 1996, the managers of Licensing/Regulatory Programs, Emergency Preparedness, and Corrective Action/Operating Experience Program organizations reported to me. As such, I was responsible for all interface and licensing activities involving the NRC headquarters and regional office, environmental regulatory agencies, and the Institute of Nuclear Power Operations. My responsibilities also included implementation of the Emergency Preparedness program, and administration of the Corrective Action and Operating Experience programs. After assuming my position in Carolina Power &

Light Company, I was instrumental in revising and upgrading the IOCFR50.59 safety evaluation program, and was responsible for its implementation at the plant site. My group was also responsible for leading the team that prepared the NRC submittal containing the conversion to the improved Technical Specifications.

1988 to
1994

Philadelphia Electric Company

As Manager - Limerick Licensing Branch at the Nuclear Group Headquarters, responsible for all licensing activities for the two unit Limerick Generating Station (General Electric BWR) conducted with the NRC headquarters and all enforcement issues involving NRC Region I, including completion of the final tasks leading to issuance of the Unit 2 Operating License. Special projects included assisting in the development of the Design Baseline Document program, obtaining NRC approval for an Emergency Operations Facility common to two sites, preparation of the Technical Specification changes to extend the plant refueling cycle to 24 months and to allow plant operation at uprated power, and obtaining NRC approval of a change to the Limerick Operating Licenses to accept and use the spent fuel from the Shoreham plant. I was also responsible for the development and implementation of the IOCFR50.59 safety evaluation process used throughout the nuclear organization, development of the initial Updated Final Safety Analysis Report for Limerick Generating Station, and served as the Company's Primary Representative to the BWR Owners' Group.

1986 to
1988

Virginia Power Company

As the Senior Staff Engineer in the Safety Evaluation and Control section, my activities involved responding to both routine and special licensing issues pertaining to North Anna Power Station (Westinghouse PWR). My duties ranged from preparing Technical Specification interpretations and change requests, exemption requests, and coordinating responses to NRC inspection reports, to developing presentations for NRC enforcement conferences and coordinating licensing activities associated with long-term issues such as ATWS and equipment qualification. I was also the Company representative to the utility group formed to address the station blackout issue, and was particularly involved in developing an acceptable method by which utilities can address equipment operability during station blackout conditions.

1981 to
1986

Consumers Power Company

During my employment with Consumers Power Company, I worked at the General Office in the Nuclear Licensing Department and the Company's Palisades Plant (Combustion Engineering PWR). While in the Nuclear Licensing Department, I held the position of Plant Licensing Engineer for the Big Rock Point Plant (General Electric BWR), Section I-lead - Special Projects Section, and Section Head - Licensing Projects and Generic Issues Section. My responsibilities while in these positions included managing the initial and continuing Palisades Plant FSAR update effort, developing and operating a computerized commitment tracking system, managing the licensing activities supporting the expansion of the Palisades Plant spent fuel storage capacity, and coordinating activities associated with various generic issues such as fire protection and seismic qualification of equipment. As the administrative point of contact for INPO, I coordinated the Company's efforts in responding to plant and corporate INPO evaluations. At the Palisades Plant, I was head of the Plant Licensing Department. My responsibilities primarily entailed managing the on-site licensing activities, including preparation of Licensee Event Reports and responses to

inspection reports, interfacing with NRC resident and regional inspectors, and serving as chairman of the on-site safety review committee. I also administered the on-site corrective action system and managed the on-site program for the review and implementation of industry operating experience.

1974 to
1981

General Atomic Company

My positions while at the General Atomic Company were principally concerned with fuel performance development efforts for the High Temperature Gas-Cooled Reactor (HTGR). Specific responsibilities included two assignments to the French Atomic Energy Commission laboratories at Saclay and Grenoble (France) for the purpose of coordinating a cooperative test program. I was also assigned as a consultant to the Bechtel Corporation, Los Angeles Power Division, and worked in the Nuclear Group of the Alvin M. Vogtle Nuclear Project for Georgia Power.

RELATED EXPERIENCE

University of Illinois

As a graduate research assistant, I assisted in both the experimental and analytical phases of a NASA-funded program in the study and modeling of far-field noise generated by near-field turbulence in jets.

PUBLICATIONS

General Atomic Company

"CPL-2 Analysis: Fission Product Release, Plateout and Liftoff."

University of Illinois

"Prediction of Far-Field Sound Power Level for Jet Flows from Flow Field Pressure Model," paper 75-440 in the AIAA Journal, co-authored by Jones, Weber, Hammersley, Planchon, Krich, McDowell, and Northranandan.

MEMBERSHIPS

American Nuclear Society
Pi Tau Sigma - Mechanical Engineers 1-Honorary Fraternity
American Association for the Advancement of Science

REFERENCES

Furnished upon request

1 MR. REPKA: Okay now gentlemen, I'll have
2 you both turn to a second document dated February 3rd,
3 2005, entitled revised pre-filed rebuttal testimony of
4 Rod M. Krich and Paul G. Schneider on behalf of
5 Louisiana Energy Services LP on contention NIRS/PC EC-
6 4, impacts of waste storage.

7 Do you have that document in front of you?

8 WITNESS KRICH: Yes.

9 WITNESS SCHNEIDER: Yes.

10 MR. REPKA: Do you recognize that
11 document?

12 WITNESS KRICH: Yes.

13 WITNESS SCHNEIDER: Yes.

14 MR. REPKA: And was it prepared by you or
15 under your supervision?

16 WITNESS KRICH: Yes,

17 WITNESS SCHNEIDER: Yes, it was.

18 MR. REPKA: Do either of you have any
19 corrections to be made to this document?

20 WITNESS SCHNEIDER: Yes, on page 10,
21 second paragraph, the line starting the ability of
22 these filters to operate. The word that was written
23 in reliability, and it should be reliable.

24 MR. LOVEJOY: Would you please repeat
25 that?

1 WITNESS SCHNEIDER: Okay. Page ten,
2 second paragraph, about halfway down the second
3 paragraph, the line begins the ability of these
4 filters to operate, reliability --

5 CHAIR BOLLWERK: It's the seventh line.

6 WITNESS KRICH: Reliably, it should be.

7 WITNESS SCHNEIDER: It should be reliably.

8 MR. REPKA: And additionally I'll note for
9 the record, because my obsessive compulsive
10 tendencies, I just noticed in the caption there should
11 be a quotation mark --

12 WITNESS SCHNEIDER: Yes.

13 MR. REPKA: -- in the last line of the
14 title after the open paren, and before the word
15 impacts.

16 WITNESS KRICH: I had one other request to
17 make.

18 MR. REPKA: Okay.

19 WITNESS KRICH: it's not a correction so
20 much as if we could go ahead and enter question seven
21 and answer seven now because it is -- since this was
22 written the press release has been made, and so this
23 could become public.

24 MR. REPKA: Okay, what I'll do with that
25 is, Mr. Krich, is I have a separate piece of paper

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1 with the nonproprietary Q and A seven, and we'll deal
2 with that separately next.

3 So recognizing that Q and A seven is
4 omitted from this version of the testimony dated
5 February 3rd, do you -- is this document true and
6 correct to the best of your knowledge and belief?

7 WITNESS KRICH: It is.

8 WITNESS SCHNEIDER: Yes.

9 MR. REPKA: And do you accept it as your
10 rebuttal testimony in this proceeding?

11 WITNESS KRICH: Yes.

12 WITNESS SCHNEIDER: Yes.

13 MR. REPKA: Okay. I'll ask the Board at
14 this point to accept into the record of this case the
15 revised pre-filed rebuttal testimony of Mr. Krich and
16 Mr. Schneider on contention EC-4.

17 CHAIR BOLLWERK: All right. Let me just
18 ask you a question. I take it the other parties have
19 seen the nonproprietary version of question seven and
20 they have no --

21 MR. REPKA: Well, I'm going to pass that
22 out separately and the nonproprietary version is
23 exactly the same as the proprietary version they had
24 previously, only the legend proprietary protected
25 information has been removed.

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1 CHAIR BOLLWERK: Okay, I just want to make
2 sure, before I put this in, that we don't have a
3 problem with that. With that having been said, anyone
4 have any objections, then, to the admission of this
5 testimony?

6 (No response.)

7 CHAIR BOLLWERK: All right, then, the
8 record should reflect that there being no objection
9 from either of the parties, that the pre-filed
10 testimony of Michael Schwartz and Rod Krich, on behalf
11 of LES concerning contention -- oops I think I have
12 the wrong testimony here.

13 Hold on, that is -- here we go. Let's try
14 again here.

15 The revised pre-filed rebuttal testimony
16 of Mr. Krich and Paul Schneider, on behalf of
17 Louisiana Energy Services on Contention NIRS/PC EC-4,
18 Impacts of Waste Storage (February 3rd, 2005) should
19 be admitted as if read.

20 (Whereupon, the pre-filed rebuttal
21 testimony of Mr. Krich and Mr. Schneider was bound
22 into the record as if having been read.)

February 3, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:)	
)	Docket No. 70-3103-ML
Louisiana Energy Services, L.P.)	
)	ASLBP No. 04-826-01-ML
(National Enrichment Facility))	

**REVISED PREFILED REBUTTAL TESTIMONY OF
 ROD M. KRICH AND PAUL G. SCHNEIDER
 ON BEHALF OF LOUISIANA ENERGY SERVICES, L.P.
ON CONTENTION NIRS/PC EC-4 (IMPACTS OF WASTE STORAGE)**

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I. WITNESS BACKGROUND

Q1. Please state your name, occupation, employer, and responsibilities relative to the licensing of Louisiana Energy Services, L.P.'s ("LES") proposed National Enrichment Facility ("NEF").

A1. I, Rod M Krich ("RMK"), am Vice President of Licensing, Safety, and Nuclear Engineering for LES, the applicant in this matter. I am presently "on loan" to LES from Exelon Nuclear, where I am Vice President Licensing Projects. I am responsible for leading the effort on behalf of LES to obtain a license from the U.S. Nuclear Regulatory Commission ("NRC"), as well as other necessary state and federal permits, to construct and operate the proposed National Enrichment Facility. A full statement of my professional qualifications was included with LES's initial prefiled testimony in this proceeding, submitted on January 7, 2005 (referred to hereinafter as "Krich Direct Testimony").

I, Paul G. Schneider ("PGS"), am a technical and management consultant working for SMG Inc, a consulting services company. I have been retained as an expert consultant by

LES to assist in the evaluation of issues associated with the environmental impacts of deconverting depleted uranium hexafluoride to U_3O_8 . I hold a BS degree in Physics and Mathematics from Wake Forest University and a MS degree in Physics from Emory University. I have more than 40 years of experience in the nuclear industry. This includes the design of chemical processing plants to convert depleted uranium hexafluoride to uranium oxide and a fluoride byproduct. I was previously employed by USEC Inc. as Director of the Nuclear Fuel Cycle and, prior to that, by Lockheed Martin as Director of the Atomic Vapor Laser Isotope Separation ("AVLIS") Program. As part of my responsibilities as Director of the Fuel Cycle at USEC Inc., I directed the activities to prepare a bid proposal to the Department of Energy to convert its stockpile of depleted uranium hexafluoride to a more stable form for permanent disposal. I led USEC's activities to select a cost-efficient process, determine the best disposition of its products, and then prepare a conceptual design of the processing plants. While at USEC Inc., I also managed the disposition of USEC's depleted uranium hexafluoride at the Starmet plant in Barnwell South Carolina, which involved the conversion by Starmet of the depleted uranium hexafluoride to DUF_4 and calcium fluoride. In this capacity, I oversaw the disposal of the DUF_4 and the calcium fluoride. A detailed statement of my professional qualifications is attached hereto.

Q2. Are you testifying in this proceeding as an expert?

A2. (RMK) Yes.

(PGS) Yes.

Q3. What is the purpose of this rebuttal testimony?

A3. (RMK, PGS) The purpose of this rebuttal testimony is to specifically address the written direct testimony of Dr. Arjun Makhijani regarding Contention NIRS/PC EC-4 in this

proceeding (referred to hereinafter as "Makhijani Direct Testimony"). This rebuttal testimony is limited to those portions of Dr. Makhijani's testimony that were not excluded by the Licensing Board in its Memorandum and Order (Ruling on Motions In Limine and Providing Administrative Directives) of January 21, 2005. We have reviewed those portions of Dr. Makhijani's testimony. We show how the issues raised by Dr. Makhijani were either addressed in our initial direct testimony in this proceeding or are irrelevant to the approach that LES intends to pursue for the deconversion of the depleted uranium hexafluoride to be generated by the NEF. We also provide some additional responses to issues raised by Dr. Makhijani. In general, as reflected in the Krich Direct Testimony, we conclude that LES and the NRC staff have performed a complete and adequate assessment of the potential environmental impacts associated with the construction and operation of a deconversion facility.

II. RESPONSE TO CLAIMS MADE IN THE PREFILED DIRECT TESTIMONY OF NIRS/PC WITNESS ARJUN MAKHIJANI

Q4. Please summarize the major opinions and conclusions stated by NIRS/PC witness Arjun Makhijani in his prefiled direct testimony relative to Contention NIRS/PC EC-4.

A4. (RMK, PGS) Dr. Makhijani makes the following five points in his direct testimony:

First, Dr. Makhijani makes the statement: "[T]he initial application, filed in December 2003, does not discuss the impact of deconversion at all. There is reference to the fact that DOE has contracted for the construction of DUF₆ conversion plants at Paducah and Portsmouth in the first Environmental Report at page 4.13-2, but there is no discussion of the impact of such plants." (Makhijani Direct Testimony, Answer 4).

Second, Dr. Makhijani raises a number of concerns related to the potential use by LES of a deconversion process that would upgrade to anhydrous hydrofluoric acid ("HF") the

HF produced from deconverting depleted uranium hexafluoride to U_3O_8 . In fact, the concerns identified by Makhijani relative to upgrading HF to anhydrous HF are by far the principal focus of his testimony. These include the following statements:

- “If the preferred option of neutralizing the HF and disposing of the calcium fluoride is replaced by a decision by LES to produce and ship anhydrous HF (AHF), the potential environmental impacts on the environment are likely to be higher. . . . [T]he health and environmental impacts on routine operation from the greater volatility and general hazards posed by anhydrous HF versus aqueous HF were not analyzed by the DOE EIS for the Paducah or Portsmouth facilities cited by the NRC in the LES DEIS analysis” (Makhijani Direct Testimony, Answer 5).
- “LES has not decided whether the hydrofluoric acid generated will be neutralized to form calcium fluoride (CaF_2) or distilled to form anhydrous hydrofluoric acid (AHF), however, the NRC stated that CaF_2 disposal was the only scenario that was reasonable to include in the DEIS” (Makhijani Direct Testimony, Answer 9).
- “[I]f any consideration is to be given by LES to the possible production and sale of anhydrous hydrofluoric acid for reuse, than [sic] an examination of this option's environmental impacts should also be carried out.” (Makhijani Direct Testimony, Answer 9).
- “There is no adequate discussion in the ER, the LES DEIS, or the DOE EISs for the Paducah and Portsmouth facilities of the anhydrous hydrofluoric acid (AHF) process or its operations issues, environmental impacts and transportation risks. LES has not yet formally selected a deconversion process, and the production of AHF process is one alternative under possible consideration.” (Makhijani Direct Testimony, Answer 8).
- “The costs, operations issues, environmental impacts and transportation risks of AHF in the contest of deconversion of DUF_6 are at this stage not based on actual experience. If the preferred option of neutralizing the HF and disposing of the calcium fluoride as LLW is replaced by a decision to produce and ship anhydrous HF, the potential impacts on the environment are likely to be higher and should be considered in the LES EIS.” (Makhijani Direct Testimony, Answer 8).
- “If any consideration is to be given by LES to the possible production and sale of anhydrous hydrofluoric acid for reuse, then an examination of this option's operations issues, environmental impacts and transportation risks should also be carried out.” (Makhijani Direct Testimony, Answer 9).

- “If the preferred option of neutralizing the HF and disposing of the calcium fluoride as LLW is replaced by a decision to produce and ship anhydrous HF, the potential impacts on the environment are likely to be higher.” (Makhijani Direct Testimony, Answer 9).

Third, Dr. Makhijani contends that there currently are no DOE or general NRC guidelines that govern the free release of contaminated hydrofluoric acid or calcium fluoride (Makhijani Direct Testimony, Answers 5, 11).

Fourth, Dr. Makhijani contends that “a consideration of lower filter efficiency [for filtering hydrofluoric acid that would be generated in large amounts during routine operations of the deconversion facility] should be included in the assessment of the routine impacts of the deconversion facility.” (Makhijani Direct Testimony,).

Fifth, Dr. Makhijani asserts as a “fact” that “the cumulative transportation distances considered for the DOE facilities are different from those that may be required for shipping the material generated by the proposed LES facility.” (Makhijani Direct Testimony, Answer 10).

Q5. Do you have a view about the five key points that Dr. Makhijani makes in his direct testimony, as you have just outlined them?

A5. (RMK, PGS) Yes. With respect to the first point above, related to whether the LES Environmental Report includes a discussion of the environmental impacts of a deconversion facility, Dr. Makhijani, himself, acknowledges that Revision 2 of the license application contains such a discussion on page 4.13-3 of the ER (*See* Makhijani Direct Testimony, Answer 4). As Dr. Makhijani recognizes, Revision 2 of the application references the environmental evaluations undertaken by the Department of Energy for deconversion facilities to be built at Portsmouth, OH and Paducah, KY, as well as the NRC's Final Environmental Impact Statement for the Claiborne Enrichment Center. In view of this, we believe that the first paragraph of EC-4, which

contends that LES's ER "fails to discuss the environmental impacts" of a deconversion plant, is now moot.

Q6. With respect to the second issue in Dr. Makhijani's direct testimony, related to the possible use of a deconversion process that would upgrade the hydrofluoric acid from a deconversion plant to anhydrous HF, do you have an opinion about the concerns identified by Dr. Makhijani?

A6. (RMK, PGS) Yes. As was noted in the Krich Direct Testimony, DOE's Programmatic Environmental Impact Statement ("PEIS"), which is incorporated by reference in the site-specific EISs for Paducah, KY and Portsmouth, OH, evaluated both the process that produces HF and the process that produces anhydrous HF: "The environmental impacts of both options (production of anhydrous HF for commercial use and neutralization of HF to CaF_2) were considered in this PEIS." (See Krich Direct Testimony, Answer 23). Similarly, "[t]wo technologies were considered for management of the HF following conversion of UF_6 to U_3O_8 . The first process would upgrade the concentrated HF to anhydrous HF for sale. Anhydrous HF is a valuable product; one potential use for HF is in the production of UF_6 from natural uranium ore for feedstock to the gaseous diffusion process. The second process would neutralize the HF to CaF_2 for disposal or sale, depending on whether the CaF_2 with trace amounts of uranium could be marketed." (See Krich Direct Testimony Answer 23). Thus, it is clear that, contrary to Dr. Makhijani's statement in his direct testimony, the DOE PEIS did, in fact, evaluate both processes, the one that produces aqueous HF and the one that produces anhydrous HF.

Q7. Question 7 and the answer thereto ~~are proprietary and~~ have been provided under separate cover.

A7. [Proprietary]

Q8. The third issue raised in the Makhijani Direct Testimony relates to the lack of any DOE or general NRC guidelines that govern the free release of contaminated hydrofluoric acid or calcium fluoride. Do you have an opinion about this issue?

A8. (RMK, PGS) Yes. Dr. Makhijani's concern on this issue appears to be twofold: (1) the ability of LES to sell or otherwise reuse the hydrofluoric acid resulting from the deconversion process on the open market (*See* Makhijani Direct Testimony, at 23); and (2) the ability of LES to dispose of the CaF_2 that would result from the neutralization of the hydrofluoric acid (Makhijani Direct Testimony, at 23).

As to the first concern, the important point to emphasize is that, as to the HF that would be produced as a result of the deconversion process, both the DOE PEIS and the site-specific EISs evaluate the environmental impacts associated with the possible sale of this HF, as well as the impacts associated with the disposal of the this HF. (Exhibit 18, at F-12; Exhibit 17, at 2-16 to 2-19; and Appendix E, Sections E.3 and E-4; Exhibit 16 at 2-17 to 2-18; and Appendix E, Sections E.3 and E.4). In discussing these impacts, the site-specific EISs explicitly discuss the process for ensuring that appropriate limits are established and enforced, noting that "authorized limits for DOE property that will be released from DOE control are established and implemented on a case-specific basis according to a process defined by DOE Order 5400.5, "Radiation Protection of the Public and the Environment," and further noting that this process is designed to ensure that "the level of residual radioactive material in the property to be released is as near to background levels as is reasonably practicable, as determined by applying the principles of the DOE ALARA process." (Exhibit 17, at. E-8-9; Exhibit 16, at E-8-9). Finally, DOE notes that if HF is proposed to be released for unrestricted use, the process of establishing and enforcing limits would include "coordination with the U.S. Nuclear Regulatory Commission or the

Responsible Agreement State agency." (Exhibit 17, at E-9; Exhibit 16, at E-9). Thus, whether or not LES intends to seek a commercial market for the HF -- and, at this point, LES does not intend to seek to sell the HF -- the DOE PEIS and the site-specific EISs contain an appropriate discussion of the regulatory issues associated with the release of the HF for unrestricted use.

As to the second issue, the DOE PEIS (Exhibit 18), as well as the two site-specific EISs for Portsmouth (Exhibit 16) and Paducah (Exhibit 17) contain a thorough discussion of the extent to which it is expected that the CaF₂ would be contaminated by the presence of uranium. For example, in Appendix F of the PEIS, DOE specifically states that "[t]he CaF₂ potentially produced in the U₃O₈ conversion process was assumed to have a uranium content of less than 1 ppm. (Exhibit 18, Volume 2, at F-64). This conclusion is supported by the commercial experience of Cogema at its W Plant in Pierrelatte, France, where the level of uranium contamination in the CaF₂ is routinely below 1 ppm. (See Exhibit 76). At such low levels of contamination, the CaF₂ could be disposed of in a municipal land fill. Indeed, there are examples of exactly this approach, where regulators have made decisions to authorize, or would be prepared to authorize, the disposal of CaF₂ in municipal landfills. (See Exhibits 21, 77, and 78). In any event, DOE's PEIS includes a thorough discussion of the waste management impacts associated with the disposal of CaF₂, whether disposed of in a municipal landfill or a low-level radioactive waste disposal facility. (See Exhibit 18, Volume 2, Section F.3.7.1). Similarly, the site-specific DOE EISs for the Portsmouth site (Exhibit 16) and Paducah site (Exhibit 17) both contain a discussion of the issues associated with the disposal of CaF₂ (See Exhibit 16, Section 5.2.3.7; Exhibit 17, Section 5.2.2.7). Importantly, as with HF, the site-specific EISs include a detailed discussion of the process for ensuring that the appropriate health and safety standards are established and applied in addressing the unrestricted release of CaF₂.

Thus, in response to Dr. Makhijani argument that “[t]he treatment and disposal of this [CaF₂] waste stream would add to the environmental impacts of the routine operation of the deconversion facility and these impacts should be considered for the specific case of the proposed LES facility in the ER and DEIS” (Makhijani Direct Testimony, Answer 11), the analysis in the DOE PEIS and the two site-specific EISs is both comprehensive and bounding of any impacts that might be experienced at the NEF.

Q9. With respect to the fourth issue in Dr. Makhijani's direct testimony, in which he contends that a “lower filter efficiency should be included in the assessment of the routine impacts of the deconversion facility”, do you have an opinion on this issue?

A9. (RMK, PGS) Yes. First, in support of his argument that a “lower filter efficiency” should be included in the assessment, Dr. Makhijani premises his entire argument on a reference to a study that was apparently undertaken of “scrubber efficiency” in the scrap recovery operations at the uranium plant near Fernald, Ohio. On the ostensible basis that “low scrubber efficiency was frequently experienced” at this site, Dr. Makhijani contends that a lower filter efficiency should have been evaluated for the proposed deconversion plant. (See Makhijani Direct Testimony, Answer 10, and Violleque reference cited in footnote 14).

In reviewing the report cited by Dr. Makhijani, which is titled “The Fernald Dosimetry Reconstruction Project” (hereinafter referred to as “The Fernald Report”), it is clear that it has absolutely no applicability to the HF filter system that would be employed by a deconversion facility. The Fernald Report discusses a plant that processes U solutions with two types of air filtration systems used at Fernald. One is a dust collector and the other is a scrubber. The dust collectors simply remove airborne particulate matter using large fiber vacuum cleaner bags. Scrubbers are treatment systems for cleaning effluents using liquid droplets. The units

spray a caustic liquid (Sodium Hydroxide, NaOH) into the exhaust system that scavenges particulate matter and reactive gasses from the exhaust and collects the material using a mist collection system. Importantly, both systems are installed to remove uranium compounds (*i.e.*, particulates) from the effluent, not HF in a gaseous state.

The effluent system addressed in the Fernald Report does not employ an activated carbon system or a multilayer potassium hydroxide ("KOH") scrubber that would be used to remove DUF6 and HF from the effluent of a deconversion plant, . Indeed, it is important to bear in mind that the Fernald facility was built more than 50 years ago to meet then-applicable standards. By comparison, current operating experience with activated carbon and KOH scrubber systems, including the experience at Urenco's enrichment facilities, has demonstrated the ability of these filters to operate reliably^(y) at high efficiencies. For these reasons, the Fernald Report is simply not relevant when comparing collection systems discussed in the report to the activated carbon and KOH systems that would be available to remove HF at a deconversion facility. Furthermore, activated carbon filters and KOH scrubber systems are not subject to corrosion by HF.

Second, Dr. Makhijani further states that "even if a 99.9 percent efficiency scrubber is installed, maintaining the efficiency at such a high level would be difficult and expensive due to the corrosive nature of HF. (See Makhijani Direct Testimony, Answer 10, footnote14). Yet there is absolutely no support for this statement anywhere in Dr. Makhijani's testimony. Thus there is no way to evaluate Dr. Makhijani's argument, as it is nothing more than an unsubstantiated assertion.

Third, it should be noted that the estimated process stack emissions of HF, as calculated by DOE in its PEIS, are truly de minimus, when compared to typical state standards

for HF. For example, the estimated 24-hour maximum HF concentrations at representative facility boundaries for the conversion to U_3O_8 with HF neutralization are 0.6 percent of the applicable state standard (*See* Exhibit 18, Volume 2, Section F.3.3.2).

Finally, as a matter of design, it is feasible to design a system that will achieve a very high level of filtering efficiency, based upon a simple trade-off between operating cost and release standards. Indeed, there is abundant operating experience that today's standards can be met with cost-efficient designs. In this regard, LES has committed to NRC that we will achieve a 99% efficiency for HF removal and monitor the effluent gas at the NEF, itself, and fully expect, therefore, that this level can be achieved for HF removal at a deconversion facility.

For the foregoing reasons, we strongly disagree with Dr. Makhijani's argument that the issue of "filter efficiency" was not adequately evaluated in the DOE environmental evaluations. In fact, Dr. Makhijani's testimony on this issue constitutes nothing more than an assertion, based upon a single reference that has no technical applicability to a deconversion facility, that "consideration of the impacts of lower filter efficiency should be included in the assessment".

Q10. With respect to the fifth issue in Dr. Makhijani's direct testimony, in which he asserts that "the cumulative transportation distances considered for the DOE facilities are different from those that may be required for shipping the material generated by the proposed LES facility", do you have an opinion on this issue?

A10. (RMK, PGS) Yes. As was noted in the Krich Direct Testimony, the DOE PEIS indicates that transportation impacts were evaluated for distances ranging from 155 to 3,100 miles [250 to 5,000 km], a range that would certainly bound transportation distances that might be involved in a private sector facility. (*See* LES Exhibit 18, Vol. 2, Appendix J, at J-10).

Q11. Does this conclude your testimony?

A11. (RMK, PGS) Yes.

1 MR. REPKA: Thank you. And I'm going to
2 hand two copies of this to the Court Reporter, of each
3 of those documents.

4 Mr. Krich, you have, in front of you a
5 one-page document that consists of question 7 and
6 answer 7?

7 WITNESS KRICH: I do.

8 MR. REPKA: And is that the non-
9 proprietary testimony of yours to be included on the
10 rebuttal testimony just entered into the record?

11 WITNESS KRICH: Yes, it is.

12 MR. REPKA: Do you have any corrections to
13 that testimony?

14 WITNESS KRICH: No, I don't.

15 MR. REPKA: And is this question and
16 answer true and correct to the best of your knowledge
17 and belief?

18 WITNESS KRICH: Yes, it is.

19 MR. REPKA: I'm going to pass out copies
20 of the non-proprietary version of Q 7 and answer 7.

21 CHAIR BOLLWERK: While he is doing that
22 let's take a break. Our court reporter has to fix
23 something.

24

25

1 (Whereupon, the above-entitled matter
2 went off the record at 9:37 a.m. and
3 went back on the record at 9:38 a.m.)

4 CHAIR BOLLWERK: Back on the record,
5 please.

6 MR. REPKA: As I noted, previously, this
7 is the exact same testimony as previously filed, only
8 the protected information legend has been removed.
9 And I will ask that the Board accept into the
10 evidence, on this Contention, this testimony of Mr.
11 Krich.

12 CHAIR BOLLWERK: All right, any objections
13 from either of the parties?

14 MR. LOVEJOY: No objection.

15 MR. CUMMINGS: No objection.

16 CHAIR BOLLWERK: Hearing none then this
17 document, which is marked with question Q7 and A7,
18 with the answer of Mr. Krich to question 7 should be
19 made part of the record at this point, as if read.

20 MR. REPKA: And I assume, Judge Bollwerk,
21 this will be bound into the transcript immediately
22 following the rebuttal testimony?

23 CHAIR BOLLWERK: Just following the
24 rebuttal testimony.

25

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1 (Whereupon Question 7 and Answer 7 of Mr.
2 Krich's pre-filed rebuttal testimony was bound into
3 the record as if having been read.)

Q7. Is there anything further that warrants mention on this issue?

A7. (RMK) Yes. While it is clear that the DOE PEIS analyzed the environmental impacts of the process that results in anhydrous HF, I should also state that LES is in the process of executing a Memorandum of Understanding with AREVA Enterprises, Inc., pursuant to which the two parties are announcing their intent to enter into a definitive contract for a deconversion plant for the depleted uranium hexafluoride to be generated by the NEF. This deconversion plant would be based upon one of AREVA's deconversion technologies. These technologies, which have been in use in Pierelatte, France for 20 years, and are the basis for a planned plant in Capenhurst, UK, as well as the two plants in the design and construction phase in Portsmouth, Ohio and Paducah, Kentucky, employ processes that result in aqueous HF. As I stated earlier, however, a substantial part of Dr. Makhijani's direct testimony focuses on his concern with anhydrous HF and the process that produces it, including issues associated with the transportation and resale of anhydrous HF. Given the decision reached by LES not to pursue the process that results in anhydrous HF, I would submit that there is no need to consider any issues relating to anhydrous HF, or the process that produces it, in this proceeding.

1 MR. REPKA: I'm going to turn, now, to the
2 exhibits that correspond to these two pieces of
3 testimony, and I will identify those, briefly, for the
4 record.

5 The first is LES exhibit number 14, the
6 National Enrichment Facility Environmental Report
7 section 4.13.3.1.

8 (Whereupon, the above-
9 referenced to document was
10 marked as LES Exhibit No. 14
11 for identification.)

12 MR. REPKA: The next is LES exhibit number
13 15, Final Environmental Impact Statement for the
14 Construction and Operation of the Claiborne Enrichment
15 Center, NUREG 1484, pages 4-65 through 4-66 and
16 Appendix A.

17 (Whereupon, the above-
18 referenced to document was
19 marked as LES Exhibit No. 15
20 for identification.)

21 MR. REPKA: LES exhibit number 16, volume
22 1 of DOE-EIS 0360, Construction and Operation of a
23 Depleted Uranium Hexafluoride Conversion Facility at
24 the Portsmouth, Ohio Site.

25

1 (Whereupon, the above-
2 referenced to document was
3 marked as LES Exhibit No. 16
4 for identification.)

5 MR. REPKA: LES exhibit number 17, volume
6 1 of DOE/EIS-0359, Construction and Operation of a
7 Depleted Uranium Hexafluoride Conversion Facility at
8 the Paducah, Kentucky, site.

9 (Whereupon, the above-
10 referenced to document was
11 marked as LES Exhibit No. 17
12 for identification.)

13 MR. REPKA: LES exhibit number 18, volumes
14 1 and 2 of DOE/EIS-0269, the Final Programmatic
15 Environmental Impact Statement for Alternative
16 Strategies for the Long-Term Management and Use of
17 Depleted Uranium Hexafluoride, sometimes referred to
18 as the PEIS.

19 (Whereupon, the above-
20 referenced to document was
21 marked as LES Exhibit No. 18
22 for identification.)

23 MR. REPKA: LES exhibit number 19 is a
24 letter dated September 22nd, 1992, from John W. N.
25 Hickey to W. Howard Arnold.

1 (Whereupon, the above-
2 referenced to document was
3 marked as LES Exhibit No. 19
4 for identification.)

5 MR. REPKA: LES exhibit number 20 is a
6 letter dated October 18th, 2000, from Erick J. Leeds
7 to the Department of Energy.

8 (Whereupon, the above-
9 referenced to document was
10 marked as LES Exhibit No. 20
11 for identification.)

12 MR. REPKA: LES exhibit number 21 is an
13 electronic correspondence regarding calcium fluoride
14 disposal summary.

15 (Whereupon, the above-
16 referenced to document was
17 marked as LES Exhibit No. 21
18 for identification.)

19 MR. REPKA: LES exhibit number 74 is a
20 Department of Energy Record of Decision dated July
21 27th, 2004 on the Construction and Operation of a
22 depleted uranium hexafluoride conversion facility at
23 the Portsmouth Ohio site, and that is excerpted from
24 the Federal Register.

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1 (Whereupon, the above-
2 referenced to document was
3 marked as LES Exhibit No. 74
4 for identification.)

5 MR. REPKA: LES exhibit number 75 is a
6 Department of Energy Record of Decision on the
7 Construction and Operation of a Depleted Uranium
8 Hexafluoride Conversion Facility at the Paducah,
9 Kentucky Site, again a Federal Register excerpt, dated
10 July 27th, 2004.

11 (Whereupon, the above-
12 referenced to document was
13 marked as LES Exhibit No. 75
14 for identification.)

15 MR. REPKA: LES exhibit number 76 is a
16 document dated September 26th, 2004, Areva-Cogema
17 Defluorination of Depleted UF-6, the W Deflourination
18 Facility.

19 (Whereupon, the above-
20 referenced to document was
21 marked as LES Exhibit No. 76
22 for identification.)

23 MR. REPKA: LES exhibit 77 is a letter
24 dated April 1st, 1999, from V. Autry of the Division
25 of Waste Management Bureau of Land and Waste

1 Management, South Carolina Department of Health and
2 Environmental Control to L. Garner, Regulatory Affairs
3 Coordinator, Starmet CMI, dated April 1st, 1999.

4 (Whereupon, the above-
5 referenced to document was
6 marked as LES Exhibit No. 77
7 for identification.)

8 MR. REPKA: LES exhibit 78 is another
9 letter dated June 17th, 1999, from V. Autry to L.
10 Garner, Starmet CMI.

11 (Whereupon, the above-
12 referenced to document was
13 marked as LES Exhibit No. 78
14 for identification.)

15 MR. REPKA: LES exhibit 79 was previously
16 identified a proprietary document, I will not move
17 that into evidence at this time.

18 And let me, one additional document not
19 previously identified, which I will pass out here this
20 morning, but I will identify at this time as LES
21 exhibit number 80, is a press release dated February
22 3rd, 2005, entitled LES and Areva Signed Memorandum of
23 Understanding for Deconversion Facility near the
24 National Enrichment Facility.

25

1 (Whereupon, the above-
2 referenced to document was
3 marked as LES Exhibit No. 80
4 for identification.)

5 MR. REPKA: And I will pass that out right
6 now, because that has not been previously circulated.

7 Having identified these documents I would
8 move that the Board accept, I guess I suppose I should
9 first ask that they be marked for identification, and
10 we will do that now.

11 CHAIR BOLLWERK: The party exhibits for
12 LES number 14, 15, 16, 17, 18, 19, 20, 21, 74, 75, 76,
13 77, 78, and 80, as identified by Counsel have been
14 marked for identification.

15 MR. REPKA: And now I will move that these
16 documents be accepted into evidence in connection with
17 this contention.

18 CHAIR BOLLWERK: Let me see if there is
19 any objections.

20 (No response.)

21 CHAIR BOLLWERK: Any from the Staff? No.
22 Any from NIRS/PC? All right, then the record should
23 reflect that LES exhibits 14, 15, 16, 17, 18, 19, 20,
24 21, 74, 75, 76, 77, 78, and 80, as identified by
25 Counsel, are admitted into evidence.

1 (The documents referred to,
2 having been previously marked
3 for identification as LES
4 exhibit numbers 14 through 21,
5 74 through 78 and 80 were
6 admitted into evidence.)

7 MR. REPKA: Two housekeeping matters.

8 CHAIR BOLLWERK: I may have one, too, but
9 let's see what yours are, first.

10 MR. REPKA: Okay. First I have all the
11 exhibits here, for the Clerk, an original and two
12 copies, which I will carry over there at the next
13 convenient opportunity.

14 CHAIR BOLLWERK: All right.

15 MR. REPKA: Second is, on LES exhibit
16 number 18 the copies previously distributed to the
17 parties have some missing sections, and I will pass
18 those out as well, just so that people can make their
19 copies complete.

20 CHAIR BOLLWERK: All right.

21 MR. REPKA: From the PEIS.

22 CHAIR BOLLWERK: All right, why don't we
23 go ahead and do that now so that folks have those.

24 MR. REPKA: And while Mr. O'Neill does
25 that, I may as well bring --

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1 CHAIR BOLLWERK: If you wouldn't mind,
2 that would be great.

3 (Pause.)

4 CHAIR BOLLWERK: My one housekeeping
5 matter, I was looking back at the rebuttal testimony,
6 question 7, the answer that says, question 7 and
7 answer thereto are proprietary and provided under
8 separate cover.

9 Would the parties have any objection, the
10 witnesses, to striking the words "are proprietary"
11 from the testimony, so it will read question 7 and the
12 answer thereto have been provided under separate
13 cover?

14 MR. REPKA: We have no objection.

15 CHAIR BOLLWERK: So there is no -- all
16 right.

17 MR. REPKA: Historically it was true, but
18 no longer necessary.

19 CHAIR BOLLWERK: All right. I'm just
20 thinking that if someone comes along later and reads
21 it they are going to wonder what actually happened.
22 So it will read question 7 and the answer thereto are,
23 I'm sorry, question 7 and the answer thereto have been
24 provided under separate cover.

25 And the answer says proprietary, we will

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1 just strike that as well. Give me one second, let me
2 give this back to the clerk.

3 MR. REPKA: And those changes would need
4 to be noted on the copies I handed to the Court
5 Reporter.

6 (Pause.)

7 CHAIR BOLLWERK: At this point, also, let
8 me see if there is anything further that LES wants to
9 say on the subject related to the testimony that we
10 just admitted, particularly question 7.

11 Is there anything further you all need to,
12 any kind of representations you want to make, or
13 should we just move forward in terms of the --

14 MR. CURTISS: I think we should move
15 forward.

16 CHAIR BOLLWERK: Okay, let's do that,
17 then. All right, Mr. --

18 MR. LOVEJOY: I thought that there was
19 going to be some announcement on the record.

20 MR. CURTISS: We can make that
21 representation at this point. We have, in the
22 discussions that we had this morning with parties, and
23 with the Board, LES is prepared to represent, and
24 commit, at this proceeding, and Mr. Krich will do so
25 as the expert witness on this subject, that in the

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1 deconversion of the depleted uranium hexafluoride that
2 will be generated by the National Enrichment Facility
3 that the deconversion of that depleted uranium
4 hexafluoride will not employ an anhydrous hydrofluoric
5 acid option, or process.

6 And Mr. Krich will explain that he is
7 prepared to amend the license application to so
8 reflect, and in so doing, it will become a condition
9 of the license, once the Board acts upon this
10 proceeding, that LES will not pursue the anhydrous HF
11 option or alternative.

12 And at this point, Mr. Krich, if you would
13 confirm that you will make that representation at this
14 time?

15 WITNESS KRICH: Yes, that is confirmed,
16 and I will make the representation that the license
17 application will be changed as you described.

18 CHAIR BOLLWERK: All right. Anything
19 further on that subject, at this point, anyway? If
20 they have any questions about this they can direct it
21 to the witness.

22 Let me turn, first, to the Staff and see
23 if they -- is there anything further with respect to
24 what LES needs to do with respect to these witnesses,
25 are they available for cross examination?

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1 MR. REPKA: They are available.

2 CHAIR BOLLWERK: All right. Then let me
3 turn to the Staff and see if they have any cross
4 examination of the witness.

5 MR. CUMMINGS: I have no cross examination
6 of this panel.

7 CHAIR BOLLWERK: Then, Mr. Lovejoy?

8 MR. LOVEJOY: Thank you, Your Honor.

9 EXAMINATION BY MR. LOVEJOY OF

10 MR. KRICH AND MR. SCHNEIDER

11 MR. LOVEJOY: Just to clarify the nature
12 of the commitment being made and, of course, if you do
13 need to get into proprietary matters you can point
14 that out, I'm sure.

15 But is LES committing, now, to
16 incorporate, in its license application terms under
17 which LES agrees to insure that any deconversion is
18 carried out without use of the HF process by inserting
19 such requirements in contracts with deconversion
20 suppliers?

21 WITNESS KRICH: We are certainly, at this
22 point in time, willing to put into the license
23 application our commitment not to use the anhydrous
24 hydrofluoric acid option. There are no contracts at
25 this time, so that is not something I can put into the

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1 application.

2 MR. LOVEJOY: Well, the question is
3 whether you are willing to agree that you will put
4 terms in a contract with a deconversion vendor that
5 says, that gives you the right to enforce a contract
6 against them stating that they are not going to use
7 the HF process?

8 WITNESS KRICH: Yes, absolutely. I'm
9 sorry, I misunderstood the question. Absolutely, yes.

10 MR. LOVEJOY: And will you be willing to
11 agree to enforce such contract terms?

12 WITNESS KRICH: Absolutely, because it
13 would be a condition of our license, we will have to
14 enforce it, just as we enforce all other conditions of
15 our license.

16 MR. LOVEJOY: Now, answer 7 refers to the
17 Memorandum of Understanding that you've entered into,
18 and this is just an agreement to continue discussions,
19 isn't it?

20 WITNESS KRICH: Yes, as stated in the
21 press release, that was entered into as an exhibit,
22 this is basically a commitment to discuss, or to
23 continue discussions leading to a contract for the
24 deconversion facility.

25 MR. LOVEJOY: It doesn't bind either side

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1 to make a contract, right?

2 WITNESS KRICH: I'm not a lawyer, so my
3 reading of it is that it does not bind either party.

4 MR. LOVEJOY: Okay. In your testimony you
5 say, and I'm referring to page 4 --

6 WITNESS KRICH: The direct testimony?

7 MR. LOVEJOY: The direct testimony. You
8 refer to an intent to convert the DUF6 to U308. Is
9 that still currently your intention?

10 I'm looking at answer 10 and answer 11.

11 (Witness reviews document.)

12 WITNESS KRICH: Yes, it is our intent to
13 only convert to U308.

14 MR. LOVEJOY: When did you make that
15 determination? You being LES.

16 WITNESS KRICH: The revision Zero of the
17 application, and if my memory serves, talks about
18 conversion to U308. So that has been our decision
19 from the beginning.

20 The reason for that decision has been in
21 existence for some time, that is the NRC stated and
22 written preference that the deconversion product be
23 U308 as opposed to other products. We decided that
24 very early on.

25 MR. LOVEJOY: So you decided to follow the

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1 NRC's suggestions, or directions?

2 WITNESS KRICH: Yes.

3 MR. LOVEJOY: Were they directions, or
4 were they suggestions?

5 WITNESS KRICH: It wasn't a suggestion, or
6 a direction. It was documents that the NRC had
7 published that indicated their preference for the form
8 of the depleted uranium to be U308.

9 MR. LOVEJOY: And in making your decision,
10 you being LES, did you consider any alternatives in
11 this regard?

12 WITNESS KRICH: We certainly looked at the
13 available literature at the time, talked to numerous
14 experts in the field, and that, taken together with
15 the determination that I just described, from the
16 Nuclear Regulatory Commission, made our decision.

17 MR. LOVEJOY: What literature did you look
18 at?

19 WITNESS KRICH: There is a lot of
20 literature out, as you know, from, for example Oak
21 Ridge National Laboratory.

22 MR. LOVEJOY: Are you thinking of a
23 document Oakridge published involving consideration of
24 alternative conversion products?

25 WITNESS KRICH: I'm thinking of a number

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1 of Oakridge reports that came out, as well as those
2 other reports from Martin Marrietta, and so on.

3 MR. CURTISS: Mr. Chairman, it is not
4 clear to me where this discussion is going. So let me
5 interpose, at least, a question and perhaps preserve
6 an objection.

7 But if the point of this discussion is to
8 ask Mr. Krich about the form to which depleted uranium
9 hexafluoride will be converted, or deconverted,
10 beginning with the discussion here of conversion to
11 U308, which Mr. Krich has indicated was in the initial
12 application, and is consistent with the guidance and
13 direction provided by the NRC, I could easily
14 anticipate that this might get to the next question
15 which is, did you consider uranium dioxide as an
16 alternative?

17 And if that is the direction in which the
18 questioning is going I think we would raise an
19 objection to questions of that nature, based upon the
20 Board's February 4th, 2005 ruling, page 3, that
21 explicitly ruled that the issue of the form of the
22 product, for purposes of disposal, and if this is
23 going to go into the direction of the uranium dioxide,
24 that is an impermissible issue beyond the scope of the
25 proceeding.

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1 So if the question is intended to explore,
2 as has been done so far, the decision that was
3 reached, Mr. Krich has said U308 is the form that this
4 will be in. But if it is to go further I think we
5 would have to object to that line of questioning.

6 CHAIR BOLLWERK: That was a rather long
7 objection but, nonetheless, do you want to say
8 anything at this point?

9 MR. LOVEJOY: Well, I'm going to be
10 exploring, with Mr. Krich, how this decision was made,
11 and the NRC directions or suggestions, or he had
12 another word for it, I think, that he followed.

13 And I don't think it goes outside the
14 bounds of what the Board has allowed. The fact
15 remains that there are issues involving the merits,
16 one way or another, for disposal that are probably
17 part of the plausible strategy determination at a
18 later time.

19 But there is, also, issues involving what
20 deconversion processes, what alternatives are out
21 there, and need to be considered as a part of a NEPA
22 analysis, which come up now. They are just
23 interrelated.

24 I don't suppose that this is going to take
25 us a whole lot of time. But these issues actually, I

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1 will be frank, they have been pushed back into the
2 case by some of the exhibits that Mr. Krich is relying
3 on, as I think I can show.

4 JUDGE ABRAMSON: Mr. Krich, do I
5 understand correctly that the license application
6 reflects the Applicant's decision to convert to U308?

7 WITNESS KRICH: Yes, sir.

8 JUDGE ABRAMSON: There is no indication of
9 a preservation by the Applicant of the right to some
10 time in the future consider U02?

11 WITNESS KRICH: My recollection is that
12 while there is a discussion of other possibilities,
13 that U308 is identified as the option that we were
14 selecting.

15 JUDGE ABRAMSON: I think, counselor, that
16 at least in my view you need to tread very lightly.
17 We have expressed our view about how we go forward
18 with this, so proceed.

19 CHAIR BOLLWERK: And as I read Mr.
20 Curtiss' objection it was more of a preliminary
21 announcement as to whether he was going to object if
22 the questions continued. So let's see where the
23 questions go at this point.

24 MR. LOVEJOY: Okay. And you referred, Mr.
25 Krich, to various NRC documents that you consulted in

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1 making this decision. Are those the documents that
2 have been identified as exhibits?

3 WITNESS KRICH: Yes, I believe they are.

4 MR. LOVEJOY: And do you have the LES
5 exhibits nearby?

6 WITNESS KRICH: I do.

7 MR. LOVEJOY: And are the NRC documents
8 that you are referring to exhibit 19 and exhibit 20?

9 (Witness reviews documents.)

10 WITNESS KRICH: Yes, it is.

11 MR. LOVEJOY: And do you have those there
12 with you?

13 WITNESS KRICH: Yes, I do.

14 MR. LOVEJOY: Okay. Can you look at
15 exhibit 20, looking over on page 2, first of all, can
16 you tell me, this is signed by Erick Leeds of Office
17 of Nuclear Material Safety and Safeguards. Is that a
18 permanent position with NRC, do you know?

19 WITNESS KRICH: I don't know.

20 MR. LOVEJOY: Okay. Anyway, right about
21 the middle of the page, page 2, the document states:
22 Disposal of DUF6 will require conversion to a more
23 stable physicochemical form, such as one of the
24 oxides, EG3U08.

25 Do you take that to be NRC's decision

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1 directing you to use U308 as your conversion product?

2 WITNESS KRICH: I'm not sure I understand
3 the question.

4 MR. LOVEJOY: Well, did you select U308
5 because you understood that that was, in effect, NRC's
6 direction to you?

7 WITNESS KRICH: We selected U308 because
8 in the previous licensing case for the Claiborne
9 Enrichment Center, that was the form that went through
10 the review in the hearing process.

11 So U308 is currently being disposed of in
12 Envirocare, it is undoubtedly recognized by all the
13 scientific looks as the best form of the material.

14 MR. LOVEJOY: Well, let me just try again.
15 Do you think that the NRC has told you to select the
16 U308 in this proceeding?

17 WITNESS KRICH: In this proceeding?

18 MR. LOVEJOY: Well, in this proceeding
19 that you are required to select that conversion
20 product?

21 WITNESS KRICH: The NRC has not required
22 us to select any particular option.

23 MR. LOVEJOY: Okay, but you do -- it is
24 your understanding that the NRC has expressed a
25 preference on their part for U308?

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1 WITNESS KRICH: That is my testimony, yes.

2 MR. LOVEJOY: Reading this letter, a
3 couple of lines underneath the passage that I referred
4 to, the text says: Dense uranium dioxide forms may
5 also be suitable based upon recent ore deposits found
6 in Canada, and the many investigations related to its
7 behavior in spent nuclear fuel.

8 MR. CURTISS: I am going to object now
9 based upon the rulings of the Board on January 21st,
10 and February 4th. It is clear, where this is going,
11 that this is focusing on the appropriateness of the
12 option selected versus an option that NIRS, and its
13 expert witnesses have insisted, repeatedly, ought to
14 be litigated in this proceeding.

15 And that the Board, in its January 21st
16 Order on page 7, and in its February 4th Order on page
17 3 has made clear is not an issue within the scope of
18 this deconversion proceeding.

19 MR. LOVEJOY: The witness has said that
20 they are taking guidance of some sort, including
21 explicit guidance, from the NRC in the Claiborne
22 proceeding in selecting DU308 as their disposal form.

23 This exhibit, dated much more recently,
24 than the Claiborne proceeding says, among other
25 things, and this is advising DOE, this is the position

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1 of NRC expressed to DOE at an important policy
2 juncture.

3 It says, at the same page I'm reading
4 from: We believe the road map needs to state the
5 disposal as the oxide, in a dedicated facility, is the
6 likely baseline.

7 It continues: We believe the road map
8 needs to recognize this linkage between disposal
9 storage and future applications and, perhaps, identify
10 the dense dioxide form as the baseline.

11 This is the expression of NRC's
12 preference.

13 CHAIR BOLLWERK: Let me see if the Staff
14 has anything they want to say. Recognizing the Staff
15 may not wish to say anything, that they don't
16 necessarily have, as the saying goes, dog in this
17 fight.

18 MR. CURTISS: Well, the Staff has
19 reflected on this, the specific reference that we base
20 our objection upon is the bottom of page 7 of the
21 Board's Order of January 21st, with regard to LES and
22 the Staff's concerns about the testimony of Dr.
23 Makhijani as it relates to the environmental impacts
24 of disposal of deconversion products.

25 In addition to the fact that this gets

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1 into a disposal issue of the type we recently have
2 excluded from this Contention, see the Board's Ruling
3 previously, it also appears to be another improper
4 attempt to use expert testimony to amend an existing
5 contention, or introduce what is, essentially, a new
6 condition outlining an additional alternative for
7 consideration.

8 And, again, on page 3 of the Board's
9 Ruling of February 4th, questions 3, 6, and 7, which
10 was yet another effort to reintroducing the disposal
11 issue, and the answers thereto, all relate singularly
12 to the proposition that LES must analyze deconversion
13 into the U02 form, a proposition that the Board has
14 previously rejected on more than one occasion, most
15 recently in our January 21st Order.

16 This is the third instance where we think
17 they are improperly seeking to establish that uranium
18 dioxide is a preferably form for purposes of disposal.
19 And on that basis we object.

20 MR. LOVEJOY: May I address that?

21 CHAIR BOLLWERK: Yes. Does the Staff want
22 to say anything? And maybe we can save a little time
23 here. Is there anything you want to say?

24 MR. CUMMINGS: Well, just in reference to
25 exhibit 20, we would note that this letter is

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1 addressed to DOE, not dealing with the NEF.

2 Furthermore, it does not express a
3 preference other than U308, it is not stating that.
4 Both would be stable waste forms, but it is not
5 expressing a preference over one or the other.

6 CHAIR BOLLWERK: All right. Mr. Lovejoy?

7 MR. LOVEJOY: You can read the letter, it
8 identifies the baseline, that is dense dioxide form.
9 Here is the situation we are in. There is going to be
10 examination of disposal issues at a later time.

11 And for environmental and plausible
12 strategy purposes, and for purposes of cost
13 determination and others. There are some decisions
14 that are going to come out of that, but they haven't
15 come out yet.

16 They will include, among other things,
17 identification of what this Board, the Commission
18 ultimately would approve as a plausible strategy.
19 Those decisions haven't been made.

20 It is not up to Mr. Krich to say this is
21 the way it is going to be. It is going to be a
22 regulatory decision, what the plausible strategy is.
23 And until that happens the alternatives are there, and
24 need to be considered.

25 At this point we are talking about

1 consideration of the impacts of the deconversion
2 activity not the disposal activity, the deconversion
3 activity.

4 This Board has said that certain aspects,
5 you know, we pointed out, by implications of
6 contamination of byproducts, and things like that,
7 which arise from various alternative conversion
8 activities.

9 And in that January 21 Decision the Board
10 said those are part of this hearing. And that is what
11 we are talking about, deconversion impacts, which
12 should be considered.

13 I'm just examining the witness on his own
14 exhibit which he says guided his decision, and finding
15 out how this witness used this document to make his
16 decision, which is in his testimony.

17 CHAIR BOLLWERK: All right, I think the
18 Board's feeling about this, having conferences
19 previously, and talked about a little bit, we made the
20 Ruling, in the two instances that Mr. Curtiss has
21 indicated, based on the contentions, and the way the
22 contentions were placed before us.

23 That may or may not be correct in the end,
24 that is something the Commission will have to decide,
25 but that is what we will stick with, and I'm going to

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1 abstain the objection, sustain the objection, excuse
2 me, sustain the objection.

3 MR. LOVEJOY: Well, may I ask, is it
4 within bounds for me to ask the witness about this
5 exhibit that he has proffered?

6 CHAIR BOLLWERK: I don't know what other
7 questions you might have.

8 JUDGE ABRAMSON: Let me suggest,
9 Counselor, that the witness has stated, quite clearly,
10 that he made the determination to proceed with U308,
11 the Board has advised you on a number of occasions
12 that U02 is not at issue in this proceeding.

13 If you want to examine on something that
14 doesn't tread on those two guidances, feel free.

15 CHAIR BOLLWERK: Moreover, if you want to
16 make some kind of a proffer of the kind of questions
17 you would have asked, to reserve on appeal, I have no
18 problem with that as well, it is up to you.

19 MR. LOVEJOY: It I should make a proffer.

20 CHAIR BOLLWERK: All right, that is
21 acceptable.

22 MR. LOVEJOY: I would be asking the
23 witness whether in fact the Board doesn't need to
24 identify a plausible strategy for disposal in this
25 proceeding, perhaps at a later hearing of this

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1 proceeding.

2 That that has not happened yet, that that
3 determination will involve, among other things,
4 selection among disposal forms, and disposal methods.
5 That in that examination the Board will need to select
6 among UO2, U308 and, possibly, other disposal forms
7 for depleted uranium.

8 And only when, and actually the purpose of
9 converting depleted uranium to another form is the one
10 and only purpose, and that is for disposal. And so
11 the conversion product has to be selected, having
12 determined what the disposal system will be, and with
13 an eye to the disposal performance of the various
14 depleted uranium forms.

15 Once that decision has been made, based on
16 an analysis of the impacts of the disposal activity,
17 the deconversion form can be selected and then the --
18 and that also has to be done with an eye to, and
19 consideration of, the impacts of the conversion
20 activity and, of course, the transportation activity
21 entailed in whatever the deconversion process is.

22 JUDGE KELBER: Under term disposal do you
23 include, as an alternative, long-term storage of the
24 product for use in breeder reactors?

25 MR. LOVEJOY: I believe that this

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1 Applicant is on a disposal path.

2 JUDGE KELBER: I didn't ask that question,
3 I asked you, when you say disposal, does that include,
4 as an alternative, of the method of disposal, does
5 that include long-term storage for use in breeder
6 reactors?

7 MR. LOVEJOY: Your question involves
8 essentially what is meant by a plausible strategy.

9 JUDGE KELBER: I'm just asking about the
10 word disposal, what do you mean by disposal?

11 MR. LOVEJOY: As I use disposal, disposal
12 does not include storage.

13 JUDGE KELBER: I see.

14 MR. LOVEJOY: Storage is temporary
15 disposal.

16 JUDGE KELBER: Okay, thank you.

17 MR. LOVEJOY: At the time the plausible
18 strategy determination is made the Commission is, of
19 course, going to need to have what we lawyers call
20 NEPA coverage for that decision.

21 And that is going to involve selection
22 among alternative disposal forms, and methods,
23 analyses of the impact, and their long-term
24 performance. These questions, we've taken the
25 position, have not been examined fully in the Draft

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1 Environmental Impact Statement as it now stands, and
2 we are probably going to, we have every expectation
3 that that will be the case after the final
4 environmental impact statement comes out.

5 That, in a word, is what I would elicit
6 from this witness. And I will say that the process we
7 are in now seems to be taking the cart before the
8 horse. And I understand that it is set up that way,
9 because of the schedule for the Environmental Impact
10 Statement and the Safety Evaluation Report coming out.

11 We are taking them in that order. But the
12 technical issues are going to govern the environmental
13 issues because of the technical issue of disposal
14 performance is going to involve selection of the
15 conversion form, just of necessity.

16 We would have hoped to explore the impacts
17 of alternative conversion activities in this hearing.
18 We would like to, we don't want to not do it now, and
19 then not do it in the Fall. And we have to do it one
20 of these times because these are part of the
21 considerations which the Board needs to explore in
22 establishing plausible strategies.

23 CHAIR BOLLWERK: I have nothing further to
24 say. That is, basically, your proffer, all right,
25 thank you.

1 Time to move on with the next question, I
2 guess.

3 MR. LOVEJOY: Mr. Krich, have you located,
4 have you identified the location for private sector
5 deconversion if that happens to be pursued?

6 WITNESS KRICH: We have, as stated in the
7 press release, no we have not. I guess I would like
8 to clarify something, if I could. And I probably
9 don't need to do this, and I apologize in advance.

10 But I don't think I testified that we took
11 direction from the NRC on selecting a form. And if I
12 did that was a misstatement.

13 MR. LOVEJOY: The press release, exhibit
14 80, this was, this is on the letterhead of Areva, and
15 also the NEF. And, Mr. Krich, did you participate in
16 preparing the press release?

17 WITNESS KRICH: I did review this prior to
18 being issued.

19 MR. LOVEJOY: Mr. Ferland is quoted,
20 toward the bottom of the first page, as saying:
21 Although in most cases we would not be making
22 deconversion plans so early in the process of
23 developing an enrichment facility, Governor
24 Richardson, and Attorney General Madrid have pressed
25 for this kind of commitment by LES toward out of state

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1 deconversion and disposal.

2 Has LES made any commitment to conduct
3 deconversion out of state?

4 WITNESS KRICH: We have committed as
5 stated in the press release.

6 MR. LOVEJOY: You've made a commitment to
7 conduct deconversion outside the state of New Mexico,
8 is that right?

9 WITNESS KRICH: I believe that is what it
10 says.

11 MR. LOVEJOY: Okay. Now, in your
12 testimony, and I think this is in your rebuttal, you
13 state that the environmental report, the application,
14 addresses the environmental impacts of deconversion.

15 And that it does discuss the environmental
16 impacts of construction and operation of a conversion
17 plant. And you cite to the text that appears now in
18 exhibit 14. And I think that is up at the top of page
19 2 of that exhibit.

20 Is the language you are referring to at
21 the top of page 2 of exhibit 14?

22 WITNESS KRICH: Yes, this is a commitment
23 we made in the license application, yes.

24 MR. LOVEJOY: And you are in charge of the
25 preparation of the license application, weren't you?

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1 WITNESS KRICH: I am, yes.

2 MR. LOVEJOY: But actually under the rules
3 of the Commission doesn't an environmental report have
4 to contain, I'm reading from my notes, but this may
5 seem familiar to you, a description of the proposed
6 action, statement of its purposes, description of the
7 environment affected, discussion of the impact of the
8 proposed action, discussion of any adverse
9 environmental effects which cannot be avoided;
10 discussion of alternatives to the proposed action, and
11 it refers to the NEPA.

12 Analysis that considers and balances the
13 environmental effects of the proposed action.
14 Consideration of the economic, technical, and other
15 benefits and costs of the proposed action.

16 Isn't that what an environmental report is
17 required to contain under 10CFR51.45?

18 WITNESS KRICH: The NRC, in its February
19 6th, 2004 Order, made it clear that the NRC was to use
20 other environmental impact statements in their review
21 of our application.

22 All the things that you just read are in
23 the environmental impact statements that we reference
24 in our application.

25 MR. LOVEJOY: All right, but you do

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1 concede that those requirements, which I referred to,
2 are in the Commission rules?

3 WITNESS KRICH: I can't help but concede
4 that.

5 MR. LOVEJOY: The Order on February 6th
6 referred to a DOE environmental impact statement, is
7 that correct??

8 WITNESS KRICH: Could you say that again?

9 MR. LOVEJOY: The Order that you referred
10 to, you just mentioned, the Hearing Order in this
11 matter, referred to a DOE environmental impact
12 statement, is that correct?

13 WITNESS KRICH: No, my recollection is
14 that it refers to environmental impact statements in
15 general.

16 MR. LOVEJOY: So environmental impact
17 statements in general?

18 WITNESS KRICH: Again, my recollection is
19 that it refers to environmental impact statements in
20 general. We could get the order and check it out, I
21 guess.

22 MR. CURTISS: Why don't we just hand the
23 witness a copy of the hearing Order so that he can
24 refer to exactly what it says. He doesn't have that
25 before him.

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1 (Witness reviews document.)

2 MR. LOVEJOY: Do you have the Order, Mr.
3 Krich?

4 WITNESS KRICH: I do.

5 CHAIR BOLLWERK: Just so I'm clear, this
6 is the Commission Original Notice of Opportunity for
7 Hearing in Order of January 2004?

8 MR. LOVEJOY: Yes, that is the document I
9 just gave Mr. Krich.

10 CHAIR BOLLWERK: It was published both in
11 the Federal Register and in the CLI. So it is CLI04-
12 3, just so the record is clear. And it was reprinted
13 in the Federal Register, that is correct.

14 MR. LOVEJOY: Could you point out the
15 reference you are talking about, Mr. Krich?

16 WITNESS KRICH: I'm in the Federal
17 Register Notice of February 6th, it is section 4,
18 titled Applicable Right Requirements, and under Item
19 1, Environmental Issues, paragraph B, Bravo.

20 MR. LOVEJOY: And would you read the text
21 that you are talking about? It is just a sentence,
22 isn't it?

23 WITNESS KRICH: The NRC Staff may consider
24 the DOE EIS in preparing the Staff's EIS.

25 MR. LOVEJOY: Does that say anything about

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1 the content of the environmental report?

2 WITNESS KRICH: The contents, it says that
3 in preparing its EIS. Now, you may not be familiar
4 with this, but the Staff prepares its EIS based on
5 environmental report that we submit.

6 Therefore if the Staff is using the DOE
7 EIS to prepare its EIS, then certainly I can reference
8 that in my environmental report.

9 MR. LOVEJOY: This Order came after the
10 submission of the application, didn't it?

11 WITNESS KRICH: Yes, it did.

12 MR. LOVEJOY: So you couldn't have been
13 relying on this Order when you made the application?

14 WITNESS KRICH: And I didn't. And if you
15 will recall, REV Zero of the application does not
16 reference the EIS.

17 MR. LOVEJOY: It doesn't mention anything
18 about deconversion impacts, does it?

19 WITNESS KRICH: Sure it does.

20 MR. LOVEJOY: Well, we don't need to
21 follow that one up.

22 The DOE/EIS referred to here is what?

23 WITNESS KRICH: I don't know, it is a
24 general reference to a DOE/EIS.

25 MR. LOVEJOY: The DOE/EIS is a general

1 reference?

2 WITNESS KRICH: I'm afraid I don't know.
3 It says the DOE/EIS.

4 MR. LOVEJOY: All right.

5 WITNESS KRICH: It is in the context of
6 plausible strategy and deconversion.

7 MR. LOVEJOY: At the time of this Order
8 had the final EISS for Paducah and Portsmouth
9 deconversion facilities been issued?

10 WITNESS KRICH: To tell you the truth I
11 don't remember. What I do know is that the PEIS was
12 issued. And that constitutes an EIS.

13 MR. LOVEJOY: Do you want to check the
14 date of the Paducah and Portsmouth EISSs?

15 MR. REPKA: That would be LES exhibit
16 numbers 16 and 17.

17 JUDGE ABRAMSON: Excuse me just a minute.
18 Mr. Krich, do you work for the Staff?

19 WITNESS KRICH: I'm sorry?

20 JUDGE ABRAMSON: Do you work for the NRC
21 Staff, either of you?

22 WITNESS KRICH: No.

23 WITNESS SCHNEIDER: No.

24 JUDGE ABRAMSON: Do you know how the Staff
25 makes their decisions, or how the Staff reacts to

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1 these directives in the Order?

2 WITNESS KRICH: No, sir.

3 JUDGE ABRAMSON: Counsel, can you explain
4 to me why you are pursuing with him what this tells
5 the Staff to do, or what permission this gives the
6 Staff to do? This is an Order that they issue that
7 says the Staff may consider something.

8 Why are you asking an LES witness about
9 what the Staff can do?

10 MR. LOVEJOY: You know, I beg your pardon,
11 you are absolutely right. This is not something that
12 authorizes LES to amend or leave anything out of their
13 environmental report. This is just a direction to
14 Staff. I will go into that later.

15 In any event, Mr. Krich, in exhibit 14,
16 which is what you prepared, you don't refer to the DOE
17 programmatic EIS at all, do you?

18 WITNESS KRICH: The, if you read the final
19 environmental impact statement for both Paducah and
20 Portsmouth, it incorporates the programmatic
21 environmental impact statement. So there is no need
22 to be redundant.

23 MR. LOVEJOY: So you don't refer to the
24 programmatic environmental impact statement in your
25 environmental report?

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1 WITNESS KRICH: Yes, I do, by virtue of
2 citing the FEIS.

3 MR. LOVEJOY: So it is your theory that if
4 a citizen wanted to find out about the impacts of the
5 deconversion process that they would read your
6 environmental report, that would refer them to the
7 Portsmouth and Paducah, and the Claiborne
8 environmental impact statements, and then in that they
9 would find another reference to the programmatic
10 environmental impact statement, and that is where they
11 would find out the facts?

12 WITNESS KRICH: If you want to find out
13 the information that you cited, from the regulations,
14 that is what is referenced in this application. In 30
15 years of doing licensing with the NRC, I have cited,
16 in applications, and in changes to licenses, other
17 documents that are available publicly, and that has
18 been fully accepted by the NRC.

19 So it is adequate so long as they are
20 public documents. These are all public documents.

21 MR. LOVEJOY: Well, let's look at one of
22 those. You say that the impacts of deconversion had
23 previously been evaluated thoroughly by NRC and by
24 DOE, and that these evaluations bound the impacts of
25 a private sector deconversion facility, and you rely

1 on these previous analyses, and one of them being the
2 Claiborne environmental impact statement.

3 Which I think is, you marked part of as
4 your exhibit 15. And you have part of the Claiborne
5 environmental impact statement, section 4.2.2.8. And
6 it says here, in the first page of your exhibit:

7 The magnitude, it says the magnitude of
8 these impacts were evaluated using the dose estimation
9 procedures described in section 4.2.2.1. Do you know
10 what those procedures are?

11 WITNESS KRICH: I can't find where you are
12 quoting.

13 MR. LOVEJOY: It is in your exhibit 15.

14 WITNESS KRICH: Yes, I have that in front
15 of me.

16 MR. LOVEJOY: Well, after the cover it
17 says, impacts of conversion from DUF6 to U308. Do you
18 have that?

19 WITNESS KRICH: Yes.

20 MR. LOVEJOY: And about four lines down it
21 says, there is a sentence, the magnitudes of these
22 impacts?

23 WITNESS KRICH: Okay.

24 MR. LOVEJOY: Were evaluated using the
25 dose estimation procedures described in section

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1 4.2.2.1.

2 WITNESS KRICH: Yes.

3 MR. LOVEJOY: Did you check any of the
4 dose estimation calculations?

5 WITNESS KRICH: This is an NRC final
6 environmental impact statement, and it refers to a
7 calculation that was done as repeated in section
8 4.2.2.1, that is what I used, yes.

9 MR. LOVEJOY: I'm just saying, did you
10 check them over to verify that the calculations were
11 correctly done?

12 WITNESS KRICH: We certainly look at them
13 for reasonableness.

14 MR. LOVEJOY: I'm sorry, for what?

15 WITNESS KRICH: We certainly look at them
16 for reasonableness, but it is in a final environmental
17 impact statement, so it has been reviewed and approved
18 by the NRC.

19 MR. LOVEJOY: Do you know whether the
20 analysis in 4.2.2.8 includes any accident scenarios?

21 WITNESS KRICH: I don't have, I don't know
22 that I have 4.2.2.8 in front of me.

23 MR. LOVEJOY: That is your exhibit,
24 exhibit 15.

25 WITNESS KRICH: Without going back through

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1 this it is my recollection that this addresses both
2 the dose, I think you asked about dose?

3 MR. LOVEJOY: I was asking about accident
4 scenarios.

5 WITNESS KRICH: Yes, what about accident
6 scenarios?

7 MR. LOVEJOY: Whether accident scenarios
8 are considered in 4.2.2.8?

9 WITNESS KRICH: That is my recollection.

10 MR. LOVEJOY: Okay.

11 WITNESS KRICH: But it may be in another
12 section.

13 MR. LOVEJOY: And this analysis assumed
14 the CaF2 process, did it not, the Claiborne analysis?

15 WITNESS KRICH: The process that was
16 evaluated here was the process that results in aqueous
17 hydrofluoric acids, which is then neutralized, it is
18 my recollection, to calcium fluoride.

19 MR. LOVEJOY: Okay. I'm just going to ask
20 you about a couple of the numbers here. And the
21 question, essentially, is do you know how these were
22 calculated.

23 I see, on page A-4 of your exhibit, in the
24 paragraph starting in the middle of the page, starting
25 with the words the primary sources of releases, do you

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1 see that paragraph?

2 WITNESS KRICH: Yes, I do.

3 MR. LOVEJOY: Two-thirds of the way down
4 it says, assuming a fabric filter efficiency greater
5 than 95 percent, approximately 3.0 times 10 to the 5
6 percent of the U308 will be lost in the atmosphere.

7 Do you know how that figure was derived?

8 WITNESS KRICH: No, I don't.

9 MR. LOVEJOY: And on A-5, over the top of
10 the page, there are estimates of doses to the critical
11 individual, the infant located near the plant. Do you
12 know how those were calculated?

13 WITNESS KRICH: This analysis was
14 performed by the NRC staff, or its contractors, so I'm
15 not familiar with the details of the analysis.

16 JUDGE KELBER: If I may interject a
17 question? Since the Claiborne plant was planned, has
18 filter technology advanced?

19 WITNESS KRICH: If you don't mind I would
20 like Mr. Schneider to --

21 JUDGE KELBER: What was the date of this?

22 WITNESS KRICH: The Claiborne was 1994.

23 WITNESS SCHNEIDER: Filter technology has
24 been evolving, over a number of years, to be able to
25 meet the more stringent release requirements.

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1 Previous designs were totally, I guess, created to
2 meet current standards.

3 And as the standards evolved the
4 technology evolved. Basically you can filter to an
5 extent where there are no releases, or no detectable
6 releases. But if the standard is, allows some
7 minuscule release, then the equipment is designed to
8 meet that standard.

9 WITNESS KRICH: I think the answer is yes,
10 it has evolved.

11 JUDGE KELBER: Thank you.

12 JUDGE ABRAMSON: Counselor can we cut to
13 the chase here? You started out by asking him about
14 a statement in his testimony that these calculations
15 bounded what could be expected from NEF.

16 And you are now addressing the underlying
17 calculations.

18 MR. LOVEJOY: Okay.

19 JUDGE ABRAMSON: It is pretty clear that
20 the witness is testifying that he didn't perform these
21 calculations. Can you get on with it?

22 MR. LOVEJOY: Yes. Let's move on to the
23 next environmental impact statements. You did refer,
24 in your environmental report, specifically to the
25 Portsmouth and Paducah plant environmental impact

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1 statements, and those are at 16 and 17 of the LES
2 exhibits.

3 Let's just take 16, which is the
4 Portsmouth plant. These involve specific plants with
5 CaF2 processes. You state, in your testimony, that,
6 on page 9, that these two final environmental impact
7 statements, exhibit 16 and 17, contain a comprehensive
8 evaluation of the environmental impacts of
9 constructing, operating, and decommissioning these two
10 facilities.

11 Have you reviewed these environmental
12 impact statements to determine whether in fact that is
13 so?

14 WITNESS KRICH: Yes, otherwise I would not
15 have testified to them.

16 MR. LOVEJOY: Well, what did you do in
17 your review?

18 WITNESS KRICH: I'm not sure I understand
19 the question.

20 MR. LOVEJOY: You said you reviewed them.
21 What did you do?

22 WITNESS KRICH: Read them.

23 MR. LOVEJOY: You read them. Did you
24 check any numbers calculated in them to figure out
25 whether you agreed?

1 WITNESS KRICH: I didn't do any separate
2 calculations but certainly compared numbers against
3 other numbers that I'm familiar with.

4 MR. LOVEJOY: What did you do, tell me?

5 WITNESS KRICH: I compared them against
6 other numbers that I was familiar with, in areas where
7 I had technical knowledge, I could look at a number in
8 the environmental impact statement and know whether it
9 was reasonable or not reasonable.

10 MR. LOVEJOY: So you used the top of the
11 head test?

12 WITNESS KRICH: Yes.

13 MR. LOVEJOY: Okay. But you didn't
14 actually follow any of the calculations through the
15 process that generated the estimates in these
16 environmental impact statements, did you?

17 WITNESS KRICH: I personally did not do
18 separate calculations.

19 MR. LOVEJOY: Well, did anyone under your
20 direction do that?

21 WITNESS KRICH: We did, and I'm sorry I'm
22 not remembering now, if we did any calculations on our
23 own, relative to the deconversion facility.

24 MR. LOVEJOY: Now, you also refer to the
25 programmatic environmental impact statement, which I

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1 take it, is exhibit 18. And you say, page 12 of your
2 testimony, that in the programmatic environmental
3 impact statement, DOE evaluated the human health and
4 safety impacts of the deconversion facility, both
5 during normal operation, and accident conditions for
6 both radiological and chemical exposures.

7 DOE also evaluated the human health and
8 safety impacts during transportation, both by truck
9 and by rail, including normal operation, and assumed
10 accident condition.

11 DOE also evaluated environmental impacts
12 associated with air quality, water and soil,
13 socioeconomics, ecology, waste management, resource
14 requirements, land use, cultural resources, and
15 environmental justice.

16 In short, this is your testimony, I
17 concluded that DOE's PEIS comprehensively evaluated
18 all of the relevant environmental impacts that might
19 be associated with the construction, operation, and
20 decommissioning of the deconversion facility.

21 WITNESS KRICH: Can you tell me where you
22 are reading from?

23 MR. LOVEJOY: This is page 12 of your
24 direct testimony, top of the page. And this exhibit
25 18, the PEIS that you are referring to?

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1 WITNESS KRICH: Yes.

2 MR. LOVEJOY: It is?

3 WITNESS KRICH: Exhibit 18 is the final
4 programmatic environmental impact statement for
5 alternative strategies for the long-term management
6 and use of depleted uranium hexafluoride.

7 MR. LOVEJOY: And that was issued in 1999,
8 correct?

9 WITNESS KRICH: That was final in 1999.

10 MR. LOVEJOY: Did you read the whole PEIS?

11 WITNESS KRICH: No, I didn't.

12 MR. LOVEJOY: What did you do by way of
13 reviewing it to support this statement you made?

14 WITNESS KRICH: Again, I'm not sure what
15 you are asking. But I did what I think most everybody
16 else does, is that you go through the document, you
17 check for the information that you are looking for,
18 you read that information, and then you double-check
19 that there isn't pertinent information some place else
20 in the document.

21 MR. LOVEJOY: So you read parts of the
22 document?

23 WITNESS KRICH: Read large parts of the
24 document.

25 MR. LOVEJOY: Did you do any independent

1 analyses to check the results of the programmatic
2 environmental impact statement?

3 WITNESS KRICH: I personally did not do
4 separate calculations. Again, and I will repeat what
5 I said before, I may have had people working for me
6 doing some separate calculations, but I can't remember
7 them right now.

8 MR. LOVEJOY: You don't remember whether
9 that happened?

10 WITNESS KRICH: I can't remember any
11 specific calculations.

12 MR. LOVEJOY: Okay.

13 JUDGE ABRAMSON: Counselor, is it your
14 line of questioning here that the witness is verifying
15 the DOE EIS' numbers, or is he summarizing what he
16 thinks DOE did, as opposed to checking numbers? I'm
17 trying to figure out where you are going here.

18 MR. LOVEJOY: Well, I'm trying to
19 establish to what extent he is vouching for these
20 data, and to what extent he is essentially saying
21 somebody else has done it, not me, but it has been
22 done. And I think it is the latter.

23 Now, you say --

24 WITNESS KRICH: I don't know that there is
25 an answer to what you just said. I'm not sure there

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1 is a dispute there. I'm not -- I took the DOE's work,
2 as I have taken NRC's work, in the case of CEC, all
3 these are approved final documents.

4 We use them in my business all the time
5 without doing separate independent calculations.

6 MR. LOVEJOY: And you did not do
7 independent calculations this time?

8 WITNESS KRICH: As I have testified,
9 before, I personally have not done independent
10 calculations.

11 MR. LOVEJOY: All right. So if I asked
12 you whether you concur, or not, with the analyses in
13 the PEIS of transportation impacts, you wouldn't be
14 able to say whether you actually agree with it, is
15 that right? Based on your own independent judgement?

16 I'm trying to cut this short. Some
17 examples I can point to. But you didn't check any of
18 those analyses?

19 WITNESS KRICH: I don't know if you are an
20 engineer or not, Mr. Lovejoy, but we don't, as
21 engineers, we don't recalculate things that are in
22 other approved documents, necessarily.

23 And so I accepted the analysis that DOE
24 did, and I looked at the results, found them to be
25 reasonable. And if we hadn't accepted them, we

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1 certainly wouldn't have cited them in our application.

2 JUDGE KELBER: Let me interject a
3 question. As a technical expert, when you review a
4 document, if you find a technical conclusion which
5 appears out of line to you, what do you do?

6 WITNESS KRICH: If I can get to the author
7 I will go to the author and question them about it.
8 If I can't get to the author then I will look to see
9 if there is another source that gives me different
10 information.

11 And ultimately I would do my own analysis
12 if I needed to use the results.

13 JUDGE KELBER: Thank you.

14 MR. LOVEJOY: Well, let me just ask you to
15 -- would you look at page 5-49 of the DOE programmatic
16 environmental impact statement? There is a paragraph,
17 starting in the middle, referring to, if a large HF
18 release. Do you see that paragraph on 5-49?

19 WITNESS KRICH: Yes, I do.

20 MR. LOVEJOY: It says if a large HF
21 release from a rail car occurred in an urban area,
22 under stable conditions, persons within a seven square
23 mile area, or 18 kilometers area, downwind of the
24 accident site, including crew members, could
25 potentially suffer irreversible adverse effects from

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1 chemical exposure to HF.

2 In a densely populated urban area it was
3 estimated that up to 30,000 persons might experience
4 irreversible adverse effects, such as long damage.
5 The number of fatalities following HF exposure would
6 be expected to be somewhat less than one percent of
7 the number of potential irreversible adverse effects,
8 citing Castro et al, 1997. Thus up to 300 fatalities
9 could occur, one percent of 30,000.

10 Did you read that text in your review of
11 this document?

12 WITNESS KRICH: Yes, I did, and I read
13 even more than that, which explains that risk is
14 consequences times probability. And if you continue
15 to read you will find out that the risk of this
16 accident is zero.

17 MR. LOVEJOY: So you are multiplying the
18 consequence, 300 fatalities, the probability that you
19 have assigned to it?

20 WITNESS KRICH: The probability.

21 MR. LOVEJOY: And so did the entire
22 analysis strike you as reasonable by your top of the
23 head test?

24 WITNESS KRICH: Yes, it did.

25 MR. LOVEJOY: Okay. Now you said, in your

1 testimony, and I think it is on 10 and 11, answer 20,
2 that if LES uses a private deconversion contractor,
3 the impacts of construction, operation, and
4 decommissioning, as described in DOE EISs, and I think
5 you are talking about --

6 JUDGE ABRAMSON: I'm sorry, where are you
7 reading from?

8 MR. LOVEJOY: I'm at answer 20 at the
9 bottom of page 10. You refer to the environmental
10 evaluations undertaken by DOE. Is that the
11 programmatic environmental impact statement, and the
12 two site specific environmental impact statements?

13 WITNESS KRICH: If you could point out
14 that statement?

15 MR. LOVEJOY: A-20.

16 WITNESS KRICH: Yes, I'm there.

17 MR. LOVEJOY: It says, assuming that the
18 private sector deconversion facility is of a size that
19 would accommodate the DUF6 generated during the 30
20 year licensed life of the NEF, the environmental
21 evaluations undertaken by DOE which analyzed the
22 facility to deconvert 61,422 cylinders of DUF6 or
23 approximately 749,000 metric tons of DUF6, see LES
24 exhibit 18, that is the PEIS.

25 WITNESS KRICH: That is right, and that is

1 consistent with Q20.

2 MR. LOVEJOY: Okay. So you are referring
3 here, just to the programmatic environmental impact
4 statement?

5 WITNESS KRICH: I was answering a question
6 about the PEIS.

7 MR. LOVEJOY: And you say that the
8 programmatic environmental impact statement analysis
9 would bound the impacts of a private facility for LES.
10 And your testimony goes on to explain the basis for
11 your statement.

12 And is that what -- is the basis what is
13 stated in the rest of answer 20 and 21?

14 WITNESS KRICH: I apologize, I'm not sure
15 I understand the question. Are you saying that do I
16 want to change my testimony?

17 MR. LOVEJOY: Well, if you want to, you
18 can, if you want to state that. I'm not asking you to
19 do that.

20 WITNESS KRICH: What are you asking me?

21 MR. LOVEJOY: I'm asking you, the basis
22 for your judgement that the analysis by DOE would
23 bound a generic environmental impacts of a
24 deconversion facility that might be built for the NEF
25 DUF6, that is your statement at the top of page 11.

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1 WITNESS KRICH: Right.

2 MR. LOVEJOY: You can refer to your
3 written testimony, or you can explain it in your own
4 words.

5 WITNESS KRICH: Well, what is in the
6 written testimony is what I meant to say.

7 MR. LOVEJOY: In a word is it your
8 understanding that if LES' private facility is
9 smaller, or has a smaller through-put than a facility
10 to deconvert DOE's inventory of depleted uranium, then
11 the DOE analysis must bound the impacts of
12 deconversion of NEF's depleted uranium?

13 WITNESS KRICH: The -- if you consider
14 that the DOE has accounted for the fact that their
15 deconversion facilities would have to eventually
16 accommodate depleted uranium by-product from
17 commercial enrichers, plus the fact that it is built
18 to handle the existing 740,000 metric tons of depleted
19 uranium hexafluoride I think it is reasonable to
20 conclude that the DOE environmental impact statement
21 does bound what we would need for a facility that
22 would cover our output, which is on the order of 7,800
23 metric tons per year.

24 MR. LOVEJOY: So your judgement is based
25 on a comparison of the volume that DOE will be

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1 managing, versus the smaller volume coming from the
2 NEF, is that it?

3 WITNESS KRICH: It is not solely based on
4 that. Certainly that is a factor. It is also based
5 on the processes that have been used, and based on the
6 fact that the environmental impact statements
7 acknowledge that they would include covering depleted
8 uranium hexafluoride from commercial enrichers.

9 MR. LOVEJOY: You refer to the process. Is
10 your testimony essentially referring to the similarity
11 of the CaF2 process being employed by the DOE plants,
12 and the process that you believe LES will be using?

13 WITNESS KRICH: Again, I'm not sure of the
14 question that you are asking.

15 MR. LOVEJOY: Well, you refer to the
16 process. One of the assumptions of your bounding
17 determination was the process you would need to --

18 WITNESS KRICH: Right.

19 MR. LOVEJOY: -- deconvert.

20 The process being used in the Paducah and
21 Portsmouth facilities, when they are completed, will
22 be an aqueous hydrofluoric acid process with the
23 availability of neutralization to CaF2, is that right?

24 WITNESS KRICH: Actually before we made
25 the decision that we just did, to sign this Memorandum

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1 of Understanding with Areva, the DOE PEIS covers
2 pretty much all the processes that are involved.

3 That is the processes that result in
4 aqueous hydrofluoric acid, and the processes that
5 result in hydro-sulfur-flouric acid. So that is the
6 processes that I was referring to.

7 JUDGE ABRAMSON: Can I pick this up for a
8 second, counselor?

9 Mr. Krich, I'm reading answer 20, and help
10 me make sure I understand what you said in answer 20.
11 As I, and perhaps I'm missing something. But it seems
12 to me it was a very simple answer.

13 You, NEF's facility, is expected to
14 generate about a quarter of the facility that was
15 analyzed by DOE in the PEIS. Is that what you are
16 saying?

17 WITNESS KRICH: Yes, sir.

18 JUDGE ABRAMSON: And, therefore, if one
19 can believe that DOE has adequately analyzed the
20 environmental impacts of a facility they looked at in
21 the programmatic environmental impact statement, that
22 should be expected to be larger environmental impacts
23 than the NEF, than a facility designed to handle just
24 the NEF --

25 WITNESS KRICH: Yes, sir.

1 JUDGE ABRAMSON: Okay, thank you.

2 MR. LOVEJOY: Let me ask you about some
3 passages in the rebuttal you filed. Page 7 you state
4 that Dr. Makhijani, yes, here it is, is incorrect in
5 pointing out that no DOE or NRC guidelines exist that
6 govern the free release of contaminated HF.

7 And --

8 JUDGE ABRAMSON: Point me at the right
9 place, please?

10 MR. LOVEJOY: Let's see, we are on, I
11 think, it is answer 8 and I think it basically is the
12 first and second paragraphs of that. And then it goes
13 on to another issue in the first full paragraph on
14 page 8. So it is answer 8, two paragraphs.

15 JUDGE ABRAMSON: And the question you
16 asked is?

17 MR. LOVEJOY: I'm sorry, I was just
18 waiting for you --

19 JUDGE ABRAMSON: I see these paragraphs,
20 I don't see a specific question, I don't see the text
21 that you are referring to, so perhaps you can repeat
22 your question so I can find it.

23 MR. LOVEJOY: Well, Mr. Krich is saying
24 that Dr. Makhijani is wrong to be concerned about the
25 fact that no guidelines exist to govern the free

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1 release of contaminated hydrofluoric acid.

2 And he goes on with an explanation stating
3 that, of course, either one of you can answer. You
4 state that there is a process for establishing limits,
5 for ensuring that appropriate release limits are
6 established and enforced under DOE order 5400.5.

7 And you go on further about coordination
8 with the NRC. But it is still a fact, isn't it, that
9 there are no standards at the present time?

10 WITNESS KRICH: Well, first, we didn't say
11 that. We thought that Dr. Makhijani's concern was
12 wrong. What we stated was that his statement that
13 there are no standards for the free release of
14 contaminated HF, or contaminated calcium fluoride,
15 that the standards didn't exist was wrong.

16 In fact contaminated calcium fluoride has
17 been released. Mr. Schneider has released calcium
18 fluoride that has been contaminated with uranium to a
19 land fill in South Carolina.

20 I have, in my experience, released
21 contaminated material to a landfill in South Carolina,
22 as well. So to say that there are no standards for
23 the free release of contaminated material, whether it
24 be HF or calcium fluoride, or contaminated concrete
25 really is incorrect.

1 JUDGE ABRAMSON: Are you discussing the
2 difference between a standard and a process? I mean
3 the --

4 MR. LOVEJOY: Well, that is one of the
5 distinctions to be made here, yes. Because the answer
6 refers to the process --

7 JUDGE ABRAMSON: Are you contending that
8 material can't be released because there is no way to
9 do it?

10 MR. LOVEJOY: No, I'm asking about the
11 statements made here which, to me, say essentially
12 that there is a process for establishing standards,
13 but it doesn't say that there are standards.

14 WITNESS KRICH: Well, again, --

15 MR. LOVEJOY: General standards for free
16 release.

17 WITNESS KRICH: Let me go back. If there
18 were not standards then certainly we would not be able
19 to free release anything. And, in fact, contaminated
20 material has been free released for a long, long time,
21 to landfills, local landfills.

22 So the statement that there are no
23 standards has to be wrong, because in reality
24 contaminated material is released all the time.

25 MR. LOVEJOY: You are talking about waste

1 acceptance criteria established for solid waste
2 disposal?

3 WITNESS KRICH: No, I'm not.

4 MR. LOVEJOY: Okay, well, are the
5 standards you are talking about referred to in this
6 answer, answer 8?

7 WITNESS KRICH: Yes, if you look at, in
8 fact, the exhibit -- I will have to look up which
9 exhibit it is, but we had exhibits from DHEC, the
10 Department of Health and Environmental Control from
11 South Carolina that gave standards for the
12 contaminated CaF to be buried in a landfill.

13 MR. LOVEJOY: Okay, these are state
14 imposed standards for disposal in a particular state?

15 WITNESS KRICH: Yes.

16 MR. LOVEJOY: Like South Carolina?

17 WITNESS KRICH: Yes, there are standards
18 in other agreement states.

19 MR. LOVEJOY: Okay. If I might suggest
20 that I might be able to bring this to a close if I
21 have a chance to confer with my associate?

22 CHAIR BOLLWERK: That would be a good
23 idea. I was just about to ask you when we could take
24 a break. So we are at the same place. Very good,
25 thank you. Why don't we do ten minutes?

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1 (Whereupon, the above-entitled matter
2 went off the record at 10:57 a.m. and
3 went back on the record at 11:12 a.m.)

4 CHAIR BOLLWERK: All right, Mr. Lovejoy,
5 you wanted to confer with your client?

6 MR. LOVEJOY: Yes, thank you. There's
7 really just one question that concerns me a little,
8 one answer that Mr. Krich gave. Would you look back
9 at Exhibit 18?

10 There was that accident scenario on page
11 5-49. Do you have that?

12 WITNESS KRICH: I do.

13 MR. LOVEJOY: And I think you said in
14 words or in substance -- and correct me if I'm wrong.
15 But, I think you said that the risk was zero.

16 WITNESS KRICH: I believe that's what I
17 said.

18 MR. LOVEJOY: Over on page 5-50 --

19 WITNESS KRICH: Yes, I think I know where
20 you're going with this. I guess I'm off by -- let's
21 see, 1, 2, 3, 4, 5 decimal points. So, it's 00003.

22 MR. LOVEJOY: Well, the probability is not
23 zero, is that right?

24 WITNESS KRICH: It's 00003.

25 MR. LOVEJOY: Now, is that --

1 WITNESS KRICH: Now, that's not the
2 probability, that's the risk. Sorry, that was the
3 probability.

4 MR. LOVEJOY: Do you know how that was
5 derived?

6 WITNESS KRICH: I do, I read the report.
7 It says how it was derived.

8 MR. LOVEJOY: Based on that probability --

9 WITNESS KRICH: So, if I could --

10 MR. LOVEJOY: Go ahead.

11 WITNESS KRICH: If you read the next
12 sentence, it says the number of fatalities estimated
13 over the same period would be zero.

14 MR. LOVEJOY: Well, it says what it says.
15 The text says zero. And then, in parenthesis it says
16 one percent of one. And, again, that's not really
17 zero, is it?

18 WITNESS KRICH: Right.

19 MR. LOVEJOY: Okay.

20 WITNESS KRICH: What I said was that the
21 risk is zero. What you're referring to is the
22 probability.

23 MR. LOVEJOY: And you're saying the risk
24 probability time is consequence?

25 WITNESS KRICH: Yes, if you round, if you

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1 multiply consequence times probability, you're going
2 to come out pretty close to zero, 0. some very, very
3 small number.

4 And, effectively, that's zero, at least in
5 engineer's terms.

6 MR. LOVEJOY: And the text actually says
7 that one individual would be estimated to experience
8 an irreversible adverse effect. And, for you as an
9 engineer that's zero?

10 WITNESS KRICH: I'm not sure I know where
11 you're reading.

12 MR. LOVEJOY: That's the sentence you were
13 reading, starting therefore.

14 WITNESS KRICH: Well, it says that the
15 number of fatalities estimated over the same period
16 would be zero.

17 MR. LOVEJOY: It says that too. And it
18 also says one individual would be estimated to
19 experience irreversible adverse effects.

20 WITNESS KRICH: Mr. Lovejoy, I do not see
21 that.

22 MR. LOVEJOY: That's the second line of
23 that paragraph.

24 WITNESS KRICH: Yes, the statement is at
25 most one individual. It doesn't say one individual.

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1 MR. LOVEJOY: Okay. I have no further
2 questions.

3 CHAIR BOLLWERK: All right. Any redirect
4 then?

5 MR. REPKA: Yes, I have one brief
6 question.

7 EXAMINATION BY MR. REPKA OF

8 ROD M. KRICH

9 PAUL G. SCHNEIDER

10 MR. REPKA: Mr. Krich, there was some
11 discussion earlier about cross referencing
12 environmental impact statements. Do you recollect that
13 testimony?

14 WITNESS KRICH: Yes, I do.

15 MR. REPKA: Do you have in front of you a
16 copy of LES Exhibit 17, which is the DOE final
17 environmental impact statement for the Paducah,
18 Kentucky site?

19 WITNESS KRICH: Yes, I have it.

20 MR. REPKA: Is the concept of cross
21 referencing the various environmental reviews that DOE
22 conducted discussed in that document, to your
23 knowledge?

24 WITNESS KRICH: To my knowledge, yes.

25 MR. REPKA: Let me direct you to page S-

1 13.

2 WITNESS KRICH: Okay.

3 MR. REPKA: Under section 7.1. -- I'm
4 sorry, S.1.6, relationship to other NEPA reviews, can
5 you tell me what that section says?

6 WITNESS KRICH: I think the easiest thing
7 may be to read part of it, I guess. But, what it
8 says, essentially is that it incorporates other
9 DOE/EIS's into this document.

10 MR. REPKA: And, you're referring to the
11 first paragraph there?

12 WITNESS KRICH: Yes, I am.

13 MR. REPKA: Okay. In your experience, is
14 that unusual in any way?

15 WITNESS KRICH: No, this is what goes on,
16 very common, very routine.

17 MR. REPKA: I have nothing further.

18 CHAIR BOLLWERK: Any additional questions
19 from the staff first on redirect?

20 MR. CUMMINGS: No, Your Honor.

21 CHAIR BOLLWERK: Anything from Mr.
22 Lovejoy?

23 MR. LOVEJOY: The paragraph you're
24 referring to mentions a tiered environmental review
25 process. Is that the kind of incorporation by

1 reference you're talking about?

2 WITNESS KRICH: We don't use tiered in our
3 side of the business. But the DOE does. And, yes,
4 that is what I'm referring to.

5 MR. LOVEJOY: Well, do you have an
6 understanding of what a tiered environmental review
7 process means in the NEPA context?

8 WITNESS KRICH: Yes, I believe I do.

9 MR. LOVEJOY: Doesn't it involve
10 preparation of a broad environmental impact statement,
11 say for a program, followed by specific environmental
12 impact statements for parts of that program?

13 WITNESS KRICH: I think that tiered as
14 generic meaning in that you prepare various documents,
15 starting at the highest level and working your way
16 down to a site specific one. It doesn't necessarily
17 apply only to EIS's.

18 MR. LOVEJOY: Well, I'm asking about the
19 term tiering in the EIS context. Doesn't it have the
20 application that I described?

21 WITNESS KRICH: What it means is that a
22 high level document or a programmatic document is
23 prepared before a specific site is selected and a
24 specific process is selected.

25 And then, once a specific site or a

1 specific process is selected, then a site specific or
2 process specific EIS.

3 MR. LOVEJOY: Now, the DOE/PEIS was a
4 programmatic environmental impact statement, right?

5 WITNESS KRICH: Yes.

6 MR. LOVEJOY: That's the title, and that's
7 what it was.

8 WITNESS KRICH: I certainly hope so.

9 MR. LOVEJOY: Is it your understanding
10 that the draft EIS for the NEF is tiered to the
11 DOE/PEIS?

12 WITNESS KRICH: The draft environmental
13 impact statement, that's what you're referring to?

14 MR. LOVEJOY: NUREG 1790.

15 WITNESS KRICH: NUREG 1790 is a draft
16 environmental impact statement for a gas centrifuge
17 uranium enrichment plant, not a deconversion.

18 MR. LOVEJOY: So, it's not part of the
19 program encompassed within the DOE PEIS?

20 WITNESS KRICH: I'm sorry, I don't
21 understand the question.

22 MR. LOVEJOY: Well, DOE/PEIS describes a
23 program, the programmatic EIS, is that correct? We
24 went through this.

25 WITNESS KRICH: No, I'm not sure we went

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1 through it at the same point.

2 JUDGE ABRAMSON: Where are you going
3 Counselor?

4 MR. LOVEJOY: Well, I am trying to
5 establish what the witness' understanding is of the
6 legal relationship between these various EIS's. The
7 concept of tiering under NEPA is a very specific
8 concept.

9 And, it actually applies to EIS's prepared
10 -- success of EIS is prepared by the same Agency. It
11 does not apply to an EIS prepared by two different
12 agencies. And I --

13 JUDGE ABRAMSON: As I recall, this portion
14 of the testimony came about because LES's Counsel
15 asked him if it was common to make reference and
16 incorporate by reference other IES's within a
17 document. And I'm lost in how you --

18 MR. LOVEJOY: Well --

19 JUDGE ABRAMSON: -- where you're going in
20 that relationship or in that context.

21 MR. LOVEJOY: I am trying to establish
22 what kind of incorporation by reference relationship
23 LES believes has taken place here and they're
24 essentially defending.

25 They have referred to these various DOE

1 EIS's. LES didn't prepare them. NRC didn't prepare
2 them. This witness hasn't checked any of the data.

3 JUDGE ABRAMSON: Are you asking this
4 witness to vouch for the NRC's incorporation of these
5 EIS's by reference or to dispute that?

6 MR. CUMMINGS: Your Honor, I think we
7 would object to the question seeking testimony from
8 Mr. Krich as to whether or not the NRC --

9 JUDGE ABRAMSON: That's why I'm asking
10 what he's doing.

11 MR. LOVEJOY: Well, it's a delicate
12 matter, Your Honor. But, I understand LES is here to
13 defend, among other things, the environmental
14 discussions and documents generated by the NRC.

15 If they're not, then he can simply say so.
16 But, I believe, actually they are. And so, I'm asking
17 about that.

18 MR. CURTISS: Let me speak to that and
19 perhaps find a path forward here. The question that
20 Mr. Repka asked on redirect related to an area of
21 inquiry that Mr. Lovejoy pursued earlier in his
22 questioning about whether it was appropriate to rely
23 on the EIS's that were referenced in the Commission's
24 order.

25 And, Mr. Lovejoy raised the question about

1 the connection between the DOE/PEIS and the Portsmouth
2 and Paducah site specific EIS's, I guess, to make the
3 point that there may not be a connection between the
4 two.

5 We were puzzled as to what the purpose of
6 the question was. And so, Mr. Repka simply pointed to
7 the reference in one of the site specific EIS's, which
8 is included in the other, as well, that the site
9 specific EIS's incorporate by reference the PEIS.

10 And so that it's appropriate to consider
11 all three of those, because of the connection that DOE
12 established between the two. This discussion and Mr.
13 Krich question or answer I don't think has anything to
14 do with tiering and however DOE viewed it.

15 It's simply a matter of relying on the
16 extensive environmental evaluations that have been
17 conducted by DOE.

18 JUDGE ABRAMSON: Perhaps, Counsel, you can
19 just tell us what the point is and let's see if we can
20 focus in on what's appropriate to ask. Or maybe you
21 can ask the right question and we can avoid --

22 MR. LOVEJOY: Well, perhaps this is better
23 explored with NRC. And I'd be happy to do that.

24 JUDGE KELBER: Well, just to conclude
25 this, let me ask, in preparation of technical

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1 articles, papers, reports, is it common practice to
2 cite conclusions and other details that are pertinent
3 from reviewed technical articles from other sources?

4 WITNESS KRICH: Yes, sir, all the time.

5 JUDGE KELBER: Thank you.

6 CHAIR BOLLWERK: All right, any further
7 questions from anyone? Anything about what Judge
8 Kelber just asked or anything else?

9 (No response.)

10 CHAIR BOLLWERK: All right. At this point
11 then, gentlemen, thank you for your service to the
12 Board. I believe at least one of you will be back to
13 see us tomorrow. Thank you very much.

14 (Pause.)

15 CHAIR BOLLWERK: At this point, I think we
16 are prepared to move forward with Mr. Palmrose.

17 (Pause.)

18 MR. CUMMINGS: At this time the Staff
19 calls Dr. Palmrose to the stand, Dr. Donald Palmrose.

20 CHAIR BOLLWERK: All right. We're ready
21 then?

22

23

24

25

1 Whereupon,

2 DR. DONALD PALMROSE

3 was called as a witness by counsel for the Staff and,
4 having been duly sworn, assumed the witness stand, was
5 examined and testified as follows:

6 MR. CUMMINGS: Would you please identify
7 yourself?

8 WITNESS PALMROSE: I am Dr. Donald E.
9 Palmrose. I'm a Senior Nuclear Safety Engineer for
10 ATL International, under contract with NRC to develop
11 the Environmental Impact Statement for the proposed
12 NEF.

13 MR. CUMMINGS: Do you have a document in
14 front of you -- I'm going to start with the direct
15 testimony. Do you have a document in front of you
16 titled NRC Staff testimony of Donald E. Palmrose
17 concerning nuclear information and resource service of
18 public citizen, Environmental Contention for NIRS/PC
19 EC-4, impacts of waste storage?

20 WITNESS PALMROSE: Yes.

21 MR. CUMMINGS: Do you recognize this as
22 your testimony?

23 WITNESS PALMROSE: Yes.

24 MR. CUMMINGS: Was this prepared by you or
25 under your supervision?

1 WITNESS PALMROSE: Yes, it was

2 MR. CUMMINGS: Do you have any corrections
3 or revisions you wish to make at this time?

4 WITNESS PALMROSE: No, I do not.

5 MR. CUMMINGS: And, is this document true
6 and correct to the best of your information,
7 knowledge, and belief?

8 WITNESS PALMROSE: Yes, it is.

9 MR. CUMMINGS: And, do you adopt this as
10 your written -- this written testimony as your sworn
11 testimony in this proceeding?

12 WITNESS PALMROSE: Yes, I do.

13 MR. CURTISS: Your Honors, at this time we
14 would request that Dr. Palmrose's testimony be
15 admitted into evidence and bound into the record as if
16 read?

17 CHAIR BOLLWERK: Any objection from the
18 parties?

19 MR. CURTISS: No objection.

20 MR. LOVEJOY: No objection.

21 CHAIR BOLLWERK: All right. Hearing none,
22 then the NRC Staff testimony of Donald E. Palmrose
23 concerning NIRS/PC Environment Contention EC-4 should
24 be bound into the record as if read.

25 (Whereupon, the pre-filed direct testimony

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1 of Dr. Donald Palmrose was bound into the record as if
2 having been read.)

February 3, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	
LOUISIANA ENERGY SERVICES, L.P.)	Docket No. 70-3103
)	
(National Enrichment Facility))	ASLBP No. 04-826-01-ML

NRC STAFF TESTIMONY OF DONALD E. PALMROSE CONCERNING
 NUCLEAR INFORMATION AND RESOURCE SERVICE AND PUBLIC CITIZEN
 ENVIRONMENTAL CONTENTION 4 ("NIRS/PC EC-4")
(IMPACTS OF WASTE STORAGE)

- Q1. Please state your name, occupation, and by whom you are employed.
- A1. My name is Donald E. Palmrose. I am employed as a Senior Nuclear Safety Engineer with Advanced Technologies and Laboratories International, Inc. (ATL). I am providing this testimony under a technical assistance contract with the NRC. A statement of my professional qualifications is attached hereto.
- Q2. Please describe your current responsibilities.
- A2. I manage the team of engineers, consultants, and support personnel (the ATL Team) that is responsible for the development of the Environmental Impact Statement (EIS) for the proposed Louisiana Energy Services, L.P. (LES or the Applicant) uranium enrichment facility.
- Q3. Please explain your duties in connection with the NRC Staff's review of the LES application to construct, operate, and decommission a gas centrifuge uranium enrichment facility near Eunice, New Mexico, in Lea County.
- A3. As part of my official responsibilities, I developed or contributed to the sections and appendices of the Draft Environmental Impact Statement for the Proposed National

Enrichment Facility in Lea County, New Mexico, NUREG-1790, September 2004 (DEIS) which pertain to public and occupational health impacts under normal operations; waste management impacts, including depleted uranium disposition; land use; visual and scenic impacts; cumulative impacts; and the no-action alternative. I also supervised the overall development of Chapter 4, "Environmental Impacts," and associated appendices of the DEIS.

I reviewed the Applicant's Environmental Report (ER) and Safety Analysis Report (SAR) pertaining to public and occupational health, waste management, and the other impact areas analyzed in Chapter 4 of the DEIS, as well as the Applicant's responses to the NRC Staff's requests for additional information. In addition to documents I found through independent research, I reviewed various documents referenced by the Applicant's ER, and previously published or available NRC documents. These documents are referenced in the DEIS. I also reviewed documents prepared by the US Department of Energy (DOE). DEIS at 1-7, 1-8 (Staff Exhibit 1). I was the principal author of DEIS Sections 2.1.9, 4.2.12, 4.2.14, and C.1 through C.3 of Appendix C. I was also a technical contributor for DEIS Sections 2.1.7, 2.2.2.4, 2.4, 4.2.1, 4.2.3, 4.4, and 4.8.

- Q4. What is the purpose of your testimony?
- A4. The purpose of this testimony is to provide my views concerning Nuclear Information and Resource Service and Public Citizen (NIRS/PC) Environmental Contention 4 (EC-4).
- Q5. Are you familiar with Contention NIRS/PC EC-4?
- A5. Yes. In its amended and final form, Contention NIRS/PC EC-4 states as follows:

Petitioners contend that the Louisiana Energy Services, L.P. Environmental Report (ER) lacks adequate information to make an informed licensing judgment, contrary to the requirements of 10 C.F.R. Part 51. The ER fails to discuss the environmental impacts of construction and lifetime operation of a conversion plant for the Depleted Uranium Hexafluoride ("UF₆") waste that is required in conjunction with the proposed enrichment plant.

The DEIS fails to discuss the environmental impacts of the construction and operation of a conversion plant for the depleted uranium hexafluoride waste. The DEIS entirely relies upon final EISs issued in connection with the construction of two conversion plants at Paducah, Kentucky, and Portsmouth, Ohio, that will convert the Department of Energy's inventory of depleted uranium (DEIS at 2-28, 2-30, 4-53, 4-54). Such reliance is erroneous, because the DOE plants are unlike the private conversion plant contemplated by LES.

Q6. Are you familiar with the bases supporting the amended NIRS/PC EC-4?

A6. Yes, the bases as accepted by the ASLB state:

The ER does not, for example, include environmental impacts of construction and lifetime operation of a conversion plant for the UF₆ waste (suggesting that construction and operation of such a plant is not seriously considered). The suggestion that Cogema and/or ConverDyn may build and operate such a facility for the conversion of LES's UF₆ waste shows that the ER is deficient in not addressing the cumulative environmental impacts of construction and operation of such a facility, which would in fact be an integral part of LES's operations. Specifically, the disposition of contaminated hydrofluoric acid ("HF") would be a significant issue. Radioactively contaminated materials should not be released into open commerce. Treating HF as a waste or transporting it for reuse in the manufacture of UF₆ would be expensive and would create risks. Both the costs and risks must be analyzed.

LES has chosen to focus its planning for a private conversion facility on a process different from the process to be used in the DOE plants. LES will adopt a process that generates anhydrous hydrofluoric acid ("AHF") (see LES Answer to Petitions of NIRS/PC and New Mexico Attorney General, May 3, 2004, at 72). The process discussed in the EISs for the Paducah and Portsmouth conversion plants is a different one, which generate aqueous HF and calcium fluoride (CaF₂) (See Paducah EIS, DOE-0359, at S-19, 1-18; Portsmouth EIS, DOE-0360, at S-17, 1-19).

Thus, the facilities and processes analyzed in the conversion plant EISs do not fully correspond to the configuration proposed for construction by LES. In particular, the use of a distillation process to upgrade the HF resulting from the conversion process to AHF is not considered in the EIS for either the Paducah or Portsmouth facilities. In addition, when the engineering analysis for these proposed facilities was conducted, the distillation option was not even commercially developed. The Draft Engineering Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride - Rev. 2, Lawrence Livermore National Laboratory

(LLNL)(1997), which is included as supporting material to the conversion plant EISs, states:

Distillation is a common industrial process and was the design basis for this suboption. The processing of the azeotrope and the process parameters for the conversion reactors were patterned after the General Atomics/Allied Signal response to the RFR and the Sequoyah Fuels Corp. patented process. This representative process has not been industrialized, but the initial research and development have been completed. (J.W. Dubrin et. al., "DEPLETED URANIUM HEXAFLUORIDE MANAGEMENT PROGRAM: The Engineering Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride Volume I", Lawrence Livermore National Laboratory, May 1997 (UCRL-AR-124080 Vol. 1 Rev. 2), at 3-8.

Therefore, the EISs for the DOE plants do not consider the impacts of the distillation process chosen by LES to generate AHF, nor the safety aspects of such operation, nor the impacts of sale, transportation, and use of AHF. The distillation process is not commercially established and projection of its impact will be speculative.

- Q7. What is meant by the conversion of depleted uranium hexafluoride waste?
- A7. The uranium enrichment process that is to be used by LES at the proposed National Enrichment Facility (NEF), will produce as a byproduct, depleted uranium hexafluoride (DUF_6). DUF_6 , when stored in cylinders, emits low levels of gamma and neutron radiation. In addition, DUF_6 is highly reactive to water vapor in air, forming hydrogen fluoride (HF) and uranyl fluoride (UO_2F_2), both of which are chemically toxic substances. Therefore, for the purposes of long-term waste management, DUF_6 is converted into a more stable form. The process of converting the DUF_6 to a more stable form is the "conversion" process that is referenced.
- Q8. In the DEIS did you consider the environmental impacts of the conversion process?
- A8. Yes, because conversion is a necessary step before the DUF_6 could be disposed of, the impacts of the conversion process were taken into account.

Q9. How did you conduct this review?

A9. I reviewed all of the environmental review documents which addressed the impacts associated with conversion.

Q10. Were some of these reviews conducted by DOE?

A10. Yes. I considered three DOE environmental review documents which relate to the conversion facilities which are being constructed for the conversion of DUF_6 at the Portsmouth, Ohio, and Paducah, Kentucky sites. Those documents, as referenced in Section 1.4.5 of the DEIS, are: Final Programmatic Environmental Impact Statement for the Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride, DOE/EIS-0269, Office of Nuclear Energy, Science and Technology, U.S. Department of Energy, April 1999 (PEIS); the Final Environmental Impact Statement for the Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site DOE/EIS-0359, Oak Ridge Operations, Office of Environmental Management, U.S. Department of Energy, June 2004 (Paducah FEIS); and the Final Environmental Impact Statement for the Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site, DOE/EIS-0360, Oak Ridge Operations, Office of Environmental Management, U.S. Department of Energy, June 2004 (Portsmouth FEIS).

Q11. What activities were performed by DOE in addressing the environmental impacts of conversion?

A11. DOE initially prepared the PEIS as a preliminary step in developing a strategy to manage the DUF_6 inventory at its two uranium enrichment facilities at Paducah, Kentucky and Portsmouth, Ohio. In Appendix F of that document, DOE evaluated the environmental impacts of three conversion options: conversion to U_3O_8 , conversion to UO_2 , or conversion to metal. PEIS at F-2 (LES Exhibit 18). The potential impacts were not site-specific

because the location of a conversion facility, if constructed, would not be decided until some time in the future. PEIS at F-4. Further, because more than one option was considered, the impacts are presented as a range within each area of impact. This range was intended to provide an estimate of the magnitude of impacts given the fact that the specific site and conversion technology were not yet determined.

Q12. Did the PEIS deal specifically with the possibility that the conversion could involve the process of distillation to produce anhydrous HF, as discussed by NIRS/PC?

A12. Yes. With regard to conversion to U_3O_8 , the PEIS considered a particular process (referred to as a "dry process") in which the DUF_6 would be converted to U_3O_8 and concentrated HF. PEIS at F-11. The HF product of this process would be in liquid, or aqueous, form. Thereafter, two technologies were considered for the management of the HF produced - one of which was to upgrade the concentrated HF to anhydrous HF for sale. PEIS at F-11 to F-12. The aqueous HF would be converted to anhydrous HF by distillation. Because a considerable market for anhydrous HF existed at the time, DOE noted that this technology could minimize waste and increase product value; however, handling, storage and transportation of large quantities of this product could pose a potential hazard to workers and the public. PEIS at F-12.

Q13. What was the other option for handling aqueous HF that was considered by DOE?

A13. The other option is that the concentrated aqueous HF could be neutralized with lime to produce CaF_2 for disposal or sale. With respect to this option, DOE noted that the potential hazards associated with processing, general handling, storage and transportation of large quantities of anhydrous HF would be avoided, but the value of CaF_2 at the time was significantly less than that of anhydrous HF. PEIS at F-12.

Q14. What did DOE conclude regarding the environmental impacts of these two processes?

A14. For most environmental areas analyzed in the PEIS, DOE concluded that the impacts would be the same, regardless of what process was selected for management of HF. In presenting the impacts from the conversion processes and the management of HF, DOE focused on significant impacts. These significant impacts did not always involve the use of anhydrous HF.

The PEIS discussed the environmental impacts on human health from construction and operations of a conversion facility for normal operations and accidents, air quality, water and soil, socioeconomics, ecology, waste management, resource requirements, land use and transportation. For radiological impacts from normal operations, DOE found that conversion to U_3O_8 would result in an average radiation exposure of about 300 mrem/yr to involved workers and less than 0.01 mrem/yr for noninvolved workers and members of the public. DOE also noted that because of the similarity of the conversion processes which would be used to manage the HF produced by conversion to U_3O_8 , the airborne emission rates of uranium compounds and the material handling activities would be expected to vary only slightly from each other, resulting in similar radiological impacts. PEIS at F-16. DOE found that no adverse chemical health effects would be expected during normal operations. PEIS at F-21.

The PEIS examined a range of accidents from high-frequency/low-consequence to low-frequency/high-consequence accidents and noted the results for radiological and chemical health impacts for the highest-consequence accident in each frequency category. PEIS at F-23 to F-37. DOE found that the maximum risk values would be less than 1 person injured for all accidents except for impact to workers from corroded cylinder spills (wet or dry conditions) and ammonia stripper overpressure. PEIS at F-36. For physical hazards, DOE determined there were lower impacts from conversion to U_3O_8 , compared

to other conversion options, and that there are essentially no differences between HF management options. PEIS at F-37.

For waste management impacts during construction, the PEIS concluded that the quantities of wastes generated would be approximately the same regardless of the conversion process. PEIS at F-62 to F-66. During operations, the impacts would range from negligible to large depending upon the choice of technology for managing HF and the ultimate generation volumes and disposition of CaF_2 resulting from the neutralization of HF. PEIS at F-62 to F-66. Overall, the waste input resulting from normal operations for conversion to U_3O_8 would be expected to have a moderate impact on waste management. PEIS at F-64.

The PEIS concludes that the total transportation risks associated with DUF_6 conversion would be low for all three conversion processes and associated management of HF. PEIS at J-27. In particular, no radiological fatalities would be expected as a result of routine shipments or a potential severe accident. Impacts due to chemical exposure from a severe accident could result in an overall risk to the public (defined as the product of the accident consequence and the probability over the duration of the program) of 1 permanent physical injury or fatality (defined as irreversible adverse effects) due to HF-related rail transportation accidents. PEIS at J-28.

The PEIS concluded that air quality, water and soil, socioeconomics, ecology, resource requirements, and land use impacts would have no or very small differences for the management options for HF. PEIS at F-37 to F-40, F-45 to F-52, F-68, F-69 and F-70. The PEIS did note that while a postulated accident involving anhydrous HF could have releases, that rapid mitigation and the small volume of release contaminants would result in negligible impacts. PEIS at F-47, F-50, and F-52. Other impacts considered by the PEIS that could potentially occur include cultural resources, environmental justice, visual,

recreational resources, noise levels, and decontamination and decommissioning. However, they were not analyzed in detail because they require consideration of specific sites. PEIS at F-72.

Q15. What was the next step in the DOE environmental analysis?

A15. DOE solicited bids from contractors to design, construct and operate DUF_6 conversion facilities at the Paducah and Portsmouth sites. Five proposals were received, and DOE selected the proposal of Uranium Disposition Services, LLC (UDS). Under the UDS proposal, the DUF_6 would be converted to U_3O_8 using a dry conversion process. The resulting aqueous HF would then be marketed for sale. If not sold, the aqueous HF would be neutralized, producing CaF_2 that, in turn, would be disposed of if not sold. Paducah FEIS at S-11, S-12, 2-5 (LES Exhibit 17); Portsmouth FEIS at S-11, S-12, 2-5 (LES Exhibit 16). Accordingly, site-specific evaluations of the environmental impacts associated with aqueous HF and CaF_2 conversion product sale and use were prepared for each site. Paducah FEIS, Appendix E; Portsmouth FEIS, Appendix E.

Q16. Did the site-specific FEISs for those sites specifically evaluate the option of producing anhydrous HF?

A16. No. However, they note that when the proposals were received, DOE was required to prepare an environmental synopsis of each, based on environmental critiques, to document the consideration given to the environmental factors and to record that the relevant environmental consequences had been evaluated in the selection process. Paducah FEIS Appendix D, p. 2; Portsmouth FEIS Appendix D, p. 2. The potential environmental impacts in the critiques were based on the offerors' data and the detailed evaluations in the PEIS. Paducah FEIS Appendix D, p. 7; Portsmouth FEIS Appendix D, p. 7. DOE explicitly noted that the estimation of potential environmental impacts for any proposal is subject to a great deal of uncertainty. In many cases its assessments were based on data from a facility with

similar, but not identical design. Paducah FEIS Appendix D, p. 12; Portsmouth FEIS Appendix D, p. 12. DOE further noted that these uncertainties were offset by several factors, including the detailed and thorough analysis contained in the PEIS. Paducah FEIS Appendix D, p. 12; Portsmouth FEIS Appendix D, p. 12.

Q17. Did you rely on these site specific FEISs in your assessment of the potential environmental impacts of conversion of the DUF_6 produced at the proposed NEF?

A17. Yes. In my discussion of the impacts that would result from a private conversion facility, I assumed that for conversion of DUF_6 to U_3O_8 , the impacts would be similar to those for the Portsmouth and Paducah facilities. Accordingly, I used the values from the DOE analyses in reaching my conclusions regarding the expected impacts in Section 4.2.14.3 of the DEIS.

Q18. Do these values, therefore, represent impacts assuming that the conversion facility will use a neutralization process with regard to the HF produced by the conversion process, thereby producing CaF_2 ?

A18. Yes. I included the impacts from this type of facility in the DEIS because specific information is available from the DOE analysis and this technology is likely to be used in the conversion process. This is the case because if LES chooses to convert the DUF_6 produced at the proposed NEF as permitted under the USEC Privatization Act, the conversion would take place at either the Portsmouth or Paducah facilities. While the technology that would be used at a private conversion facility is not certain, DOE selection of a process which does not produce anhydrous HF indicates that it is not currently a cost effective option. This is further evidenced by the fact that the other existing conversion facilities do not produce anhydrous HF. These include the Cogema conversion facility in France, which is a commercial facility for converting DUF_6 to U_3O_8 , and three U.S. fuel fabricators which convert enriched UF_6 to UO_2 . Each of these facilities sells the HF

produced by the conversion process in aqueous form. The Engineering Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride, UCRL-AR-124080 Vol. 1 Rev. 2, Lawrence Livermore National Laboratory, May 1997, at p. 3-9 (Staff Exhibit 18).

Q19. Would you be able to address the impacts that would result from conversion utilizing a distillation process to convert aqueous HF to anhydrous HF with the same degree of specificity used in the DEIS regarding the neutralization process?

A19. No. Specific analyses on the impacts from the neutralization process are contained in the Paducah and Portsmouth FEISs. On the contrary, with regard to a process of distillation resulting in anhydrous HF, there is no current conversion facility that uses this technology. Furthermore, there is no plan to construct such a facility, therefore, the process used to distill HF to an anhydrous form has not been fully developed. Therefore, any assessment of the impacts resulting from distillation would have a high degree of uncertainty and any analysis would have to be derived from the evaluation of similar technologies. In the PEIS, DOE performed this type of analysis by relying on data from similar technologies. The PEIS presented the potential impacts as a range of impacts designed to provide a reasonable estimate of their magnitude, taking into account the uncertainty relative to the specific technology and site. PEIS at F-4.

Q20. Do you consider the analysis contained in the PEIS to be an adequate analysis of the impacts of distillation, given the current understanding of technology that could be used in distillation?

A20. Yes. Given these uncertainties and based on current knowledge, the analysis performed by DOE in the PEIS presents a thorough analysis of impacts of a conversion facility using an as yet to be commercially established distillation process to produce anhydrous HF. A more specific analysis would require knowledge of the specific processes which would be used to perform the distillation process and the specific site at which the facility would be

constructed.

Q21. Does this conclude your testimony?

A21. Yes.

CURRICULUM VITAE

Donald E. Palmrose, Ph.D.

Senior Nuclear Safety Engineer

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Summary of Qualifications

Dr. Palmrose has twenty-five years of management and technical expertise in Risk Assessments, National Environmental Policy Act (NEPA) assessments and documentation, Nuclear Safety Analysis, Radiation Protection, Criticality Safety, and Thermal-Hydraulic Analysis. Dr. Palmrose has been a project manager, technical lead, and trainer for the evaluation of the risk from the use of byproduct material by industry, medical applications, and research supporting the U.S. Nuclear Regulatory Commission (NRC) Office of Nuclear Material Safety and Safeguards (NMSS). He has participated in the preparation of several key NEPA documents for the U.S. Department of Energy (DOE) and the NRC that include construction and operation of new fuel cycle facilities, decommissioning of shutdown facilities; the processing and deposition of transuranic wastes, and in developing strategies encompassing the transport and disposition of plutonium-bearing material within the DOE complex. At various times, he has been a team member for audits, 10 CFR 830 reviews, and training for activities that include operational readiness reviews, safety analysis reports, documented safety analyses, safety evaluation reports, and risk assessments. He has six years of managerial and operational experience on nuclear power plants and is a specialist in development and application of computer analysis for radiological dose assessments and of nuclear power plant operations for nuclear safety.

Education

Ph.D. Nuclear Engineering, Texas A&M University, May 1993.

M.S. Nuclear Engineering, Texas A&M University, May 1986.

B.S. Nuclear Engineering, Oregon State University, June 1979.

Professional Experience

Advanced Technologies and Laboratories (ATL) International, Inc.

Senior Nuclear Safety Engineer, March 2000-present

Dr. Palmrose has served as project manager and a technical contributor in several NRC risk assessments concerning the nuclear fuel life cycle and the use of byproduct material. In general, the

risk assessments have been in support of NRC programs for risk-informed decision-making of byproduct material uses. There were two risk studies, or assessments, concerning the change in risk if petitions for rule making would be implemented. One petition was to allow the irradiator facility operator to be off-site during operations and the second was to remove radiography associated equipment from 10 CFR Part 34.20. Another byproduct material risk assessment evaluated the potential impacts of enforcement or rulemaking changes involving chemical agent detectors or monitors that use nuclear byproduct material sealed sources. Two related projects were involved improving the NRC staff's understanding of the risk assessments developed in NUREG/CR-6642, "Risk Analysis and Evaluation of Regulatory Options for Nuclear Byproduct Material Systems." Dr. Palmrose led the development of a handbook about NUREG/CR-6642 and an associated training course (P-405, "Byproduct Materials System of Risk Analysis and Evaluation in NMSS") that was given to the NRC staff at Headquarters and the four Region offices. A related NUREG/CR-6642 task consisted of developing an approach to uncertainty analysis of this nuclear byproduct material risk study for the purpose of supporting a revision of NMSS inspection guidance. Dr. Palmrose led a NMSS-sponsored project in gathering risk information concerning the life cycle of spent nuclear fuel, especially for dry storage and transportation risks from NRC, industry, and other governmental technical basis documents. The project report not only presented an overview of the spent nuclear fuel life cycle and annual risks as available but also presented recommendations and suggested process steps that the NRC could pursue to better risk-inform this arena of NMSS responsibility.

Dr. Palmrose has been a key technical contributor in performing NEPA evaluations relating to radiation health effects, alternative actions, site conditions, operational history, and remediation technologies. This work includes an Environmental Impact Statement (EIS) for the decommissioning of the Sequoyah Fuels Corporation Facility, a former uranium conversion plant nearby Gore, Oklahoma; an EIS for the construction and operation of a uranium enrichment facility, and Environmental Assessments (EAs) for the license renewal of a wet-basin independent spent fuel storage installation (ISFSI), and a gaseous centrifuge test facility. He has been involved in several NEPA-required Supplement Analyses and draft Amended Record of Decisions in support of the timely closure of the Rocky Flats Environmental Technical Site (RFETS) involving the safe transportation, storage, and disposition of plutonium-bearing material to either the Savannah River Site (SRS) or to the Waste Isolation Pilot Project (WIPP). For his work on RFETS projects, he received a letter of appreciation on July 2, 2002 from DOE's Office of Nuclear Material and Spent Fuel.

Dr. Palmrose has been a technical contributor in the reviews and revisions of NRC Regulatory Guides and Standard Review Plans for: (1) dry cask storage systems and facilities in support of 10 CFR Part 72; (2) current 10 CFR Part 71; and (3) proposed 10 CFR Part 71 rule changes. He provided technical support for a safety evaluation report regarding potential purification processes in a mixed oxide fuel fabrication facility.

Dr. Palmrose has participated in eight independent reviews of Documented Safety Analyses (DSAs) of Los Alamos National Laboratory (LANL) facilities to ensure these DSAs are produced in accordance with 10 CFR 830, current DOE Orders and Standards, and LANL guidance and checklists. The LANL facilities reviewed include the Beryllium Technology Facility (BTF); the Bolas Grande Project; the existing Chemistry and Metallurgy Research (CMR) Facility; the General

Tank's area; the Los Alamos Neutron Science Center (LANSCE); the Radioassay and Nondestructive Testing (RANT) facility; the TA-54 and Transuranic Waste Characterization Modular Units; and the Waste Characterization, Reduction, and Repackaging (WCRR) facility. The reviews addressed proper accident identification, accident analysis, identification of structures, systems, and components that are safety-class and safety-significant and associated technical safety requirements for safe operation. The reviews included verifying and/or independently confirming the quantitative accident analysis in accordance with applicable DOE orders, standards and handbooks (i.e., DOE-O-420.1A, DOE-STD-3009-94Ch2, and DOE-HDBK-3010-94). This included calculations of material-at-risk and accident consequences using the five-factor formula of DOE-HDBK-3010-94.

Dr. Palmrose coordinated the developed of the environmental section of the Technical Basis Document on the U.S. Department of Energy (DOE) Portsmouth Gaseous Diffusion Plant as a member of ATL's radiation dose reconstruction team for the National Institute for Occupational Safety and Health (NIOSH). He is currently assessing the source term and developing the external dosimetry section of the Technical Basis Document for DOE's former Pinellas Plant.

Dr. Palmrose has supported the DOE in nuclear criticality safety as part of nuclear safety analyses and reviews. He prepared a nuclear criticality safety program report tailored for DOE's Office of River Protection at Richland, WA. This document recommended an oversight program of contractors' criticality programs to ensure the safe remediation of the Hanford Tank Farms in according with DOE Order 420.1 and other DOE Standards and memoranda. As a team member for a nuclear safety review of DOE's East Tennessee Technology Park (ETTP) contractor, he critiqued the performance the nuclear criticality safety and training programs for integration into line operations; for complying with ANSI/ANS national standards and DOE orders, directives, policies, and standards.

Scientech, Inc., 1996-2000

Risk Assessment and Thermal-Hydraulics Group, Senior Engineer, Thermal-Hydraulic Analysis
Principal Investigator

Dr. Palmrose provided technical and program support to industry and several offices of DOE, to the U.S. Nuclear Regulatory Commission Office of Nuclear Reactor Regulation (NRR), Office of Nuclear Reactor Research (RES), and Office of Nuclear Materials, Safety, and Safeguards (NMSS). He has performed risk analysis of nuclear byproduct material systems licensed by the NRC for use in industrial, medical, and research applications and documented in NUREG/CR-6642. He gathered data, performed risk and consequence analyses, and documented the results for twelve of forty systems for NUREG/CR-6642. Under a DOE international safety program, he was a team member providing advice, guidance, and review of deliverables to a trio of Ukrainian companies developing an integrated safety analysis for the Zaporizhzhya Unit 5 VVER-1000 nuclear power plant based on U.S. safety standards and criteria. Dr. Palmrose provided technical assistance to a nuclear utility in the analysis of licensing application for spent fuel storage of a decommissioned nuclear power plant. He has performed thermal-hydraulic safety analysis and project management for RES and DOE using the RELAP5/MOD3 and the TRAC-PF1/MOD2 thermal-hydraulic codes including operating commercial PWRs, scaled experimental facility (ROSA/AP600), advance reactor designs

(AP600), research reactors (Brookhaven National Laboratory High Flux Beam Reactor), and for supporting pressurized thermal shock analysis.

Lockheed-Martin Idaho Technologies Co. and EG&G Idaho, Inc., 1991-1996
NRC Thermal-Hydraulics Analysis Unit and National Nuclear Regulatory Support Office, Staff Engineer

He performed various safety analyses for DOE and NRC using various code packages or by creating special analytical codes to analyze operating commercial pressurized water reactors (PWRs), scaled experimental facilities, advance and conceptual reactor designs, and research reactors. This work also includes the performance of a criticality accident analysis for a nuclear fuels storage facility presenting the potential radiological effects during personnel evacuation.

Texas A&M University, Department of Nuclear Engineering, 1984-1991
Non-Teaching Assistant, Research Assistant, and Research Reactor Technical Support Staff

As a Non-Teaching and Research Assistant for the Department of Nuclear Engineering, he graded, prepared lectures, and performed various other teaching and research activities with special emphasis on fusion and thermal-hydraulic courses. He also performed various technical support services at the Texas A&M University Science Center for a Training, Research, and Isotope, General Atomics (TRIGA) research reactor in 1987.

U.S. Navy and U.S. Naval Reserves, 1979-1995
Officer

Active duty service in the Surface Nuclear Propulsion Program, 1979-1984
Reserve assignments with Office of Naval Research and Engineering Duty units, 1984-1995

Active duty service in the Surface Nuclear Propulsion Program under ADM Hyman Rickover. Responsible for directing the daily activities of up to 120 men in the maintenance and operation of nuclear and non-nuclear mechanical systems under dynamic operating conditions. —1 Division Officer on U.S.S. Mississippi (CGN-40) from October 1980 to November 1982. Qualified as a Surface Warfare Officer in November 1982. Auxiliaries Officer on U.S.S. Enterprise (CVN-65) from February 1983 to March 1984. Transferred from active duty to the reserves in late March 1984. Reserve assignments with Office of Naval Research and Engineering Duty units. Retired from U.S. Naval Reserves on September 1, 1995.

Specific Technical Expertise

Safety Analysis —Performed accident and safety analysis for public and occupational health and safety for all exposure pathways for committed effective dose equivalent (CEDE) and total effective dose equivalent (TEDE) evaluated to current regulatory criteria and standards. Experience with applying the RESRAD, GENII, and other environmental dispersion codes that apply Gaussian plume and other dispersion methodologies. Specific applications are as follows: Performed an integrated and multi-dimensional activation and shielding analysis of a potential experimental fusion device.

Determined the potential radiological effects on personnel evacuation for a criticality accident at a nuclear fuels storage facility at the INEL. Conducted a risk analysis of nuclear byproduct material systems licensed by the NRC for use in industrial, medical, and research applications. Assisted in the analysis of licensing application for spent fuel storage of a decommissioned nuclear power plant. Reviewed licensee applications submitted to the NRC. Reviews of required 10 CFR 830 Documented Safety Analyses (DSAs) of LANL facilities to ensure these DSAs are produced in accordance with current DOE Orders and Standards, and LANL guidance and checklists.

Thermal-Hydraulic Analysis — Thermal-hydraulic safety analysis using various code packages (example: the Reactor Excursion and Leak Analysis Program Version 5 or RELAP5) or by creating special analytical codes. Developed a computer program based on noncondensable gas and steam mixture behavior to calculate the maximum system pressure for a long term loss of a shutdown PWR's residual heat removal system. Modeled and analyzed various nuclear power plants with the RELAP5/MOD3 and the TRAC-PF1/MOD2 thermal-hydraulic codes including operating commercial PWRs (H. B. Robinson Unit 2), scaled experimental facilities (ROSA/AP600, SPES, and PMK-NVH), advance reactor designs (AP600), and research reactors (Univ. of Rhode Island research reactor and Brookhaven National Laboratory High Flux Beam Reactor). Thermal-hydraulic Principal Investigator for an U.S. Nuclear Regulatory Commission programs on pressurized thermal shock study to support regulatory guide changes and for integral test facility calculations using RELAP5/MOD3. Technical manager of a New York Power Authority contract for Independent V&V of the SOLOMON code.

Training — Manager, technical lead, and principal trainer for NRC Course P-405, "Byproduct Materials System of Risk Analysis and Evaluation in NMSS," U.S. Nuclear Regulatory Commission given to NRC Headquarter and Region Office staff during calendar years of 2002 and 2003. Developed and presented practical application of thermal-hydraulic analysis in a RELAP5 training course. Taught and organized undergraduate laboratory course and occasional main lectures in support of several engineering courses while a graduate student at Texas A&M.

Professional Associations

American Nuclear Society, Member

Publications and Presentations

"Feasibility of Recoil Enhanced Tritium Release from Fusion Blankets Containing Solid Lithium Compounds," Masters of Science Thesis, Texas A&M University, (May 1986).

"Enhancing Tritium Release from Diffusion Limited Solid Lithium Compounds" (co-author), American Nuclear Society Annual Meeting, Dallas, Texas (June 1987).

"TAU: A Design for a Thousand Astronomical Unit Voyage" (co-author), American Nuclear Society Annual Meeting, Dallas, Texas (June 1987).

"Development of a Space Reactor Systems Code at Texas A&M University" (co-author), American Nuclear Society Annual Meeting, Dallas, Texas (June 1987).

"Enhancing Tritium Release from Diffusion Limited Solid Lithium Compounds," Fusion Technology (co-author), Vol. 15, No. 2, Part 1, pp. 193-203 (March 1989).

"Nuclear Radiation Analysis of the IGNITEX Experiment" (co-author), 16th IEEE International Conference On Plasma Science, Buffalo, New York, IEEE 89-CH-2760-7, 59 (May 1989).

"The Impact of Dose Rates Due to Decay Photons of the Design of the IGNITEX Device" (co-author), 13th International Symposium on Fusion Engineering, Knoxville, Tennessee, 1, 720 (October 1989).

"Assessment of Structural Activation in the Operation of the Fusion Ignition Experiment IGNITEX" (co-author), 17th IEEE International Conference on Plasma Science, Oakland, California, IEEE 90-CH 2857-1, 94 (May 1990).

"Activation and Decommissioning Considerations for the Fusion Ignition Experiment IGNITEX" (co-author), Ninth Topical Meeting on the Technology of Fusion Energy, Oak Brook, Illinois (October 1990) and published in Fusion Technology (co-author), Vol. 19, No. 3, Part 2B, pp. 1931-1937 (May 1991).

"A Model for Calculation of RCS Pressure During Reflux Boiling Under Reduced Inventory Conditions and Its Assessment Against PKL Data" (co-author), Proceedings of the United States Nuclear Regulatory Commission for the Nineteenth Water Reactor Safety Information Meeting, NUREG/CP-0119 Vol. 3, pp 329-351 (April 1992).

Thermal-Hydraulic Processes During Reduced Inventory Operation with Loss of Residual Heat Removal (co-author), NUREG/CR-5855 EGG-2671 (April 1992).

"Development of a Multi-Dimensional Coupled Neutron-Gamma Shielding Package for an Entry-Level Workstation" (co-author), Proceedings of the Topical Meeting on New Horizons in Radiation Protection and Shielding, Pasco, Washington (April 26 - May 1, 1992).

"RCS Pressure Under Reduced Inventory Conditions Following a Loss of Residual Heat Removal" (co-author), AIChE Symposium Series, No. 288, Vol. 88, pp 267-274 (1992).

"A Multi-Dimensional Activation and Shielding Analysis Code Package for a Workstation," Doctor of Philosophy Dissertation, Texas A&M University, (May 1993)

"Modeling of a Horizontal Steam Generator for the Submerged Nuclear Power Station Concept" (co-author), 1993 RELAP5 International Users Seminar, Boston, Massachusetts (July 1993).

"An Experimental and Analytical Investigation of Loss of Residual Heat Removal Transients in a Babcock and Wilcox Type Reactor" (co-author), 29th National Heat Transfer Conference, Atlanta, Georgia August 8-11, 1993, ASME, HTD-Vol. 245, NE-Vol. 11, pp 111 (August 1993).

"Modeling Horizontal Steam Generators with RELAP5," 1994 RELAP5 International Users Seminar, Baltimore, Maryland (August 1994).

"Potential Failure of Steam Generator Tubes Following a Station Blackout" (co-author), American Nuclear Society 1994 Winter Annual Meeting, Washington, D.C. (November 1994).

Scaling and Design of LSTF Modifications for AP600 Testing (co-author), NUREG/CR-6066 (November 1994).

"Application of RELAP5 and TRAC-P to PTS," RELAP5 Users Meeting, Annapolis, Maryland (June 1997).

Risk Analysis and Evaluation of Regulatory Options for Nuclear Byproduct Material Systems (contributor), Final Draft NUREG/CR-6642 (November 1999).

"Reducing the Effects of Secondary System Transients for Pressurized Thermal Shock," Accepted Paper ICONE-8 Conference, Baltimore, MD, April 2000.

Supplement Analysis for Storage of Surplus Plutonium Materials in the K-Area Material Storage Facility at the Savannah River Site, DOE/EIS-0229-SA-2, U.S. Department of Energy, Assistant Secretary for Environmental Management, Washington, D.C., February 2002.

NRC Course P-405, "Byproduct Materials System of Risk Analysis and Evaluation in NMSS," U.S. Nuclear Regulatory Commission, 2002-2003.

Environmental Assessment of the USEC American Centrifuge Lead Cascade Facility, U.S. Nuclear Regulatory Commission, January 27, 2004.

Technical Basis Document for the Portsmouth Gaseous Diffusion Plant - Occupational Environmental Dose, ORAUT-TKBS-0015-4 Rev. 00, March 17, 2004.

Draft Environmental Impact Statement for the Decommissioning of the Sequoyah Fuels Corporation Uranium Conversion Facility at Gore, Oklahoma, (to be published).

Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico, Draft Report for Comment, NUREG-1790, (September 2004).

1 MR. CUMMINGS: And now turning to the
2 rebuttal testimony, do you have a document in front of
3 you titled NRC Staff rebuttal testimony of Donald E.
4 Palmrose concerning nuclear information and resource
5 service of public citizen Environment Contention for
6 NIRS/PC EC-4, impacts of waste storage?

7 WITNESS PALMROSE: Yes, I do.

8 MR. CUMMINGS: And, do you recognize this
9 as your testimony?

10 WITNESS PALMROSE: Yes, it is.

11 MR. CUMMINGS: Was it prepared by or under
12 your supervision?

13 WITNESS PALMROSE: Yes, it was.

14 MR. CUMMINGS: And, do you have any
15 corrections or revisions you wish to make at this
16 time?

17 WITNESS PALMROSE: No, I do not.

18 MR. CUMMINGS: And, is this document true
19 and correct to the best of your information,
20 knowledge, and belief?

21 WITNESS PALMROSE: Yes, it is.

22 MR. CUMMINGS: And, do you adopt this as
23 your written testimony -- this written testimony as
24 your sworn testimony in this proceeding?

25 WITNESS PALMROSE: Yes, I do.

NEAL R. GROSS

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1 MR. CUMMINGS: Your Honors, at this time
2 we would request that the rebuttal testimony of Dr.
3 Palmrose be admitted into evidence and bound into the
4 record as if read.

5 CHAIR BOLLWERK: All right, any objections
6 from the parties?

7 (No response.)

8 CHAIR BOLLWERK: All right, hearing none,
9 the testimony, the NRC Staff rebuttal testimony of
10 Donald E. Palmrose concerning NIRS/PC Environmental
11 Contention 4 is adopted and should be bound into the
12 record as if read.

13 (Whereupon, the pre-filed rebuttal
14 testimony of Dr. Donald Palmrose was bound into the
15 record as if having been read.)

February 3, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	
LOUISIANA ENERGY SERVICES, L.P.)	Docket No. 70-3103
)	
(National Enrichment Facility))	ASLBP No. 04-826-01-ML

NRC STAFF REBUTTAL TESTIMONY OF DONALD E. PALMROSE CONCERNING
 NUCLEAR INFORMATION AND RESOURCE SERVICE AND PUBLIC CITIZEN
 ENVIRONMENTAL CONTENTION 4 ("NIRS/PC EC-4")
 (IMPACTS OF WASTE STORAGE)

- Q1. Please state your name, occupation, and by whom you are employed.
- A1. My name is Donald E. Palmrose. I am employed as a Senior Nuclear Safety Engineer with Advanced Technologies and Laboratories International, Inc. I am providing this testimony under a technical assistance contract with the NRC.
- Q2. Have you previously submitted testimony in this proceeding?
- A2. Yes. I provided testimony in this proceeding on January 7, 2005, on behalf of the U.S. Nuclear Regulatory Commission. In that testimony, I described my current responsibilities. I also attached a copy of my professional qualifications.
- Q3. What was the purpose of your previous testimony?
- A3. I provided my views concerning Nuclear Information and Resource Service and Public Citizen (NIRS/PC) Environmental Contention 4 (EC-4).
- Q4. What is the purpose of this testimony?
- A4. To provide my views on NIRS/PC's pre-filed testimony of Dr. Arjun Makhijani regarding contention NIRS/PC EC-4.

Q5. What have you done to prepare this testimony?

A5. I have reviewed all of the pre-filed testimony, including supporting documentation and related NEPA analysis.

Q6. On the basis of your review, do you agree with all of the conclusions and analyses presented in the pre-filed testimony of Dr. Makhijani?

A6. I agree with some, but not all of the conclusions and the underlying analyses presented by Dr. Makhijani.

Q7. Do you agree with Dr. Makhijani's statements in his pre-filed direct testimony at pages 7-8 and 12-13, that due to the lack of specific information it is not possible to quantify all of the impacts of a potential decision by LES to use a process that produces anhydrous hydrofluoric acid?

A7. Yes.

Q8. Do you agree with Dr. Makhijani's statements in his pre-filed direct testimony at pages 7, 11, and 12 that the potential impacts on the environment are likely to be higher if the conversion facility used by LES produces and ships anhydrous hydrofluoric acid instead of neutralizing the aqueous hydrofluoric acid and disposing of the calcium fluoride (CaF₂)?

A8. No. First, I would like to reiterate that I do not believe that it is possible to make a definitive assessment of which process would result in greater or lesser environmental impacts given the uncertainty of the technology that would be used and the site where the conversion facility would be located. Instead, one can draw only generic conclusions regarding potential impacts. At this time, DOE has compiled the most complete, available environmental analysis for anhydrous hydrofluoric acid management and the associated impacts in the Final Programmatic Environmental Impact Statement for the Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride, DOE/EIS-0269, Office of Nuclear Energy, Science and Technology, U.S. Department of

Energy, April 1999 (PEIS). Examination of the information in the PEIS does not indicate that the overall potential impacts for the option of producing anhydrous hydrofluoric acid are likely to be greater than those for neutralization of aqueous hydrofluoric acid to calcium fluoride (CaF_2) for disposal or sale.

For the management of hydrofluoric acid following conversion of the depleted uranium hexafluoride, the PEIS presents the options of either producing anhydrous hydrofluoric acid (i.e., upgrading aqueous hydrofluoric acid to anhydrous hydrofluoric acid) or the neutralization of aqueous hydrofluoric acid to CaF_2 for disposal or sale. Therefore, the impacts between the options of producing anhydrous hydrofluoric acid or neutralizing to CaF_2 are found in the PEIS in the following sections; Appendix F (Conversion) and Appendix J (Transportation) (LES Exhibit 18).

For conversion operations, the PEIS lists the impacts as being none, nonexistent, or small for most impact areas with no differentiation between the anhydrous hydrofluoric acid and CaF_2 options for the following: normal operations at F16 and F-21; physical hazards at F-37; air quality at F-40; water and soil at F-47, F49, F-50; socioeconomics at F-52; ecology during operation at F-58, F-61; land use at F-68. Impacts to ecology were assessed as being moderate from facility construction for any option, thus the impacts would not be different for either anhydrous hydrofluoric acid or CaF_2 . PEIS at F-58.

In assessing the potential impacts from facility accidents, the PEIS considers the most severe or bounding accidents for frequency categories. The categories are defined as likely, unlikely, extremely unlikely and incredible as determined by the probability per year for the accident scenario. PEIS at F-33 to F-34. The bounding accidents that involve hydrofluoric acid concern the rupture of a hydrofluoric acid pipeline to a stand alone storage tank (in the unlikely category), and an accident involving the hydrofluoric acid storage tank itself (in the incredible category). A storage tank would be present only in the event that the

anhydrous hydrofluoric acid option is chosen. The impacts to surface water, ground water, soils, and ecology from these accidents were assessed as negligible or nonexistent due to rapid mitigation and the small volume of anhydrous hydrofluoric acid in the release. PEIS at F-47, F-50, F-52, F-61. Impacts to human health were also considered. The overall impacts are expressed in terms of the maximum risk for an irreversible adverse effect (i.e. permanent injury). For the bounding accidents, the maximum risk was determined to be less than one irreversible adverse effect over the projected years of facility operation. PEIS at F-35, F-36. For waste management, the impacts from normal operation of the U_3O_8 conversion facility were assessed as ranging from negligible to large, depending upon the choice of technology and the ultimate generation volumes and disposition of CaF_2 for the facility. PEIS at F-64. The impacts would be negligible in the case of anhydrous hydrofluoric acid because it would be used as a resource, and there would be a minimal amount of CaF_2 produced that would need to be treated as waste. If the option of neutralization to CaF_2 was chosen, the impacts due to waste storage would be significantly greater due to the large volume of CaF_2 that would be processed and would need to be treated as waste.

Appendix J of the PEIS assessed the impacts on human health and the environment from the transportation of depleted uranium and associated materials (i.e., anhydrous hydrofluoric acid and CaF_2). Both the radioactive and chemical nature of the materials transported, as well as the operation of the transportation vehicles would have an impact on risks involved in the various options (i.e. anhydrous hydrofluoric acid and CaF_2). PEIS at J-12. The PEIS presents these risks to human health for normal operations and accidents in Tables J.5 and J.6 assuming that anhydrous hydrofluoric acid would be shipped only by rail while CaF_2 could be shipped by either truck or rail. Regardless of which hydrofluoric acid management option is chosen (i.e. upgrading to anhydrous hydrofluoric

acid or neutralizing to CaF_2), the impacts from routine transportation were found to be none for chemical impacts and very small for radiological impacts. Vehicle-related health risks were determined to be independent of the nature of the cargo and would be incurred for similar shipments of any commodity. PEIS at J-13. No radiological fatalities would be expected as a result of a potential severe accident involving either anhydrous hydrofluoric acid or CaF_2 . PEIS at J-27. While it was determined that a severe accident involving anhydrous hydrofluoric acid could result in fatalities due to irreversible adverse effects, the overall probability of an anhydrous hydrofluoric acid accident occurring would depend on the total number of shipments and the actual locations of the origin and destination sites. PEIS at J-27, J-28. The probability of an accident would increase with the number of shipments and distance between sites. In order to make a general assessment, DOE made assumptions concerning the distance between sites and the number of shipments. DOE assumed that approximately 5000 railcars of anhydrous hydrofluoric acid would be produced if the entire DOE uranium hexafluoride (UF_6) inventory were converted to oxide. DOE also assumed that the distance traveled per shipment would be 1000 km, and that based on the national average accident statistics for railcars, the overall probability for such an accident in an urban area would be about 3×10^{-5} over the duration of the program. The resulting overall risk to the public (defined as the product of the accident consequence and the probability) from a hydrofluoric acid related transportation accident was determined to be 1 irreversible adverse effect (i.e., about 1 person would be expected to experience irreversible adverse effects). PEIS at J-28. Absent specific information regarding distances and total number of shipments, the generic analysis contained in the PEIS is the most complete and best available information on transportation accidents involving anhydrous hydrofluoric acid.

Q9. Can you quantify what airborne emissions would be released for a conversion facility and the efficiency of hydrofluoric acid scrubbers without knowing the actual configuration of the facility and the scrubber technology that would be used?

A9. No, not precisely. However, a generic analysis of these types of emissions for a conversion facility was addressed in the PEIS at F-16. Due to the similarity of the different conversion processes analyzed, the PEIS notes that the level of airborne emissions are expected to vary only slightly from each other, resulting in similar radiological impacts. PEIS at F-16.

Q10. Do you agree with Dr. Makhijani's pre-filed testimony on page 14 in which he states that based on experiences at the uranium plant near Fernald, Ohio, that impacts of lower scrubber efficiency should be assessed in the impacts of the deconversion facility?

A10. No. The low scrubber efficiency example at Fernald given at page 14 of Dr. Makhijani's testimony is not appropriate for comparison to hydrofluoric acid scrubbers since the operating conditions are different. First the Fernald conditions for six of the scrubbers were for handling hot exhaust gases from the kiln and furnaces for a caustic liquid. This would present different engineering challenges than those posed by the use of hydrofluoric acid scrubbers. Secondly, the testimony does not acknowledge or address hydrofluoric acid scrubber performance from existing UF_6 to uranium oxide conversion facilities.

Q11. Do you have any other significant comments on the pre-filed testimony of Dr. Makhijani you have reviewed?

Q11. No.

1 MR. CUMMINGS: And now I'll turn to the
2 exhibits offered by the Staff in support of Contention
3 EC-4. Staff Exhibit 18, which is an excerpt from a
4 Lawrence Livermore National Laboratory Engineering
5 Analysis report of the long-term management of
6 depleted uranium hexafluoride dated May 1997.

7 (Whereupon, the above-
8 referenced to document was
9 marked as Staff Exhibit No. 18
10 for identification.)

11 MR. CUMMINGS: At this time we would ask
12 that this exhibit be marked and entered into evidence.

13 CHAIR BOLLWERK: All right. The record
14 should reflect that Staff Exhibit 18 is described by
15 Counsel, is identified for the record.

16 And the copies have been provided to the
17 Clerk?

18 MR. CUMMINGS: We will provide one when we
19 are through.

20 CHAIR BOLLWERK: Okay.

21 MR. CUMMINGS: And, Your Honors, at this
22 time I have nothing more for this witness and would
23 offer him for cross examination.

24 CHAIR BOLLWERK: All right. And I take it
25 you would like -- I may not have heard you, but you'd

1 like the exhibit to be admitted as well.

2 MR. CUMMINGS: Yes.

3 CHAIR BOLLWERK: You may have said it and
4 I just didn't catch it.

5 MR. CUMMINGS: Yes, Your Honor. We would
6 like the exhibit to be admitted into evidence.

7 CHAIR BOLLWERK: All right. Then, Staff
8 Exhibit 18 as described by Counsel and marked for
9 identification will be admitted.

10 (The document referred to,
11 having been previously marked
12 for identification as Staff
13 Exhibit No. 18 was received in
14 evidence.)

15 CHAIR BOLLWERK: All right. Let me --
16 nothing further from the Staff with respect to the
17 witness at this point?

18 MR. CUMMINGS: No, Your Honor.

19 CHAIR BOLLWERK: You are ready for cross
20 examination. I'll turn to LES then and see if they
21 have any questions for this witness.

22 MR. REPKA: We have no questions for the
23 Staff witness.

24 CHAIR BOLLWERK: All right, then Mr.
25 Lovejoy you're on again.

1 MR. LOVEJOY: Thank you, Your Honor.

2 EXAMINATION BY MR. LOVEJOY OF

3 DONALD PALMROSE

4 MR. LOVEJOY: Do you have the Staff
5 exhibit there in front of you Mr. Palmrose?

6 (No response.)

7 MR. LOVEJOY: I'm going to ask you some
8 passages in the draft EIS, which I think is Exhibit 1.

9 WITNESS PALMROSE: I have the draft EIS
10 with me.

11 MR. LOVEJOY: Thank you. The scoping
12 summary which is here on appendix A says, let's see,
13 my notes say this is on page 17, at the middle of
14 page.

15 There's a caption, depleted uranium
16 disposition. And it says the draft EIS will address
17 concerns about the depleted uranium hexafluoride
18 material or tails resulting from the enrichment
19 operation over the lifetime of the proposed plant's
20 operation.

21 These concerns include the safe and secure
22 storage and ultimate removal of this material from New
23 Mexico and potential conversion of UF6 to U3O8 and
24 ultimate disposition. Now, was that done in the draft
25 EIS?

1 WITNESS PALMROSE: Yes, it was.

2 MR. LOVEJOY: And how was that done?

3 WITNESS PALMROSE: That was done by
4 reviewing relevant documents from the DOE, the
5 Applicant's Environmental Report and safety analysis
6 report, and also looking at other documents developed
7 by DOE or from international organizations.

8 (Pause.)

9 MR. LOVEJOY: Over on page five of your
10 testimony you describe how you reviewed the
11 environmental review -- you said I reviewed all of the
12 environmental review documents which address the
13 impacts associated with conversion.

14 And the question was, were some of these
15 reviews conducted by DOE. You answer yes and then you
16 continue on about review of the EIS's for the
17 Portsmouth and Paducah plants. Do you see that text?

18 WITNESS PALMROSE: Yes, I do.

19 MR. LOVEJOY: In that review that you
20 mention there, what did you do?

21 WITNESS PALMROSE: I examined the process
22 that they would use to convert from depleted uranium
23 hexafluoride to U308 and examined the impacts
24 associated and described in those documents.

25 MR. LOVEJOY: Did you take any notes?

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1 WITNESS PALMROSE: I would take notes as
2 needed for my personal records.

3 MR. LOVEJOY: Did you do any calculations?

4 WITNESS PALMROSE: Not directly from the
5 DOE documents.

6 MR. LOVEJOY: Does that apply also to the
7 programmatic EIS?

8 WITNESS PALMROSE: Yes, it does.

9 MR. LOVEJOY: Did you check any of the
10 calculations reflected in the DOE EIS's?

11 WITNESS PALMROSE: I reviewed the impacts
12 presented to determine whether or not they were
13 reasonable to me. And I determined that they were
14 reasonable based on the information I had available in
15 those documents and from my past experience.

16 MR. LOVEJOY: You made kind of a top-of-
17 the-head judgment of reasonableness?

18 WITNESS PALMROSE: If I consider that the
19 impacts were within reasonably -- within an order of
20 magnitude of those values given in the document.

21 MR. LOVEJOY: And, how did you establish
22 that?

23 WITNESS PALMROSE: Based on reviewing
24 their assumptions given in the document and also based
25 on past analysis that I have seen and reviewed or

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1 helped perform.

2 MR. LOVEJOY: Have you worked on other
3 Environmental Impact Statements with respect to
4 conversion plants?

5 WITNESS PALMROSE: Yes. I have worked on
6 the draft EIS for the de-commissioning of the Sequoyah
7 Fuels facility in Oklahoma.

8 MR. LOVEJOY: What kind of facility was
9 that?

10 WITNESS PALMROSE: That facility converted
11 yellow cake to UF6.

12 MR. LOVEJOY: Was that the Kerr-Magee
13 plant formerly?

14 WITNESS PALMROSE: I'm sorry, I don't
15 understand the question.

16 MR. LOVEJOY: Okay. All right.

17 CHAIR BOLLWERK: I can tell you from my
18 knowledge the answer is yes.

19 MR. LOVEJOY: Can you look at -- do you
20 have LES exhibit -- do you have the LES exhibits
21 nearby?

22 (No response.)

23 MR. LOVEJOY: I was going to ask you about
24 Exhibit 18, programmatic EIS.

25 WITNESS PALMROSE: I believe I have the

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1 NIRS/PC one. Wait, LES Exhibit which number, sir?

2 MR. LOVEJOY: Let me ask you about the
3 same passage on page 5-49.

4 WITNESS PALMROSE: Counselor, which
5 Exhibit number?

6 MR. LOVEJOY: That's LES Exhibit 18.

7 (Pause.)

8 MR. LOVEJOY: Do you have that?

9 WITNESS PALMROSE: Yes.

10 MR. LOVEJOY: I'm looking at 5-49. And
11 it's the paragraph starting, if a large HF release
12 from a rail car, that passage.

13 WITNESS PALMROSE: Yes, I have that in
14 front of me.

15 MR. LOVEJOY: Do you remember reading this
16 in your review of this document?

17 WITNESS PALMROSE: Yes, I do. It was also
18 quoted in other parts of the PEIS.

19 MR. LOVEJOY: I'm sorry, in that what?

20 WITNESS PALMROSE: It's also quoted in
21 other parts of the EIS.

22 MR. LOVEJOY: Do you remember making a
23 judgment of the reasonableness of the calculations
24 reflected here?

25 WITNESS PALMROSE: Yes.

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1 MR. LOVEJOY: And what was your judgment?

2 WITNESS PALMROSE: That the analysis was
3 appropriate.

4 MR. LOVEJOY: And how did you arrive at
5 that conclusion?

6 WITNESS PALMROSE: I arrived at that
7 conclusion because in the DEIS we performed an
8 analysis of a transportation accident with a UF6
9 cylinder. And the impacts were similar to this.

10 MR. LOVEJOY: What -- can you identify the
11 DEIS analysis you're talking about?

12 WITNESS PALMROSE: Yes, I can. Give me a
13 minute. This would be in appendix D, in the un-
14 redacted version.

15 MR. CUMMINGS: I believe that's Exhibit
16 1B, if I've got the right proposal.

17 MR. LOVEJOY: Can you identify it
18 specifically.

19 MR. CUMMINGS: We're going to check to see
20 if we can use the redacted version --

21 CHAIR BOLLWERK: That would be better.

22 MR. CUMMINGS: -- for this.

23 (Pause.)

24 MR. CUMMINGS: I'm afraid we submitted the
25 redacted version to the Board marked as an exhibit. We

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1 didn't have an extra copy of that. So, could we check

2 --

3 CHAIR BOLLWERK: Just pull that out.

4 MR. LOVEJOY: I'm sorry, 1B or 1A? I want
5 to make sure.

6 MR. CUMMINGS: One-B would be the redacted
7 version.

8 MR. LOVEJOY: Okay.

9 MR. CUMMINGS: The reference to D-27 in
10 the DEIS is in the redacted version, Exhibit 1B.

11 CHAIR BOLLWERK: All right.

12 MR. LOVEJOY: I'm sorry, are we in the
13 redacted or unredacted version of this?

14 MR. CUMMINGS: This is the redacted
15 version.

16 CHAIR BOLLWERK: I understand it's in both
17 of them. So it doesn't make any difference what
18 you're looking at. That was the point I'm just trying
19 to make.

20 For the record, if someone would go to
21 public record, they could look at this material and
22 find it.

23 MR. LOVEJOY: So, what is the analysis
24 you're referring to now?

25 WITNESS PALMROSE: In performing the

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1 evaluation of transportation impacts, our expert in
2 port transportation reviewed and put into our EIS this
3 section concerning the chemical impacts resulting from
4 accidents with UF6 cylinders.

5 MR. LOVEJOY: And, can you just state in
6 the record what passages you're referring to?

7 WITNESS PALMROSE: This is the section D.5
8 on pages D26 and D27.

9 MR. LOVEJOY: Okay. So, you're saying
10 that this analysis had results similar enough to the
11 analysis reflected in the PEIS at page 5-49. So you
12 felt comfortable relying on the PEIS analysis?

13 WITNESS PALMROSE: That is correct.

14 MR. LOVEJOY: You state in your testimony
15 that, for most environmental areas analyzed in the
16 PEIS, the impacts would be similar for two
17 deconversion processes, the CaF2 process and the AHF
18 process.

19 I'm looking at pages six and seven of your
20 testimony. Were there some areas where they were not
21 similar?

22 WITNESS PALMROSE: Yes.

23 MR. LOVEJOY: What were those?

24 WITNESS PALMROSE: Potential accidents.

25 (Pause.)

1 MR. LOVEJOY: And, in the PEIS, your
2 testimony notes that they examined a range of
3 accidents. You give the maximum risk values as less
4 than one person injured per all accidents, except for
5 an impact to workers from corroded cylinder spills and
6 ammonia stripper overpressure.

7 Are these the accidents you are talking
8 about?

9 WITNESS PALMROSE: Could you clarify your
10 question as far as which processes we're comparing?

11 (Pause.)

12 MR. LOVEJOY: I'm reading at the bottom of
13 page seven, the last paragraph on the page, starting
14 the PEIS.

15 WITNESS PALMROSE: I see the text.

16 MR. LOVEJOY: I'm sorry?

17 WITNESS PALMROSE: I see the text.

18 MR. LOVEJOY: Okay. I'm sorry, I'm going
19 to withdraw that. This is -- we'll speed this up. In
20 your testimony you refer back to the PEIS at page
21 eight.

22 And let me ask you this, your testimony
23 states that impacts due to chemical exposure from
24 severe accident could result in an overall risk to the
25 public, defining it as -- I'm looking at the middle of

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1 page eight -- defined as the product of the accident
2 consequence and the probability over the program
3 duration of one permanent physical injury or fatality
4 referred to as irreversible adverse affects due to
5 hydrofluoric acid related rail transportation
6 accidents.

7 And, are you referring there to the
8 accident discussed in section 522 of the PEIS? I'll
9 give you the page for it. That starts at 5-25.

10 WITNESS PALMROSE: No.

11 MR. LOVEJOY: Okay. Which is the
12 accident?

13 WITNESS PALMROSE: That accident that I'm
14 quoting in my testimony is related to a rail accident
15 of anhydrous HF shipments, whereas, the section you're
16 quoting on page 5-25 is related to shipments of UF6
17 cylinders if I'm reading the text correctly.

18 (Pause.)

19 MR. LOVEJOY: What accident are you
20 referring to in the discussion on 8?

21 WITNESS PALMROSE: I cite on page J28 of
22 the PEIS --

23 MR. LOVEJOY: Okay.

24 WITNESS PALMROSE: -- where that text is
25 being quoted from.

1 MR. LOVEJOY: Okay. Let me move on here.
2 You relied also on the DOE site specific EIS's the
3 reports from Paducah, you've talked about that. You,
4 in NUREG 1790, you state at page 4-53, down at the
5 bottom -- do you see that?

6 WITNESS PALMROSE: Yes, on page 4-53.

7 MR. LOVEJOY: Right. Down at the bottom
8 you say in that first paragraph, the impacts of
9 conversion at a private conversion facility or at DOE
10 conversion facilities are similar because it is
11 assumed that the facility design of a private
12 conversion facility would be similar to the DOE
13 conversion facilities. That was your assumption,
14 right?

15 WITNESS PALMROSE: That is correct.

16 MR. LOVEJOY: And this was an assumption
17 that you made based on your best judgment, that
18 reliance on the DOE process was sufficient?

19 WITNESS PALMROSE: On the description
20 provided in the DOE documents and also in the previous
21 analysis done, and also based on information in the
22 Applicant's Environmental Report.

23 MR. LOVEJOY: The values in the DOE
24 PEIS's, the site specific, not PEIS's, the site
25 specific EIS's assume a CaF2 process, don't they?

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1 WITNESS PALMROSE: They have that as an
2 option.

3 MR. LOVEJOY: Do you consider that there
4 are other processes in the Portsmouth and Paducah
5 EIS's considered as options.

6 WITNESS PALMROSE: Those documents state
7 that their first option would be to sell aqueous HF on
8 the commercial market. If that was not available to
9 be sold, then they would neutralize to calcium
10 fluoride and either try to sell that material.

11 And, if it cannot be sold, then dispose of
12 it in a licensed facility.

13 MR. LOVEJOY: Is it, in your opinion, a
14 realistic option to sell the aqueous HF on the
15 commercial market?

16 WITNESS PALMROSE: Yes, based on current
17 cases of that occurring.

18 JUDGE ABRAMSON: Excuse me, are you an
19 economist?

20 WITNESS PALMROSE: No, I'm not sir. There
21 are documents that are quoted in the Paducah and
22 Portsmouth EIS that Cogema has sold aqueous HF in the
23 commercial market.

24 And I know of the facilities in the U.S.
25 that convert to UO2 that also generate aqueous HF and

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1 have sold it to commercial users.

2 MR. LOVEJOY: Do you have the Portsmouth
3 EIS nearby? That's Exhibit 16 by LES?

4 WITNESS PALMROSE: Yes, I do.

5 MR. LOVEJOY: There's a description at the
6 top of that page of a tank rupture.

7 MR. CUMMINGS: Excuse me, what page?

8 MR. LOVEJOY: Excuse me, that's page S-37.
9 It says if an aqueous or anhydrous NH₃ tank rupture at
10 the conversion facility, a maximum of up to about
11 2,300 members of the general public might experience
12 adverse effects, mild and temporary effects such as
13 respiratory irritation or temporary decrease in kidney
14 function as a result of chemical exposure.

15 A maximum of about 210 people might
16 experience irreversible adverse affects such as lung
17 damage or kidney damage with the potential for about
18 four fatalities.

19 With regard to non-involved workers, up to
20 about 1,400 workers might experience adverse effects
21 mild and temporary as a result of chemical exposures.
22 A maximum of about 1,400 non-involved workers might
23 experience irreversible adverse effects with the
24 potential for about 30 fatalities.

25 JUDGE ABRAMSON: What is the page number

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1 Counsel?

2 MR. LOVEJOY: This is S-37 of LES Exhibit
3 16.

4 JUDGE ABRAMSON: Okay. Thank you.

5 MR. LOVEJOY: Did you review that in your
6 review of this EIS?

7 WITNESS PALMROSE: At one time I did read
8 the whole document, yes.

9 MR. LOVEJOY: And, did you reach any
10 judgment about the reasonableness of these results?

11 WITNESS PALMROSE: They appeared
12 reasonable to me at the time, yes.

13 MR. LOVEJOY: Okay. And, how did you
14 reach that judgment?

15 WITNESS PALMROSE: I reached that judgment
16 based on, again, prior documentation and looking at
17 what DOE -- how DOE presented their analysis and based
18 on what I knew of the potential effects of HF
19 shipments.

20 MR. LOVEJOY: Did you perform any
21 calculations or check any calculations underlying this
22 result?

23 WITNESS PALMROSE: No, sir.

24 JUDGE ABRAMSON: Is this accident
25 incorporate in the analysis in DEIS for this type of

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1 accident?

2 WITNESS PALMROSE: No, sir. The DEIS
3 assumes that aqueous HF would not be able to be sold
4 commercially and therefore would be neutralized. So,
5 shipments of aqueous HF was not addressed in the DEIS
6 for that reason.

7 JUDGE ABRAMSON: And aqueous HF would not
8 be stored on-site in tanks, is that --

9 WITNESS PALMROSE: Aqueous HF would be a
10 byproduct of the process. And hydrous NH3 would be
11 used in the facility as part of the process for
12 conversion.

13 JUDGE ABRAMSON: I'm sorry, I'm trying to
14 understand. I have not read this exhibit in-depth.
15 But, is this section of this exhibit discussing on-
16 site accident or is discussing the transportation
17 accident?

18 WITNESS PALMROSE: In this particular
19 instance it's at the conversion facility. You have to
20 assume that this is site specific, not a
21 transportation accident.

22 JUDGE ABRAMSON: And so, are you saying --
23 first of all, did I understand correctly that you did
24 not consider this type of an accident in preparation
25 of the EIS?

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1 WITNESS PALMROSE: I reviewed the DOE
2 document in preparation for the EIS.

3 JUDGE ABRAMSON: Right.

4 WITNESS PALMROSE: So, I had read that
5 this was presented as an accident and with these
6 consequences.

7 JUDGE ABRAMSON: So, you considered this
8 accident, but for some reasons the consequences of
9 such an accident are not incorporated into the EIS.
10 Are they so small that they need not be?

11 WITNESS PALMROSE: No, they are
12 incorporated into the DEIS in a couple different ways.
13 Since there's two options for private conversion one
14 near facility to the proposed NEF-1 at a distant
15 location, or in the option of DOE conversion.

16 In the case of DOE conversion, this is the
17 facility, so this is the impacts associated with that
18 option.

19 JUDGE ABRAMSON: Okay.

20 WITNESS PALMROSE: For the case of the
21 private conversion the site that we chose as the
22 alternative for a distance away from the proposed NEF
23 was for metropolis Illinois based on the statement in
24 the ER that they had discussions with that facility.

25 And, since that facility is right next to

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1 or nearby to the Paducah site, the Paducah site is
2 quoted as being the guidance for impacts for that
3 metropolis location.

4 JUDGE ABRAMSON: And, in the Paducah site
5 EIS, this scenario had been considered?

6 WITNESS PALMROSE: Yes, sir.

7 JUDGE ABRAMSON: Okay. So that the
8 numbers that Paducah had, that DOE had developed for
9 Paducah were adopted by you in preparation of the DEIS
10 when looking at metropolis. I'm trying to figure out
11 the --

12 WITNESS PALMROSE: Yes.

13 JUDGE ABRAMSON: The question, of course,
14 we're struggling with is did you take the hard look?
15 So the question is, did you look at this?

16 WITNESS PALMROSE: Yes, sir.

17 JUDGE ABRAMSON: Sorry Counselor.

18 MR. LOVEJOY: Maybe this connects with
19 that line of inquiry. In the DEIS -- and you were
20 principal author of section 4.3.14, is that right?

21 WITNESS PALMROSE: Yes, sir. I believe
22 that's in my testimony. I'm trying to get the numbers
23 straight.

24 MR. LOVEJOY: It states on page 4-54 --
25 and I'm looking at the middle of that page -- the

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1 paragraph starting because states, and I'm
2 paraphrasing, that the public and occupational health
3 impacts of the private conversion facility built in
4 metropolis Illinois would be bounded by the impact
5 from the Paducah conversion facility because both
6 conversion facilities would be located in the same
7 area and would be approximately the same size. Is
8 that right?

9 WITNESS PALMROSE: That is correct.

10 MR. LOVEJOY: Now, what do you mean by
11 bounded?

12 WITNESS PALMROSE: What I mean by bounding
13 is that the impacts from the potential conversion
14 facility at metropolis would be similar or less than
15 to the impacts produced at the Paducah conversion
16 facility.

17 MR. LOVEJOY: And, what calculations did
18 you go through to reach the conclusion that the
19 impacts would be bounded?

20 WITNESS PALMROSE: Based on the capacity
21 of what the facility at metropolis would have to be to
22 convert the proposed NEF depleted uranium hexafluoride
23 to U3O8. That was the main factor, yes.

24 MR. LOVEJOY: And you figured that the
25 impacts of the facility that had a smaller thru-put

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1 would be less than the impacts of a facility that had
2 a larger thru-put?

3 WITNESS PALMROSE: Yes, for most cases,
4 yes.

5 MR. LOVEJOY: That was the calculation you
6 went through?

7 WITNESS PALMROSE: Yes, for public and
8 occupational and health impacts.

9 MR. LOVEJOY: Are your calculations such
10 as they were written down anywhere?

11 WITNESS PALMROSE: You say calculations.
12 I guess I'd have to dispute whether -- the term
13 calculations. Since this facility is -- we're
14 bounding it with Paducah.

15 Is that -- I'm applying a DOE approved
16 public review document as being appropriate for this
17 facility.

18 MR. LOVEJOY: Was the calculation, so to
19 speak, a no-brainer?

20 WITNESS PALMROSE: I wouldn't necessarily
21 call it a calculation. Calculation means you did a
22 numbered analysis and came up with thorough
23 mathematical models and such.

24 So I wouldn't necessarily call it a
25 calculation. I would call it an assessment. That the

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1 Paducah -- the impacts provided in the Paducah
2 conversion facility EIS would be appropriate for a
3 facility at metropolis.

4 MR. LOVEJOY: Did you make any memorandum
5 for the hearing file reflecting that determination?

6 JUDGE ABRAMSON: I accurately interpret
7 what's been said here, that you accepted the DOE
8 calculations on their face without verifying them and
9 then said assuming those are right, this facility will
10 be bounded by the -- the result -- the environment
11 effects of this facility would be bounded by those
12 results if they are right.

13 WITNESS PALMROSE: That's true, except
14 that I reviewed the impacts and believed that they
15 were reasonable and appropriate for the situation.

16 JUDGE ABRAMSON: But you did not
17 independently verify a recalculation in the DOE?

18 WITNESS PALMROSE: No, no.

19 JUDGE ABRAMSON: Did you do some?

20 WITNESS PALMROSE: No, because in
21 reviewing the DOE EISS, I believed that they were a
22 reasonable assessment of the impacts.

23 MR. LOVEJOY: You assumed that the private
24 deconversion facility would use a CaF2 neutralization
25 process if neutralization were required, right?

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1 WITNESS PALMROSE: That's correct.

2 MR. LOVEJOY: And you mentioned in your
3 testimony the AHF process of distilling anhydrous
4 hydrofluoric acid. And you mentioned that it does
5 involve greater risks in handling the material.

6 And those risks are not mentioned in the
7 draft EIS, true?

8 WITNESS PALMROSE: That's correct.

9 MR. LOVEJOY: And you felt it was not
10 necessary to have that discussion because the AHF
11 process is not currently a cost effective option.

12 WITNESS PALMROSE: I can not say whether
13 it's cost effective. It's not technically effective.
14 It hasn't been proven to be -- it hasn't been proven
15 for industrial use.

16 MR. LOVEJOY: On page ten of your
17 testimony it says, and I'm looking at A-18, it says
18 starting about five lines down while the technology
19 that would be used at a private conversion facility is
20 uncertain, DOE's selection of a process which does not
21 produce anhydrous HF indicates that it is not
22 currently a cost effective option.

23 WITNESS PALMROSE: Okay, clarifying my
24 remark for its cost effectiveness, if you cannot
25 produce a industrial scale process, then it doesn't,

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1 it would not be a cost effective option.

2 MR. LOVEJOY: And it was your judgment
3 that it was not possible to produce an industrial
4 scale process?

5 WITNESS PALMROSE: For the upgrading of
6 anhydrous HF.

7 MR. LOVEJOY: That was your decision?

8 WITNESS PALMROSE: That's my opinion.

9 MR. LOVEJOY: Okay. What analysis did you
10 undertake to reach that conclusion?

11 WITNESS PALMROSE: I reviewed the Lawrence
12 Livermore National Lab Engineering Analysis report
13 that formed the basis for the PEIS, and also reviewed
14 the PEIS, and I also did my own independent search for
15 any type of situation or case where aqueous HF had
16 been upgraded to anhydrous HF.

17 MR. LOVEJOY: And what did you conclude
18 out of these researches?

19 WITNESS PALMROSE: That it's not currently
20 a viable process to perform. In fact, in the rebuttal
21 testimony of Dr. Makhijani, he particularly points
22 out to a Cogema presentation where it there states
23 that they were not able to develop that process.

24 MR. LOVEJOY: Are you saying that you
25 reached the judgment that it simply can't be carried

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1 out, the AHF process, under present technology?

2 WITNESS PALMROSE: Are you talking about
3 upgrading to --

4 MR. LOVEJOY: Yes.

5 WITNESS PALMROSE: At the current time, it
6 does not appear to be a viable option.

7 MR. LOVEJOY: Can't be done?

8 WITNESS PALMROSE: It hasn't been
9 developed to a full industrial scale. The Lawrence
10 Livermore, the engineering analysis part I cited
11 specifically notes that some research in smaller
12 scales had been performed, but that an industrial
13 scale development had not taken place.

14 MR. LOVEJOY: Well there's always a first
15 plan, isn't there?

16 WITNESS PALMROSE: In general, that's
17 true, yes.

18 MR. LOVEJOY: Is there any reason you
19 didn't refer the reader of the DEIS to the DOE/PEIS
20 for an analysis of impacts of the AHF process?

21 WITNESS PALMROSE: Because for the reasons
22 that we just discussed. It was not a developed
23 process. It was not, in my opinion, a likely
24 alternative for the management of hydrofluoric acid.

25 MR. LOVEJOY: Now let me step back. Are

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1 you aware under NEPA of the concept of cooperating
2 agencies in preparation of an EIS?

3 WITNESS PALMROSE: Yes, I am.

4 MR. LOVEJOY: Did NRC take the role of
5 cooperating agency in the preparation of any of these
6 DOE EISS, the Paducah, Portsmouth, or the programmatic
7 EIS?

8 WITNESS PALMROSE: Not being a member of
9 the Staff I cannot answer that question.

10 MR. LOVEJOY: You don't know, okay. Do
11 you know the concept of tiering under NEPA?

12 WITNESS PALMROSE: Yes, I understand the
13 basic concept.

14 MR. LOVEJOY: Okay. In your view, is the
15 draft EIS for the NUREG-1790 document, is that tiered
16 to any of these DOE EISSs?

17 WITNESS PALMROSE: In this case I don't
18 think tiered is a proper term. We relied upon and
19 incorporated analyses and results from those into the
20 DEIS when appropriate.

21 MR. LOVEJOY: Okay. Are you aware that
22 under Commission rules, rules state that the NRC Staff
23 will independently evaluate and be responsible for the
24 reliability of all information used in a draft EIS?

25 JUDGE ABRAMSON: Do you want to give us a

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1 reference to the rules?

2 MR. LOVEJOY: Ten CFR 51.70.

3 WITNESS PALMROSE: I don't have --
4 necessarily read that directly but I understand that,
5 yes. I believe the word is independent assessment.
6 Counselor --

7 MR. LOVEJOY: I have independently
8 evaluate and be responsible for the reliability of.
9 But the term independent assessment may also exist in
10 other rules. Are you familiar under NEPA of the
11 concept of one agency adopting an EIS done by another
12 agency?

13 WITNESS PALMROSE: I'm familiar with the
14 concept.

15 MR. LOVEJOY: Okay. Did the NRC adopt the
16 DOE PEIS?

17 JUDGE ABRAMSON: Excuse me, Dr. Palmrose,
18 are you an attorney?

19 WITNESS PALMROSE: No, I am not, sir.

20 JUDGE ABRAMSON: Perhaps Staff -- perhaps
21 OGC can help him deal with this which strikes me as
22 legal question.

23 MR. CUMMINGS: Dr. Palmrose, do you know
24 whether the NRC has adopted the DOE/PEIS?

25 WITNESS PALMROSE: Previously we've cited

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1 to the Commission's ruling that the NRC can use and
2 apply DOE Environmental Impact Statements.

3 MR. CUMMINGS: And you're referring to the
4 February 6th order which stated that the NRC Staff may
5 consider the DOE-EIS in preparing the Staff's EIS?

6 WITNESS PALMROSE: That's correct.

7 MR. LOVEJOY: SO is your answer that the
8 Commission did not adopt any DOE-EISs?

9 WITNESS PALMROSE: That is asking me to
10 give an opinion on a Staff position, and I cannot give
11 you what the Staff position was on those EISs.

12 MR. LOVEJOY: So your answer is you don't
13 know?

14 WITNESS PALMROSE: Whether or not that
15 that's the Staff position, correct.

16 MR. LOVEJOY: Now the February 6th order
17 referred to the DOE-EIS, correct?

18 WITNESS PALMROSE: That's what I had
19 previously read during the previous testimony. I seem
20 to -- I believe that's correct.

21 MR. LOVEJOY: Do you have it? Do you have
22 the order?

23 WITNESS PALMROSE: Yes, I do.

24 MR. LOVEJOY: Okay, and it refers to the
25 DOE-EIS, true?

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1 WITNESS PALMROSE: That's correct.

2 MR. LOVEJOY: And what did you understand
3 that reference to refer to?

4 MR. CUMMINGS: Your Honor, we would object
5 to asking Dr. Palmrose to characterize what was
6 intended by that statement in the Commission order.

7 CHAIR BOLLWERK: I don't think he's
8 testifying what the statement was in the Commission
9 order, it's what his understanding of it was. I'll
10 overrule the objection.

11 He's not speaking for the Commission.
12 What he understands it to be -- it is what -- he's
13 going to tell us what he understands it to be.

14 WITNESS PALMROSE: To step back, at this
15 time during the development of the draft EIS, the
16 project manager was Dr. Abe Zeitoun. And I worked for
17 Dr. Zeitoun, so I took direction from him as far as
18 the documents that we could use, and it's my
19 understanding from the direction he received from NRC.

20 Once again this is just my understanding
21 that we were to apply appropriate DOE-EISS in
22 preparing the draft Environmental Impact Statement.

23 MR. LOVEJOY: So Dr. Zeitoun authorized
24 you to apply the Portsmouth and Paducah EISS in
25 addition to the programmatic EIS, is that true?

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1 WITNESS PALMROSE: That's correct.

2 MR. LOVEJOY: At the time of this order,
3 the Portsmouth and Paducah final EISs had not been
4 issued. Isn't that true?

5 WITNESS PALMROSE: I believe no, that is
6 false. I believe the draft Environmental Impact
7 Statements for those facilities were published in
8 November of 2003.

9 MR. LOVEJOY: The question was as to the
10 final EISs for Portsmouth and Paducah.

11 WITNESS PALMROSE: My apologies, I
12 misunderstood. The final were issued later, that's
13 correct.

14 MR. LOVEJOY: They were issued in June, is
15 that right, of '04?

16 WITNESS PALMROSE: That's correct.

17 MR. LOVEJOY: Okay. And isn't it true
18 that the DEIS doesn't make reference explicitly to any
19 analyses in the DOE programmatic EIS?

20 WITNESS PALMROSE: That's correct.

21 MR. LOVEJOY: Anyway, so you did not adopt
22 any of those analyses in the draft EIS?

23 WITNESS PALMROSE: That's correct, because
24 they weren't the most current.

25 MR. LOVEJOY: I'm sorry, I just didn't

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1 hear your answer. Did you say they weren't the most
2 current?

3 WITNESS PALMROSE: That's correct.

4 MR. LOVEJOY: That's all I have.

5 JUDGE ABRAMSON: Just a point of
6 clarification. Pardon me for picking this up. I
7 thought I understood that there were conclusions of
8 DOE in these two DEISs or FEISs for Paducah and
9 Portsmouth that you accepted as accurate and
10 incorporated the results from by saying that, for
11 example, for metropolis results for this plan -- this
12 proposed plan would be bounded by the results,
13 computed by DOE in it's analysis of this plan. Is
14 that correct?

15 WITNESS PALMROSE: That's correct, sir.

16 JUDGE ABRAMSON: So, but in large [art you
17 did not independently verify the DOE results, you
18 accepted them as accurate. Is that correct?

19 WITNESS PALMROSE: Based on an assessment
20 of the material presented and their supporting
21 documents.

22 JUDGE ABRAMSON: Thank you.

23 CHAIR BOLLWERK: Any other questions based
24 on -- all right. Any redirect?

25 MR. CUMMINGS: Could I just --

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1 CHAIR BOLLWERK: Surely.

2 MR. CUMMINGS: Just one moment.

3 (Pause.)

4 CHAIR BOLLWERK: I just want to make sure
5 I have the time line straight. And I can -- I don't
6 know if the witness -- the Commission order -- I'm
7 sorry, the draft EIS was out for both facilities, I
8 understand, then the Commission order, then was it the
9 final Staff EIS, or the final EIS for the Paducah and
10 Portsmouth came out. Or do I --

11 MR. LOVEJOY: I can't speak to the drafts.
12 The finals of Portsmouth and Paducah I believe are
13 June 2004.

14 CHAIR BOLLWERK: Okay.

15 WITNESS PALMROSE: Your Honor?

16 CHAIR BOLLWERK: Yes.

17 WITNESS PALMROSE: I believe that both the
18 draft Paducah and Portsmouth EISs as they get
19 described in the summary section --

20 CHAIR BOLLWERK: Yes.

21 WITNESS PALMROSE: They state that the
22 draft EIS was released for public comment in November
23 2003.

24 CHAIR BOLLWERK: Right.

25 WITNESS PALMROSE: Then you have the

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1 Commission's --

2 CHAIR BOLLWERK: Commission order which is
3 January of 2004.

4 WITNESS PALMROSE: And then the final
5 Paducah and Portsmouth EIS is in June 2004.

6 CHAIR BOLLWERK: Right.

7 WITNESS PALMROSE: And then our draft EIS
8 in September of 2004.

9 CHAIR BOLLWERK: Two-thousand four.
10 Alright, that's chronology, all right. Thank you.

11 JUDGE ABRAMSON: Did you get any guidance
12 from the Staff on how to interpret the concept that
13 the Staff may consider the DOE-EIS guidance either in
14 what it meant, DOE-EIS.

15 Did it mean - it didn't say draft and it
16 didn't say final. It just said the DOE-EIS. Did you
17 get any guidance there for what that meant?

18 WITNESS PALMROSE: Yes, sir. We were told
19 to apply the most current available DOE-EISs for the
20 conversion facilities that were available.

21 JUDGE ABRAMSON: So you might have started
22 from the draft EISs for those two, and then as the
23 finals became available, you would have shifted to the
24 finals?

25 WITNESS PALMROSE: That's exactly correct,

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1 sir.

2 JUDGE ABRAMSON: And when you say apply,
3 you took that to mean you could accept their findings?

4 WITNESS PALMROSE: If we believed they
5 were reasonable with concurrence of Staff.

6 JUDGE ABRAMSON: Okay. That's all I have
7 on that one.

8 CHAIR BOLLWERK: All right. Any redirect?

9 MR. CUMMINGS: I did have one question.
10 Dr. Palmrose, based on your experience is it common
11 practice to rely on and make reference to previous
12 analyses such as the ones that you have talked about
13 done by DOE?

14 WITNESS PALMROSE: That's correct.

15 CHAIR BOLLWERK: All right. Any further
16 questions on that, or --

17 MR. REPKA: May I ask one follow up on
18 that answer?

19 CHAIR BOLLWERK: All right.

20 MR. REPKA: In that practice, do you need
21 a Commission order saying you can do that in order to
22 rely upon other reports and other documents?

23 WITNESS PALMROSE: Not necessarily. You
24 would have to have the client's permission generally.
25 And it would be done as part of the review process of

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1 your draft document.

2 MR. REPKA: But that client's permission,
3 you're referring there to the agency contractor that's
4 retained you. And it wouldn't necessarily be in the
5 form of a Commission order?

6 WITNESS PALMROSE: That's correct.

7 MR. REPKA: Thanks.

8 CHAIR BOLLWERK: Just so -- you are the
9 contractor, correct?

10 WITNESS PALMROSE: For the NRC for the
11 draft EIS.

12 CHAIR BOLLWERK: Right.

13 WITNESS PALMROSE: But I have done other
14 work --

15 CHAIR BOLLWERK: Right.

16 WITNESS PALMROSE: -- for other agencies
17 where we applied other documents in similar
18 situations. I guess the contracting --

19 MR. REPKA: So you receive your
20 authorization from the Staff, the contracting agents?

21 WITNESS PALMROSE: Yes, in this case from
22 the Staff.

23 CHAIR BOLLWERK: Okay -- go ahead. You
24 look like you're --

25 MR. LOVEJOY: No. Thank you, I won't.

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1 CHAIR BOLLWERK: All right. Any other
2 questions? All right then. I think that concludes
3 your testimony. We thank you, sir, for your service
4 to the Board, and you are dismissed.

5 It's about 12:30. My suggestion would be
6 let's go ahead and swear in the next witness, who is
7 Dr. Makhijani, I believe. Let's go ahead and get his
8 testimony in.

9 Let's go ahead and at least have the
10 argument on the question of the in limine motion, and
11 then we'll go from there as to where we should
12 proceed.

13 What we'll go ahead and do is admit his
14 direct testimony, and then before we get to the
15 rebuttal then we can have the discussion about the in
16 limine motion.

17 We'll take a five minute break while
18 everybody's kind of shifting around here.

19 (Whereupon, the above-entitled matter
20 went off the record at 12:18 p.m. and
21 went back on the record at 12:25 p.m.)

22 CHAIR BOLLWERK: All right, I believe at
23 this point -- let's go back on the record please. I
24 believe at this point we're ready to hear Dr.
25 Makhijani's testimony.

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1 Anything preliminarily? Should we go
2 ahead and swear the witness? Are we ready?

3 MR. LOVEJOY: Please.

4 CHAIR BOLLWERK: Dr. Makhijani, if you
5 could raise your right hand please?

6 Whereupon,

7 DR. ARJUN MAKHIJANI

8 was called as a witness by Counsel for NIRS and,
9 having been duly sworn, assumed the witness stand, was
10 examined and testified as follows.

11 CHAIR BOLLWERK: Thank you very much, sir.
12 Could you get closer to the microphone so we can hear
13 you and the Court Reporter can hear you? I think that
14 one with the wire seems to work a little better than
15 the wireless one.

16 WITNESS MAKHIJANI: Can you hear me?

17 (No response.)

18 WITNESS MAKHIJANI: Thank you.

19 CHAIR BOLLWERK: Why don't we do the
20 direct testimony first?

21 MR. LOVEJOY: Yes. I'm just calculating
22 which exhibits correspond.

23 CHAIR BOLLWERK: All right.

24 MR. LOVEJOY: Do you have your direct
25 testimony with you, Dr. Makhijani?

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1 WITNESS MAKHIJANI: I do.

2 MR. LOVEJOY: Oh, we already handed it in.
3 Do you have the version of your testimony dated
4 January 28th, '05, Dr. Makhijani?

5 WITNESS MAKHIJANI: That's correct.

6 MR. LOVEJOY: Are there any changes or
7 corrections to be made to this testimony?

8 WITNESS MAKHIJANI: I don't believe so.

9 MR. LOVEJOY: Okay. Is this the testimony
10 you're prepared to give under oath?

11 WITNESS MAKHIJANI: Well, I have to say
12 that this testimony is a scientific shadow of what I
13 originally submitted, because in my opinion the
14 questions of conversion do involve consideration of
15 alternatives.

16 JUDGE ABRAMSON: Dr. Makhijani, that's not
17 the question you were asked.

18 WITNESS MAKHIJANI: The testimony I was
19 prepared to give is the testimony, Your Honor, that I
20 submitted. The testimony that I submitted was
21 redacted without consultation with me, so I should be
22 entitled to say, at least, refer to the packs.

23 If I am wrong, Your Honor, I could be
24 stand corrected.

25 CHAIR BOLLWERK: Just let me say, sir,

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1 that the testimony that you submitted, there were
2 objections that were made to it by parties. The Board
3 sustained some of those objections, and the portions
4 of the testimony that were stricken were based on the
5 legal ruling of the Board.

6 So I understand what you were prepared to
7 say -- my understanding is that what you are now going
8 to be swearing to is what's in front of you. If
9 that's not correct you should let us know, but --

10 WITNESS MAKHIJANI: Your Honor, --

11 CHAIR BOLLWERK: You could -- I have to
12 say you could not put the testimony that we have
13 stricken back into your testimony.

14 WITNESS MAKHIJANI: I'm not attempting to
15 do that, Your Honor.

16 CHAIR BOLLWERK: All right.

17 WITNESS MAKHIJANI: I am not a lawyer. I
18 am an engineer and a scientist. And I believe the
19 reason I want to say this, in due deference to the
20 Court's decision that those parts have been stricken,
21 I'm not trying to put them back, is simply that I
22 prepared testimony that was, in my opinion, had some
23 scientific integrity and it had to be viewed in its
24 whole.

25 And as a result of the legal proceedings,

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1 a certain substantial portion has been taken out. I'm
2 not questioning the validity of those proceedings.
3 I'm just saying that it has been deprived, as a
4 result, of a good bit of its scientific integrity in
5 regard to considering the environmental impacts of the
6 conversion facility.

7 CHAIR BOLLWERK: All right.

8 MR. LOVEJOY: With that acclamation are
9 you prepared to swear to this testimony as your own?

10 WITNESS MAKHIJANI: Yes.

11 MR. LOVEJOY: Thank you. And we've given
12 copies to the clerk on the direct testimony. Now you
13 have in front of you this February 7 revision of your
14 rebuttal testimony.

15 CHAIR BOLLWERK: Let's go ahead and get
16 this in first, and then -- we'll do it in two pieces.

17 MR. LOVEJOY: All right.

18 CHAIR BOLLWERK: Why don't we go ahead and
19 do that. So you're asking that this, the direct
20 testimony then be adopted in the record, correct?

21 WITNESS MAKHIJANI: Yes. We're asking
22 that it be entered into the record.

23 CHAIR BOLLWERK: All right, any
24 objections?

25 (No response.)

1 CHAIR BOLLWERK: All right, hearing none,
2 then the direct testimony of Dr. Makhijani regarding
3 Nuclear Information Resource Service and Public
4 Citizen's Contention EC-4, as revised on January 8th,
5 2005, is adopted and incorporated into the record as
6 it read.

7 (Whereupon, the pre-filed direct testimony
8 of Dr. Makhijani was bound into the record as if
9 having been read.)

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January 28, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

Docket No. 70-3103

Louisiana Energy Services, L.P.
National Enrichment Facility

ASLBP No. 04-826-01-ML

DIRECT TESTIMONY OF DR. ARJUN MAKHIJANI
REGARDING NUCLEAR INFORMATION AND RESOURCE SERVICE
AND PUBLIC CITIZENS'S
CONTENTION EC-4
REVISED JAN. 28, 2005

Q1: Please state your name, affiliation, and qualifications.

A1. My name is Dr. Arjun Makhijani. Among my credentials is a doctorate in Engineering from the Electrical Engineering Department of the University of California at Berkeley (1972, specialization: the application of plasma physics to controlled nuclear fusion). I am President of the Institute for Energy and Environmental Research (IEER), an organization, which, among its activities, assesses environmental damage from the operation of nuclear fuel facilities, and estimates the compliance of those facilities with environmental regulations, mainly relating to radioactive materials and wastes and to radioactivity exposures. In addition, I am, in my personal capacity as part of a non-IEER team, currently one of the principal personnel who have been chosen by the U.S. government to carry out an audit of the radiation dose reconstruction

that is being done for nuclear weapons complex workers who have applied for compensation under the Energy Employees Occupational Illness Compensation Program Act.

I have authored and co-authored numerous studies, articles, and books examining nuclear-related issues, including emissions from nuclear weapons plants, nuclear fuel cycle related issues, nuclear weapons production and testing, and nuclear waste. Among other things, I was the principal author of the first ever independent source term reconstruction from a nuclear weapons plant (the Feed Materials Production Center), done in 1989.

Chapters I have co-authored include "Dismantling the Bomb," and "Nuclear Waste Management and Environmental Remediation," in Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940, Stephen I. Schwartz, editor, Brookings Institution Press, Washington, D.C., 1998. I am also a co-author of "The Production of Nuclear Weapons and Environmental Hazards," a chapter appearing in Nuclear Wastelands: A Global Guide to Nuclear Weapons Production and its Health and Environmental Effects, MIT Press, Cambridge, Massachusetts, 1995. I am principal editor of this book.

I have served on the Radiation Advisory Committee of the Science Advisory Board of the United States Environmental Protection Agency (EPA), and on the EPA's advisory subcommittee on Radiation Cleanup Standards of the National Advisory Committee on Environmental Policy and Technology. From 1997 to 2002, I was part of an IEER team that monitored three independent audits of the compliance of the Los Alamos National Laboratory in New Mexico with radiation regulations under the Clean Air Act, specified in 40 CFR 61, Subpart H. The audits and the

IEER monitoring of the audits were the result of a federal consent decree issued after the court found Los Alamos National Laboratory to be in violation of 40 CFR 61, Subpart H.

My current resume is attached to this testimony.

Q2. What is the purpose of your testimony today?

A2. I am testifying in support of contention EC-4, which is advanced in this proceeding by Nuclear Information and Resource Service and Public Citizen. That contention states as follows:

CONTENTION: Petitioners contend that the Louisiana Energy Services, L.P. Environmental Report (ER) lacks adequate information to make an informed licensing judgment, contrary to the requirements of 10 C.F.R. Part 51. The ER fails to discuss the environmental impacts of construction and lifetime operation of a conversion plant for the Depleted Uranium Hexafluoride ("UF₆") waste that is required in conjunction with the proposed enrichment plant.

The DEIS fails to discuss the environmental impacts of the construction and operation of a conversion plant for the depleted uranium hexafluoride waste. The DEIS entirely relies upon final EISs issued in connection with the construction of two conversion plants at Paducah, Kentucky, and Portsmouth, Ohio, that will convert the Department of Energy's inventory of depleted uranium (DEIS at 2-28, 2-30, 4-53, 4-54). Such reliance is erroneous, because the DOE plants are unlike the private conversion plant contemplated by LES.

Q3. What materials have you reviewed in preparation for your testimony?

A3. Part of my preparation was working with and assigning tasks to Dr. Brice Smith, recently promoted to senior scientist as of December, and our librarian Lois Charmers. I reviewed various parts of the LES license application, including the Environmental Report and the Safety Analysis Report, submitted by LES to the Commission in support of its application, that relate to

the depleted uranium to be generated by the facility, the management of that material, and its deconversion and disposal. I also reviewed various documents prepared by LES and persons working for LES that shed light on LES's plans for disposition of depleted uranium. I have also reviewed documents on uranium risks including those from scientific journals as well as publications from national and international bodies such as the National Research Council, the Royal Society, and the World Health Organization.

In addition, I have reviewed the Draft Environmental Impact Statement (DEIS) (NIRS/PC Exhibit 41) as well as the Final Environmental Impact Statement for the proposed Claiborne Enrichment Facility (NIRS/PC Exhibit 58). I have revisited the history of 10 CFR 61.55 as well as other parts of 10 CFR 61. I have reviewed several related Department of Energy documents, such as the Environmental Impact Statements for the proposed Portsmouth and Paducah conversion plants (DOE/EIS-0359 and DOE/EIS-0360) (NIRS/PC Exhibits 52 and 53), and the 1999 DOE Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride, DOE/EIS-0269 (NIRS/PC Exhibit 54). I have also reviewed some of the supporting documents for those studies such as the 1997 Lawrence Livermore National Laboratory Engineering and Cost Analyses.

I have studied these and related areas for many years, and so cannot make a full list of all the materials I have reviewed that may shed light on the questions before the Board. For a further listing of documents reviewed as part of my work in this case in collaboration with Dr. Smith, I refer you to the reference list in Makhijani and Smith, Costs and Risks of Management and

Disposal of Depleted Uranium from the National Enrichment Facility Proposed to be Built in Lea County, New Mexico by LES, Nov. 24, 2004, filed in this proceeding.

Q4. Focusing on the impact of construction and operation of a deconversion plant, can you explain what disclosure of such impact you have found in the documents concerning this license application?

A4. Starting with the license application, I found the following:

First, the initial application, filed in December 2003, does not discuss the impact of deconversion at all. There is reference to the fact that DOE has contracted for the construction of UF_6 conversion plants at Paducah and Portsmouth in the first Environmental Report at page 4.13-2, but there is no discussion of the impact of such plants.

Second, in Revision 2 of the application, the following language appears at page 4.13-3:

“The environmental impact of a UF_6 conversion facility was previously evaluated generically for the Claiborne Enrichment Center (CEC) and is documented in Section 4.2.2.8 of the NRC Final Environmental Impact Statement (FEIS) (NRC, 1994a). After scaling to account for the increased capacity of the NEF compared to the CEC, this evaluation remains valid for the NEF. In addition, the Department of Energy has recently issued FEISs (DOE, 2004a; DOE, 2004b) for the UF_6 conversion facilities to be constructed and operated at Paducah, KY and Portsmouth, OH. These FEISs consider the construction, operation, maintenance, and decontamination and decommissioning of the conversion facilities and are also valid evaluations for the NEF.”

The Commission staff has also issued its Draft Environmental Impact Statement, NUREG-1790, (NRC Staff Ex. 1) in September 2004 (DEIS) (NIRS/PC Exhibit 41). This document has the following disclosure concerning the impact of alternative deconversion facilities:

The DEIS states that the NEF would produce up to 7800 metric tons of DUF_6 per year. (page 2-16). The DEIS states that it is assumed that the proposed deconversion facility for the NEF depleted uranium will use the same technology as the DOE plants; this is described as a continuous dry conversion process based on the process used by Framatome ANP in Richland, Washington. (page 2-28). As for location, the DEIS states that the deconversion plant could be located (a) at Metropolis, Illinois (pages 2-29, 2-30) or (b) at or near to the proposed NEF (page 2-30). It also states that deconversion might be carried out at the DOE plants by extending their operation (page 2-31).

Addressing the impacts of deconversion, the DEIS states that the "impacts of conversion at a private conversion facility or at DOE conversion facilities are similar because it is assumed that the facility design of a private conversion facility would be similar to the DOE conversion facilities." (page 4-53; see also 4-54). The DEIS states:

"Because the operations would be the same as the DOE conversion facilities, the environmental impacts from normal operations of an adjacent conversion facility would be representative of the impacts of the DOE facilities and the proposed NEF. Therefore, the maximum occupational and member of the public annual exposures would be approximately 6.9 millisieverts (690 millirem) and 5.3×10^{-5} millisieverts (5.3×10^{-5} millirem), respectively. The impacts due to accidents would be bounded by the proposed NEF's highest accident consequence—the hydraulic rupture of a UF_6 cylinder. This maximum accident impact would be a collective dose of 12 person-sieverts (12,000 person-rem) or equivalent to 7 latent cancer fatalities." (page 4-54).

The DEIS also states that the impact of use of DOE conversion facilities would be scaled to the impact of the operation of those facilities to process DOE depleted uranium. (page 4-56). The DEIS also contains a discussion of the impacts of routine operation and accident scenarios involving the NEF itself in Chapter 4 and Appendix C.

Q5. Given that the DEIS refers to the environmental impact statements for the DOE deconversion facilities, what do such statements disclose that is relevant to the operation of the NEF and the depleted uranium produced by the NEF?

A5. DOE released two very similar environmental impact statements for the Paducah and Portsmouth deconversion facilities. A few main points can be noted about these documents:

- Currently there are no DOE or general NRC guidelines that govern the free release of contaminated hydrofluoric acid or calcium fluoride.¹
- In the analysis of proposals to construct and build the DOE deconversion facility it was determined that the accident scenarios with the largest consequences were primarily those involving hydrofluoric acid.² If the preferred option of neutralizing the HF and disposing of the calcium fluoride as LLW is replaced by a decision by LES to produce and ship anhydrous HF (AHF), the potential impacts on the environment are likely to be higher. However, given that no existing facility for UF₆ deconversion currently produces AHF, the fact that the

¹ DOE Paducah ROD 2004 p. 44657 - 44658 (NIRS/PC Exhibit 50) and DOE Portsmouth ROD 2004 p. 44652 - 44653 (NIRS/PC Exhibit 51) (LES Ex. 74)

² Paducah EIS from Appendix D page 18-19 (NIRS/PC Exhibit 52) (LES Ex. 17)

cumulative transportation distances considered for the DOE facilities are different from those that may be required for shipping the material generated by the proposed LES facility³, as well as the fact that the health and environmental impacts on routine operation from the greater volatility and general hazards posed by anhydrous HF versus aqueous HF were not analyzed by the DOE EIS for the Paducah or Portsmouth facilities cited by the NRC in the LES DEIS analysis⁴, it is not possible at this time to quantify the potential impacts of such a decision.

Q6. Moving to the proposal before the Commission, what do you understand LES proposes to do with the DUF₆ from the NEF?

A6. The LES DEIS contains the following description of the two options proposed for the management of the DUF₆ that would be generated by the proposed NEF:

The first option would be to ship the material to a private conversion facility prior to disposal (Option 1). An alternative available under the provisions of the USEC Privatization Act of 1996 would be to ship the material to the DOE's conversion facility at Portsmouth, Ohio, or Paducah, Kentucky, for temporary storage and eventual processing by the DOE conversion facility prior to disposal by DOE (Option 2).⁵

In addition, LES has publicly stated that

For many reasons, including the large volume of byproduct already in storage in the US, the DOE deconversion facilities are not LES's path of choice for byproduct deconversion. LES has continually supported the development of a commercial, private deconversion facility. In fact, the company will seek to

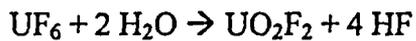
³ Currently no commercial deconversion facility exists in the U.S. that would be able to accept the DUF₆ from the proposed LES enrichment facility and thus no quantification of this potential impact was attempted.

⁴ NRC NEF EIS Draft 2004 p. 2-30 (NIRS/PC Exhibit 41)(NRC Staff Ex. 1)

⁵ NRC NEF EIS Draft 2004 p. 2-28 (NIRS/PC Exhibit 41)(NRC Staff Ex. 1)

develop long-term supply contracts with potential deconversion operators in order to assist in their financing and licensing efforts to build such a facility.⁶

LES has stated that its preferred option is the deconversion of the DUF_6 to DU_3O_8 followed by its disposal as a bulk powder in an abandoned mine or potentially at a shallow land disposal facility. In addition, LES has stated that it will consider the following reactions for producing the DU_3O_8



followed by



LES has not decided whether the hydrofluoric acid generated will be neutralized to form calcium fluoride (CaF_2) or distilled to form anhydrous hydrofluoric acid (AHF), however, the NRC stated that CaF_2 disposal was the only scenario that was reasonable to include in the DEIS:

The hydrofluoric acid could be sold to a commercial hydrofluoric acid supplier for reuse if the radioactive content is below free release limits, or it could be converted to calcium fluoride (CaF_2) for sale or disposal. Because conversion of the large quantities of DUF_6 at the DOE Portsmouth and Paducah Gaseous Diffusion Plant sites would be occurring at the same time the proposed NEF would be in operation, it is not certain that the market for hydrofluoric acid and calcium fluoride would allow for the economic reuse of the material generated by the proposed NEF. Therefore, only immediate neutralization of the hydrofluoric acid by conversion to calcium fluoride with disposal at a licensed low-level radioactive waste disposal facility is considered in this analysis.⁷

⁶ LES NEF UF_6 info sheet p. 3 (NIRS/PC Exhibit 59).

⁷ NRC NEF EIS Draft 2004 p. 2-29 (NIRS/PC Exhibit 41) (NRC Staff Ex. 1)

Q7. With these understandings, what criticisms do you have of the disclosure that has been made in the ER and the DEIS of the impacts of conversion of depleted uranium?

A7. The choice of deconversion process that is to be pursued involves important trade-offs that require additional analysis by LES and the NRC. In addition, if any consideration is to be given by LES to the possible production and sale of anhydrous hydrofluoric acid for reuse, than an examination of this option's environmental impacts should also be carried out.

Q8. Please explain what is lacking in the ER and the DEIS as regards analysis of deconversion processes.

A8. There is no adequate discussion in the ER, the LES DEIS, or the DOE EISs for the Paducah and Portsmouth facilities of the anhydrous hydrofluoric acid (AHF) process or its operations issues, environmental impacts and transportation risks. LES has not yet formally selected a deconversion process, and the production of AHF process is one alternative under possible consideration.

When the engineering analysis was completed in 1997, apparently no large-scale facility had been put into routine industrial use anywhere. The "Draft Engineering Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride - Rev. 2" from the Lawrence Livermore National Laboratory (LLNL) (NIRS/PC Exhibit 55), which is included as supporting material to the DOE programmatic EIS (NIRS/PC Exhibit 54), ^(LES Ex. 1B) states that

Distillation is a common industrial process and was the design basis for this suboption. The processing of the azeotrope and the process parameters for the

conversion reactors were patterned after the General Atomics/Allied Signal response to the RFR and the Sequoyah Fuels Corp. patented process. This representative process has not been industrialized, but the initial research and development have been completed.⁸

Cogema has not itself operated a deconversion facility that converts the HF into anhydrous hydrofluoric acid (AHF) at its plant in France. The costs, operations issues, environmental impacts and transportation risks of AHF in the context of deconversion of DUF₆ are at this stage not based on actual experience. If the preferred option of neutralizing the HF and disposing of the calcium fluoride as LLW is replaced by a decision to produce and ship anhydrous HF, the potential impacts on the environment are likely to be higher and should be considered in the LES EIS.

Q9. In analyzing the impacts of the AHF process, what factors would need to be considered?

A9. If any consideration is to be given by LES to the possible production and sale of anhydrous hydrofluoric acid for reuse, than an examination of this option's operations issues, environmental impacts and transportation risks should also be carried out. This analysis would require the identification of a location for the deconversion plant.

This has not yet been done in the ER or DEIS nor in the DOE EISs for the Paducah or Portsmouth facilities.

In the analysis of proposals to construct and build the DOE deconversion facility it was determined that the accident scenarios with the largest consequences were primarily those

⁸ LLNL 1997 (EA) p. 3-8 (NIRS/PC Exhibit 55).

involving hydrofluoric acid.⁹ In considering the differences between the properties of aqueous HF and anhydrous HF, the EIS for the Paducah deconversion facility points out that

It should be noted that there may be differences in the accident impacts between releases of AHF and aqueous HF, and that these differences were not fully evaluated in the critique... Anhydrous HF has a much higher volatility than aqueous HF, and therefore would result in a larger amount of material being dispersed to the environment if equal amounts were spilled. At this time, it is not clear if production of aqueous HF would result in a significant reduction in accident risk.¹⁰

In the same EIS, it was also reported that an accident involving a railcar in an urban setting under unfavorable weather conditions could potentially cause irreversible damage to people within an area covering seven square miles downwind with up to 300 fatalities. For comparison, this is an area roughly one-fifth of the size of Santa Fe, New Mexico. The DOE analysis goes on to conclude that, "[a]s noted above, shipment of aqueous HF may have different risks than shipment of AHF."¹¹

If the preferred option of neutralizing the HF and disposing of the calcium fluoride as LLW is replaced by a decision to produce and ship anhydrous HF, the potential impacts on the environment are likely to be higher. However, given that no existing facility for UF₆ deconversion currently produces AHF, the fact that the cumulative transportation distances considered for the DOE facilities are different from those that may be required for shipping the material generated by the proposed LES facility¹², as well as the fact that the health and environmental impacts on routine operation from the greater volatility and general hazards posed by anhydrous HF versus aqueous HF were not analyzed by the DOE EIS for the Paducah or

⁹ Paducah EIS from Appendix D page 18-19 (NIRS/PC Exhibit 52) (LES Ex. 17)

¹⁰ Paducah EIS from Appendix D page 19 (NIRS/PC Exhibit 52) (LES Ex. 17)

¹¹ Paducah EIS from Appendix D page 20 (NIRS/PC Exhibit 52) (LES Ex. 17)

¹² Currently no commercial deconversion facility exists in the U.S. that would be able to accept the DUF6 from the proposed LES enrichment facility and thus no quantification of this potential impact was attempted.

Portsmouth facilities cited by the NRC in the LES DEIS analysis¹³, it is not possible at this time for to quantify the potential impacts of such a decision.

Q10. Under LLNL's assumptions, what airborne emissions would be released from the deconversion plants that you believe should be considered?

A10. The generation of hydrofluoric acid (HF) in large amounts would result in an exhaust gases that are highly acidic and chemically hazardous if sufficiently concentrated. Therefore, a scrubber system is proposed to remove most of the HF that will be produced during routine operations. According to engineering analysis performed by Lawrence Livermore National Laboratory for depleted uranium deconversion facilities (NIRS/PC Exhibit 55), the proposed type of scrubber would be able to remove up to 99.9 percent of the HF from the exhaust gases. The estimated composition of the exhaust gases under four scenarios as presented in the LLNL engineering analysis is shown in the following table:

Table: Estimated concentration of hydrofluoric acid and uranium oxide in the exhaust gas from the process building under a variety of assumptions regarding the chemical form of the uranium oxide and whether the HF is neutralized with lye to CaF₂ or processed for resale as AHF. The implied uranium concentration in the HF is calculated assuming 99.9% of the HF is removed by the scrubber prior to release at the stack and that no uranium oxide is removed in that process.

Scenario	HF pounds per year emitted after scrubbing	Pounds of uranium oxide per year in scrubbed exhaust	Implied contamination of the HF, ppm of U
U ₃ O ₈ with AHF sale ^(a)	900	3.3	3.1
U ₃ O ₈ ; CaF ₂ process without HF sale ^(b)	300	3.3	---
UO ₂ with AHF sale ^(c)	900	12	11.7
UO ₂ ; CaF ₂ process without HF sale ^(d)	300	12	---

¹³ NRC NEF EIS Draft 2004 p. 2-30 (NIRS/PC Exhibit 41) (NRC Staff Ex. 1)

Notes:

- (a) LLNL 1997 (EA) p. 6.4-7-2 (NIRS/PC Exhibit 55).
- (b) LLNL 1997 (EA) p. 6.5-7-2 (NIRS/PC Exhibit 55).
- (c) LLNL 1997 (EA) p. 6.6-7-2 (NIRS/PC Exhibit 55).
- (d) LLNL 1997 (EA) p. 6.7-7-2 (NIRS/PC Exhibit 55).

These releases correspond to annual airborne emissions of approximately 0.51 to 1.9 millicuries of uranium under routine operation. A private conversion facility built to handle the smaller amount of depleted uranium that would be generated at the proposed LES enrichment facility in comparison to the DOE stockpile which formed the basis of the LLNL analysis would be expected to have proportionally lower absolute levels of these emissions assuming the same scrubber efficiencies. A consideration of the impacts for lower filter efficiency should be included in the assessment of the routine impacts of the deconversion facility. Low scrubber efficiency was frequently experienced in the scrap recovery operations at the uranium plant near Fernald, Ohio, for instance.¹⁴

Q11. What disposition should be considered for the HF?

A11. Currently there are no DOE or general NRC guidelines that govern the free release of contaminated hydrofluoric acid or calcium fluoride.¹⁵ The NRC has granted a license to the Framatome Advanced Nuclear Power, Inc. uranium fuel fabrication facility in Richland, Washington, for the release of HF containing up to 6.4 ppm of uranium and the European limit

¹⁴ Voillequé et al. 1995, Appendix I (NIRS/PC Exhibit 57). See especially Table I-10 through I-13, which indicate highly variable scrubber performance, ranging from better than manufacturer specifications to nearly complete failure of scrubbers. Sodium hydroxide was the scrub fluid. Thus, even if a 99.9 percent efficiency scrubber is installed, maintaining the efficiency at such a high level would be difficult and expensive due to the corrosive nature of HF.

¹⁵ DOE Paducah ROD 2004 p. 44657 - 44658 (NIRS/PC Exhibit 50) and DOE Portsmouth ROD 2004 p. 44652 - 44653 (NIRS/PC Exhibit 51) (LES Ex. 74)

for release of HF from the Cogema Pierrelatte deconversion plant is 5 ppm.¹⁶ The cost analysis of a uranium deconversion plant intended to process the DOE's stockpile of DUF_6 conducted by Lawrence Livermore National Laboratory concluded, however, that

In addition to the uncertain market, there is concern about possible public reaction to uranium contaminants. If the fluorine chemical is to be sold in North America, it may be subjected to higher purity standards due to the source material.¹⁷

The implied uranium concentrations of uranium in the hydrofluoric acid given in the above table assume that no uranium oxide was removed by the HF scrubber and, therefore, the actual total contamination of the acid is likely to be higher than these levels. Given the fact that the value for the DU_3O_8 facility is close to the existing U.S. and European benchmarks and the fact that the value for the DUO_2 facility is roughly twice as large, as well as the caution raised by the LLNL analysis regarding the potential for even tighter standards in the U.S. in the future, suggests that it should be assumed that the hydrofluoric acid resulting from the deconversion of the DUF_6 from the proposed LES facility will not be able to be resold on the open market.

One possibility for the use of this material that would not be hampered by the projected levels of contamination would be its reuse in manufacturing new UF_6 from natural uranium. However, in the present context this is not likely to be a plausible option for LES given the very large amounts of hydrofluoric acid that will be being produced by the government's deconversion facility for the DOE stockpile of depleted uranium. In particular, the suggested use of the HF by the uranium fuel facility in Metropolis, Illinois, is not likely to be attractive given the proximity of the Paducah deconversion plant to be operating in nearby Paducah, Kentucky. The Portsmouth deconversion plant in Piketon, Ohio, which would also generate large amounts of

(LES Ex. 17)

¹⁶ DOE Paducah EIS 2004 p. E-13 (NIRS/PC Exhibit 52) and LLNL Cost Analysis 1997 p. 50-51 (NIRS/PC Exhibit 56).

¹⁷ LLNL Cost Analysis 1997 p. 50-51 (NIRS/PC Exhibit 56).

HF, is also much closer than the proposed LES facility in southeastern New Mexico. These facts were explicitly considered by the NRC and in the DEIS for the proposed LES facility when it concluded that CaF_2 disposal as LLW was the only scenario that was reasonable to include in the DEIS. The potential need for disposing of the calcium fluoride (CaF_2) as LLW comes from the fact that it is expected to be contaminated by the presence of the uranium in the hydrofluoric acid.¹⁸

Assuming that, other than the presence of uranium, the calcium fluoride can be considered non-hazardous waste, the contaminated CaF_2 would qualify as Class A low-level waste that could likely be disposed of in a suitable 10 CFR 61.55(a) facility. The treatment and disposal of this waste stream would add to the environmental impacts of the routine operation of the deconversion facility and these impacts should be considered for the specific case of the proposed LES facility in the ER and DEIS.

¹⁸ Paducah EIS p. E-5 (NIRS/PC Exhibit 52). (LES Ex. 17)

**Curriculum Vita of
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Education:

Ph.D. University of California, Berkeley, 1972, from the Department of Electrical Engineering. Area of specialization: plasma physics as applied to controlled nuclear fusion. Dissertation topic: multiple mirror confinement of plasmas.
M.S. (Electrical Engineering) Washington State University, Pullman, Washington, 1967. Thesis topic: electromagnetic wave propagation in the ionosphere.
Bachelor of Engineering (Electrical), University of Bombay, Bombay, India, 1965.

Current Employment:

1987-present: President and Senior Engineer, Institute for Energy and Environmental Research, Takoma Park, Maryland. (part-time in 1987).
February 3, 2004-present, Associate, SC&A, Inc., one of the principal investigators in the audit of the reconstruction of worker radiation doses under the Energy Employees Occupational Illness Compensation Program Act under contract to the Centers for Disease Control and Prevention, U.S. Department of Health and Human Services.

Other Long-term Employment

1984-88: Associate Professor, Capitol College, Laurel, Maryland (part-time in 1988).
1983-84: Assistant Professor, Capitol College, Laurel, Maryland.
1977-79: Visiting Professor, National Institute of Bank Management, Bombay, India. Principal responsibility: evaluation of the Institute's extensive pilot rural development program.
1975-87: independent consultant (see page 2 for details)
1972-74: Project Specialist, Ford Foundation Energy Policy Project. Responsibilities included research and writing on the technical and economic aspects of energy conservation and supply in the U.S.; analysis of Third World rural energy problems; preparation of requests for proposals; evaluation of proposals; and the management of grants made by the Project to other institutions.
1969-70: Assistant Electrical Engineer, Kaiser Engineers, Oakland California. Responsibilities included the design and checking of the electrical aspects of mineral industries such as cement plants, and plants for processing mineral ores such as lead and uranium ores. Pioneered the use of the desk-top computer at Kaiser Engineers for performing electrical design calculations.

Professional Societies:

Institute of Electrical and Electronics Engineers and its Power Engineering Society
American Physical Society
Health Physics Society
American Association for the Advancement of Science

Awards:

The John Bartlow Martin Award for Public Interest Magazine Journalism of the Medill School of Journalism, Northwestern University, 1989, with Robert Alvarez.

Consulting Experience, 1975-1987

Consultant on a wide variety of issues relating to technical and economic analyses of alternative energy sources; electric utility rates and investment planning; energy conservation; analysis of energy use in agriculture; US energy policy; energy policy for the Third World; evaluations of portions of the nuclear fuel cycle.

Partial list of institutions to which I was a consultant in the 1975-87 period:

Tennessee Valley Authority
 Lower Colorado River Authority
 Federation of Rocky Mountain States
 Environmental Policy Institute
 Lawrence Berkeley Laboratory
 Food and Agriculture Organization of the United Nations
 International Labour Office of the United Nations
 United Nations Environment Programme
 United Nations Center on Transnational Corporations
 The Ford Foundation
 Economic and Social Commission for Asia and the Pacific
 United Nations Development Programme

Languages: English, French, Hindi, Sindhi, and Marathi.

Reports, Books, and Articles (Partial list)

(Newsletter, newspaper articles, excerpts from publications reprinted in books and magazines or adapted therein, and other similar publications are not listed below)

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Makhijani, A., and A.J. Lichtenberg, *An Assessment of Energy and Materials Utilization in the U.S.A.*, University of California Electronics Research Laboratory, Berkeley, 1971.

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Makhijani, A., and A. Poole, *Energy and Agriculture in the Third World*, Ballinger, Cambridge, 1975.

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- Kahn, E., M. Davidson, A. Makhijani, P. Caeser, and S. Berman, *Investment Planning in the Energy Sector*, Lawrence Berkeley Laboratory, Berkeley, 1976.
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CERTIFICATE OF SERVICE

Pursuant to 10 CFR § 2.305 the undersigned attorney of record certifies that on January 28, 2005, the foregoing Direct Testimony of Dr. Arjun Makhijani Regarding Nuclear Information and Resource Service and Public Citizen's Contention EC-4, Revised Jan. 28, 2005, was served by electronic mail and by first class mail upon the following:

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1 MR. LOVEJOY: Thank you. Dr. Makhijani,
2 do you also have the February 7 revision of your
3 rebuttal testimony?

4 WITNESS MAKHIJANI: I don't, Mr. Lovejoy.
5 I have the January 28th version, which I believe has
6 been amended.

7 MR. LOVEJOY: Okay. I believe we passed
8 out the February 7 revision, which corresponds to the
9 rulings we received previously. Could you identify
10 the February 7 version? Do you have that now?

11 WITNESS MAKHIJANI: Yes. This is the
12 first chance I've actually had to look at this, so I
13 don't know how we are going to proceed --

14 MR. LOVEJOY: All right.

15 WITNESS MAKHIJANI: -- because this has
16 been amended in a legal proceeding that has been
17 explained to me, but I haven't actually seen this
18 testimony.

19 CHAIR BOLLWERK: All right, let me make
20 this suggestion perhaps. Maybe Dr. Makhijani can take
21 a look at that while we talk about the motion in
22 limine --

23 MR. LOVEJOY: Okay.

24 CHAIR BOLLWERK: So at least he will be
25 aware, subject to that ruling, that this is in fact

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1 what he was, you know, what he's concerned about.

2 JUDGE ABRAMSON: And let me suggest, Dr.
3 Makhijani, that when you look at what you've just been
4 handed, you look at that and compare it to what you
5 had in front of you from the 28th or whatever earlier
6 date that was, and make sure that what is still there
7 is identical to what -- to the portions that have not
8 been removed from your original.

9 WITNESS MAKHIJANI: Your Honor, this is a
10 rather difficult job to do in a short period of time.
11 Normally one would compare it in a computer file if
12 one were going to do it rapidly.

13 JUDGE ABRAMSON: Well, your lawyer did
14 that too. Maybe your lawyer can advise you what he's
15 done here.

16 MR. LOVEJOY: The questions and answers I
17 think were -- this is 3, I think it was 3, 6, and 7
18 that were taken out.

19 CHAIR BOLLWERK: That's correct. I
20 believe that is. Look at the order, but that sounds
21 correct to me.

22 WITNESS MAKHIJANI: Okay. Can I take that
23 as sort of given that no other changes have been made?

24 JUDGE ABRAMSON: I think you can state --
25 you can state that on that assumption, on the

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1 assumption that he's done that.

2 WITNESS MAKHIJANI: Your Honor, I don't
3 want to delay the proceedings.

4 CHAIR BOLLWERK: Well this is going to
5 take us a couple minutes. So take a couple minutes
6 here and go ahead and review it so you're satisfied
7 with it.

8 But I think the representation is that 3,
9 6, and 7 were questions that were removed.

10 WITNESS MAKHIJANI: Sure. Thank you, Your
11 Honor.

12 CHAIR BOLLWERK: If you see anything else
13 that you think is missing let us know.

14 WITNESS MAKHIJANI: Okay, thank you, Your
15 Honor.

16 MR. LOVEJOY: I did not change the numbers
17 of the questions and answers.

18 CHAIR BOLLWERK: All right, I think we've
19 got that settled. The Staff has made a motion that
20 basically the -- question 9, the answer to question 9
21 be stricken.

22 And we've heard also from LES, they made
23 a filing. Let me see -- let me have them just
24 basically, very quickly, review their argument with us
25 and then we'll turn to you and see what you're

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1 response is.

2 Anything -- if you want to say anything
3 further, we have you paper, so --

4 MR. CUMMINGS: No, we have nothing
5 further, Your Honor.

6 CHAIR BOLLWERK: All right. Then let me
7 turn to the --

8 MR. CURTISS: Our views are set forth in
9 our February 6th filing.

10 CHAIR BOLLWERK: All right, then Mr.
11 Lovejoy.

12 MR. LOVEJOY: Well, the Board has
13 previously ruled on similar issues, and in the January
14 21 ruling, there was a question about testimony by Dr.
15 Makhijani concerning, among other things, the
16 contaminant load in products of deconversion.

17 And I'm looking at page 11 of the ruling.
18 And the Board said about that that to the degree the
19 contaminant load in these products determines the fate
20 and impacts of such deconversion products, this is a
21 relevant matter for consideration in the context of
22 this Contention.

23 Excuse me. As I understand it, the
24 objection being made is that some of Dr. Makhijani's
25 testimony goes too much into the issues of disposal

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1 and disposal alternatives and merits and disadvantages
2 or various forms of depleted uranium for disposal.

3 And the question and answer 9 are not on
4 that issue. They are on, well, various aspects of
5 transportation and management of chemicals used in the
6 course of deconversion.

7 So -- and yes, it does mention some
8 possible impacts of facilities to deconversion to UO2
9 requiring certain amounts of anhydrous ammonia. And -
10 - but these are all impacts of deconversion processes,
11 not disposal.

12 I previously mentioned in discussions we
13 had earlier today the fact that this Board is, at some
14 point, going to need to identify the plausible
15 strategy which it will approve for disposal.

16 And that will certainly bring the Board
17 into consideration of alternative deconversion
18 products, and the impacts of those products, both upon
19 disposal and on the environment from the deconversion
20 activities.

21 And since the decision has not been made
22 what the plausible strategy is, to my eyes our
23 alternatives are still on the table regardless of what
24 LES says.

25 I, you know, for the sake of efficiency if

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1 nothing else, it seems appropriate to take a look at
2 these issues when we're all here, and see what the,
3 you know, the impacts and the implications of
4 different deconversion processes are.

5 If you want to not look at the disposal
6 impacts, that's one decision. But these still are
7 alternatives that have implications rising out of the
8 deconversion processes.

9 CHAIR BOLLWERK: All right. That speaks
10 to the first paragraph, what about the second
11 paragraph?

12 MR. LOVEJOY: Well, this involves the
13 train fire accident. There was, in the petitions that
14 we started with in this case, reference to the
15 transportation impacts associated with deconversion
16 processes.

17 And this is another one. This is an
18 example. I'm sure that it's not the only one that can
19 be asserted.

20 CHAIR BOLLWERK: Anything further, then?

21 MR. LOVEJOY: No.

22 CHAIR BOLLWERK: All right. We're going
23 to recess for about two minutes and we'll be right
24 back with you then.

25 MR. LOVEJOY: All right.

1 (Whereupon, the above-entitled matter
2 went off the record at 12:37 p.m. and
3 went back on the record at 12:40 p.m.)

4 CHAIR BOLLWERK: All right, if we could go
5 back on the record please. After considering the
6 arguments of the parties, the Board is going to rule
7 the following.

8 We are going to grant the Staff's motion
9 with respect to the last sentence in the first
10 paragraph of answer A9.

11 JUDGE ABRAMSON: The one that starts in
12 addition.

13 CHAIR BOLLWERK: All right. The sentence
14 in addition from the 1997 LLNL study, it is known that
15 facilities to deconvert to UO2 would require larger
16 amounts of anhydrous ammonia than facilities
17 deconverting to U3O8, excuse me, given the greater
18 hydrogen needs of producing uranium dioxide.

19 JUDGE ABRAMSON: These are examples, but
20 I mean it's okay. It doesn't matter, because he's
21 giving examples.

22 CHAIR BOLLWERK: All right. And then with
23 respect to the second paragraph, we would leave that
24 paragraph in tact. So we would deny the Staff's
25 motion relative to that second paragraph.

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1 Now just as a syntax matter, would the
2 testimony read more correctly if this is an example,
3 or to say these are examples after we stricken that
4 sentence? I'll leave that.

5 MR. LOVEJOY: I think you're correct. It
6 should say these are.

7 CHAIR BOLLWERK: All right.

8 MR. LOVEJOY: Would you like Dr. Makhijani
9 to make these --

10 WITNESS MAKHIJANI: Are there two now? I
11 thought that was the second example. Let me just see.
12 Yes, I think you are right.

13 MR. LOVEJOY: Would you like Dr. Makhijani
14 to make these by --

15 CHAIR BOLLWERK: He can make them by hand.
16 You can make them by hand, as long as the Court
17 Reporter gets them. That's the important part.

18 MR. LOVEJOY: All right.

19 WITNESS MAKHIJANI: Maybe I'll just do it
20 on a copy here.

21 CHAIR BOLLWERK: That's fine. We just
22 need -- so that you have -- you all have two copies,
23 correct? That's what you need. Do you have a copy
24 there?

25 All right, if you just make that one, and

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1 I think our clerk is going to go ahead and make it on
2 the other copy, and that should suffice.

3 MR. LOVEJOY: May I hand these to Dr.
4 Makhijani?

5 CHAIR BOLLWERK: Yes, if he wants to look
6 at it. And we'll retrieve it and give it to the clerk
7 then, when we're done. So, just so we're straight,
8 one copy's over here, the other copy's over there.

9 Oh, you've got another one? All right
10 we'll get them all then, that's good.

11 WITNESS MAKHIJANI: These are examples.
12 I have this here.

13 CHAIR BOLLWERK: Does he want to keep that
14 with him? We actually -- I have another copy over
15 here.

16 WITNESS MAKHIJANI: Your Honor, I've made
17 the change in my copy.

18 CHAIR BOLLWERK: You got it? Okay, very
19 good then. And with that ruling we're going to go
20 ahead and, I take it, you want the testimony adopted
21 then?

22 MR. LOVEJOY: Please.

23 CHAIR BOLLWERK: All right.

24 MR. LOVEJOY: Dr. Makhijani, with that
25 amendment, is this your testimony?

1 WITNESS MAKHIJANI: Well, Mr. Lovejoy, I
2 would make the same stipulation without repeating it,
3 as I did with my direct testimony, that there's a
4 scientific integrity matter here that is beyond the
5 legal questions.

6 And I understand the legal arena, but it's
7 my business to study the real world, and my testimony
8 no longer has the scientific wholeness that it did
9 when I submitted it.

10 CHAIR BOLLWERK: All right. With that
11 understanding, sir, we appreciate you expressing your
12 concerns. We'll go ahead and at this point the
13 rebuttal testimony of Dr. Makhijani regarding Nuclear
14 Information and Resource Service, Public Citizen's
15 Contention EC-4, revised on February 7th, 2005, is
16 further revised based on the Board's ruling today on
17 the Staff's motion in limine is adopted into the
18 record as if read..

19 (Whereupon, the pre-filed rebuttal
20 testimony of Dr. Makhijani was bound into the record
21 as if having been read.)

February 7, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

Docket No. 70-3103

Louisiana Energy Services, L.P.
National Enrichment Facility

ASLBP No. 04-826-01-ML

REBUTTAL TESTIMONY OF DR. ARJUN MAKHIJANI
REGARDING NUCLEAR INFORMATION AND RESOURCE SERVICE
AND PUBLIC CITIZENS'S CONTENTION EC-4
REVISED FEB. 7, 2005

Q1. Please state your name and what testimony will you be discussing today.

A1. My name is Dr. Arjun Makhijani and I have previously submitted direct testimony in this proceeding. I will be offering rebuttal to the pre-filed direct testimony of Rod M. Krich presented on behalf of Louisiana Energy Services, L.P and the pre-filed direct testimony of Donald E. Palmrose, presented on behalf of the NRC staff. The testimony of R.M. Krich and D.E. Palmrose was offered with respect to the Nuclear Information and Research Service and Public Citizen Environmental Contention 4 ("NIRS/PC EC-4") and filed with the court on January 7, 2005.

Q2. With respect to the decision by LES to deconvert the depleted uranium hexafluoride (DUF_6) that would be produced by the proposed LES enrichment facility to uranium oxide (U_3O_8), what opinions were offered in the opposing experts' direct testimony that you plan to discuss?

A2. The testimony of interest from R.M. Krich was as follows

Q11. What is the basis for your decision to convert the DUF_6 to U_3O_8 ?

A11. (RMK) **The U_3O_8 is recognized by the NRC as the more stable physiochemical form and the more compatible, as regards to safety, with the long-term disposition of tails (See LES Exhibit 19). In fact, NRC has recommended U_3O_8 as a waste form for the long term storage and disposal, as it is thermodynamically stable and relatively insoluble (See LES Exhibit 20). DOE has also identified conversion to U_3O_8 as the preferred alternative in its Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269)(April 1999)(See LES Exhibit 18).¹ (emphasis added)**

The testimony of interest from D.E. Palmrose was as follows

Q7. What is meant by the conversion of depleted uranium hexafluoride waste?

A7. The uranium enrichment process that is to be used by LES at the proposed National Enrichment Facility (NEF), will produce as a byproduct, depleted uranium hexafluoride (DUF_6). DUF_6 , when stored in cylinders, emits low levels of gamma and neutron radiation. In addition, DUF_6 is highly reactive to water vapor in air, forming hydrogen fluoride (HF) and uranyl fluoride (UO_2F_2), both of which are chemically toxic substances. **Therefore, for the purposes of long-term waste management, DUF_6 is converted into a more stable form.** The process of converting the DUF_6 to a more stable form is the "conversion" process that is referenced.² (emphasis added)

¹ Testimony of Rod M. Krich p. 4

² Testimony of Donald Palmrose p. 4

Q4. With respect to the issue of whether the private deconversion facility preferred by LES would produce aqueous HF, anhydrous HF, or calcium fluoride (CaF₂), what testimony will you be addressing?

A4. R.M. Krich testified that LES has not yet decided upon a specific deconversion process to produce U₃O₈, nor have they decided upon whether the facility would produce aqueous HF, anhydrous HF, or neutralize the acid to calcium fluoride. Despite this lack of specifics, R.M. Krich testified that the analysis in the PEIS for the impacts of AHF production would bound any possible impacts from the proposed LES facility.³

D.E. Palmrose testified that the site-specific Final EISs did not consider AHF production, but that the EISs did make note of the analysis presented in the PEIS.⁴ In addition, he went on to testify that

Q20. Would you be able to address the impacts that would result from conversion utilizing a distillation process to convert aqueous HF to anhydrous HF with the same degree of specificity used in the DEIS regarding the neutralization process?

A20. No. Specific analyses on the impacts from the neutralization process are contained in the Paducah and Portsmouth FEISs. On the contrary, with regard to a process of distillation resulting in anhydrous HF, there is no current conversion facility that uses this technology. Furthermore, there is no plan to construct such a facility, therefore, the process used to distill HF to an anhydrous form has not been fully developed. Therefore, any assessment of the impacts resulting from distillation would have a high degree of uncertainty and any analysis would have to be derived from the evaluation of similar technologies. In the PEIS, DOE performed this type of analysis by relying on data from similar technologies. The PEIS presented the potential impacts as a range of impacts designed to provide a reasonable estimate of their magnitude, taking into account the uncertainty relative to the specific technology and site. PEIS at F-4."⁵

³ Testimony of Rod M. Krich p. 4-5 and 12-13

⁴ Testimony of Donald Palmrose p. 9-10

⁵ Testimony of Donald Palmrose p. 10-11

Q21. Do you consider the analysis contained in the PEIS to be an adequate analysis of the impacts of distillation, given the current understanding of technology that could be used in distillation?

A21. Yes. Given these uncertainties and based on current knowledge, the analysis performed by DOE in the PEIS presents a thorough analysis of impacts of a conversion facility using an as yet to be commercially established distillation process to produce anhydrous HF. A more specific analysis would require knowledge of the specific processes which would be used to perform the distillation process and the specific site at which the facility would be constructed."⁶

Q5. Given what has been testified to regarding the possibility that the LES private deconversion facility might upgrade the aqueous HF to anhydrous HF, what opinions have you formed regarding the needed analysis that has not been included in the NEF DEIS?

A5. Given the uncertainties acknowledged by LES, and the immaturity of technological development of producing AHF as the end product in the deconversion process, it is difficult to technically sustain the claim of bounding impacts. Despite the fact that R.M. Krich testified that no specific process has yet been decided, the NEF DEIS states that

In this Draft EIS, it is assumed that the proposed conversion facility would be using the same technology adapted for use by DOE in its conversion facilities. This technology would apply a continuous dry conversion process based on the commercial process used by Framatome Advanced Nuclear Power, Inc., fuel fabrication facility in Richland, Washington (DOE, 2004a; DOE, 2004b; LES, 2004a).⁷

The Paducah and Portsmouth facilities, however, will produce aqueous HF and therefore in regards to the proposed process for the upgrading the aqueous HF to anhydrous HF, the 1997 Livermore analysis assumed that the process of direct distillation would be used. This was

⁶ Testimony of Donald Palmrose p. 11

⁷ NRC Draft EIS 2004 p. 2-28 (NIRS/PC Exhibit 41)(NRC Staff Ex. 1)

also the assumption used in the PEIS.⁸ The distillation process is not used in any of the existing deconversion plants, nor in the cited fuel fabrication facility. Given this lack of commercially available experience, the Livermore analysis noted that

Although anhydrous HF is not produced as the by-product from the Cogema facility, distillation (the assumed process to upgrade the aqueous HF) is well established. Again, any uncertainties with the specific distillation process and its integration assumed for the engineering analysis (see Section 3.2.1.1) would be addressed in a subsequent engineering development phase of the Program.⁹

Despite the confidence of the DOE and others that, because distillation is a common industrial process that it could be straightforwardly adapted to the needs of a DUF₆ deconversion plant, the experience of Cogema proved otherwise. As reported in 2001, Cogema abandoned distillation as a possibility for upgrading the HF produced at their Pierrelatte facility.

Specifically it was reported that

Various alternatives of the dry process were investigated. One process that received special attention was to distill the aqueous HF to obtain anhydrous acid and to recycle the remaining azeotrope by direct reinjection in the defluorination kiln. This alternative was eventually discarded since it required more sensitive kiln technology and was more corrosive.¹⁰

and that

Studies have been carried out to convert this 70% [aqueous] HF to anhydrous HF, which can be sold on the European market at a much higher price. Five different processes have been technically compared. Direct distillation has been discarded because of the lack of commercial market for the 38% azeotrope by-product and the problems associated with its direct re-injection inside the defluorination kiln (such as the design of a special super-heating system).¹¹

In 2001, the preferred option of Cogema was to use a liquid-liquid extraction process, but no final decision had been reached given their ability to continue selling the aqueous HF on the European market.

⁸ LLNL Engineering Analysis 1997 p. 3-8 (NIRS/PC Exhibit 55) and DOE PEIS 1999 p. F-12 (NIRS/PC Exhibit 54) (LEX Ex. 18)

⁹ LLNL Engineering Analysis 1997 p. 3-7 (NIRS/PC Exhibit 55).

¹⁰ Hartmann et al. 2001 (NIRS/PC Exhibit 61).

¹¹ Hartmann et al. 2001 (NIRS/PC Exhibit 61).

Given the failure of distillation at the Cogema plant, it is necessary that the NRC and LES perform additional analyses of the impacts of AHF production using technologies more likely to actually be put into operation. The PEIS itself states that

For each conversion option, the potential environmental impacts are presented as a range within each area of impact. This range is intended to provide a reasonable estimate of the magnitude of impacts, taking into account the uncertainty relative to the specific technologies and sites that could ultimately be selected for conversion. The range of impacts results from two factors: (1) fundamental differences among the technologies within each conversion option; and (2) differences in the conditions at the three representative sites that were evaluated. A more detailed assessment of specific technologies and site conditions will be conducted, as appropriate, as part of the second phase (tier) of the programmatic National Environmental Policy Act (NEPA) approach.¹²

and that

The cumulative impacts of conversion, long-term storage, and disposal activities could not be determined because specific sites and technologies have not been designated for these options. Further analyses of cumulative impacts would be performed as required by NEPA and DOE regulations for any technology or siting proposals that would involve these facilities.¹³

Given that the PEIS considers only the impacts of distillation, it is not possible to determine whether its reported impacts actually bound the possible impacts of a private facility built to handle the depleted uranium from the proposed LES enrichment facility that would use alternative technologies to upgrade the aqueous HF to anhydrous HF.

Q8. With respect to the issue of transportation, what did the pre-filed direct testimony contain that you plan to discuss?

¹² DOE PEIS 1999 p. F-4 (NIRS/PC Exhibit 54) (LES Sr. 18)
¹³ DOE PEIS 1999 p. 4-29 (NIRS/PC Exhibit 54) (LES Sr. 18)

A8. The testimony of R.M. Krich, claims that the analysis in the PEIS bounds all transportation accidents given that it considers adequately long distances (250 to 5,000 km) and considers all of the types of materials that might be transported in connection to the proposed LES facility.¹⁴

Q9. With respect to their reliance on the analysis conducted in the PEIS, what opinion have you formed with respect to the adequacy of this approach?

A9. The transportation analysis presented in the DOE PEIS does not consider all of the process chemicals that might be transported in connection with a private deconversion facility built to handle the depleted uranium from the proposed LES enrichment facility. For example, the Final EISs for the Paducah and Portsmouth deconversion plants consider the transportation of anhydrous ammonia which is more volatile and hazardous than the ammonia considered in the PEIS. In addition, the site-specific EISs considered larger numbers of shipments of anhydrous ammonia than the number of ammonia shipments considered in the PEIS.¹⁵ ~~In addition, from the 1997 LLNL study, it is known that facilities to deconvert to UO₂ would require larger amounts of anhydrous ammonia than facilities deconverting to U₃O₈ given the greater hydrogen needs of producing uranium dioxide. This is~~ *These are* ~~an example~~ of the kind of issue that arises in transitioning from the generic to the specific technologies that were noted above in which the PEIS analysis might not bound the impacts of operation of real world facilities.

¹⁴ Testimony of Rod M. Krich p. 13-14

(LES Ex. 18)

¹⁵ DOE PEIS 1999 p. 5-47 (NIRS/PC Exhibit 54) and DOE Paducah FEIS 2004 p. 2-33 and 5-71 (NIRS/PC Exhibit 52) (LES Ex. 17)

In addition, the transportation accidents considered in the DOE analysis apparently did not report the impacts of a serious train fire in general much less a bounding accident like the Baltimore CSX train fire that occurred in mid-July 2001. The CSX train derailment ignited a leak of tripropylene and burned additional cars of wood and paper products. The flames and heat prevented access to the tunnel for several days while smoke poured out both ends of the tunnel and a number of manholes along the street. Two other rail cars involved in the accident were carrying hydrochloric acid and one contained an environmentally hazardous plasticizer.¹⁶ The influence of accidents such as train fires on the chemical and radiological impacts of transportation should be fully addressed in the NEF DEIS. The recent rail accident in Graniteville, S.C. on January 6, 2005 involving the release of chlorine gas in which nine people died, 250 were injured, and 5,400 (virtually the total population of the nearby town) were evacuated highlights the continued risks associated with the transportation of hazardous materials.¹⁷

¹⁶ NTSB/RAB-04/08 p. 1-2 and 6 (NIRS/PC Exhibit 62).
Fears, D. and S.K. Goo 01/10/05 (NIRS/PC Exhibit 63).

1 CHAIR BOLLWERK: At this point then, the
2 exhibits I guess we need to deal with?

3 MR. LOVEJOY: I would like to identify
4 exhibits accompanying Dr. Makhijani's testimony.
5 These have been given to the parties and to the clerk.

6 Exhibit 50 is a DOE record of decision
7 with respect to the Paducah facility. Exhibit 51 is
8 a DOE record of decision with respect to the
9 Portsmouth facility.

10 Fifty-two is the final EIS for the Paducah
11 facility, and 53 is the final EIS for the Portsmouth
12 facility. Fifty-four is the final programmatic EIS of
13 DOE -- no, I'm sorry. I've been reading too fast.

14 These are our exhibits. Each of them,
15 however, would be duplicated by an LES exhibit, or
16 many of them. And so we've not made extra copies.
17 And I perhaps should give the parallel site to the LES
18 exhibit.

19 JUDGE ABRAMSON: Please do.

20 MR. LOVEJOY: Exhibit 50 is LES Exhibit
21 75. Exhibit 51 is LES Exhibit 74. Exhibit 52 is LES
22 Exhibit 17. Exhibit 53 is LES Exhibit 16. And Exhibit
23 54 is Les Exhibit 18.

24 WITNESS MAKHIJANI: Is that the final EIS?

25 MR. LOVEJOY: Fifty-four is the

1 programmatic EIS.

2 CHAIR BOLLWERK: Just so I'm clear, the
3 copies that you're going to be giving to them are the
4 LES exhibits then, with those numbers on them?
5 Because those are not LES -- am I missing something?

6 MR. REPKA: Actually 16, 17, 18, 74 and 75
7 are all LES exhibits.

8 CHAIR BOLLWERK: Okay.

9 MR. LOVEJOY: They came in this morning,
10 I think.

11 CHAIR BOLLWERK: They came in -- those are
12 not the same as the numbers he just -- am I missing
13 something here or not?

14 JUDGE ABRAMSON: Let's run down the
15 numbers again. Give us your exhibit number and the
16 LES exhibit numbers please, starting with 50. Is that
17 correct?

18 MR. LOVEJOY: Yes. Our Exhibit 50 is LES
19 Exhibit 75.

20 JUDGE ABRAMSON: Okay.

21 MR. LOVEJOY: Our Exhibit 51 is LES
22 Exhibit 74.

23 JUDGE ABRAMSON: All right.

24 MR. LOVEJOY: Our Exhibit 52 is LES
25 Exhibit 17. Our Exhibit 53 is LES Exhibit 16. Our

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1 Exhibit 54 is LES Exhibit 18.

2 MR. CURTISS: That is correct.

3 JUDGE ABRAMSON: Thank you.

4 MR. LOVEJOY: Fifty-five is -- it's an
5 extract from the Livermore Engineering Analysis
6 report, May 1997.

7 (Whereupon, the above-
8 referenced to document was
9 marked as NIRS/PC Exhibit No.
10 55 for identification.)

11 MR. LOVEJOY: Fifty-six is the Livermore
12 Cost Analysis report of May 1997.

13 (Whereupon, the above-
14 referenced to document was
15 marked as NIRS/PC Exhibit No.
16 56 for identification.)

17 MR. LOVEJOY: So, 57 is the Voilleque et
18 al Fernald Dosimetry reconstruction project report.

19 (Whereupon, the above-
20 referenced to document was
21 marked as NIRS/PC Exhibit No.
22 57 for identification.)

23 MR. LOVEJOY: Fifty-eight is the Claiborne
24 final EIS.

25

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1 (Whereupon, the above-
2 referenced to document was
3 marked as NIRS/PC Exhibit No.
4 58 for identification.)

5 MR. LOVEJOY: Fifty-nine is a statement by
6 NEF on uranium hydrofluoride deconversion and
7 disposal.

8 (Whereupon, the above-
9 referenced to document was
10 marked as NIRS/PC Exhibit No.
11 59 for identification.)

12 MR. LOVEJOY: Sixty was deleted. Sixty-one
13 was the article by Hartmann et al on the French
14 approach for the management of depleted uranium.

15 (Whereupon, the above-
16 referenced to document was
17 marked as NIRS/PC Exhibit No.
18 61 for identification.)

19 MR. LOVEJOY: Sixty-two is a National
20 Transportation Safety Board railroad accident brief,
21 December 16 of '04.

22 (Whereupon, the above-
23 referenced to document was
24 marked as NIRS/PC Exhibit No.
25 62 for identification.)

1 MR. LOVEJOY: And 63 is the news article
2 by Fears and Goo entitled thousands can't return home
3 after toxic train:

4 (Whereupon, the above-
5 referenced to document was
6 marked as NIRS/PC Exhibit No.
7 63 for identification.)

8 MR. LOVEJOY: And that's it for this
9 witness, I believe.

10 CHAIR BOLLWERK: Let me just confer here
11 with Judge Abramson one second since somebody's
12 writing down numbers.

13 (Pause.)

14 CHAIR BOLLWERK: In terms of 16, 17, 18,
15 these are LES numbers, 75 and 76? Seventy-four and
16 75. Those have already been admitted in evidence, so
17 we don't need to deal with those.

18 So we're then dealing with, for
19 identification, NIRS/PC 55, 56, 57, 58, 59, 61, 62,
20 and 63, those are the appropriate numbers, are marked
21 for identification as described by Counsel. And you
22 would like the admission of those?

23 MR. LOVEJOY: Move them into evidence.

24 CHAIR BOLLWERK: All right, any
25 objections?

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1 (No response.)

2 CHAIR BOLLWERK: All right. Hearing no
3 objections, NIRS/PC Exhibits 55, 56, 57, 58, 59, 61,
4 62, and 63 are admitted into evidence.

5 (The document referred to,
6 having been previously marked
7 for identification as NIRS/PC
8 Exhibit Nos. 55 to 59, 61 to 63
9 were admitted into evidence.)

10 CHAIR BOLLWERK: And again, the other ones
11 you've referenced have already been put in and they
12 are in evidence already.

13 All right, anything further from your
14 perspective with respect to Mr. Makhijani at this
15 point?

16 MR. LOVEJOY: We tender the witness.

17 CHAIR BOLLWERK: All right. Let me then
18 turn to LES and to the Staff, it is now one o'clock,
19 or a little before one o'clock. Would you like to
20 take a luncheon break, or would you like to proceed?

21 MR. CURTISS: I think this is an
22 appropriate time to take a break.

23 CHAIR BOLLWERK: Yes?

24 MR. REPKA: I just have one. On the
25 exhibits we just discussed, I should just point out

1 that Dr. Makhijani's testimony still references some
2 of the nearest PC numbers where there's a
3 corresponding LES number.

4 CHAIR BOLLWERK: Okay.

5 MR. REPKA: So lest there be any confusion
6 you'll have to cross check.

7 CHAIR BOLLWERK: All right.

8 MR. LOVEJOY: Yes, we distributed exhibit
9 lists which provided the key --

10 CHAIR BOLLWERK: All right.

11 MR. LOVEJOY: -- between the two exhibits.

12 CHAIR BOLLWERK: How many references are
13 there? Can you tell just out of --

14 MR. LOVEJOY: fifty to 63 minus one, 12.

15 CHAIR BOLLWERK: No, within the testimony
16 itself, how many references are there?

17 MR. REPKA: Just looking at the rebuttal,
18 there's probably a handful of references.

19 CHAIR BOLLWERK: It's something just to be
20 aware of, the cross checking. It should be fine.

21 MR. LOVEJOY: If it would assist the
22 Board, we could prepare a version overnight that
23 changes the nearest PC numbers to LES numbers.

24 CHAIR BOLLWERK: Actually, I'm thinking it
25 may be simpler than that, if you don't mind, if you

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1 could just take the testimony that we just admitted
2 and just mark it on there.

3 Could you do that? There's not too many
4 that you could do that, say, over the lunch period.
5 That would be great if that's possible. That would
6 take care of the problem, whether it -- again, the
7 important part is I want to make sure it's in the
8 transcript as it goes out.

9 So if it's done by hand that should be all
10 right. So you'll provide those back to the Court
11 Reporter after lunch then.

12 MR. LOVEJOY: I will.

13 CHAIR BOLLWERK: All right. I should also
14 mention there is a matter as well of some testimony
15 yesterday that had some references that were incorrect
16 that you offered me this morning, the --

17 MR. LOVEJOY: Page references.

18 CHAIR BOLLWERK: Right, from Dr. -- from
19 Mr. Rice's testimony.

20 MR. LOVEJOY: Yes. We have the correction
21 sheet, so to speak.

22 CHAIR BOLLWERK: What I think I'm going to
23 suggest is that we deal with those. He's going to be
24 back tomorrow, it appears.

25 MR. LOVEJOY: Yes.

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1 CHAIR BOLLWERK: And maybe we'll deal with
2 those at that point.

3 MR. LOVEJOY: All right.

4 CHAIR BOLLWERK: All right. If there's
5 nothing else at this point from the parties then,
6 we'll go ahead and take out lunchtime break. Why
7 don't we come back at -- all right, why don't we come
8 back at 2:30.

9 (Whereupon, at 12:50 p.m., the above-
10 entitled matter was recessed for lunch.)

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

2:30 p.m.

CHAIR BOLLWERK: If we could go on the record please. We're back from our lunch break. And Mr. Makhijani is now available for cross examination, and I guess we'll start with LES.

EXAMINATION BY MR. CURTISS OF

DR. ARJUN MAKHIJANI

MR. CURTISS: Thank you, Mr. Chairman.
Hello Dr. Makhijani.

WITNESS MAKHIJANI: Hello Mr. Curtiss.

MR. CURTISS: How are you?

WITNESS MAKHIJANI: Fine, thank you.

MR. CURTISS: I have several questions that I'd like to ask you about. And I know there are a lot of documents before you, and most of my questions are going to relate to your direct testimony and your revised rebuttal testimony, if you have those before you.

And then I'll be asking you questions largely about the Programmatic Environmental Impact Statement, which should be somewhere before you as LES Exhibit 18, I believe.

And perhaps we should take a moment here just to -- it should be in one of those two red wells.

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1 WITNESS MAKHIJANI: I have them here.

2 MR. CURTISS: And I'll also be asking some
3 questions as well about the site specific EISS, which
4 when we get to that point, they're largely the same.
5 So I'll focus on probably one or the other, Portsmouth
6 or Paducah.

7 And the one that I have in mind is Exhibit
8 16. So when we get to that point we can pull that out
9 as well. The first issue that I'd like to raise with
10 you, Dr. Makhijani, relates to the statement in your
11 direct testimony that, on page 5, if you could pull
12 that up, it's the answer to question number four where
13 you state that, quote, the initial application, this
14 being the application submitted by LES, does not
15 discuss the impact of deconversion at all. Do you see
16 where I am in your testimony?

17 WITNESS MAKHIJANI: Yes, Mr. Curtiss, I
18 do.

19 MR. CURTISS: About halfway down the --

20 WITNESS MAKHIJANI: I do.

21 MR. CURTISS: -- middle of page five. I
22 want to just clarify, if I could. You go on to say,
23 at the bottom part of that page, that in rev. 2 of the
24 application, which was submitted as I believe at the
25 end of July, there is a reference to several documents

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1 that evaluate the environmental impact of a
2 deconversion facility.

3 Do I understand from the statement that
4 you've made here that your acknowledging that, at
5 least in rev. 2, for the first time in rev. 2 that the
6 application contains a discussion of the environmental
7 impacts of a deconversion facility, understanding that
8 you may have questions or concerns about the nature of
9 the discussion, but is it the case that you would
10 acknowledge that the application actually does now,
11 with rev. 2, contain a discussion of the environmental
12 impacts of a deconversion facility?

13 WITNESS MAKHIJANI: Well, I would say that
14 it refers to other environmental impact statements
15 that have a discussion. I don't know that I would
16 call reference to other environmental documents as a
17 discussion, because in my opinion, discussion in a
18 technical sense requires that you actually evaluate
19 yourself the content of those other documents.

20 And I would say there is some reference to
21 it. And so there are words -- there are certainly
22 words in revision 2 and other documents about it. But
23 in terms of an analytical independent look, I would
24 not call it a discussion in that sense.

25 MR. CURTISS: At least by contrast to your

1 comment about the initial application where there was
2 no discussion, that is to say you took the position
3 that it was silent on this issue all together --

4 WITNESS MAKHIJANI: Yes.

5 MR. CURTISS: -- at least there is some
6 reference to EISs in rev. 2 that discuss in those EISS
7 the environmental impacts.

8 WITNESS MAKHIJANI: Yes. Let me just, you
9 know, -- if we can just focus on the scientific
10 content of what I am trying to say, it is -- you are
11 right.

12 In the first one there was no -- it was
13 silent. Revision 0 silent, and then in revision 2 and
14 in other documents, there is mention. And the mention
15 is by reference to analysis in other documents.

16 But the discussion analysis and evaluation
17 is in those other documents. In my opinion, a simple
18 reference and incorporation of numbers in somebody
19 else's work doesn't constitute a technical evaluation
20 or discussion.

21 MR. CURTISS: Okay. Well I think I
22 understand your point in that there has been some
23 evolution in the addressing --

24 WITNESS MAKHIJANI: yes.

25 MR. CURTISS: -- of the environmental

1 impacts from rev. 0, which was silent, to rev. 2.

2 WITNESS MAKHIJANI: Yes.

3 MR. CURTISS: Okay. And that's really all
4 I wanted to discuss on that point.

5 WITNESS MAKHIJANI: Sure.

6 MR. CURTISS: I'd like to spend a few
7 minutes talking about the issue that, I think, if I
8 understand your testimony correctly, really represents
9 the largest part of the concern that you've expressed,
10 both in the direct testimony and in the rebuttal.

11 And that has to do with a concern that if
12 LES should use a deconversion process that employs
13 anhydrous HF technology, your testimony raises several
14 concerns about that.

15 And I'd like to go through those issues
16 here if I could by reference to your testimony and the
17 underlying analysis. In your direct testimony on page
18 11, which is the question and answer 9, if you could
19 flip over to that, you make the statement that, quote,
20 if any consideration is to be given by LES to the
21 possible production and sale of anhydrous HF acid for
22 reuse, then an examination of the operations issues,
23 environmental impacts, and transportation risks should
24 also be carried out. Do you see where I am?

25 WITNESS MAKHIJANI: Yes.

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1 MR. CURTISS: Is it your contention, Dr.
2 Makhijani, that an analysis of those environmental
3 impacts associated with the anhydrous HF option needs
4 to be undertaken and it has not been undertaken, or
5 alternatively that something's been done but the
6 analysis is deficient?

7 WITNESS MAKHIJANI: Well, as the next
8 sentence which you didn't read says, this analysis
9 would require the identification of the location of
10 the deconversion plant.

11 So for instance, in my testimony, rebuttal
12 testimony, I refer to the accident in the tunnel in
13 Baltimore. And so if you don't have a location of the
14 deconversion plant and you're trying to estimate the
15 consequences of the shipments of anhydrous
16 hydrofluoric acid, you will not know how many tunnels,
17 of what character, in what cities, what are the urban
18 population densities, and whether you might have the
19 lucky accident of having a water pipe just above where
20 your fire took place to help you extinguish your fire.

21 So yes, you can say some general things
22 based on a pilot plant somewhere in France that did
23 not work, but for it to be called an environmental
24 analysis, I would say no, that you can't do that
25 without a specific site for the plant, and a specific

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1 transportation routes, and a specific technology
2 that's proven.

3 MR. CURTISS: Do I take it from your
4 statement that you reject the notion that any
5 discussion in a programmatic EIS, such as the one we
6 have here in Exhibit 18, that any discussion of, in
7 this case, the impacts of AHF cannot be relied on
8 because you don't have a specific site?

9 WITNESS MAKHIJANI: It cannot -- it
10 certainly cannot be relied on in an environmental
11 impact statement for a particular plant, yes. A
12 programmatic statement has a certain function which
13 lays out the kinds of things that you might expect in
14 a particular program.

15 But as was the case with the Programmatic
16 Impact Statement, Environmental Impact Statement which
17 was followed by two sites, specific -- project
18 specific, I should say, EISS for Paducah and
19 Portsmouth, Paducah and Portsmouth could not really be
20 built based on the evaluation in the PEIS.

21 MR. CURTISS: Yes.

22 WITNESS MAKHIJANI: And as it turns out,
23 the evaluation in the PEIS was based on the
24 distillation technology for anhydrous hydrofluoric
25 acid, which then turned out to be not a viable one

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1 according to the company that was developing it.

2 MR. CURTISS: And I'd like to come back to
3 that, because I do have some questions on
4 transportation. I know that's been one of your
5 concerns.

6 But focusing on the Programmatic EIS, is
7 it in fact, from your perspective, an acceptable way
8 to evaluate programmatic issues, understanding as DOE
9 did, and as I think LES has indicated in its testimony
10 it will do, when a specific site is identified, of
11 course, you would have to go through a site specific
12 environmental evaluation of those site specific
13 impacts.

14 But that fact doesn't constrain the
15 ability to look at the programmatic impacts, I take
16 it.

17 WITNESS MAKHIJANI: Well, in this specific
18 instance, it isn't just the question of going from a
19 programmatic environmental impact statement to a
20 project specific one, because we're talking about a
21 technology that hasn't even been developed.

22 And the technology that was covered in the
23 PEIS actually has been rejected. And so you're really
24 left with no basis to make any statements based on the
25 PEIS because the technology of the PEIS discussed.

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1 The distillation technology is no longer
2 on the table.

3 MR. CURTISS: They've decided to go to a
4 specific technology when they got to the selection
5 other two sites of those evaluated in the PEIS. Would
6 that be a fair statement?

7 WITNESS MAKHIJANI: No, I guess maybe I'm
8 not -- if I'm not answering the rest of your question
9 you can stop me and then give me a question that I
10 understand better.

11 But you're asking me whether it's
12 legitimate to discuss and evaluate technology on a
13 programmatic basis. And my answer to that general
14 question is yes.

15 MR. CURTISS: Okay.

16 WITNESS MAKHIJANI: In the specific
17 instance of anhydrous hydrofluoric acid, what happened
18 in the Programmatic Environmental Impact Statement is
19 really completely moot, not because of what happened
20 today because my testimony was written prior to that,
21 because the specific technology that was being
22 discussed and evaluated in the PEIS and in the
23 Livermore study was shown to be nonviable.

24 It had not only economic problems, it had
25 serious technical problems because when the residual

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1 aqueous hydrofluoric was re-injected into the kiln, it
2 created operating problems with the kiln.

3 And so Cogema decided to reject that
4 technology and looked but did not develop -- looked at
5 five other options but did not really fully develop
6 any of them.

7 So those options will have different
8 environmental impacts. And as things stand today, the
9 PEIS discussion of anhydrous hydrofluoric acid is
10 really moot.

11 It's not an environmental assessment of
12 anything that can be considered to relate to a
13 specific project. You can't go from that PEIS to a
14 specific project because the technology that was
15 discussed in the PEIS is obsolete. It's nonviable.

16 MR. CURTISS: Well, setting aside the
17 question of why DOE decided to go with a particular
18 technology when they commissioned the Portsmouth and
19 the Paducah sites, at the time that the PEIS was done
20 isn't it a fact that it looked at the anhydrous HF
21 technology, as well as the aqueous HF technology, at
22 the level of development at the time, understanding
23 that neither one, at least in the United States, had
24 been commercialized at that time.

25 Wouldn't it be a fair statement that this

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1 PEIS has a thorough discussion of the anhydrous HF
2 technology?

3 WITNESS MAKHIJANI: I would not call it
4 thorough because when a technology is under
5 development you can't really have a thorough
6 evaluation of it.

7 MR. CURTISS: But let's --

8 WITNESS MAKHIJANI: You have -- when you
9 haven't discussed -- let's be specific. When you
10 haven't discussed -- discovered what all the process
11 problems are going to be, what kinds of accidents you
12 may have, what kinds of maintenance problems you may
13 have, what kind of final arrangements of the pipes and
14 pumps in a particular factory you're going to have,
15 you can't really evaluate it's environmental impacts
16 in a thorough way.

17 And I think you can do a preliminary
18 scoping kind of thing, saying this is what we know,
19 and it's preliminary. And I think actually perhaps at
20 least that's what Livermore did.

21 And I think that's what the PEIS did. I
22 don't think that it should be characterized -- I know
23 it has been characterized as thorough. But I don't
24 believe it should be characterized as thorough.

25 MR. CURTISS: What I'd like to do, because

1 you've made the observation that the nature of the
2 analysis in the PEIS is of a preliminary nature or of
3 a scoping nature and not thorough in it's approach,
4 what I'd like to do if you could pull out Exhibit 18,
5 is to go through the PEIS, first focusing on those
6 sections of the PEIS that in fact say that there is a
7 discussion of anhydrous HF, and then ask you about
8 certain areas you've raised to inquire about the
9 robustness of that review.

10 If you could -- there are actually two
11 volumes there, so I'm going to move back and forth
12 between the two volumes, but let's begin with volume
13 one.

14 And if we could go to page 2-9 -- this is
15 LES Exhibit 18.

16 JUDGE ABRAMSON: Two-9 Counsel?

17 MR. CURTISS: Yes, sir, page 2-9 in LES
18 Exhibit 18, which, itself, consists of two volumes.
19 The appendices are volume 2, and the text that I'm
20 referring to now is in the first volume.

21 I should say that this is, as Mr. Repka
22 indicated this morning, this chapter was inadvertently
23 deleted from the exhibit. And you should have copies
24 of it.

25 They were provided by Mr. Repka earlier

1 this morning. So if you have reference there to --
2 you have a summary and a volume 2 I apologize for
3 that.

4 But it's in one of those two documents
5 that were provided when Mr. Repka introduced the
6 exhibits. Page 2-9 of Exhibit 18. Do you have that
7 reference, Dr. Makhijani?

8 WITNESS MAKHIJANI: Yes, Mr. Curtiss.

9 MR. CURTISS: If you could look at the
10 paragraph on that page that begins -- the second full
11 paragraph that begins in addition, and just read that
12 paragraph to yourself, if you would.

13 WITNESS MAKHIJANI: Yes.

14 MR. CURTISS: And read if you would aloud
15 what the last sentence of that paragraph says, the
16 environmental impacts.

17 WITNESS MAKHIJANI: The environmental
18 impacts of both options, production of anhydrous HF
19 for commercial, and neutralization of HF to CaF2 were
20 considered in this PEIS.

21 MR. CURTISS: Okay. If I could ask you to
22 -- and I'm not going to go through every reference
23 here. I'd like to just ask you about a couple of
24 references.

25 If you could go to, in that same volume,

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1 page 5-35, which is about an inch of paper into the
2 document, and if you could look at the third bullet on
3 that page, conversion, paren, representative site,
4 there is a sentence about halfway through that
5 paragraph just after the footnote one reference that
6 begins as described, could you read that aloud as
7 well?

8 WITNESS MAKHIJANI: Would I be permitted,
9 given that there's an unmentionable uranium form in
10 that sentence?

11 MR. CURTISS: Well, we'll allow you to
12 reference that just for purposes of completeness, but
13 not to open the door to discussion of UO2 if the Board
14 agrees. You don't mind my pulling your leg.

15 JUDGE KELBER: Excuse me, but what page
16 are we on?

17 MR. CURTISS: I'm sorry, Judge Kelber,
18 5-35 --

19 JUDGE KELBER: Thank you.

20 MR. CURTISS: -- of volume 1.

21 WITNESS MAKHIJANI: As described in
22 appendix F, two representative conversion technologies
23 were assessed for conversion to U308, and three for
24 conversion to UO2.

25 MR. CURTISS: And then if I could ask, I

1 have one more reference that I would like to refer you
2 to. And this is actually in volume 2 now in the
3 appendices.

4 And I think you understand how they're
5 organized, but it's at --

6 WITNESS MAKHIJANI: Yes.

7 MR. CURTISS: -- page F-12.

8 WITNESS MAKHIJANI: Yes.

9 MR. CURTISS: And at page F-12, there's a
10 reference at the top of that page. Would you read
11 that entire paragraph aloud please?

12 WITNESS MAKHIJANI: Two technologies were
13 considered for management of the HF following
14 conversion of UF6 to U3O8. The first process would
15 upgrade the concentrated HF to anhydrous HF for sale.

16 Anhydrous HF is a valuable product. One
17 potential use for HF is in the production of UF6 from
18 natural uranium ore for feed stock to the gaseous
19 diffusion process.

20 The second process would neutralize the HF
21 to CaF2 for disposal or sale, depending on whether the
22 CaF2 with trace amounts of uranium could be marketed.

23 MR. CURTISS: Thank you. And
24 understanding that you have raised questions about the
25 particulars of the analysis, which we'll get into

1 shortly, having to do with transportation impacts and
2 the like, would it be a fair characterization of the
3 statements that you just reviewed on page 2.9 of
4 Exhibit 18, 5-35, and this reference in appendix F,
5 would it be a fair characterization that DOE's PEIS
6 considered both technologies, the anhydrous HF
7 technology, and the aqueous HF technology, the former
8 being the subject of your principle concerns, would it
9 be a fair characterization of this PEIS that it looked
10 at both of those options?

11 WITNESS MAKHIJANI: Yes.

12 MR. CURTISS: Okay. I want to pick up on
13 anything there that you've raised in your testimony.
14 And it appears in several places throughout your
15 rebuttal testimony. And the page references --

16 WITNESS MAKHIJANI: Should I keep this
17 open?

18 MR. CURTISS: We'll come back to that so
19 you can set it aside, but I will have some other
20 questions about it if you have your rebuttal testimony
21 there. And this is the revised version that is eight
22 pages of text.

23 WITNESS MAKHIJANI: I'm sorry, Mr.
24 Curtiss, could you repeat what you were saying?

25 MR. CURTISS: Yes, your rebuttal

1 testimony, dated in the upper right hand corner
2 February 7th of 2005 --

3 WITNESS MAKHIJANI: Yes.

4 MR. CURTISS: Now I don't have specific
5 page references, but the point I want to make about
6 this, and want to have it before you for reference is,
7 that at several places in your rebuttal testimony, and
8 in addition based upon what you've said here today,
9 you emphasize the lack of experience with the AHF
10 technology, and the fact that it has not been
11 commercialized.

12 In question and answer 7, for example, if
13 you could flip over to that question and answer,
14 particularly on page 6 of that question and answer,
15 you describe several problems that you have with, or
16 concerns that you have with the anhydrous HF
17 technology. Do you see where I am in your testimony?

18 WITNESS MAKHIJANI: Yes.

19 MR. CURTISS: Understanding that the --

20 JUDGE ABRAMSON: Excuse me, Counsel..

21 MR. CURTISS: I'm sorry.

22 JUDGE ABRAMSON: Were not question and
23 answer 7 stricken from the rebuttal?

24 MR. CURTISS: I don't believe so. But I
25 have to --

1 WITNESS MAKHIJANI: Well, actually they're
2 not in my -- I'm on page six, but not on question 7.
3 You're right, Your Honor.

4 MR. CURTISS: Well, maybe it's been
5 renumbered. It's actually question and answer 5, with
6 -- this has not been renumbered. You're correct.

7 It's question and answer 5. It goes from
8 5 to 8 in this revised rebuttal testimony.

9 JUDGE ABRAMSON: Right, thank you.

10 MR. CURTISS: So thank you for the
11 correction. Question and answer 5, which begins on
12 page 4 and runs on for a couple of pages, sets forth
13 your concerns with the anhydrous HF technology, is
14 there something -- understanding that you have raised
15 questions about the handling and transportation of
16 anhydrous HF, is there something unique about that
17 aspect of this, setting aside the commercialization of
18 the facility that would result in anhydrous HF, is
19 there something unique about the handling, the
20 production, and the transportation of anhydrous HF
21 that concerns you?

22 WITNESS MAKHIJANI: Well, anhydrous HF is
23 more volatile. It's more concentrated. So for a
24 given quantity of it to be released to the
25 environment, your health and environment impacts are

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1 going to be bigger.

2 So naturally you have more concerns about
3 that.

4 MR. CURTISS: Now setting aside the
5 deconversion technology and its possible use of
6 anhydrous HF, do you have any knowledge as to how much
7 anhydrous HF for other applications is produced,
8 handled, and transported each year?

9 WITNESS MAKHIJANI: I believe it's about
10 270,000 tons per year in the Unites States.

11 MR. CURTISS: I have it in a different
12 form, but it was -- would it surprise you that 730
13 million pounds of anhydrous HF are produced and
14 transported, handled every year?

15 WITNESS MAKHIJANI: I said 270,000 tons.

16 MR. CURTISS: Does that come out to about
17 700 --

18 WITNESS MAKHIJANI: Metric tons, so yes,
19 several hundred million pounds.

20 MR. CURTISS: So the handling and the
21 manufacture and the transportation of anhydrous HF is
22 something that is done extensively today, set aside
23 its use and application in the deconversion facility.
24 It's done extensively as we speak today.

25 WITNESS MAKHIJANI: Yes.

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1 MR. CURTISS: Okay. I want to move now to
2 one of your additional areas of particular concern,
3 the issue of transportation impacts. And I'd like to
4 go back to your direct testimony and refer you to page
5 12 of that testimony.

6 WITNESS MAKHIJANI: Yes.

7 MR. CURTISS: Toward the end of what I
8 believe is answer 9, answer 9 begins on page 11, you
9 refer, quote, to the fact that the cumulative
10 transportation distances, do you see that discussion
11 towards the bottom of page 12?

12 WITNESS MAKHIJANI: Yes.

13 MR. CURTISS: The fact that the cumulative
14 transportation distances considered for the DOE
15 facilities are different from those that may be
16 required for shipping the material generated by the
17 proposed LES facility.

18 WITNESS MAKHIJANI: Yes.

19 MR. CURTISS: What's the basis for that
20 statement?

21 WITNESS MAKHIJANI: Yes, actually this
22 statement occurs -- and it's a phrase in a more
23 complicated sentence which I would like to read so I
24 can -- my answer will be understood.

25 MR. CURTISS: Okay.

1 WITNESS MAKHIJANI: However, given that no
2 existing facility for UF6 deconversion currently
3 produces AHF, the fact that the cumulative traps
4 distances considered for DOE facilities are different
5 from those that may be required for shipping the
6 material generated by the proposed LES facility, as
7 well as the fact that the health and environmental
8 impacts on routine operation from the greater
9 volatility and general hazards posed by anhydrous HF
10 versus aqueous HF were not analyzed by the DOE/EIS for
11 the Paducah or Portsmouth facilities cited by the NRC
12 in the LES/DEIS analysis, it is not possible at this
13 time for, I guess it should say -- the for should be
14 deleted, it's not possible at this time to quantify
15 the potential impacts of such a decision.

16 So I think, as I review this, you know,
17 you run around a lot when you prepare these pieces of
18 paper, that as we were discussing earlier my testimony
19 in this regard should be seen in the context of my
20 observation that the environmental impacts of a
21 specific project are properly evaluated for a specific
22 location.

23 And I agree, you know, that transportation
24 distances actually shouldn't have been here because
25 the DOE considers different transportation distances

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1 that the kilometerage, the mileage aspects of it.

2 However this does not end the
3 transportation question in terms of location and the
4 specific routes. So what it should have actually said
5 is the specific routes.

6 MR. CURTISS: Okay.

7 WITNESS MAKHIJANI: The distances is not
8 so much an issue. I would agree.

9 MR. CURTISS: Okay. The reason I ask is
10 that you have -- I've read this carefully several
11 times.

12

13 WITNESS MAKHIJANI: Yes, I know.

14 MR. CURTISS: And you've conflated several
15 topics --

16 WITNESS PALMROSE: Yes.

17 MR. CURTISS: -- in this paragraph. And
18 I wanted to make sure that we addressed each of the
19 issues that you're seeking to raise. And I take it
20 from what you've just said that one of the issues that
21 you've raised in this paragraph, that the cumulative
22 transportation distances that were evaluated by DOE,
23 which I think you may understand is 5,000 kilometers
24 or 3,100 miles, certainly bounds the transportation
25 distances that might be associated with a deconversion

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1 facility wherever it's located, if it's in the Unites
2 States.

3 WITNESS MAKHIJANI: Yes. I wouldn't
4 characterize my sentence as conflating issues. It's
5 actually a list of issues with comma that go to a
6 proper conclusion, even though it may be an
7 unacceptably long statement, sentence for an editor.

8 The clauses do belong together because
9 they conclude by saying it is not possible at this
10 time to quantify the potential impacts of such a
11 decision. And I think all of the phrases are needed
12 for that concluding phrase.

13 But I agree with you that it really should
14 not have said distances. It should have said routes.

15 MR. CURTISS: So the only remaining
16 transportation --

17 WITNESS MAKHIJANI: The distance is not a
18 question.

19 MR. CURTISS: Please, go ahead.

20 WITNESS MAKHIJANI: I agree, the DOE does
21 have 5,000 kilometers in it, and it shouldn't have
22 said that.

23 MR. CURTISS: Okay. So the only remaining
24 transportation consideration that I understand you've
25 identified in responding to my question, really has to

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1 do with the transportation routes that would be
2 associated with a specific facility, a specific
3 location, I should say?

4 WITNESS MAKHIJANI: No, that's just one of
5 the questions. In my rebuttal testimony, I actually
6 mention two accidents that were very severe. And of
7 most interest here is the Baltimore accident, which
8 was the subject of some discussion before lunch.

9 And actually it goes to the risk analysis
10 in regard to these accidents because if you look at
11 Exhibit 62 --

12 MR. CURTISS: Well, we're going to come to
13 that if I could --

14 WITNESS MAKHIJANI: If I might just answer
15 your question, Mr. Curtiss.

16 MR. CURTISS: Yes, please.

17 WITNESS MAKHIJANI: Since you said that
18 new routes covered substance of my concerns in regard
19 to transportation, they do not because the severity of
20 accidents, as well as the probability calculations for
21 how frequently these accidents might occur and what
22 their consequences might be, all of these are
23 significant concerns.

24 And I don't think they have been discussed
25 in a manner that could be called bounded.

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1 MR. CURTISS: I'll -- thank you. I'll
2 come back to that.

3 WITNESS MAKHIJANI: Sure.

4 MR. CURTISS: Because I do have some
5 questions. And I'm going through your testimony
6 pretty much in order.

7 WITNESS MAKHIJANI: Sure.

8 MR. CURTISS: So I will come to the
9 transportation questions in a minute. On page 14 of
10 your direct testimony, if you could reference that, in
11 particular I'm looking at question 11 and your answer
12 thereto.

13 WITNESS MAKHIJANI: Yes.

14 MR. CURTISS: You state that, quote,
15 currently there are no DOE or general NRC guidelines
16 that govern the free release other contaminated
17 hydrofluoric acid or calcium fluoride.

18 And then continuing on page 15 of your
19 direct testimony, if you could refer to that about
20 halfway down the page in the middle of that page, you
21 continue, quote, it should be assumed that the
22 hydrofluoric acid resulting from the deconversion of
23 the DUF6 from the proposed facility will not be able
24 to be resold on the market.

25 WITNESS MAKHIJANI: It's the last

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1 sentence? Let me just find where you are.

2 MR. CURTISS: It's about in the middle of
3 page 15, Dr. Makhijani, at the end of that first full
4 paragraph.

5 WITNESS MAKHIJANI: Oh, yes. Okay.

6 MR. CURTISS: Do you see where it refers
7 to that?

8 WITNESS MAKHIJANI: Yes. Yes, I do.

9 MR. CURTISS: Do I understand you to say
10 in this answer to question 11 that there is no process
11 either at the NRC or DOE to establish authorized
12 limits for the release of radioactively contaminated
13 materials?

14 WITNESS MAKHIJANI: I don't think that's
15 what my testimony says. My testimony is an
16 existential one, that currently there is no -- there
17 are no DOE or NRC guidelines in existence.

18 I didn't say anything about a process to
19 create such guidelines, I believe.

20 MR. CURTISS: And could you explain for us
21 what you mean by guidelines?

22 WITNESS MAKHIJANI: Well, the NRC would
23 have to presumably look at the problem of contaminated
24 hydrofluoric acid and calcium fluoride in the rather
25 large quantities in which they are proposed to be

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1 generated in a deconversion facility, either the one
2 that is the subject of this license proceeding, or the
3 ones -- presumably and the ones at Portsmouth and
4 Paducah, because we're talking about very large
5 quantities of materials, and publish a notice as to
6 how it was going to examine what the scope of the
7 subject was going to be, what the criteria of the
8 examination were going to be, presumably publish an
9 environmental impact statement of a programmatic
10 nature for the public to look at and comment on before
11 it promulgated guidelines that would allow free
12 release of this material on a rather large scale.

13 MR. CURTISS: And is it then your position
14 that no release of any radioactively contaminated
15 material can be undertaken, whether it's this or any
16 other material, unless those guidelines, as you've
17 described them here, are first established?

18 WITNESS MAKHIJANI: No, that's not what I
19 said. In fact, I tried to head off the second
20 question by being very specific in my answer to your
21 first in that what is proposed here is the generation
22 of very, very large quantities, tens of thousands of
23 tons, or hundreds of -- if you include the Paducah and
24 Portsmouth, which hundreds of thousands of tons of
25 contaminated material, this is beyond the scale of any

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1 free release that might have occurred of the nature
2 that was spoken about this morning, at least so far as
3 I know.

4 I haven't heard about hundreds of
5 thousands of calcium fluoride being shipped off to
6 South Carolina landfills, and perhaps that might be
7 because I don't know enough.

8 The -- so far as I know, such a thing has
9 not occurred, in all seriousness. And because of the
10 scale and character of this thing there would have to
11 be some kind of process.

12 It's certainly not my contention, nor have
13 I -- do I intend to discuss in my testimony the more
14 general topic of free release of contaminated
15 materials.

16 This is a contentious and difficult topic
17 of a broader nature that I don't really want -- I'm
18 not prepared to testify about here.

19 MR. CURTISS: So in your answer to
20 question 11 which does in fact raise the question of
21 guidelines for -- DOE or NRC guidelines for the free
22 release of contaminated material, do I understand you
23 just to have said that this is a topic that you're not
24 prepared to testify about?

25 WITNESS MAKHIJANI: No, I didn't say that.

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1 I would appreciate if you'd at least listen to what I
2 am saying. I'm sorry for the slight irritation and
3 frustration.

4 I think -- I though my testimony is very
5 specific. It says currently there are no DOE or
6 general NRC guidelines that govern the free release of
7 contaminated hydrofluoric acid or calcium fluoride.

8 JUDGE KELBER: Excuse me, let me
9 interject. I'm puzzled as what do you mean by
10 guidelines. Do you mean a regulation, or do you mean
11 occasionally the NRC Staff will issue guidance
12 documents which usually are how to prepare an
13 application.

14 Do you want to distinguish what you mean
15 by guidelines?

16 WITNESS MAKHIJANI: Your Honor, there's a
17 third type of document, perhaps you meant to include
18 that in the second one that you mentioned, is that
19 there are formal regulations.

20 And then the NRC Staff has in the past
21 also issues, for instance, a branch technical position
22 on decommissioning, which is a different type of
23 document.

24 And under that general -- and I would call
25 that a guidance document.

1 JUDGE KELBER: Okay.

2 WITNESS MAKHIJANI: And I believe it was.

3 JUDGE KELBER: Thank you, that's what I
4 wanted to know.

5 WITNESS MAKHIJANI: Yes.

6 JUDGE KELBER: You're asking for a
7 document that the Staff might prepare as an aid to its
8 licensees.

9 WITNESS MAKHIJANI: Your Honor, I haven't
10 gotten to the point of, I don't believe in my
11 testimony, asking for specific document. All I have
12 observed is either a regulation or -- implicitly,
13 either a regulation or a Staff position does not
14 exist.

15 JUDGE KELBER: You mentioned regulations.
16 Do you mean that the regulations on low level waste do
17 not encompass these materials?

18 WITNESS MAKHIJANI: No, if it were -- no.
19 We would have no issue with declaration of calcium
20 fluoride, so far as any specification that I've seen
21 or been able to estimate, were it to be declared as
22 low level waste.

23 So we have no issue with the NRC's
24 position in this case that aqueous hydrofluoric acid
25 should be converted to calcium fluoride which should

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1 be treated as low lever waste.

2 We don't think that any new guidelines,
3 positions, papers, or regulations are needed for that.

4 JUDGE KELBER: Thank you.

5 MR. CURTISS: Thank you. I want to follow
6 up on a couple of points to make sure I understand.
7 In your testimony you state that there are no DOE or
8 NRC guidelines that would apply to the release of
9 hydrofluoric acid or CaF.

10 And what I think I've understood you to
11 say is that while there may be examples of the free
12 release of CaF, for example, what you're really
13 talking about here is the large volumes that we're
14 talking about from a deconversion facility.

15 WITNESS MAKHIJANI: Well, that is the
16 context in which these guidelines need to be created
17 and issued if there if to be free release. If you're
18 going to -- and I recall the same rule in regard to
19 low level waste and the whole controversy around
20 depleted uranium itself, when the rule -- when 61.55
21 was originally issues, the question of whether
22 depleted uranium should be considered as a waste was
23 broached at the time.

24 And because there wasn't a whole lot of
25 depleted uranium to be considered as a waste or

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1 disposed of, the NRC kind of mooted, took the issue
2 off the table and said well it's not right.

3 And I would suggest that the same is the
4 case -- has been the case. I actually have not
5 studied the specific instances of calcium fluoride
6 disposal, nor the regulations in South Carolina under
7 which it might have been disposed of.

8 So I really can't comment on that. All
9 I'm saying is that the context here for such
10 guidelines is the very large volumes, yes.

11 MR. CURTISS: Okay. Let me ask you then
12 to refer to LES Exhibit 16, which is the Portsmouth
13 site specific EIS. And if you could, Dr. Makhijani,
14 refer to appendix E, which is almost at the end of the
15 document. And I'm looking in particular at page E-8.

16 WITNESS MAKHIJANI: Yes.

17 MR. CURTISS: And the title of the section
18 that I'd like to ask you about is Section E.4,
19 overview of the DOE process for establishing
20 authorized limits for release or radioactively
21 contaminated materials.

22 And understanding that this section is
23 included in an EIS for the Portsmouth deconversion
24 facility, and there's similar section virtually
25 identical the Paducah EIS, where this section

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1 discusses the process for establishing limits for
2 release or standards for release of radioactively
3 contaminated materials of the amounts and quantities
4 we are talking about here.

5 If you would look at the third paragraph
6 on page E-8?

7 WITNESS MAKHIJANI: Yes.

8 MR. CURTISS: Which begins in general
9 authorized limits so forth, and so on. Doesn't this
10 in fact indicate that these determinations on free-
11 release are going to be made on a case-by-case basis?

12 WITNESS MAKHIJANI: Yes.

13 MR. CURTISS: And, if I could further ask
14 you, then on page E-10 of this section entitled --
15 actually, section E.4.2, verification of compliance
16 with the DOE public dose limit.

17 In the last paragraph, a paragraph that
18 begins because the DOE public dose limits -- in the
19 last paragraph of that section it refers to a 25
20 millirem standard.

21 I'll allow you to read that if you would
22 like.

23 (Pause.)

24 WITNESS MAKHIJANI: Okay.

25 MR. CURTISS: So, would it be a fair

1 characterization of what's presented here in section
2 E.4 in this site-specific EIS that the process that
3 DOE has adopted and set forth here for making these
4 pre-release determinations is a case-by-case process
5 and the standard that they will apply or -- to use
6 your term -- the guideline is in fact set forth here
7 in the section as a 25 millirem standard?

8 WITNESS MAKHIJANI: Well, it's actually
9 one fourth of the 25 millirem, because 25 millirem is
10 from all sources. But this thing, since it is a case-
11 by-case approach, this thing has not yet been
12 evaluated for calcium fluoride.

13 And, as I said earlier, it's not my -- I'm
14 not getting into the question of free-release of any
15 and all materials from DOE or other nuclear licensees
16 of the NRC.

17 All I'm saying is that this process hasn't
18 been completed for calcium fluoride and hydrofluoric
19 acid. It's simply a statement of where we are at this
20 point.

21 MR. CURTISS: If I could then refer you
22 back to the beginning of section E.4 on page 4-8, the
23 introductory statement here reads, as previously
24 explained, two products of the DUF6 conversion
25 technology, HF and CaF would have potential commercial

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1 use.

2 Those are the two products that are
3 addressed in your testimony for which you express the
4 concern that there aren't standards either at the DOE
5 or NRC or a process.

6 And this section appears to set forth both
7 a process case-by-case and a standard 25 millirem, or
8 a quarter of 25 millirem, irrespective of where it is,
9 for making these determinations for commercial use of
10 HF and CaF.

11 WITNESS MAKHIJANI: Well, I think I
12 already testified that my testimony doesn't go to the
13 existence of a process. On the contrary, I said, I
14 think maybe this is the fourth time, that I'm simply
15 making an existential statement about two specific
16 materials.

17 I certainly recognize that -- and I think
18 I testified in regard to calcium fluoride. If it were
19 treated as low-level waste, there's already a
20 regulation there for disposal of it.

21 All I'm saying is, in relation to these
22 two specific materials, whatever processes there are
23 to be gone through, whether it's a branch technical
24 position, a regulation, a DOE case-by-case, that's not
25 completed as we sit here. That's all.

1 MR. CURTISS: Okay. Let me move on if I
2 could.

3 WITNESS MAKHIJANI: Okay.

4 MR. CURTISS: If you could, refer to page
5 14 of your testimony. This is your direct testimony.
6 Actually, I should reference you back to the
7 discussion that begins on page 13 in response to
8 question ten.

9 This is your answer that focuses on what
10 I'll refer to in a short-hand as scrubber efficiency.

11 WITNESS MAKHIJANI: Yes.

12 MR. CURTISS: And the ability to filter
13 out materials. On page 14 you reference a report.
14 It's set forth in footnote 14 -- Voilleque, if I'm
15 pronouncing that correctly, which I'll refer to as the
16 Fernald report.

17 WITNESS MAKHIJANI: Voilleque.

18 MR. CURTISS: Excuse me?

19 WITNESS MAKHIJANI: Voilleque.

20 MR. CURTISS: Thank you. I'll refer to it
21 as the Fernald report because that's easier to
22 understand.

23 WITNESS MAKHIJANI: Okay. I know Fernald,
24 so I should --

25 MR. CURTISS: Oh, thank you. And I take

1 it from the description here, and having gone back and
2 looked at the Fernald, that it focuses, among other
3 things, on the question of scrubber efficiency and the
4 variability that the report reports on relative to
5 that issue. Is that your purpose in referencing this
6 in support of your testimony?

7 WITNESS MAKHIJANI: Yes. I mean, it's a
8 complex -- Mr. Voilleque's report is a complex report.
9 It covers lots of topics. But that's one of them.

10 MR. CURTISS: And the report itself, if I
11 understand it, focus on the Fernald plan and the
12 scrubbers or the filters, or whatever the proper term
13 is. Let's call them scrubbers that were installed at
14 the Fernald plant.

15 And, among other things, as I say, it
16 reports on the efficiency of that system.

17 WITNESS MAKHIJANI: Well, it covers both
18 filters and scrubbers because there were both, there
19 were bag houses and wet scrubbers. And the part that
20 I'm referring to is about the wet scrubbers.

21 MR. CURTISS: Okay. Do you know when the
22 wet scrubbers that you're referring to were designed
23 and installed in the Fernald plant?

24 WITNESS MAKHIJANI: Well the Fernald
25 plant, a pilot plant was built in 1951 and --

1 MR. CURTISS: Nineteen --

2 WITNESS MAKHIJANI: Fifty-one.

3 MR. CURTISS: Fifty-one?

4 WITNESS MAKHIJANI: The pilot plant was.

5 It was built in stages. So, I wouldn't recall exactly
6 when the scrap recovery plant was built. I think the
7 scrubbers in plant 2-3, which is the de-nitration
8 plant, would have been built early on.

9 So, during the first half of the 50's. I
10 do not know, however. They had a lot of problems with
11 them as you can tell. And, the scrubbers were
12 probably repaired and replaced along the way.

13 And I have not studied the history of the
14 scrubbers as to when the scrubbers that are the object
15 of Mr. Voilleque's analysis there were designed and
16 installed.

17 The initial ones were in the 50's. But,
18 I do not know how frequently they were installed in
19 the place. They had some --

20 MR. CURTISS: Do you know --

21 WITNESS MAKHIJANI: --difficulties with
22 them.

23 MR. CURTISS: I'm sorry, go ahead.

24 WITNESS MAKHIJANI: No, sorry.

25 MR. CURTISS: Do you know whether they

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1 were replaced and updated?

2 WITNESS MAKHIJANI: No. All I know, I did
3 some expert work at Fernald that I might have
4 mentioned earlier which was an assessment, the first
5 time an independent assessment of radiation releases
6 from a nuclear weapons plant that was done, I think,
7 anywhere.

8 And, in that context I noticed that they
9 had many problems with their scrubbers and the acid
10 environment was eating up the lining and so on, and
11 raised the question of scrubber efficiency in my
12 report.

13 And, subsequently, when the Centers for
14 Disease Control commissioned its own analysis, that
15 was part of the analysis. So, I just now that they
16 had problems with meeting their manufacturer specified
17 efficiencies.

18 And, because of poor maintenance and other
19 problems, a lot of it was poor maintenance.

20 MR. CURTISS: And, is my recollection
21 correct that among the reasons the Fernald plant was
22 shut down was because of the fact that with whatever
23 the vintage of design of the scrubber system was, it
24 couldn't meet the regulatory standards or had issues
25 with releases.

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1 WITNESS MAKHIJANI: I do not recall
2 actually that there was any specific reference to the
3 scrubbers or the obsolescence of the plant. The plant
4 was shut down in mid 1989 as the Cold War was winding
5 down.

6 And, the emissions from the plant had
7 actually gone down a great deal in the 70's and 80's,
8 although the amount of distress in the public when
9 they got to know about the old releases had mounted.

10 And, in the context of the end of the Cold
11 War when many nuclear weapons facilities were shut
12 down for health and safety reasons, Fernald was also
13 shut.

14 But, you know, I actually have to say that
15 I did not see the official document or directive from
16 the Department of Energy that shut down the plant.
17 But it was not my impression that it was shut down
18 because of the scrubbers.

19 The scrubbers were certainly a part of the
20 lawsuit. And maybe the lawsuit and the settlement had
21 something to do with its being shut down. But I do
22 not know that there was specific reference to the
23 scrubbers.

24 MR. CURTISS: Were the scrubber systems
25 that were installed at Fernald intended to remove

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1 hydrofluoric acid?

2 WITNESS MAKHIJANI: No, they were intended
3 to remove both acids and uranium. They were primarily
4 uranium removal devices. The gasses, the exhaust
5 gasses from the scrap recover plant contained or were
6 acidic uranium bearing exhausts.

7 MR. CURTISS: But they weren't designed,
8 as I understand it in reading the report, to remove
9 hydrofluoric acid, which would be the focus of a
10 deconversion.

11 WITNESS MAKHIJANI: As I said, I have not
12 looked into the design questions of the Fernald
13 scrubbers. All I looked at is because of the
14 maintenance problem they had a lot of difficulties in
15 meeting their efficiency standards.

16 They had a potassium hydroxide scrubber
17 and acid gasses that were being scrubbed, acid
18 uranium-bearing gasses. So, in that sense, it was
19 broadly similar.

20 I don't want to make any implication that
21 there is an exact analogy between that situation and
22 this one. The context of my raising this is that you
23 actually have to pay a great deal of attention to
24 maintaining your plant, spend a great deal of money,
25 have adequate enforcement, and a lot of different

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1 things if you're going to meet your efficiency goals
2 for scrubbers, because they are more difficult.

3 JUDGE KELBER: Let me interject. Do you
4 feel that the NRC's enforcement of emissions from
5 various plants that have filters and scrubbers is not
6 good enough?

7 WITNESS MAKHIJANI: Oh, no. I actually
8 have not studied NRC enforcement.

9 JUDGE KELBER: I see. Are you -- do you
10 consider yourself familiar with scrubber and filter
11 technology of the recent years?

12 WITNESS MAKHIJANI: No, I'm familiar
13 enough in the sense that I've looked at these issues
14 in regard to emissions of radioactive materials. I
15 wouldn't consider myself or present myself as a
16 chemical engineering expert -- I'm not.

17 For the record, I did talk to Dr. Wichner,
18 who is a chemical engineering expert on scrubbers
19 about this very matter. And it was in an informal
20 conversation with him just to check on whether I was
21 off-base or not --

22 JUDGE KELBER: Thank you.

23 WITNESS MAKHIJANI: -- that he made this
24 remark about maintenance.

25 MR. CURTISS: Thank you, Your Honor. I

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1 just have three or four more questions and then I'll
2 finish up here. In your rebuttal testimony, Dr.
3 Makhijani, on page 7, the question and answer nine, if
4 you could refer to that.

5 (Pause.)

6 WITNESS MAKHIJANI: Yes.

7 MR. CURTISS: You have a statement here
8 that the PEIS, Exhibit 18, Programmatic Environmental
9 Impact Statement did not consider the type of ammonia,
10 that is to say anhydrous ammonia, that would be
11 transported if this option were chosen for a
12 deconversion facility. Do you see where I am?

13 WITNESS MAKHIJANI: Yes.

14 MR. CURTISS: By way of example, on page
15 J-10, if you could refer to J-10, Exhibit 18, that
16 would be the Programmatic Environmental Impact
17 Statement.

18 JUDGE ABRAMSON: J-10?

19 MR. CURTISS: J-10, yes, sir.

20 (Pause.)

21 WITNESS MAKHIJANI: Yes.

22 MR. CURTISS: This is one of the many --
23 I just cite this as one example. But this is one of
24 the many instances as I have reviewed this PEIS where
25 it indicates that the transportation of ammonia was

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1 considered.

2 Is there anything in the PEIS that states
3 that the form of ammonia that is referred to here and
4 was considered was not the anhydrous form?

5 WITNESS MAKHIJANI: Well, the process
6 described here uses aqueous ammonia, I believe. I do
7 not have the page number off the top of my head. But,
8 the deconversion processes and the source of hydrogen
9 for the deconversion is considered to be aqueous
10 ammonia in the process description.

11 I don't believe it describes what type of
12 ammonia is being transported. But, I think it's an
13 inference that if they're using aqueous then it will
14 be transported aqueous.

15 MR. CURTISS: Going back to the earlier
16 question that we discussed, the various references,
17 this is the document, the PEIS that considers both the
18 aqueous and the anhydrous HF option.

19 WITNESS MAKHIJANI: Yes.

20 MR. CURTISS: There's a reference here to
21 ammonia not being considered in the PEIS. I take it
22 that you're saying that anhydrous ammonia was not
23 considered here.

24 WITNESS MAKHIJANI: Well, I think there
25 may be a technical misunderstanding. I don't think

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1 the anhydrous hydrofluoric acid and the anhydrous
2 ammonia should be mixed up.

3 The anhydrous hydrofluoric acid is -- was
4 a proposed end-product of one possible flow sheet that
5 anhydrous hydrofluoric acid would be produced and if
6 it could be produced.

7 And, if that were the choice, it would be
8 salt. In that process a certain flow sheet for the
9 factory that would do all of these things was
10 described.

11 How do you get from depleted uranium
12 hexafluoride to U308? And in that process hydrogen
13 gas is required. And ammonia is the raw material for
14 creating hydrogen gas in the factory.

15 If you look at the chemical reaction --
16 and I believe that actually the chemical reactions are
17 given in my testimony. I do not remember which one.

18 JUDGE ABRAMSON: Direct.

19 WITNESS MAKHIJANI: In my direct? Thank
20 you, Your Honor. If you look at the chemical
21 reactions on page nine of direct testimony -- on page
22 nine of my direct testimony, maybe that will become
23 clearer.

24 The second chemical reaction, the middle
25 input constituent is hydrogen. That is created by

1 cracking ammonia. Ammonia you can buy industrially in
2 aqueous form, which is liquid.

3 Or you can buy it in anhydrous form. And
4 the end product for your factory is simply the
5 hydrogen. It has absolutely nothing to do with
6 hydrofluoric acid at the other end of the process,
7 except it creates the hydrogen input into your
8 processing function.

9 And so, the point of raising this in my
10 testimony is to simply illustrate that, when you go
11 from a programmatic statement to a real plant, that
12 lots of things could change and that programmatic
13 environment impact statement evaluation is not to be
14 considered bounding for a particular plant.

15 And this is an illustration that with
16 anhydrous ammonia input you would have transportation
17 impacts that would potentially be bigger than with
18 aqueous ammonia.

19 MR. CURTISS: And, I think I understand
20 that point. For purposes of the environmental
21 evaluation of this issue, understanding that the LES
22 application rev. 2 refers to the Portsmouth and
23 Paducah EIS's which incorporate my reference to
24 programmatic EIS.

25 I take it what you're saying here is that

1 the issue of concern to you was evaluated in the
2 Portsmouth and Paducah EIS in a more thorough way and,
3 I take it, an adequate way from what you've described
4 here.

5 You're not suggesting that there's a
6 deficiency in the analysis in Portsmouth or Paducah
7 EIS, but rather simply as you get to a site-specific
8 evaluation some issues get refined.

9 And, as they are addressed in a site-
10 specific context, you refine that evaluation.

11 WITNESS MAKHIJANI: Well, I haven't
12 actually -- there are several different nested things
13 in your question. One is there isn't in my testimony
14 any suggestion of deficiency in these EIS's because I
15 haven't actually evaluated in the sense that I
16 discussed earlier, the numbers in the EIS.

17 I've just evaluated how these numbers
18 should be used in site specific project which is the
19 subject of the present license hearing. I personally
20 cannot vouch for these numbers and would never use
21 them in anything that I were doing of any consequence
22 without independent evaluation.

23 And so, I cannot say that they don't
24 contain deficiencies. In fact, I know that from very
25 solid experience -- some of which the DOE has agreed

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1 to -- that published DOE documents, numbers, waste
2 data, and risk analyses are very seriously deficient
3 on occasion, so seriously deficient as to be invalid.

4 But that's a separate question altogether.
5 So I'm not saying there are or are not deficiencies.
6 And so, whatever testimony I give should not be taken
7 to imply that there are not.

8 MR. CURTISS: Thank you Dr. Makhijani.
9 Mr. Chairman, that concludes my questions.

10 CHAIR BOLLWERK: All right then. Why
11 don't we go ahead, before we start the Staff's cross
12 examination, and go ahead and take a ten minute break?

13 (Whereupon, the above-entitled matter
14 went off the record at 3:34 p.m. and
15 went back on the record at 3:44 p.m.)

16 CHAIR BOLLWERK: All right. Why don't we
17 go back on the record please? All right. I think
18 we're ready for the Staff's cross examination of Dr.
19 Makhijani.

20 EXAMINATION BY MR. CUMMINGS

21 DR. ARJUN MAKHIJANI

22 MR. CUMMINGS: Thank you Dr. Makhijani.
23 I only have a few brief questions in your rebuttal
24 testimony on page eight, it's your response in answer
25 nine.

1 WITNESS MAKHIJANI: Yes.

2 MR. CUMMINGS: You state that the
3 influence of accidents such as train colliders on the
4 chemical and radiological impacts of transportation
5 should be fully addressed in the NEF DEIS?

6 WITNESS MAKHIJANI: Yes.

7 MR. CUMMINGS: And, haven't you previously
8 testified that such an analysis would require site-
9 specific information which we do not have at this
10 time?

11 WITNESS MAKHIJANI: Well, site specific
12 information is one of the inputs, as I said early in
13 my direct testimony. There are a number of other
14 things that go into it.

15 Certainly there is the idea of the type of
16 accident that would be a bounding accident. Yes, you
17 have to have site specific information in order to
18 know the route and the worst case on your route for
19 the tunnels.

20 But that doesn't prevent an analysis, for
21 instance, more generally of the worst case tunnel that
22 such a train could go through. And the Baltimore
23 example is illustrative of that.

24 And the reason I that is needed is there
25 is the probabilistic risk assessments that are done

1 and that are the heart of the analysis and in the
2 Baltimore accident, which I think is specially
3 important because the risk assessments that are being
4 done in this case are before the fact.

5 But, in the Baltimore accident, even after
6 the fact, after detailed investigations by the
7 National Transportation Safety Board, after the
8 physical evidence of the accident could be collected,
9 the National Transportation Safety Board could not
10 actually determine definitively a cause of the
11 derailment, a specific thing that triggered the
12 accident.

13 And so, I think a full range of the scale
14 and the type of accidents that could happen needs to
15 be considered in the DEIS. And, yes, I would not
16 consider the DEIS complete until there is a site-
17 specific site both for -- site for the deconversion
18 plant, because the deconversion plant is really
19 integral to the question of the license.

20 MR. CUMMINGS: Thank you, Dr. Makhijani.
21 The Staff has no more questions.

22 CHAIR BOLLWERK: All right. Any redirect
23 then?

24 MR. CURTISS: No redirect.

25 CHAIR BOLLWERK: Any additional --

1 MR. LOVEJOY: No further questions for
2 LES, sir.

3 CHAIR BOLLWERK: All right. Nothing
4 further from the Staff?

5 MR. CUMMINGS: No.

6 CHAIR BOLLWERK: Nothing from the Judges?
7 I'm looking at him.

8 JUDGE KELBER: Well, there is one --

9 CHAIR BOLLWERK: All right.

10 WITNESS MAKHIJANI: I thought I was free.

11 JUDGE KELBER: Specifically for fires. I
12 just want to understand something specifically with
13 respect to a fire accident, accidents involving fire
14 as opposed to accidents involving derailments,
15 capsizing of cars, etcetera.

16 Are there chemical reactions that might be
17 induced by the fire that would render the products
18 more hazardous?

19 WITNESS MAKHIJANI: Actually, as I said in
20 response to your earlier query, Your Honor, I'm not a
21 chemical engineer. So, I'd like to stay away a little
22 bit from that question if I may.

23 JUDGE KELBER: Okay. Thank you.

24 WITNESS MAKHIJANI: Thank you.

25 CHAIR BOLLWERK: How much of your concern

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1 has to do with the fact -- with respect to the train
2 accident -- that it had to do anything with the tunnel
3 as opposed to simply the chemicals that were involved?

4 WITNESS MAKHIJANI: Well, I think the
5 tunnel had a great deal to do with the impact of the
6 accident. Because there was a fire in the tunnel and
7 the -- well, there was a flammable liquid in the car
8 itself that triggered a fire in the other cars that
9 were not derailed.

10 And because it was a tunnel it was really
11 impossible for access for many days. And so, in a
12 very critical part of town there was this fire raging
13 out of control.

14 And there was, as I alluded to earlier,
15 this sort of more or less happy circumstance that the
16 water main burst above it. And so, it was a very
17 complex and difficult thing.

18 And I think the tunnel is -- a tunnel
19 underneath a city was very much at the heart of the
20 problem.

21 CHAIR BOLLWERK: All right. Any other
22 questions from the Board? Any questions in response
23 to my question?

24 MR. CURTISS: No.

25 MR. CUMMINGS: No.

1 MR. LOVEJOY: No.

2 CHAIR BOLLWERK: No? All right. Very
3 good. Okay, you're done sir. Thank you for your
4 service to the Board. We appreciate it.

5 WITNESS MAKHIJANI: Thank you very much.

6 CHAIR BOLLWERK: All right. At this point,
7 if there nothing else with respect to this particular
8 contention -- hearing nothing -- I think then we are
9 about to adjourn.

10 Tomorrow morning why don't we plan again
11 on starting at 9:00? We will have, I guess, EC-2, I'm
12 sorry, is the subject for tomorrow. I understand
13 you'll be starting with a panel of five?

14 So we'll have to get another table over
15 there. We're working on that now so they'll have some
16 place to sit. At this point, if there's nothing that
17 the parties have in a procedural nature or
18 administrative, then we can adjourn for the afternoon.

19 We'll see everyone tomorrow morning at
20 nine o'clock. Thank you very much.

21 (Whereupon, at 3:50 p.m., the above-
22 entitled matter was adjourned.)

23

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Louisiana Energy Service,

LP

Docket Number: 70-3103-ML

Location: Hobbs, NM

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.



Edward A. Johns
Official Reporter
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