RAS 10878

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

ATOMIC SAFETY AND LICENSING BOARD
(ASLB)

+ + + + +

CLOSED HEARING

DOCKETED
USNRC

December 21, 2005 (3:30pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

In the Matter of:

LOUISIANA ENERGY SERVICES, L.P.

(National Enrichment Facility)

Docket Nos.
70-3103-ML
ASLBP No.
04-826-01-ML

Tuesday, October 25th, 2005

Room T-B345
NRC Building 2
11454 Rockville Pike
Rockville, Maryland

The above-entitled matter came on for hearing, pursuant to notice, at 9:30 a.m.

BEFORE:

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

Template=SECY-032

SECY-02

APPEARANCES:

On Behalf of Louisiana Energy Services:

JAMES R. CURTISS, ESQ.
MARTIN J. O'NEILL, ESQ.
DAVID A. REPKA, ESQ.
AMY ROMA, ESQ.
TYSON SMITH, ESQ.
Of: Winston & Strawn, LLP
1400 L Street, NW
Washington, D.C. 20005-23502
(202) 371-5726

JOHN W. LAWRENCE, ESQ.
Of: Louisiana Energy Services, L.P.
2600 Virginia Avenue, NW. Suite 610
Washington, D.C. 20037

On Behalf of Nuclear Information & Resource Service and Public Citizen:

LINDSAY A. LOVEJOY, JR., ESQ.
618 Paseo del Peralta, Unit B
Santa Fe, NM 87501

On Behalf of the Nuclear Regulatory Commission:

LISA CLARK, ESQ.
MARGARET BUPP, ESQ.
Of: Office of the General Counsel
Mail Stop O-15 D21
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(301) 415-8339 AF

Also Present:

ATOMIC SAFETY LICENSING BOARD:

BETHANY ENGLE
CHERVERNE CLOYD

JONATHAN RUND
KAREN VALLOCH
JACK WHETSTINE
ANDREW WELKIE

ALSO PRESENT: (Cont.)

LOUISIANA ENERGY SERVICES
PAUL HARDING
ROD KRICH
PAUL SCHNEIDER
LESLIE COMPTON

NUCLEAR INFORMATION & RESOURCE SERVICES AND
PUBLIC CITIZEN
MELISSA KEMP
ARJUN MAKHIJANI
BRICE SMITH

I-N-D-E-X

EXAMINATION

PREFILED DIRECT TESTIMONY OF:
DONALD PALMROSE
JAMES PARK
JENNIFER MAYER
CRAIG DEAN
TIMOTHY C. JOHNSON 2105

PREFILED REBUTTAL TESTIMONY OF:
DONALD PALMROSE
JAMES PARK
JENNIFER MAYER
CRAIG DEAN
TIMOTHY C. JOHNSON 2107

EXAMINATION BY MS. CLARK OF:
DONALD PALMROSE
JAMES PARK
JENNIFER MAYER
CRAIG DEAN
TIMOTHY C. JOHNSON 2111

EXAMINATION BY MR. CURTISS OF:
DONALD PALMROSE
JAMES PARK
JENNIFER MAYER
CRAIG DEAN
TIMOTHY C. JOHNSON 2147

EXAMINATION BY MR. LOVEJOY OF:
DONALD PALMROSE
JAMES PARK
JENNIFER MAYER
CRAIG DEAN
TIMOTHY C. JOHNSON 2163

EXAMINATION BY MS. CLARK OF:
DONALD PALMROSE
JAMES PARK
JENNIFER MAYER
CRAIG DEAN
TIMOTHY C. JOHNSON 2233

I-N-D-E-X (Cont.)

EXAMINATION

EXAMINATION BY MR. CURTISS OF:
DONALD PALMROSE
JAMES PARK
JENNIFER MAYER
CRAIG DEAN
TIMOTHY C. JOHNSON 2241

EXAMINATION BY MR. LOVEJOY OF:
DONALD PALMROSE
JAMES PARK
JENNIFER MAYER
CRAIG DEAN
TIMOTHY C. JOHNSON 2246

EXAMINATION BY THE BOARD OF:
ROD KRICH
LESLIE COMPTON 2266

EXAMINATION BY MR. LOVEJOY OF:
ROD KRICH
LESLIE COMPTON 2295

EXAMINATION BY MR. CURTISS OF:
ROD KRICH
LESLIE COMPTON 2308

EXAMINATION BY MR. LOVEJOY OF:
ROD KRICH
LESLIE COMPTON 2324

PREFILED REVISED DIRECT TESTIMONY OF:
ARJUN MAKHIJANI 2334

PREFILED REVISED REBUTTAL TESTIMONY OF:
ARJUN MAKHIJANI 2336

EXAMINATION BY MR. CURTISS OF:
ARJUN MAKHIJANI 2379

EXAMINATION BY MS. CLARK OF:
ARJUN MAKHIJANI 2404

EXHIBIT INDEX

KEY
I-Identified
A-Admitted into evidence
R-Rejected
W-Withdrawn
TUA-Taken under advisement

Official Hearing Document Exhibit #/letter	Title	Disposition/ Page
Staff 36	FEIS chapters 2 and 4	I-2108
Staff 37	SER chapter 10	I-2108
Staff 38	NUREG CR6477	I-2109
Staff 39	Review Summary	I-2109
Staff 40	Pierson letter (SNM1107)	I-2109
Staff 41	Pierson letter (SNM1227)	I-2110
Staff 42	Webber letter (SNM1097)	I-2110
Staff 36-42		A-2111
NIRS/PC 234	Urenco spreadsheet	I-2162
NIRS/PC 234		A-2164
NIRS/PC 85	10CFR Final Rule 1982	I-2337
NIRS/PC 96	Bellona 2003	I-2338
NIRS/PC 98	Cleaver & Freeze	I-2338
NIRS/PC 99	Craft et al 2003	I-2338
NIRS/PC 100	Chater deposition 10-4-04	I-2339
NIRS/PC 109	EPA 2001	I-2339
NIRS/PC 111	EPA FGR 13	I-2339
NIRS/PC 122	ICRP 81	I-2340
NIRS/PC 128	Kozak et al, 2004	I-2340
NIRS/PC 134	LES NEF ER 2004	I-2340
NIRS/PC 150	NAS-NRC 1996	I-2341
NIRS/PC 151	NAS-NRC 2003	I-2341
NIRS/PC 152	NRC CE EIS Final 1994	I-2342
NIRS/PC 169	10CFR 61 DEIS 1981	I-2342
NIRS/PC 168	10CFR 61 DEIS 1981b	I-2342
NIRS/PC 185	IAEA 2003	I-2343
NIRS/PC 186	IAEA/NEA 2001	I-2343
NIRS/PC 188	Krich 2005b	I-2343
NIRS/PC 191	NEF FEIS 2005	I-2343
NIRS/PC 190	Makhijani and Smith 2004	I-2344
NIRS/PC 193	NRC 1991	I-2344
NIRS/PC 195	01-18-05 NRC memo in order	I-2344
NIRS/PC 201	Yu et al, 1993	I-2345
NIRS/PC 203	ACP DEIS 2005	I-2345
NIRS/PC 204	ASLB August 4, 2005	I-2345
NIRS/PC 205	ASLB CEC 1997	I-2346
NIRS/PC 206	ASLB June 30, 2005	I-2346

EXHIBIT INDEX

KEY
I-Identified
A-Admitted into evidence
R-Rejected
W-Withdrawn
TUA-Taken under advisement

Official Hearing Document Exhibit #/letter Title	Disposition/ Page
NIRS/PC 221 LES 2005/08/11	I-2346
NIRS/PC 224 Makhijani & Smith 2005	I-2347
NIRS/PC 85, 99, 100, 109, 111, 122, 128, 134, 150, 151, 152, 169, 168, 185, 186, 188, 191, 190, 193, 195, 201, 203, 204, 205, 206, 221, 224	A-2352
LES 117 Deposition transcript	I-2382 A-2388

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

2 9:00 a.m.

3 CHAIR BOLLWERK: Good morning. We are

4 here to continue the evidentiary hearing for the

5 Louisiana Energy Services proceeding.

6 This morning we are going to hear from the

7 NRC Staff on the question of deconversion. And let

8 me, before we get started, see if there are any

9 procedural matters that any of the parties want to

10 raise with the Board?

11 MR. CURTISS: Mr. Chairman, I have one.

12 The Board, in the guidance that it gave the parties

13 yesterday relative to the appropriate scope of the

14 Commission order indicated that it would entertain

15 further filings and/or discussion on two issues, the

16 matter of Summary Disposition, which is addressed in

17 footnote 38 of the Commission's order.

18 And the matter of whether NIRS/PC waived

19 the consideration of wet and dry sites in footnote 52.

20 Subject to the Board's preference on this, LES

21 believes that those issues are important to resolve

22 prior to the disposal panel, as they relate to the

23 appropriate scope of testimony of that panel, of those

24 panels, excuse me.

25 And we would be prepared to present oral

1 argument on those issues if that is amenable to the
2 Board, prior to the disposal panel taking the stand,
3 or alternatively, if it is the Board's desire, we
4 could present the argument in written filings on those
5 two issues.
6 CHAIR BOLLWERK: All right, let me see
7 what the other parties have to say about that. Let's
8 turn to the Staff first.
9 MS. CLARK: With regard to Summary
10 Disposition, it occurs to me that it may be helpful to
11 have our witnesses testify first, with regard to some
12 of the issues that have newly been admitted, before we
13 argue for Summary Disposition.
14 So perhaps it would be best to put off the
15 arguments until after the submission of the testimony.
16 CHAIR BOLLWERK: Did you contemplate an
17 argument about whether Summary Disposition was an
18 appropriate procedure, or actually an argument on a
19 Summary Disposition Motion, as it were?
20 MR. CURTISS: Well, certainly deferring to
21 the Staff, I think Summary Disposition, not just a
22 procedure, which we are prepared to do orally or in
23 writing, but the actual Summary Disposition argument
24 which the Commission, in footnote 48, invited I
25 believe.

1 And I would certainly, I think, defer to
2 the Staff's point that that issue may benefit from
3 additional clarity after the Staff's witnesses. But
4 we could revisit it after that.
5 MS. CLARK: I think it may be appropriate
6 on the issue of whether the proper numbers were used
7 in the FEIS. And I think it would be helpful to have
8 our witnesses give some explanation during the
9 hearing.
10 CHAIR BOLLWERK: Let's hear what Mr.
11 Lovejoy has to say, and then we may have a suggestion
12 to make.
13 MR. LOVEJOY: Well, for my part, I guess
14 I need a little more clarity from the other parties,
15 because I'm not sure what they are trying to dispose
16 of summarily. And putting the testimony in, and then
17 having a summary disposition motion is not my idea of
18 summary disposition.
19 I think this discussion involves issues of
20 presentation of results of deep disposal, or modeling
21 of deep disposal. Are we on --
22 CHAIR BOLLWERK: That is correct, that was
23 the point, yes.
24 MR. LOVEJOY: Well, the Commission noted,
25 I believe, that there were some mathematical changes

1 made between the draft and the final environmental
2 impact statement. And I think that is probably so.
3 I would want to consult with my experts on
4 the significance of those. But those were far from
5 the only problem with those numbers. And I, you know,
6 I would be very surprised if you would be able to give
7 summary disposition to a contention involving problems
8 with the deep disposal numbers, which have never been
9 supported.
10 We have never gotten the backup
11 information on them, and the Staff has never been in
12 a position to defend them. I'm not sure what the
13 grounds -- maybe I get summary disposition, no joke,
14 really.
15 So I'm not quite sure what they are going
16 to move for. I guess I would like to know what the
17 motion is and maybe see it written down before I
18 recommend procedures.
19 CHAIR BOLLWERK: Well, I mean, normally a
20 summary disposition motion is in writing. It would be
21 unusual, to say the least, to have one orally. It is
22 possible, I suppose. But one suggestion that was made
23 here with having the Staff testify before the
24 Applicant in this instance, clarify that any?
25 JUDGE ABRAMSON: Just on this topic. In

1 other words, would it make sense to have the Staff
2 experts testify as to what is in the FEIS, on these
3 numbers that they think would then resolve the
4 question you've raised, and maybe have your expert
5 tell us what he sees as the remaining problems, and
6 then we could hear the summary disposition motion, if
7 it still makes sense.
8 Two summary disposition motions, maybe.
9 MR. CURTISS: I think, from our
10 perspective we would make two points. We are
11 certainly willing to do it in writing if that is the
12 Board's preference.
13 Two points relative to the issue raised in
14 footnote 48. And I think that footnote does clearly
15 state what the issue is here. Number one that the
16 numbers were corrected and, therefore, the issue as
17 the Commission seems to state in their footnote, is
18 now moot, or lends itself to summary disposition.
19 Secondly, as I think has been clearly
20 stated, Louisiana Energy Services is not relying, in
21 this proceeding, on the deep mine, or the geologic
22 disposal option.
23 And I think we would, secondarily, make
24 that point. And for those two reasons I think we can
25 move beyond the discussion of the geologic or mine

1 option, that seems to be the subject of that footnote.
2 JUDGE ABRAMSON: And so your view would
3 be, Mr. Curtiss, that this is now a challenge to the
4 adequacy, or the hard look in the Draft Environmental
5 Impact Statement, and not a challenge to the
6 application itself?
7 MR. CURTISS: Yes, I think we have taken
8 the mine option off of the table, and we are focusing
9 on the adequacy, not just of the DEIS, but the FEIS as
10 well.
11 JUDGE ABRAMSON: Right, I'm sorry --
12 MR. CURTISS: In this proceeding. And I
13 think the Board, in its guidance yesterday on its view
14 of the Commission decision made it clear that the
15 focus is on the adequacy of the impacts analysis, as
16 it relates to large volumes and concentrations in
17 near-surface disposal facilities.
18 JUDGE ABRAMSON: So that the challenge,
19 Mr. Lovejoy, if I'm getting this right, for
20 proposition here is that the remaining challenge is a
21 challenge to the FEIS, not a challenge to the
22 application?
23 The Applicant takes the view, correct me
24 if I've got this wrong, I think I hear the Applicant
25 taking the view that his application is for shallow

1 land burial only and, therefore, challenges to the
2 FEIS, while they are important to the overall process
3 of the hearing, are challenges to the adequacy of the
4 FEIS. Is that --
5 MR. LOVEJOY: It is a challenge to the
6 NEPA coverage. The data that showed up in the Draft
7 Environmental Impact Statement purporting to show
8 quantified releases from deep disposal, was not in the
9 application.
10 And although the application, as filed,
11 did propose some form of deep disposal. But the scene
12 shifted some months after that. Yes, the question
13 here involves the NEPA coverage.
14 MR. CURTISS: And I should clarify that we
15 will certainly defend and rely on both the FEIS, the
16 DEIS, and the application, to the extent that it
17 presents analysis and discussion of the near-surface
18 disposal option.
19 So we don't intend to issue reliance on
20 our application in that respect.
21 CHAIR BOLLWERK: All right. I don't think
22 this discussion any further at this point is going to
23 move things forward, other than I appreciate the fact
24 that you thought about this, and brought some things
25 to our attention.

1 It looks like if we are going to be doing
2 something with this it would be before the disposal
3 panels begin, I believe. And we need to talk among
4 ourselves and see if we need to give you further
5 guidance in terms of how we proceed, and we will do
6 that.
7 MR. CURTISS: And aside from the summary
8 disposition issue, we would welcome guidance on the
9 footnote 52 waiver issue, as well, because we think
10 that is central to the scope of the issues to be
11 litigated on the disposal issue.
12 (Pause.)
13 CHAIR BOLLWERK: Part of the question on
14 that is, given the time frame, can you put something
15 in writing, and can there be a response by then?
16 MR. CURTISS: The absence of Marty O'Neill
17 explains what we are trying to do today, which is to
18 present it to you in writing, and we think we can do
19 that COB today.
20 CHAIR BOLLWERK: All right. Then the
21 question, Mr. Lovejoy, and for the Staff would be, do
22 you want to respond in writing, or would you prefer to
23 do so orally?
24 JUDGE ABRAMSON: Could you do so orally?
25 MR. LOVEJOY: When would this be, may I

1 ask would this be tomorrow morning, tomorrow
2 afternoon?
3 CHAIR BOLLWERK: If we are going to do it
4 before disposal in theory, yes, that would be -- it
5 may turn out to be the same thing that we had with
6 your motion in limine, which you put something in
7 writing, and then the response was oral from the other
8 parties.
9 I mean, you have his position in writing,
10 at least, that would be --
11 MR. LOVEJOY: May we have a moment?
12 CHAIR BOLLWERK: Sure.
13 MR. CURTISS: We will certainly endeavor
14 to advise the Board, as the day goes on, at what time
15 we will be able to file the written footnote 52 waiver
16 argument. I expect that will be mid-afternoon at the
17 earliest.
18 (Pause.)
19 CHAIR BOLLWERK: Go ahead, I'm sorry.
20 MR. LOVEJOY: We could respond orally, as
21 long as we get the material promptly, either by email
22 or by hand.
23 CHAIR BOLLWERK: It sounds like Mr.
24 Curtiss is saying some time mid-afternoon,
25 potentially. That is at this point.

1 MR. LOVEJOY: Well, he knows where I will
2 be.
3 CHAIR BOLLWERK: Right, that is true.
4 MR. CURTISS: I will endeavor to get it
5 hard copy so that we can just serve it here, rather
6 than electronically. That is easier for the parties.
7 CHAIR BOLLWERK: All right. Is there
8 anything the Staff wants to say on this subject?
9 MS. CLARK: No, thank you.
10 CHAIR BOLLWERK: All right. At this
11 point, Ms. Clark, make sure that you are getting close
12 to the microphone. I hear from the people behind the
13 curtain over there, that sometimes they can't hear
14 you.
15 MS. CLARK: That I'm hard to hear? Okay.
16 CHAIR BOLLWERK: I think everyone in the
17 room can but, apparently, they are having some trouble
18 in there. And that only affects things to the degree
19 that they are doing things back there based on some
20 things you are saying.
21 Let's, then, move to the testimony for
22 this morning. And let me raise sort of a procedural
23 point. I guess you said you wanted to put on some
24 live testimony, then incorporate the direct and
25 rebuttal prefiled testimony?

1 Would it make more sense to go ahead and
2 get that in the record, and then put on -- I mean, it
3 is, you are talking about surrebuttal, and I'm not
4 sure, in terms of the transcript, we are going to have
5 the two prefiled portions of it, and then the live
6 testimony.
7 I don't know that it is going to make a
8 difference in terms of the way it reads, but --
9 MS. CLARK: That is fine, we can go ahead
10 and put all the testimony into the record first.
11 CHAIR BOLLWERK: I think that would
12 probably be, just in terms of the flow of things,
13 might be easier for everyone to keep track of. So why
14 don't we go ahead and incorporate that, as well as the
15 exhibits, and then we can -- we will have whatever
16 live surrebuttal, I guess.
17 And, again, I take it the parties didn't
18 have an objection to this and certainly their cross
19 examination can be based on that live testimony as
20 well.
21 JUDGE ABRAMSON: Mr. Curtiss, when you get
22 a chance could you ask Ms. Compton if she could come
23 out here this morning?
24 MR. CURTISS: They are checking now.
25 JUDGE ABRAMSON: Great, thank you very

1 much.

2 CHAIR BOLLWERK: Let me turn then, to the

3 panel. I appreciate your patience with us while we

4 took care of a few procedural matters. Are you

5 comfortable back there? It looks like you are kind of

6 squeezed in, but it looks like everybody made it.

7 I know at least one member of the panel

8 has been before the Board before, but we are going to

9 go ahead and swear everybody else, including that

10 individual in, because it has been some time.

11 Whereupon,

12 DONALD PALMROSE

13 JAMES PARK

14 JENNIFER MAYER

15 CRAIG DEAN

16 TIMOTHY C. JOHNSON

17 were called as witnesses by counsel for the Staff and,

18 having been duly sworn, assumed the witness stand,

19 were examined and testified as follows:

20 CHAIR BOLLWERK: All right, Ms. Clark?

21 MS. CLARK: Do you have, before you, a

22 document entitled NRC Staff Testimony Concerning

23 Admitted Contentions Relating to Deconversion?

24 WITNESS PARK: Yes.

25 WITNESS MAYER: Yes.

1 WITNESS PALMROSE: Yes.

2 WITNESS DEAN: Yes.

3 WITNESS JOHNSON: Yes.

4 MS. CLARK: Did you prepare this testimony

5 for submission in this proceeding?

6 WITNESS PARK: Yes.

7 WITNESS MAYER: Yes.

8 WITNESS DEAN: Yes.

9 WITNESS JOHNSON: Yes.

10 WITNESS PALMROSE: Yes.

11 MS. CLARK: Have you prepared a statement

12 of your professional qualifications?

13 WITNESS PARK: Yes.

14 WITNESS MAYER: Yes.

15 WITNESS DEAN: Yes.

16 WITNESS JOHNSON: Yes.

17 WITNESS PALMROSE: Yes.

18 MS. CLARK: Is your statement of

19 professional qualifications attached to your prefiled

20 testimony?

21 WITNESS PARK: Yes.

22 WITNESS MAYER: Yes.

23 WITNESS DEAN: Yes.

24 WITNESS JOHNSON: Yes.

25 WITNESS PALMROSE: Yes.

1 MS. CLARK: Do you have any --

2 CHAIR BOLLWERK: Let's make sure we get an

3 affirmation from everybody here.

4 MS. CLARK: Do you have any corrections or

5 revisions to that testimony at this time?

6 WITNESS PARK: No.

7 WITNESS MAYER: No, we don't.

8 WITNESS DEAN: No.

9 WITNESS JOHNSON: No.

10 WITNESS PALMROSE: No.

11 MS. CLARK: Do you adopt this written

12 testimony as your sworn testimony in this proceeding?

13 WITNESS PARK: Yes.

14 WITNESS MAYER: Yes.

15 WITNESS DEAN: Yes.

16 WITNESS JOHNSON: Yes.

17 WITNESS PALMROSE: Yes, I do.

18 MS. CLARK: I now move to have this direct

19 testimony admitted into this proceeding.

20 CHAIR BOLLWERK: All right. Any

21 objections?

22 (No response.)

23 CHAIR BOLLWERK: All right, then the NRC

24 Staff testimony concerning admitted contentions

25 relating to deconversion will be adopted into the

1 record as if read.

2 (Whereupon, the direct testimony of Mr.

3 Palmrose, Mr. Park, Ms. Mayer, Mr. Dean and Mr.

4 Johnson was bound into the record as if having been

5 read.)**

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

September 15, 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 CONCERNING
ADMITTED CONTENTIONS RELATING TO DECONVERSION

Q.1. Please state your name, occupation and by whom you are employed.

A.1. (TJ) Timothy C. Johnson. I am the U.S. Nuclear Regulatory Commission (NRC) Project Manager overseeing the licensing of the proposed Louisiana Energy Services, L.P. (LES) uranium enrichment facility near Eunice, New Mexico. I have been the PM for the project since its inception in January of 2002, when LES initiated discussions with NRC for the project. A statement of my professional qualifications is attached hereto.

A.1. (JP) James Park. I am the NRC Project Manager for the environmental review of the application for construction and operation of the proposed uranium enrichment facility submitted by LES. A statement of my professional qualifications is attached hereto.

A.1. (JM) Jennifer Mayer. I am employed as a consultant by ICF Consulting. I am providing this testimony under a technical assistance contract with the NRC. A statement of my professional qualifications is attached hereto.

A.1. (CD) Craig Dean. I am employed by ICF Consulting. I am providing this testimony under a technical assistance contract with the NRC. A statement of my professional qualifications is attached hereto.

A.1. (DP) Donald E. Palmrose, Ph.D. I am employed by Advanced Systems Technology and Management Incorporated. I am providing this testimony under a technical assistance contract with the NRC. A statement of my professional qualifications is attached hereto.

Q.2. Please describe your current job responsibilities in connection with the NRC Staff's review of the application by LES to construct and operate a uranium enrichment facility in Lea County, New Mexico, to be known as the National Enrichment Facility (NEF).

A.2. (TJ) As Project Manager, my current job responsibilities include coordinating the review of the application for construction and operation of the proposed uranium enrichment facility submitted by LES and the preparation of NUREG-1827, "Safety Evaluation Report, for the National Enrichment Facility in Lea County, New Mexico", June 2005, (SER) that documents the safety review prepared by NRC Staff including the portion relevant to this proceeding, Chapter 10 ("Decommissioning"), attached as Staff Exhibit 37. In the review of the application, I focused particularly on the decommissioning funding and waste management aspects of the proposed facility.

A.2. (JP) I was responsible for overseeing the preparation of NUREG-1790, the "Final Environmental impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico," June 2005, (FEIS), including the portions relevant to the current proceeding, Chapters 2 and 4 ("Alternatives" and "Environmental Impacts"), attached as Staff Exhibit 36.

A.2. (JM) I have assisted the NRC Staff in evaluating the proposed decommissioning funding plan for the NEF and was the principal author of the decommissioning cost sections of Chapter 10 of the SER.

A.2. (DP) I developed or contributed to the sections and appendices of the Draft Environmental Impact Statement, NUREG-1790, September 2004, (DEIS) and the FEIS. As relevant to this testimony, I was the principal author of Sections 2.1.9, DUF_6 Disposition Options; 2.2.2.4, Alternatives for DUF_6 Disposition; 2.2.2.5, Anhydrous Hydrofluoric Acid Option; and 4.2.14.4, Impacts from Disposal of the Converted Waste.

A.2. (CD) I am the manager responsible for the technical support provided by ICF Consulting to NRC in evaluating the financial assurance provisions in LES's decommissioning funding plan. In that capacity, I was the principal evaluator of the financial assurance instruments and the assessment of the adequacy of the contingency factor.

I. <u>Plausibility of Deconversion</u>

Q.3. What is the purpose of this portion of your testimony?

A.3. (TJ, JP, DP) The purpose of our joint direct testimony is to provide the NRC Staff's views concerning the admitted contentions regarding the plausibility of LES's proposal to deconvert the depleted uranium hexafluoride (DUF_6) produced by the enrichment process to triuranium oxide (U_3O_8) for disposal. The specific contentions we will address here are EC-3/TC-1 and EC-5/TC-2 as supported by Basis (G).

Q.4. Are you familiar with the aspects of the admitted Contentions which relate to the "plausibility" of LES's proposal for private sector deconversion?

A.4. (TJ, JP, DP) Yes. Contention EC-3/TC-1, as relevant, states:

> Petitioners contend that Louisiana Energy Services, L.P., ("LES") does not have a sound, reliable, or plausible strategy for private sector disposal of the large amounts of radioactive and hazardous Depleted Uranium Hexafluoride ("DUF_6") waste that the operation of the plant would produce in that:
>
> (B) Similarly, the statement that "discussions have recently been held with Cogema concerning a private conversion facility" (ER 4.13-8) is without substance.

Contention EC-6/TC-3 and supporting Basis G state:

> Petitioners contend that the Louisiana Energy Services, L.P., ("LES") application seriously underestimates the costs and the feasibility of managing and disposing of the Depleted Uranium Hexafluoride ("DUF_6") produced in the planned enrichment facility in that:
>
> (G) LES's "preferred plausible strategy" for the disposition of depleted UF_6 is the possible sale to a "private sector conversion facility" followed by disposal of deconverted U_3O_8 in a "western U.S. exhausted underground uranium mine." (ER 4.13-8). Such a conversion strategy cannot be accepted as plausible given that no such conversion facility exists nor is it likely to be built to suit LES's timing and throughput requirements.

Q.5. Please explain the references to the term "deconversion."

A.5. (TJ, JP, DP) The uranium enrichment process which LES proposes to use at the NEF would produce as a byproduct DUF_6. The depleted uranium produced by LES will be in the chemical form of uranium hexafluoride (UF_6), a chemical that will react with moisture in air to form hydrogen fluoride (HF). HF is a corrosive chemical compound that can cause injury if inhaled or ingested. Therefore, before long-term storage, DUF_6 is converted to a non-reactive chemical form, such as an oxide like U_3O_8. This process is called "deconversion."

Q.6. What is LES's proposed strategy for private sector deconversion of the DUF_6 which will be produced at the NEF?

A.6. (TJ, JP, DP) As explained in the FEIS, LES has proposed, as one option for the disposition of the DUF_6 produced at the facility, a strategy whereby DUF_6 is deconverted to U_3O_8 at a private sector facility before disposal. Staff Exhibit 37 at 2-27 to 2-30.

Q.7. NIRS/PC contends that this strategy is not "plausible." What does this term mean in the context of licensing a facility such as the NEF?

A.7. (TJ, JP, DP) The Staff's review of the LES application deals with environmental and financial aspects of the disposition of the DUF_6 that will be generated during the life of the NEF. In order to make meaningful conclusions with regard to those issues, the underlying strategy proposed for dispositioning of the tails must be "plausible." This means that the strategy must be reasonable or credible.

Q.8. What information have you reviewed that relates to LES's private sector deconversion strategy?

A.8. (TJ, JP, DP) A Memorandum of Understanding between LES and AREVA Enterprises, Inc., which states, among other things, that:

[redacted]

[redacted]

Q.9. What additional information did you consider in assessing the plausibility of private sector deconversion?

A.9. (TJ, JP, DP) The technology to deconvert DUF_6 to a uranium oxide such as U_3O_8 is well known. Fuel fabricators throughout the United States convert UF_6 into oxides as a step in producing nuclear fuel. Chemical processes are used to produce U_3O_8 from UF_6. To produce fuel, the U_3O_8 is chemically reduced in the presence of hydrogen to form UO_2. For the private sector DUF_6 deconversion of the DUF_6 produced by the NEF, it would be unnecessary to use the reduction step

Q.10. Based on the information you have reviewed, is it your professional opinion that it is plausible that LES will be able to obtain private sector deconversion of the DUF_6 produced by the NEF given LES's timing and throughput requirements?

A.10. (TJ, JP, DP) Yes. As explained above, the chemical processes for deconversion are well understood and have been used in commercial-scale plants, such as the Cogema dry deconversion plant in Pierrelatte, France, for over 20 years. LES has signed a Memorandum of Agreement with AREVA, of which Cogema is a wholly owned subsidiary, to construct and operate a deconversion plant for LES depleted uranium tails. The experience of AREVA/Cogema in the operation of a commercial-

scale deconversion plant in France indicates that it has the technical and industry expertise to build a deconversion plant and to understand the technical feasibility of building a plant sized appropriately to satisfy the throughput requirements of the NEF. The experience of AREVA/Cogema similarly indicates that it has sufficient expertise to project preliminarily when construction will be complete [redacted] Therefore, we consider the representations in the MOU between AREVA and LES as credible and sufficient to demonstrate that a private sector deconversion is plausible.

II. Cost of Deconversion

Q.11. What is the purpose of this portion of your testimony?

A.11. (TJ, JM, CD) The purpose of our testimony is to present the basis for the Staff conclusions regarding the cost estimates relating to decommissioning presented by LES and, specifically, the basis for the Staff's views concerning the aspects of the admitted contentions that concern the cost estimate for deconversion.

Q.12. Please explain why LES was required to submit estimates for the costs of decommissioning activities.

A.12. (TJ, JM, CD) 10 C.F.R. § 70.25(a) and (e) require an applicant for a license relating to a uranium enrichment facility to submit a decommissioning funding plan that contains a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning, including a means for adjusting cost estimates and associated funding levels periodically over the life of the facility. 10 C.F.R. §§ 40.36(d) and 30.35(d) impose these same requirements for applicants for a license to possess source material and applicants for a license to possess byproduct material in excess of specified quantities. Under these regulations, the periodic adjustments must be made

at least once every three years. The methods by which financial assurance for decommissioning funding may be assured are set forth in 10 C.F.R. §§ 70.25(f), 30.35(f) and 40.36(e) and include, for a non-governmental entity, prepayment, a surety method, insurance or other guarantee method, or an external sinking fund.

Q.13. Is there any Staff guidance relating to the review of decommissioning cost estimates?

A.13. (TJ, JM, CD) Yes. The relevant Staff guidance is set forth in NUREG-1757 "Consolidated NMSS Decommissioning Guidance", LES Exhibit 82. According to that guidance, the decommissioning funding plan outlines the work required to decommission the facility and provides a site-specific cost estimate assuming the work will be performed by an independent third-party contractor and without taking credit for salvage value or reduced taxes. LES Exhibit 82 at 4-1. The Staff's assessment of the adequacy of the applicant's cost estimate is based upon consideration of the completeness of the estimate, the level of detail presented, and the reasonableness of the estimate. In particular, the guidance sets forth the following nine criteria as guidance for evaluating the adequacy of a decommissioning cost estimate:

- The cost estimate is based on documented and reasonable assumptions;
- The cost estimates for individual facility activities and components are reasonable and, to the extent possible, consistent with NRC cost estimation reference documents (including, for example, NUREG/CR-6477, Revised Analyses of Decommissioning Reference Non-Fuel Cycle Laboratories, July 1998, attached as Staff Exhibit 38
- ("NUREG/CR-6477") which provides unit costs for various decontamination activities, salaries, and other reference costs);
- The cost estimate reflects decommissioning under appropriate facility conditions;

- The cost estimate includes costs for labor, equipment and supplies, overhead and contractor profit, sampling, and miscellaneous expenses;
- The cost estimate includes costs for all major decommissioning activities, including planning and preparation; decontamination or dismantling facility components; packaging, shipping, and disposal of wastes; restoration of facility grounds; and the final radiation survey.
- The cost estimate meets the applicable regulatory requirements;
- No credit is taken for salvage value;
- The decommissioning cost estimate includes an adequate contingency factor of 25 percent; and
- The decommissioning cost estimate provides a description of how it will be adjusted periodically over the life of the facility.

LES Exhibit 82 at 4-10 to 4-11.

Q.14. What is the LES decommissioning cost estimate and what documents have you reviewed that support that estimate?

A.14. (TJ, JM, CD) Since submitting its original application, LES has updated and revised its decommissioning funding estimate. The most recent cost estimate is set forth in Table 10.1-14 of Revision 4 of the NEF Safety Analysis Report, LES Exhibit 83. As that table shows, LES currently estimates that the cost of decontamination and decommissioning of the NEF will be $131,103,000 in 2004 dollars. Disposition of the total amount of tails expected to be generated is estimated to cost $622,269,000 in 2004 dollars. LES added an additional 25% contingency factor to the sum of these estimates for a total decommissioning cost of $941,590,000. In reviewing the cost estimates provided by LES, we reviewed relevant NRC guidance documents (e.g., NUREG-1757 and NUREG/CR-6477), the license application and responses to Requests for Information sent from the Staff to LES. In addition, we reviewed supporting documents at the LES office located in Washington, D.C.

Q.15. Based on your review, what did you conclude regarding the cost estimates underlying LES's decommissioning funding plan?

A.15. (TJ, JM, CD) We concluded that LES has provided sufficient documentation to demonstrate that the cost estimate provided for each of the underlying aspects of decommissioning was reasonable. Specifically, we determined that the cost estimate for decontamination and decommissioning of $131,103,000 and the cost estimate for tails disposition in the amount of $622,169,000 are reasonable.

Q.16. What type of funding mechanism has LES proposed for ensuring the availability of those funds?

A.16. (TJ, CD) LES has proposed using of a surety bond method and has provided draft copies of the surety bond and standby trust language which satisfy the requirements of 10 C.F.R. §§ 70.25(f)(2), 30.35(f)(2) and 40.36(e)(2). LES provided unexecuted copies of both the surety bond and the standby trust they are proposing to use to demonstrate financial assurance. The surety bond is a guarantee by a surety company that it will fund decommissioning if the licensee fails to do so. The standby trust is set up to receive payments from the surety company under the bond. The NRC can direct payments from the standby trust to fund decommissioning. We compared the unexecuted drafts prepared by LES to the model surety bond and standby trust contained in NUREG-1757, Volume 3, Appendix A, and concluded that they were accurate copies, with no omissions or additions. The Staff has imposed a license condition requiring LES to provide final executed copies of these financial instruments prior to receipt of licensed material, as set forth at page 10-15 of Staff Exhibit 36.

Q.17. Can you please explain how funding will be provided during the life of the facility?

A.17. (TJ) LES will initially fund the total estimated cost of decontamination and decommissioning of the facility of $131,103,000. In addition, LES will fund the estimated cost of disposing of the amount of tails expected to be generated during the first three years of operation of $22,700,000. A contingency factor of 25% was added to the sum of those estimates. LES's initial funding will therefore amount to $192,000,000. Thereafter, LES will submit updated cost estimates and any corresponding revisions to the funding instruments to account for projections of disposal of depleted uranium disposition annually. In addition, LES will submit updated funding estimates and corresponding revisions to the funding instruments to account for facility decommissioning costs at least every three years. These requirements for funding updates will be imposed by the license condition described in the SER, Staff Exhibit 36 at page 10-15.

Q.18. Are you familiar with Contention EC-5/TC-2 as it relates to the cost of deconversion?

A.18. (TJ, JM, CD) Yes, in relevant part, Contention EC-5/TC-2 states:

> Louisiana Energy Services, L.P., (LES) has presented estimates of the costs of decommissioning and funding plan as required by 42 U.S.C. 2243 and 10 C.F.R. 30.35, 40.36, and 70.25 to be included in a license application. See Safety Analysis Report 10.0 through 10.3; ER 4.13.1. Petitioners specifically contest the sufficiency of such presentations as based on . . . (4) the lack of any relevant estimate of the cost of converting and disposing of depleted uranium, given it does not rely upon the three examples - the 1993 CEC estimate, the LLNL report, and the UDS contract - cited in its application.
>
> LES has presented additional estimates for the costs of deconversion. . . of depleted uranium for purposes of the decommissioning and funding plan required by 42 USC 2242 and 10 CFR 30.35, 40.36, and 70.25. See LES Response to RAI dated January 7, 2005. Such presentations are insufficient because they contain no factual bases or documented support for the amounts of the following particular current LES

estimates, i.e., $2.69/kgU for conversion, . . . and cannot be the basis for financial assurance.

Q.19. Has LES provided a basis for its estimate for conversion of the DU ($2.69/kgU)?

A.19. (TJ, JM) Yes. The deconversion cost was based on costs contained in a business study prepared in conjunction with a proposal by Cogema to build a deconversion plant for Urenco at the Capenhurst site in the United Kingdom. The proposed deconversion facility would produce U_3O_8 and aqueous hydrogen fluoride (HF) and would deconvert 3,500 Metric Tons (MT) U/year. We reviewed the business study during an in-office review on April 19, 2005. Staff Exhibit 39. During that review, LES explained that the cost estimate was adjusted to account for differences in planned operating capacities, Euros-to-dollars conversion, and other costs associated with "Americanization." "Americanization" refers to costs to obtain regulatory approval and costs to convert European equipment standards to standards used in the United States. Specifically, LES modified the Cogema information to reflect a 7,000 MT U/year capacity by doubling the operating costs and by adding funds to reflect the increased capital and construction costs of a larger capacity plant considering the shared nature of some systems. Additional funds were also added for Americanizing the design and for licensing.

Q.20. In your opinion, does the information described provide a sufficiently documented and reasonable basis for estimating the cost of conversion?

A.20. Yes. The information submitted was sufficient to evaluate the reasonableness of the basis for the cost estimates. That is, the cost estimate of $2.69/kg U was based on costs at an existing operating facility. Estimating costs based on actual operating

facilities is a robust method because it reflects the operational wisdom gained over the 20 years the plant has been operating. Appropriate modifications were made to address changes in the facility size and throughput, costs specific to operating in America rather than France, and the initial translation of Euros-to-dollars.

Q.21. Are you familiar with Basis (E) of Contention EC-6/TC-3?

A.21. Yes, Contention EC-6/TC-3 and supported Basis (E) states:

> Petitioners contend that the Louisiana Energy Services, L.P., ("LES") application seriously underestimates the costs and the feasibility of managing and disposing of the Deptleted Uranium Hexafluoirde ("DUF_6") produced in the planned enrichment facility in that:
>
> (E) A problem arises with respect to disposal of CaF_2. It is not known whether the CaF_2 will be contaminated with uranium. Such contamination would prevent the resale of the CaF_2 and would require that such material be disposed of as low-level waste.

Q.22. Please explain the role of disposal of CaF_2 in the context of the deconversion of the DUF_6 produced at the NEF.

A.22. (TJ, JM, CD, DP, JP) One of the byproducts of the deconversion of DUF_6 to produce U_3O_8 is aqueous hydroflouric acid, or HF. HF may be sold commercially or, alternatively, may be converted to CaF_2 which may then be disposed of or sold commercially.

Q.23. Please explain the role of disposal of CaF_2 in LES's private conversion strategy.

A.23. (TJ, DP) LES proposes that hydrofluoric acid produced as a byproduct of DUF_6 conversion to U_3O_8 be converted to CaF_2, which would then be disposed of in a landfill.

Q.24. How is the fate of CaF_2 which is produced during the deconversion process accounted for in LES's cost estimate?

A.24. (TJ, JM) LES includes a cost of $0.02/kgU to dispose of the CaF_2 in a local landfill. LES Exhibit 97.

Q.25. Could contamination of the CaF_2 with uranium affect LES's ability to dispose of the product at a municipal landfill and instead require disposal at a low level waste repository?

A.25. (TJ, DP, JP) Yes, if the contamination exceeds the limit for the landfill. These limits are established by the governing regulatory authority. In the case of deconversion of the DUF_6 generated by the NEF, we would not expect that the level of contamination by uranium to be sufficient to prevent disposal at a landfill. We draw this conclusion in part from knowledge of the operations at three nuclear fuel fabrication facilities operating in the United States that generate aqueous HF as a byproduct of operations converting UF_6 to uranium dioxide (UO_2), the chemical form of nuclear reactor fuel. As shown in the Table below, two of these fuel fabricators sell the aqueous HF produced by the conversion process while the third converts the aqueous HF produced to CaF_2 which is sold for commercial use. Each of these fabricators is licensed by the NRC and each has approval to transfer to unlicensed recipients HF or CaF_2 under specific conditions limiting uranium content. *See* Staff Exhibits 40-42. The purpose of each these conditions is to ensure that the contamination is sufficiently low to allow the fabricator to sell or dispose of these products as non-radioactive material.

Fuel Fabrication Facilities that convert UF6 to UO2			
	Global Nuclear Fuels	Framatone, Richland	Westinghouse
The chemical process for "deconversion" of UF6 to UO2	Dry: UF6+H2 [steam] => U3O8 [H2] => UO2+HF	Dry: UF6+H2 [steam] => U3O8 [H2] => UO2	Wet: UF6+NH3=>ADU+HF=>ADU+N2 [H2]=>UO2
Form of the HF produced (aqueous or anhydrous)	Gas which is condensed to an aqueous phase	Gas which is condensed to an aqueous phase	Aqueous
Disposition of produced	HF is sold	HF is sold	HF is precipitated in waste treatment facility to produce CaF2 which is sold to produce bricks
Limit imposed by license condition for uranium contamination	License: < 3ppm U in HF 30pCi/gm in CaF2	License: < 3pico * curie/ml (HF); "unrestricted commercial use, no larger than 20,000 liters"	License: < 3ppm U

* - 3 picocuries is equivalent to 0.9 ppm for 5% enriched uranium.

The fact that these fabricators have been able to operate under these license limits, which provide that contamination cannot exceed 3 parts per million, or 3 pc/ml, indicates that the conversion process results in only minimal uranium contamination. We also took into account the fact that these limits are below those set for municipal landfills, including the Lea County landfill (*See* LES Exhibit 77, LES Exhibit 78, and LES Exhibit 97) and are consistent with the experience of AREVA with the W plant in Pierrelatte, France. LES Exhibit 76. On the basis of this information, I concluded that disposal in a landfill is a reasonable assumption.

Q.26. Does this conclude your testimony?

A.26. (TJ, JP, JM, CD) Yes.

TIMOTHY C. JOHNSON

Professional Qualifications

I am currently the Licensing Project Manager of the Louisiana Energy Services (LES) uranium enrichment plant project in the Gas Centrifuge Facility Licensing Section, Special Projects Branch, Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission.

I received a Bachelor of Science degree in Mechanical Engineering from Worcester Polytechnic Institute in Worcester, Massachusetts, in 1971 and a Master of Science degree in Nuclear Engineering from Ohio State University, in Columbus, Ohio, in 1973.

Courses I have taken that are pertinent to my present discipline are in the areas of advanced mathematics, engineering design, mass and heat transport, thermodynamics, reactor theory, nuclear physics, nuclear power plant engineering, and health physics. I was elected to membership in Pi Mu Epsilon, the mathematics honorary society.

From January 1973 to August 1977, I was employed by Stone & Webster Engineering Corporation in Boston, Massachusetts. As the offgas and ventilation filter system specialist, I was responsible for the technical adequacy of offgas and ventilation filter systems for pressurized water reactor, boiling water reactor, high temperature gas cooled reactor, and liquid metal fast breeder reactor projects. My responsibilities included ensuring that equipment met both applicable regulatory and equipment code requirements. I prepared master specifications for offgas and ventilation filter systems for use by project staff. I reviewed project specifications and performed technical reviews of vendor proposals. I also reviewed vendor procedures for qualification and testing of offgas and ventilation system components.

Since September 1977, I have been employed by the U.S. Nuclear Regulatory Commission in the areas of radioactive waste management, decommissioning, and fuel cycle facility licensing.

From September 1977 to April 1984, I had lead responsibility for the waste form performance aspects of low-level radioactive wastes to include radwaste processing, solidification, high integrity containers, and volume reduction systems. In this capacity, I developed programs for analyzing, evaluating, coordinating, and recommending licensing actions related to the waste form and waste classification areas of 10 CFR Part 61. These responsibilities have specifically included coordinating the development of the waste form and waste classification requirements and preparing the appropriate sections for: (1) the low-level waste management regulation, 10 CFR Part 61; (2) the draft and final environmental impact statements that support 10 CFR Part 61; and (3) the technical positions on waste form and waste classification that provide guidance to waste generators for complying with the 10 CFR Part 61 requirements. I also acted as lead for an intra-agency task group for implementation for the 10 CFR Part 61 requirements at nuclear power plants.

During this time, I also participated on a Task Force responsible for Three Mile Island Unit 2 (TMI-2) waste disposal issue resolution to include the evaluation of EPICOR-II, Submerged Demineralizer System, and decontamination solution wastes. I also prepared and coordinated waste disposal section for the TMI-2 Programmatic Environmental Impact Statement. For other nuclear power facilities, I prepared and coordinated waste disposal sections for the Dresden Unit 1 Decontamination and the Turkey Point Steam Generator Replacement Environmental Impact Statements.

As Project Officer, I coordinated with contractors and managed the following technical assistance studies:

1. Alternative Methods for the Disposal of Low-Level Waste;
2. Chemical Toxicity of Low-Level Waste;
3. Volume Reduction Techniques for Low-Level Wastes;
4. TMI Resin Solidification Test Program; and
5. Assay of Long-Lived Radionuclides in Low-Level Waste from Power Reactors.

From April 1984 to April 1987, I was Section Leader of the Materials Engineering Section in the Division of Waste Management. In this capacity, I supervised a section that performed technical and engineering evaluations of low-level and high-level radioactive waste packages. This included planning and executing section programs, providing technical direction and integration of materials concerns into NRC low-level and high-level waste licensing activities, and supervising the management of technical assistance programs.

In the low-level waste area, my responsibilities included planning and supervising: (1) the reviews of topical reports on solidification agents, high integrity containers, and waste classification computer codes; and (2) the reviews of licensee specific requests for packaging unique waste materials.

In the high-level waste area, my responsibilities included planning and supervising: (1) the reviews of DOE waste package programs; (2) the reviews of draft and final Repository Site Environmental Assessments in the materials and waste package areas; (3) the direct interactions with DOE in formal waste package and waste glass program meetings; (4) the development of five-year plans for waste package activities; (5) the development of a capability to review the DOE Site Characterization Plans; and (6) the development of technical positions in the areas of waste package reliability and extrapolation of test data to long time frames.

From April 1987 to May 1992, I was Section Leader of the Special Projects Section in the Division of Waste Management. In this capacity, I supervised a section responsible for mixed wastes, decommissioning of materials licensee facilities and power reactors, financial assurance for decommissioning materials licensees and low-level waste disposal facilities, greater than Class C wastes, low-level waste disposal site quality assurance, and the low-level waste data base.

In these areas, the Special Projects Section issued three joint NRC/U.S. Environmental Protection Agency guidance documents on mixed wastes, a Standard Review Plan and a Standard Format and Content Guide on financial assurance mechanisms for materials licensee decommissioning , and a guidance document on quality assurance for low-level waste disposal facilities. The section was also responsible for coordinating the storage and disposal of greater than Class C wastes with DOE, reviewing decommissioning plans for the Pathfinder, Shoreham, Rancho Seco, and Fort St. Vrain nuclear power facilities, and developing a financial assurance program for materials licensees.

From May 1992 to November 1999, I was Section Chief of decommissioning sections in the Division of Waste Management responsible for developing and executing the Site Decommissioning Management Plan (SDMP), an agency effort to ensure that 17 decommissioning policy issues were resolved and over 40 non-routine decommissioning sites would be properly decommissioned. During this time, I acted as Project Manager for the decommissioning of the Chemetron site in Cleveland, Ohio, a controversial contaminated site located in a residential neighborhood. The site was remediated and the license terminated in 1998.

From November 1999 to the present, I was a Senior Mechanical Systems Engineer in the Division of Fuel Cycle Safety and Safeguards. In this position, I acted as deputy project manager for the Mixed Oxide Fuel Fabrication Facility licensing and project manager for the licensing of gas centrifuge uranium enrichment facilities. I am currently Project Manager for the Louisiana Energy Services gas centrifuge enrichment plant.

At the NRC, I have participated as the NRC and Division of Waste Management representative on the following industry, government, and international committees:

1. American Nuclear Society Subcommittee 16.1, Leach Testing Standard;
2. American Nuclear Society Subcommittee 40.35, Volume Reduction Systems Standard;
3. American National Standards Institute Subcommittee N14.9.2, Packaging for Transportation Standard;
4. American Society of Mechanical Engineers Radwaste Committee;
5. American Society for Testing and Materials Subcommittee C26.07, Waste Management Committee;
6. International Atomic Energy Agency Committee to prepare a Code of Practice for Low-Level Waste Management at Nuclear Power Plants;
7. International Atomic Energy Agency Committee to prepare a document "National Policies and Regulations for Decommissioning Nuclear Facilities;"
8. Interagency Review Board for the Chemical Waste Incinerator Ship Program;
9. Interagency Review Group for Disposal of Low-Level Wastes at Sea;
10. American Society of Mechanical Engineers Mixed Waste Committee.

I also served as a member of the Nuclear Engineering Program Advisory Board at Worcester Polytechnic Institute.

am a member of the following professional societies:

American Nuclear Society
American Society of Mechanical Engineers
American Society for Testing and Materials

Publications and Presentations

T.C. Johnson, M.J. Bell, "Volume Reduction of Low-Level Wastes," Ninth Biennial Conference of Reactor Operating Experience, Arlington, Texas, August 1979.

T.C. Johnson, P.H. Lohaus, R.D. Smith, "10 CFR 61 Waste Form Requirements," Atomic Industrial Forum Conference on NEPA and Nuclear Regulation, Washington, DC, October 1981.

T.C. Johnson, P.H. Lohaus, R.D. Smith, "10 CFR Part 61 Waste Classification Requirements," Electric Power Research Institute Radwaste Workshop, Charlotte, NC, October 1981.

T.C. Johnson, P.H. Lohaus, R.D. Smith, "10 CFR Part 61 Requirements," American Society of Mechanical Engineers/Electric Power Research Institute Radwaste Workshop, Augusta, GA, February 1982.

T.C. Johnson, H. Lowenberg, "Classification of TMI Wastes," Waste Management '82, Tucson, AZ, March 1982.

T.C. Johnson, P.H. Lohaus, R.D. Smith, "10 CFR 61 Waste Form Requirements," American Nuclear Society Topical Meeting on Radioactive Waste Management, Richland, WA, April 1982.

T.C. Johnson, P.H. Lohaus, G.W. Roles, "Implementation of 10 CFR 61 Part Waste Classification and Waste Form Requirements," Waste Management '83, Tucson, AZ, March 1983.

R.E. Browning, Et al.,"Status Report on NRC Regulation for Land Disposal of Low-Level Radioactive Wastes and Geologic Disposal of High-Level Wastes," International Atomic Energy Agency Radioactive Waste Management Conference, Seattle, WA, May 1983.

P.H. Lohaus, T.C. Johnson, "NRC Approach to Dealing with Hazardous Substances in Low-Level Radioactive Wastes," American Nuclear Society Summer Meeting, Detroit, MI, June 1983.

T.C. Johnson, P.H. Lohaus, G.W. Roles, "Implementation of 10 CFR 61 Part Waste Classification and Waste Form Requirements," ERM-Midwest Workshop, Columbus, OH, June 1983.

T.C. Johnson, P.H. Lohaus, G.W. Roles, "Implementation of 10 CFR 61 Part Waste Classification and Waste Form Requirements," Electric Power Research Institute Radwaste Workshop, Washington, DC, July 1983.

T.C. Johnson, P.H. Lohaus, G.W. Roles, "Implementation of 10 CFR 61 Part Waste Classification and Waste Form Requirements," Test, Research, and Training Reactor Conference, Boston, MA, October 1983.

T.C. Johnson, P.H. Lohaus, G.W. Roles, "Implementation of 10 CFR 61 Part Waste Classification and Waste Form Requirements," Pennsylvania Low-Level Radioactive Waste Symposium, Harrisburg, PA, October 1983.

T.C. Johnson, et al., "Economics of 10 CFR Part 61," Waste Management '84, Tucson, AZ, March 1984.

M. Tokar, et al., "NRC Licensing Requirements for High-Level Radioactive Waste Packages," Waste Management '85, Tucson, AZ, March 1985.

T.C. Johnson, et al., "Current Regulatory Issues," American Society of Mechanical Engineers/Electric Power Research Institute Radwaste Workshop, Savannah, GA, February 1986.

T.C. Johnson, et al., "High-Level Waste Package Licensing Considerations for Extrapolating Test Data," Materials Research Society Symposium, Boston, MA, December 1986.

T.C. Johnson, et al., "Update on LLW Regulatory Guides and Topical Reports," Waste Management '87, Tucson, AZ, March 1987.

E.A. Wick, et al., "NRC Staff Perspective on Performance of Vitrified HLW and How It Relates to Other Components," Waste Management '87, Tucson, AZ, March 1987.

T.C. Johnson, G.W. Roles, "Data Requirements for Waste Classification and Manifesting," Department of Energy Low-Level Waste Management Conference, Denver, CO, August 1988.

T.C. Johnson, D.E. Martin, "Decommissioning Rule Overview," NRC Region III State Liaison Meeting, Glen Ellyn, IL, September, 1988.

T.C. Johnson, D.E. Martin, "Decommissioning Rule Overview," NRC All Agreement States Meeting, Potomac, MD, October 1988.

T.C. Johnson, D.E, Martin, "NRC Perspective on Mixed Wastes," California Mixed Waste Workshop, Davis, CA, October 1988.

T.C. Johnson, "NRC Regulatory Initiatives," DOE Low-Level Waste Management Conference, Pittsburgh, PA, August 1989.

T.C. Johnson, "NRC Residual Contamination Criteria," Environmental Protection Agency/Japanese Atomic Energy Research Institute Residual Contamination Workshop, St. Michaels, MD, September 1989.

T.C. Johnson, G.W. Roles, "Decommissioning Waste Characteristics," Environmental Protection Agency/Japanese Atomic Energy Research Institute Residual Contamination Workshop, St. Michaels, MD, September 1989.

T.C. Johnson, "Air Treatment Issues Associated with a Mixed Oxide Fuel Fabrication Facility," 27th Nuclear Air Cleaning and Treatment Conference, Nashville, TN, September 2002.

Instructor: American Society of Mechanical Engineers Radwaste Course, 1982, 1984-1989;
NRC Transportation and Low-Level Waste Course, NRC Technical Training Center, Chattanooga, TN, 1988, 1989.
Harvard School of Public Health Waste Disposal Course, Boston, MA, 1990.

James R. Park
6007 Jennings Lane, Springfield, VA 22150 / (703) 971-6007

RELEVANT PROFESSIONAL EXPERIENCE

U.S. NUCLEAR REGULATORY COMMISSION (NRC) ROCKVILLE, MD

Environmental Project Manager March 2004 - present

- Prepare and review environmental assessments and environmental impact statements on various aspects of the nuclear fuel cycle.

Project Manager August 1994 - December 1998

- Interacted with federal and state governmental agencies, private companies, and members of the public on NRC actions related to the 10 Code of Federal Regulations (CFR) Part 40 licensing of active and inactive uranium mining sites
- Coordinated detailed interdisciplinary technical reviews of licensing actions proposed by 10 CFR Part 40 licensees and reporting of review findings in accordance with NRC policies
- Coordinated periodic meetings between the NRC, other federal and state governmental agencies, private companies, and members of the public on issues related to uranium recovery and site decommissioning
- Received extensive experience in word processing, graphics, and database software, and in Internet search and retrieval during the preparation of technical evaluation reports, environmental assessments, and environmental impact statements
- Received "Outstanding" rating in annual performance appraisals for the period of Fiscal Years 1996, 1997, and 1998

Systems Performance Analyst June 1989 - August 1994

- Participated in the development of high-speed computer simulations of the long-term performance of the proposed 10 CFR Part 60 high-level waste repository at Yucca Mountain, Nevada
- Monitored several tasks related to scenario analysis on multi-million dollar contracts with the Center for Nuclear Waste Regulatory Analyses (CNWRA) and ensured final CNWRA products met specified technical requirements and schedule constraints
- Presented one paper at and was co-author on two other papers for the annual International High-Level Radioactive Waste Management (IHLRWM) Conference in 1994. Supported NRC preparations for 1990 - 1993 IHLRWM Conferences

James R. Park
6007 Jennings Lane, Springfield, VA 22150 / (703) 971-6007

OTHER EMPLOYMENT

FAIRFAX COUNTY, VA PUBLIC SCHOOLS

General Education Classroom Teacher 6th Grade

Lorton Station Elementary School (Lorton, VA)	August 2003 - February 2004
Newington Forest Elementary School (Springfield, VA)	August 1999 - June 2001

- Plan and implement lessons and activities in all major areas of the curriculum
- Instruct in both individual and team teaching situations

EDUCATION

ST. CHARLES BORROMEO SEMINARY Emphasis in Philosophy	PHILADELPHIA, PA August 2001 - May 2003
MARYMOUNT UNIVERSITY M.Ed., emphasis in Elementary Education, NK-8	ARLINGTON, VA May 1999
IMPERIAL COLLEGE / UNIVERSITY OF LONDON MSc. in Structural Geology and Rock Mechanics	LONDON, ENGLAND October 1988
VIRGINIA POLYTECHNIC & STATE UNIVERSITY B.S. in Geology (cum laude)	BLACKSBURG, VA June 1986

VOLUNTEER EXPERIENCE

- Assisted in and developed activities for and visited with seniors at an assisted-living facility and in a day-care setting (September 2002 - April 2003)
- Assisted in and developed activities for Community Outreach Program for adults with developmental disabilities (September 2001 - April 2002)
- Judged entries for a Junior/Senior High School science fair (1997)

REFERENCES

Available upon request.

Jennifer Mayer
Senior Associate

ICF Consulting

EDUCATION

B.S., Chemical Engineering with Honors, Bucknell University, Lewisburg, Pennsylvania, 1992

EXPERIENCE OVERVIEW

Ms. Mayer is a chemical engineer with over thirteen years of experience in cost modeling and cost-benefit analyses. She has prepared several independent cost estimates for clean up for license termination, and reviewed a number of decommissioning funding plans. She recently prepared the cost benefit analysis for the Generic Environmental Impact Statement for NRC's clearance rule. She has also prepared cost models to evaluate the cost impacts of various proposed rulemakings including changes to EPA's LDR program, the addition of several industrial sectors to EPA's Toxic Release Inventory reporting system, and entombment of nuclear reactors as a decommissioning alternative.

PROJECT EXPERIENCE

Review of Decommissioning Cost Estimates/Decommissioning Funding Plans

Cost Estimate Review for Fuel Enrichment Facilities, U.S. NRC, 2004-Present.
Ms. Mayer has supported NRC in review of decommissioning cost estimate, decommissioning funding plan and the cost estimate in the GEIS for one or two proposed fuel enrichment facilities, and has reviewed the decommissioning cost estimate and decommissioning funding plans for a second facility. These reviews include evaluation for inclusion of required elements, determination if individual unit costs are reasonable, and appropriate adjustment to cost estimates to account for inflation and/or facility operational changes.

Decommissioning Cost Estimate/ Decommissioning Funding Plan Review, U.S. NRC, 2000-Present.
Ms. Mayer has supported NRC in review of over a dozen decommissioning cost estimates and decommissioning funding plans under 10 CFR Parts 30, 40, 70, and 72. These reviews included ensuring all necessary required elements were included, determining of whether individual unit costs and total costs were reasonable, and determining if appropriate adjustment to cost estimates to account for inflation and/or facility operational changes were included. For each review, Ms. Mayer prepared a memorandum listing deficiencies and potential deficiencies.

Fuel Cycle Facility Licensing Procedures Deposition Support, US NRC, 2004-Present.
Ms. Mayer attended the depositions of expert witnesses on the costs of decommissioning a fuel cycle facility as a technical expert, and provided feedback to NRC's legal counsel. Ms. Mayer also attended expert witness training for depositions and may be called to act as an expert witness.

Requests for Additional Information in Fuel Cycle Facility Licensing Procedures, US NRC 2004-Present.
For the licensing procedures associated with the LES fuel cycle facility, Ms. Mayer has reviewed decommissioning cost estimates, presented potential deficiencies to NRC, and reviewed both NRC's draft Requests for Additional Information (RAIs) and the potential licensee's responses to those RAIs.

Review of PCB Commercial Storage Applications, U.S. EPA, 1998-Present.
Ms. Mayer is managing ICF Consulting's support in reviewing PCB commercial storage applications for EPA's OPPT, to ensure that closure plans meet the requirements of TSCA in order for facilities to receive operating approval from EPA. She has both conducted reviews herself and supervises a team of reviewers. Each review includes providing a summary of deficiencies and recommendations for additional information necessary for permit approval, as well as verifying the closure cost estimate to determine if the costs of carrying out all of the activities described in the closure plan are covered.

Other Cost Estimates

Independent Cost Estimate for Radioactive Contamination Cleanup, U.S. NRC, 2002.
For US NRC, Ms. Mayer reviewed existing characterization data for a contaminated site in eastern Oklahoma, and contributed to a summary characterization document. She also reviewed cost estimates provided by the facility, offered comment, and prepared an independent cost estimates for cleanup of the site under an unrestricted release scenario.

Independent Cost Estimate for Radioactive Contamination Cleanup, U.S. NRC, 2001.
For US NRC, Ms. Mayer reviewed existing characterization data and cost estimates for a contaminated site in central Pennsylvania, provided comment, and prepared an independent cost estimates for cleanup of the site under five different scenarios, including restricted release and unrestricted release. This cost estimate used comparisons of contaminant levels with derived concentration guidance levels to determine the extent of contamination that had to be removed for buildings, groundwater, soil, and vegetation. She participated in a site visit to better understand the conditions of almost 20 buildings and numerous areas of soil contamination.

Screening Level Analysis of Restricted Release Site Cleanups, U.S. NRC, 2001.
For NRC, Ms. Mayer conducted a screening level analysis to model the costs of remediating six sites to restricted release levels. She helped develop feasible release scenarios and applied generic cost assumptions to input data provided by NRC. This work was used as the basis for STP-04-003.

Support for Rulemaking Planning

Entombment, U.S. NRC, 2001-2002.
Ms. Mayer conducted a cost analysis of proposed changes to the Entombment scenario of nuclear reactor decommissioning. She calculated costs to model reactors decommissioning under decontamination, safe storage, and entombment scenarios to determine if entombment was an economically feasible alternative. For this modeling, she considered both the current regulatory requirements and the proposed regulatory requirements.

Cost Benefit Analysis for Controlling the Disposition of Solid Materials, U.S. NRC, 2003-Present.
Ms. Mayer prepared the cost-benefit analysis for the Draft Generic Impact Statement for Controlling the Disposition of Solid Materials. Focusing on solid materials from light water reactors, she is modeling the costs and benefits of allowing this material to "clear" under each of four regulatory alternatives and 5 dose option levels. She is prepared the Regulatory Analysis based on this cost-benefit analysis. She has modeled the incremental values and impacts over a 50-year timeframe relative to the no action baseline by evaluating each of the 18 attributes that must be analyzed under NUREG BR/0814.

Regulatory Analysis for Fire Protection Manual Action Rule, 2004.
Ms Mayer prepared the draft Regulatory Analysis for changes to 10 CFR Part 50 dealing with operator manual actions. In this analysis, she examined the effect of the rule with and without an interim enforcement policy. Her analysis also considered the effect of some licensees not being in full compliance with existing requlations.

Regulatory Analysis of IAEA Safety Standards, U.S. NRC, 1999-2000.
Ms. Mayer evaluated the regulatory implications of NRC adoption of the IAEA ST-1 provisions pertaining to uranium hexafluoride (UF_6) in proposed revisions to 10 CFR Part 71. Specifically, she evaluated the difference between the international standard referenced by IAEA (ISO 7195) and the national standard referenced by existing regulations (ANSI N14.1), as well as other differences in regulatory requirements. She then estimated the amount of UF_6 shipped, and the cost of necessary changes in management, and the environmental costs and benefits.

Summary of Analysis of Public Comments

NRC Clearance Rule Comment Summary, 1999.
Ms Mayer assisted in summarizing comments received on the NRC Clearance rule. In particular, she summarized comments pertaining to restricted release of materials, as an alternative to unrestricted release.

Phase IV Land Disposal Restrictions, 1997.
Ms. Mayer helped manage ICF's work in summarizing over 600 comments on EPA's Phase IV LDR rule. For this effort, she helped develop the issue outline, provided specifications for the Lotus Notes system used in the comment summary process, and responded to technical questions from staff reading comment letters to best categorize comments. She also helped summarize the major issues raised by the commenters. Ms. Mayer helped prepare several technical background documents that were used by EPA to respond to commenters concerns as well as revising another technical background document to incorporate facility specific information provided in the public comment process.

Environmental Analysis

Environmental Assessment of IAEA Safety Standards, U.S. NRC, 1999-2000.
Ms. Mayer evaluated the environmental implications of NRC adoption of the IAEA ST-1 provisions pertaining to uranium hexafluoride (UF_6) in proposed revisions to 10 CFR Part 71. Specifically, she evaluated the difference between the international standard referenced by IAEA (ISO 7195) and the national standard referenced by existing regulations (ANSI N14.1), as well as other differences in regulatory requirements. She then estimated the amount of UF_6 shipped, and the cost of necessary changes in management, and the environmental costs and benefits.

Environmental Assessment of Geological and Seismological Characteristics for and Design of Dry Cask Independent Spent Fuel Storage Installations (10 CFR Part 72).
Ms. Mayer helped evaluate the environmental implications resulting from proposed changes to 10 CFR Part 72, including changes to the design earthquake and other design requirements for ISFSIs.

Selected Company Reports

Decommissioning Cost Estimate For Safety Light Corporation Bloomsburg, PA, 2001.

Decommissioning Cost Estimate For Fansteel Inc. Muskogee, OK, 2002.

Economic Analysis for Final Rule: Revisions to the Underground Injection Control Regulations for Class V Injection Wells, 1999.

Application of Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes, Regulatory Impact Analysis, April 1998.

Regulatory Analysis of IAEA Safety Standards, 2000.

Regulatory Analysis for Controlling the Disposition of Solid Materials: Draft Report, 2005

Regulatory Analysis of Post-fire Operator Manual Actions Rule - 10 CFR Part 50 - Appendix R: Draft Report, 2004

Group II Cost Estimates And Financial Capability Assessment For Staff Response To SRM-SECY-00-180 Draft Report, 2002 (Basis of STP-04-003)

CURRICULUM VITAE

Donald E. Palmrose, Ph.D.
Senior Safety Analyst
Advanced Systems Technology and Management, Inc.
8300 Old Courthouse Rd., Suite 210
Vienna, VA 22182
Telephone: 703-821-2185
Fax: 703-821-0455

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 Systems Technology and Management (AdSTM), Inc.
Senior Safety Analyst, July 2005-Present

Dr. Palmrose serves as a safety expert and contributor for several U.S. Federal government agencies, including the Federal Motor Carrier Safety Administration (FMCSA) and the U.S. Nuclear Regulatory Commission (NRC). He is developing a quality assurance review plan for FMCSA along with supporting a review of the regulatory effectiveness of Field Operations along the Southern and Northern Borders. For the NRC, he is supporting the developmental assessment of the TRACE thermal-hydraulics code including the comparison of TRACE code results to test facility data.

Advanced Technologies and Laboratories (ATL) International, Inc.
Senior Nuclear Safety Engineer, March 2000-July 2005

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 Zaporizhyzhya 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).

Final Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico, NUREG-1790, (June 2005).

CRAIG M. DEAN

EDUCATION

1984-85	Graduate Study, Economics and Statistics, American University
1976-1979	J.D., Georgetown University Law Center
1964-1969	M.A., (Ph.D. less dissertation), Russian Studies, Columbia University
1960-1964	B.A., cum laude, History, Carleton College

EXPERIENCE

Mr. Dean joined ICF in January 1984, and is a Project Manager. He is an attorney and regulatory analyst, with an extensive background in financial assurance. His experience includes development and implementation of financial assurance requirements for the Environmental Protection Agency, the Nuclear Regulatory Commission, and several states. Since 1986, Mr. Dean has provided support to the NRC for the development of financial assurance regulations, program implementation, case work, training, and special projects involving financial assurance.

Financial Assurance Regulations of 10 CFR Parts 30, 40, 50, 70, and 72

Since 1986, Mr. Dean has been providing support to the NRC in analysis of financial assurance submissions, evaluation of financial assurance issues, development of guidance documents and delivery of training on financial assurance, licensing reviews, and enforcement. Projects have included the following:

- Review of Financial Assurance Submissions from NMSS Licensees.
  Since promulgation of the NRC regulations on financial assurance for decommissioning of materials licensees in 1988, Mr. Dean has provided support to NRC in the review and evaluation of non-standard financial assurance submissions from licensees for costs of decommissioning licensed nuclear materials facilities. The submissions have included both decommissioning cost estimates and financial instruments. Mr. Dean has participated directly in the reviews, and has also supervised other ICF staff performing reviews and provided quality assurance.

- Financial Assurance Program Assessment.
  Mr. Dean managed major components of a multi-year analysis in 1986-1987 of financial assurance requirements of the NRC for low-level radioactive waste, mixed low-level and RCRA waste, uranium mill tailings, and source, special nuclear, and byproduct licensees, including financial mechanisms, decommissioning cost estimates, reporting and recordkeeping requirements, bankruptcy problems, financial test issues, overall regulatory structure, and guidance. The assessment compared the NRC regulatory framework with financial assurance requirements of other federal agencies, particularly the EPA. Mr. Dean is currently managing a two-year contract to provide technical assistance to NMSS related to financial assurance for decommissioning and subsurface soil and groundwater monitoring of materials and non-power reactor facilities.

- Analysis of the Implications of Electric Utility Deregulation on Nuclear Reactor Decommissioning Financial Assurance.

  Mr. Dean prepared a detailed study of the development of NRC policy on decommissioning financial assurance for nuclear power reactors to assess the implications of utility deregulation. He prepared a detailed chronological analysis of the development of NRC's policy concerning whether financial assurance should be required, the level of assurance (e.g., "reasonable assurance") required, the amounts of such assurance, the types of financial instruments to be allowed to provide assurance, the respective responsibilities of the NRC and other regulatory bodies, such as state PUCs and FERC, with respect to financial assurance, and related topics.

- Financial Assurance Training for NRC Regional and Headquarters Staff, and Agreement State Staff.

  Mr. Dean prepared and presented training in July-August 1989 to four NRC Regions on financial assurance for decommissioning, including overview of financial mechanisms, review of cost estimates, implementation procedures, and data sources. He also presented training to NRC Headquarters staff from Office of Research, Office of Nuclear Materials Safety and Safeguards, Office of General Counsel, and Commission staff. The training was repeated in September 1992 to five NRC Regions and Headquarters staff, in August 1995 to three Regions and Headquarters staff, and in 1998 to three Regions (one by teleconference), Headquarters staff, and staff from three Agreement States.

- Financial Assurance Workshops for NRC Agreement States Staff.

  Mr. Dean developed and presented a workshop on design and implementation of financial assurance for decommissioning to representatives of 28 States at the NRC annual meeting of Agreement States in October 1991. He also developed and presented a two-day training program in July 1993 sponsored by NRC's Agreement States Office for staff from 14 Agreement States. Training consisted of overview of financial assurance concepts and procedures for technical review of financial assurance submissions, including cost estimates and financial mechanisms, from nuclear materials licensees.

- Review of Decommissioning Cost Estimates and Financial Assurance Mechanisms for Proposed Fuel Enrichment Facilities.

  Mr Dean is currently managing reviews of cost estimates and financial mechanisms submitted by Louisiana Energy Services (LES) and U.S. Enrichment Company (USEC) in support of their license applications.

- Financial Assurance Compliance Support to NMSS.

  Mr. Dean has managed or participated in support to NMSS and to NRC's Office of General Counsel in special enforcement situations involving the financial ability of materials licensees to carry out necessary decommissioning activities. Topics evaluated have included corporate ownership and piercing the corporate veil of a holding company involved in bankruptcy to determine if associated companies could be sources of financial assurance for decommissioning, evaluation of the financial condition of several firms in bankruptcy or reporting financial distress and assessments of their ability to pay financial assurance if needed, review of financial mechanisms either proposed or in use by licensees, and other topics.

- Financial Assurance Compliance Support to NRR.
  Mr. Dean has provided support to NRR for the review of the terms and conditions of trust funds submitted by reactors, including a review in 2005 of proposed amendments to non-qualified decommissioning trust agreements for Turkey Point and St. Lucie nuclear plants. He has also reviewed tax issues pertaining to decommissioning trust funds established for nuclear power reactors, including evaluation of a private letter ruling addressing the tax liability of a licensee for reactor decommissioning financial assurance.

Analysis of Bankruptcy Issues Affecting Financial Assurance

- Evaluation of Vulnerability of Financial Assurance Mechanisms in Bankruptcy.
  In support of the Environmental Protection Agency's evaluation of various financial mechanisms for use to provide financial assurance for closure and post-closure care of hazardous waste management facilities, Mr. Dean prepared a comprehensive analysis of the vulnerability of financial tests, letters of credit, trust funds, and surety bonds in reorganization and liquidation. In particular, he evaluated the effects of the automatic stay provision, legal decisions allowing environmental claims and/or administrative cost claims to avoid the automatic stay; the likelihood of government claims that are subject to the automatic stay to later be given preference over other claims; and the effects of the cram down provision on the likelihood of recovery if government claims are not given priority. He also evaluated the law pertaining to the bankruptcy or reorganization of parent and subsidiary corporations and the law of parent to subsidiary ("downstream"), subsidiary to parent ("upstream") and subsidiary to subsidiary ("cross-stream") corporate guarantees.

- Bankruptcy Analysis Support to NRC.
  Mr. Dean has provided support to both NRR and NMSS staff for the analysis of bankruptcy issues. For NRR, he prepared an evaluation of nuclear power reactor ownership structures and their effects on NRC's reactor decommissioning financial assurance requirements that included an examination of the bankruptcy vulnerabilities of different forms of business organization, including corporations and partnerships as well as new forms of organization such as limited partnerships, limited liability partnerships (LLPs), limited liability limited partherships (LLLPs), and limited liability companies (LLCs). For NMSS, he supervised the preparation of a summary of bankruptcy law as it was likely to affect NMSS financial assurance; identified sources of information on the likelihood that a firm that emerges from reorganization will reenter bankruptcy and the time periods in which their reentry is most likely to occur; and evaluated financial assurance submissions by the Fansteel corporation that involved bankruptcy issues.

Analysis of Business Organization Issues Affecting Financial Assurance

- Corporate Guarantees.

  For the EPA, Mr. Dean researched the law on corporate guarantees and developed the terms and conditions of the corporate guarantee used in 40 CFR Parts 264 and 265 for financial assurance for closure and post-closure care of hazardous waste facilities. These corporate guarantee terms and conditions were subsequently adopted for financial assurance for underground storage tanks, and, by the NRC, for decommissioning financial assurance of facilities licensed by NMSS. For the EPA, Mr. Dean also reviewed the impacts of state insurance law on corporate guarantees for liability coverage.

- Evaluation of Power Reactor Ownership Structures.

  For NRC/NRR, in response to a critical study released by the STAR Foundation of the increasing use of limited liability companies and multi-tiered holding companies to own nuclear power plants, Mr. Dean prepared a comprehensive working paper describing the basic attributes of corporations, partnerships (including limited liability partnerships and limited liability limited partnerships), and limited liability companies in terms of their organic statutes (Uniform Partnership Act, Uniform Limited Partnership Act, Uniform Limited Liability Company Act, etc.) as well as other governing law. The paper compared their key organizational attributes in terms of characteristics or actions most likely to affect financial assurance (e.g., limited liability, property ownership and distribution, and dissolution of the entity). The paper evaluated whether complex holding companies or other forms of organization that include limited liability subsidiaries pose a risk to the NRC of failing to provide reasonable financial assurance for decommissioning. The paper also reviewed the use of organizational terms in 10 CFR Part 50 and recommended changes to reflect the increased variety of business organizational structures in current use by reactor owners.

- Evaluation of Licensee's Use of Limited Liability Companies.

  Mr. Dean prepared a detailed set of draft Requests for Additional Information submitted by the Office of Nuclear Reactor Regulation to Exelon Energy Corporation dealing with Exelon's use of numerous limited liability companies (LLCs) to hold trust funds for nuclear reactor decommissioning. Mr. Dean also participated in numerous teleconferences with Exelon staff, accountants, and attorneys, and NRC staff to receive Exelon's verbal explanations and determine if additional information was required. Mr. Dean then prepared a written analysis that formed the basis for a part of the Safety Evaluation Report on the licensee's proposed transactions, which involved license transfers and changes in control of the decommissioning trust funds.

Decommissioning Technology

- Evaluation of Institutional Controls for Decommissioning Facilities.
  Mr. Dean has provided support to several federal agencies, including EPA and the Department of Energy, for the evaluation of potential institutional controls for decommissioning facilities. For the DOE, he managed a study of potential long-term controls for weapons-program sites contaminated with high-level radioactive materials and evaluated studies of institutional controls at particular DOE sites prepared by the Environmental Defense Fund. For EPA, he prepared analyses of such institutional controls as deed notices, covenants, easements, and similar restrictions for use at hazardous waste management facilities and brownfields sites.

- Review of Restricted Release Decommissioning Scenarios at Selected NRC Sites.
  Mr. Dean prepared a comparison of restricted release scenarios, including site setting, constituents of concern, release criteria (DCGLs), sludges, structures, soils, groundwater, drummed wastes and solid wastes on site, disposal cell design, institutional controls and land use restrictions, offsite disposal alternatives, estimated costs, and expected duration of restrictions, for several sites, including Sequoyah Fuels, Shieldalloy Metallurgical Corporation, Molycorp, Inc., and Fansteel, Inc., as input to the remedial design for the SafetyLight site.

- Development of Independent Decommissioning Cost Estimate for NMSS Licensee Site.
  Mr. Dean participated in the evaluation of decommissioning alternatives for the SafetyLight (SLC) site located in Bloomsburg, PA. In particular, he prepared the component of the revised cost estimate developed by ICF for the site that addressed institutional controls for the site, he participated in the review and evaluation of alternative scenarios for restricted and unrestricted release, and he reviewed the final report prepared by ICF.

Preparation of Draft NRC Rulemaking and Guidance Documents on Financial Assurance

- Rulemaking Support for Financial Assurance Requirements for NMSS Licensee Decommissioning.
  Mr. Dean managed support to NMSS for the review of a petition for rulemaking by Westinghouse and General Electric requesting revised financial assurance requirements for large firms. The project involved quantification of the degree of assurance provided by all financial assurance mechanisms currently authorized by NRC and comparison to the degree of assurance provided by proposed financial test mechanism. (Cited as an example in NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook.") The project culminated in development of the financial test for financial assurance currently used by the NRC. Support for the rulemaking included development of draft text for the Federal Register notice, preparation of a Regulatory Analysis, OMB clearance document, and comment summary and analysis. Mr. Dean also managed a related project to address decommissioning by licensees that are not-for-profit entities, such as hospitals and universities, or that cannot qualify for the bond component of the financial test because they do not issue bonds. The report was published as NUREG/CR-6514, *Analysis of Potential Self-Guarantee Tests for Demonstrating Financial Assurance by Non-Profit Colleges, Universities, and Hospitals, and by Business Firms That Do Not Issue Bonds,* June 1997, and formed the basis for

rulemaking action by NMSS. Support for that rulemaking also included development of draft text for the Federal Register notice, preparation of a Regulatory Analysis, OMB clearance document, and comment summary and analysis.

- Rulemaking Support for Financial Assurance Requirements for Power Reactor Decommissioning.

  Mr. Dean participated in a review of public comments on an NRC proposal to revise the financial assurance requirements for power reactors, proposed revisions to the trust fund requirements in 10 CFR Part 50, provided support for the preparation of a rule amending the requirements for nuclear power reactor decommissioning trust funds, and assisted NRC in a review of existing guidance.

- Financial Assurance Guidance.

  Mr. Dean provided support for the development of guidance materials implementing NRC requirements for financial assurance for decommissioning of licensed facilities, including NUREG-1336, Rev. 1, *Standard Format and Content Guide for Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72*, July 1989 and NUREG-1337, Rev. 1, *Standard Review Plan for the Review of Financial Assurance Mechanisms for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72*, August 1989, Regulatory Guide 3.66, *Standard Format and Content Guide for Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72*, September 1998, and NUREG-1727, NMSS Decommissioning Standard Review Plan, September 2000.

Support for Financial Assurance Requirements of the Environmental Protection Agency

- Financial Assurance for Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDFs).

  Between 1980 and 1983, while employed by the Government Research Corporation, Mr. Dean supported the development of financial assurance requirements by the Environmental Protection Agency under the Resource Conservation and Recovery Act (RCRA) for hazardous waste TSDFs. He participated in meetings with private attorneys and experts from the American Bankers Association and other trade organizations on trust funds, surety bonds, letters of credit and other financial instruments. He also participated in the development of a financial test for financial assurance. Mr. Dean also participated in the development of guidance on the preparation of decommissioning cost estimates for TSDFs.

- Financial Assurance for Underground Storage Tanks and Municipal Waste Disposal Facilities.

  Beginning in 1984, at ICF, Mr. Dean provided support to the EPA for the development of financial assurance requriements for leaking underground storage tanks containing petroleum and for municipal landfills. He also worked on the development of standards for limiting lender liability for environmental cleanup costs at facilities containing underground storage tanks.

PROFESSIONAL AFFILIATIONS

Member of the Bar of the District of Columbia (Admitted to Practice, 1979)

SELECTED PUBLICATIONS/PRESENTATIONS

NUREG/CR-6514, *Analysis of Potential Self-Guarantee Tests for Demonstrating Financial Assurance by Non-Profit Colleges, Universities, and Hospitals, and by Business Firms That Do Not Issue Bonds* June 1997.

"Financial Assurance for Low-Level Radioactive Waste Disposal Facilities: Factors Affecting the Type, Levels, and Duration of Requirements," presented at WASTE MANAGEMENT '89, Tucson, Arizona March 1, 1989.

"EPA Regulations: Mixed Waste, RCRA and Low-Level Waste," presented at the seminar on Liability Coverage for Low-Level Radioactive Waste Disposal Facilities at the quarterly meeting of the Low-Level Radioactive Waste Forum, April 27-29, 1987.

"RCRA Reauthorization: What It Means For Your Company," speech presented at Hazardous Materials Expo '85, Chicago, Illinois, August 1985.

"Review of Financial Responsibility Regulations," paper presented at RCRA Financial Responsibility and Closure/Post-Closure Plans Seminar, sponsored by Government Institutes, Inc., Washington, D.C., June 1981.

"The Design of Hazardous Waste Management Financial Responsibility Programs," paper presented at Third National Conference on Hazardous Materials Management, Anaheim, California, March 1981.

Student Topics Editor, "The Tax Lawyer," Journal of the American Bar Association, Tax Section (published jointly with Georgetown University Law Center), 1978-1979.

1 MS. CLARK: Do you have, before you, a
2 document entitled NRC Staff Rebuttal Testimony
3 Regarding Deconversion?
4 WITNESS PARK: Yes.
5 WITNESS MAYER: Yes.
6 WITNESS DEAN: Yes.
7 WITNESS JOHNSON: Yes.
8 WITNESS PALMROSE: Yes.
9 MS. CLARK: Did you prepare this testimony
10 for submission into the record, in this proceeding?
11 WITNESS PARK: Yes.
12 WITNESS MAYER: Yes.
13 WITNESS DEAN: Yes.
14 WITNESS JOHNSON: Yes.
15 WITNESS PALMROSE: Yes.
16 MS. CLARK: Do you have any corrections,
17 or revisions, to this testimony at this time?
18 WITNESS PARK: No.
19 WITNESS MAYER: No, we don't.
20 WITNESS DEAN: No.
21 WITNESS JOHNSON: No.
22 WITNESS PALMROSE: No.
23 MS. CLARK: Do you adopt this written
24 testimony as your sworn testimony in this proceeding?
25 WITNESS PARK: Yes.

1 WITNESS MAYER: Yes.

2 WITNESS DEAN: Yes.

3 WITNESS JOHNSON: Yes.

4 WITNESS PALMROSE: Yes, I do.

5 MS. CLARK: I now move to have the NRC
6 Staff rebuttal testimony admitted into the record of
7 this proceeding.

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

10 (No response.)

11 CHAIR BOLLWERK: Hearing none, then the
12 NRC Staff rebuttal testimony regarding deconversion
13 will be adopted and placed into the record as if read.

14 (Whereupon, the prefiled rebuttal
15 testimony of Mr. Palmrose, Mr. Park, Ms. Mayer, Mr.
16 Craig, and Mr. Johnson was bound into the record as if
17 having been read.)**

18

19

20

21

22

23

24

25

October 11, 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 REGARDING DECONVERSION

Q.1. Please state your name, occupation and by whom you are employed.

A.1. (TJ) Timothy C. Johnson. I am the U.S. Nuclear Regulatory Commission (NRC) Project Manager overseeing the licensing of the proposed Louisiana Energy Services, L.P. (LES) uranium enrichment facility near Eunice, New Mexico. I have been the PM for the project since its inception in January 2002, when LES initiated discussion with NRC for the project.

A.1. (JP) James Park. I am the NRC Project Manager for the environmental review of the application for construction and operation of the proposed uranium enrichment facility submitted by LES.

A.1. (DP) Donald E. Palmrose, Ph.D. I am employed by Advanced Systems Technology and Management Incorporated. I am providing this testimony under a technical assistance contract with the NRC.

A.1. (JM) Jennifer Mayer. I am employed as a consultant by ICF Consulting. I am providing this testimony under a technical assistance contract with the NRC.

A.1. (CD) Craig Dean. I am employed as a consultant by ICF Consulting. I am providing this testimony under a technical assistance contract with the NRC.

Q.2. Have you previously submitted testimony in this proceeding?

A.2. (TJ, JP, DP, JM, CD) Yes, we provided pre-filed direct testimony in this proceeding on September 15, 2005, on behalf of the NRC Staff. In that testimony, we described our individual responsibilities related to the NRC Staff's review of the application by Louisiana Energy Services, L.P. (LES) to construct and operate a uranium enrichment facility in Lea County, New Mexico, to known as the National Enrichment Facility (NEF). Statements of our professional qualifications were attached to that testimony.

Q.3. What was the purpose of your previous testimony?

A.3. (TJ, JP, DP, JM, CD) The purpose of our pre-filed direct testimony was to provide the NRC Staff's views concerning the admitted contentions regarding the plausibility and cost of LES's proposal to deconvert the depleted uranium hexafluoride (DUF_6) produced by the enrichment process to triuranium oxide (U_3O_8) for disposal.

Q.4. What is the purpose of this testimony?

A.4. (TJ, JM, CD) To provide our views on NIRS/PC's pre-filed testimony of Dr. Arjun Makhijani regarding deconversion.

Q.5. Have you read the direct pre-filed testimony of Dr. Makhijani regarding deconversion? If so, please state your opinion of the testimony.

A.5. (TJ, JM, CD) Yes we have. First, we disagree with Dr. Makhijani's conclusion that LES's estimate of $2.67 per kgU is not credible because it is less than the cost Urenco is paying for conversion at the Pierrelatte plant in France, or [illegible]uros per kgU. There are a number of reasons that the cost to LES to construct and operate a deconversion facility could differ from those for the Pierrelatte plant. However, there is no basis on which to make a comparison between the two because the only information which has been provided by Dr. Makhijani is the price Urenco is paying for deconversion. It is not possible to determine the cost of building, licensing or operating a deconversion plant

from the price being charged to a customer. Thus, there is no way to assess the reliability of Dr. Makhijani's assumption that the price charged to Urenco would be equivalent to the costs LES would incur to deconvert UF_6 at a facility constructed and operated in the United States. Absent such information, we believe that the basis for the Pierrelatte price is insufficiently documented to determine a cost estimate for the cost of deconversion.

In contrast, LES has estimated the specific cost elements of construction and operation by using the costs documented in a recent business study developed by Urenco for a proposed deconversion facility to be built in Capenhurst. In addition, LES has accounted for anticipated differences between that facility and the one proposed for LES by adjusting the costs to account for the larger scale of the LES facility and including the costs of "Americanization" to account for matters such as the different regulatory structure in the United States. In our view, this process results in a more realistic and supportable cost estimate than simply assuming that the cost Urenco is paying for deconversion in France would be identical to that LES would be expected to pay in the United States.

Q.6. What is your opinion of Dr. Makhijani's testimony regarding the impact of the cost of neutralization of hydrofluoric acid (HF) produced by the deconversion process?

A.6. (TJ, JM, CD) We disagree with Dr. Makhijani's claim that the LES cost estimate does not account for the cost of neutralization of the HF. Dr. Makhijani states that the Pierrelatte plant currently reuses or sells the HF produced by the deconversion process and reuse or sale of HF is also assumed for the proposed Capenhurst facility. LES, on the other hand, proposes to neutralize the HF produced to produce CaF_2 for disposal. Dr. Makhijani claims that this neutralization step has not been accounted for in LES's cost estimate and the estimated cost of deconversion is therefore too low.

We disagree. First, Dr. Makhijani overlooks the fact that when the HF is sold on the open market it results in revenues to the deconversion facility which offset the costs of the facility. Because LES is not proposing to sell HF, it is not accounting for any revenues in its cost estimate. In addition, LES has explained that in order to sell HF a deconversion facility must incur additional costs for equipment to store the product before commercial sale. LES did not include any additional costs to account for neutralization to the costs obtained from the Urenco business study because these costs would be offset by the elimination of equipment for storing HF prior to commercial sale. Staff exhibit 39. Thus, Dr. Makhijani is not correct in stating that this difference has not been taken into account. With regard to the notation in the Urenco business study that the effective provision would be increased, LES Exhibit 91 at 9/15, it is our understanding that this refers to the cost of adding the cost of neutralization to the capacity to store HF for sale; in other words, maintaining both process lines rather than just one.

Q.7. What about Dr. Makhijani's claim that the cost of HF neutralization is significantly higher than the cost of selling HF?

A.7. (TJ, JM, CD) This claim is not supported by the evidence cited. Dr. Makhijani relies upon a statement in the 1997 cost analysis report for long-term management of depleted uranium hexafluoride prepared by the Lawrence Livermore National Laboratory for the Department of Energy (LLNL report) that "neutralization of HF produced by conversion processes results in higher estimated costs than production and sale of AHF." NIRS Exhibit 56 at p 49. However, the quoted conclusion summarizes the result after both costs and revenues are considered. The difference Dr. Makijani points to primarily reflects the fact that if AHF is not sold, there will be a loss of revenue and therefore a higher cost to the company. In fact, an examination of the costs in the LLNL

report indicate that when revenues from byproduct sales are removed, the cost associated with anhydrous HF production is nearly the same as the cost of HF neutralization. NIRS Exhibit 56, Table 4.8, p 52. As shown in the relevant portions of that Table reproduced below, there is less than a three percent disagreement between these two costs.

	AHF production	HF Neutralization
Cost with Byproduct Sales ($)	266,950,000	325,230,000
Byproduct Sales Credit ($)	77,320,000	11,020,000
Cost without Byproduct Sales Credit ($)	344,270,000	336,250,000

Q.8. What about Dr. Makhijani's claim that the CaF_2 produced by the deconversion process must be disposed of at a low-level waste facility because the option of using a landfill was not evaluated in the Staff's Environmental Impact Statement?

A.8. (TJ, JP, DP) It is our understanding that the adequacy of the Staff's environmental review is not at issue here so we will not address the details of how our environmental review was conducted. However, as a general matter the Staff's review under NEPA is only to assess the environmental impacts of the proposed action. While the Staff makes assumptions in the course of its review, many of which are for the purpose of ensuring that the most conservative review is conducted, it does not make decisions as to how the proposed action will be carried out. Thus, Dr. Makhijani is wrong in claiming that the Staff has determined the only acceptable method of disposal because the Staff does not make disposal decisions for applicants or other entities.

Q.9. Does this conclude your testimony?

A.9. (TJ, JP, DP, JM, CD) Yes.

1 MS. CLARK: At this time I would like to
2 identify the NRC Staff exhibits that are associated
3 with our deconversion testimony.
4 NRC exhibit number 36 is NUREG 1790, the
5 final environmental impact statement for the proposed
6 National Enrichment Facility in Lea County, New
7 Mexico, chapters 2 and 4.
8 (Whereupon, the above-
9 referenced to document was
10 marked as NRC Staff Exhibit No.
11 36 for identification.)
12 MS. CLARK: NRC Staff exhibit number 37 is
13 NUREG 1827, entitled Safety Evaluation Report for the
14 National Enrichment Facility in Lea County, New
15 Mexico, chapter 10.
16 (Whereupon, the above-
17 referenced to document was
18 marked as NRC Staff Exhibit No.
19 37 for identification.)
20 MS. CLARK: Staff Exhibit number 38 is
21 NUREG CR6477 entitled Revised Analysis of
22 Decommissioning Reference Non-Fuel Cycle Facilities.
23
24
25

1 (Whereupon, the above-
2 referenced to document was
3 marked as NRC Staff Exhibit No.
4 38 for identification.)
5 MS. CLARK: Staff Exhibit number 39 is an
6 in-office review summary LES decommissioning fund,
7 dated April 19, 2005.
8 (Whereupon, the above-
9 referenced to document was
10 marked as NRC Staff Exhibit No.
11 39 for identification.)
12 MS. CLARK: Staff exhibit number 40 is a
13 letter from Robert Pierson of the NRC, to Robert
14 Williams, Westinghouse Electric Corporation. The
15 subject renewal and closing Safety Evaluation Report
16 for the renewal of special nuclear material license
17 SNM1107 for the Westinghouse Electric Corporation
18 Columbia Fuel Fabrication Facility, in Columbia, South
19 Carolina.
20 (Whereupon, the above-
21 referenced to document was
22 marked as NRC Staff Exhibit No.
23 40 for identification.)
24 MS. CLARK: Staff exhibit number 41 is a
25 letter from Robert Pierson, NRC, to L. J. Moss of

1 Siemens Power Corporation, the subject renewal
2 enclosing safety evaluation report for the renewal of
3 special nuclear material license, SNM1227 for the
4 Siemens Power Corporation, Richland Engineering and
5 Manufacturing Facility.
6 (Whereupon, the above-
7 referenced to document was
8 marked as NRC Staff Exhibit No.
9 41 for identification.)
10 MS. CLARK: And Staff exhibit number 42,
11 a letter from Michael F. Webber, of the NRC, to Ralph
12 Reda, subject Safety Evaluation Report application
13 dated September 19, 1997, changes to table 6.0 for the
14 DCPHF effluent recovery and storage facility, and
15 enclosing Safety Evaluation Report for the renewal of
16 special nuclear material license SNM1097 for the
17 General Electric Company.
18 (Whereupon, the above-
19 referenced to document was
20 marked as NRC Staff Exhibit No.
21 42 for identification.)
22 MS. CLARK: Staff Exhibit 46 is -- I'm
23 sorry, that is it, just up to Staff exhibit 42.
24 CHAIR BOLLWERK: All right.
25 MS. CLARK: I now move to have these

1 exhibits admitted into evidence.

2 CHAIR BOLLWERK: All right. The record

3 should first reflect that Staff exhibits 36 through

4 42, as described by counsel, have been marked for

5 identification, and a motion has been made that these

6 exhibits be admitted into evidence.

7 Any objections?

8 (No response.)

9 CHAIR BOLLWERK: Then hearing none, then

10 Staff exhibits 36, 37, 38, 39, 40, 41, and 42, as

11 described by counsel, are admitted into evidence.

12 (The document referred to,

13 having been previously marked

14 for identification as NRC Staff

15 Exhibit Nos. 36-42 were

16 admitted into evidence.)

17 MS. CLARK: Do you have, before you, a

18 document entitled Revised Rebuttal Testimony of Dr.

19 Arjun Makhijani in support of NIRS/PC Contentions EC-

20 3, TC-1, EC-5, TC-2, and EC-6, TC-3, concerning LES'

21 Deconversion Strategy and Cost Estimate?

22 WITNESS PARK: Yes.

23 WITNESS MAYER: Yes.

24 WITNESS DEAN: Yes.

25 WITNESS JOHNSON: Yes.

1 WITNESS PALMROSE: Yes, I do.

2 MS. CLARK: I would like to direct your
3 attention to page 8 of that testimony, and to
4 paraphrase what Dr. Makhijani has said, on page,
5 beginning on page 8, essentially he has testified that
6 the disposal of calcium fluoride, which is a byproduct
7 of the deconversion facility, as low level waste, was
8 the only option considered by the NRC Staff in the
9 draft, or the final environmental impact statements.

10 Continuing to page 9 Dr. Makhijani states
11 that because of the alternative of disposal in an
12 industrial landfill was not considered, the
13 environmental impacts of this option have not been
14 evaluated.

15 Dr. Palmrose, were you primarily
16 responsible for drafting the Staff's environmental
17 impact statements as they relate to disposal options?

18 WITNESS PALMROSE: Yes, I did.

19 MS. CLARK: Can you please explain whether
20 you believe that Dr. Makhijani has accurately
21 characterized your review?

22 WITNESS PALMROSE: No, he has not. I
23 disagree with the statement on page 9. I didn't
24 select, or eliminate the option of sale or any
25 disposal option for calcium fluoride in the

1 environmental impact statement.

2 I reviewed all reasonable options for

3 their environmental impacts. What I applied was the

4 most conservative analysis for calcium fluoride,

5 namely for the transportation and disposal as low

6 level waste.

7 This does not mean that other options that

8 would have lower impacts are eliminated, but that this

9 analysis would bound those impacts.

10 MS. CLARK: Mr. Park, are you the NRC

11 staff member responsible for the overall management of

12 the Staff's environmental review?

13 WITNESS PARK: Yes, I was.

14 MS. CLARK: As I explained before, Dr.

15 Makhijani has claimed that if a particular option is

16 not explicitly evaluated in an environmental impact

17 statement, there is no legal basis on which the NRC

18 may permit that action to occur.

19 Is that consistent with your understanding

20 of the purpose and effect of the Staff's environmental

21 review?

22 WITNESS PARK: No, that is not consistent

23 with my understanding.

24 MR. LOVEJOY: I object to the witness

25 testifying about the legal standards. He can talk

1 about his own understanding of his assignment.

2 MS. CLARK: Well, his assignment, part of

3 his assignment is assessing the scope of the Staff's

4 environmental review. And I think he is a very well

5 qualified expert on that subject.

6 I'm not asking him for a legal opinion,

7 I'm asking him for the scope of the Staff's and the

8 purpose of the Staff's overall NEPA review.

9 CHAIR BOLLWERK: Well, I think he can

10 testify as to what he understands his responsibilities

11 were. Is that the point you are making?

12 MR. LOVEJOY: That is all right.

13 CHAIR BOLLWERK: All right, then let's

14 frame it in those terms, then.

15 MS. CLARK: In the context of your

16 assignment to manage the Staff's review, what is your

17 understanding of the scope and the purpose of that

18 obligation?

19 WITNESS PARK: Are you asking my

20 responsibilities concerning this particular project,

21 or regarding the NEPA analysis itself?

22 MS. CLARK: Well, the NEPA analysis, yes.

23 WITNESS PARK: In regards to the NEPA

24 analysis for this proposed action the purpose of a

25 NEPA analysis is to evaluate the potential

1 environmental impacts associated with such a proposed
2 action.
3 NEPA analysis and the documents that
4 result, are not the manner in which the NRC would
5 actually impose license conditions, or license a
6 facility. It informs the Staff's decision as to
7 regarding a decision whether or not to issue that
8 license.
9 MS. CLARK: Thank you. Mr. Johnson, are
10 you the NRC Staff project manager responsible for the
11 overall review of the license application at issue
12 here?
13 WITNESS JOHNSON: Yes, I am.
14 MS. CLARK: And assuming that your review
15 is successfully completed, isn't it true that a
16 license will then be issued, basEd on this
17 application?
18 WITNESS JOHNSON: Yes.
19 MS. CLARK: Can you explain whether that
20 license is issued to LES as a company, or is it
21 licensed to the National Enrichment Facility, as such?
22 WITNESS JOHNSON: The license would be
23 issued to LES as the entity that would construct and
24 operate the uranium enrichment facility that is
25 proposed.

1 MS. CLARK: So in that case is it fair to
2 say that the license relates to the activities
3 undertaken by LES with regard to the operation and
4 construction of the NEF?
5 WITNESS JOHNSON: Yes.
6 MS. CLARK: Would this license have any
7 application to the operation or construction of a
8 deconversion facility which LES has proposed, with
9 regard to deconvert the tails produced by the National
10 Enrichment Facility?
11 WITNESS JOHNSON: No, the license that
12 would be issued, assuming that positive determinations
13 are made in favor of the Applicant, would be issued
14 for the construction and operation of uranium
15 enrichment facility, it would not be for the purpose
16 of deconverting depleted uranium from that operation.
17 MS. CLARK: Is it your understanding that
18 a private deconversion facility would have to be
19 licensed?
20 WITNESS JOHNSON: Yes, it is.
21 MS. CLARK: Would it necessarily be
22 licensed by the NRC?
23 WITNESS JOHNSON: It could be licensed by
24 either the NRC or an agreement state, if the facility
25 was proposed to be located in an agreement state.

1 MS. CLARK: Mr. Johnson, in your review of
2 the application for the National Enrichment Facility,
3 have you identified any safety or public health
4 considerations that would require you to condition the
5 license issued to LES with regard to the ultimate
6 disposal of calcium fluoride?
7 WITNESS JOHNSON: No, we have not
8 identified any safety or environmental concern that
9 would cause us to add a license condition for the
10 uranium enrichment facility license that is related to
11 disposal of calcium fluoride, or related to the
12 operation of the deconversion facility.
13 MS. CLARK: Thank you. Next I would like
14 to move on to discuss the testimony that has been
15 submitted on rebuttal by Dr. Makhijani, and some of
16 the testimony that was presented yesterday regarding
17 costs.
18 First, I would like you to please turn
19 your attention to page 3 of Dr. Makhijani's rebuttal
20 testimony.
21 Beginning on page 3 Dr. Makhijani makes
22 the statement that despite the clear and undisputed
23 fact that the Urenco business study concerns a plant
24 that has not yet been built, NRC Staff witnesses claim
25 that the cost estimate was based on costs at an

1 existing operating facility.

2 Ms. Mayer, were you the individual who is

3 primarily responsible for preparing our testimony on

4 that subject?

5 WITNESS MAYER: Yes, I was.

6 MS. CLARK: Can you please tell us whether

7 you can explain this discrepancy that Dr. Makhijani

8 has noted?

9 WITNESS MAYER: I can. I think a little

10 review would be helpful. The W plant in Pierrelatte,

11 France, as was described yesterday, has been operating

12 at an industrial scale since 1984, and thus Cogema,

13 who runs it, has over 20 years of experience operating

14 a facility.

15 In 2004 Urenco issued a request for

16 proposal to determine if it was less costly to build

17 their own facility to deconvert tails, or to continue

18 sending their tails to the facility in Pierrelatte,

19 France.

20 Although the Capenhurst facility has not

21 been built, Cogema responded to that request for

22 proposal with an estimate that is commonly described

23 as the business study.

24 The 20 years of operational experience

25 underlie that cost, that business study, or that cost

1 estimate. When LES prepared their cost estimate for
2 this proceeding, they used that business study as the
3 basis, and made several modifications to reflect
4 conditions in the United States.
5 None of those modifications, in any way,
6 make that cost estimate reflect less of the
7 operational experience from the facility in
8 Pierrelatte, France.
9 So we have made the statement that the LES
10 estimate is in fact based on that operational
11 experience in Pierrelatte, France.
12 MS. CLARK: Thank you. Next I would like
13 to talk about some of the testimony that we heard
14 yesterday with regard to the cost of capital.
15 Yesterday we heard testimony from experts
16 from LES regarding capital costs that reflects the
17 return of investment. Mr. Dean, are you the one who
18 would primarily be responsible, in the Staff, for
19 reviewing that aspect of the cost estimate?
20 WITNESS DEAN: Yes, I was.
21 MS. CLARK: And can you briefly explain
22 your understanding of how the return on investment,
23 that we were discussing, relates to the cost estimate
24 for deconversion?
25 WITNESS DEAN: Well, in this particular

1 decommissioning situation is unusual in the sense that
2 it really is composed of a facility which will be
3 decommissioned in the customary way. That is the
4 licensee will provide full up-front funding for the
5 decommissioning cost estimate.
6 But a component of the decommissioning
7 activities will be the construction, operation, and
8 then the subsequent decommissioning of the
9 deconversion facility.
10 And that is an unusual situation with
11 respect to the standard operating guidance in NUREG
12 1757, under which decommissioning is usually
13 conducted.
14 Under 1757 the licensee generally
15 speaking, prepares a decommissioning cost estimate,
16 and then provides full up-front funding for that
17 decommissioning cost estimate in the form of a
18 financial assurance mechanism.
19 And the decommissioning cost estimate is
20 required to be provided in current dollars. In
21 essence that means that even if the decommissioning is
22 intended to take place 10, or 20 years in the future,
23 the licensee is required to fully fund the
24 decommissioning cost estimate now.
25 That is to say there is now discounting

1 back from 20 years hence to current net present value
2 of the decommissioning cost estimate that was provided
3 by the licensee for the decommissioning when it
4 ultimately occurs.
5 MS. CLARK: Assuming that that is the
6 case, and the decommissioning funding is completely
7 provided in current dollars, before operation begins,
8 would it ordinarily be necessary to account for cost
9 of capital for which, as I understand it, and please
10 correct me if I'm wrong, accounts for the costs that
11 would be charged to the company for borrowing money in
12 order to build, construct and operate a deconversion
13 facility?
14 WITNESS DEAN: No, it ordinarily would not
15 be. The licensee, as I said, provides a
16 decommissioning cost estimate which is a description
17 of all the activities that are going to take place at
18 the facility to be commissioned with their associated
19 labor rates, and costs, and materials.
20 And it then is required to either set
21 aside money in a trust fund, in full, for that amount
22 or to purchase a surety bond, or a letter of credit,
23 or another third party financial instrument for that
24 amount.
25 So there would be no necessity of

1 addressing the cost of capital.

2 MS. CLARK: So when you review these types

3 of estimates, is it ordinarily your practice to ask

4 the Applicant to account for the cost of capital in

5 this basis?

6 WITNESS DEAN: No, it is not.

7 MS. CLARK: In this case, when you began

8 reviewing the application was it your understanding

9 that that full decommissioning funding would be

10 provided?

11 WITNESS DEAN: We were uncertain, at the

12 beginning of the time that we began this review,

13 exactly how the decommissioning funding would be

14 provided. And we engaged in a long series of, I guess

15 you would describe it as back and forth with the

16 Applicant, through request for additional information,

17 and teleconferences, and other forms of communication,

18 sometimes meetings, to try to get additional details

19 about the contents of their decommissioning cost

20 estimate.

21 Primarily that was our focus at the

22 beginning of our review.

23 MS. CLARK: When you were assessing the

24 cost estimate that LES provided, what was your

25 understanding of how the cost of capital, to account

1 for return on investment, was accounted for?

2 WITNESS DEAN: Our understanding was that

3 the cost of capital, profit, any other associated

4 unusual costs associated with the deconversion

5 facility, were included in the 2 dollars and 67 cent

6 estimate that they provided.

7 That, however, was a rather long and

8 somewhat difficult process to go through. We

9 essentially started in early March of this year, with

10 nothing but the number, the 2 dollars and 67 cents per

11 KGU figure.

12 And early in March, subsequent to a

13 request for additional information, we received the

14 spreadsheet that I think is included in the exhibits

15 as NIRS/PC 234, which is a spreadsheet of analysis of

16 a financial stream of payments and costs in euros.

17 And we attempted to associate that with

18 the 2 dollars and 67 cents cost. Unsuccessfully, I

19 might add. Early in April we received a two page

20 estimate, again, in response to a request for

21 additional information.

22 I don't have, unfortunately, the exhibit

23 number that was the April 8th, 2005 submission

24 NEF05017. And we looked at it in the meeting

25 yesterday, it is the one that contains the tabular

1 description of the costs on the bottom of page 2 of 2.
2 We continued to have difficulty
3 associating the 2 dollars and 67 cents figure in
4 detail, with this table. Because, in part, it was
5 said to be based on a Urenco estimate that had been
6 provided to LES, Cogema estimate, excuse me.
7 And so finally, I think it was, the 19th
8 of April, we were asked to come into LES offices to
9 perform an in-office review of a redacted version of
10 that business case. And that, I think, is Staff
11 exhibit number 39, the memorandum that was prepared at
12 the conclusion of that in-office review.
13 There were several items on the agenda for
14 that in-office review. It was a meeting that lasted
15 several hours, and it addressed not only the business
16 case, but several other topics.
17 And the business case that we saw was
18 substantially redacted. I believe it is the same
19 redacted version that is in exhibit today. We, in the
20 course of that review, once again assumed that the
21 cost of capital and profit were included in the 2
22 dollars and 67 cents figure that was included in the
23 business case.
24 That was consistent, I might add, with the
25 way that we had treated some of the other inputs to

1 the deconversion costs that we had received. We had
2 been simultaneously looking for supporting information
3 for the transportation costs of the depleted uranium.
4 We had been looking for substantiation for
5 the estimate for disposal, and for the CAF disposal.
6 And in each case we had concluded that there was an
7 independent third party submission supporting the
8 position that LES was taking.
9 Not necessarily binding contract, but at
10 least an independent third party had looked at that
11 particular component of the cost estimate. And we
12 treated the Cogema business case in the same way.
13 In each case, the TLI estimate for
14 transportation, the WCS estimate, the Lea County
15 estimate, we did not look behind the surface of the
16 letter to enquire whether in their business case that
17 they were, essentially, providing they had included
18 capital cost or profit.
19 We took it, essentially, as face value for
20 that particular document. And we treated the Cogema
21 estimate in the same way.
22 JUDGE ABRAMSON: Mr. Dean, let me
23 interrupt for a second. And since this is a topic I
24 was trying to pursue at some length yesterday.
25 In the matters of estimates for

1 transportation and disposal of the DU and the CaF, did
2 the Applicant have independent third party estimates
3 for the actual numbers for those?
4 Or were they, again, trying to compute the
5 number based on what it would cost to build the
6 facilities?
7 WITNESS DEAN: No, you are correct, that
8 they had numbers that related to a service that was
9 going to be provided, rather than a computation of a
10 larger facility.
11 JUDGE ABRAMSON: And when you reviewed
12 what the Applicant had prepared, related to its
13 estimate of deconversion, was that based on a third
14 party estimate of deconversion service, or was it
15 based on supporting information from third parties
16 about the cost of building the facility, or providing
17 O&M for the facility?
18 WITNESS DEAN: Our understanding, I
19 believe, at that point was that Cogema might possibly
20 build the facility. We were uncertain, frankly, how
21 the facility was going to be built, because the
22 Applicant was not fully certain, itself, about --
23 JUDGE ABRAMSON: I'm sorry, what I'm
24 trying to understand is, was the Applicant, was the
25 Applicant telling you, giving you a 2.67, or 2.69,

1 I've seen two numbers, were they giving you this
2 number as provided by a third party, or were they
3 generating that number themselves, based on underlying
4 information on the cost of building the facility, and
5 O&M --
6 WITNESS DEAN: Well, they were generating
7 that number in dollars because the underlying material
8 that they were relying on was provided in euros.
9 JUDGE ABRAMSON: Now, was the underlying
10 number that was provided in euros, that is a simple
11 conversion, dollars to euros, was that -- did that
12 underlying number, was there an underlaying euro
13 equivalent of the 2.67, or were the underlying numbers
14 related only to the cost of building the facility, and
15 the cost of O&M?
16 WITNESS DEAN: The latter. We were unable
17 to ever obtain a document that did the conversion
18 between the Cogema estimate and the 2 dollars and 67
19 cents figure.
20 JUDGE ABRAMSON: Did the Cogema estimate
21 have an estimate for the cost of actual conversion
22 provided in euros?
23 WITNESS DEAN: I would have to go back and
24 look.
25 JUDGE ABRAMSON: Because you just said you

1 were unable to convert the Cogema estimate in euros to
2 the dollar estimate.
3 WITNESS DEAN: What we did not have --
4 JUDGE ABRAMSON: I'm sorry, I think your
5 colleague wants to comment here.
6 WITNESS DEAN: You are welcome to.
7 WITNESS MAYER: If I could jump in?
8 JUDGE ABRAMSON: Please.
9 WITNESS MAYER: The Cogema estimate was
10 modified in several ways to reflect the american cost.
11 JUDGE ABRAMSON: I'm sorry, was there a
12 Cogema estimate of the service itself, the
13 deconversion service?
14 WITNESS MAYER: I believe at the end of
15 the business study there is an estimate in euros.
16 JUDGE ABRAMSON: There is an estimate in
17 euros in the Cogema study?
18 WITNESS MAYER: Yes.
19 JUDGE ABRAMSON: And you looked at that,
20 and then -- you can both answer this, because this is
21 -- since you two are the two who did this.
22 When you looked at that study the
23 information in the business case was not in sufficient
24 detail to advise you how they arrived at the euro
25 number? Forget now how they converted the euro number

1 to dollars, and think about the business study that
2 you were reviewing.
3 When you looked at that business study
4 were you able to determine how the euro number for
5 deconversion cost was arrived at?
6 MS. CLARK: If it would be helpful I have
7 the business study here, if you would like to look at
8 it?
9 JUDGE ABRAMSON: Yes, that might --
10 CHAIR BOLLWERK: It is an exhibit, right?
11 What exhibit number?
12 MS. CLARK: LES 91.
13 CHAIR BOLLWERK: Thank you.
14 JUDGE ABRAMSON: How soon is your witness
15 going to be here, Mr. Curtiss?
16 MR. CURTISS: She is on her way.
17 JUDGE ABRAMSON: Great, thank you. Let me
18 go get my reading glasses.
19 (Pause.)
20 JUDGE ABRAMSON: Sorry, I can't read
21 without these things. So the question was, were you
22 able to look at this and determine how the ultimate
23 number, in euros, was arrived at?
24 And this is the study you reviewed, this
25 exhibit?

1 WITNESS DEAN: Yes, it is.

2 JUDGE ABRAMSON: And perhaps you can show

3 me where the number in euros is?

4 WITNESS MAYER: It was not our goal, in

5 that meeting, to verify their number in euros per

6 dollar, and then follow the conversion. It was simply

7 to find that there was a substantial basis that was

8 independently provided, and to understand how they had

9 adapted that into the american cost.

10 So although we think we could arrive at

11 the dollar per euro cost, right now, that was not our

12 goal in that meeting.

13 JUDGE ABRAMSON: I'm sorry, but let's go

14 back. Did -- was there a euro cost for deconversion

15 service? I want to understand, exactly, what you were

16 looking at, and exactly how you reached the conclusion

17 that this is a reasonable number.

18 WITNESS DEAN: There is a euro cost.

19 WITNESS MAYER: On page 13 of 15.

20 WITNESS DEAN: Yes, it is give in in two

21 places, and it is -- one is [redacted] euros per kilogram U

22 in 2004, which is escalated.

23 JUDGE ABRAMSON: We are looking at LES 91?

24 WITNESS MAYER: There are two costs

25 provided in, under paragraph 10, which is on page 13

of 15, of LES 91.

JUDGE ABRAMSON: Okay, that -- okay, I see it. So [redacted] euros per kilogram uranium?

WITNESS MAYER: Yes, that is actually the cost that, if I understand correctly, that is the cost that Urenco was paying to Cogema for the small quantity that they were sending, currently.

And the two lines above, where it says the price for deconversion is expected to be between [redacted] euros per kilogram uranium, is actually the estimate they arrived at.

JUDGE ABRAMSON: Now, you --

WITNESS MAYER: That estimate includes HF sales, however.

JUDGE ABRAMSON: Yes, I understand all that from yesterday. Now, when you looked at this you didn't attempt to break down and determine how this number was arrived at, is that correct?

Is that what I heard you say earlier, you did not try to break down how this [redacted] number was arrived at?

WITNESS DEAN: We reviewed the breakouts that are provided earlier in this estimate.

WITNESS MAYER: That is we looked at the scope of what it included, and the cost provided for

1 each. Those tended to be provided as a total amount,
2 rather than in dollars per, in euros per KGU.
3 JUDGE ABRAMSON: Did you see any
4 spreadsheets, or computations of the stream of
5 revenues, or anything related to this?
6 WITNESS MAYER: Well, we wouldn't be
7 looking at a stream of revenue, because they are not
8 allowed to take any credit for salvage value.
9 JUDGE ABRAMSON: I don't see what that has
10 to do with the -- you have a service they are
11 providing at [redacted] euros per kilogram. You look
12 at the number of kilograms they are servicing over the
13 period of the --
14 WITNESS DEAN: The direct answer to your
15 question is that the only spreadsheet that we saw was
16 the spreadsheet in 234. In the in-office interview we
17 did not see any additional spreadsheets.
18 JUDGE ABRAMSON: Now, you then, and they
19 gave you some explanations for how this study was
20 adapted to what they thought would be built in the
21 U.S.?
22 WITNESS DEAN: That is right.
23 JUDGE ABRAMSON: And from that they
24 generated the 2.67. Did you ever see a spreadsheet,
25 or a detailed analysis of how the 2.67 was arrived at?

1 WITNESS MAYER: The closest thing that we
2 saw to that, and I do believe that this addressed it,
3 was the four line table that we looked at yesterday,
4 that had three costs, that had the costs in dollars
5 per KGU, that had a 70 million dollar cost for the
6 capital, and several other costs.
7 JUDGE ABRAMSON: Did you have any
8 discussion with them about how the costs were
9 allocated? For example, was there a cost -- did they
10 talk with you about a cost for purchase of the site?
11 WITNESS DEAN: No.
12 JUDGE ABRAMSON: Did they talk with you
13 about how much money would be provided as equity, and
14 how much money would be provided as debt?
15 WITNESS DEAN: No.
16 JUDGE ABRAMSON: Did they talk with you
17 about how they provided for the interest during
18 construction?
19 WITNESS DEAN: No. As I said before, this
20 was a subject that was one subject in a substantially
21 larger and longer meeting.
22 JUDGE ABRAMSON: I understand that.
23 WITNESS DEAN: We did talk about
24 americanization of the estimate, and some other
25 topics, I believe.

1 JUDGE ABRAMSON: So what led you to the
2 conclusion that this 2 dollars and 67 cents is a
3 sufficiently reliable number for protecting the public
4 health and safety?
5 WITNESS MAYER: That it was based on an
6 independent request, response to a request for
7 proposal that was more or less unrelated to this
8 proceeding. That is, we had no reason to believe that
9 Cogema would be incorrect in preparing the cost
10 estimate in response to that request for a proposal.
11 And, in fact, based on their operating
12 experience we believed that they, better than anyone
13 else, would be able to estimate that correctly.
14 JUDGE ABRAMSON: And that number was
15 between [redacted] euros per kilogram uranium? Which
16 I think if I take today's rate, about a dollar 30 per
17 kilogram would take you to --
18 JUDGE KELBER: One dollar 30 per euro.
19 JUDGE ABRAMSON: I'm sorry, a dollar 30
20 per euro would take you to something like [redacted]
21 [redacted], and then you would
22 have to do all the modifications.
23 Did you attempt to do those, or you
24 assumed that LES had done them sufficiently?
25 WITNESS MAYER: Well, you have to keep in

1 mind that the scale of the two facilities are
2 different, and that one is for 3,500 metric tons --
3 JUDGE ABRAMSON: I'm aware of all that.
4 What I'm trying to understand is how you reached the
5 conclusion that the 2.67 was a reliable number.
6 I understand that you looked at a Cogema
7 business study related to the facility in Europe.
8 WITNESS MAYER: Right.
9 JUDGE ABRAMSON: Okay. And I understand
10 your rationale that Cogema had no -- you had no reason
11 to challenge Cogema's efforts, that there was any
12 question about the veracity of their efforts, or
13 truthfulness of that.
14 What I'm trying to understand is how the
15 Staff reached a conclusion that the 2.67 number is
16 sufficiently reliable to be used in decommissioning
17 funding, when you were, when you didn't have a
18 detailed breakdown of how the 2.67 was arrived at.
19 You saw what we saw yesterday, I gather?
20 WITNESS DEAN: No, actually we --
21 WITNESS MAYER: Yes, we had seen that
22 previously.
23 JUDGE ABRAMSON: The four line table?
24 WITNESS MAYER: Yes.
25 WITNESS DEAN: Yes.

1 JUDGE ABRAMSON: And the spreadsheet with
2 the 15 percent discount rate applied to something we
3 don't know what, and so what you are telling me is
4 that your basis for your conclusion was that you
5 didn't think Cogema had any reason to do things wrong
6 in their study?
7 WITNESS DEAN: It was the same basis that
8 we relied on to accept the transportation logistics
9 estimate, or the Lea County estimate.
10 JUDGE ABRAMSON: And as I understand it,
11 there is a distinction. Those estimates were actually
12 estimates for a service provided by third parties.
13 Here we have an estimate not for this particular
14 service provided by a third party, but an estimate of
15 a cost to build a facility, or a service provided for
16 a different purpose, in a different facility, with
17 different gazinzous and gazoutous, if you will let me
18 use engineering terms.
19 Okay, I think I understand, thank you Ms.
20 Clark.
21 MS. CLARK: Just to follow-up on Judge
22 Abramson's questions, how do you account for the
23 difference between the numbers in the business study,
24 in euros, and the 2 dollars and 67 cents that LES has
25 estimated?

1 WITNESS MAYER: Yes, I would like to refer
2 to Staff exhibit 39, which is the summary of the in-
3 office review. The second paragraph speaks: LES
4 staff stated that the cost estimate used for
5 proprietary Urenco business study of a proposed 3,500
6 metric ton U per year, deconversion plant for the
7 business study, which was based on a response to the
8 Urenco request for a proposal.
9 The paragraph continues to explain how the
10 modifications were done and says: LES modified the
11 Cogema information to reflect the 7,000 metric ton per
12 year capacity, by doubling the operating costs, and by
13 adding funds to reflect the increased capital and
14 construction cost of a larger capacity plant,
15 considering the shared nature of some systems.
16 Additional funds were also added for
17 americanizing the design and for licensing. The
18 exhibit continues, if I can paraphrase, to say that
19 the Cogema proposal included hydrochloric acid sales
20 and, as previously described, LES staff believed that
21 that was adequate to substitute the cost of putting in
22 the equipment to neutralize the HF to CaF.
23 And they finally described the euro rate
24 that they had used which was, I believe, a dollar,
25 1.29 euro per dollar, which was based on the November

1 day that they had actually done the calculation.
2 That was in the same year as the estimate.
3 MS. CLARK: So does the difference in
4 scale account for some reduction in overall costs, per
5 KGU?
6 WITNESS MAYER: Yes, in the, particularly
7 in the capital costs as described in that paragraph.
8 MS. CLARK: Thank you. I would like to
9 move on to a slightly different subject also regarding
10 costs. And this relates to Dr. Makhijani's testimony
11 beginning on, let's see, page 8, I believe. I'm
12 sorry, it is page 16.
13 CHAIR BOLLWERK: This is his rebuttal
14 testimony, correct?
15 MS. CLARK: Correct.
16 CHAIR BOLLWERK: Fine.
17 MS. CLARK: Here Dr. Makhijani talks about
18 the costs that he believes should be included to
19 account for washing of the cylinders that are used at
20 the deconversion facility.
21 Yesterday we heard from the LES experts
22 that costs associated with washing or disposing of
23 these cylinders has not been included in the costs for
24 the deconversion that is needed for these tails.
25 Is this information new to you?

1 WITNESS MAYER: It is in -- yesterday was
2 not the first time I had heard it. It was when Dr.
3 Makhijani's testimony was submitted, in writing, and
4 I saw it then.
5 It had originally been the Staff's belief
6 that cylinder washing had been included in the
7 estimate, because it was included in the business
8 study that we reviewed, in the in-office review we've
9 just described.
10 And we didn't realize, until last week, or
11 the week before, when that testimony was submitted,
12 that that had not been included.
13 MS. CLARK: Dr. Makhijani, if you will
14 look on page 16, talks about the costs that are in the
15 business study. He notes that the cost of disposing
16 of the cylinder would be [redacted] euros. The cost of
17 washing and reusing, and I believe this comes from the
18 business study, would be [redacted]
19 euros.
20 He then states that assuming 12 metric
21 tons of DUF6 per cylinder, and using the exchange rate
22 proposed by LES, the costs per cylinder quoted in the
23 Urenco business study would amount to at least [redacted]
24 cents per kilogram of uranium.
25 First I would like to ask you, given -- we

1 heard yesterday LES' explanation of why they do not
2 believe that any additional cost needs to be added to
3 account for cylinder washing.
4 Do you agree with this assessment?
5 WITNESS MAYER: In part.
6 MS. CLARK: Could you explain, please?
7 WITNESS MAYER: Like the cost of capital
8 disposal of tails is a fairly unusual thing to see in
9 a decommissioning cost estimate. If the facility
10 currently existed to process those tails we would
11 consider disposal of those tails to be an operational
12 cost, outside the scope of the decommissioning funding
13 plan.
14 It is only the lack of the facility that
15 brings it inside the scope. When the -- and so when
16 that facility is up and running those costs would
17 properly be considered operational cost as Mr. Krich
18 and others described yesterday.
19 With the possible exception, and I think
20 the reasonable exception of the tails that are
21 expected to be generated at the very end of the life
22 of the facility, because LES won't need them back to
23 reuse them.
24 And although Mr. Krich asserts that they
25 would be a resource to the deconversion facility, I

1 think it is reasonable for LES to account for washing
2 them, so that they could be recertified and reused by
3 that facility.
4 So in that sense, at a minimum, there is
5 some costs that we have recently discovered that ought
6 to be added to the cost estimate, that we hadn't
7 realized prior to the rebuttal testimony as being
8 missing.
9 JUDGE ABRAMSON: And I think we heard
10 yesterday a suggestion by both NIRS/PC's counsel, and
11 by the witnesses, that it wasn't necessarily clear
12 that, at least in the early years of operation, that
13 there would be just the 5,000 cylinders on-site that
14 needed to be dealt with, but that there may be some
15 stored off-site while you are waiting for them to be
16 processed.
17 So when one looks at, let's say, when one
18 looks at the possibility, however remote of NEF and
19 LES ceasing operations some point earlier than the 30
20 year end of its term, the funding needs to be there,
21 or I guess the question is for you, do you think the
22 funding needs to be there to provide for disposal, or
23 cleanup at least, of whatever cylinders there may be
24 accumulated within the ownership of LES, as opposed to
25 those that are just sitting on-site?

1 So the point is that it is not just
2 however many are in normal use between the National
3 Enrichment Facility and the deconversion facility, but
4 it is whatever they have accumulated, however many
5 cylinders they have at that point.
6 WITNESS MAYER: I'm not sure I would
7 characterize it exactly like that, for the reason that
8 LES will annually fund the following year's, or to
9 ensure that the following year's tails are included.
10 JUDGE ABRAMSON: No, I understand, and it
11 is very laudable, and I wanted to mention this
12 earlier, when you were discussing the mechanism for
13 funding, and I realize that there are a lot of
14 mechanism.
15 But here where you have a single purpose
16 vehicle that is going to provide everything, I think
17 it is laudable that you and the Applicant have reached
18 the conclusion that this should be funded up front
19 with a bond, and that the bond is going to be adjusted
20 going forward, so that it always covers what needs to
21 be covered at that instant, or for the three year
22 window that the bond exists.
23 But the question is what needs to be
24 covered.
25 WITNESS MAYER: Right. And there are two

1 ways you could look at what might happen. One is that
2 the deconversion facility is built and operated during
3 the life of the NEF, in which case I would suggest
4 that the number, you could arrive at an expected
5 number of cylinders to be in that recycle loop.
6 And that funding for washing those would
7 appropriately be included because at the end of the
8 life of the facility they will be there.
9 The other circumstance is that the
10 deconversion facility is not built and potentially an
11 entire, the entire life of the NEF's operations there
12 be a tail cylinder for all of those tails.
13 So that would be the maximum number of --
14 JUDGE ABRAMSON: Right. And --
15 WITNESS MAYER: -- cylinders involved.
16 JUDGE ABRAMSON: -- so as you go forward,
17 sorry I didn't mean to cut you off. But as you go
18 forward, let's say at year 15, the NEF has been
19 running now for 12 years, because it took three years
20 to construct, I'm just making hypotheticals up.
21 The NEF has been running for 12 years.
22 Over the period of time it gradually built up, there
23 is no deconversion facility yet, hypothetical, right?
24 WITNESS MAYER: Right.
25 JUDGE ABRAMSON: So now what has to, what

1 the bond has to cover is disposition of everything
2 that has been accumulated up to that point, right?
3 WITNESS MAYER: Right.
4 CHAIR BOLLWERK: Okay. And that is the
5 way I understand it, and that is the way I understand
6 the Applicant proposes to do. Is that right, Mr.
7 Curtiss?
8 MR. CURTISS: I will have our witness
9 speak to that.
10 JUDGE ABRAMSON: Okay.
11 MR. CURTISS: And I will recall both Mr.
12 Krich and Ms. Compton.
13 JUDGE ABRAMSON: That will be great, thank
14 you.
15 So what you are saying is that there may
16 be an element of the size, of the cost estimate, which
17 needs to go into the size of the bond, which relates
18 to washing the cylinders, which has not yet been
19 included in the cost, which you think needs to be
20 included?
21 WITNESS MAYER: That is correct.
22 JUDGE ABRAMSON: Okay.
23 WITNESS MAYER: It is arriving at what
24 that estimate is going to be. And it would be my
25 suggestion that LES work with the NRC to figure out

1 what is a reasonable recycled number of cylinders
2 involved in the recycle loop.
3 And that be --
4 JUDGE ABRAMSON: Well, it is clear, before
5 there --
6 WITNESS MAYER: -- basis.
7 JUDGE ABRAMSON: But it is clear before
8 there is a deconversion facility, there is nothing
9 being recycled. So up to the point that there is a
10 deconversion facility you can do the number very
11 simply, it is just whatever they have processed,
12 right?
13 WITNESS MAYER: Correct.
14 JUDGE ABRAMSON: Okay. And then when you
15 get a deconversion facility things change, because now
16 you have a hard contract, and a lot of things change.
17 WITNESS MAYER: Well, and I would argue
18 that if steps are taken, that the deconversion
19 facility is licensed but not built, that you could
20 continue making the assumption that it will be that
21 quantity of cylinders that you have involved.
22 At the same time the NRC has the ability,
23 during the annual updates of the financial assurance
24 mechanism, if it becomes clear that that NEF facility,
25 I'm sorry, if the deconversion facility will not be

1 built, that they could, at that point, then require
2 funding for all of the cylinders over the life of the
3 facility.
4 In other words, they have the --
5 JUDGE ABRAMSON: Yes, you could require --
6 WITNESS MAYER: -- ability --
7 JUDGE ABRAMSON: -- that, but what would
8 be the sense? You only need to require them to fund
9 what their problem is. And if it is a three year, if
10 it is a bond good for three years, you require them to
11 fund whatever is going to be the liability over that
12 three year window.
13 And then at the end of three years you
14 adjust. Assuming there are not changes in the
15 interim. And we will get to the change question
16 later.
17 WITNESS MAYER: I agree, I'm just pointing
18 out that the NRC has a mechanism that if it suddenly
19 becomes apparent that the facility, the deconversion
20 facility isn't built, that they have the ability to,
21 at that point, request the funding for the rest of the
22 cylinders, if they wanted to.
23 JUDGE ABRAMSON: I'm done, thank you.
24 MS. CLARK: I don't have anything further
25 at this point. So since our testimony has already

1 been entered in the record, the panel is available for
2 cross examination.
3 CHAIR BOLLWERK: All right. Let me turn
4 to Mr. Curtiss first, and see if he has any questions.
5 Then we can take a break, if that would be useful to
6 you, why don't we go ahead and do that?
7 Do you have any questions for the panel?
8 MR. CURTISS: Just one for Ms. Mayer.
9 EXAMINATION BY MR. CURTISS OF
10 DONALD PALMROSE
11 JAMES PARK
12 JENNIFER MAYER
13 CRAIG DEAN
14 TIMOTHY C. JOHNSON
15 MR. CURTISS: Based upon, or the panel as
16 a whole, I should say.
17 Based upon the review that you've
18 undertaken of the plausibility of a deconversion
19 facility, which is one of the issues that has been
20 raised in this proceeding, do you have a view about
21 this point, based upon your understanding of the
22 Areva/Cogema experience, the Areva MOU, with LES,
23 whether at this point in time it is reasonable,
24 plausible I should say, that a deconversion facility
25 could be built?

1 MS. CLARK: Excuse me, I would ask that
2 this question be answered by a Staff member.
3 MR. CURTISS: Okay.
4 MS. CLARK: Mr. Johnson. Ms. Mayer and Mr.
5 Dean are contractors and can't speak to NRC Staff
6 determinations.
7 MR. CURTISS: Mr. Johnson, I will direct
8 that question to you.
9 WITNESS JOHNSON: Yes, I believe that the
10 Memorandum of Understanding with the Areva group is
11 sufficient to provide a reasonable basis that there is
12 a mechanism available to provide a deconversion
13 facility.
14 MR. CURTISS: And is it your understanding
15 that that is the standard? That is to say, is it
16 plausible that the Applicant, at this point, is
17 required to meet?
18 WITNESS JOHNSON: Yes, I believe that the
19 Applicant has provided a plausible strategy for
20 deconversion.
21 MR. CURTISS: And in the event that
22 circumstances should change at some future point, on
23 any issue relative to the plausibility of a
24 deconversion facility, do you agree with the
25 description that has been provided by this panel,

1 relative to the authority that the agency has, under
2 the periodic update provision?
3 WITNESS JOHNSON: Yes.
4 MR. CURTISS: Thank you.
5 JUDGE ABRAMSON: Let me follow this up.
6 This has been a question I have been trying to get
7 answered, and I don't know whether Mr. Johnson can
8 answer it, but he has ventured an opinion on plausible
9 strategies.
10 Mr. Johnson, do you see a difference
11 between having a plausible strategy and providing a
12 cost estimate that is sufficient to rest the public
13 health and safety on?
14 WITNESS JOHNSON: Well, I believe there is
15 a relationship.
16 JUDGE ABRAMSON: Well, you can't have a
17 cost estimate without a plausible strategy. But could
18 you have a plausible strategy without a reliable cost
19 estimate?
20 WITNESS JOHNSON: You could if you were
21 trying to answer the question is there a plausible
22 strategy. I believe that is a separate question. But
23 for the purpose of our licensing we have to address
24 both issues.
25 JUDGE ABRAMSON: I understand you have to

1 address both. But Mr. Curtiss was asking you about
2 whether the strategy is plausible, and in the end we
3 need two things. We need the strategy to be
4 plausible, but it seems to me the purpose of having a
5 plausible strategy is to take that and develop from it
6 a decommissioning cost estimate which can be used for
7 the funding.
8 Is that --
9 WITNESS JOHNSON: Yes, I agree with that
10 statement.
11 JUDGE ABRAMSON: Okay. So the mere, and
12 so my question for you is, is the existence of a
13 plausible strategy in and of itself sufficient to
14 establish the grounds that the cost estimate, based on
15 that plausible strategy, is reliable, or reasonable,
16 or do you need more?
17 WITNESS JOHNSON: Well, yes. I think that
18 before you can develop a cost estimate you have to
19 have a plausible strategy.
20 JUDGE ABRAMSON: Well, I guess I didn't
21 get an answer to my question.
22 MR. CURTISS: Perhaps I can follow-up with
23 this?
24 JUDGE ABRAMSON: Please.
25 MR. CURTISS: If you will permit me. The

1 question that I have posed is intended to address the
2 question of whether relative to cylinder washing, or
3 cylinders as a resource, as Mr. Krich testified
4 yesterday, whether the extent of cylinder washing, and
5 an assumption that has to be incorporated into a
6 financial assurance estimate today, can appropriately
7 be based upon, today, a view that a deconversion
8 facility might not be built, if the strategy, if the
9 plausible strategy test has been satisfied relative to
10 the plausibility of a deconversion facility being
11 built?
12 So it is the interconnection between the
13 cylinder washing issue, and the witness' testimony,
14 Jen Mayer's testimony that if a deconversion facility
15 might not be built, that a different assumption ought
16 to be made today.
17 And my question really went to if a
18 plausible strategy exists today, Mr. Johnson, and
19 understanding that if circumstances change there is a
20 periodic update mechanism, do you believe it is
21 reasonable to say, today, that a plausible strategy
22 exists for a deconversion facility, understanding that
23 the cost estimate is not answered by answering that
24 question?
25 WITNESS JOHNSON: Well, I'm not really

1 clear as to what your question is. But my opinion is,
2 is that if we are talking about the cost estimate,
3 there will be a period of time where there are
4 cylinders that have to be cleaned, if they are going
5 to be reused.
6 And that should be accommodated,
7 somewhere, in the cost estimate. I believe that is a
8 different question than is deconversion using the
9 processes that are proposed by Areva, whether or not
10 that is plausible.
11 MR. CURTISS: Okay, thank you.
12 WITNESS MAYER: If I may, Judge Abramson,
13 it seems to me that the cost estimate process does
14 inform our plausible strategy determination, to some
15 extent.
16 For example, if we were to discover that
17 vendors, that there is no vendor for a necessary
18 service, that is capable of performing that service,
19 that might inform our plausibility determination.
20 Or, for example, if the cost were so
21 prohibitively expensive that it seemed infeasible,
22 however, that hasn't been the case in this situation.
23 The Staff has testified that we have learned recently
24 that there were certain costs that we thought were
25 accounted for, but were not actually accounted for.

1 But it is not a matter of those costs
2 being such that they couldn't be included. And,
3 therefore, I don't think that in the process of this
4 particular review, we've uncovered any information to
5 indicate that this strategy would not be plausible.
6 JUDGE ABRAMSON: Let's cut right to the
7 chase, because there is a very simple, fundamental
8 question, that I think the Board is facing, and that
9 is this.
10 It is technically feasible to build this
11 deconversion facility, I don't think there is any
12 doubt about that, it has been built, we know how to
13 build it, the technology is developed, the permitting
14 process is probably achievable, and with money from
15 somewhere it could be built.
16 So it is plausible to build a deconversion
17 facility to do this.
18 WITNESS JOHNSON: Yes, I agree with that.
19 JUDGE ABRAMSON: Okay. So that that
20 element of the plausible strategy is not at issue.
21 What is at issue is what do you put in the
22 decommissioning fund, as a number, to cover
23 deconversion in the interim, until there is an
24 estimate, from a third party, or an estimate based on
25 -- or a number from a contract, the issue that we have

1 to come to grips is, is the fact that it is
2 technically feasible to build this facility,
3 sufficient to establish the 2.67 number, or does it
4 take more to establish that number?
5 WITNESS JOHNSON: Well, I think it takes
6 a little more to establish what the right number is.
7 And what we did was we looked at the breakouts that
8 were in the Urenco cost study, and other information.
9 We had discussions with LES, and on that
10 basis we felt that the estimate that was provided was
11 a reasonable estimate. Now, with this new
12 information, I think we would like to relook at the
13 cylinder washing, and to define, you know, a better
14 sense of how many cylinders might be involved that
15 might need to be treated as part of a decommissioning
16 fund.
17 So that is an element that, as we've
18 testified, is something that we would like to see
19 added to the fund.
20 JUDGE ABRAMSON: I understand that. But
21 you don't feel that there is any need to go deeper
22 into the origin of the 2.67 number, you don't feel the
23 need to see a real spreadsheet analysis to understand
24 where the equity and debt are coming from, how they
25 are allocated, and how all these numbers add up to

1 something that is supported by a 2.67 number?

2 You are comfortable that you have looked

3 enough, that you can conclude the 2.67 number is

4 reliable?

5 WITNESS JOHNSON: I think that we have

6 looked at the general breakouts of the costs of the

7 facility, in terms of construction, and operation.

8 Now, granted, that that is at a level that didn't have

9 line items, for example cost of capital.

10 But for the information that we had before

11 us, we felt that that was a reasonable estimate for

12 defining, at this point in time, what the deconversion

13 costs would be.

14 JUDGE KELBER: Mr. Johnson, I would like

15 to focus on a much less general point. At several

16 times during the past hour people have referred to

17 washing cylinders in case a deconversion plant is not

18 built.

19 Would anybody in his right mind attempt to

20 wash a cylinder filled with tails?

21 WITNESS JOHNSON: No, what we are

22 referring to is after the cylinders have been emptied

23 and --

24 JUDGE KELBER: I understand that.

25 WITNESS JOHNSON: -- there is a small

1 amount of material in there, with a heel, that would
2 need to be cleaned up.
3 JUDGE KELBER: That I understand. What
4 I'm getting at is that there have been several
5 discussions about what you would do with the cylinders
6 if the deconversion facility were not built. You
7 wouldn't wash them?
8 WITNESS JOHNSON: No, the uranium
9 hexafluoride would remain in there until there was
10 some deconversion facility, or the material was sent
11 to the DOE facilities.
12 JUDGE KELBER: That I understand, thank
13 you. I wanted to make that clear.
14 MR. CURTISS: I have one follow-up for Mr.
15 Johnson, and maybe I can more precisely state the
16 question as to the scope of the cylinder washing
17 obligation.
18 If there is a plausible strategy for a
19 deconversion facility, which I take it from the
20 response to the earlier question, you agree there is;
21 need we assume that it won't be built for purposes of
22 the extent of the cylinder washing obligation?
23 WITNESS JOHNSON: I think it is legitimate
24 to assume that a deconversion facility will be built.
25 I think the question that we have relates to the

1 timing of when that would be built, and how many
2 cylinders might be involved in a potential inventory
3 at that time.
4 MR. CURTISS: Okay, thank you.
5 CHAIR BOLLWERK: All right, at this point
6 anything further from -- I take it, Mr. Curtiss, you
7 are finished with your question?
8 MR. CURTISS: I am, thank you.
9 CHAIR BOLLWERK: Anything further from
10 either of the Board members at this point?
11 (No response.)
12 CHAIR BOLLWERK: All right. Why don't we,
13 it is about 25 after, why don't we go ahead and take
14 ten minutes? Then we'll come back and begin the cross
15 examination by NIRS/PC. Thank you.
16 (Whereupon, the above-entitled matter
17 went off the record at 10:25 a.m. and
18 went back on the record at 10:40 a.m.)
19 CHAIR BOLLWERK: Let's go back on the
20 record. Two quick procedural points before we
21 proceed. During the course of the conversation with
22 the Staff witnesses there were two exhibits identified
23 that currently aren't in the record.
24 One is NIRS/PC 234 and we believe the
25 other one is NIRS/PC 188. The question is for

1 purposes of the record does the Staff and or anyone
2 else want those marked as exhibits or are you
3 satisfied with a reference to something in a piece of
4 paper that isn't currently in the record and may or
5 may not get in there depending on how we deal with
6 this. So --
7 MS. CLARK: I'd request that they be
8 marked for identification.
9 CHAIR BOLLWERK: All right. Then we'll go
10 ahead and mark -- could you check and make sure I have
11 the right exhibit number for the second one? We think
12 it's 188. It was identified as NEF 05017 if I've got
13 the correct reference here.
14 MS. CLARK: Yes, okay.
15 CHAIR BOLLWERK: But can -- we need -- I
16 need to make sure that's the right exhibit number.
17 Okay, 0157, okay. NEF 0157? I may have written the
18 number down wrong. All right.
19 MR. CURTISS: We have -- the reference I
20 think we have is NEF '05 referring to the year, 017.
21 CHAIR BOLLWERK: Oh, okay. But the real
22 question is, is it Exhibit 188, as --
23 MR. CURTISS: Yes, it is.
24 CHAIR BOLLWERK: Okay. All right. Then
25 let us have then -- are you checking it? Go ahead.

1 We should make sure we're doing the right thing here.
2 We want to make sure we're --
3 And I take it that attachment hasn't been
4 pre-marked by anybody else.
5 MR. CURTISS: Are we talking about the
6 April 8th?
7 CHAIR BOLLWERK: Attachment one to the
8 April 8th letter. You introduced this yesterday.
9 MR. CURTISS: April 8th letter. Do I have
10 a different letter? I have the wrong --
11 CHAIR BOLLWERK: These are one of your
12 exhibits yesterday, Mr. Lovejoy?
13 MR. LOVEJOY: It is -- it's attachment one
14 to that letter.
15 CHAIR BOLLWERK: And what was the exhibit
16 number on --
17 MR. LOVEJOY: Part of it, 188.
18 CHAIR BOLLWERK: One eighty-eight. There
19 it is. Use 188, NIRS/PC --
20 MR. LOVEJOY: I'm being advised that maybe
21 some of the copies didn't have the full attachment but
22 we had corrected copies that were to be inserted in --
23 is that correct?
24 Well let's do that. The official exhibit
25 has this.

1 CHAIR BOLLWERK: Attachment 1 is just
2 estimating cost for deconversion.
3 MR. LOVEJOY: Yes.
4 CHAIR BOLLWERK: It's not labeled as
5 attachment one but it's there.
6 MR. LOVEJOY: Yes, then the prior page
7 says attachment 1.
8 CHAIR BOLLWERK: It's not included in this
9 copy.
10 MR. LOVEJOY: That's attachment 1.
11 WITNESS MAYER: I believe it's also LES
12 92.
13 CHAIR BOLLWERK: They already have it in?
14 I mean that's --
15 CHAIR BOLLWERK: Is LES 92 equivalent to
16 NIRS 188?
17 MR. CURTISS: LES 92 I believe just has
18 the attachment, not the cover letter.
19 JUDGE ABRAMSON: Only the attachment.
20 WITNESS MAYER: That was the only part we
21 were describing.
22 CHAIR BOLLWERK: So in theory then the
23 reference ought to be to LES 92, then? We don't need
24 to necessarily deal with NIRS 188, right?
25 JUDGE ABRAMSON: That's the table we were

1 looking at yesterday.

2 CHAIR BOLLWERK: Okay. Why don't we do

3 that then, make -- obviously a little bit past the

4 point, but the record then is going to be that the

5 reference to what was described as NEF-05-017 has in

6 fact already been admitted as NIRS -- I'm sorry, it's

7 LES 92.

8 And then in terms of -- I believe the

9 other question was 234.

10 JUDGE ABRAMSON: I think it was -- wasn't

11 it the other one that we had yesterday, 236 which was

12 in the middle of something? Isn't that the one with

13 the spreadsheet?

14 CHAIR BOLLWERK: Well --

15 WITNESS DEAN: You looked at 235 and 236.

16 234 proceeds it.

17 CHAIR BOLLWERK: And 234 is in fact the

18 correct reference. We might as well check it here

19 just to make sure that we're -- since that one turned

20 out to be a little -- slightly different than what we

21 thought.

22 MS. CLARK: That is correct.

23 CHAIR BOLLWERK: That's correct? All

24 right. Then let's go ahead, and I -- and for the

25 record identify -- mark for identification Exhibit

1 NIRS/PC 234 which is a -- described as a cover letter
2 dated November 1st, 2004 with some Urenco spreadsheets
3 concerning deconversion plants, and it's marked as
4 proprietary.
5 (Whereupon, the above-
6 referenced to document was
7 marked as NIRS/PC Exhibit No.
8 234 for identification.)
9 CHAIR BOLLWERK:
10 Do you want to ask that be moved into
11 evidence or do you just want it identified?
12 MS. CLARK: Just identify them.
13 CHAIR BOLLWERK: All right. All right, at
14 this point then, I think having dealt with those
15 matters I believe Mr. Lovejoy, the -- ready for your
16 cross examination. And I hope the way we've done this
17 may have actually assisted you in some ways in terms
18 of clarifying things.
19 I'm not sure, but we'll go from here.
20 MR. LOVEJOY: Well, I'm sure it did. And
21 examination may be a little more disjointed than it
22 might otherwise have been. I apologize.
23
24
25

1 EXAMINATION BY MR. LOVEJOY OF:

2 DONALD PALMROSE

3 JAMES PARK

4 JENNIFER MAYER

5 CRAIG DEAN

6 TIMOTHY C. JOHNSON

7 MR. LOVEJOY: First, maybe to -- before I forget I
8 should move the introduction of NIRS/PC Exhibit 234,
9 if I may.
10 CHAIR BOLLWERK: I think we're already --
11 it's been marked, so --
12 MR. LOVEJOY: It's been marked.
13 CHAIR BOLLWERK: The question is to
14 whether you want it admitted as evidence.
15 MR. LOVEJOY: I do.
16 CHAIR BOLLWERK: Okay. Any objections?
17 Any objections from the Staff?
18 (No response.)
19 CHAIR BOLLWERK: All right. Then let the
20 record reflect that NIRS/PC Exhibit 234 as previously
21 identified it admitted into evidence.
22
23
24
25

1 (The document referred to,
2 having been previously marked for
3 identification as NIRS/PC Exhibit No. 234
4 was admitted in evidence.)
5 MR. LOVEJOY: Now Dr. Palmrose, you said
6 in a discussion of the Environmental Impact Statement
7 of disposal of CaF2 that an analysis showing disposal
8 of that material as low level radioactive waste would
9 bound the impacts.
10 In fact it would not necessarily bound the
11 impacts, would it, if the impacts were different from
12 disposing of this material in a conventional solid
13 waste landfill?
14 WITNESS PALMROSE: I disagree. For
15 disposal as low level waste it would be demonstrated
16 that there would be a radiological hazard that would
17 not be present if it was sent to a landfill.
18 MR. LOVEJOY: Well, okay. So you're
19 assuming that if it went to a landfill there is no
20 hazard and if it went to a low level waste disposal
21 site there is a hazard. But it's the same material,
22 isn't it?
23 WITNESS PALMROSE: Not necessarily. It
24 would be depending on the content of the uranium.
25 MR. LOVEJOY: Oh, so you're assuming that

1 if it did go to a solid waste landfill it would have
2 essentially no uranium content?
3 WITNESS PALMROSE: It would have what
4 would be determined as not having a radiological
5 hazard.
6 MR. LOVEJOY: Okay. And did you determine
7 how much that is?
8 WITNESS PALMROSE: Based on information
9 from the Staff of processes at existing fuel
10 fabricators they have on a case by case basis been
11 allowed to release materials as in -- provided in the
12 testimony values of, I believe, less than three ppm of
13 uranium.
14 And I'll have to verify that back in the
15 testimony. Yes, some have been allowed to release
16 with less than three ppm of uranium.
17 MR. LOVEJOY: Released for what purposes?
18 WITNESS PALMROSE: For, in this case,
19 commercial use to produce bricks.
20 MR. LOVEJOY: That's different from
21 disposal, of course. So if I get your description
22 you're assuming that the CaF2 that would go to a solid
23 waste landfill would contain less uranium than the
24 material sent to a low level waste facility.
25 WITNESS PALMROSE: Basically, yes.

1 MR. LOVEJOY: And how would that lower
2 uranium content of the material going to a landfill be
3 obtained?
4 WITNESS PALMROSE: It would be the result
5 of the conversion process of the DEM neutralization of
6 the hydrofluoric acid from the deconversion facility.
7 MR. LOVEJOY: Yes, but how would it be --
8 how would you obtain a result such that the uranium
9 content was lower than the material going to a
10 landfill -- rather to a solid waste site? Correct me,
11 low level waste site.
12 WITNESS PALMROSE: There would have to be
13 a measurement of the material prior to its leaving the
14 site to determine what it met the conditions to be
15 sent to a landfill.
16 MR. LOVEJOY: And is there some treatment
17 to apply to material like that to reduce its uranium
18 content?
19 WITNESS PALMROSE: I guess that would
20 depend on the process. And I'm right now not aware of
21 any process that the Applicant had proposed to once it
22 then turned to calcium fluoride to reduce the uranium
23 content further.
24 MR. LOVEJOY: Whatever the process is
25 there would become cost involved. Is that right? And

1 the cost of testing?

2 WITNESS PALMROSE: I'm not qualified to

3 talk about cost of the material.

4 MR. LOVEJOY: Okay.

5 JUDGE ABRAMSON: Can I pick this up for a

6 second?

7 MR. LOVEJOY: Please.

8 JUDGE ABRAMSON: Just -- I -- it seems to

9 me that what you're suggesting is that if what comes

10 out the back end of the process has got enough uranium

11 content it has to go to low level waste and if it

12 doesn't it goes to some other place. Is that right?

13 WITNESS PALMROSE: That's correct based on

14 the licensing condition.

15 JUDGE ABRAMSON: And what the Applicant

16 has been advising us, I think, is that what comes --

17 what they expect to come out will have something like

18 one ppm of uranium. Is that correct?

19 WITNESS PALMROSE: I believe one or less.

20 JUDGE ABRAMSON: One or less. And so when

21 you do your NEPA analysis, you're looking to bound it?

22 You're looking to get a worst case? Is that why you

23 looked at the possibility that the concentration might

24 be more than one ppm?

25 WITNESS PALMROSE: In part. But to --

1 also to include the impacts of transportation since
2 that could be over long distances.
3 JUDGE ABRAMSON: Now I'm confused.
4 Explain to me what that's got to do with the disposal.
5 WITNESS PALMROSE: Well there's two parts.
6 There's the disposal location and then there's also
7 meeting the requirements for whether it's low level
8 waste or going to a landfill.
9 So once -- if it's been -- we looked at as
10 far as if it was going to be free release the distance
11 would be relatively short, we believe, versus if it
12 was going to a low level waste disposal site the
13 transportation distances would be much longer.
14 JUDGE ABRAMSON: So what you're saying is
15 the environmental effects of something that had
16 considerably more uranium content than is expected, or
17 than we're hearing is expected, both from the Staff
18 and the Applicant, were looked at in the context of
19 looking at what it takes to transport this -- what it
20 takes to dispose of it in an LLW site, which means
21 transporting it and disposing of it.
22 And so the environmental effects will also
23 come in from transportation. Now I got this right?
24 WITNESS PALMROSE: That is correct, sir.
25 JUDGE ABRAMSON: And did that -- why was

1 that part of the NEPA evaluation since it's not part
2 of what expected from the facility?
3 WITNESS PALMROSE: It's based in part that
4 it's past DOE studies weren't sure whether or not he
5 calcium fluoride would have uranium content low
6 enough, and that also in part that the process hasn't
7 yet been built, that Applicant is proposing.
8 MS. CLARK: I believe that Judge
9 Abramson's question is going to the scope of our NEPA
10 analysis in the context of why we would consider
11 transportation with -- in relation to disposal and
12 operation of the NEF and perhaps Mr. Park, you could
13 address that.
14 JUDGE ABRAMSON: Well let me clarify my
15 question just so we're all on the same page. As I
16 understand it from both the Applicant and the Staff's
17 witnesses on the calcium fluoride side, the facility
18 is expected, because other facilities are in existence
19 which do this process, to have uranium content less
20 than one ppm. Is that accurate?
21 WITNESS PALMROSE: Yes, sir, it could.
22 JUDGE ABRAMSON: It could? It might not?
23 Under what circumstances might it not? If they used
24 a different process or if the facility didn't work
25 like other facilities? Tell me the circumstances when

1 it could.

2 WITNESS PALMROSE: There could be a

3 process malfunction that would cause --

4 JUDGE ABRAMSON: Okay. So from some short

5 term situation there might be some? I assume short

6 term, right? You fix the malfunction.

7 WITNESS PALMROSE: Or potentially -- or if

8 somehow their process is slightly different than what

9 is -- has been --

10 JUDGE ABRAMSON: Okay.

11 WITNESS PALMROSE: Or being planned to be

12 --

13 JUDGE ABRAMSON: And so your NEPA

14 analysis, your NEPA analysis, looked at the

15 environmental effects of dealing with calcium fluoride

16 product that did not meet the specs that the Applicant

17 expects. Is that correct?

18 WITNESS PALMROSE: Yes, sir.

19 JUDGE ABRAMSON: Okay. I'm sorry, carry

20 on Mr. Lovejoy.

21 MR. LOVEJOY: Well, just following up, the

22 -- there is no cost estimate for transporting the

23 material to a low level waste disposal site, is there?

24 WITNESS MAYER: No, because it's not the

25 expected path.

1 MR. LOVEJOY: But according to Dr.
2 Palmrose you can't be sure.
3 WITNESS JOHNSON: The environmental
4 analysis was done to bound impacts. That was its sole
5 purpose. It wasn't intended to define what is
6 expected. We expect that and consider it plausible
7 that a deconversion facility can generate neutralized
8 HF in the form of calcium fluoride that can be less
9 than the limits that we've applied for fuel
10 fabrication facilities.
11 And it was on that expected basis that we
12 developed our cost estimate. That's different from
13 the environmental analysis which was purely intended
14 to bound what the impacts might be.
15 MR. LOVEJOY: Well the expected path
16 according to the final EIS says -- is as follows,
17 because conversion of the large quantities of DUF6 at
18 the DOE, Portsmouth, and Paducah gaseous diffusion
19 plant sites would be occurring at the same time.
20 The proposed NEF would be in operation.
21 It's not certain that the market for aqueous
22 hydrofluoric acid and calcium fluoride would allow for
23 the economic reuse of the material generated by the
24 proposed NEF.
25 Therefore only immediate neutralization of

1 the hydrofluoric acid by conversation to calcium
2 fluoride would disposal at a licensed low level
3 radioactive waste disposal facility is considered in
4 this analysis.
5 So that's the path as far as the FEIS is
6 concerned.
7 WITNESS JOHNSON: I believe that's a
8 correct statement, that that was what's considered in
9 environmental analysis as an attempt to bound what the
10 impacts might be. It wasn't intended to limit what
11 might be reasonably expected to occur with the calcium
12 fluoride, which is disposal in an industrial landfill.
13 MR. LOVEJOY: And there was no analysis of
14 impacts of disposing of calcium fluoride in an
15 industrial landfill?
16 WITNESS PALMROSE: We looked at what we
17 thought would be reasonable and that it would be
18 bounded by the analysis presented in the FEIS.
19 MR. LOVEJOY: Looked at? What do you
20 mean? What did you do?
21 WITNESS PALMROSE: Basically, by being
22 sent to an industrial landfill it would meet the
23 requirements for that landfill, and therefore show
24 protection to the members of the public and the
25 environment for that, and that the transportation

1 distances would be far less than those involved for
2 shipping to a low level waste disposal site.
3 MR. LOVEJOY: Oh, so you assumed a uranium
4 content that would result in essentially no impact.
5 WITNESS PALMROSE: By being sent to an
6 industrial landfill it would have to have shown that
7 it would meet those requirements. And there's no
8 analysis of the landfill in the EIS. As I stated
9 before, the analysis in the Environmental Impact
10 Statement bounced.
11 MR. LOVEJOY: Okay. Now I think Ms. Mayer
12 said that there was no third party quote for the
13 charge for the service of deconversion. I think
14 that's correct. And let me ask you whether in fact
15 you did not have such a quotation for providing the
16 service of deconversion from a third party. Didn't
17 you have that?
18 WITNESS MAYER: I'm sorry, could you
19 repeat the question?
20 MR. LOVEJOY: Did you have a third party
21 quotation for the service of deconversion as
22 distinguished from estimates of the cost of elements
23 of a plant that would do that?
24 WITNESS MAYER: No.
25 MR. LOVEJOY: You did not?

1 WITNESS MAYER: I'm sorry, could you
2 repeat the question again?
3 MR. LOVEJOY: Did you have a third party
4 cost for providing the service of deconversion?
5 WITNESS MAYER: No, we had an estimate of
6 how much it would cost to build a facility and operate
7 it.
8 MR. LOVEJOY: Okay. You had the business
9 study though, didn't you, LES Exhibit 91?
10 WITNESS MAYER: We've seen it.
11 MR. LOVEJOY: Did they let you take it
12 home?
13 WITNESS MAYER: It was never submitted as
14 part of the licensing review.
15 MR. LOVEJOY: I'm looking at LES Exhibit
16 91, page 7/15, third paragraph.
17 WITNESS MAYER: Yes.
18 MR. LOVEJOY: About halfway down, and it
19 refers to the cost of deconversion. And it says the
20 price compares favorably with the pricing conditions
21 provided by Cogema, [redacted] Euros per Kg U. Did you
22 consider that in your analysis?
23 WITNESS MAYER: In what context?
24 MR. LOVEJOY: Well was this not a price
25 provided by a third party for deconversion?

1 WITNESS MAYER: It was a -- as I
2 understand the [redacted] Euro per KG U cost for price, that
3 is what Urenco is paying Cogema for a small quantity
4 of tails currently being disposed at the Pierrelatte
5 facility in France.
6 That is not on this continent, and that is
7 not a cost that -- it's a price. It's not one that
8 LES could opt to pay without transporting the material
9 to France, which is not reasonable.
10 So we did not consider that as one of the
11 costs that needed to be considered.
12 MR. LOVEJOY: So you rejected a
13 contemporaneous third party price because it was in
14 Europe and you decided it would be better to believe
15 cost estimates from Europe?
16 JUDGE KELBER: I think -- Mr. Lovejoy, I
17 think that's not a correct representation of what the
18 witness said. If she could repeat it to make it clear
19 how she treated that cost.
20 WITNESS MAYER: The [redacted] Euro per Kg U?
21 JUDGE KELBER: Yes.
22 JUDGE ABRAMSON: First of all what's the
23 origin of the [redacted] Euro? Where did that number come
24 from to your -- I mean it's in your report or it's in
25 an NRC Staff letter. Where --

1 WITNESS MAYER: It is in the business
2 study.
3 JUDGE ABRAMSON: Okay. So that's the
4 number out of the business study. And that business
5 study was prepared for whom by whom?
6 WITNESS MAYER: It was prepared for Urenco
7 by Cogema.
8 WITNESS JOHNSON: And the [redacted] Euros refers
9 to what? The business study was prepared by Urenco
10 for internal use in evaluating whether or not it would
11 be financially reasonable of them to build their own
12 conversion facility using Cogema technology.
13 The information that is the base part of
14 the business cost study is a response from Cogema to
15 a request for proposals from Urenco.
16 JUDGE KELBER: And what does the [redacted] Euro
17 number refer to?
18 WITNESS JOHNSON: It refers to a contract
19 price that Urenco is currently paying Cogema to
20 process a small amount, I believe it's [redacted] metric
21 tons of depleted UF6 per year.
22 JUDGE KELBER: Thank you.
23 MR. LOVEJOY: And this is a contract to
24 have deconversion carried out by the W plant, which is
25 the worlds only operating deconversion plant serving

1 enrichment plants. Is that right?

2 WITNESS JOHNSON: Yes.

3 MR. LOVEJOY: Did you include it in your

4 calculations?

5 WITNESS JOHNSON: We knew that that cost

6 element existed, but we felt that the cost study for

7 a plant that was built at the capacity needed for the

8 NEF facility based on the Pierrelatte experience and

9 their technology would also be a reasonable way of

10 defining the cost for deconversion.

11 The -- I think you have to realize that

12 the cost of the small contract between Urenco and

13 Cogema doesn't necessarily represent the total cost of

14 another entity building a full sized plant and

15 operating.

16 All that reflects is the cost that Urenco

17 happens to be paying Cogema for processing a

18 relatively small amount of depleted uranium.

19 MR. LOVEJOY: So it might have been kind

20 of a good deal for Urenco, right?

21 WITNESS MAYER: Well --

22 MR. LOVEJOY: They were -- Cogema was

23 selling the marginal capacity at the W plant, just as

24 long as you cover your marginal costs you might as

25 well make a sale, right? It would be lower than the

1 normal price covering all the costs.

2 WITNESS MAYER: You're asking about

3 Cogema's operating strategy and pricing, I think

4 beyond our area of expertise, certainly beyond mine.

5 However, one of he findings of the study in this

6 paragraph suggests that the price to build the

7 proposed Capenhurst facility is in fact less than what

8 they are currently paying Cogema to take the material

9 in France.

10 JUDGE ABRAMSON: I'm sorry let me make

11 sure I got -- that I've understood that right. I

12 think what that says is not the price to build, but

13 the price to provide the service if they build the

14 plant, right?

15 It's not the price to build, they're

16 talking about -- what was it, [redacted]

17 Euros if they build the plant as opposed to [redacted] that

18 they're currently paying. Is that right?

19 It's a price for the service if they build

20 the plant, not a price to build the plant.

21 WITNESS MAYER: I am not understanding the

22 distinction that you're making.

23 WITNESS JOHNSON: But the purpose of the

24 Urenco business study was to evaluate whether or not

25 it would be financially better for Urenco to build and

1 operate a plant rather than contract the services
2 directly with Cogema.
3 And the conclusion of the business study
4 was that it would be favorable for Urenco to do that.
5 JUDGE ABRAMSON: Because the price for
6 that deconversion would be lower than was being paid
7 --
8 WITNESS JOHNSON: Yes.
9 JUDGE ABRAMSON: -- on the other. Yes,
10 okay, thank you.
11 MR. LOVEJOY: Did you consider any of the
12 cost estimates that were submitted in the Claibourne
13 litigation involving, for example, the EG&G report
14 that we looked at yesterday in your calculations?
15 WITNESS JOHNSON: We were aware of the
16 southern information, but we felt that because of the
17 time frames in which those estimates were provided
18 that the more current information from the Urenco
19 business study was more appropriate to use.
20 MR. LOVEJOY: Did you look at the
21 quotations Cogema had submitted in that litigation
22 about giving it's own quotation for providing
23 deconversion in the United States, four to six dollar
24 quotations? Did you consider that at all?
25 WITNESS JOHNSON: I'm sorry, could you

1 repeat the question again?

2 MR. LOVEJOY: Did you give any

3 consideration to the quote that Cogema gave and was

4 submitted in the Claibourne case of a price to perform

5 deconversion in the Unites States? I think the price

6 was four to six dollars.

7 WITNESS JOHNSON: Well, again, we based

8 our analysis on the more recent information.

9 MR. LOVEJOY: So you didn't give any

10 consideration to that?

11 WITNESS MAYER: In their earlier -- in the

12 earliest submissions of I think it was the SERVICE

13 that contained the description of the cost there was

14 mention of previous estimates.

15 And then there was a different estimate

16 provided. That later estimate, or the -- I think at

17 that point that might have been five dollars and

18 something. That later estimate we asked for

19 documentation of.

20 And that started us down the path of

21 asking for information, getting some, asking for

22 clarification, getting clarification, asking for more

23 clarification, that ultimately resulted in, for the

24 purpose of deconversion, the two dollar and 67 cent

25 estimate.

1 MR. LOVEJOY: So you didn't go looking for
2 information yourselves, and you asked the LES people,
3 you know, how come this is less than you quoted in the
4 other case.
5 WITNESS MAYER: For the purpose of a
6 decommissioning cost estimate review we normally look
7 at the information submitted and see if it has a
8 reasonable basis. If it has a reasonable basis we
9 will accept other without doing complex independent
10 review.
11 WITNESS JOHNSON: And because the
12 information that was submitted as part of the Urenco
13 business plan was very recent information we felt it
14 reasonable to base our evaluation on that information.
15 MR. LOVEJOY: You're talking about the
16 Urenco business study?
17 WITNESS JOHNSON: Right.
18 MR. LOVEJOY: But the estimate you're
19 actually dealing with is the one made up by the
20 partnership LES and the United States extensively
21 taking information from the Cogema quotation and
22 multiplying, adding, making many changes to it. That
23 was the estimate you focused on, right?
24 WITNESS JOHNSON: Yes, that is correct.
25 And again, its base is the Urenco business study.

1 JUDGE ABRAMSON: Mr. Johnson, we -- the
2 LES has an estimate from the Department of Energy of
3 three dollars and something per kilogram. Is that
4 estimate to both deconvert and dispose, or do they
5 just turn it over to DOE and it's DOE's problem what
6 they do with it? What does that estimate cover.
7 WITNESS MAYER: Could I speak to that?
8 JUDGE ABRAMSON: I don't care. One of you
9 --
10 WITNESS JOHNSON: Well, it's actually
11 both. It is transfer of the material to DOE. And
12 under the law under which this transfer takes place,
13 the generator of the depleted uranium has to pay the
14 prorated share of DOE's cost for doing it.
15 And those costs are broken down by the --
16 I believe it's the letter from Mr. Golan to LES.
17 JUDGE ABRAMSON: So they could turn it
18 over to DOE and DOE would take care of everything for
19 three dollars and something a kilogram. Is that -- am
20 I remembering that right? Is that the all-in number?
21 WITNESS JOHNSON: It was for the total
22 price that included conversion, storage,
23 transportation, and disposal.
24 WITNESS MAYER: The cost of three dollars
25 and some cents in that letter were in dollars per Kg

1 UF6. That needs to be converted to dollars per Kg U
2 to be comparable, at which point, if my memory serves,
3 that's about 4 dollars and 91 cents without
4 contingency.
5 JUDGE ABRAMSON: Four dollars and 90 cents
6 per Kg U as it compared with -- but that includes
7 disposal.
8 WITNESS MAYER: And transportation.
9 JUDGE ABRAMSON: And transportation. And
10 I think we heard yesterday from the Applicant's panel
11 that it includes 5 cents per Kg for dealing with
12 cylinders. Was that -- Mr. Curtiss, what was that?
13 There was some number that was in there that --
14 MR. CURTISS: I think I can clarify that
15 that was an assumption in the DOE estimate that the
16 calcium fluoride would be disposed of in a low level
17 radioactive waste disposal facility.
18 JUDGE ABRAMSON: That's what the 55 cents
19 was?
20 MR. CURTISS: Yes.
21 JUDGE ABRAMSON: Okay.
22 MR. CURTISS: I'm advised that's correct.
23 JUDGE ABRAMSON: So if -- and that was 55
24 cents per Kg U, or for Kg UF6? Do we have that
25 specific or am I asking for something we don't have?

1 MR. LOVEJOY: I think it was Kg U, Your
2 Honor.
3 JUDGE ABRAMSON: Kg U?
4 MR. CURTISS: The exhibit number is number
5 85, and it is presented as [redacted] cents for disposal. And
6 these are all, as the witness had pointed out, in a
7 form that would need to be translated.
8 JUDGE ABRAMSON: So in Kg U --
9 WITNESS JOHNSON: The relevant number for
10 the DOE estimate for disposal was [redacted] cents per Kg U.
11 JUDGE ABRAMSON: For disposal?
12 WITNESS JOHNSON: For disposal, yes.
13 JUDGE ABRAMSON: Okay.
14 WITNESS JOHNSON: The --
15 JUDGE ABRAMSON: And what was the DOE
16 breakdown number for deconversion?
17 WITNESS JOHNSON: Three dollars and 96
18 cents.
19 JUDGE ABRAMSON: Three ninety-six compared
20 with 2.67 that we've got here. So at least you have
21 that as a comparative number to look at. There's a
22 real bid -- I mean not a real bid, but a real
23 estimate.
24 WITNESS JOHNSON: Yes. And in one of our
25 requests for additional information we asked LES to

1 explain some of these differences in costs.

2 MR. LOVEJOY: The DOE estimate assumes

3 disposal at Envirocare too, doesn't it?

4 WITNESS JOHNSON: The DOE cost basis was

5 from a -- they indicated to us was from a quotation

6 DOE had received from Envirocare.

7 MR. LOVEJOY: And that disposal must be

8 proceeded by environment analysis before it can go

9 forward. Is that right?

10 WITNESS JOHNSON: I really don't know what

11 DOE is planning in terms of its overall environment

12 assessments and how they're all going to tie this

13 together. From our standpoint, the environmental

14 assessment and pathway analyses for use of Envirocare

15 was done as part of the Utah licensing of the

16 Envirocare facility.

17 MR. LOVEJOY: Okay. Now I'm looking at --

18 well I still have NIRS/PC Exhibit 188. I think it was

19 identified as LES Exhibit 92. This contains the data

20 that you were given to support the cost estimate.

21 Do you know how the decontamination,

22 decommissioning cost was arrived at?

23 WITNESS MAYER: I believe on page two of

24 that exhibit it describes that the decontamination and

25 decommissioning estimate is set at ten percent of the

1 capital cost of the facility.

2 MR. LOVEJOY: Did you ever see any math

3 supporting that figure?

4 WITNESS MAYER: Well, if you -- not in

5 this exhibit.

6 MR. LOVEJOY: Well, in your in-house

7 review when you went over to LES?

8 WITNESS MAYER: I don't believe so.

9 MR. LOVEJOY: They just told you it would

10 be ten percent, right?

11 WITNESS MAYER: They certainly told us

12 that in this exhibit.

13 MR. LOVEJOY: Now neither Urenco nor LES

14 has ever built and operated and decommissioned a

15 deconversion plant, have they?

16 WITNESS MAYER: That's correct.

17 MR. LOVEJOY: And they told you that the

18 cost to convert the engineering and licensing

19 standards to U.S. standards would be five percent of

20 the capital cost? Is that right?

21 WITNESS JOHNSON: They indicated that the

22 Americanization process would be five million dollars.

23 MR. LOVEJOY: What support did they give

24 you for the five million dollars?

25 WITNESS JOHNSON: They broke that down

1 into two pieces. One was modifying the design to
2 American codes and standards as two million dollars,
3 and licensing costing three million dollars.
4 And what we did was we looked at the
5 licensing fraction to look at how it would compare to
6 the cost of licensing such a facility if the NRC was
7 to do it. If you assumed a million dollars to prepare
8 an Environmental Impact Statement, 500 dollars is a
9 fee for licensing, and a million and a half for the
10 review, that amounts to a little over five staff years
11 to do the review.
12 And we felt that for this type of facility
13 those were reasonable costs for doing the licensing.
14 MR. LOVEJOY: Do you know how much the
15 licensing costs were in the Claibourne case?
16 WITNESS JOHNSON: I don't recall what the
17 Claibourne costs were. The current cost for this
18 particular project is about 11 staff years. And the
19 primary differences between these two licensing
20 actions is this would be a part 40 facility that does
21 not require criticality reviews or integrated safety
22 analyses.
23 And because of that we felt that it was
24 reasonable that the licensing costs proposed would be
25 reasonable for this type of facility.

1 MR. LOVEJOY: So these are the costs of
2 the operations of the NRC in the licensing process?
3 WITNESS JOHNSON: These would be the fees
4 that would be billed to the Applicant.
5 MR. LOVEJOY: Oh. So that doesn't include
6 the fees that are billed by, say, the Applicant's
7 lawyers and consultants to the Applicant, right?
8 WITNESS JOHNSON: Those are the -- as we
9 understood it these would be the costs that we would
10 bill for the licensing of the facility.
11 MR. LOVEJOY: So the answer is it did not
12 include those other costs?
13 WITNESS JOHNSON: Well I believe it
14 included it. It's embedded within it although there
15 isn't a specific line item addressing that. But those
16 costs as we understood it would be the costs for
17 licensing the facility, and what we might bill them
18 for the licensing.
19 JUDGE ABRAMSON: Let's hear the numbers
20 again then. There was a total of five million. Is
21 that right?
22 WITNESS JOHNSON: There was a total of
23 five million. Two million were for modifications of
24 the design to change from European codes and standards
25 --

1 JUDGE ABRAMSON: Okay. So there's three
2 left.
3 WITNESS JOHNSON: And the remaining three
4 million would be for licensing. And by licensing I'm
5 referring to the costs that would be billed by NRC to
6 license this facility.
7 JUDGE ABRAMSON: So -- and did -- when you
8 said that you thought the three million was adequate
9 to cover the NRC's fees, was there going to be enough
10 left over to cover an equal amount, let's say, for
11 lawyers and consultants fees, or would your -- would
12 the NRC's fees consume the entire three million?
13 WITNESS JOHNSON: Well, you know, if
14 there's a hearing, hearing support is not billed to an
15 Applicant. But --
16 JUDGE ABRAMSON: Well you were talking
17 about so many staff years are -- I don't know whether
18 you call person years of support from the NRC. Did
19 that eat up the three million, or did that only eat up
20 one of the three million?
21 WITNESS JOHNSON: Well, it was broken down
22 into a million to do the Environmental Impact
23 Statement if one was required.
24 JUDGE ABRAMSON: Okay.
25 WITNESS JOHNSON: And a million and a half

1 for staff review.

2 JUDGE ABRAMSON: Okay. So that's two and

3 a half of the three.

4 WITNESS JOHNSON: And then a half a

5 million as a licensing fee.

6 JUDGE ABRAMSON: Okay.

7 WITNESS JOHNSON: That's how we viewed it.

8 We did not get that breakdown from LES.

9 JUDGE ABRAMSON: No, but when --

10 WITNESS JOHNSON: In our analysis as to

11 whether or not that's a reasonable number, that was a

12 thinking that we --

13 JUDGE ABRAMSON: So, in your view, five

14 million is sufficient but not to cover their own costs

15 of lawyering it and getting consultants for it.

16 That's got to be covered somewhere else.

17 WITNESS JOHNSON: Not necessarily for the

18 cost of LES to --

19 JUDGE ABRAMSON: Whoever it is, whoever is

20 going to build this, right?

21 MR. LOVEJOY: Does anyone on this panel

22 know how much it costs to process the Claibourne

23 application?

24 WITNESS MAYER: No.

25 MR. LOVEJOY: You don't know, okay.

1 WITNESS JOHNSON: Excuse me, could you
2 repeat the question?
3 MR. LOVEJOY: The cost of the Claibourne
4 proceeding application.
5 JUDGE ABRAMSON: NRC's cost.
6 WITNESS JOHNSON: No, I do not recall what
7 those were.
8 MR. LOVEJOY: You don't know.
9 WITNESS DEAN: Mr. Lindsay, may I correct
10 something pertaining to D&D that we did not respond
11 earlier?
12 MR. LOVEJOY: It's Mr. Lovejoy.
13 WITNESS DEAN: I apologize. In reviewing
14 the D&D costs, we have previously reviewed Lawrence
15 Livermore National Laboratory decommissioning cost
16 estimate for a deconversion facility.
17 And that cots estimate is the ten percent
18 approach for determining the D&D cost, a study, excuse
19 me.
20 MR. LOVEJOY: So you just checked that
21 figure in that study?
22 WITNESS DEAN: We confirmed that there was
23 a precedent for using that approach.
24 MR. LOVEJOY: How did they calculate the
25 capital cost here?

1 WITNESS DEAN: It's not shown.

2 MR. LOVEJOY: So you just took the number?
3 Is that a yes?

4 WITNESS DEAN: Yes.

5 CHAIR BOLLWERK: We need to articulate an
6 answer. A head shake doesn't go on the record.

7 WITNESS DEAN: I apologize.

8 MR. LOVEJOY: So, how much is for land,
9 and how much is for, you know, constructing the
10 structure? And how much is for, you know, the
11 hardware, piping, instrumentation, dosing? You don't
12 know?

13 WITNESS DEAN: For some of that
14 information in the business study, but in general
15 presumed that that information was subsumed in the
16 numbers shown here.

17 MR. LOVEJOY: Okay. Now, did you ask for
18 any breakout on the annual operations and maintenance
19 figure they gave you?

20 WITNESS MAYER: Well, when this two page
21 exhibit came in that we're looking at, we asked for
22 clarification on all of it. That's why we went to
23 have the in-office review.

24 MR. LOVEJOY: What did you find out?

25 WITNESS MAYER: They pointed out that, in

1 the business, the way they had arrived at that number
2 was they had taken the O&M cost from the business
3 study and that they had doubled that because the plant
4 capacity would be doubled.
5 JUDGE ABRAMSON: Did they say at to you
6 about what they'd been advised by Urenco or Cogema
7 would be the actual O&M cost for a double sized plant?
8 (No verbal response.)
9 JUDGE ABRAMSON: In other words, we heard
10 yesterday some testimony from LES witnesses to the
11 effect that doubling was conservative and they had
12 some numbers.
13 WITNESS MAYER: To the best of my
14 recollection they said something similar to us in the
15 in-office review.
16 JUDGE ABRAMSON: Do you have a
17 recollection of what they said to you?
18 WITNESS MAYER: I remember their
19 description that it would be -- that doubling it would
20 be an overestimate for the reasons they described
21 yesterday.
22 But I do not recall them giving us a
23 specific figure of what the actual O&M cost might have
24 been. Although they may have done so.
25 JUDGE ABRAMSON: Okay. And, were you

1 there also, Mr. Dean?

2 WITNESS DEAN: Yes, I was.

3 JUDGE ABRAMSON: And do you have any

4 recollection on that?

5 WITNESS DEAN: I have no recollection of

6 their giving us a detailed breakdown.

7 JUDGE ABRAMSON: Okay.

8 WITNESS JOHNSON: And I was at the

9 meeting. And I agree with the testimony that Jen just

10 provided, that they talked about it in general terms

11 as being an overestimate, but no specific cost figures

12 were provided.

13 JUDGE ABRAMSON: Okay.

14 MR. LOVEJOY: So the figure they doubled

15 was applicable to what, to British conditions?

16 WITNESS MAYER: Presumably coming out of

17 the Urenco Study, yes.

18 MR. LOVEJOY: Did you look into, you know,

19 comparable wage rates and overhead rates in the U.S.

20 and the U.K.?

21 WITNESS MAYER: We did not. Although,

22 it's my general impression that wage rates in the U.S.

23 are lower than they are in Europe.

24 MR. LOVEJOY: So you went on your general

25 impression?

1 WITNESS MAYER: Yes.

2 JUDGE ABRAMSON: Efficiencies are higher

3 here, though.

4 MR. LOVEJOY: In the U.K., does the

5 company directly pay health insurance costs for its

6 workers? Do you know?

7 WITNESS MAYER: I have no idea.

8 MR. LOVEJOY: Okay. Isn't there national

9 health insurance coverage in the U.K.?

10 WITNESS MAYER: I don't know that either.

11 MR. LOVEJOY: Okay. I can show it to you,

12 but I'm looking now at the Livermore Report, which is

13 Exhibit 56, at page 34, NIRS/PC Exhibit 56, page 34.

14 And I'll just read you the text. You

15 don't really need to look at it. My question is, the

16 assumption here in the report is that D&D would

17 proceed but would not include facility demolition and

18 pre-release of the site. Did you think that that was

19 a comparable --

20 WITNESS MAYER: I'm sorry. I'm going to

21 need to take a look at the reference that you're

22 referring to.

23 MR. LOVEJOY: Okay, please. It's on page

24 34, under 3.2.10.

25 WITNESS MAYER: I'm sorry, what page?

1 MR. LOVEJOY: Page 34, 3.2.10.

2 (Pause.)

3 WITNESS MAYER: And what is your question?

4 MR. LOVEJOY: The question is, did you

5 think that the ratio, ten percent, was truly

6 applicable since this one is based on an assumption

7 the facility demolition would not be required.

8 WITNESS MAYER: There's no requirement

9 under a decommissioning cost estimate that a facility

10 once cleaned needs to be demolished.

11 MR. LOVEJOY: So you're assuming it would

12 not be demolished and the site be released in your

13 estimate of decommissioning?

14 WITNESS MAYER: For which facility?

15 MR. LOVEJOY: For the deconversion plant.

16 WITNESS MAYER: That seems reasonable.

17 MR. LOVEJOY: All right.

18 (Pause.)

19 JUDGE ABRAMSON: Were you all aware of the

20 DOE breakdown of prices at the time you were doing

21 this review of the LES estimates for deconversion?

22 WITNESS MAYER: The LES estimate came in

23 before the DOE estimate was submitted. The first time

24 we saw the DOE estimate was some time after March 1st

25 because that was when the letter was dated.

1 JUDGE ABRAMSON: And was after you had
2 completed this iteration with LES about their
3 deconversion costing?
4 WITNESS MAYER: When we went to the in-
5 office review we were aware of the DOE estimate and
6 its breakdown because one of our questions there was
7 whether they knew why some of the individual costs --
8 that is, the deconversion cost -- had some discrepancy
9 between them as to the transportation cost.
10 So we were aware of the DOE estimate at
11 that point.
12 JUDGE ABRAMSON: Did you come away with
13 that with some understanding of why the DOE's number
14 of, what was it, 390 for deconversion was -- what the
15 difference was between the DOE number of 3.90 and the
16 LES number of 2.67?
17 WITNESS MAYER: It's my recollection that
18 in that meeting Mr. Krich suggested some reasons why
19 there might be discrepancies, but really needed to
20 look into it further.
21 And, later in the process, that kind of
22 more detailed comparison did occur.
23 JUDGE ABRAMSON: Did?
24 WITNESS MAYER: Yes.
25 WITNESS DEAN: This is the subject that we

1 pursued in April and May of this year with some
2 intensity.
3 JUDGE ABRAMSON: And, can you tell us a
4 little bit? Is it documented somewhere? Can you tell
5 us a little bit about what you found?
6 WITNESS DEAN: Among other things, we
7 attended an in-office meeting with the contractors who
8 have prepared the DOE estimate.
9 JUDGE ABRAMSON: An in-office meeting here
10 or at DOE?
11 WITNESS DEAN: At the Department of
12 Energy.
13 JUDGE ABRAMSON: Okay.
14 WITNESS DEAN: That was delayed for
15 several weeks after the in-office meeting that we're
16 describing with LES because the Department of Energy
17 had to receive approval from the contractors to even
18 release the study to us or to allow us to see it in
19 detail.
20 JUDGE ABRAMSON: Okay.
21 WITNESS DEAN: I believe that the meeting
22 we attended occurred on the last day of May because
23 that in fact was the last day that our contract was in
24 effect.
25 JUDGE ABRAMSON: And you did see this

1 study that underlaid the DOE numbers?

2 WITNESS DEAN: The LMI Study.

3 JUDGE ABRAMSON: That's the LMI Study?

4 Okay.

5 WITNESS MAYER: It was --

6 WITNESS JOHNSON: The response to our

7 request for additional information came in August

8 12th, 2005 in LES' letter to us. And it provides

9 several pages of discussion regarding the differences

10 in the estimate categories.

11 WITNESS MAYER: If I could clarify the

12 time line just a little bit, on May 31st or so we went

13 to that meeting at DOE headquarters. Subsequently,

14 LES submitted the LMI report to us. We asked a series

15 of questions --

16 JUDGE ABRAMSON: LES submitted the LMI.

17 But the LMI report was the one that underlaid the DOE

18 estimate?

19 WITNESS MAYER: Yes.

20 JUDGE ABRAMSON: Okay.

21 WITNESS MAYER: They provided it for our

22 review.

23 JUDGE ABRAMSON: Okay.

24 WITNESS MAYER: We asked a series of

25 questions as a request for information. In mid-August

1 they submitted a detailed look at the two cost
2 estimates and what the discrepancies --
3 JUDGE ABRAMSON: LES did or LMI did?
4 WITNESS MAYER: LES did with input from
5 LMI.
6 JUDGE ABRAMSON: Okay.
7 JUDGE KELBER: Excuse me, where is that
8 document?
9 MR. CURTISS: That document that the
10 witness is referring to is LES Exhibit 87, which
11 represents a detailed discussion of the differences
12 between the DOE and the LES cost estimate.
13 And, if I could refer you to the
14 information with the Bates number in the bottom right-
15 hand corner, LES PRO 01312, it is a table labeled
16 table two, revised cost estimate that reconciles the
17 LES estimate with the DOE estimate.
18 To the earlier question, I would direct
19 your attention to the difference in the two. One of
20 the significant differences is that the DOE cost
21 estimate assumed that the calcium fluoride would be
22 disposed of in a low level radioactive waste disposal
23 facility.
24 JUDGE ABRAMSON: Is that part of the 390,
25 Mr. Curtiss? I thought there was a breakdown for

1 deconversion cost. And I'm wondering there's an
2 explanation of the deconversion cost differences.
3 MR. CURTISS: Yes, I can direct your
4 attention to that table. If you go down to the
5 transportation/disposal of CaF8 --
6 JUDGE ABRAMSON: Hang on just a second.
7 (Pause.)
8 JUDGE ABRAMSON: Page 13, did I hear?
9 MR. CURTISS: Yes, the Bates number is LES
10 PRO 01312.
11 JUDGE ABRAMSON: Right.
12 MR. CURTISS: And I should call your
13 attention to the detailed responses that the witness
14 referred to that were submitted on August 12th
15 following the meeting.
16 And you'll see at the top of this the
17 deconversion cost estimate starting out with the DOE
18 estimate. And these have been converted to KgU to
19 permit comparison, 2.69 and [redacted].
20 The 2.69 includes the two cents for
21 disposal of CaF in a municipal landfill and then goes
22 down a comparison of what was included on each side.
23 And our witness panel when recalled can
24 speak to this in detail. I'm not intending to testify
25 about this here at this point, in other words.

1 But, to the earlier question as to whether
2 there were significant differences, the DOE estimate
3 includes in the item transportation/disposal of CaF 54
4 cents for disposal of that in a low level radioactive
5 waste disposal facility.
6 JUDGE ABRAMSON: All right. So, if I'm
7 reading this table correctly, and we will ask your
8 panel when you recall them, the comparable figure from
9 DOE is [redacted] compared to the 2.60?
10 MR. CURTISS: That is correct. And our
11 panel can speak to this. I will also note that this
12 also includes a reconciliation of disposal,
13 transportation, and in the bottom half of this, the
14 total 4.68 to [redacted] before the contingency is added.
15 So that purports -- I think that document
16 addresses your question. And our panel can speak to
17 that upon recall in more detail.
18 JUDGE ABRAMSON: Good.
19 MR. CURTISS: I hope, as a reconciliation.
20 JUDGE KELBER: Let me ask again about that
21 table that we have there. There's a [redacted] cent item for
22 the disposal of calcium fluoride.
23 MR. CURTISS: Yes, sir.
24 JUDGE KELBER: And that's not included in
25 the LES estimate?

1 MR. CURTISS: That is correct.

2 JUDGE KELBER: Because the LES estimate is

3 based on a much lower disposal cost.

4 MR. CURTISS: Yes, sir. That is correct.

5 The DOE --

6 JUDGE KELBER: And that's accounted for

7 separately.

8 MR. CURTISS: Yes, the DOE estimate --

9 JUDGE KELBER: So that if you take the

10 three -- I think it's a net of [redacted], and subtract the

11 [redacted] cents, we then get a more comparable set of

12 numbers.

13 JUDGE ABRAMSON: No, no.

14 MR. CURTISS: No, I think you -- and I'll

15 defer to our panel to explain this. But, we start

16 with [redacted]. And if you'll see the [redacted] cents is deleted

17 on the right-hand column, transportation disposal of

18 CaF.

19 JUDGE ABRAMSON: It's indicated at a plus.

20 But I assume --

21 JUDGE KELBER: It's indicated in the table

22 as a plus.

23 JUDGE ABRAMSON: Yes. We'll have to --

24 MR. CURTISS: We'll have our panel address

25 this. The disposal of CaF, I stand corrected, is in

1 the disposal line under original disposal minus [redacted] in
2 the next column. I was looking at the wrong line.
3 JUDGE ABRAMSON: Okay. I'm sorry. Lets'
4 get back to this.
5 MR. CURTISS: Our witness can explain that
6 in detail.
7 JUDGE KELBER: I'm just trying to make
8 sure that we're comparing -- well, apples and oranges
9 isn't exactly right. But, the apples that are peeled
10 and the apples that are not peeled.
11 MR. CURTISS: Right.
12 CHAIR BOLLWERK: I think we were doing
13 cross examination. And I think we got a little off
14 the track slight. So, back to you.
15 MR. LOVEJOY: That's good. It was
16 important. Could you look at LES Exhibit 91, the
17 business study? Do you have that?
18 WITNESS MAYER: Yes, I do.
19 MR. LOVEJOY: I'm looking at the last page
20 of it, which is a spreadsheet. The question is just
21 this, do you see a figure here for decommissioning?
22 (Pause.)
23 WITNESS MAYER: Not to the extent that I
24 can read the print on this page.
25 MR. LOVEJOY: Over in the far right

1 column, do you see ten million? They didn't put the
2 zeroes.
3 WITNESS MAYER: Would that be a shaded
4 figure or the --
5 MR. LOVEJOY: Yes, it's a shaded figure.
6 WITNESS MAYER: Yes.
7 MR. LOVEJOY: Okay. And do you understand
8 that's ten million Euros?
9 WITNESS MAYER: More from my recollection
10 from what the unit column says than my ability to read
11 it right now.
12 MR. LOVEJOY: Okay, but it's Euros. Okay.
13 That's more than 8.8 million dollars, isn't it, when
14 you convert?
15 (No verbal response.)
16 MR. LOVEJOY: The answer is obvious.
17 WITNESS MAYER: Yes.
18 MR. LOVEJOY: Okay. Now, I heard some
19 testimony before about how there's no need for
20 accounting for cost of capital for various reasons.
21 Did you all perform any calculations to identify how
22 much of the cost of capital was embedded or included
23 in the operations and maintenance figure?
24 WITNESS MAYER: No.
25 MR. LOVEJOY: No? Have you ever in a

1 financial analysis seen the cost of capital or return
2 on investment merged with labor costs and put into
3 operation and maintenance figure?
4 WITNESS MAYER: That's not typically how
5 it's done.
6 MR. LOVEJOY: Okay. So, did you, in
7 deciding that there was no need to include the cost of
8 capital, making any calculations based on what the
9 cost of capital to build a deconversion plant, not in
10 New Mexico, but in the far west Texas, for example,
11 might be?
12 WITNESS DEAN: No.
13 MR. LOVEJOY: I mean, wasn't that part of
14 the analysis you needed to make?
15 WITNESS DEAN: I think you should
16 understand that our analysis was primarily and
17 initially organized around the review of documents
18 that were submitted to us.
19 So, our mandate was not to, as you
20 suggested earlier, go out and find additional examples
21 of situations where there was a deconversion cost and
22 perform a comparison of those costs to this cost.
23 With respect to your precise question, we
24 reviewed this business study. But no, we did not
25 calculate a cost of capital. We presumed that the

1 cost of capital was included in this business study.
2 MR. LOVEJOY: You presumed that?
3 WITNESS DEAN: That is correct.
4 MR. LOVEJOY: And that consistent with --
5 WITNESS DEAN: This was a redacted --
6 MR. LOVEJOY: -- your due diligence in
7 this matter?
8 WITNESS DEAN: This was a redacted
9 business study. And, as a business study, our
10 experience was that business studies address the cost
11 of capital and profit somewhere in them.
12 We did not see the entire business study.
13 We saw only selected pages from it.
14 MR. LOVEJOY: So, you never saw the cost
15 of capital?
16 WITNESS DEAN: That is correct.
17 MR. LOVEJOY: And well, but it's not in
18 this estimate either, not stated?
19 WITNESS MAYER: Which estimate are you
20 referring to?
21 MR. LOVEJOY: I'm looking at NIRS/PC
22 Exhibit 188, the -- I think it's LES Exhibit 92.
23 WITNESS DEAN: Ninety-two, I think, is
24 what we're looking at.
25 WITNESS MAYER: Are you referring to the

1 business study?

2 MR. LOVEJOY: I'm referring to the two

3 page table. Look at LES Exhibit 92.

4 WITNESS MAYER: Sorry, that's in our other

5 book.

6 MR. LOVEJOY: Okay.

7 (Pause.)

8 WITNESS MAYER: All right, we have the

9 Exhibit before us now.

10 MR. LOVEJOY: It's number 92.

11 WITNESS MAYER: Yes. Could you --

12 MR. LOVEJOY: The question was, was the

13 cost of capital set forth in the tables you have there

14 or the text for that matter?

15 WITNESS MAYER: There are capital costs in

16 this table. Whether the capital costs include the

17 cost of capital is unclear from these tables.

18 MR. LOVEJOY: Okay, thank you. You

19 corrected me and you answered my question. The cost

20 of capital is not shown.

21 WITNESS MAYER: It's not broken out. We

22 have no idea if it's included based on the near two

23 word descriptions that are in the left-hand column.

24 MR. LOVEJOY: Okay. So, you don't know

25 what the capital cost to build this plant would be,

1 the cost of debt and equity?

2 WITNESS MAYER: Not broken out as an

3 individual element, no.

4 (Pause.)

5 MR. LOVEJOY: Let me ask you a slightly

6 different subject. You've made reference to the

7 Livermore Report for its guidance on decommissioning

8 costs.

9 And you recall, if you were here

10 yesterday, that we talked for some a bit about how

11 economies of scale were represented in that report. Do

12 you remember that?

13 WITNESS MAYER: I do remember the

14 discussion yesterday, yes.

15 MR. LOVEJOY: Have you studied that part

16 of the report?

17 WITNESS MAYER: Not in detail.

18 MR. LOVEJOY: Okay. It's a fact, though,

19 that the cost estimates that were in the original

20 Cogema quotation were derived from their experience at

21 the Pierrelatte plant, is that right?

22 WITNESS MAYER: That is correct.

23 MR. LOVEJOY: And that's a pretty big

24 plant, right?

25 WITNESS MAYER: If I understand it, it has

1 a capacity of 20,000 metric tons of something. I
2 can't recall which unit.
3 MR. LOVEJOY: Is it 20,000 tons of UF6?
4 There's been some confusion about that.
5 (No verbal response.)
6 MR. LOVEJOY: Do you have NIRS/PC Exhibit
7 233 nearby?
8 (Pause.)
9 MR. LOVEJOY: I believe 233, it was
10 introduced yesterday.
11 CHAIR BOLLWERK: Yes, it was admitted,
12 actually.
13 MR. LOVEJOY: It's a fax transmission with
14 several documents in it, including the response to the
15 request for quotation.
16 WITNESS MAYER: We've located the exhibit.
17 MR. LOVEJOY: Okay. Do you have the page,
18 page LES PRO 00605 on the lower right corner? It has
19 Areva's letterhead.
20 WITNESS MAYER: We found that as well.
21 MR. LOVEJOY: Okay. And this has -- in
22 the first paragraph it's described as a non-binding
23 technical and economic assessment. Are you looking at
24 the same page?
25 WITNESS MAYER: We're looking at that

1 page, yes.

2 MR. LOVEJOY: And it says after that,

3 further down that paragraph, it says bases for this

4 assessment are the Cogema process and technology

5 currently implemented on the Tricastin site in

6 accordance with French applicable standards and

7 regulations.

8 Do you understand to refer to their plant

9 operating in Pierrelatte?

10 WITNESS MAYER: I'm not familiar with the

11 reference to the Tricastin site. That may be

12 Pierrelatte or it may not.

13 MR. LOVEJOY: That's the only one they

14 have. It is.

15 WITNESS MAYER: Okay.

16 MR. LOVEJOY: And so, their costs were

17 derived from their experience at that plant. But they

18 were developing estimates for a lot smaller plant,

19 isn't that right?

20 WITNESS MAYER: Yes.

21 (Pause.)

22 MR. LOVEJOY: Did you ask anyone whether

23 the efficiency of the smaller plant, being at a much

24 smaller scale, might be less than the plant that was

25 the source of the data for the estimate?

1 WITNESS DEAN: Mr. Lovejoy, this document
2 was never transmitted to us, our clients. So we did
3 not review it in the course of our work.
4 MR. LOVEJOY: Oh, you never had this
5 Cogema data? This was the only third-party data of a
6 sort that gave rise the Urenco study, wasn't it?
7 WITNESS MAYER: We saw the Urenco business
8 study and in-office review.
9 MR. LOVEJOY: And you never saw the Cogema
10 quotations?
11 WITNESS DEAN: We did not see the document
12 that you're describing.
13 MR. LOVEJOY: Did you -- were you --
14 WITNESS MAYER: Until it was produced as
15 an exhibit in one of the depositions I attended. But,
16 at that point I was not charged with reviewing it.
17 MR. LOVEJOY: Were you given to understand
18 anything about the source of the cost estimates used
19 in the business plan?
20 WITNESS MAYER: As we previously stated,
21 we understand that the business plan was based a
22 Cogema response to Urenco response for proposal, and
23 that response was based on their experience operating
24 the Pierrelatte facility in France or the facility in
25 France in Pierrelatte, in the sense of the operation

1 experience gained at that facility provided some of
2 the basis for the response to the request for
3 proposal.
4 MR. LOVEJOY: The cost information, is
5 that right?
6 WITNESS MAYER: That is correct.
7 MR. LOVEJOY: Did you ask whether cost
8 data coming from such a large plant was really
9 applicable to a much smaller plant?
10 WITNESS MAYER: No, it was not our
11 understanding that they had -- they had not at that
12 point explain, nor did we ask how they had done the
13 scaling, other than from the 3,500 metric ton proposal
14 for Capenhurst to the current U.S. facility.
15 JUDGE ABRAMSON: The Pierrelatte plant is
16 how old at this point, Mr. Johnson, do you have an
17 idea?
18 WITNESS JOHNSON: It started operation in
19 1984.
20 JUDGE ABRAMSON: And when was the last
21 train built? Do you know? As I understand it was
22 built in stages.
23 WITNESS JOHNSON: In the early 90's, I
24 believe, they expanded it to the second train.
25 JUDGE ABRAMSON: Okay. So, when they talk

1 about using their experience, was that the first plant
2 they built?
3 WITNESS JOHNSON: Apparently there was a
4 small pilot scale plant, I think, of about 350 metric
5 ton capacity. And that was expanded into one that
6 would handle 10,000 metric tons of UF6.
7 And then, in a second iteration, and I
8 believe it was in the early 1990's, it was expanded to
9 a capacity of 20,000 metric tons of UF6.
10 JUDGE ABRAMSON: So, this is a technology
11 and an industry that they've been learning about as
12 they built this plant. Is that a fair assumption?
13 WITNESS JOHNSON: Yes.
14 JUDGE ABRAMSON: And, is it the panel's
15 experience -- and you can all speak to this the extent
16 you have some knowledge that when an industry is being
17 developed that they learn from what they do and how do
18 costs of future similar facilities usually evolve in
19 an industry as it goes through that stage of
20 development.
21 WITNESS JOHNSON: Well, I think we felt it
22 was reasonable that the cost presented account for all
23 the relevant recent experiences that Cogema had had
24 during its 20 year operating lifetime and that it
25 would put in the best practices and most economical

1 practices would be proposed in the facility that they
2 proposed to Urenco.
3 JUDGE ABRAMSON: So, did the Staff make
4 any effort to correlate costs at Pierrelatte to this
5 estimate that Urenco had done for Cogema or Cogema had
6 done for Urenco? I'm not sure which way it was.
7 WITNESS JOHNSON: Well, I don't believe we
8 did it at that detail. We were aware of the cost
9 estimates for the DOE facility, which is currently
10 under construction.
11 And again, we asked about the DOE
12 difference between those costs. And again, those are
13 relevant recent cost estimates. So, I think it's
14 reasonable to compare those two cost estimates.
15 MR. LOVEJOY: Well, let's take a look at
16 what you did see, which is the business study here,
17 and LES Exhibit 91. And I'm at page 9/15. [redacted]
18 [redacted]
19 [redacted]
20 [redacted]
21 [redacted]
22 [redacted]
23 [redacted] Did you include that
24 information in your analyses?
25 WITNESS MAYER: Just give me a second.

1 I'd like to read this.

2 (Pause.)

3 WITNESS MAYER: Okay. What was your

4 question?

5 MR. LOVEJOY: Did you include that

6 information in your analyses?

7 WITNESS MAYER: [redacted]

8 [redacted]

9 [redacted]

10 [redacted]

11 [redacted]

12 [redacted]

13 [redacted]d

14 [redacted]

15 [redacted]

16 [redacted]

17 [redacted]

18 [redacted]

19 [redacted]

20 [redacted]

21 [redacted]

22 [redacted]

23 [redacted]

24 MR. LOVEJOY: Did you inquire someone with

25 LES and ascertain whether your reading was accurate?

1 WITNESS MAYER: Well, during our in-office
2 review, Mr. Krich clearly explained to us that he had
3 asked about the hydrofluoric acid and what would
4 happen to it, and that his sources had told him that
5 the costs to neutralize the HF were going to be equal
6 or lower than the costs to produce the hydrofluoric
7 acid because of the special equipment needed to handed
8 the acid in that purity.
9 So, I didn't feel it necessary to question
10 that a second time.
11 MR. LOVEJOY: And, do you know how much
12 the investment was in the Urenco business study in
13 equipment to deal with the HF as a resale item?
14 WITNESS MAYER: No.
15 MR. LOVEJOY: Do you know how much the
16 cost of neutralization equipment would have been?
17 WITNESS MAYER: No, not from this study.
18 WITNESS JOHNSON: We didn't have specific
19 numbers on those costs, other than the information
20 that it would be less expensive to put in a
21 neutralization line than it would be to produce HF for
22 sale with the associated tankage and equipment.
23 MR. LOVEJOY: So, they told you that it
24 was more expensive to operate an HF storage
25 purification, etcetera line than to operate a CaF2

1 neutralization line?

2 WITNESS JOHNSON: Yes, and that's

3 supported by the testimony that was given yesterday

4 and also a recent letter that I think came in from Mr.

5 Schneider yesterday.

6 MR. LOVEJOY: That's the one where Mr.

7 Smets said it would be really expensive to set up for

8 HF because you'd have to put in a rail spur, correct?

9 WITNESS JOHNSON: I do not recall a rail

10 spur. But, the sense of the letter to Mr. Schneider

11 provided more detail in terms of the cost of running

12 a conversion, a HF production line as opposed to an HF

13 neutralization process line.

14 MS. CLARK: If you would like to refer to

15 the letter, it's LES Exhibit 115.

16 JUDGE KELBER: Excuse me, what number?

17 MS. CLARK: It's 115.

18 (Pause.)

19 MR. LOVEJOY: Do you have number 115? We

20 should probably look at that. Looking at page one --

21 do you have that, Mr. Johnson?

22 WITNESS JOHNSON: I'm sorry, could you

23 repeat the question?

24 MR. LOVEJOY: I will give you the

25 question, get the Exhibit.

1 WITNESS JOHNSON: Yes, I have the exhibit.

2 MR. LOVEJOY: Okay. Doesn't it say under

3 bulk HF, in the U.S. bulk HF is only transported by

4 rail, which would require the deconversion plant to

5 install a rail spur with significant interlocks that

6 support safe loading and transport? That's what it

7 says, right?

8 WITNESS JOHNSON: Okay.

9 MR. LOVEJOY: So that's the basis on which

10 he said that HF processing would be really expensive,

11 more than neutralization.

12 WITNESS JOHNSON: Well, there's also

13 discussion on the equipment and corrosion resistant

14 tankage that would be required for that facility that

15 would not be required if all you were going to do was

16 neutralize the HF.

17 MR. LOVEJOY: Did you look at that EG&G

18 study that we referred to yesterday that concluded

19 that neutralization equipment would cost, I think it

20 was two dollars and 60 cents per KgU, the equipment

21 and the operating costs?

22 WITNESS JOHNSON: No, I haven't looked at

23 that study.

24 MR. LOVEJOY: You didn't look at that?

25 WITNESS JOHNSON: No.

1 MR. LOVEJOY: If someone had brought that
2 to your attention, would you want to check it out?
3 WITNESS JOHNSON: I would look at it,
4 certainly.
5 MR. LOVEJOY: And you haven't done that?
6 (No verbal response.)
7 MR. LOVEJOY: So, if I follow what you're
8 saying, is CaF2 a saleable item in Europe? Let me ask
9 you that.
10 WITNESS JOHNSON: I'm sorry?
11 MR. LOVEJOY: Is the calcium fluoride
12 saleable in Europe? Can it be sold?
13 WITNESS JOHNSON: Well, in Europe they
14 don't neutralize it. They sell the HF as aqueous HF
15 without neutralization.
16 MR. LOVEJOY: Okay. But, if they chose to
17 do the neutralization, could they sell the CaF2?
18 WITNESS JOHNSON: I really don't know what
19 -- how that would be treated right now. They don't
20 generate calcium fluoride. So I don't know how that
21 would be treated in France.
22 MR. LOVEJOY: So you don't know -- my
23 basic question is, why does it make business sense to
24 put in the HF equipment if it's all more expensive?
25 WITNESS MAYER: If I could address that --

1 MR. LOVEJOY: Please.

2 WITNESS MAYER: In our reviews we always
3 take out the credit that would be attributed to
4 selling the HF. If you add that back in, the
5 economics would change to be favorable to sell the HF.

6 But, since you're not allowed to consider
7 salvage value in this review, there are two
8 possibilities. One is to put in the equipment line
9 and not take credit for it and then put in the
10 additional equipment to neutralize it because that
11 would be the reasonable path.

12 And, in that instance, it would not be
13 favorable.

14 MR. LOVEJOY: So, do you know the market
15 economics of selling the CaF in Europe?

16 WITNESS MAYER: Not in Europe, no.

17 MR. LOVEJOY: Okay.

18 (Pause.)

19 MR. LOVEJOY: Well, we talked a bit about
20 the question of dealing with the cylinders. And I'm
21 not sure we got to closure on that. Can you tell what
22 you're going to do about the question of cylinders?

23 You said there's more numbers to be
24 crunched, I think.

25 WITNESS JOHNSON: Well, I'm not sure that

1 we're prepared to identify in detail what it is we
2 would do. We would certainly want to have further
3 discussions with LES on their basis for cylinder
4 washing.
5 But we think it is a legitimate cost to
6 add to decommissioning funding. Now, what that cost
7 would ultimately account for, that is something that
8 we would need to discuss with the Applicant.
9 MR. LOVEJOY: When are we going to get
10 your number?
11 WITNESS JOHNSON: Again, it would be
12 something that we would try to detail and to discuss
13 with them as soon as possible. I can't provide you a
14 specific date as of right now.
15 MR. LOVEJOY: Is this something you expect
16 to come up with this week?
17 WITNESS JOHNSON: I don't know if it will
18 be this week or next week. But it would be in a short
19 time frame that we would address this with LES.
20 MR. LOVEJOY: Okay. Nuclear weapon, what
21 about the question of disposing of cylinders? Have
22 you addressed that at all?
23 WITNESS JOHNSON: Excuse me? Disposal of
24 what?
25 MR. LOVEJOY: Disposal of cylinders. Were

1 you here yesterday when there was testimony about how
2 the DOE PEIS makes assumptions about disposal of
3 cylinders?
4 WITNESS JOHNSON: Yes.
5 MR. LOVEJOY: And we worked up a cost
6 estimate. And, in that case it came to 90 cents per
7 KgU for cylinder disposal. Do you remember that?
8 WITNESS JOHNSON: Yes, I do.
9 MR. LOVEJOY: Do you intend to incorporate
10 any estimates of the cost of disposal of cylinders?
11 WITNESS JOHNSON: Well, I think what we
12 would incorporate is an estimate for cleaning them so
13 that they could be released for unrestricted use. And
14 again, the normal part of our decommissioning review
15 is to get clean-up to a level where equipment and
16 buildings can be released for unrestricted use.
17 But, we do not require cost estimates for
18 what happens to that equipment after it meets our
19 decommissioning radiation protection standards.
20 MR. LOVEJOY: So, are you assuming that
21 there's a process of cleaning which will bring a
22 contaminated DUF6 cylinder to the point where it's
23 good for unrestricted use?
24 WITNESS JOHNSON: Yes.
25 MR. LOVEJOY: Not use as another DUF6

1 cylinder, but unrestricted release to the general
2 environment?
3 WITNESS JOHNSON: Yes, it's our
4 understanding that this happens in the normal
5 recertification of cylinders where the heels are
6 removed from the cylinders so that the certification
7 process can go on that requires access for doing
8 thickness measurements and so on of the cylinder to
9 verify that it can still meet the American National
10 Standards Institute's standard for these cylinders.
11 MR. LOVEJOY: And, are you assuming that
12 the economics of the enrichment business in the United
13 States will be such that there's a use for these
14 cylinders, assuming, say, the NEF has shut down and
15 we're having a third party conduct decommissioning?
16 WITNESS JOHNSON: Well, I think there
17 would be -- there would probably be a market for some
18 of the cylinders. But again, it depends on the kind
19 of inventories that we're talking about.
20 MR. LOVEJOY: So, you would need to kind
21 of work up the hypothetical conditions that prevail in
22 the event a third party had to take over the
23 deconversion and disposal task?
24 WITNESS JOHNSON: Yes, and for any
25 cylinders that were still remaining to be processed,

1 we would expect the cost be added to clean those.

2 MR. LOVEJOY: And, if it was necessary to

3 dispose of them, it would be necessary to add that

4 cost too, right?

5 WITNESS JOHNSON: Yes.

6 JUDGE KELBER: Excuse me, but you would

7 not add -- if you had a disposal cylinder, you would

8 not include the cost of cleaning it first.

9 WITNESS JOHNSON: Well, the cylinders with

10 the heels in them would be unacceptable for disposal

11 because there is a small amount of UF6 in them. And

12 that's a reactive material which normally wouldn't be

13 suitable for disposal. So, it would have to be

14 cleaned.

15 JUDGE KELBER: Would it have to be cleaned

16 to the point where they could be certified?

17 WITNESS JOHNSON: I'm sorry?

18 JUDGE KELBER: Would they have to be

19 cleaned to the point where they have to be certified?

20 I'm wondering if they're doubling their loss.

21 WITNESS JOHNSON: It would have to be

22 cleaned to the point where they could be released to

23 meet our decommissioning standards for equipment.

24 JUDGE KELBER: That's somewhat different

25 than for unrestricted use.

1 WITNESS JOHNSON: Well no, I believe they
2 are the same thing.
3 JUDGE KELBER: Are they the same?
4 WITNESS JOHNSON: Yes.
5 JUDGE KELBER: Okay.
6 JUDGE ABRAMSON: So, just so I understand
7 this completely, let's see if I've got this right, Mr.
8 Johnson. The NRC's decommissioning regulations
9 require that buildings, equipment facilities, to the
10 extent they can be decontaminated be decontaminated
11 and then released -- to the point where they can be
12 released for unrestricted use.
13 The NRC does not impose any further
14 obligations on its licensee to say how it's going to
15 take care of getting rid of it. If the site is clean,
16 for example --
17 WITNESS JOHNSON: Yes, that is correct.
18 JUDGE ABRAMSON: So, the site could be
19 clean and the cylinders could be left on site once
20 clean, and they would meet the NRC's requirements. And
21 that is all the NRC required.
22 They would not require, for example, that
23 the licensee have provided fund for now stripping the
24 site back to its original condition.
25 WITNESS JOHNSON: Yes, the decommissioning

1 standards are based on bringing the facility and any
2 equipment that may be left there to a point where it
3 can be released for unrestricted use.
4 JUDGE ABRAMSON: So, the point is that you
5 remove the radiation horizontal, not that you remove
6 anything that could rust or anything that might decay,
7 or anything that might fall down.
8 WITNESS JOHNSON: That is correct.
9 MR. LOVEJOY: Well, my problem is that the
10 method of dealing with the cylinders has been dealt
11 with so impressionistically so far. And there's
12 really no proposal on the table.
13 I'm concerned that the -- that cost, that
14 element of the whole process be presented in a more
15 formal way with the proposals by LES and others, and
16 a chance for us to review it and talk to these
17 witnesses about it when they evaluate it.
18 And I must say -- and maybe this is
19 getting into kind of a general procedural question. I
20 understand that Ms. Compton is coming back and there's
21 going to be more inquiry about rate of return and that
22 kind of thing, which may then induce these witnesses
23 to revise what they have proposed so far.
24 So, I can bring the examination of the
25 panel to a pause. But I don't understand that they're

1 done. So I'm not quite sure how I can be done.

2 JUDGE ABRAMSON: And I think in my view

3 that is appropriate.

4 CHAIR BOLLWERK: You are correct. If

5 there's additional information that's relevant here

6 that's going to be coming in, and it appears there is,

7 then obviously you have some opportunity to deal with

8 that in some way.

9 I don't know how it's going to come in or

10 what that will be at this point. I don't know, for

11 instance, if these people are going to be able to get

12 together and talk and come up with a number before

13 this proceeding is over or if we're talking about, you

14 know, weeks with another report or a piece of paper

15 coming.

16 JUDGE ABRAMSON: Let's see if we can take

17 one issue at a time. The Board would like Ms. Compton

18 and Mr. Krich, or whoever Mr. Curtiss wants to put to

19 come back on so we can talk with them about this cost

20 estimate for the deconversion.

21 And, if that necessitates that we have

22 further questions from the Staff's panel, we'd like

23 the Staff's panel to be available for that. Does that

24 work for everybody?

25 (No verbal response.)

1 JUDGE ABRAMSON: That's certainly where
2 we'd like to go. Now, that takes care of that issue.
3 As to the cylinder disposition issue, it sounds to me
4 like the Staff needs to think about what it would like
5 to require in the way of funding for cylinder
6 disposition.
7 Is that what I'm hearing, Mr. Johnson as
8 to the cylinder?
9 MS. CLARK: Well, I think ordinarily our
10 process is when we identify an item like this we ask
11 the Applicant to propose a plan and a cost.
12 JUDGE ABRAMSON: I see.
13 MS. CLARK: Which we then review for
14 adequacy.
15 JUDGE ABRAMSON: All right. So these are
16 two separate issues. I don't think that the latter
17 requires putting panels on regulation away. Although,
18 Mr. Curtiss, do you have a suggestion as to how we
19 might proceed with these?
20 MR. CURTISS: No. Well, I think there is
21 a clear path forward. And the subject of talking with
22 the client, I think we can resolve this issue in this
23 proceeding.
24 JUDGE ABRAMSON: Great.
25 MR. CURTISS: We do have testimony on the

1 record that in the prefiled testimony discusses what
2 the estimated cost of cylinder washing would be if you
3 assume worst case.
4 And, subject to further discussion, why
5 don't we return to that issue at an appropriate point
6 later today? And I think we'll be able to resolve
7 that question.
8 JUDGE ABRAMSON: Okay. So, why don't --
9 I don't want to infringe on the Chairman's authorities
10 here.
11 CHAIR BOLLWERK: If I'm hearing what
12 you're saying, you're essentially done with this panel
13 at this point, other than these outstanding question
14 of, A, the washing, and B, whatever might come of the
15 additional questions the Board has for Ms. Compton and
16 Mr. Krich.
17 MR. LOVEJOY: Essentially, yes.
18 CHAIR BOLLWERK: And so, you would like an
19 opportunity, if need be -- well, certainly the Board
20 has additional questions for this panel. Obviously you
21 have additional cross examination.
22 JUDGE ABRAMSON: I'd like the panel --
23 this panel to stay here while Mr. Krich and Ms.
24 Compton resume their testimony so we can have
25 everybody here and try to sort this out.

1 CHAIR BOLLWERK: And, let me ask a
2 question. Is that something we can do after lunch? Or
3 was that going to be --
4 MS. CLARK: Yes, that would be -- my panel
5 will remain for the LES panel. I would like to have
6 a small amount of time for redirect.
7 CHAIR BOLLWERK: Do you want to do that
8 right now?
9 MS. CLARK: Well, I was wondering if I
10 could have maybe a ten minute break.
11 JUDGE ABRAMSON: Well, why don't we break
12 for lunch then?
13 CHAIR BOLLWERK: Maybe we should just
14 break for lunch then.
15 MS. CLARK: Okay.
16 CHAIR BOLLWERK: Let's do that. Is Ms.
17 Compton going to be here by --
18 MR. CURTISS: Yes, she's here.
19 CHAIR BOLLWERK: Okay.
20 MR. CURTISS: What I would suggest, and
21 depending upon the extent of redirect by the Staff of
22 their panel, LES may have redirect questions for this
23 panel as well.
24 I don't expect that to be extensive, but
25 there are some specific issues we'd like to pursue.

1 And then we'll be done from our perspective with this
2 panel.
3 And the Staff may cover all of our issues.
4 So I don't think we will have more than half an hour
5 of redirect for this panel. And then we're prepared
6 to call back both Mr. Krich and Ms. Compton where I
7 think many of the issues that have been raised can be
8 addressed.
9 Further questioning from the Board, which
10 is the original proposal for them to return, but we'd
11 redirect on that panel as well.
12 CHAIR BOLLWERK: All right. Then it
13 sounds at this point we are ready for a luncheon
14 break. I have about quarter after. Is 1:15, what's
15 better for you all?
16 MR. CURTISS: One fifteen.
17 CHAIR BOLLWERK: All right. Let's take
18 our lunch break then until 1:15. And we'll return
19 then and at that point move to redirect from the Staff
20 and then move forward from there.
21 (Whereupon, at 12:15 p.m. the above-
22 entitled matter was recessed for lunch.)
23
24

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

2 1:15 p.m.

3 CHAIR BOLLWERK: Let's go back on the

4 record. We are here after our luncheon break and we

5 are ready, I guess, to -- unless something has

6 occurred during lunch, let me just check, is there

7 anything procedurally that has occurred during lunch

8 time that we need to be aware of, before we start with

9 the redirect for the Staff?

10 MS. CLARK: No, Your Honor.

11 CHAIR BOLLWERK: All right, then I believe

12 that there was some redirect testimony for the Staff.

13 MS. CLARK: Yes, thank you.

14 EXAMINATION BY MS. CLARK OF:

15 DONALD PALMROSE

16 JAMES PARK

17 JENNIFER MAYER

18 CRAIG DEAN

19 TIMOTHY C. JOHNSON

20 MS. CLARK: Earlier, on cross examination,

21 we had a lot of discussion about washing of the

22 cylinders.

23 And I believe that you, Mr. Johnson,

24 talked about what would be involved in washing and

25 what the standards were for reuse versus free release.

1 And I believe that you wanted to make a clarification
2 with regard to that?
3 WITNESS JOHNSON: Yes. We received some
4 additional information that the standard washing
5 technique doesn't always bring a cylinder down to a
6 free release level, and that at least an alternative
7 decontamination method might be required to get it
8 down to those levels.
9 MS. CLARK: Thank you. Next I would like
10 to move on to talk a little bit, again, about our NEPA
11 analysis. And, Dr. Palmrose, Mr. Lovejoy asked you a
12 number of questions about the possible disposal of the
13 calcium fluoride produced by the deconversion
14 facility.
15 And first I would just like to ask you,
16 once again, in conducting your environmental analysis
17 did you make a determination as to how that calcium
18 fluoride will be disposed of?
19 WITNESS PALMROSE: No, I did not. I
20 reviewed all disposal and other options.
21 MS. CLARK: And what options did you
22 consider?
23 WITNESS PALMROSE: I considered potential
24 sale, and the potential for disposal as low level
25 waste or disposal in a landfill.

1 MS. CLARK: So you considered all of those
2 options, including disposal of low level waste as
3 options, is that correct?
4 WITNESS PALMROSE: That is correct.
5 MS. CLARK: And in your consideration of
6 those options how did that play into your
7 environmental analysis?
8 WITNESS PALMROSE: I wanted to analyze the
9 option that would have the most bounding impacts for
10 environmental effects.
11 MS. CLARK: And which option did you
12 consider had the most bounding effects?
13 WITNESS PALMROSE: Disposal as low level
14 waste.
15 MS. CLARK: And how did you reach that
16 determination?
17 WITNESS PALMROSE: I reached that
18 determination because of the long distances involved
19 in shipping this material to a licensed disposal
20 facility.
21 MS. CLARK: What are the licensed disposal
22 facilities that you considered?
23 WITNESS PALMROSE: Hanford, Washington and
24 Envirocare.
25 MS. CLARK: At another point in his

1 questioning Mr. Lovejoy discussed, to some extent, the
2 DOE's proposal for dealing with their depleted
3 uranium. And he noted that Envirocare is one option
4 that DOE is considering for disposal of the converted
5 tails.
6 Is that your understanding of the DOE's
7 proposal? Mr. Park, if you could speak to that?
8 WITNESS PARK: Yes, it is my
9 understanding.
10 MS. CLARK: Mr. Lovejoy went on to say
11 that before this can happen additional environmental
12 analysis must be conducted. Is it your understanding
13 that DOE must conduct an additional environmental
14 analysis before it can dispose of tails at Envirocare?
15 WITNESS PARK: I think there is some
16 relevant language that addresses that in the final
17 environmental impact statements that were prepared for
18 both the Portsmouth and Paducah conversion plants that
19 might address that issue.
20 MS. CLARK: Okay. Then why don't I refer
21 you to, let's refer to the Portsmouth final
22 environmental impact statement. This is LES exhibit
23 number 16.
24 JUDGE KELBER: What number was that?
25 MS. CLARK: LES exhibit 16. And we will

1 be looking at page 2-27.

2 WITNESS PARK: Okay.

3 MS. CLARK: Could you please read the

4 relevant language on that page?

5 WITNESS PARK: This is on page 2-27 of the

6 Portsmouth DUF6 conversion final environmental impact

7 statement, under section 2.3.4, it is the third

8 paragraph down.

9 And it states: This EIS evaluates the

10 impacts from packaging, handling, and transporting

11 conversion products from the conversion facilities to

12 a low level waste disposal facility.

13 The disposal facility would be, one,

14 selected in a manner consistent with DOE policies and

15 orders. And, two, authorized or licensed to receive

16 the conversion products by either DOE, in conformance

17 with DOE orders; the NRC, in conformance with the NRC

18 regulations, or an NRC agreement state agency, in

19 conformance with state laws and regulations determined

20 to be equivalent to NRC regulations.

21 Assessment of the impacts and risk from

22 on-site handling and disposal at the low level waste

23 disposal facility, is deferred to the disposal sites,

24 site-specific NEPA or licensing documents.

25 MS. CLARK: Now, has there been such a

1 site-specific analysis for the Envirocare facility?
2 WITNESS PARK: Yes, there has.
3 MS. CLARK: And who performed, who was
4 responsible for performing that NEPA analysis?
5 WITNESS PARK: The State of Utah.
6 MS. CLARK: Or I should say that
7 environmental analysis. So would there be any need
8 for the Department of Energy to conduct a NEPA
9 analysis in the event that they choose to use
10 Envirocare as their disposal site?
11 WITNESS PARK: No, they would not need to.
12 As indicated in the language I just read, they would
13 defer to that disposal site, site-specific NEPA or
14 licensing documents which the State of Utah would have
15 conducted as part of its review.
16 MS. CLARK: And, just for clarity, I would
17 like to refer you to exhibit 17, which is the Paducah
18 final environmental impact statement. And I refer you
19 to page 2-25, and I would just like to ask you if the
20 same language appears in that document that you just
21 read to us?
22 WITNESS PARK: Yes, the first paragraph at
23 the top of page 2-25 for the Paducah DUF6 conversion
24 final environmental impact statement is the same
25 language as in the Portsmouth final environmental

1 impact statement.

2 MS. CLARK: Thank you. Moving on to the

3 cross examination concerning cost estimates, at one

4 point in time I believe Mr. Lovejoy asked you, Ms.

5 Mayer, whether you had considered contemporaneous cost

6 estimates for deconversion.

7 And I believe you said you had not. Can

8 I ask you what contemporary cost estimates, that you

9 are aware of, that relate to deconversion?

10 WITNESS MAYER: There is the cost estimate

11 prepared by LES and there is a cost estimate prepared

12 by DOE for the USEC facility.

13 MS. CLARK: Do we have a cost estimate,

14 then, from Cogema? And maybe I should clarify.

15 Isn't it true that we have an estimate of

16 the cost that Urenco is paying to Cogema for

17 deconversion, currently?

18 WITNESS MAYER: Yes, we know what that

19 cost is.

20 MS. CLARK: Do you consider that cost

21 estimate relevant to -- do you consider that cost

22 estimate to be relevant and applicable to the cost

23 estimate that LES would pay for deconversion?

24 WITNESS MAYER: No. It would provide some

25 general background information, but for a number of

1 reasons it could not be directly used. These reasons
2 include the fact that the operations occur on a
3 different continent, that one is a price and one is a
4 cost estimate.
5 And there may be other regional
6 differences in what is included and what is not,
7 including the scale.
8 MS. CLARK: And did you consider the cost
9 estimate that DOE provided?
10 WITNESS MAYER: Yes, as I described
11 earlier we looked at that in some detail.
12 MS. CLARK: Okay, thank you. That is all
13 I have.
14 CHAIR BOLLWERK: All right. Any
15 questions? Let me see if there are any questions from
16 the Board?
17 (No response.)
18 CHAIR BOLLWERK: No? Then, Mr. Curtiss?
19 MR. CURTISS: Yes, I just have a few brief
20 questions here, primarily for Mr. Johnson.
21
22
23
24
25

1 EXAMINATION BY MR. CURTISS OF:

2 DONALD PALMROSE

3 JAMES PARK

4 JENNIFER MAYER

5 CRAIG DEAN

6 TIMOTHY C. JOHNSON

7 MR. CURTISS: Refer to LES exhibits 92 and
8 93, if you have those before you.
9 WITNESS JOHNSON: Yes.
10 MR. CURTISS: And have you seen these two
11 documents before?
12 WITNESS JOHNSON: Yes, I have.
13 MR. CURTISS: And is it correct that these
14 documents contain, principally exhibit 92, but also as
15 further explained in 93, how the Applicant, LES took
16 the cost estimate with respect to the -- from the
17 Urenco business study, and made certain adjustments in
18 that cost estimate to reflect what has been generally
19 referred to as the americanization of the facility?
20 WITNESS JOHNSON: Yes, it does.
21 MR. CURTISS: And is this a transparent
22 description of that process?
23 WITNESS JOHNSON: We thought it was a
24 reasonable description of the process.
25 MR. CURTISS: And was this, were these two

1 documents and your discussion with the Applicant on
2 April 19th, as you refer to in exhibit 93, in your
3 judgement did those contain a reasonable and adequate
4 explanation of how they adjusted the Urenco business
5 study estimate for certain factors necessary to build
6 that facility in the United States?
7 WITNESS JOHNSON: Yes, we felt it was
8 reasonable.
9 MR. CURTISS: Okay, thank you. If I could
10 turn your attention, Mr. Johnson, to NIRS/PC exhibit
11 56, which is the Lawrence Livermore report of May
12 1997? It is one of those exhibits that appears in an
13 odd place. So if you could look behind exhibit 134.
14 WITNESS JOHNSON: I'm sorry, which exhibit
15 is that?
16 MR. CURTISS: It appears out of sequence
17 because it was previously introduced, but it is
18 exhibit 56, which appears in the sequence behind
19 exhibit number 134.
20 WITNESS JOHNSON: All right, I have it.
21 MR. CURTISS: Could you turn to page 34 of
22 that exhibit, Mr. Johnson?
23 WITNESS JOHNSON: Yes.
24 MR. CURTISS: And do you see section
25 3.2.10, decontamination and decommissioning?

1 WITNESS JOHNSON: Yes.

2 MR. CURTISS: And do you recall the point
3 that was made, upon cross examination by Mr. Lovejoy,
4 where he referred to the sentence in that introductory
5 paragraph, it was assumed that facility demolition
6 would not be required.

7 Would you explain what is required insofar
8 as decontamination and decommissioning, and clarify
9 for the record whether once a facility is
10 decontaminated, and decommissioned from a radiological
11 standpoint, is there any further requirement that the
12 NRC imposes to demolish buildings?

13 WITNESS JOHNSON: No, we do not specify
14 anything further for the facility, other than to meet
15 the radiological standards for decommissioning.

16 MR. CURTISS: And on that basis, then,
17 would it be reasonable, as this presents here, to
18 assume that the ten percent estimate, which does not
19 include demolition would cover, as a proxy, the
20 decontamination decommissioning?

21 WITNESS JOHNSON: Yes, that is the way I
22 understand this particular section in the report.

23 MR. CURTISS: I have one further question,
24 then. If I could refer you to the LES exhibits, Mr.
25 Johnson, and exhibit number 115, if you have that

1 before you?

2 WITNESS JOHNSON: Yes, I have it.

3 MR. CURTISS: Have you seen this letter

4 before?

5 WITNESS JOHNSON: Yes, I have.

6 MR. CURTISS: Would you describe what this

7 letter addresses?

8 WITNESS JOHNSON: This letter addresses

9 the cost between neutralization of the HF produced in

10 deconversion, and the alternative of holding the HF

11 for sale.

12 MR. CURTISS: And are you generally

13 familiar with equipment that is required, in the

14 description here, of both the capital and the

15 operational costs associated with each one of those?

16 WITNESS JOHNSON: Yes, in terms of the

17 general detail that is here I understand what he is

18 saying.

19 MR. CURTISS: And in the context of this

20 issue, which you referred to under cross examination,

21 is it correct that the approach taken by the

22 Applicant, to this issue, was to evaluate the Urenco

23 business study estimate, which in turn was based upon

24 the Cogema response for the Capenhurst facility, and

25 determine whether an additional amount needed to be

1 added to the U.S. facility, if it were to be built for
2 deconversion to account for the fact that CaF
3 neutralization would be employed here, and not HF
4 handling storage.
5 And they concluded, didn't they, that the
6 costs would be relatively equal, but the CaF
7 neutralization would certainly be no more than HF
8 handling storage?
9 WITNESS JOHNSON: That was what was
10 provided to us by LES in our discussions.
11 MR. CURTISS: And you subsequently read
12 this letter and does this letter support that
13 conclusion?
14 WITNESS JOHNSON: Yes, it does.
15 MR. CURTISS: And with respect to the rail
16 spur issue, would that conclusion still be the same if
17 you did or didn't have to build a rail spur, that
18 based upon the type of equipment, and the handling
19 that would be required for HF, given its nature, you
20 still believe that the basis for those being roughly
21 equal, or certainly no more expensive in the case of
22 CaF is still a reasonable basis?
23 WITNESS JOHNSON: Well, as the information
24 was presented to us, in our discussions, it didn't
25 talk about a rail spur. LES talked about just

1 exchanging the types of process unit operations that
2 might be used, and the costs to do that.
3 MR. CURTISS: Was there anything that
4 counsel for NIRS/PC asked you upon cross examination,
5 that would cause you to alter your view about the
6 conclusion you reached, based upon the information
7 provided by LES in this letter?
8 WITNESS JOHNSON: No.
9 MR. CURTISS: I have no further questions.
10 CHAIR BOLLWERK: Mr. Lovejoy?
11 MR. LOVEJOY: Thank you.
12 EXAMINATION BY MR. LOVEJOY OF:
13 JAMES PARK
14 JENNIFER MAYER
15 CRAIG DEAN
16 TIMOTHY C. JOHNSON
17 DONALD PALMROSE
18 MR. LOVEJOY: Mr. Johnson, you said that
19 you determined that the standard washing technique for
20 cylinders doesn't always create a product that is
21 suitable for free release.
22 What exactly did you find out?
23 WITNESS JOHNSON: Well, we found out that
24 sometimes after doing washing the cylinders may still
25 contain contamination that would exceed the limits for

1 free release.

2 MR. LOVEJOY: What limit are you speaking

3 of when you say that?

4 WITNESS JOHNSON: The limits for free

5 release for surface contamination of equipment that

6 are a standard for any licensee.

7 MR. LOVEJOY: And what is the value?

8 WITNESS JOHNSON: I don't recall the

9 values. The values are given by nuclide. I believe

10 it is 3,000 DPM for depleted uranium. But I could be

11 wrong on that. I would have to go back and look at

12 the exact numbers.

13 JUDGE KELBER: Excuse me, is that in part

14 40, or part 20?

15 WITNESS JOHNSON: This is a standard that

16 has been adopted, I guess, in an old branch technical

17 position, and is referenced by all of our licensees in

18 terms of release of materials, and personnel

19 exposures, and contaminated materials.

20 JUDGE KELBER: It is a license condition,

21 not a regulation?

22 WITNESS JOHNSON: I'm sorry?

23 JUDGE KELBER: It is a license condition,

24 it is not a regulation?

25 WITNESS JOHNSON: It is usually proposed

1 by the Applicant, or the licensee, and we approve that
2 as part of the licensing. But it is a standard set of
3 criteria that are used for all licensees.
4 MR. LOVEJOY: Well, what exactly was the
5 information you got, was it that the standard washing
6 techniques sometimes do and sometimes don't meet free
7 release standards?
8 WITNESS JOHNSON: Yes.
9 MR. LOVEJOY: And what was there --
10 WITNESS JOHNSON: I'm sorry?
11 MR. LOVEJOY: -- measure of frequency
12 communicated to you?
13 WITNESS JOHNSON: I don't have further
14 details on that.
15 MR. LOVEJOY: So your information is that
16 we cannot assume that standard washing techniques lead
17 to a free release standard?
18 WITNESS JOHNSON: Yes, and that other
19 decontamination methods might be required to get down
20 to levels for free release.
21 MR. LOVEJOY: Do you have a description of
22 those other methods?
23 WITNESS JOHNSON: No, I don't.
24 MR. LOVEJOY: Do you have cost figures for
25 those other methods?

1 WITNESS JOHNSON: I don't have it at this
2 point in time, no.
3 MR. LOVEJOY: Okay. Do you have
4 information that actually says that other
5 decontamination techniques would attain free release
6 standards?
7 WITNESS JOHNSON: That is my
8 understanding, yes.
9 MR. LOVEJOY: Okay.
10 WITNESS JOHNSON: I think techniques like
11 sandblasting may have to be used, those kinds of
12 things. But it would be an alternative technique than
13 just a standard cylinder washing. That was the
14 information I received.
15 MR. LOVEJOY: So if I understand what you
16 are saying there would need to be standard cylinder
17 washing, and then some kind of evaluation of the
18 cylinder, to see whether it would meet standards?
19 WITNESS JOHNSON: Well, in any case if the
20 proposal is to release these things for standard, for
21 unrestricted use, there would have to be the
22 appropriate decontamination method used, and an
23 appropriate radioactive survey to ensure that the
24 levels were achieved.
25 MR. LOVEJOY: Do you have cost figures for

1 the radioactive surveys?

2 WITNESS JOHNSON: I don't have cost

3 figures for that at this time.

4 MR. LOVEJOY: Do you have cost figures for

5 disposal of cylinders in the event that is necessary?

6 WITNESS JOHNSON: I don't have cost

7 figures for disposal as low level waste, in the United

8 States, no.

9 MR. LOVEJOY: Do you have any --

10 WITNESS JOHNSON: I mean, it would be

11 other than what is available in the standard rate

12 sheets. It would depend on how the cylinders are

13 treated. I assume that they would be cut up if they

14 were to go to low level waste disposal to reduce the

15 volume.

16 MR. LOVEJOY: Do you have any information

17 that assists you to project whether cylinders would be

18 marketable in the time frame we are concerned about?

19 In other words, if they were cleaned, decontaminated,

20 would they be articles of commerce, do you have any

21 idea?

22 WITNESS JOHNSON: I would believe that

23 there would be a market for at least some of them. It

24 would be dependent on the total number as to what the

25 market would be.

1 But, I mean, it is conceivable that there
2 would be a continued use of these cylinders by others
3 who are shipping, or storing, depleted uranium
4 hexafluoride.
5 MR. LOVEJOY: That is not a very long
6 customer list, though, is it?
7 WITNESS JOHNSON: No, it wouldn't be. But
8 on the other hand that doesn't mean that there would
9 not be any market for any of the cylinders.
10 MR. LOVEJOY: Well, you would assume that
11 others participating in enrichment in the United
12 States would have secured their cylinder supplies,
13 wouldn't you?
14 WITNESS JOHNSON: Well, I don't know if
15 they would secure all of them, but certainly I think
16 it is reasonable to expect that at least some of them
17 might be used by others.
18 MR. LOVEJOY: Do you have any plan in mind
19 to try to project whether these would be marketable?
20 WITNESS JOHNSON: I don't have a plan in
21 mind for doing that. Normally the way we would
22 address these kinds of questions is we would request
23 a proposal from the Applicant, and review their
24 information.
25 But at this point I don't have further

1 information on what the market would be.

2 MR. LOVEJOY: Have you requested a

3 proposal from the Applicant?

4 WITNESS JOHNSON: Pardon?

5 MR. LOVEJOY: Have you requested a

6 proposal from the Applicant?

7 WITNESS JOHNSON: Not to date, I haven't.

8 MR. LOVEJOY: Do you plan to do that

9 today?

10 WITNESS JOHNSON: I don't know when. I

11 think we would have to discuss with the Applicant a

12 process for evaluating that. But I'm not prepared, at

13 this moment, to talk about what the details of that

14 would be.

15 MR. LOVEJOY: Let me move to another

16 subject and just ask you, Dr. Palmrose, a couple of

17 things. My memory may be wrong here, but did you say

18 that you analyzed the transportation impacts of

19 transporting calcium fluoride?

20 WITNESS PALMROSE: I had another person on

21 our staff do the transportation analysis impacts.

22 MR. LOVEJOY: And is it in the

23 environmental impact statement?

24 WITNESS PALMROSE: Yes, it is.

25 MR. LOVEJOY: Where is that?

1 WITNESS PALMROSE: CaF2 is listed there in
2 appendix D, and it is also discussed in chapter four.
3 MR. LOVEJOY: Did you make any calculation
4 of -- certainly you did not make calculations of costs
5 about transportation, did you?
6 WITNESS PALMROSE: No, I didn't.
7 MR. LOVEJOY: Did you calculate anything
8 with respect to the mileage per KGU, or anything that
9 would quantify the transportation for the CaF2?
10 WITNESS PALMROSE: Mileage and distances
11 were included to Hanford and Envirocare.
12 MR. LOVEJOY: Okay. Now, Mr. Park, do you
13 still have the Paducah environmental impact statement
14 there? I think it is LES exhibit 17.
15 WITNESS PARK: Paducah?
16 MR. LOVEJOY: Paducah.
17 WITNESS PARK: I do.
18 MR. LOVEJOY: You read one passage. Would
19 you turn to page 1-20, towards the bottom of the page,
20 at least in my version? And just --
21 WITNESS PARK: Okay, I found the page.
22 MR. LOVEJOY: Tell me if I read it right,
23 okay? I think it will be fastest this way.
24 To me it says: Assessment, this is in the
25 last full paragraph, starting in the middle.

1 Assessment of the impacts and risks from on-site
2 handling and disposal at the low level waste disposal
3 facility are deferred to the disposal site specific
4 NEPA or licensing documents.
5 DOE plans to decide the specific disposal
6 locations for the depleted U308 conversion product
7 after additional appropriate NEPA review. Accordingly
8 DOE will continue to evaluate its disposal options,
9 and will consider any further information or comments
10 relative to that decision.
11 DOE will give a minimum 45 day notice
12 before making the specific disposal decision, and will
13 provide any supplemental NEPA analysis for public
14 review and comment.
15 Is that what it says?
16 WITNESS PARK: Yes, it is.
17 MR. LOVEJOY: Okay. Have you reviewed any
18 NEPA analysis or studies of disposal of depleted
19 uranium at the Envirocare facility?
20 WITNESS PARK: No, I have not. That
21 Envirocare site, and low level waste disposal facility
22 is licensed by the state of Utah, under NRC agreement
23 state program. So, no, I have not done that analysis.
24 MR. LOVEJOY: You haven't reviewed any
25 documents reflecting the Utah authority's

1 environmental review of waste disposal at Envirocare?
2 WITNESS PARK: I'm sorry, could you
3 clarify?
4 MR. LOVEJOY: You have not reviewed any
5 documents reflecting the Utah authorities review of
6 the impacts of waste disposal at Envirocare?
7 WITNESS PARK: What we have done is we
8 have had a telephone call with the state of Utah to
9 discuss this issue. And the state of Utah indicated
10 that it had done those analysis. We have not
11 personally gone back to second guess or reanalyze them
12 for them.
13 MR. LOVEJOY: Did you ask them anything
14 about the details of the analysis they've done?
15 WITNESS PARK: There were some questions
16 about that in the sense of the applicability of the
17 site.
18 MR. LOVEJOY: What information did you get
19 from them?
20 MS. CLARK: Perhaps -- I don't recall, Mr.
21 Park, were you in that telephone conversation?
22 WITNESS PARK: No, I was not.
23 MS. CLARK: I believe that Mr. Johnson was
24 so perhaps he is the proper person to discuss that
25 conversation.

1 WITNESS JOHNSON: What we did was we
2 wanted to verify with the State of Utah that the
3 facility could accept large quantities of depleted
4 uranium.
5 And we had a phone call with them, in
6 which they discussed the reviews that they had done,
7 and the rationale for why they felt that that facility
8 could accept large quantities of depleted uranium
9 oxides for disposal.
10 CHAIR BOLLWERK: When you say large
11 quantities, are we talking about 133,000 metric tons?
12 WITNESS JOHNSON: Yes, they said that they
13 could accept depleted uranium oxides in quantities
14 that large.
15 MR. LOVEJOY: Did you make any enquiry
16 about whether they determined that disposal at the
17 Envirocare site would meet the dose limits in 10CFR
18 part 61 subpart C?
19 WITNESS JOHNSON: Yes. What the state of
20 Utah told us that as part of their licensing review
21 they had a contractor do pathway evaluations. But
22 some of those pathways, for that particular facility,
23 were considered by the state to be unrealistic.
24 And that is because of the very high
25 salinity in the groundwater, which would make it

1 unsuitable for human or animal consumption, or for
2 irrigation.
3 The soils had a very high saline content
4 that would make it difficult to grow foodstuffs.
5 There was a very low rainfall rate, and a very high
6 evapotransporation rate.
7 When all of these were considered they
8 felt that the intruder pathways that are normally a
9 part of a pathway evaluation were unrealistic, because
10 of the unique site characteristics of the Envirocare
11 site.
12 And that they felt that the disposal would
13 meet the objectives of the state's equivalent to the
14 subpart C performance objectives in Part 61.
15 MR. CURTISS: Mr. Chairman, if there is a
16 nexus here between the line of questioning and the
17 cylinder disposal issue, and he can tie that up, I
18 would be anxious to hear it. Otherwise if we are
19 evolving into a discussion of the plausibility of
20 disposal of depleted uranium DU308, hopefully we can
21 finish that panel and get to that issue in a couple of
22 days, because that is an issue before the disposal
23 panel.
24 CHAIR BOLLWERK: Let me ask Mr. Lovejoy
25 where he is going with this.

1 MR. LOVEJOY: I would be happy to defer
2 this to the disposal panel.
3 CHAIR BOLLWERK: All right.
4 MR. LOVEJOY: Ms. Mayer, you said, I
5 believe, that the information about the price that
6 Urenco pays Cogema, for deconversion, was not
7 relevant. And you gave, I think, three reasons.
8 One was that it was on a different
9 continent. Actually the proposal here is to build a
10 plant using essentially the same process on this
11 continent, right?
12 WITNESS MAYER: That is correct.
13 MR. LOVEJOY: And it is no big deal to
14 convert from euros to dollars, is it?
15 WITNESS MAYER: I would not necessarily --
16 in a simple fashion that is correct. You go to Yahoo!
17 you get the price for the day and you convert it. But
18 there are other issues that may play into the
19 conversion from euros or dollars.
20 For instance, would you rather buy a
21 gallon of gas in the United States, or in Europe?
22 They are not 1.2 percent apart from each other.
23 MR. LOVEJOY: Are you implying that there
24 are factors that would make the price of deconversion
25 in this country significantly different, that aren't

1 covered by the euro/dollar conversion?

2 WITNESS MAYER: I think that is a

3 possibility.

4 MR. LOVEJOY: Have you looked into those

5 aspects of this cost analysis?

6 WITNESS MAYER: Some of them -- there was

7 a line item for americanization that sought to address

8 those issues.

9 MR. LOVEJOY: And that was to adjust a

10 proposal to meet U.S. regulations, was it not?

11 WITNESS MAYER: As well as licensing

12 requirements.

13 MR. LOVEJOY: Okay. So either than that

14 you don't know of any factors that would change the

15 prices paid here, would you? ChaNge them because they

16 are here, that I take it was your suggestion?

17 WITNESS MAYER: Well, I think some of

18 those are built into the equipment standards that are

19 part of that americanization cost.

20 MR. LOVEJOY: Well, let me ask you about

21 some of the other basis you mentioned, which is to say

22 that one figure was price, and the other was cost.

23 Are you suggesting that having a figure for the price

24 of deconversion is irrelevant?

25 WITNESS MAYER: No, as I believe I stated,

1 having such a price provides relevant background
2 material. What I mean is that they are not directly
3 comparable.
4 MR. LOVEJOY: So the cost of carrying out
5 deconversion can be quite different from the price you
6 charge, is that right?
7 WITNESS MAYER: The cost of something can
8 -- the price charged for something can be different
9 from the cost that underlay, yes.
10 MR. LOVEJOY: And the price that you
11 charge, if you are in business to make a profit,
12 includes your profit and return on equity, doesn't it?
13 WITNESS MAYER: Yes among all the other
14 factors.
15 MR. LOVEJOY: So on that basis wouldn't
16 you prefer a price figure?
17 WITNESS MAYER: Not if there was no vendor
18 that could provide that service locally. If you are
19 going to have to build your own facility I would
20 rather have the cost to build that facility, than the
21 cost of a price for a service that you cannot reach
22 because of the geographic locations of the two
23 facilities.
24 MR. LOVEJOY: Okay. But, of course, you
25 would then need to add in the profit, or the return on

1 equity, and the debt service, wouldn't you?

2 WITNESS MAYER: As I believe we had in our

3 discussion, on return of investment, earlier,

4 depending on how you finance the financial assurance,

5 that might be covered.

6 JUDGE ABRAMSON: Mr. Curtiss is chomping

7 at the bit.

8 MR. CURTISS: I'm not really chomping at

9 the bit. I had lunch, so I don't have to chomp at

10 anything. But I do have one question to ask of Mr.

11 Johnson relative to this.

12 I'm trying to keep track of everything

13 that my good friend from New Mexico thinks you ask the

14 licensee to submit here. And I was puzzled as to one

15 of them that he thinks we ought to be submitting in

16 response to his line of questioning having to do with

17 sort of a business plan for cylinders, and resale.

18 So let me pursue that line of questioning

19 just briefly. These cylinders you've described, of

20 course, I'm not going to get into the question of how

21 you might clean them, or decontaminate them, or get

22 them to the level that you have described as the level

23 for unrestricted release.

24 But if the cylinders get to that level,

25 where they are unrestricted release, is there any NRC

1 regulatory interest insofar as what a company does
2 with cylinders that have been cleaned up and met your
3 unrestricted release standards?
4 WITNESS JOHNSON: No. As I mentioned
5 before, once a component or equipment meets the
6 standards for unrestricted release, the NRC wouldn't
7 place any further requirements on them.
8 MR. CURTISS: And whatever a company or
9 partnership like LES wish to do with those cylinders
10 would be completely up to them, wouldn't that be
11 correct?
12 WITNESS JOHNSON: Yes.
13 MR. CURTISS: And do you happen to know
14 whether the decommissioning cost estimate that LES
15 submitted assumed any revenues from the resale of
16 cylinders?
17 WITNESS JOHNSON: No, it did not.
18 MR. CURTISS: Just one other question.
19 Were you here when Dr. Harding presented his testimony
20 yesterday?
21 WITNESS JOHNSON: Yes, I was.
22 MR. CURTISS: And the discussion of
23 cylinders and the value that they have?
24 WITNESS JOHNSON: Yes.
25 MR. CURTISS: Do you have any reason to

1 disagree that there is a value inherent in those
2 cylinders?
3 WITNESS JOHNSON: Well, there may be a
4 value. It would be hard to quantify, and I guess it
5 would also depend on the number of cylinders that were
6 in the inventory.
7 I think it is reasonable that a portion of
8 those cylinders may have a real economic value. But
9 again, if it is a large number maybe not all of them
10 might have a real value.
11 MR. CURTISS: So back to my initial point,
12 that if the cylinders are cleaned up to that clean
13 level that you described, unrestricted release,
14 whatever the value is, it is completely up to the
15 licensee, the business, as to what to do with those
16 cylinders?
17 WITNESS JOHNSON: Yes.
18 MR. CURTISS: So in that circumstance I
19 take it that there is nothing that you think the
20 licensee owes the NRC about its business plan to deal
21 with the cylinders?
22 WITNESS JOHNSON: That is correct. If the
23 assumption is they can be cleaned up to a level for
24 unrestricted use we wouldn't dictate what the entity
25 who had them did with them following that.

1 MR. CURTISS: Thank you.

2 MR. CURTISS: Let me see if the Staff have

3 any other questions?

4 MS. CLARK: No further questions.

5 CHAIR BOLLWERK: Mr. Lovejoy?

6 MR. LOVEJOY: No further questions.

7 CHAIR BOLLWERK: All right. Then at this

8 point -- Judge Kelber, I'm sorry.

9 JUDGE KELBER: I would like to ask a

10 question that I think Mr. Johnson is the right person

11 to address this.

12 Since the cylinders, I hate to pursue this

13 topic, but I'm going to. Since the cylinders cost

14 money to procure, and you have licensees over the

15 country who procure these cylinders, since these

16 cylinders cost money to procure, it is reasonable to

17 assume that a licensee will get the minimum number

18 that the licensee needs for reliable service. Is that

19 not correct?

20 WITNESS JOHNSON: I would assume that that

21 would be the way the facility would operate.

22 JUDGE KELBER: So that over a 30 year

23 lifetime I would expect that each cylinder might be

24 cleaned and marked six times, that is once every five

25 years, the last time being the key one, the key time?

1 WITNESS JOHNSON: That may be. It would
2 be dependent on the rate that the deconversion
3 facility can process that material and return it.
4 JUDGE KELBER: I'm assuming some sort of
5 steady state. There might be a lag time. But what we
6 are talking about is something that occurs to each
7 cylinder just six times during its life?
8 WITNESS JOHNSON: That might be a
9 reasonable estimate.
10 JUDGE KELBER: Okay. We are not talking
11 about something that occurs on every Tuesday.
12 WITNESS JOHNSON: I'm sorry?
13 JUDGE KELBER: We don't count on something
14 that occurs every Tuesday.
15 WITNESS JOHNSON: No, this would be a
16 periodic requirement to --
17 JUDGE KELBER: Once every five years.
18 WITNESS JOHNSON: -- for recertification,
19 yes.
20 JUDGE KELBER: Yes.
21 CHAIR BOLLWERK: All right, anything
22 further?
23 (No response.)
24 CHAIR BOLLWERK: All right, then, at this
25 point we will dismiss the panel. I think you may be

1 staying around to listen to some of the testimony we
2 are going to be hearing in the next several minutes.
3 But I thank you, at this point, for your
4 service to the Board. And I know some of you we will
5 see again, I'm sure.
6 I believe at this point we are going to
7 have Mr. Krich and Ms. Compton back to testify again.
8 Some questions that the Board had. So if they would
9 like to come up and take a seat?
10 Whereupon,
11 ROD KRICH
12 LESLIE COMPTON
13 were recalled as witness by the Board and, having been
14 previously duly sworn, assumed the witness stand, were
15 examined and testified as follows:
16 CHAIR BOLLWERK: All right. You
17 previously have been sworn yesterday and will continue
18 to remain under oath. So -- and I guess Judge
19 Abramson may have some questions for you.
20 JUDGE ABRAMSON: Well, I might as well
21 start. Here we go again. You -- I don't know of you
22 heard. Mr. Krich heard a lot of it but probably you
23 didn't.
24 So let me just get back -- where we're
25 going back to is what our understanding is or what

1 understanding we can gain from the two dollars and 67
2 cent estimate.
3 And let me see if I can frame this and
4 then I'll ask you to help me understand it a little
5 better. As I see it, and I'm looking at the table
6 that you've given us in LES 92 --
7 WITNESS KRICH: Judge, would it be okay if
8 we get that --
9 JUDGE ABRAMSON: Yes, sure, please. This
10 is the table we were talking about yesterday, but --
11 okay. And this is the table that shows sort of the
12 basics of -- the fundamental elements of the cost of
13 construction and operating and eventually
14 decontaminating a facility.
15 Now help me -- let's -- first of all let
16 me make sure I understand this right. The 70 million
17 dollar cost for construction is a number that you --
18 that LES developed based on a number you saw in the
19 Cogema, Urenco business study. Is that correct?
20 WITNESS COMPTON: Yes.
21 JUDGE ABRAMSON: And that's a number you
22 arrived at by doubling the construction cost of that
23 facility? Or how did you arrive at that number?
24 WITNESS KRICH: I guess first, Judge, I
25 should say that we included in the 70 million, and we

1 should get a copy of the business study if we could
2 get a copy --
3 JUDGE ABRAMSON: I think it's million.
4 WITNESS KRICH: It includes what we
5 estimated to be the cost for the land, the facility
6 --
7 JUDGE ABRAMSON: It does the site cost?
8 WITNESS KRICH: Yes, sir.
9 JUDGE ABRAMSON: Okay.
10 WITNESS KRICH: Because the facility only
11 takes up about an acre.
12 JUDGE ABRAMSON: Okay. And that was
13 something that you included. Did you make that clear
14 to the Staff?
15 WITNESS KRICH: We may not have. We -- on
16 April 19th we had an in office visit from the NRC
17 Staff and their consultants. And what we did is walk
18 through the business study from Urenco and explained
19 how we went from those numbers to the numbers in this
20 table and what assumptions we made in doing that.
21 JUDGE ABRAMSON: Okay.
22 WITNESS KRICH: And it is Exhibit 93, I
23 believe, is a brief summary that we handed to the
24 Staff when they came for their in office review to
25 kind of help them through that.

1 JUDGE ABRAMSON: And so the 70 million
2 included the cost for the land because that was a
3 relatively small cost.
4 WITNESS KRICH: Small cost.
5 JUDGE ABRAMSON: Just sort of in the
6 noise, is that --
7 WITNESS KRICH: Yes, yes, Judge.
8 JUDGE ABRAMSON: Okay. And the 70 million
9 was arrived at from the business study? Was it a
10 straightforward process? Can you give me a short
11 outline of how that number came about?
12 WITNESS COMPTON: Yes. In the business
13 study, and again that was for the 3,500 ton U plant
14 --
15 JUDGE ABRAMSON: Right.
16 WITNESS COMPTON: They had [redacted] million
17 Euros for the base plant from Cogema.
18 JUDGE ABRAMSON: Okay.
19 WITNESS COMPTON: And then also [redacted]
20 million Euros for the sight infrastructure and some of
21 the licensing and engineering that Urenco would have
22 to provide --
23 JUDGE ABRAMSON: Okay.
24 WITNESS COMPTON: -- for the site.
25 WITNESS KRICH: Let me add to that,

1 because there was a question that you asked that I
2 think some of this goes to. And that is that [redacted]
3 million Euros includes the cost of licensing in
4 Europe. And so --
5 JUDGE ABRAMSON: The [redacted] million Euros --
6 WITNESS KRICH: The [redacted] million Euros.
7 WITNESS COMPTON: [redacted], yes.
8 WITNESS KRICH: [redacted] million Euros. If
9 you have the business study in front of you --
10 JUDGE ABRAMSON: Yes, what exhibit number
11 is it?
12 MR. CURTISS: Ninety-one.
13 JUDGE ABRAMSON: Ninety-one.
14 WITNESS KRICH: Go to page 8 of 15.
15 JUDGE ABRAMSON: All right.
16 WITNESS KRICH: And you see item B, bravo,
17 capital.
18 JUDGE ABRAMSON: Right.
19 WITNESS KRICH: And under there you have
20 Urenco would provide.
21 JUDGE ABRAMSON: Got it.
22 WITNESS KRICH: Okay. Then building and
23 service provision within the building.
24 JUDGE ABRAMSON: Okay.
25 WITNESS KRICH: Project management,

1 licensing, and approval processes, [redacted] million Euros.
2 JUDGE ABRAMSON: And is that -- are those
3 two figures incorporated into your 70 million dollar
4 U.S. number for facility construction or are they
5 separately considered in the licensing engineering
6 side?
7 WITNESS COMPTON: They're actually -- it
8 would be those two numbers plus an additional [redacted]
9 million for the additional train to take you to the
10 7,000 tons U capacity.
11 WITNESS KRICH: The answer to your
12 question, Judge, is yes.
13 WITNESS COMPTON: yes.
14 WITNESS KRICH: We incorporated all those
15 charges, all those costs in the 70 million.
16 WITNESS COMPTON: In the 83 total.
17 WITNESS KRICH: Eighty-three total, sorry.
18 WITNESS COMPTON: Sorry.
19 JUDGE ABRAMSON: In the 83 total?
20 WITNESS COMPTON: In the cost of the --
21 capital cost for the facility and then the licensing
22 and engineering, that's an additional 13 million
23 dollars in our table.
24 JUDGE ABRAMSON: I thought it said 18 in
25 the table I'm looking at.

1 WITNESS COMPTON: I'm sorry, 18.

2 JUDGE ABRAMSON: So it's 88 million.

3 WITNESS COMPTON: Right.

4 JUDGE ABRAMSON: And 88 million includes

5 the all-in cost of getting it built.

6 WITNESS COMPTON: Yes.

7 JUDGE ABRAMSON: So that includes your

8 lawyers fees. It includes -- and it includes your

9 lawyers fees because it's translated from something in

10 the business study, which piece of it is.

11 It's in the Urenco would provide licensing

12 and approval process. So that's what -- you figured

13 that since it cost them [redacted] million that would

14 include everything they had to do, and --

15 WITNESS KRICH: Internally. It didn't

16 include of course the cost for paying NRC fees, and

17 that's the reason --

18 JUDGE ABRAMSON: Right.

19 WITNESS KRICH: -- we added the

20 additional.

21 JUDGE ABRAMSON: So your number of 18

22 million, did you actually break it down internally

23 line by line to try to come up with this 70 and this

24 18, or were you broad stroking it, broad brush?

25 WITNESS KRICH: It was more of a -- we did

1 not go in a line by line item. What we -- and I can
2 explain what we did is we took these two together and
3 then split them out between construction and licensing
4 and engineering, based on our experience, the
5 experience that we're having at the NEF facility in
6 terms of what's the split between those.
7 JUDGE ABRAMSON: Okay.
8 WITNESS COMPTON: And we reviewed that
9 with Dr. Harding who is intimately involved in these
10 estimates and he agreed with our approach.
11 WITNESS KRICH: He agreed with the split.
12 JUDGE ABRAMSON: The ratio of licensing
13 and engineering versus facility construction?
14 WITNESS KRICH: Construction, exactly.
15 JUDGE ABRAMSON: And I think we heard the
16 panel this morning say -- just a second Mr. Curtiss.
17 I think we heard the panel this morning say that --
18 something about a five million dollar figure that had
19 been allocated --
20 WITNESS KRICH: Correct.
21 JUDGE ABRAMSON: -- of which covered NRC
22 fees and something else. What was it?
23 WITNESS KRICH: Americanization.
24 JUDGE ABRAMSON: Oh, no. That doesn't
25 sound right. Do you remember, Ms. Clark?

1 MS. CLARK: I thought that the five
2 million was all for NRC licensing fees.
3 WITNESS KRICH: It's actually -- we
4 added --
5 MS. CLARK: Oh, three million and then --
6 JUDGE ABRAMSON: Oh right, a million for
7 the EIS and three million for licensing fees, and
8 something -- how does that fit into the 18?
9 WITNESS KRICH: Okay. I can explain. We
10 took these figures from the Urenco business study,
11 added them together and divvied it up between
12 construction, 70 million, and licensing and
13 engineering, 13 million.
14 We then added an additional five million
15 onto the licensing and engineering to account for
16 other charges that you wouldn't have to account for in
17 Europe such as the licensing fees, there are the fees
18 from NRC.
19 JUDGE ABRAMSON: So you originally had 13
20 which is why you suggested it was 13 and the table
21 says 18.
22 WITNESS COMPTON: Correct.
23 WITNESS KRICH: Exactly.
24 JUDGE ABRAMSON: Okay.
25 WITNESS KRICH: Exactly. And then the --

1 so that -- the five million was split between three
2 million for licensing which was to pay the fees for
3 the NRC, and two million to do the conversion from
4 European standards to American standards.
5 JUDGE ABRAMSON: Okay.
6 WITNESS KRICH: And again, that's based on
7 our experience that we're currently going through with
8 the NEF because we have to -- we in fact are
9 converting European standards to U.S. standards.
10 JUDGE ABRAMSON: Okay. So now is where it
11 gets to the financial side. So we need 88 million
12 dollars out of the gate to cover the cost of getting
13 a facility to the point where it can start producing
14 the service. Is that right, 70 and 18?
15 WITNESS COMPTON: That's correct.
16 JUDGE ABRAMSON: And you're not going to
17 spend it all at once, but you're going probably spend
18 most of your 18 up front and then you're going to
19 spend your 70 during construction.
20 WITNESS COMPTON: That's correct.
21 JUDGE ABRAMSON: And then you'll start
22 generating revenues, right?
23 WITNESS COMPTON: Yes.
24 JUDGE ABRAMSON: And the revenues would be
25 generated from the sale of the service. You're going

1 to provide this service assuming -- now when I say you
2 I don't mean LES I mean you the owners or whoever the
3 owners of this plant are going to start providing a
4 service.
5 They're going to provide it at some
6 number. How did you arrive at that number? That's the
7 question.
8 WITNESS KRICH: The --
9 JUDGE ABRAMSON: That 2.67.
10 WITNESS KRICH: Two sixty-seven.
11 JUDGE ABRAMSON: Tell me how you -- what
12 computation you did to arrive at the 2.67. I know --
13 I mean I can see that you got to have -- well maybe we
14 should do one more element.
15 WITNESS KRICH: Right.
16 JUDGE ABRAMSON: You have an annual --
17 you're going to have an annual cost of operation and
18 maintenance.
19 WITNESS KRICH: Right.
20 JUDGE ABRAMSON: And your table shows 12.5
21 but I heard yesterday that it's not really 12.5, that
22 you had doubled the O&M cost from the business study.
23 WITNESS KRICH: The 12.5 reflects the
24 doubling.
25 JUDGE ABRAMSON: The double, right.

1 WITNESS KRICH: That's the doubling.

2 JUDGE ABRAMSON: So -- and that's an

3 annual expenditure you have to make.

4 WITNESS KRICH: Correct.

5 WITNESS COMPTON: Correct.

6 JUDGE ABRAMSON: Okay. Now tell me how --

7 what you estimate the actual O&M cost to be for this

8 88 million dollar facility.

9 WITNESS KRICH: Maybe I'll start and then

10 I'll turn it over to --

11 JUDGE ABRAMSON: Okay.

12 WITNESS KRICH: -- Ms. Compton. Based on

13 the information that we got from Urenco that's in

14 their business study with respect to the operating

15 costs for a 3,500 metric ton facility, we then took

16 that figure in order to increase it for a 7,000 metric

17 ton plant we doubled it.

18 And we've I think said yesterday that in

19 fact to do that scaling up you don't really need to

20 double. It's about [redacted]. And we got this

21 confirmed to us by Cogema, I believe, because you

22 share people, you share equipment.

23 JUDGE ABRAMSON: [redacted]

24 [redacted] Did I do that right?

25 WITNESS KRICH: I think so, Judge.

1 WITNESS COMPTON: Correct.

2 WITNESS KRICH: Yes.

3 JUDGE ABRAMSON: [redacted]

4 [redacted]

5 WITNESS KRICH: So the 12.5, the 12

6 million 500,000 is the doubled amount.

7 JUDGE ABRAMSON: I understand that.

8 WITNESS KRICH: And so that's what we put

9 in for an annual operating cost. Now if you look in

10 the next column over there it says the number of

11 kilograms U, okay?

12 JUDGE ABRAMSON: Yes.

13 WITNESS KRICH: So you see that for

14 facility construction we used -- 110 is the number

15 that we used for he total amount of -- over the 30

16 year license life of the plant, and that's the total

17 amount of kilograms of U that would be generated in

18 depleted uranium.

19 JUDGE ABRAMSON: That would be processed,

20 okay, I see.

21 WITNESS KRICH: Okay.

22 JUDGE ABRAMSON: Yes.

23 WITNESS KRICH: So for the facility

24 construction that 70 million covers -- is spread over

25 the 110,000 -- 110 million --

1 JUDGE ABRAMSON: Okay, I see what did
2 here.
3 WITNESS KRICH: -- kilograms. For the
4 operating costs you could do it -- you can calculate
5 it two ways. You can do it on an annual basis or do
6 it on a total basis, but you wind up at the same
7 point.
8 So we just did it on an annual basis. And
9 there's a little footnote down there that explains
10 that. So the 12.5 million dollars is associated with
11 the 7,000 metric tons -- I'm sorry, 7 million
12 kilograms of depleted U that we generate each year.
13 JUDGE ABRAMSON: Okay. So I see how you
14 got the 2.67 --
15 WITNESS KRICH: Right.
16 JUDGE ABRAMSON: -- now, by just
17 allocating those to the number of tons that the
18 money's spread over.
19 WITNESS KRICH: Exactly.
20 JUDGE ABRAMSON: Okay. Now help me with
21 a little more financial model approach to this thing
22 --
23 WITNESS KRICH: Okay.
24 JUDGE ABRAMSON: -- or business model, if
25 you will. We're going to do our own business model in

1 the hearing for a moment.

2 WITNESS KRICH: And I'll turn it over to

3 Ms. Compton. But at first, just to bear in mind, when

4 you're talking about this one of the things you have

5 to bear in mind is that -- and as the previous panel

6 explained this is kind of different because we're

7 talking about a deconversion facility that's in the

8 future.

9 We're going to start paying for it way

10 before it's needed. And so it's, you know, there's a

11 difference in time here. So for example, just to give

12 you an idea, if we were to start the plant up and

13 operate for two years and then shut it down we

14 wouldn't have all the money needed to build a

15 deconversion facility.

16 We would have enough money to cover

17 whatever tails we had generated, but it's not enough

18 money --

19 JUDGE ABRAMSON: No, I understand that.

20 WITNESS KRICH: Okay.

21 JUDGE ABRAMSON: But you'd --

22 WITNESS KRICH: Okay.

23 JUDGE ABRAMSON: -- only have enough money

24 to cover the tails you generate if 2.67 a kilo was the

25 --

1 WITNESS KRICH: Is a good number.

2 JUDGE ABRAMSON: And that's what we're

3 working --

4 WITNESS KRICH: Exactly. I think what

5 Leslie -- what Ms. Compton is going to be able to show

6 you is that that's more than enough to cover that.

7 JUDGE ABRAMSON: Okay. And that is the

8 issue before us, and I think before the commission.

9 Is this a reasonable number to reliable -- a

10 sufficiently reliable number.

11 So let me think about this, if you'll bear

12 with me, from the point of view of somebody who might

13 have been asked can I build and finance this project.

14 And I got a project that's going to cost me 88 million

15 dollars to get built, and it's going to cost me eight

16 point something million a year to operate.

17 And at the end of its life it's going to

18 cost me 8.8 million to get rid of it.

19 WITNESS KRICH: Right.

20 WITNESS COMPTON: Right.

21 JUDGE ABRAMSON: Right? And that's the

22 kind of -- that's the numbers we're looking at. [redacted]

23 [redacted]

24 [redacted]

25 [redacted]--

1 WITNESS KRICH: Yes, [redacted], right,
2 right.
3 JUDGE ABRAMSON: Okay. So if I were to
4 take the up front number of 88 million and say I got
5 to finance that somewhere, either through debt or
6 equity, and then I got to finance my operations to
7 tune of eight million a year, eight point something
8 million a year, and I'm going to start generating
9 revenue in year X while a facility's running at
10 certain percent of capacity and eventually it's going
11 to ramp up to capacity and I'd look at that for my
12 revenue stream, I would not -- and let's say were
13 generating 7,000 -- 7 million kilograms a year time
14 2.67, so something like 20 -- a little less than 20
15 million dollars a year in revenues once I'm at full
16 speed. Is that right?
17 WITNESS KRICH: Well actually -- and I'll
18 have to go look up the number. If you take in 7
19 million kilograms of depleted uranium and you put out
20 the -- I have to look up the number
21 WITNESS COMPTON: Right, it's about an --
22 JUDGE ABRAMSON: But if you're charging
23 them 2.67 --
24 WITNESS KRICH: Per the input, yes.
25 WITNESS COMPTON: Correct.

1 WITNESS KRICH: Per the input, yes.

2 JUDGE ABRAMSON: Right.

3 WITNESS KRICH: Okay.

4 JUDGE ABRAMSON: You're charging 2.67 time
5 7 million so you're generating something short of 20
6 million a year in revenue. Is that right?

7 WITNESS COMPTON: Sounds about right.

8 WITNESS KRICH: That's about right.

9 JUDGE ABRAMSON: Three times 7 would be
10 21. I'm less than 21. I'm more than 14. So
11 somewhere between 14 and 21, closer to 21. Okay. So
12 I'm generating something short of 20 million a year.

13 I've got to have 88 million in my pocket
14 plus eight for the first year's operation, assuming we
15 start first year at full speed, full capacity. So I
16 need 90 some million bucks.

17 And I'm going to generate 20 some a year.
18 Of the 20 some, eight's going to go to paying my O&M,
19 eight and a half, right? So I got something like ten
20 to 12 left over per year to deal with servicing my
21 debt and equity.

22 Is this analysis right? Oh, and to set
23 aside something to cover the 8.8 at the end, and let's
24 say that I do that linearly over the 30 years so it's
25 not a big number.

1 WITNESS KRICH: Right.

2 JUDGE ABRAMSON: It's a third of a million
3 a year. So I still got something more than ten
4 million a year to service my debt and my equity. Is
5 that right? Is that a proper way to look at this from
6 a business perspective?

7 WITNESS COMPTON: I believe, Judge. The
8 one assumption that I made is that each year this
9 price would escalate by three percent. So once you
10 have -- you would escalate the 2.67 by three percent
11 each year.

12 [redacted]
13 [redacted]
14 [redacted]
15 [redacted]

16 And if you continue on that path and your
17 price goes up at three percent but you've already paid
18 for your facility, you know, you've paid for it in 20
19 --

20 JUDGE ABRAMSON: Well, you borrowed.

21 WITNESS COMPTON: You borrowed, correct.

22 JUDGE ABRAMSON: And you got to pay it
23 back.

24 WITNESS COMPTON: You borrowed. You and
25 the bank own it during the --

1 JUDGE ABRAMSON: Yes, you and the bank own
2 it and my consortium and the bank have to pay -- I
3 have to pay the bank for it. So I've got to carry my
4 interest until 2016 or I got to carry my equity in
5 debt.
6 If I'm saying I'm putting my equity in now
7 and I don't build until 2016 that doesn't make a lot
8 of sense. So maybe we don't even build until 2012 or
9 13 or something.
10 WITNESS COMPTON: Correct. And you
11 wouldn't. You would probably wait until that point
12 and then you'd have the full thru-put.
13 JUDGE ABRAMSON: So let's say you start
14 your facility a few years before you need it. Start
15 construction a few years before you need it.
16 WITNESS COMPTON: Right.
17 JUDGE ABRAMSON: And so you've got
18 interest during construction.
19 WITNESS COMPTON: Yes.
20 JUDGE ABRAMSON: And your equity's just
21 hanging on by its teeth until the plant's producing,
22 right? So you got a few years when you have to go.
23 But once you go you're now producing ten or 12 million
24 dollars a year in present dollars.
25 WITNESS COMPTON: Correct.

1 JUDGE ABRAMSON: Right, in present
2 dollars. And you've put a three percent inflator on
3 your 2.67.
4 WITNESS COMPTON: Yes.
5 JUDGE ABRAMSON: But you put a three
6 percent inflator on your O&M.
7 WITNESS COMPTON: No, on the full 2.67.
8 And over time that would --
9 JUDGE ABRAMSON: I'm sorry, yes. I
10 understand there's a three percent inflator on the
11 2.67. So over time that's going to grow to five.
12 WITNESS KRICH: It reflects O&M,
13 construction, licensing, and --
14 JUDGE ABRAMSON: No, no. No, no, no.
15 That's the fee you're charging your client.
16 WITNESS COMPTON: Right.
17 WITNESS KRICH: Right, right.
18 JUDGE ABRAMSON: Okay, that's your revenue
19 stream. You're revenue stream's growing at a straight
20 three percent.
21 WITNESS COMPTON: Yes.
22 JUDGE ABRAMSON: Your costs, your O&M
23 costs are growing at something.
24 WITNESS COMPTON: Correct.
25 JUDGE ABRAMSON: Right?

1 WITNESS COMPTON: Probably at, we'll say,
2 a straight three percent.
3 JUDGE ABRAMSON: And what about your cost
4 of construction between now and the time you start.
5 Do you think they grow too?
6 WITNESS COMPTON: Yes.
7 JUDGE ABRAMSON: So in fact the
8 differential between the cost of construction and the
9 actual revenue stream is only different by a few
10 years, right?
11 You lock in your price the day you break
12 ground, and you lock in your debt costs the day you
13 break ground. And now you got your revenue stream
14 continuing to grow for a few -- your price continuing
15 --
16 WITNESS COMPTON: Yes.
17 JUDGE ABRAMSON: -- to grow for a few
18 years while you're not generating revenue so there's
19 some modest -- let's say it's three years at three
20 percent.
21 WITNESS COMPTON: Yes.
22 JUDGE ABRAMSON: Ten percent total. So
23 from 2.67 you go to 2.90. I'm ballparking, but you go
24 up a little bit --
25 WITNESS COMPTON: Right.

1 JUDGE ABRAMSON: -- okay, for those three
2 years. So there is an increment.
3 WITNESS COMPTON: Yes.
4 JUDGE ABRAMSON: And that gives you a
5 better spread between the revenue stream. That gives
6 you more margin.
7 WITNESS COMPTON: Correct. And that
8 margin continues to build over the life cycle of the
9 facility. And, you know, continues, and continues, as
10 you go out.
11 JUDGE ABRAMSON: Okay. So this really
12 rests, the economics of this, I don't want to call it
13 a study, and I don't want to call it a proposal, but
14 the economics of this case, if you will, rests on what
15 is built into the 12 and a half million a year, that
16 is not O&M costs?
17 And, sorry, and the fact that your price
18 for your service is going up three percent a year,
19 while the other costs are locked in the day you start
20 construction?
21 WITNESS COMPTON: Correct.
22 JUDGE ABRAMSON: Okay.
23 WITNESS COMPTON: And if you look at that
24 three percent, on that 80 cents, you get your 64 cents
25 for your construction, and your --

1 JUDGE ABRAMSON: There is three percent on
2 2.67, right? The thing -- yes, you are right, I'm
3 sorry. A difference between --
4 WITNESS COMPTON: But for our net
5 component --
6 JUDGE ABRAMSON: -- and 1.79.
7 WITNESS COMPTON: Taking out your
8 decommissioning, taking out your O&M, if you look at
9 how that grows over time, it is significantly more.
10 We talked about it yesterday. And actually I looked
11 at it last night.
12 It is about 60 million more than even once
13 you take out the cost of the escalation of the
14 facility if you build it.
15 JUDGE ABRAMSON: Sixty million over the
16 life of the facility?
17 WITNESS COMPTON: Over the payments that
18 you would expect to receive if you started up, in say,
19 2016. And if you built it, between 2012 and 2016, and
20 had to pay escalated costs of construction in that
21 time frame, like we talked about, as you mentioned
22 earlier, going in about three percent a year, up until
23 that point, from today's cost.
24 JUDGE ABRAMSON: If I divide the seven
25 million a year into the 110 you are counting on

1 processing that to about what, 15 or 16 years of
2 operation, full speed.
3 So you could, if it is a 30 year life on
4 the NEF, this thing doesn't need to be operating until
5 year 12, or something, 13, somewhere halfway, nearly
6 halfway into the cycle on NEF, is that right?
7 WITNESS COMPTON: Actually we would
8 assume, in this case, it starts about 2016 and
9 operates for 17 years.
10 JUDGE ABRAMSON: In 2016 and --
11 WITNESS COMPTON: Roughly.
12 JUDGE ABRAMSON: -- that is based on NEF
13 starting when? In 2008, so there is an eight year
14 lag?
15 WITNESS KRICH: And there is a ramp-up.
16 JUDGE ABRAMSON: There is a ramp-up
17 period. So now to back up into something we haven't
18 been talking about, here, but this is very helpful,
19 thank you.
20 To back up into something we haven't been
21 talking about, the amount of DU that is accumulated,
22 and therefore the number of cylinders that are
23 accumulated is that eight years plus whatever is not
24 handled during the ramp-up period, right?
25 You get the year, you've operated for

1 eight years, before you have the deconversion
2 facility, and now you have some ramp-up period, so a
3 couple more years when the deconversion facility is
4 ramping up.
5 WITNESS KRICH: Right.
6 JUDGE ABRAMSON: So it is eight plus years
7 of --
8 WITNESS KRICH: That is about right, that
9 is right.
10 JUDGE KELBER: Now, let me interject.
11 Presumably when the NEF starts up there will also be
12 a certain amount of ramping up to do.
13 WITNESS KRICH: Yes. So we are not
14 producing --
15 JUDGE ABRAMSON: Well, in fact, NEF said
16 they are going to build up as their demand goes,
17 right? They are not going to step function up to one
18 hundred percent?
19 WITNESS KRICH: No, it goes in modules,
20 actually, it will be built in modules. So you
21 construct for the first two years, starting 2006,
22 assuming we are able to get the license in 2006.
23 We can run the first module, which is the
24 500,000 slew, and run that after two years of
25 construction, then we continue to construct out, build

1 out the rest of the plant while we are producing
2 enriched uranium.
3 And so there is a slow ramp-up in the
4 amount of depleted uranium that you are making. So
5 the number of cylinders that you produce in the first
6 few years is pretty small, until you get up to the
7 full production level.
8 JUDGE ABRAMSON: Right. But if we needed
9 to calculate the amount of DU that was going to be
10 accumulated, until this came along, and the number of
11 cylinders, that can be computed based on the ramp-up
12 of the NEF --
13 WITNESS KRICH: That is right.
14 JUDGE ABRAMSON: -- and the ramp-up of the
15 deconversion facility?
16 WITNESS KRICH: That is right.
17 JUDGE ABRAMSON: So that is all very
18 helpful. Now, let me ask you a more basic question.
19 Do you think the Staff understood this when they
20 reached their conclusion?
21 I know you would like to think they
22 reached the right conclusion based on the right
23 information. But you had meetings with them, I
24 didn't.
25 Was all this information conveyed to them,

1 or was it conveyed in a different way, or --

2 WITNESS KRICH: When we met with the Staff

3 on April 16th, this is after -- and we went through a

4 lot of questions and answers, and telephone calls, and

5 sending in information, but we met with them in-office

6 on April 19th.

7 We laid out exactly this information and

8 walked through how we did the, we went from one, this

9 cost estimate to our cost estimate. And based on the

10 questions that we received, during that time, the

11 Staff went off for a period and caucused on their own.

12 I felt that they had a good grounding and

13 a good understanding of what we had done.

14 JUDGE ABRAMSON: Was there a discussion

15 between you and them about the doubling of the O&M

16 costs, and what meant in terms of how it would cover

17 other related costs, or --

18 WITNESS KRICH: Yes, Judge. There was a

19 discussion about the doubling of the O&M costs. And

20 we talked about the fact that that was highly

21 conservative. We did not go into, and I remember

22 distinctly, we didn't go into a lot of discussion as

23 to what the extra covered.

24 So we didn't really discuss with them what

25 that extra amount we were counting on was covering.

1 Because it was kind of, it was just a kind of thing
2 that we carried with us without identifying it
3 explicitly.
4 So it is our fault for not identifying it
5 explicitly.
6 JUDGE ABRAMSON: Well, the reason I'm
7 pursuing this is that the heart, as I saw it, of
8 NIRS/PC's proposition here was that these numbers
9 didn't cover costs of capital, and other related
10 costs. And that is what I wanted to pursue and see if
11 they do or don't, whether or not they were properly
12 explained to the Staff.
13 I think it is incumbent on all of us to
14 make sure that we are comfortable if they do, or we
15 understand that they don't.
16 WITNESS KRICH: Right.
17 JUDGE ABRAMSON: So with that I'm finished
18 with that. I suppose Mr. Lovejoy wants to follow this
19 up and perhaps the rest of the counsel want to follow
20 this up.
21 WITNESS KRICH: So just to add, just to
22 finish, I think that the Staff did walk away with a
23 good understanding that the doubling of the operations
24 costs included a substantial margin which could then
25 be used to cover other items.

1 JUDGE ABRAMSON: I understand enough now
2 that I can be quiet until somebody raises something
3 new for me.
4 WITNESS KRICH: Right.
5 CHAIR BOLLWERK: Let's see first if Mr.
6 Curtiss has any questions.
7 MR. CURTISS: Well, I will defer to Mr.
8 Lovejoy. And then I will have some questions.
9 EXAMINATION BY MR. LOVEJOY OF:
10 ROD KRICH
11 LESLIE COMPTON
12 MR. LOVEJOY: I do have a few questions
13 remaining. And I guess one of them would be, isn't it
14 a fact that the facility costs, 70 million, you
15 derived essentially by difference?
16 WITNESS KRICH: I'm not sure I --
17 MR. LOVEJOY: Didn't you take a figure for
18 engineering, licensing, for the NEF you estimated that
19 it would be half that amount for the deconversion
20 plant, you took 26 million for the licensing and
21 engineering of the NEF, cut it in half, got 13
22 million, added 5 million for americanization, and then
23 subtracted that from the 88 million dollars which you
24 got by putting the costs from the business plan,
25 business study, into dollars?

1 You had an 88 million dollar total cost,
2 right, for constructing this facility, is that right?
3 WITNESS KRICH: No, no, Mr. Lovejoy. That
4 is not right. What we did, as we just explained to
5 the Judge, we took two figures that were in the Urenco
6 business study, [redacted] million euros, and [redacted] million
7 euros, and summed those to cover the cost.
8 And then, of course, upgraded them, or
9 upscaled them for the additional train by [redacted] million
10 euros.
11 JUDGE ABRAMSON: That is abou[redacted] million,
12 plus or minus?
13 WITNESS KRICH: In euros. So that covers,
14 now, the total cost of construction, engineering, and
15 licensing. And in order to be able to differentiate
16 between the plant construction, and the licensing and
17 engineering, we looked at how much we are spending for
18 the NEF facility.
19 JUDGE ABRAMSON: But you didn't need to
20 differentiate, I mean, the sum was the sum?
21 WITNESS KRICH: You are right, the sum was
22 the sum.
23 JUDGE ABRAMSON: Right, so I --
24 WITNESS KRICH: We did this for the
25 purposes of just trying to clarify. But you are

1 exactly right, we didn't really need to differentiate.

2 JUDGE ABRAMSON: And so you took the --

3 what did we say the number was, 65 million, and we

4 converted it to euros, does that come to 88?

5 JUDGE KELBER: You said euros to dollars.

6 JUDGE ABRAMSON: I'm sorry, euros to

7 dollars.

8 WITNESS KRICH: It comes to 83 -- yes, I

9 believe it comes to 83 million because, remember, we

10 added an additional five million dollars there.

11 JUDGE ABRAMSON: Okay, five million

12 dollars you added?

13 WITNESS KRICH: Yes.

14 JUDGE ABRAMSON: So the [redacted] million euros,

15 which was the [redacted], and the [redacted], and another [redacted] the

16 additional train, that gets you to approximately [redacted]

17 million euros, which gets you to about 83 million

18 dollars, and you have another 5, which gets you to 88

19 million.

20 And then you said at my 88 I could, if I

21 wanted to, break it down between construction costs,

22 and licensing and engineering costs. Our experience

23 with NEF is that here is the ratio, that seems to be

24 a rational ratio.

25 But it is irrelevant in the sense that you

1 still need the 88 million --

2 WITNESS KRICH: That is correct.

3 JUDGE ABRAMSON: -- if you buy what they

4 are telling you, what the study is telling you are the

5 costs in Europe. So the five million was --

6 WITNESS KRICH: The five million covered

7 the cost of paying NRC fees, and for converting to

8 U.S. standards.

9 JUDGE ABRAMSON: Okay.

10 WITNESS KRICH: Because the licensing was

11 already included in that 83 million. But I want to,

12 because I know where Mr. Lovejoy is going here, we

13 didn't ratio it from engineering to construction. We

14 just said how much is it costing us now for NEF to do

15 the engineering and licensing?

16 And that is where we estimated the 13

17 million, subtracted that out of the 83 million.

18 JUDGE ABRAMSON: To get to the --

19 WITNESS KRICH: To the 70 million, and

20 then added five million on to the 13 million, gets you

21 the 18 million.

22 JUDGE ABRAMSON: Okay. But the fact is we

23 are still saying it is 88 --

24 WITNESS KRICH: The bottom line is the

25 bottom line.

1 JUDGE ABRAMSON: -- to have it done?

2 WITNESS KRICH: Yes.

3 JUDGE ABRAMSON: And that is basically the

4 Urenco number plus five. Carry on now.

5 WITNESS KRICH: Well, it is the Urenco

6 number, but the engineering and licensing figure comes

7 from U.S. experience, or U.S. projections, the half

8 million extra, and the half cost of the NEF, 13 plus

9 5 makes 18 million.

10 They subtract out from the total 88

11 million, and they get 70 million as construction

12 costs, but that is just by difference. You know it

13 could well be more.

14 JUDGE ABRAMSON: Oh, true, but so could

15 the other number. If I look at this third party

16 neutral judge type of story I have a number from

17 Urenco that says it is 83 million dollars to do this.

18 And what LES is telling me is, oops, that

19 83 million misses 5 million extra that I have to pay

20 in the U.S. because of certain adaptations in the

21 U.S., pay the NRC, do some adaptions to standards,

22 etcetera. So the number is 88.

23 And the number is 88 and that is now money

24 out of pocket. Anyway, I understand that much, thank

25 you. Carry on, Mr. Lovejoy.

1 MR. LOVEJOY: So the 88 million would over
2 time escalate at some percentage also, wouldn't it?
3 WITNESS COMPTON: Yes.
4 MR. LOVEJOY: Okay. Because I didn't hear
5 that mentioned before.
6 JUDGE ABRAMSON: No, that is one of the
7 things I asked. Everything goes up until they start
8 construction. They can lock the 88 in the day they
9 start constructing, because that number now gets
10 spent.
11 JUDGE KELBER: I believe that escalation
12 at three percent was mentioned yesterday.
13 JUDGE ABRAMSON: That is also irrelevant.
14 MR. LOVEJOY: And what was the information
15 that told you that doubling the plant size would
16 actually cause an increase in O&M of, I think it was
17 [redacted] you said?
18 WITNESS KRICH: We talked to Cogema about
19 this. If you remember from yesterday, Mr. Lovejoy, we
20 went through this in detail. So I will try to
21 summarize today, because I don't want to bore
22 everybody with it.
23 But the optimum size plant is 7,000 metric
24 tons U, or 10,000 metric tons UF6, that is the optimum
25 sized plant. And, in fact, that is the size of the W1

1 plant, and the W2 plant.

2 So that is, really, Cogema has a very good

3 understanding of what it takes to build a facility to

4 operate at 7,000 metric tons UU, because that is the

5 size of each one of their facilities.

6 So based on our discussions with them as

7 to the operating costs, and if we go from 3,500 to

8 7,000 which is, exactly where they operate each one of

9 their facilities, they told us that that is not a

10 doubling, because there is so much shared equipment

11 and operations, personnel and operations.

12 That it runs about [redacted]. It is an

13 increase of about [redacted]. We went ahead and doubled

14 it to be able to be conservative and cover a lot of

15 other costs that might come up.

16 MR. LOVEJOY: Who gave you that data?

17 WITNESS KRICH: Cogema. This isn't data,

18 this is a qualitative assessment of how much more we

19 needed to add to their estimate for 3,500 metric

20 plant, 3,500 metric ton plant to increase it to a

21 7,000 metric ton plant.

22 And their advise was you don't need to

23 double it, it is about [redacted] larger. We went ahead

24 and doubled it.

25 MR. LOVEJOY: Did you ask for any data

1 about prevailing wage rates in U.S. and the UK?

2 WITNESS KRICH: We actually considered

3 that and we came to the conclusion that covering wages

4 in the U.S. was actually a little cheaper than the

5 wages in England, including health care costs, this is

6 the total coverage.

7 MR. LOVEJOY: How did you get this

8 information?

9 WITNESS KRICH: Qualitatively. Same as

10 what we've done for NEF, we looked at what we are

11 estimating in our business plan, in our cost estimates

12 for the NEF. And we talked to Dr. Harding and other

13 people in Urenco.

14 MR. LOVEJOY: You had a figure, in one of

15 your spreadsheets, I think it was attached as the last

16 page of the business plan, showing ten million euros

17 for decommissioning. But you didn't use that in this

18 estimate. Why was that?

19 WITNESS KRICH: I think Dr. Harding

20 testified yesterday that spreadsheet was a parametric

21 study. And so it is not, it didn't give numbers that

22 were relevant or particular to this exact cost

23 estimate.

24 They were running parametric figures and

25 looking at various, what the changes, if you change

1 one variable what happens to the rest of the figure.
2 So it is not relevant.
3 MR. LOVEJOY: This was submitted to the
4 directors of Urenco, wasn't it, the business study?
5 WITNESS KRICH: What was submitted?
6 MR. LOVEJOY: The business study, LES
7 exhibit number --
8 WITNESS KRICH: I'm not sure who it was
9 submitted to, Mr. Lovejoy.
10 MR. LOVEJOY: Well, it says distribution,
11 on the first page, UEC joint board members.
12 WITNESS KRICH: Yes, I'm not sure -- which
13 page is it? If you are getting to the point of
14 whether this last page was distributed, I can't say
15 that.
16 MR. LOVEJOY: And the copy you got of this
17 study it was attached, was it not?
18 WITNESS KRICH: I don't remember.
19 WITNESS COMPTON: I believe I received it
20 separately.
21 MR. CURTISS: Yes, I think I can speak to
22 that. This was provided as LES 00646, at the end of
23 this. And when we received the Urenco business study,
24 and disclosed it with the referenced proprietary bates
25 numbers at the bottom, we inadvertently attached this

1 to it. It just happens to appear in sequence. So
2 counsel will take the responsibility for that.
3 The business study, as we received it, did
4 not include the attached spreadsheet.
5 MR. LOVEJOY: So, in the hypothetical that
6 the Court was asking about, where there is
7 construction and operation of the NEF, that commences
8 over a period before the deconversion process is
9 available, are there costs incurred from accumulating
10 cylinders, strong them on-site, managing that
11 inventory?
12 WITNESS KRICH: I guess I'm not sure I
13 understand that question. The cost of operating the
14 plant is the cost of operating the Panel.
15 JUDGE ABRAMSON: The NEF plant?
16 WITNESS KRICH: The NEF plant, yes.
17 MR. LOVEJOY: But the storage costs for
18 the cylinders that you have not been able to send to
19 a deconversion plant, is there any costs incurred?
20 WITNESS COMPTON: It is actually very
21 incremental. We are building a pad upon which to
22 store these, that we have to have. And then as far as
23 monitoring them, using our operations personnel, it is
24 just a collateral duty, and we will do that, and keep
25 strict records, as we have agreed to.

1 But it is really -- it certainly doesn't
2 require an extra person, it is part of routine
3 operations and what we have to do in keeping our
4 inventory.
5 WITNESS KRICH: As I explained a little
6 bit earlier, because of the ramp-up, after about 8
7 years, I think is what we said, the number of depleted
8 uranium byproduct cylinders is pretty small.
9 JUDGE ABRAMSON: Is it less than the 5,000
10 you have agreed witness --
11 WITNESS KRICH: In 8 years?
12 JUDGE ABRAMSON: Yes.
13 WITNESS KRICH: If we go 8 years, yes, it
14 is a little bit less than that, yes.
15 WITNESS COMPTON: Eight years including
16 that ramp-up.
17 WITNESS KRICH: Yes, the 5,000 comes from
18 assuming a full power, a full production rate.
19 JUDGE ABRAMSON: So you could be eight
20 years into operation before you start bumping into
21 your limit under your New Mexico agreement?
22 WITNESS KRICH: Just about, that is right.
23 MR. LOVEJOY: Well, Ms. Compton, you did
24 some exercises generating spreadsheets, I assume, on
25 a computer. Is that right?

1 WITNESS COMPTON: All the time.

2 MR. LOVEJOY: And did you in those

3 exercises account for some portion of the O&M costs as

4 actually available to pay debt service?

5 WITNESS KRICH: I think that we testified

6 just a little while ago that we didn't identify this

7 as a specific line item. We just added enough margin

8 that it would cover those types of costs.

9 But we, neither Ms. Compton nor I,

10 identified that as a specific line item.

11 MR. LOVEJOY: Now, the reason I'm curious,

12 I do recall yesterday, Ms. Compton, you came up with

13 a number for what is left over at the end of the

14 operating life, which was available.

15 And I was wondering what you got that

16 from, what kind of studies?

17 WITNESS COMPTON: As we just talked about

18 today, just looking over time, if you assume, we just

19 spoke about with Dr. Abramson, if you look over time

20 at the escalation of the 2.67, or actually just the

21 construction piece, there is a, you know, that

22 continues to escalate after you've paid for it, and

23 that would cover your cost of capital, conceivably.

24 MR. LOVEJOY: Did you just do that in your

25 head, did you do that in your computer, how did you

1 calculate that?

2 WITNESS COMPTON: I just plugged it into

3 a spreadsheet very quickly.

4 MR. LOVEJOY: Did you print this out?

5 WITNESS COMPTON: No.

6 MR. LOVEJOY: Did you show the information

7 to the Staff?

8 WITNESS KRICH: No, she discussed it with

9 me.

10 WITNESS COMPTON: I just discussed it with

11 Rod.

12 WITNESS KRICH: And we agreed that that

13 was an appropriate thing to do.

14 WITNESS COMPTON: I mean, I may have --

15 MR. LOVEJOY: Was this material produced

16 in discovery?

17 WITNESS KRICH: It wasn't existing. I

18 think we just explained that it was done in the

19 computer, it was not printed out. Ms. Compton and I

20 discussed what her concept was and I concurred with

21 her.

22 MR. LOVEJOY: When did this take place?

23 WITNESS KRICH: Mr. Lovejoy, I can't tell

24 you exactly. When we did these calculations we did

25 this analysis back in the early part of the year.

1 WITNESS COMPTON: Back when we were
2 looking at the LMI study.
3 WITNESS KRICH: No, before. I'm talking
4 about even when we went and did this conversion.
5 WITNESS COMPTON: Yes.
6 WITNESS KRICH: It was the early part of
7 the year though. Yes, the early part of the year.
8 MR. LOVEJOY: Do you have all the
9 documents that exist relative to that analysis?
10 WITNESS KRICH: That's all I have.
11 CHAIR BOLLWERK: All right. Mr. Curtiss?
12 MR. CURTISS: I just have a few areas.
13 And I don't know whether to clarify this as redirect
14 or surrebuttal. But, if the Board will give me some
15 liberty, I think I can get through this fairly quickly
16 and focus on many of the questions that were raised
17 here.
18 EXAMINATION BY MR. CURTISS OF:
19 ROD KRICH
20 LESLIE COMPTON
21 MR. CURTISS: Mr. Krich, did you hear the
22 testimony of Mr. Johnson of the NRC Staff relative to
23 cylinder washing?
24 WITNESS KRICH: I did.
25 MR. CURTISS: And he referred to a method

1 of cleaning these, or at least the standard that he
2 would apply for unrestricted release and the method
3 for cleaning these.
4 Is that an area that you know anything
5 about?
6 WITNESS KRICH: I picked up a little
7 information over time about this in talking with, in
8 particular, Cameco, which is a company that, as
9 everyone may know, mines uranium and then converts it
10 to yellow cake for eventual enrichment and use in
11 nuclear power plant.
12 There's two things here that we need to
13 keep clear. In talking about the cylinder wash, that
14 cost includes -- typically includes the
15 recertification.
16 So it is cylinder wash and
17 recertification. And Mr. Johnson was right about the
18 activities involved in cylinder wash and
19 recertification.
20 What we also know from Cameco is that,
21 typically, when they typically will clean a cylinder,
22 if they're not going to reuse it, they'll clean a
23 cylinder down to free release.
24 And that involves wash and sandblasting if
25 need be. And it turns out that the information from

1 Cameco is that that's actually a little less expensive
2 than the cylinder wash and recertification.
3 MR. CURTISS: So, there is a technically
4 plausible approach here based upon information which
5 you've gathered that allows the -- that would allow
6 the cleaning of these cylinders to the level that Mr.
7 Johnson articulated earlier.
8 And, based upon your preliminary
9 information, that approach would be bounded by
10 whatever the cost of cylinder washing would be, do you
11 believe?
12 WITNESS KRICH: Exactly.
13 MR. CURTISS: Is that --
14 WITNESS KRICH: That would be founded by
15 that cost, that's right.
16 MR. CURTISS: Is that your expert
17 judgment?
18 WITNESS KRICH: That's my expert judgment
19 based on the information of actual experience today.
20 JUDGE ABRAMSON: And you have a number for
21 wash? Not a number for the substitute process, but a
22 number for wash?
23 WITNESS KRICH: Well, I think that we said
24 yesterday we would agree it runs about [redacted] cents
25 per KgU.

1 MR. CURTISS: I'm going to jump around
2 here a little bit. But, do you have LES Exhibit 95
3 before you?
4 JUDGE ABRAMSON: I'm sorry, [redacted] cents
5 assuming the cylinder is only used once, right?
6 Because if you fill it, f you cycle it a few times and
7 then wash it, it's a little different, right?
8 WITNESS KRICH: No, this is to do the
9 cylinder wash and recertification.
10 JUDGE ABRAMSON: Okay.
11 WITNESS KRICH: This is the five year --
12 JUDGE ABRAMSON: But when you're talking
13 about per KgU, that depends how many kilograms you
14 cycled through the cylinder.
15 WITNESS KRICH: Yes.
16 JUDGE ABRAMSON: So, what was the
17 assumption on that?
18 WITNESS KRICH: The assumption was just
19 our total number of -- we just -- and obviously it's
20 very conservative. We just assume dour 133,000 metric
21 tons of depleted uranium that we produce over the
22 license life of the plan.
23 JUDGE ABRAMSON: And that it was
24 distributed and no cylinder was used more than once?
25 WITNESS KRICH: A one shot deal, yes, sir.

1 JUDGE KELBER: That's very conservative.
2 JUDGE ABRAMSON: Very conservative.
3 WITNESS KRICH: Yes, very conservative.
4 MR. CURTISS: That's worst case, I take
5 it.
6 WITNESS KRICH: Absolutely. That's
7 assuming that you operate for 30 years, put your
8 cylinders out on the pad, and then send them to the
9 deconverter and then wash all the --
10 JUDGE ABRAMSON: But it's also perhaps a
11 relevant number to use for the period until the
12 deconversion facility is up and running, right?
13 Because, up until then, you've been just filling
14 cylinders and storing them.
15 WITNESS KRICH: Yes. Although, in reality
16 -- and this is what I was saying yesterday. In
17 reality you're going to be moving cylinders back and
18 forth to the plant and the pad because you're going to
19 bring them back in to use them for various things, the
20 evolutions that you do in the plant.
21 So, there is some use while they're in
22 storage.
23 JUDGE ABRAMSON: Even once they're filled?
24 WITNESS KRICH: Even once they're filled,
25 yes, sir.

1 MR. CURTISS: And just to clarify what I
2 think you said, the cost that you've estimated for
3 cylinder washing includes the cost of recertification?
4 WITNESS KRICH: Yes, the [redacted] cents
5 per kilogram U includes that cylinder washing and
6 recertification.
7 MR. CURTISS: Let me follow-up then on the
8 storage cost question.
9 WITNESS KRICH: I'm sorry, I think Dr.
10 Harding, I think, also testified to that yesterday
11 based on the costs that were in their business study.
12 MR. CURTISS: All right. The question
13 arose about storage of your cylinders on the NEF site
14 before you send them off for deconversion. Did
15 understand you to say that that would be covered as an
16 operating expense?
17 WITNESS KRICH: In real life that would be
18 an operating expense, yes.
19 MR. CURTISS: It wouldn't be typical to
20 financially assure that, or would it?
21 WITNESS KRICH: No.
22 MR. CURTISS: Okay. Now, if you could,
23 refer to Exhibit 95 if you have it there before you.
24 WITNESS KRICH: Yes, I have it.
25 MR. CURTISS: Do you see paragraph four in

1 that? Let me ask you, are you familiar with this
2 exhibit?
3 WITNESS KRICH: Item line four?
4 MR. CURTISS: Yes.
5 WITNESS KRICH: The capital estimate?
6 MR. CURTISS: Yes.
7 WITNESS KRICH: Yes.
8 MR. CURTISS: You spoke about the
9 adjustment that -- let me ask you first, who is this
10 phone discussion between?
11 WITNESS KRICH: This is a phone discussion
12 between Chris Chater of Urenco, who was involved in
13 the Request for Proposal that was sent out for
14 deconversion facility at the Capenhurst plant, and
15 Bridget LeMotais, who works at the -- she works for
16 Cogema, and I believe, she's located at the
17 Pierrelatte deconversion facility.
18 MR. CURTISS: And, do I understand item
19 four in that exhibit to be the basis for your earlier
20 testimony that you incorporated [redacted] million Euro for
21 the scaling up of the facility?
22 WITNESS COMPTON: Yes.
23 WITNESS KRICH: Yes.
24 MR. CURTISS: So that's the source of
25 that. It wasn't --

1 WITNESS KRICH: Right, we didn't pull this
2 out of the air. We got this directly from Cogema
3 based on their experience in operating two lines, each
4 line at 7,000 metric tons.
5 MR. CURTISS: It wasn't a number that you
6 independently generated, or massaged, or tweaked. You
7 just took it based upon their expertise?
8 WITNESS KRICH: Yes, sir.
9 MR. CURTISS: Okay. If I could refer you
10 to LES Exhibit 87, this is to follow-up on a question
11 that Judge Kelber raised earlier in the process.
12 And if you would go to the -- do you have
13 the exhibit there?
14 WITNESS KRICH: Yes, I do.
15 MR. CURTISS: If you would, go to the page
16 LES PRO-01312, which is table two, revised cost
17 estimate information comparison, excuse me.
18 WITNESS KRICH: Yes.
19 MR. CURTISS: Would you describe here as
20 you sought to compare the LES and the DOE estimate how
21 you approached this? And, if we could, return
22 specifically to the question of how the CaF disposal
23 issue was treated respective by you and DOE in your
24 respective cost estimate.
25 WITNESS KRICH: Yes. Judge Kelber was

1 right in his characterization. What we were trying to
2 do here was really compare apples and apples, that's
3 always the objective.
4 And we have our estimate, the LES
5 estimate. We had an estimate from a March 1st letter
6 from the Department of Energy which gave us the cost
7 for deconversion, transportation, storage and
8 disposal.
9 However, what they considered to be
10 deconversion, transportation, and disposal and storage
11 were a little bit different than what we had defined.
12 So, what this table goes about doing,
13 based on input that we got, information that we got
14 from LMI and their report, and confirming it with them
15 by phone calls, is we're trying to bring everything to
16 the same basis.
17 And so, what we did is, since our
18 estimate, the LES estimate of 2.69 is the cost of two
19 dollars and 67 cents for deconversion, plus the two
20 cents for the disposal of the calcium fluoride in a
21 landfill, we wanted to make sure that the DOE estimate
22 that we were comparing it against reflected those same
23 things, the cost for deconversion and the cost for
24 disposing of the calcium fluoride.
25 So, what we did is subtract off other

1 things that were in the original DOE number and add in
2 what was not so that we could be comparing apples and
3 apples.
4 So, the 2.69 is compared to the [redacted]. The
5 [redacted] is the DOE number. But it reflects the cost of
6 disposing of the calcium fluoride as low level
7 radioactive waste, which is what the DOE -- we
8 discussed that before.
9 The DOE did that for the purposes of being
10 conservative and accounting for the fact that they're
11 going to have some non-conforming cylinders and so on.
12 So, you could subtract off [redacted] cents from
13 the [redacted] and add back in two cents if you really
14 wanted to compare deconversion and CaF disposal as
15 landfill to deconversion and CaF disposal as landfill.
16 And so, Judge Kelber was right in what he
17 characterized.
18 JUDGE KELBER: Let me ask, is it correct
19 to state that the two estimates under that basis are
20 within approximately ten percent?
21 WITNESS KRICH: Yes, sir. Yes, Judge,
22 pretty close.
23 MR. CURTISS: Is there anything else that
24 you'd like to highlight about this table?
25 WITNESS KRICH: No, I think it goes to

1 explaining, make sure that when we're comparing DOE
2 cost for the various elements that go into the total
3 cost, that you're comparing apples and apples.
4 MR. CURTISS: The subject came up in cross
5 examination by Counsel for NIRS about disposal by DOE
6 of its depleted uranium DU3O8 at Envirocare. And I
7 note on the disposal line your estimate one dollar 14
8 per KgU and the DOE estimate of [redacted] cents per KgU,
9 those are both for Envirocare disposal?
10 WITNESS KRICH: They are.
11 MR. CURTISS: And I know we'll return to
12 this issue in the disposal panel, but does it reflect
13 the fact that, based upon information that they've
14 received, the disposal at Envirocare could take place
15 a much lower level, and therefore that portion of the
16 estimate is highly conservative?
17 WITNESS KRICH: In fact, yes. The answer
18 is yes. And in fact, if you look at one of the
19 footnotes here, and it's in the LMI report, the
20 Department of Energy, or actually the UDS, the Uranium
21 Disposition Services, which is the contractor to DOE
22 building the two deconversion facilities, one at
23 Paducah and one at Portsmouth, told LMI that they have
24 a quote from Envirocare for [redacted] dollars and [redacted] cents
25 per cubit foot to dispose of the depleted uranium.

1 Now, that compares to the figure that we
2 used in our cost estimate of 80 dollars per cubic
3 foot.
4 MR. CURTISS: I won't pursue that further
5 because we'll return to that on the disposal panel.
6 WITNESS KRICH: The [redacted] -- I should say
7 that the, yes, as you can see, the [redacted] dollars and [redacted]
8 cents translates to about [redacted] cents per KgU versus our
9 dollar and 14 cents.
10 MR. CURTISS: Okay. Could I ask you to
11 turn to LES Exhibit 90? Do you recognize this
12 exhibit?
13 WITNESS KRICH: Yes, I do.
14 MR. CURTISS: And, do you recall the
15 question that you were asked, the question that was
16 raised about this Exhibit earlier for another panel
17 relative to whether this Areva in making this decision
18 appropriately scaled its bid relative to its W plan?
19 Do you recall that discussion?
20 WITNESS KRICH: Yes.
21 MR. CURTISS: Would it be fair to assume
22 that, in responding to the Urenco RFP, that Areva,
23 given its technical expertise in this area was,
24 without questioning their ability from a commercial or
25 technical standpoint, able to figure out how to scale

1 a facility up or down or adjust the estimate as
2 reflected in this estimate?
3 WITNESS KRICH: Absolutely. Furthermore,
4 as I stated just a little while ago, there too you
5 have a W1 plant and a W2 plant. Each of those plants
6 runs a -- their thru-put is 7,000 metric tons, not
7 20,000 metric tons.
8 So, in scaling down to the 3,500 metric
9 ton, you're scaling from a 7,000 optimally designed
10 plant, not a 20,000 metric ton plant.
11 MR. CURTISS: So it's -- go ahead.
12 WITNESS KRICH: Certainly these people who
13 have been operating this plant for 20 years have been
14 deconverting for 20 years, and are in the business of
15 making a profit.
16 Cogema is a highly profitable company and
17 would know how to come up with a cost estimate to
18 build a plant that operated a thru-put of 3,500 metric
19 tons.
20 But eve more than that, when we said,
21 okay, we want to scale this back-up to 7,000 metric
22 tons, which is the size of each one of their plants,
23 we got those figures from Cogema, who is operating two
24 7,000 metric ton plants.
25 So, you know, common sense tells you that

1 the figures that we got from Cogema are pretty solid
2 since that's the size plant that they operate.
3 MR. CURTISS: In a certain respect, the
4 fact that the Areva response to the Urenco RFP
5 reflecting their commercial and technical expertise,
6 as you've said, was produced in that context.
7 It is certainly from LES' perspective, an
8 independent estimate of what it would cost to build a
9 deconversion facility.
10 WITNESS KRICH: Yes, we think this is a
11 good independent estimate that reflects a third
12 party's cost at building a deconversion plant.
13 MR. CURTISS: Well --
14 WITNESS KRICH: And, as I said, I think I
15 testified yesterday that we had other people who have
16 worked on deconversion, who have worked at a
17 deconversion plant, Mr. Schneider in particular, who
18 has looked at this information and concurred that this
19 is a reasonable estimate.
20 MR. CURTISS: Okay. If I could refer you
21 to LES Exhibit 91, the Urenco business study.
22 (Pause.)
23 MR. CURTISS: Do you have it there before
24 you?
25 WITNESS KRICH: I have it, yes.

1 MR. CURTISS: This was the basis for the
2 estimate that LES produced. Is this a document that
3 you provided to and/or reviewed with the NRC relative
4 to how it formed the basis for your cost estimate?
5 WITNESS KRICH: Yes, to my recollection,
6 in fact, I believe it's reflected in the notes or the
7 summary of the meeting of April of 19th. But, this is
8 the document.
9 This is one of the documents that we used
10 during the review by the NRC staff and their
11 consultants on the in-house review that they
12 conducted.
13 And I believe that we also then
14 subsequently submitted this on the docket.
15 MR. CURTISS: Okay.
16 WITNESS KRICH: I should explain that we
17 had provided all this information to the NRC via the
18 discovery process. And I had assumed in an early
19 letter that the NRC Staff and its consultants would
20 then have access to this material since it was part of
21 the discovery.
22 I was informed by the Staff that that was
23 not the case. So that started the process of putting
24 this all on the docket.
25 MR. CURTISS: Okay. I note here that

1 there are certain pages in this business study that
2 note that there has been non-relevant materials
3 redacted.
4 WITNESS KRICH: yes.
5 MR. CURTISS: Were you familiar with those
6 materials that were redacted?
7 WITNESS KRICH: Just vaguely. But, during
8 the in-office review, the copy that we had, my
9 recollection is that the copy that we had at that time
10 was the complete copy.
11 But the material, in going through it,
12 really was -- and I confirmed this with Dr. Harding
13 while he was here yesterday. This material was just
14 strictly a business related material.
15 So, we didn't feel it was necessary to
16 leave it in the --
17 MR. CURTISS: Was there anything in the
18 redacted materials, based on your recollection of your
19 discussion with Dr. Harding, that was relevant in any
20 respect to the cost estimate information that you
21 relied on?
22 WITNESS KRICH: Absolutely not. There was
23 nothing in the redacted material that bore on the cost
24 estimate.
25 MR. CURTISS: That's all the questions I

1 have.

2 CHAIR BOLLWERK: All right. Let me turn

3 to Staff to see if they have any questions.

4 MS. CLARK: I have no further questions.

5 CHAIR BOLLWERK: All right. Let me turn

6 back to Mr. Lovejoy then.

7 MR. LOVEJOY: Just a couple of things.

8 EXAMINATION BY MR. LOVEJOY OF:

9 ROD KRICH

10 LESLIE COMPTON

11 MR. LOVEJOY: Now, when you shared LES

12 Exhibit 91, the business study, with Staff personnel,

13 was the spreadsheet in the back attached?

14 WITNESS KRICH: I do not remember. I

15 think it's fair to say that we used Ms. Compton's

16 copy. And her copy did not have the spreadsheet

17 attached.

18 As Mr. Curtiss explained already, he was

19 the one who attached it, not us.

20 MR. LOVEJOY: Well, did you share the

21 spreadsheet with Staff?

22 WITNESS KRICH: My recollection is no,

23 because it wasn't relevant.

24 MR. CURTISS: Well, I will say that the

25 spreadsheet was disclosed to the Staff because it has

1 an LES PRO Bates number on it. So yes, it was. But,
2 as I testified, it was inadvertently attached by
3 Counsel to a document that was on another subject and
4 for another purpose.
5 MR. LOVEJOY: Well, in your discussions
6 with Staff, I'm talking about not those related to the
7 litigation, but those related to the docket, so to
8 speak, and the licensing process.
9 Did you share it with those who were
10 coming to review the cost estimates over at your
11 office?
12 WITNESS KRICH: This document, this
13 spreadsheet, as we explained, is a parametric study.
14 And so, since what the Staff was looking for was how
15 we developed our cost, this really is not relevant.
16 MR. LOVEJOY: Could you explain how you
17 came out with [redacted] cents for cylinder washing?
18 I'm not sure I caught how many times -- how many
19 washing stages that covers.
20 WITNESS KRICH: Well, Mr. Lovejoy, do you
21 have your calculator ready?
22 MR. LOVEJOY: I sure do.
23 WITNESS KRICH: We actually took -- it was
24 a very simple calculation. We took the figure in the
25 -- it's based on two inputs, actually, information

1 that we had from Cameco as to about how much it costs
2 to wash the cylinder.
3 And I don't know how many washings that
4 amounts to in order to get it to the point where it
5 can be recertified. And also, we looked at the
6 information that was in the Urenco business study, the
7 [redacted]
8 Is that right? Roughly [redacted] to [redacted]
9 Euros. And Dr. Harding testified yesterday that that
10 figure reflects washing and recertification.
11 MR. LOVEJOY: What kind of facility did
12 Cameco develop this data from?
13 WITNESS KRICH: I don't know about the
14 facility. But I know that they do wash cylinders.
15 So, they have actual experience. I don't know what
16 their facility --
17 MR. LOVEJOY: Do they have a conversion
18 plant?
19 WITNESS KRICH: Yes, they do.
20 MR. LOVEJOY: Okay. Is that the facility
21 that developed --
22 WITNESS KRICH: I don't know.
23 MR. LOVEJOY: Now, just one other thing,
24 Cogema is owned by the French government, isn't it?
25 100 percent or nearly?

1 WITNESS KRICH: It's not 100 percent, to
2 my recollection.
3 MR. LOVEJOY: Is it more than 80?
4 WITNESS KRICH: I don't know.
5 MR. LOVEJOY: Okay.
6 WITNESS KRICH: But I guess I would say,
7 regardless of who owns Cogema or Areva, they're still
8 in the business to make a profit. They're not a non-
9 profit agency as far as I know.
10 MR. LOVEJOY: But, nevertheless, they're
11 a government-owned corporation with access to the
12 national treasury for financing?
13 WITNESS KRICH: You know, I think Mr.
14 Lovejoy, I think that's a mischaracterization in the
15 sense that I believe that you asked Mr. DuPerret that
16 question.
17 And he indicated very clearly. And we can
18 pull the testimony on this. But he indicated very
19 clearly that Cogema is a profit center within Areva.
20 And so, profit center to me means that on their
21 balance sheet they must show a profit based on their
22 costs and what they charged their customers.
23 MR. LOVEJOY: Well, that's the hope, I'm
24 sure, isn't it?
25 WITNESS KRICH: No, it's the reality.

1 MR. LOVEJOY: That's all I have.

2 CHAIR BOLLWERK: All right. Anything from

3 either of the Board members?

4 (No verbal response.)

5 CHAIR BOLLWERK: None of the other

6 parties?

7 (No verbal response.)

8 CHAIR BOLLWERK: All right then. We thank

9 you again for appearing for us, Ms. Compton, for

10 coming down here today.

11 JUDGE ABRAMSON: Sorry to drag you back

12 here, but thank you very much.

13 CHAIR BOLLWERK: And again, we dismiss you

14 with our thanks for appearing before the Board.

15 JUDGE ABRAMSON: Before we take a break,

16 I don't need to talk to the Staff panel again. Does

17 any counsel need to talk to the Staff panel again

18 after this? Mr. Lovejoy?

19 MR. LOVEJOY: I don't think so.

20 JUDGE ABRAMSON: Mr. Curtiss?

21 MR. CURTISS: No, we're all finished.

22 JUDGE ABRAMSON: Okay, good. So, thank

23 you for sitting around, folks.

24 CHAIR BOLLWERK: All right. It's

25 approximately ten after three. So why don't we go

1 ahead and take about break at this point. And we'll
2 begin then with Dr. Makhijani.
3 Then we'll return. Let's make it about ten
4 minutes. So we'd be back about 20 after.
5 (Whereupon, the above-entitled matter
6 went off the record at 3:10 p.m. and
7 went back on the record at 3:25 p.m.)
8 CHAIR BOLLWERK: Back on the record.
9 Whereupon,
10 ARJUN MAKHIJANI
11 was called as a witness by counsel for the Intervenor
12 and, having been duly sworn, assumed the witness
13 stand, was examined and testified as follows:
14 MR. LOVEJOY: Thank you, Your Honor.
15 EXAMINATION BY MR. LOVEJOY OF:
16 ARJUN MAKHIJANI
17 MR. LOVEJOY: Dr. Makhijani, do you have
18 before you copies of prefiled direct testimony and
19 prefiled rebuttal testimony that you've prepared?
20 WITNESS MAKHIJANI: Yes.
21 MR. LOVEJOY: Okay. Let's take it one by
22 one. Would you recite for the record the date on the
23 prefiled direct testimony that you have?
24 WITNESS MAKHIJANI: October 18th, 2005.
25 MR. LOVEJOY: Is this the direct testimony

1 that you're prepared to offer in this proceeding on
2 the issue of deconversion?
3 WITNESS MAKHIJANI: This is not the direct
4 testimony that I filed. This is pieces of my direct
5 testimony. As I testified earlier in February in a
6 smaller way than today, essential pieces of my
7 testimony have been redacted.
8 And I was given to understand in February,
9 at least that was my clear understanding, that at this
10 hearing I would be allowed to testify about al the
11 aspects of deconversion that I believed as an expert
12 were relevant.
13 And I believe essential aspects of my
14 testimony have been redacted. And, even a word is
15 systematically censored. That word, of course, is a
16 chemical form of uranium that governmental agencies,
17 the Nuclear Regulatory Commission, and the Department
18 of Energy have all written about and examined.
19 But I alone am not allowed to talk about
20 it, even though I have studied it.
21 MR. CURTISS: Is the witness' position
22 here that whatever remains of his testimony doesn't
23 have any scientific integrity?
24 WITNESS MAKHIJANI: No. All pieces of
25 what I write have scientific integrity. But, when you

1 take a suit and cut it to pieces, you still have the
2 pieces left, even though you have thrown away other
3 pieces.
4 So, I'm testifying about the pieces that
5 are left.
6 MR. CURTISS: All right.
7 WITNESS MAKHIJANI: But I felt it
8 essential to say this because I found it quite an
9 extraordinary proceeding was not only my testimony
10 extensively redacted, we were not allowed to show the
11 redactions.
12 I myself was forced to renumber the
13 questions so the original numbers of questions and
14 answer cannot be shown.
15 JUDGE ABRAMSON: Dr. Makhijani, we
16 understand.
17 CHAIR BOLLWERK: Let me just make one
18 thing clear, Dr. Makhijani. Everything that you filed
19 in this proceeding is in fact in the official record
20 of this proceeding.
21 So, if there are questions on appeal,
22 whether it's before the Commission or before a Federal
23 Court, your original testimony as your prefiled it,
24 quote, unquote, is part of the record of this
25 proceeding.

1 And we'll go forward that way. What we
2 are now looking at is what the Board decided based on
3 the motions that were filed, was appropriate testimony
4 given the issues that were raised.
5 So, again, your testimony in the form that
6 you wanted it is in the record. It's simply not going
7 to be part of the evidentiary record of this
8 proceeding.
9 There's a legal distinction there, which
10 is an important one. But nonetheless, it is not that
11 it is not part of this record.
12 WITNESS MAKHIJANI: Your Honor, as you
13 know, I am not a lawyer. And, please excuse me. And
14 thank you very much for bearing with me on this.
15 CHAIR BOLLWERK: Sure.
16 WITNESS MAKHIJANI: But, correct me if I
17 am wrong, but I do believe that I was given to
18 understand in February by you that I would be allowed
19 to testify about uranium dioxide in this proceeding a
20 suitable end form for the deconversion process. And
21 I'm not being allowed to do that.
22 CHAIR BOLLWERK: Again, that was always
23 subject to whatever appropriate legal arguments were
24 raised about the relevance of that testimony. And the
25 Board was presented with motions and ruled on those

1 motions.

2 WITNESS MAKHIJANI: And other witnesses

3 have testified. Your Honor, I say this in all due

4 respect. But I am bewildered that other witnesses

5 have testified about the Department of Energy

6 strategies, about the Department of Energy's costs.

7 But I'm not allowed to testify about the

8 Department of Energy's record at fulfilling its

9 obligations. This seems very mysterious to me.

10 CHAIR BOLLWERK: Well, again, this is

11 something that the Board made its rulings. Mr.

12 Lovejoy is aware of those rulings. And, if he has a

13 problem with them, you all already -- you know where

14 the Commission is at.

15 And, that would be the place to bring that

16 up. And I appreciate, sir, your concern. We've done

17 what we felt was appropriate. And, if we're incorrect

18 in that, the Commission knows where we live as well

19 and can tell us that.

20 WITNESS MAKHIJANI: Thank you for bearing

21 with me.

22 CHAIR BOLLWERK: Not a problem. I

23 appreciate you bringing your views to our attention.

24 MR. LOVEJOY: With that, Dr. Makhijani, is

25 the prefiled direct testimony on deconversion, which

1 you have before you, testimony that you're willing to
2 offer under oath before this board?
3 WITNESS MAKHIJANI: Yes.
4 MR. LOVEJOY: Thank you. We offer for
5 introduction into the record.
6 CHAIR BOLLWERK: All right. Any
7 objections?
8 (No verbal response.)
9 CHAIR BOLLWERK: Then the revised direct
10 testimony of Dr. Makhijani concerning LES'
11 deconversion strategy and cost estimate dated October
12 18th, 205 is then entered into the record as if read.
13 (Whereupon, the prefiled revised direct
14 testimony of Dr. Makhijani was bound into the record
15 as if having been read.)**
16
17
18
19
20
21
22
23
24
25

October 18, 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. | ASLBP No. 04-826-01-ML

National Enrichment Facility

REVISED DIRECT TESTIMONY OF DR. ARJUN MAKHIJANI IN SUPPORT OF NIRS/PC CONTENTIONS EC-3/TC-1, EC-5/TC-2, AND EC-6/TC-3 CONCERNING LES'S DECONVERSION STRATEGY AND COST ESTIMATE

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 program 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 that 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 three contentions, which were advanced in this proceeding by Nuclear Information and Resource Service and Public Citizen. The first contention, EC-3/TC-1 -- Depleted Uranium Hexafluoride Storage and Disposal, states as follows:

> CONTENTION: Petitioners contend that Louisiana Energy Service, L.P., (LES) does not have a sound, reliable, or plausible strategy for private sector disposal of the large amounts of radioactive and hazardous Depleted Uranium Hexafluoride ("DUF6") waste that the operation of the plant would produce in that the statement that "discussions have recently been held with Cogema concerning a private conversion facility" (ER 4.13-8) is without substance.

The second contention, EC-5/TC-2 -- Decommissioning Costs, states as follows:

> CONTENTION: Louisiana Energy Services, L.P., (LES) has presented estimates of the costs of decommissioning and funding plan as required by 42 U.S.C. 2243 and 10 C.F.R. 30.35, 40.36, and 70.25 to be included in a license application. See Safety Analysis Report 10.0 through 10.3; ER 4.13.1. Petitioners contest the sufficiency of such presentations as based on the lack of any relevant estimate of the cost of converting and disposing of depleted uranium, given it does not rely upon the three examples -- the 1993 CEC estimate, the LLNL report, and the UDS contract --cited in its application.
>
> LES has presented additional estimates for the costs of deconversion, transportation, and disposal of depleted uranium for purposes of the decommissioning and funding plan required by 42 USC 2243 and 10 CFR 30.35, 40.36, and 70.25. See LES Response to RAI

dated January 7, 2005. Such presentations are insufficient because they contain no factual bases or documented support for the amounts of the following particular current LES estimates, i.e., $2.69/kgU for conversion, $1.14/kgU for disposal, $0.85/kgU for transportation, and a total of $5.85/kgU including contingency, and cannot be the basis for financial assurance.

The third contention, EC-6/TC-3 -- Costs of Management and Disposal of Depleted UF_6, states as follows:

> CONTENTION: Petitioners contend that the Louisiana Energy Services, L.P., (LES) application seriously underestimates the costs and the feasibility of managing and disposing of the Depleted Uranium Hexafluoride ("DUF6") produced in the planned enrichment facility in that:
>
> > (E) A problem arises with respect to disposal of CaF2. It is not known whether the CaF2 will be contaminated with uranium. Such contamination would prevent the resale of the CaF2 and would require that such material be disposed of as low-level waste.
> >
> > (G) LES's "preferred plausible strategy" for the disposition of depleted UF6 is the possible sale to a "private sector conversion facility" followed by disposal of deconverted U3O8 in a "western U.S. exhausted underground uranium mine." (ER 4.13-8). Such a conversion strategy cannot be accepted as plausible given that no such conversion facility exists nor is it likely to be built to suit LES's timing and throughput requirements.
> >
> > (I) The "engineered trench" method of waste disposal proposed by LES is not likely to be acceptable (ER 4.13-11, -19) if DUF6 is not considered low level waste.

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, a senior scientist at IEER, and our librarian Lois Chalmers. 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 disposal options and uranium health effects including those from scientific journals as well as publications from national and international bodies such as the International Commission on Radiological Protection, the National Research Council of the National Academy of Sciences, the OECD Nuclear Energy Agency, the Royal Society, the International Atomic Energy Agency, and the World Health Organization.

In addition, I have reviewed the Draft and Final Environmental Impact Statement for the proposed National Enrichment Facility prepared by the Nuclear Regulatory Commission (NUREG-1790) (NIRS/PC Ex. 152) (NRC Staff Ex. 36) as well as the Final Environmental Impact Statement for the proposed Claiborne Enrichment Facility (NUREG-1484) (NIRS/PC Ex. 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) (LES Ex. 16, 17) 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) (LES Ex. 18). I have also reviewed some of the supporting documents for those studies such as the 1997 Lawrence Livermore National Laboratory Engineering and Cost Analyses. (NIRS/PC Ex. 55, 56).

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 lists in the following reports:

> 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*, November 24, 2004. (NIRS/PC Ex. 190) (See particularly 3-19 concerning uranium health risks, 19-29 concerning regulatory aspects and generic analyses of near-surface disposal, 30-34 concerning deconversion and byproducts thereof, and 35-51 concerning factors affecting costs and cost estimates).
>
> Makhijani and Smith, *Update to 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 by Arjun Makhijani, PhD. and Brice Smith, Ph.D. based on information obtained since November 2004*, July 5, 2005. (NIRS/PC Ex. 224) (See particularly 1 (summary), 2-6 concerning the need to analyze specific disposal options, 7-8 concerning the difficulties of the Envirocare site, 8-22 concerning the difficulties of the WCS site, 22-24 concerning the probable need for geologic disposal).

Both of these reports have been filed in this proceeding on the indicated dates and are incorporated by reference here. These works form the primary technical basis for my conclusions as presented in this testimony. I asked Dr. Brice Smith to draft my testimony for me based on the above materials, my deposition testimony, and an outline we developed together. I reviewed, edited, and approved the text of this testimony while on travel.

Q4. What is your understanding of the requirements for a plausible strategy as it relates to the disposition of the depleted uranium hexafluoride that would be generated by the proposed National Enrichment Facility?

A4. In the Claiborne Enrichment Center case the Atomic Safety and Licensing Board ruled that

> Thus, in assessing the plausible tails disposal strategy adopted by the Applicant as part of its decommissioning funding plan, we first must determine whether the funding plan contains a reasonable or credible plan to dispose of the DUF_6 tails generated at the CEC and then determine whether the Applicant's cost estimates for the components of the plan are reasonable.[1]

[1] ASLB CEC 1997 (NIRS/PC Ex. 205) p. 4 of 18.

In the current context, a reasonable and credible plan for the disposition of the depleted uranium hexafluoride that would be produced by the proposed NEF facility would have to address the deconversion of the DUF6 to a more stable chemical form, the safe disposal of the deconversion by-products (i.e. the neutralization of the hydrofluoric acid and the disposal of the resulting calcium fluoride), the processing of the DU into a suitable waste form, and the ultimate disposal of the depleted uranium in a manner that will meet all current regulatory requirements including the annual dose limits in 10 CFR 61 and the EPA maximum concentration limits for drinking water.

An additional element that needs to be considered in the context of defining a plausible strategy is cost. While the Board has ruled that "the cost of implementing a particular strategy has no bearing upon whether any particular strategy is technically plausible," it has also acknowledged that LES itself noted that "the issues of 'plausible strategy' for waste disposal/dispositioning and decommissioning costs are closely related" and that "the reasonableness of the estimated costs of either the DOE plausible strategy or any potential private disposal strategy will be at issue in this proceeding."[2]

For an additional discussion on the nature and requirements of a plausible strategy I refer you to the Makhijani and Smith 2004 Report (NIRS/PC Ex. 190), specifically pages 44 to 47.

Q5. Moving to the proposal before the Commission, what do you understand LES proposes to do with the DUF6 from the NEF?

[2] ASLB June 30 2005 (NIRS/PC Ex. 206) p. 13-14.

A5. The LES FEIS contains the following description of the two options proposed for the management of the DUF6 that would be generated by the proposed NEF:

> Two options are proposed for disposition of DUF6. 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 United States Enrichment Corporation (USEC) Privatization Act of 1996 would be to ship the material to a DOE conversion facility, either at Portsmouth, Ohio, or at Paducah, Kentucky, for temporary storage and eventual processing by the DOE conversion facility prior to disposal by DOE (Option 2).[3]

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 develop long-term supply contracts with potential deconversion operators in order to assist in their financing and licensing efforts to build such a facility.[4]

LES and the NRC Staff have also stated that it is their position that the depleted uranium from the deconversion facility would be considered Class A low-level radioactive waste under 10 CFR 61.55 and that the preferred option is the deconversion of the DUF_6 to DU_3O_8 followed by its disposal in a shallow land disposal facility. While no shallow-land burial site has been specifically identified by LES as the final destination for the DU_3O_8 that would be generated, the NRC FEIS considers only the Hanford and Envirocare sites as potential options. The option of disposal at the proposed Waste Control Specialists facility in Andrews County, Texas, which is currently seeking a license was explicitly removed from consideration by the NRC as follows:

> Due to the need for separate regulatory actions prior to disposal at WCS [Waste Control Specialists], it is assumed that the depleted U3O8 generated from the adjacent or offsite private conversion process would be disposed at another disposal site licensed to accept this material.[5]

The FEIS focuses heavily on the choice of Envirocare and, in fact, draws no conclusions whatsoever about the environmental impacts of disposal at Hanford. The option of disposing of the

[3] NEF FEIS 2005 (NIRS/PC Ex. 191) p. 2-28.
[4] LES NEF UF6 info sheet p. 3 (emphasis added) (NIRS/PC Ex. 134).
[5] NEF FEIS 2005 (NIRS/PC Ex. 191) p. 2-33.

depleted uranium in an abandoned mine previously put forth by LES in this case was withdrawn as a basis upon which they would rely for their plausible strategy.

Finally, LES has stated that it will consider only the neutralization of the hydrofluoric acid generated during deconversion to form calcium fluoride (CaF_2). They have also proposed that the CaF_2 would be disposed of in the Lea County landfill as industrial waste.[6]

Q6. In light of your understanding of the requirements of a plausible strategy, what is your conclusion regarding the plausibility of the Cogema option for deconverting the DUF_6 that would be generated by the proposed NEF?

A6. Based on Cogema's experience operating a similar deconversion plant in France (i.e. the Pierrelatte plant) to that which would be required to handle the material from the proposed LES facility, reliance on Cogema for the deconversion option would be considered technologically plausible once a siting process for the deconversion facility is specified by the NRC and provided that the final deconversion form chosen is U_3O_8 and not UO_2.

Q7. What is your conclusion regarding the cost of a plausible deconversion strategy using the Cogema process?

[6] Krich 2005 (NIRS/PC Ex. 187) Attachment 1.

A7. When it is available, the most reasonable basis upon which to make any engineering cost estimate is experience at similar real-world, operating facilities. In this case, such operating experience is available from the Pierrelatte plant. Currently, Urenco (the main company in the LES consortium) is paying [redacted] euros per kg U to convert [redacted] metric tons per year of DUF_6 to DU_3O_8, put the oxide into cylinders, transport it to Holland, and store it there. The [redacted] euros per kg U includes two components. The conversion component is about [redacted] euros per kg U and the rest is for transportation to and storage in Holland.[7] This is also compatible with an estimate provided by Cogema to LES for conversion only of about [redacted] euros per kg.[8] No disposal cost is included in the [redacted] euros per kilogram since the European Union has no disposal facility for DU. The Urenco-Cogema contract is an experimental contract for [redacted] years. The [redacted] euro estimate does not include a correction for future escalation, although there is reported to be an escalator in the contract that will be applied periodically. Hence the [redacted] euros per kg U is, in effect, a present value of conversion costs. This is the most reliable cost estimate to date since it is the one cost estimate that is based on a contract with an operating facility in which DUF_6 has actually changed hands and been processed.[9] We used this cost as the base case in our economic analysis present in the November 2004 report.

The reliance on the [redacted] euro per kg U cost would be a reasonable and credible cost estimate for deconversion, transportation, and storage if the final deconversion form chosen was DU_3O_8, and this cost was offered in a memorandum of understanding between Cogema and LES, appropriate

[7] Deposition Chater et al. 2004/10/04(NIRS/PC Ex. 100), pp. 22-25.
[8] LES Business Study 2004(LES Ex. 91), pp. 13-14. A range of [redacted] euros per kg U is given in this study for conversion costs only.
[9] The Uranium Disposition Services contract with the DOE to build and operate the deconversion facilities for Paducah and Portsmouth over the next six years is not based on operating experience and it does not include a provision for the cost of ultimate disposal of the DU3O8, only storage until the contract is re-evaluated in 2010. (DOE Paducah ROD 2004 (NIRS/PC Ex. 105) p. 44657 – 44658 and DOE Portsmouth ROD 2004 (NIRS/PC Ex. 106) p. 44652 – 44653)

provisions were made for cost escalation and for how exchange rate considerations would be addressed, and the calcium fluoride costs as discussed below were added as a separate line item.

LES, however, is currently relying on a business study prepared by Cogema for Urenco regarding a proposed deconversion facility at Capenhurst that has not been built. From this study LES derived a value of $2.67 per kg U.[10] This is not a credible estimate for the cost of deconversion given that it is below the [redacted] euro per kg U value that is based on the operating experience at the Pierrelatte plant and a real-world contract. (Using LES's proposed exchange rate of 1.291 dollars per euro, the [redacted] euro deconversion cost would be equal to $[redacted] per kg U).[11]

An additional consideration with respect to the deconversion cost estimate is the fact that the Pierrelatte plant operated by Cogema currently either reuses the hydrofluoric acid generated in making new natural uranium hexafluoride or sells the acid on the open market in Europe. The same is also assumed to be true for the proposed facility at Capenhurst. LES has agreed to base its cost estimate on the assumption that the deconversion plant will not attempt to resell the hydrofluoric acid, and will instead neutralize it to form calcium fluoride which will then be disposed of.[12] This will increase both the cost of operating the facility as well as eliminate a source of revenue relative to the Pierrelatte plant. Therefore, the [redacted] euro per kg U figure must be increased to take this important difference into account.

With respect to the cost of deconversion, LES "indicated [to the NRC] that they believe that neutralization would have no effect on the overall deconversion costs because those costs would be

[10] Krich 2005b (NIRS/PC Ex. 188) Attachment 1 and LES Business Study 2004 (LES ex. 91).
[11] LES 2005/08/11 (NIRS/PC Ex. 221) p. 22.
[12] Krich 2005 (NIRS/PC Ex. 187) Attachment 1 and NEF FEIS 2005 (NRC Staff Ex. 36) p. 2-44 to 2-45.

balanced by the elimination of costs for equipment for storing HF prior to commercial sale."[13] In deriving their deconversion estimate from the Capenhurst business study, they took no credit for the resale of the HF, but allowed no increase to the deconversion cost associated with the neutralization steps. The stated LES assumption, however, is in apparent contradiction to previous cost estimates. For example, the LLNL analysis states that "[i]t is noted that neutralization of the HF produced by conversion processes results in higher estimated costs than production and sale of AHF."[14] While this analysis did not consider the sale of aqueous HF such as that sold by the Pierrelatte plant, it raises questions about LES's assumptio[redacted]

With respect to the disposal of the CaF_2, LES currently states that it will be disposed of as industrial waste at the Lea County Landfill at a rate equivalent to $0.02 per kg U. This, however, is not a reasonable or credible assumption at present. The CaF_2 generated during deconversion will be contaminated with depleted uranium. According to LES, "[t]he CaF_2 would need to be classified as a 'Industrial Solid Waste' in order to be considered for disposal at the landfill" and that such wastes cannot contain low-level radioactive waste. In addition, the landfill will require a "Disposal Management Plan" approved by the New Mexico Environment Department in order to accept the CaF2 from the deconversion facility.[16] Currently there are no general federal free release limits for calcium fluoride contaminated with uranium, nor are there appropriate state guidelines.[17] As such, at present the only option available for consideration is that the calcium fluoride be disposed of at a

[13] Johnson 2005 (NRC Staff Ex. 39).
[14] LLNL 1997 CA (NIRS/PC Ex. 56) p. 49.
[15] LES Business Study 2004 (LES Ex. 91) p. 9.
[16] Krich 2005 (NIRS/PC Ex. 187) Attachment 1.
[17] See for example Paducah FEIS 2004 (LES Ex. 17) p. E-5.

low-level radioactive waste disposal facility, which would increase the LES cost estimate considerably.

The disposal of the calcium fluoride as low-level waste was the only option considered by the NRC Staff in either the DEIS or FEIS for the proposed NEF, and thus must be choice of the applicant. For example:

> [Draft Environmental Impact Statement]
> Because conversion of the large quantities of DUF6 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.[18]
>
> This Draft EIS also considers that the private conversion facility could be located close to the proposed NEF (this is known as Option 1b). This would involve a private sector company constructing and operating a new conversion facility close (within 6.4 kilometers [4 miles]) to the proposed NEF.... The hydrofluoric acid would be converted to calcium fluoride for disposal at a licensed low-level radioactive waste disposal site.[19]
>
> [Final Environmental Impact Statement]
> Because conversion of the large quantities of DUF6 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 aqueous 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.[20]
>
> This EIS also considers that the private conversion facility could be located near the proposed NEF, (this is known as Option 1b). This would involve a private sector company constructing and operating a new conversion facility close (within 6.4 kilometers [4 miles]) to the proposed NEF.... The hydrofluoric acid would be converted to calcium fluoride for disposal at a licensed low-level radioactive waste disposal site.[21]

---

[18] NEF DEIS 2004 (NIRS/PC Ex. 152) p. 2-29.
[19] NEF DEIS 2004 (NIRS/PC Ex. 152) p. 2-30.
[20] NEF FEIS 2005 (NIRS/PC Ex. 191) p. 2-28 to 2-29.
[21] NEF FEIS 2005 (NIRS/PC Ex. 191) p. 2-30

In addition, the NRC Staff has also reached a similar conclusion in the Draft Environmental Impact Statement for the proposed U.S. Enrichment Corporation American Centrifuge Plant released in August 2005. In this DEIS the only option considered by the NRC Staff was that the calcium fluoride would be disposed of at a license low-level radioactive waste dump.[22]

An alternative of an industrial landfill has not been considered by the NRC and no environmental impacts of such an option have been evaluated. Hence there is no legal or technical basis for the NRC to grant a license for the LES plant on the basis of industrial landfill disposal of CaF_2.

The costs added by disposal of the CaF_2 as low-level waste are substantial and need to be included in the financial guarantee put forward by LES. For example, when both neutralization and disposal of the CaF_2 as low-level waste was considered by in the 1997 LLNL analysis, the deconversion cost of a facility producing DU_3O_8 increased by more than two-thirds compared to production and sale of AHF.[23] In the economic analysis present in the November 2004 IEER report, we considered a range of costs for neutralizing the HF and disposing of the resulting CaF_2 of between $2.00 and $4.00 per kg U based on the LLNL study and the conclusions of a National Research Committee report on dispositioning the DOE's depleted uranium. These values are significantly in excess of the $0.02 per kg U currently claimed by LES.

Finally, the need to consider the substantial costs of neutralizing the HF and properly disposing of the resulting CaF_2 was explicitly noted by the Atomic Safety and Licensing Board in the Claiborne Enrichment Case:

[22] ACP DEIS 2005 (NIRS/PC Ex. 203)p. 4-77 and D-6 and D-12 to D-13.
[23] LLNL 1997 CA (NIRS/PC Ex. 56A) p. 52 and 119

On the basis of the evidentiary record in this proceeding, we cannot find that the Applicant's estimated cost of $4.86/kgU (totaling $12 million annually and $360 million over 30 years of operation) is a reasonable estimate for converting DUF6 to U3O8. The LES estimate is deficient because it fails to include the significant cost of neutralizing the hydrofluoric acid byproduct of the conversion process. The evidentiary record is clear that the Applicant's cost estimate for converting DUF6 to U3O8 does not include any provision for incurring the additional substantial cost of neutralizing the byproduct HF from the primary conversion process.... Without evidence to show that there will be a sufficient market for the byproduct HF in the United States, we can only conclude that a domestic conversion facility, regardless of whether it is ultimately built and operated by COGEMA or some other entity, will have to neutralize the HF as an additional step in the conversion process and that the additional cost must be included in the cost of conversion.[24]

Indeed, Mr. LeRoy [one of LES's expert witnesses in the CEC case] indicated that the Applicant's cost projections for disposal did not include any analysis of the future market for conversion byproducts and he acknowledged that there could be a glut of such byproducts on the market in the future from tails conversion. He further conceded that the question of the cost of neutralization of HF is not irrelevant to the LES cost estimate.... Accordingly, on the basis of this evidentiary record, we cannot find that the Applicant has met its burden of proof and demonstrated by a preponderance of the evidence that the LES cost estimate for the conversion of DUF6 to U3O8 is a reasonable one because it fails to include the substantial costs for neutralizing the byproduct HF from the conversion process.[25]

"For the reasons detailed in Part II.B.3, we conclude that the Applicant's cost estimate of $12 million annually for the conversion of DUF6 to U3O8 is not a reasonable one given its failure to include the substantial costs of neutralizing the conversion process byproduct hydrofluoric acid.[26]

[24] ASLB CEC 1997 (NIRS/PC Ex. 205) p. 10 of 18.
[25] ASLB CEC 1997 (NIRS/PC Ex. 205) p. 11 of 18.
[26] ASLB CEC 1997 (NIRS/PC Ex. 205) p. 14 of 18.

References:

10 CFR 61 DEIS 1981 (NIRS/PC Ex. 167)	U.S. Nuclear Regulatory Commission, "Draft Environmental Impact Assessment on 10 CFR 61 'Licensing Requirements for Land Disposal of Radioactive Waste'", Main Report, September 1981 (NUREG-0782, Vol. 2)
10 CFR 61 DEIS 1981b (NIRS/PC Ex. 168)	U.S. Nuclear Regulatory Commission, "Draft Environmental Impact Assessment on 10 CFR 61 'Licensing Requirements for Land Disposal of Radioactive Waste'", Appendices G-Q, September 1981 (NUREG-0782, Vol. 4)
10 CFR 61 FEIS 1982 (NIRS/PC Ex. 169)	U.S. Nuclear Regulatory Commission, "Final Environmental Impact Assessment on 10 CFR 61 'Licensing Requirements for Land Disposal of Radioactive Waste'", Summary and Main Report, November 1982 (NUREG-0945, Vol. 1)
10 CFR 61 final rule 1982 (NIRS/PC Ex. 85)	U.S. Nuclear Regulatory Commission. "10 CFR parts 2, 19, 20, 21, 30, 40, 51, 61, 70, 73 and 170: licensing requirements for land disposal of radioactive waste. Final Rule." *Federal register*, v.47, no. 248 (Dec. 27, 1982). pp. 57446-57477.
40 CFR 141 2004 (NIRS/PC Ex. 202)	U.S. Code of Federal Regulations, "Title 40 – Protection of Environment: Chapter I – Environmental Protection Agency; Part 141 – National primary drinking water regulations", July 1, 2004, online at http://www.access.gpo.gov/nara/cfr/waisidx_04/40cfr141_04.html.
40 CFR 61 2004 (NIRS/PC Ex. 87)	U.S. Code of Federal Regulations, "Title 40 – Protection of Environment: Chapter I – Environmental Protection Agency; Part 61 – National emission standards for hazardous air pollutants", July 1, 2004, online at http://www.access.gpo.gov/nara/cfr/waisidx_04/40cfr61_04.html.
ACP DEIS 2005 (NIRS/PC Ex. 203)	U.S. Nuclear Regulatory Commission, Office of Waste Management and Environmental Protection, Office of Nuclear Material Safety and Safeguards, *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio*, Draftt Report for Comment, August 2005 (NUREG-1834)
ASLB Aug 4 2005 (NIRS/PC Ex. 204).	U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P. (National Enrichment Facility), "Memorandum and Order: (Ruling on Motion to Admit Late-Filed Amended and Supplemental Contentions)", Docket No. 70-3103-ML, ASLBP No. 04-826-01-ML, August 4, 2005.
ASLB CEC 1997. (NIRS/PC Ex. 205)	U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P.(Claiborne Enrichment Center), LBP-97-3, Docket No. 70-3070-ML, ASLBP No. 91-641-02-ML (Special Nuclear Material License), 45 N.R.C. 99, 1997 WL 345666 (N.R.C.), March 7, 1997.
ASLB June 30 2005 (NIRS/PC Ex. 206)	U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P.(National Enrichment Facility), "Memorandum and Order: (Ruling on NIRS/PC Late-Filed Contention Amendments)", Docket No. 70-3103-ML, ASLBP No. 04-826-01-ML, June 30, 2005.

Baird et al. 1990 (NIRS/PC Ex. 170)	R.D. Baird, M.K. Bollenbacher, E.S. Murphy, R. Shuman, and P.B. Klein, "Evaluation of the Potential Public Health Impacts Associated with Radioactive Waste Disposal at a Site Near Clive, Utah", Rogers and Associates Engineering Corporation, June 1990 (RAE-9004/2-1)
Baird et al. 1990b (NIRS/PC Ex. 171)	R.D. Baird, G.B. Merrell, D.E. Bernhardt, and V.C. Rogers, "Additional Radionuclide Concentration Limits for the NORM Disposal Site at Clive, Utah", Rogers and Associates Engineering Corporation, August 1990 (RAE-9000/16-1)
Barron 2005 (NIRS/PC Ex. 207)	Jeff Barron, "Plant construction falls behind", *Portsmouth Daily Times*, July 15, 2005.
Bauman 2005 (NIRS/PC Ex. 172)	Joe Bauman, "Senate OKs Class B, C waste ban", *Deseret Morning News (Salt Lake City)*, February 3, 2005.
Bauman 2005b (NIRS/PC Ex. 173)	Joe Bauman, "House votes to ban importing of B, C wastes", *Deseret Morning News (Salt Lake City)*, February 10, 2005
Blevins 2005 (LES Ex. 104)	Memo to Scott Flanders from Matthew Blevins, "Telephone Summary Regarding Depleted Uranium Disposal", April 6, 2005. [Internal NRC memo regarding a February 24, 2005 teleconference]
Carr 2005 (NIRS/PC Ex. 174)	Letter from James R. Carr, Professor of Geological Sciences and Engineering at the University of Nevada, Reno, to Arjun Makhijani, Regarding the Potential for Erosion at the Proposed WCS Site, May 16, 2005.
CEC FEIS 1994 (NIRS/PC Ex. 58)	U.S. Nuclear Regulatory Commission, "Final Environmental Impact Statement for the Construction and Operation of Claiborne Enrichment Center, Homer, Louisiana", Volume 1, August 1994 (NUREG-1484)
Closing the Circle (NIRS/PC Ex. 208)	U.S. Department of Energy, *Closing the Circle on the Splitting of the Atom: The Environmental Legacy of Nuclear Weapons Production in the United States and What the Department of Energy is Doing About It*, DOE/EM-0266, Washington, D.C.: DOE Office of Environmental Management, Office of Strategic Planning and Analysis, January 1996.Closing the Circle on the Splitting of the Atom online at http://legacystory.apps.em.doe.gov/text/close/close2.htm.
Dallas Morning News 2005 (NIRS/PC Ex. 175)	Wire Reports, "Probation threatened for nuclear agency", *Dallas Morning News*, April 30, 2005.
Deposition Chater et al. 2004/10/04 (NIRS/PC Ex. 100)	*Deposition of Chris Chater, Bernard Duperret, Rodney H. Fisk, Rod Krich, Robert Pratt, Paul G. Schneider, Michael H. Schwartz, Julian J Steyn.* Monday, October 4, 2004. In the matter of Louisiana Energy Services (National Enrichment Facility) v. Nuclear Information and Resource Service and Public Citizen. U.S. Nuclear Regulatory Commission, Docket No. 70-3103-ML; ASLBP No. 03-816-01-ML. Transcript by Neal R. Gross. At head of title: Before the Commission. Deposition took place in offices of Winston & Strawn, Washington, DC.
DOE 1995 (NIRS/PC Ex. 176)	U.S. Department of Energy, "Integrated Data Base Report – 1994: U.S. Spent Nuclear Fuel and Radioactive Waste Inventories, Projections, and Characteristics", September 1995 (DOE/RW-0006, Rev. 11)
DOE 1997 (NIRS/PC Ex. 177)	U.S. Department of Energy, "Integrated Data Base Report – 1996: U.S. Spent Nuclear Fuel and Radioactive Waste Inventories, Projections, and Characteristics", December 1997 (DOE/RW-0006, Rev. 13)

DOE 1998 (NIRS/PC Ex. 102)	U.S. Department of Energy. Office of Environmental Management. *Department of Energy Response to 1997 IEER Environmental Management report.* [Washington, DC]: EM, March 18, 1998.
DOE 1998b (NIRS/PC Ex. 209)	U.S. Department of Energy, *The Current and Planned Low-Level Waste Disposal Capacity Report*, Revision 1, September 18, , 1998.
DOE 2000 (NIRS/PC Ex. 103)	U.S. Department of Energy. Office of Environmental Management. *Buried Transuranic-Contaminated Waste Information for U.S. Department of Energy Facilities*, Washington, DC: DOE EM, June 2000.
DOE 2001 (NIRS/PC Ex. 178)	U.S. Department of Energy, "Summary Data on the Radioactive Waste, Spent Nuclear Fuel, and Contaminated Media Managed by the U.S. Department of Energy", April 2001.
DOE Paducah ROD 2004 (NIRS/PC Ex. 105)	U.S. Department of Energy. "Record of decision for construction and operation of a depleted uranium hexafluoride conversion facility at the Paducah, KY, site." *Federal Register*, v. 69, no. 143 (July 27, 2004). pp. 44654-44658. On the Web at http://web.ead.anl.gov/uranium/pdf/PadRODRegister.pdf.
DOE PEIS 1999 (LES Ex. 18)	U.S. Department of Energy, "Final Programmatic Environmental Impact Statement For Alternative Strategies For The Long-Term Management And Use Of Depleted Uranium Hexafluoride", April 1999 (DOE/EIS-0269)
DOE Portsmouth ROD 2004 (NIRS/PC Ex. 106)	U.S. Department of Energy. "Record of decision for construction and operation of a depleted uranium hexafluoride conversion facility at the Portsmouth, OH, Site." *Federal Register*, v. 69, no. 143 (July 27, 2004). pp. 44649-44654. On the Web at http://web.ead.anl.gov/uranium/pdf/PortRODRegister.pdf.
Envirocare 2005 (NIRS/PC Ex. 179)	Envirocare of Utah, LLC, "State of Utah Radioactive Material License UT 2300249: Amendment 22", adopted June 13, 2005, online at http://www.envllc.com/pages/lp/index.php (as viewed on July 1, 2005)
Envirocare 2005b (NIRS/PC Ex. 180)	Envirocare of Utah, LLC. Press Release, "Envirocare Purchased By Investor Group: New Owners Call for Ban of B & C Waste in the State of Utah", February 1, 2005
EPA 1999 (NIRS/PC Ex. 181)	U.S. Environmental Protection Agency, "Understanding Variation in Partition Coefficient, K_d, Values, Volume II: Review of Geochemistry and Available K_d Values for Cadmium, Cesium, Chromium, Lead, Plutonium, Radon, Strontium, Thorium, Tritium (^3H), and Uranium", August 1999 (EPA 402-R-99-004B)
EPA FGR 13 (NIRS/PC Ex. 111)	Keith F. Eckerman, Richard W. Leggett, Christopher B. Nelson, Jerome S. Puskin, Allan C.B. Richardson. *Cancer Risk Coefficients for Environmental Exposure to Radionuclides: Radionuclide-Specific Lifetime Radiogenic Cancer Risk Coefficients for the U.S. Population, Based on Age-Dependent Intake, Dosimetry, and Risk Models.*. Federal Guidance Report No. 13. EPA 402-R-99-001. Oak Ridge, TN: Oak Ridge National Laboratory; Washington, DC: Office of Radiation and Indoor Air, United States Environmental Protection Agency, September 1999.
EPA FGR 13 CD Supplement 2002 (NIRS/PC Ex. 112)	EPA (2002). U.S. Environmental Protection Agency, *Federal Guidance Report 13 Cancer Risk Coefficients for Environmental Exposure to Radionuclides: CD Supplement*, EPA 402-C-99-001, Rev. 1 (Oak Ridge National Laboratory, Oak Ridge, TN; U.S. Environmental Protection Agency, Washington, DC).

Etter 1996 (NIRS/PC Ex. 182)	Memo to Susan White, Staff Attorney, From Stephen D. Etter, Staff Geologist for the Texas Natural Resource Conservation Commission, "Suitability of the Waste Control Specialists, Inc. Site, Andrews Country, Texas, for Disposal of Radioactive Wastes, Draft", April 1996.
Fioravanti & and Makhijani 1997 (NIRS/PC Ex. 115)	Marc Fioravanti and Arjun Makhijani. *Containing the Cold War Mess: Restructuring the Environmental Management of the U.S. Nuclear Weapons Complex*. Takoma Park, Maryland: Institute for Energy and Environmental Research, October 1997. On the Web at http://www.ieer.org/reports/cleanup.
Fioravanti & and Makhijani 1998 (NIRS/PC Ex.116)	Marc Fioravanti and Arjun Makhijani. *Supplement to Containing the Cold War Mess* *IEER's Response to the Department of Energy's Review*. Takoma Park, Maryland: Institute for Energy and Environmental Research, March, 1998. On the Web at http://www.ieer.org/reports/cleanup/cln-supp.html.
Fisk 2004 (LES Ex. 98)	Rod Fisk to Rod Krich, "Costs", December 2, 2004. E-mail.
Fisk 2005 (LES Ex. 99)	Rod Fisk to Rod Krich, "Transportation of Depleted UF6 and U3O8", March 23, 2005. E-mail.
GAO 2004 (NIRS/PC Ex. 183)	U.S. General Accounting Office, "Low-Level Radioactive Waste: Disposal Availability Adequate in the Short Term, but Oversight Needed to Identify Any Future Shortfalls", Report to the Chairman, Committee on Energy and Natural Resources, U.S. Senate, June 2004 (GAO-04-604)
GAO/RCED-92-183 (NIRS/PC Ex. 211)	U.S. General Accounting Office, "Nuclear Waste: Defense Waste Processing Facility – Cost, Schedule, and Technical Issues", Report to the Chairman, Environment, Energy, and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, June 1992 (GAO/RCED-92-183)
GAO/RCED-93-87 (NIRS/PC Ex. 212)	U.S. General Accounting Office, "Federal Research: Super Collider is Over Budget and Behind Schedule", Report to the Congressional Requesters, February 1999 1993 (GAO/RCED-93-87)
GAO/RCED-97-63 (NIRS/PC Ex. 213)	U.S. General Accounting Office, "Department of Energy: Management and Oversight of Cleanup Activities at Fernald", Report to the Congressional Requesters, March 1997 (GAO/RCED-97-63)
GAO/T-RCED-93-58 (NIRS/PC Ex. 214)	U.S. General Accounting Office, "Nuclear Waste: Yucca Mountain Project Management and Funding Issues", Statement of Jim Wells, Testimony before the Subcommittee on Energy and Power, Committee on Energy and Commerce and the Subcommittee on Energy and Mineral Resources, Committee on Natural Resources, House of Representatives, July 1, 1993 (GAO/T-RCED-93-58)
GAO/T-RCED-99-21 (NIRS/PC Ex. 215)	U.S. General Accounting Office, "Nuclear Waste: Schedule, Cost, and Management Issues at DOE's Hanford Tank Waste Project", Statement of Ms. Gary L. Jones, Testimony before the Subcommittee on Oversight and Investigations, Committee on Commerce, House of Representatives, October 8, 1998 (GAO/T-RCED-99-21)
GAO-02-191 (NIRS/PC Ex. 216)	U.S. General Accounting Office, "Nuclear Waste: Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project", Report to the Congressional Requesters, December 2001 (GAO-02-191)

GAO-03-593 (NIRS/PC Ex. 217)	U.S. General Accounting Office, "Nuclear Waste: Challenges to Achieving Potential Savings in DOE's High-Level Waste Cleanup Program", Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives , June 2003 (GAO-03-593)
Henetz 2005 (NIRS/PC Ex. 184)	Patty Henetz, "Huntsman signs waste-ban measure; Class B and C: The material can be thousands of times hotter than what Envirocare of Utah deals in", *Salt Lake City Tribune*, February 26, 2005.
Hertzler et al. 1994 (NIRS/PC Ex. 117)	T.J. Hertzler, D.D. Nishimoto, and M.D. Otis. *Depleted uranium disposal options evaluation.* EGG-MS-11297. Idaho Falls, ID: Waste Management Technology Division, Science Applications International Corporation for EG&G Idaho, Inc. and the U.S. Department of Energy, Office of Environmental Restoration and Waste Management, May 1994.
Holt 2005 (NIRS/PC Ex. 219)	Mark Holt, "Civilian nuclear waste disposal", CRS Issue Brief for Congress, Order code IP92059, Congressional Research Service, Updated June 9, 2005.
Huntoon 2000 (NIRS/PC Ex.118)	Letter from Carolyn L. Huntoon, Assistant Secretary for Environmental Management, U.S. Department of Energy, to Arjun Makhijani, July 18, 2000.
IAEA 2003 (NIRS/PC Ex. 185)	International Atomic Energy Agency, "Scientific and Technical Basis for the Geologic Disposal of Radioactive Wastes", Technical Reports Series No. 413, February 2003 (STI/DOC/010/413)
IAEA/NEA 2001 (NIRS/PC Ex.186)	A Joint Report by the OECD Nuclear Energy Agency and the International Atomic Energy Agency, "Management of Depleted Uranium", 2001
ICRP 81 (NIRS/PC Ex. 122)	International Commission on Radiological Protection. *Radiation protection recommendations as applied to the disposal of long-lived solid radioactive waste.* Annals of the ICRP, v. 28, no. 4. ICRP publication 81. Kidlington, Oxford; Tarrytown, NY: Pergamon, 1998.
Johnson 2005 (NRC Staff Ex. 39)	Timothy C. Johnson to James W. Clifford, "April 19, 2005, In-Office Review Summary: Louisiana Energy Services Decommissioning Funding", April 29, 2005. Internal NRC memo.
Kozak et al. 1992 (NIRS/PC Ex. 128)	Matthew W. Kozak, Thomas A. Feeney, Christi D. Leigh, Harlan W. Stockman. *Performance assessment of the proposed disposal of depleted uranium as Class A Low-level Wastewaste.* FIN A1764 Final Letter Report submitted December 16, 1992 to F.W. Ross (Low-Level Waste Management Branch, Office of Nuclear Material Safety and Safeguards, Nuclear Regulatory Commission). Albuquerque, NM: Sandia National Laboratories, 1992.
Krich 2005 (NIRS/PC Ex. 187)	Letter to Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, From R.M. Krich, LES, "Clarifying Information Related to Depleted UF_6 Disposition Costs and Request for License Condition", March 29, 2005 (NEF#05-016)
Krich 2005b (NIRS/PC Ex. 188)	Letter to Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, From R.M. Krich, LES, "Clarifying Information Related to Depleted UF_6 Disposition Costs and Application for Withholding Information from Public Disclosure", April 8, 2005 (NEF#05-017)

LES 2005/08/11 (NIRS/PC Ex. 221)	U.S. Nuclear Regulatory Commission, before the Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P. (National Enrichment Facility), "Applicant's Objections and Responses to Nuclear Information and Resource Service's and Public Citizen's Second Supplemental Interrogatories and Document Request", Docket No. 70-3103-ML, ASLBP No. 04-826-01-ML, August 11, 2005.
LES Business Study 2004 (LES Ex. 91)	*Business study: tails deconversion and cylinder washing plants at Urenco (Capenhurst) Limited.* 26th August 2004. Protected Materials. Bates no. LES-PRO-00631 etc.
LES NEF UF6 info sheet (NIRS/PC Ex. 134)	Louisiana Energy Services. *Uranium hexafluoride deconversion and disposal in the United States.* National Enrichment Facility Information Sheet, Version 2. 1-19-04. On the Web at http://www.nefnm.com/documents/infosheets/uranium.pdf.
LES SAR 2004 (NIRS/PC Ex. 222)	Louisiana Energy Services, "National Enrichment Facility License Application Safety Analysis Report", Revision 2, July 2004, On the Web at http://www.nrc.gov/materials/fuel-cycle-fac/ml042190038.pdf.
LLNL 1997 CA (NIRS/PC Ex. 56)	Hatem Elayat, Julie Zoller, Lisa Szytel. *Cost analysis report for the long-term management of depleted uranium hexafluoride.* UCRL-AR-127650. Livermore, CA: Lawrence Livermore National Laboratory, May 1997. Summary (26 p) on the Web at http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=575544&queryId=3&start=0.
LLNL 1997 EA (NIRS/PC Ex. 55)	J.W. Dubrin, J.N. Zoller, L. Rahm-Crites, et al. *Depleted Uranium Hexafluoride Program: Engineering analysis report for the long-term management of depleted uranium hexafluoride.* UCRL-AR-124080, Rev 2. Livermore, CA: Lawrence Livermore National Laboratory, May 1997. (Volumes I & II). On the Web at http://www.llnl.gov/tid/lof/documents/toc/231539.html.
LLNL Wilt 1997 (NIRS/PC Ex. 135)	Gloria Wilt. "Dealing with a Dangerous Surplus from the Cold War." Lawrence Livermore National Laboratory UCRL-52000-97-4. *Science & technology review* (April 1997) pp. 4-13. On the Web at http://www.llnl.gov/str/pdfs/04_97.pdf.
LMI 2004 (LES Ex. 86)	Eve M. Meek, David R. Gallay, Douglas A. Gray, and Gerald W. Westerbeck, "An Analysis of DOE's Cost to Dispose of DUF6", LMI Government Consulting, December 2004 (Report DE523T1)
Makhijani & Boyd 2001 (NIRS/PC Ex. 137)	Arjun Makhijani and Michele Boyd. *Poison in the Vadose Zone: An examination of the threats to the Snake River Plain aquifer from the Idaho National Engineering and Environmental Laboratory.* Takoma Park, Maryland: Institute for Energy and Environmental Research, October 2001. On the Web at http://www.ieer.org/reports/poison/pvz.pdf.
Makhijani & Boyd 2004 (NIRS/PC Ex. 136)	Arjun Makhijani and Michele Boyd. *Nuclear Dumps by the Riverside: Threats to the Savannah River from Radioactive Contamination at the Savannah River Site (SRS).* Takoma Park, Maryland: Institute for Energy and Environmental Research, March 11, 2004. On the Web at http://www.ieer.org/reports/srs/index.html.

Makhijani and Gopal 2001 (NIRS/PC Ex. 189)	Arjun Makhijani and Sriram Gopal, "Setting Cleanup Standards to Protect Future Generations: The Scientific Basis of the Subsistence Farmer Scenario and Its Application to the Estimation of Radionuclide Soil Action Levels (RSALs) for Rocky Flats", December 2001.
Makhijani and Smith 2004 (NIRS/PC Ex. 190)	Arjun Makhijani and Brice 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", November 24, 2004.
Makhijani October 2000 (NIRS/PC Ex. 138)	Arjun Makhijani. Letter from IEER to Carolyn Huntoon, Assistant Secretary for Environmental Management, United States Department of Energy October 13, 2000 On the Web http://www.ieer.org/comments/waste/tru2hunt.html.
MOA 2005 (LES Ex. 105)	E. James Ferland, President and CEO Louisiana Energy Services, L.P. and George E. Dials, President and COO Waste Control Specialists LLC, "Memorandum of Agreement between Louisiana Energy Services, L.P. and Waste Control Specialists LLC", January 14, 2005.
NAS/NRC 1996 (NIRS/PC Ex. 150)	National Research Council. Committee on Decontamination and Decommissioning of Uranium Enrichment Facilities. *Affordable Cleanup? Opportunities for cost reduction in the decontamination and decommissioning of the nation's uranium enrichment facilities.* Washington, DC: National Academies Press, 1996.
NAS/NRC 2003 (NIRS/PC Ex. 151)	National Research Council. Board on Radioactive Waste Management. Committee on Improving the Scientific Basis for Managing Nuclear Materials and Spent Nuclear Fuel through the Environmental Management Science Program. *Improving the Scientific Basis for Managing DOE's Excess Nuclear Materials and Spent Nuclear Fuel.* Washington, DC: National Academies Press, 2003.
NAS/NRC 2005 (NIRS/PC Ex. 225)	Richard R. Monson (Chair) et al., "Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII – Phase 2", Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, Board on Radiation Effects Research, National Academies Press, Washington, DC (2005)
NEF DEIS 2004 (NIRS/PC Ex. 152)	U.S. Nuclear Regulatory Commission, "Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico: Draft Report for Comment", September 2004 (NUREG-1790)
NEF FEIS 2005 (NIRS/PC Ex. 191)	U.S. Nuclear Regulatory Commission, "Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico: Final Report", Chapters 1 through 10 and Appendices A through G, June 2005 (NUREG-1790, Vol. 1)
NRC 1991 (NIRS/PC Ex. 193)	James M. Taylor, "Disposition of Depleted Uranium Tails from Enrichment Plants", Enclosure: Factors Involved in the Disposition of Depleted Uranium Hexafluoride DUF_6 Tails, January 25, 1991 (SECY-91-019)
NRC 2002 (NIRS/PC Ex. 88)	U.S. Nuclear Regulatory Commission, "Nuclear Regulatory Legislation: 107th Congress; 1st Session", June 2002 (NUREG-0980 Vol. 1, No. 6)
NRC 2005 (NIRS/PC Ex. 195)	U.S. Nuclear Regulatory Commission in the matter of Louisiana Energy Services, L.P. (National Enrichment Facility), "Memorandum and Order", CLI-05-05, Docket No. 70-3103-ML, January 18, 2005

NRC CEC EIS Final 1994 (NIRS/PC Ex. 58)	U.S. Nuclear Regulatory Commission. Office of Nuclear Material Safety and Safeguards. *Final Environmental Impact Statement for the ConstrctionConstruction and Operation of Claiborne Enrichment CerterCenter, Homer, Louisiana.* NUREG-1484. Washington, DC, September 2004.
NUREG 1757, Vol.3 (NIRS/PC Ex. 249)	U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Division of Waste Management, *Consolidated NMSS Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness, Final Report*, Prepared by T.L. Fredrichs, E.R. Pogue, M.C. Maier, and R. N. Young, August 2005 (NUREG-1757 Vol.3)
Paducah FEIS 2004 (LES Ex. 17)	U.S. Department of Energy, "Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site", Volume 1: Main Text and Appendixes A–H, June 2004 (DOE/EIS-0359)
Portsmouth FEIS 2004 (LES Ex. 16)	U.S. Department of Energy, "Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site", Volume 1: Main Text and Appendixes A–H, June 2004 (DOE/EIS-0360)
Rod Krich Deposition August 26, 2005 (NIRS/PC Ex. 226)	*Deposition of Rod Krich.* Friday, August 26, 2005. In the matter of Louisiana Energy Services (National Enrichment Facility) v. Nuclear Information and Resource Service and Public Citizen. U.S. Nuclear Regulatory Commission, Docket No. 70-3103-ML; ASLBP No. 04-826-01-ML. Deposition took place in offices of Winston & Strawn, Washington, DC.
Rowberg 2001 (NIRS/PC Ex.227)	Richard Rowberg, "The National Ignition Facility: Management, Technical, and Other Issues", CRS report for Congress, Order code RL30540, Congressional Research Service, Updated November 8, 2001.
Saunders and Young 1983 (NIRS/PC Ex. 196)	Ian Saunders and Anthony Young, "Rates of Surface Processes on Slopes, Slope Retreat, and Denudation", *Earth Surface Processes and Landforms*, Vol. 8, 473-501 (1983)
Schenk and Jackson 2002 (NIRS/PC Ex. 197)	H. Jochen Schenk and Robert B. Jackson, "Rooting depths, lateral root spreads and below-ground/above-ground allometries of plants in water-limited ecosystems", *Journal of Ecology*, Vol. 90, 480-494 (2002)
Smith 2004 (NIRS/PC Ex.160)	Brice Smith. *What the DOE Knows it Doesn't Know about Grout: Serious Doubts Remain About the Durability of Concrete Proposed to Immobilize High-Level Nuclear Waste in the Tank Farms at the Savannah River Site and other DOE Sites.* Institute for Energy and Environmental Research, Takoma Park, Maryland updated October 18, 2004. On the web at http://www.ieer.org/reports/srs/grout.pdf.
TCEQ 2003 (NIRS/PC Ex. 228)	Texas Commission on Environmental Quality, "Lineup of Legislation, The TCEQ's playbook grows with new responsibilities, laws to implement", Natural Outlook, Summer 2003, online at http://www.tceq.state.tx.us/AC/comm_exec/forms_pubs/pubs/pd/020/03-03/legislation.html (Last Modified 8/4/05)

Texas Agreement 1963 (NIRS/PC Ex. 198)	Glenn T. Seaborg, Chairman of the Atomic Energy Commission, and Price Daniel, Governor of Texas, "Agreement Between the United States Atomic Energy Commission and the State of Texas for Discontinuance of Certain Commission Regulatory Authority and Responsibility Within the State Pursuant to Section 274 of the Atomic Energy Act of 1954, as Amended", 1963.
WCS 2004 (NIRS/PC Ex. 199)	Waste Control Specialists, LLC., "Application for License to Authorize Near-Surface Land Disposal of Low-Level Radioactive Waste", originally filed on August 4, 2004 and ruled Administratively Complete by the Texas Commission on Environmental Quality on February 18, 2005, available online at http://64.224.191.188/wcs/.
Wheatley 2005 (NIRS/PC Ex. 200)	Letter from Wade M. Wheatley to Glenn Shankle, "License Application for a Proposed Low-Level Radioactive Waste Disposal Facility: Evaluation of Merit", Texas Commission on Environmental Quality, April 26, 2005.
Yu et al. 1993 (NIRS/PC Ex. 201)	C. Yu, C. Loureiro, J.-J. Cheng, L.G. Jones, Y.Y. Wang, Y.P. Chia, and E. Faillace. *Data collection handbook to support modeling impacts of radioactive material in soil.* Argonne, IL: Environmental Assessment and Information Sciences Division, Argonne National Laboratory, April 1993. On the Web at http://web.ead.anl.gov/resrad/documents/data_collection.pdf.

Curriculum Vita of

Arjun Makhijani

Address and Phone:

Institute for Energy and Environmental Research
6935 Laurel Ave., Suite 201
Takoma Park, MD 20912
Phone: 301-270-5500
e-mail: arjun@ieer.org
Website www.ieer.org

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)

Hower, G.L., and A. Makhijani, "Further Comparison of Spread-F and Backscatter Sounder Measurements," *Journal of Geophysical Research*, *74*, p. 3723, 1969.

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.

Logan, B. G., A.J. Lichtenberg, M. Lieberman, and A. Makhijani, "Multiple-Mirror Confinement of Plasmas," *Physical Review Letters*, *28*, 144, 1972.

Makhijani, A., and A.J. Lichtenberg, "Energy and Well-Being," *Environment*, *14*, 10, June 1972.

Makhijani, A., A.J. Lichtenberg, M. Lieberman, and B. Logan, "Plasma Confinement in Multiple Mirror Systems. I. Theory," *Physics of Fluids*, *17*, 1291, 1974.

A Time to Choose: America's Energy Future, final report of the Ford Foundation Energy Policy Project, Ballinger, Cambridge, 1974. One of many co-authors.

Makhijani, A., and A. Poole, *Energy and Agriculture in the Third World*, Ballinger, Cambridge, 1975.

Makhijani, A., *Energy Policy for the Rural Third World*, International Institute for Environment and Development, London, 1976.

Kahn, E., M. Davidson, A. Makhijani, P. Caeser, and S. Berman, *Investment Planning in the Energy Sector*, Lawrence Berkeley Laboratory, Berkeley, 1976.

Makhijani, A., "Solar Energy for the Rural Third World," *Bulletin of the Atomic Scientists*, May 1977.

Makhijani, A., "Energy Policy for Rural India," *Economic and Political Weekly*, 12, Bombay, 1977.

Makhijani, A., *Some Questions of Method in the Tennessee Valley Authority Rate Study*, Report to the Tennessee Valley Authority, Chattanooga, 1978.

Makhijani, A., *The Economics and Sociology of Alternative Energy Sources*, Economic and Social Commission for Asia and the Pacific, 1979.

Makhijani, A., *Energy Use in the Post-Harvest Component of the Food Systems in Ivory Coast and Nicaragua*, Food and Agriculture Organization of the United Nations, Rome, 1982.

Makhijani, A., *Oil Prices and the Crises of Debt and Unemployment: Methodological and Structural Aspects*, International Labour Office of the United Nations, Final Draft Report, Geneva, April 1983.

Makhijani, A., and D. Albright, *The Irradiation of Personnel at Operation Crossroads*, International Radiation Research and Training Institute, Washington, D.C., 1983.

Makhijani, A., K.M. Tucker, with Appendix by D. White, *Heat, High Water, and Rock Instability at Hanford*, Health and Energy Institute, Washington, D.C., 1985.

Makhijani, A., and J. Kelly, *Target: Japan - The Decision to Bomb Hiroshima and Nagasaki*, July 1985, a report published as a book in Japanese under the title, *Why Japan?*, Kyoikusha, Tokyo, 1985.

Makhijani, A., *Experimental Irradiation of Air Force Personnel During Operation Redwing - 1956*, Environmental Policy Institute, Washington, D.C., 1985.

Makhijani, A., and R.S. Browne, "Restructuring the International Monetary System," *World Policy Journal*, New York, Winter, 1985-86.

Makhijani, A., R. Alvarez, and B. Blackwelder, *Deadly Crop in the Tank Farm: An Assessment of Management of High-Level Radioactive Wastes in the Savannah River Plant Tank Farm*, Environmental Policy Institute, Washington, D.C., 1986.

Makhijani, A., "Relative Wages and Productivity in International Competition," *College Industry Conference Proceedings*, American Society for Engineering Education, Washington, D.C., 1987.

Makhijani, A., *An Assessment of the Energy Recovery Aspect of the Proposed Mass Burn Facility at Preston, Connecticut*, Institute for Energy and Environmental Research, Takoma Park, 1987.

Makhijani, A., R. Alvarez, and B. Blackwelder, *Evading the Deadly Issues: Corporate Mismanagement of America's Nuclear Weapons Production*, Environmental Policy Institute, Washington, D.C., 1987.

Makhijani, A., *Release Estimates of Radioactive and Non-Radioactive Materials to the Environment by the Feed Materials Production Center, 1951-85*, Institute for Energy and Environmental Research, Takoma Park, 1988.

Alvarez, R., and A. Makhijani, "The Hidden Nuclear Legacy," *Technology Review*, 91, 42,1988.

Makhijani, A., Annie Makhijani, and A. Bickel, *Saving Our Skins: Technical Potential and Policies for the Elimination of Ozone-Depleting Chlorine Compounds*, Environmental Policy Institute and Institute for Energy and Environmental Research, Takoma Park, 1988.

Makhijani, A., Annie Makhijani, and A. Bickel, *Reducing Ozone-Depleting Chlorine and Bromine Accumulations in the Stratosphere: A Critique of the U.S. Environmental Protection Agency's Analysis and Recommendations*, Institute for Energy and Environmental Research and Environmental Policy Institute/Friends of the Earth, Takoma Park, 1989.

Makhijani, A., and B. Franke, *Addendum to Release Estimates of Radioactive and Non-Radioactive Materials to the Environment by the Feed Materials Production Center, 1951-85*, Institute for Energy and Environmental Research, Takoma Park, 1989.

Makhijani, A., *Global Warming and Ozone Depletion: An Action Program for States*, Institute for Energy and Environmental Research, Takoma Park, 1989.

Makhijani, A., *Managing Municipal Solid Wastes in Montgomery County*, Prepared for the Sugarloaf Citizens Association, Institute for Energy and Environmental Research, Takoma Park, 1990.

Saleska, S., and A. Makhijani, *To Reprocess or Not to Reprocess: The Purex Question - A Preliminary Assessment of Alternatives for the Management of N-Reactor Irradiated Fuel at the U.S. Department of Energy's Hanford Nuclear Weapons Production Facility*, Institute for Energy and Environmental Research, Takoma Park, 1990.

Makhijani, A., "Common Security is Far Off," *Bulletin of the Atomic Scientists*, May 1990.

Makhijani, A., *Draft Power in South Asian Agriculture: Analysis of the Problem and Suggestions for Policy*, prepared for the Office of Technology Assessment, Institute for Energy and Environmental Research, Takoma Park, 1990.

Mehta, P.S., S.J. Mehta, A.S. Mehta, and A. Makhijani, "Bhopal Tragedy's Health Effects: A Review of Methyl Isocyanate Toxicity," *JAMA 264*, 2781, December 1990.

Special Commission of International Physicians for the Prevention of Nuclear War and the Institute for Energy and Environmental Research, *Radioactive Heaven and Earth: The Health and Environmental Effects of Nuclear Weapons Testing In, On, and Above the Earth*, Apex Press, New York, 1991. One of many co-authors.

Makhijani, A., and S. Saleska, *High Level Dollars Low-Level Sense: A Critique of Present Policy for the Management of Long-Lived Radioactive Waste and Discussion of an Alternative Approach*, Apex Press, New York, 1992.

Makhijani, A., *From Global Capitalism to Economic Justice: An Inquiry into the Elimination of Systemic Poverty, Violence and Environmental Destruction in the World Economy*, Apex Press, New York, 1992.

Special Commission of International Physicians for the Prevention of Nuclear War and the Institute for Energy and Environmental Research, *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge, MA, 1992. One of several co-authors.

Makhijani, A., "Energy Enters Guilty Plea," *Bulletin of the Atomic Scientists*, March/April 1994.

Makhijani, A., "Open the Files," *Bulletin of the Atomic Scientists*, Jan./Feb. 1995.

Makhijani, A., " 'Always' the Target?" *Bulletin of the Atomic Scientists*, May/June 1995.

Makhijani, A., and Annie Makhijani, *Fissile Materials in a Glass, Darkly: Technical and Policy Aspects of the Disposition of Plutonium and Highly Enriched Uranium*, IEER Press, Takoma Park, 1995.

Makhijani, A., and K. Gurney, *Mending the Ozone Hole: Science, Technology, and Policy*, MIT Press, Cambridge, MA, 1995.

Makhijani, A., H. Hu, K. Yih, eds., *Nuclear Wastelands: A Global Guide to Nuclear Weapons Production and the Health and Environmental Effects*, MIT Press, Cambridge, MA, 1995.

Zerriffi, H., and A. Makhijani, *The Nuclear Safety Smokescreen: Warhead Safety and Reliability and the Science Based Stockpile Stewardship Program*, Institute for Energy and Environmental Research, Takoma Park, May 1996.

Zerriffi, H., and A. Makhijani, "The Stewardship Smokescreen," *Bulletin of the Atomic Scientists*, September/October 1996.

Makhijani, A., *Energy Efficiency Investments as a Source of Foreign Exchange*, prepared for the International Energy Agency Conference in Chelyabinsk, Russia, 24-26 September 1996.

Makhijani, A., "India's Options," *Bulletin of the Atomic Scientists*, March/April 1997.

Ortmeyer, P. and A. Makhijani, "Worse than We Knew," *Bulletin of the Atomic Scientists*, November/December 1997.

Fioravanti, M., and A. Makhijani, *Containing the Cold War Mess: Restructuring the Environmental Management of the U.S. Nuclear Weapons Complex*, Institute for Energy and Environmental Research, Takoma Park, October 1997.

Principal author of three chapters in Schwartz, S., ed., *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940*, Brookings Institution, Washington, D.C., 1998.

Franke, B., and A. Makhijani, *Radiation Exposures in the Vicinity of the Uranium Facility in Apollo, Pennsylvania*, Institute for Energy and Environmental Research, Takoma Park, February 2, 1998.

Fioravanti, M., and A. Makhijani, *Supplement to Containing the Cold War Mess- IEER's Response to the Department of Energy's Review*, Institute for Energy and Environmental Research, Takoma Park, March 1998.

Makhijani, A., "A Legacy Lost," *Bulletin of the Atomic Scientists*, July/August 1998.

Makhijani, A., and Hisham Zerriffi, *Dangerous Thermonuclear Quest: The Potential of Explosive Fusion Research for the Development of Pure Fusion Weapons*, Institute for Energy and Environmental Research, Takoma Park, July 1998.

Makhijani, A., and Scott Saleska, *The Nuclear Power Deception - U.S. Nuclear Mythology from Electricity "Too Cheap to Meter" to "Inherently Safe" Reactors*, Apex Press, New York, 1999.

Makhijani, A., "Stepping Back from the Nuclear Cliff," *The Progressive*, vol. 63, no. 8, August 1999.

Makhijani, A., Bernd Franke, and Hisham Zerriffi, *Preliminary Partial Dose Estimates from the Processing of Nuclear Materials at Three Plants during the 1940s and 1950s*, Institute for Energy and Environmental Research, Takoma Park, September 2000. (Prepared under contract to the newspaper *USA Today*.)

Makhijani, A., and Bernd Franke, *Final Report of the Institute for Energy and Environmental Research on the Second Clean Air Act Audit of Los Alamos National Laboratory by the Independent Technical Audit Team*, Institute for Energy and Environmental Research, Takoma Park, December 13, 2000.

Makhijani, A., *Plutonium End-Game: Managing Global Stocks of Separated Weapons-Usable Commercial and Surplus Nuclear Weapons Plutonium*, Institute for Energy and Environmental Research, Takoma Park, January 2001.

Makhijani, A., Hisham Zerriffi, and Annie Makhijani, "Magical Thinking: Another Go at Transmutation," *Bulletin of the Atomic Scientists*, March/April 2001.

Makhijani, A., *Ecology and Genetics: An Essay on the Nature of Life and the Problem of Genetic Engineering*. New York: Apex Press, 2001.

Makhijani, A., "Burden of Proof," *Bulletin of the Atomic Scientists*, July/August 2001.

Makhijani, A., "Reflections on September 11, 2001," in Kamla Bhasin, Smitu Kothari, and Bindia Thapar, eds., *Voices of Sanity: Reaching Out for Peace*, Lokayan, New Delhi, 2001, pp. 59-64.

Makhijani, A., and Michele Boyd, *Poison in the Vadose Zone: An examination of the threats to the Snake River Plain aquifer from the Idaho National Engineering and Environmental Laboratory* Institute for Energy and Environmental Research, Takoma Park, October 2001.

Makhijani, A., *Securing the Energy Future of the United States: Securing the Energy Future of the United States: Oil, Nuclear, and Electricity Vulnerabilities and a post-September 11, 2001 Roadmap for Action*, Institute for Energy and Environmental Research, Takoma Park, November 2001.

Makhijani, A., and Sriram Gopal, *Setting Cleanup Standards to Protect Future Generations: The Scientific Basis of Subsistence Farmer Scenario and Its Application to the Estimation of Radionuclide Soil Action Levels (RSALs) for Rocky Flats*, Institute for Energy and Environmental Research, Takoma Park, December 2001.

Makhijani, A., "Some Factors in Assessing the Response to September 11, 2001," *Medicine and Global Survival*, International Physicians for the Prevention of Nuclear War, Cambridge, Mass., February 2002.

Makhijani, Annie, Linda Gunter, and A. Makhijani. *Cogéma: Above the Law?: Concerns about the French Parent Company of a U.S. Corporation Set to Process Plutonium in South Carolina.* A report prepared by Institute for Energy and Environmental Research and Safe Energy Communication Council. Takoma Park, MD, May 7, 2002.

Deller, N., A., Makhijani, and J. Burroughs, eds., *Rule of Power or Rule of Law? An Assessment of U.S. Policies and Actions Regarding Security-Related Treaties*, Apex Press, New York, 2003.

Makhijani, A., "Nuclear targeting: The first 60 years," *Bulletin of the Atomic Scientists*, May/June 2003.

Makhijani, A., "Strontium," *Chemical & Engineering News*, September 8, 2003.

Makhijani, A., and Nicole Deller, *NATO and Nuclear Disarmament: An Analysis of the Obligations of the NATO Allies of the United States under the Nuclear Non-Proliferation Treaty and the Comprehensive Test Ban Treaty*, Institute for Energy and Environmental Research, Takoma Park, Maryland, October 2003.

Makhijani, A., *Manifesto for Global Democracy: Two Essays on Imperialism and the Struggle for Freedom*, Apex Press, New York, 2004.

Makhijani, A., "Atomic Myths, Radioactive Realities: Why nuclear power is a poor way to meet energy needs," *Journal of Land, Resources, & Environmental Law*, v. 24, no. 1, 2004, pp. 61-72. Adapted from an oral presentation given on April 18, 2003, at the Eighth Annual Wallace Stegner Center Symposium titled "Nuclear West: Legacy and Future," held at the University of Utah S.J. Quinney College of Law."

Makhijani, A., and Michele Boyd, *Nuclear Dumps by the Riverside: Threats to the Savannah River from Radioactive Contamination at the Savannah River Site*, Institute for Energy and Environmental Research, Takoma Park, Maryland, forthcoming, March 2004.

Makhijani, A., and Brice Smith, *The Role of E.I. du Pont de Nemours and Company (Du Pont) and the General Electric Company in Plutonium Production and the Associated I-131 Emissions from the Hanford Works*, Institute for Energy and Environmental Research, Takoma Park. Maryland, March 30, 2004.

Makhijani, A., Peter Bickel, Aiyou Chen, and Brice Smith, *Cash Crop on the Wind Farm: A New Mexico Case Study of the Cost, Price, and Value of Wind-Generated Electricity*, Institute for Energy and Environmental Research, Takoma Park, Maryland, April 2004.

Makhijani, A., Lois Chalmers, and Brice Smith, *Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear Power*, Institute for Energy and Environmental Research, Takoma Park, Maryland, October 15, 2004.

Makhijani, A., and Brice 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*, Institute for Energy and Environmental Research, Takoma Park, Maryland, November 24, 2004.

Institute for Energy and Environmental Research, *Lower Bound for Cesium-137 Releases from the Sodium Burn Pit at the Santa Susana Field Laboratory*, IEER, Takoma Park, Maryland, January 13, 2005. (Authored by A. Makhijani and Brice Smith.)

Institute for Energy and Environmental Research, *Iodine-131 Releases from the July 1959 Accident at the Atomics International Sodium Reactor Experiment*, IEER, Takoma Park, Maryland, January 13, 2005. (Authored by A. Makhijani and Brice Smith.)

Makhijani, A., and Brice Smith. *Update to 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.* Institute for Energy and Environmental Research, Takoma Park, Maryland, July 5, 2005.

CERTIFICATE OF SERVICE

Pursuant to 10 CFR § 2.305 the undersigned attorney of record certifies that on October 18, 2005, the foregoing Revised Direct Testimony of Dr. Arjun Makhijani in Support of NIRS/PC Contentions EC-3/TC-1, EC-5/TC-2, and EC-6/TC-3 concerning LES's Deconversion Strategy and Cost Estimate was served by expedited delivery upon the following:

G. Paul Bollwerk, III
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Third Floor, Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738
e-mail: gpb@nrc.gov

Dr. Paul B. Abramson
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Third Floor, Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738
e-mail: pba@nrc.gov

Dr. Charles N. Kelber
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Third Floor, Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738
e-mail: CKelber@att.net

James Curtiss, Esq.
David A. Repka, Esq.
Martin J. O'Neill, Esq.
Winston & Strawn
1700 K Street, N.W.
Washington, D.C. 20006-3817
e-mail: jcurtiss@winston.com
drepka@winston.com
moneill@winston.com

John W. Lawrence, Esq.
National Enrichment Facility
100 Sun Ave., N.E.
Suite 204
Albuquerque, NM 87109 (by Fedex)
e-mail: jlawrence@nefnm.com

Office of the General Counsel
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738
Attention: Lisa B. Clark, Esq.
e-mail: OGCMailCenter@nrc.gov
lbc@nrc.gov
abc1@nrc.gov
jth@nrc.gov
dmr1@nrc.gov
dac3@nrc.gov

Office of Commission Appellate Adjudication
Mail Stop O-16C1
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Secretary
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738
Attention: Rulemakings and Adjudications Staff
e-mail: hearingdocket@nrc.gov

Lindsay A. Lovejoy, Jr.
618 Paseo de Peralta, Unit B
Santa Fe, NM 87501
(505) 983-1800
(505) 983-0036 (facsimile)
e-mail: lindsay@lindsaylovejoy.com

1 MR. LOVEJOY: Thank you. And, Dr.
2 Makhijani, do you also have before you your rebuttal
3 testimony concerning deconversion?
4 WITNESS MAKHIJANI: Yes.
5 MR. LOVEJOY: Could you read the date on
6 that copy that you have? It should be in the upper
7 right-hand corner.
8 WITNESS MAKHIJANI: October 21st, 2005.
9 I was just making sure it says deconversion.
10 MR. LOVEJOY: Yes. Okay. Thank you.
11 With that, is the rebuttal testimony you have before
12 you testimony that you're willing to make under oath
13 before this Board?
14 WITNESS MAKHIJANI: Yes, I won't subject
15 you to the same things.
16 CHAIR BOLLWERK: We understand.
17 MR. LOVEJOY: We offer that testimony for
18 admission in the record.
19 CHAIR BOLLWERK: All right. Any
20 objections?
21 (No verbal response.)
22 CHAIR BOLLWERK: Then the revised rebuttal
23 testimony of Dr. Makhijani concerning LES'
24 deconversion strategy and cost estimate dated October
25 21st, 20005 is entered into the record as if read.

1 (Whereupon, the revised rebuttal testimony
2 of Dr. Makhijani was bound into the record as if
3 having been read.)**
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

October 21, 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. | ASLBP No. 04-826-01-ML

National Enrichment Facility

REVISED REBUTTAL TESTIMONY OF DR. ARJUN MAKHIJANI IN SUPPORT OF NIRS/PC CONTENTIONS EC-3/TC-1, EC-5/TC-2, AND EC-6/TC-3 CONCERNING LES'S DECONVERSION STRATEGY AND COST ESTIMATE

Q1. Please state you name and what testimony you will 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, Leslie M. Compton, and Paul JC Harding presented on behalf of Louisiana Energy Services, L.P dated September 16, 2005 and the pre-filed direct testimony of Timothy C. Johnson, James Park, Jennifer Mayer, Craig Dean, and Donald E. Palmrose presented on behalf of the NRC Staff dated September

15, 2005. The testimony of Rod Krich, Timothy Johnson, James Park, Jennifer Mayer, Craig Dean, and Donald Palmrose was offered with respect to issues of uranium hexafluoride deconversion as they relate to Nuclear Information and Research Service and Public Citizen Contentions EC-3/TC-1, EC-5/TC-2, AND EC-6/TC-3.

Q2. With respect to the basis of the LES deconversion cost estimate, what opinions were offered by the opposing experts in their direct testimony that you plan to discuss?

A2. The testimony of interest from Rod Krich was as follows:

> A29. (RMK) ... At present, AREVA Group has both existing and planned commercial deconversion plants – one plant that has been operating in Pierrelatte, France for 20 years (*i.e.*, the "W" plant); ***another that is in the design and licensing discussion phase in Capenhurst, United Kingdom***; and two plants that are in the design and construction phases in Portsmouth, Ohio and Paducah, Kentucky.[1]

The testimony of interest from Timothy Johnson, James Park, and Donald E. Palmrose was as follows:

> A.8. (TJ, JP, DP) A Memorandum of Understanding between LES and AREVA Enterprises, Inc., which states, among other things, that:
>
> ...
>
> AREVA, representing COGEMA SA and Framatome ANP SAS, has the requisite commercial experience to build a deconversion plant in the United States to deconvert DUF6 to U3O8 based on its experience in building and operating a deconversion plant in Pierrelatte, France, and in designing deconversion plants located in Paducah, Kentucky and Portsmouth, Ohio. In addition, ***AREVA is in the process of discussing design and licensing activities regarding a deconversion plant for Urenco, Ltd. in the United Kingdom.***[2]

[1] LES Deconversion 2005 p. 15 (emphasis added).
[2] NRC Staff Deconversion 2005 p. 5 (emphasis added).

Q.19. Has LES provided a basis for its estimate for conversion of the DU ($2.69/kgU)?

A.19. (TJ, JM) Yes. The deconversion cost was based on costs contained in a business study prepared in conjunction with ***a proposal by Cogema to build a deconversion plant for Urenco at the Capenhurst site*** in the United Kingdom. The ***proposed deconversion facility*** would produce U3O8 and aqueous hydrogen fluoride (HF) and would deconvert 3,500 Metric Tons (MT) U/year. We reviewed the business study during an in-office review on April 19, 2005....

Q.20. In your opinion, does the information described provide a sufficiently documented and reasonable basis for estimating the cost of conversion?

A.20. [???] Yes. The information submitted was sufficient to evaluate the reasonableness of the basis for the cost estimates. That is, ***the cost estimate of $2.69/kg U was based on costs at an existing operating facility. Estimating costs based on actual operating facilities is a robust method because it reflects the operational wisdom gained over the 20 years the plant has been operating.*** Appropriate modifications were made to address changes in the facility size and throughput, costs specific to operating in America rather than France, and the initial translation of Euros-to-dollars.[3]

Q3. Based on the testimony cited above, what opinions do you have regarding the LES deconversion cost estimate?

A3. The testimony of the NRC Staff witnesses is plainly inconsistent in its interpretation of the basis underlying the current LES cost estimate for deconversion. In answer 29 of the testimony of Rod Krich and answers 8 and 19 from the NRC Staff witnesses cited above it is repeatedly made clear that the deconversion facility at Capenhurst, United Kingdom, is not yet built and that Urenco and Cogema are, as yet, still discussing the design of the proposed plant. This fact is also made clear in the business study upon which LES is relying for its $2.69 per kilogram uranium cost estimate. [redacted][4] However, despite this clear and

[3] NRC Staff Deconversion 2005 p. 12-13 (emphasis added).
[4] LES Business Study 2004 (LES Ex. 91) p. 8/15.

undisputed fact regarding the status of the Capenhurst deconversion plant, the NRC Staff witnesses claim that "the cost estimate of $2.69/kg U was based on costs at an existing operating facility." The NRC Staff statement is plainly wrong because the estimate is for a facility that has not yet been built. This clear contradiction in the NRC Staff testimony and the factually incorrect statement show a lack of due diligence on the part of the NRC Staff witnesses in their review and evaluation of the LES cost estimate.

The distinction between what underlies the current LES estimate and what the NRC claims is significant in its implications. In my pre-filed direct testimony I stated that

> When it is available, the most reasonable basis upon which to make any engineering cost estimate is experience at similar real-world, operating facilities. In this case, such operating experience is available from the Pierrelatte plant.

The NRC Staff witnesses reached that same conclusion in their testimony when they stated that

> Estimating costs based on actual operating facilities is a robust method because it reflects the operational wisdom gained over the 20 years the plant has been operating.

The actual cost that Cogema was charging Urenco in 2004 for deconversion services at the operating Pierrelatte Plant under a real-world contract in which depleted uranium hexafluoride had changed hands was [redacted] euros per kilogram of uranium which translates into $[redacted] per kilogram of uranium using the exchange rate proposed by LES ($1.291 per euro).[5] This cost is explicitly noted in the Urenco business study upon which LES is relying and which the NRC Staff witnesses testified to reviewing "during an in-office review on April 19, 2005" (see above). Thus, the real-world cost that the NRC Staff would consider to be "robust" is, in fact, [redacted] percent more than the current LES estimate of $2.69 per kilogram of uranium.

[5] LES 2005/08/11 (NIRS/PC Ex. 221) p. 22.

Q4. With respect to the capacity of the deconversion facility considered in the Urenco business study and that considered by LES in making its current cost estimate, what opinions were offered by the opposing experts in their direct testimony that you plan to discuss and what is the implication of that testimony?

A4. Throughout the answers to questions 33, 35, 36, 37, 38, and 39, Rod Krich, Leslie Compton, and Paul Harding repeatedly report the capacity of the proposed Urenco plant as "3,500 MT UF6/year" and the capacity of the plant considered by LES as "7,000 MT UF6/year." However, the business study upon which they rely, as well as the calculations they discuss all assume the capacity of the facilities to be 3,500 MT U/year and 7,000 MT U/year.[6] These values are on an elemental uranium basis not a uranium hexafluoride basis. As a result we will retain the assumption that the capacity of the facilities are properly given by 3,500 MT U/year and 7,000 MT U/year and not the capacities on the basis of UF6 stated by the LES witnesses in their pre-filed direct testimony. The implication is that the LES cost estimates would not be correct if the capacities are assumed to be on a UF6 basis.

Q5. With respect to the LES estimate for the cost of decommissioning the deconversion facility what opinions were offered by the opposing experts in their direct testimony that you plan to discuss?

A5. The testimony of interest from Rod Krich and Leslie Compton was as follows:

> A41. (RMK, LMC) The assumption that the decontamination and decommissioning costs associated with any future deconversion would be on the order of 10% of the estimated

[6] See for example LES Business Study 2004 (LES ex. 91) p. 7/15.

> capital costs for that facility is based on LES's NEF-related experience.... LES thus views the 10% "D&D" assumption to be reasonable, if not highly conservative, with regard to any deconversion plant that might be built and operated to process DUF6 from the NEF. As discussed previously, a deconversion facility is essentially a chemical process plant that is substantially less complex in design and operation than a uranium enrichment facility. Accordingly, the decontamination and decommissioning of such a deconversion facility will be commensurately less complex. In the event that a commercial deconversion facility is constructed to handle DU from the NEF, a detailed "bottom-up" decommissioning estimate would be performed in connection with the licensing process for that facility.[7]

Q6. What is your opinion regarding LES's use of 10 percent of the capital cost when estimating the decommissioning cost for the deconversion facility?

A6. The LES estimate for the total capital cost of the deconversion plant is $88 million which results in an estimate of $8.8 million for decontamination and decommissioning costs. However, this estimate is not consistent with the information in the Urenco business study upon which LES is relying upon for its cost estimate. In the spreadsheet attached to the business study (which assumes a plant throughput of 7,000 MT U per year, the same as LES) the "Decommissioning" cost is reported as having a present value of 10 million euros. This translates into $12.91 million using the exchange rate proposed by LES. Thus, the business study underlying the LES deconversion cost estimate would support a D&D cost that is nearly 47 percent larger than that currently used by LES in its cost calculations.

Q7. With respect to the issue of uranium contamination in the calcium fluoride produced by neutralizing the hydrofluoric acid at a deconversion facility, what opinions were offered by the opposing experts in their direct testimony that you plan to discuss?

[7] LES Deconversion 2005 p. 24-25.

A7. The testimony of interest from Rod Krich and Paul Schneider was as follows:

> A42. (RMK) Because actual operating experience indicates that any potential uranium contamination in the HF acid co-product of the aqueous HF deconversion process would not exceed trace quantities (*i.e.*, 1 ppm), LES has reasonably assumed that any CaF2 generated by the neutralization of that HF with lime may be disposed of as industrial solid waste in a municipal landfill.[8]
>
> A44. (RMK, PGS) ... It warrants mention that the 1999 DOE Programmatic Environmental Impact Statement ("PEIS") for the long-term management of DUF6, as well as the two DOE site-specific EISs for the Portsmouth and Paducah deconversion facilities, contain discussion of the extent to which it is expected that CaF2 associated with the deconversion process would be contaminated by uranium. For example, in Appendix F of the PEIS, DOE specifically states that "[t]he CaF2 potentially produced in the U3O8 [de]conversion process was assumed to have a uranium content of less than 1 ppm."[9]

The testimony of interest from Timothy Johnson, James Park, and Donald E. Palmrose was as follows:

> Q.25. Could contamination of the CaF2 with uranium affect LES's ability to dispose of the product at a municipal landfill and instead require disposal at a low level waste repository?
>
> A.25. (TJ, DP, JP) Yes, if the contamination exceeds the limit for the landfill. These limits are established by the governing regulatory authority. In the case of deconversion of the DUF6 generated by the NEF, we would not expect that the level of contamination by uranium to be sufficient to prevent disposal at a landfill. We draw this conclusion in part from knowledge of the operations at three nuclear fuel fabrication facilities operating in the United States that generate aqueous HF as a byproduct of operations converting UF6 to uranium dioxide (UO2), the chemical form of nuclear reactor fuel.... The fact that these fabricators have been able to operate under these license limits, which provide that contamination cannot exceed 3 parts per million, or 3 pc/ml, indicates that the conversion process results in only minimal uranium contamination. We also took into account the fact that these limits are below those set for municipal landfills, including the Lea County landfill and are consistent with the experience of AREVA with the W plant in Pierrelatte, France. On the basis of this information, I concluded that disposal in a landfill is a reasonable assumption.[10]

---

[8] LES Deconversion 2005 p. 25.
[9] LES Deconversion 2005 p. 26-27.
[10] NRC Staff Deconversion 2005 p. 14-15.

Q8. What opinions do you have regarding the LES and NRC Staff assertions regarding the reasonableness of assuming that landfill disposal of calcium fluoride will occur for the purpose of preparing a decommissioning cost estimate?

A8. First, as noted in my pre-filed direct testimony, the disposal of the calcium fluoride as low-level waste was the only option considered by the NRC Staff in either the DEIS or FEIS for the proposed NEF. For example:

> [Draft Environmental Impact Statement for the proposed NEF]
> Because conversion of the large quantities of DUF6 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.***[11]
>
> This Draft EIS also considers that the private conversion facility could be located close to the proposed NEF (this is known as Option 1b). This would involve a private sector company constructing and operating a new conversion facility close (within 6.4 kilometers [4 miles]) to the proposed NEF.... ***The hydrofluoric acid would be converted to calcium fluoride for disposal at a licensed low-level radioactive waste disposal site.***[12]
>
> [Final Environmental Impact Statement for the proposed NEF]
> Because conversion of the large quantities of DUF6 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 aqueous 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.***[13]
>
> This EIS also considers that the private conversion facility could be located near the proposed NEF, (this is known as Option 1b). This would involve a private sector company constructing and operating a new conversion facility close (within 6.4 kilometers [4 miles])

[11] NEF DEIS 2004 (NIRS/PC Ex. 152) p. 2-29 (emphasis added).
[12] NEF DEIS 2004 (NIRS/PC Ex. 152) p. 2-30 (emphasis added).
[13] NEF FEIS 2005 (NIRS/PC Ex. 191) p. 2-29 (emphasis added).

> to the proposed NEF.... ***The hydrofluoric acid would be converted to calcium fluoride for disposal at a licensed low-level radioactive waste disposal site.***[14]

In addition, the NRC Staff has reached a similar conclusion regarding the disposal of calcium fluoride in the Draft Environmental Impact Statement for the proposed U.S. Enrichment Corporation American Centrifuge Plant (ACP) published in August 2005. In the ACP DEIS the only option considered by the NRC Staff was that the calcium fluoride produced would be disposed of at a license low-level radioactive waste site.[15]

The alternative of an industrial landfill has not been considered by the NRC Staff in the NEF draft or final environmental impact statements and no evaluation of environmental impacts of such an option have been presented by the NRC Staff witnesses in their pre-field direct testimony. Hence there is no legal basis for the NRC to grant a license for the LES plant on the basis of industrial landfill disposal of CaF2.

Second, as the LES witnesses mention, the DOE PEIS for depleted uranium management as well as the site-specific EISs for the Paducah and Portsmouth plants do make assumptions regarding the potential contamination of the calcium fluoride that would result from neutralizing the hydrofluoric acid. However, despite making these assumptions, the authors of the DOE reports conclude that it remains "unknown" whether or not the calcium fluoride could be resold, disposed of in an industrial landfill, or whether even the levels they assume could require the CaF2 to be disposed of as low-level radioactive waste. For example, the DOE PEIS states that:

> During the conversion process, the HF would be upgraded to anhydrous HF by distillation, a common industrial process. Based on historical experience, it is anticipated that the anhydrous HF would contain only trace amounts of depleted uranium (less than 1 ppm, or

[14] NEF FEIS 2005 (NIRS/PC Ex. 191) p. 2-30 (emphasis added).
[15] ACP DEIS 2005 (NIRS/PC Ex. 203) p. 4-77 and D-6 and D-12 to D-13.

> 0.4 pCi/g). Thus, it was assumed that the anhydrous HF could be sold commercially for unrestricted use.
>
> The process of HF neutralization with lime would convert the concentrated HF to CaF2 for disposal or possible sale. This step would avoid the potential hazards associated with the processing, general handling, storage, and transportation of large quantities of anhydrous HF. However, the value of CaF2 is significantly less than that of anhydrous HF, and large quantities of lime are required for neutralization, which would add to the cost of the neutralization option. ***It is also unknown whether the CaF2 produced would be sold, disposed of as nonhazardous solid waste, or disposed of as LLW.*** If disposal were required, there could be moderate impacts to waste management.[16]

Significantly, Rod Krich and Paul Schneider quote the first sentence from the following paragraph in the DOE PEIS, but fail to include the DOE's resulting conclusion:

> The CaF2 potentially produced in the U3O8 conversion process was assumed to have a uranium content of less than 1 ppm. ***It is currently unknown whether this CaF2 could be sold (e.g., as feedstock for commercial production of anhydrous HF) or whether the low uranium content would require disposal as either a nonhazardous solid waste or as LLW.***[17]

Finally, Appendix D of the Paducah and Portsmouth final EISs includes the full text of a report prepared by Argonne National Laboratory entitled *Environmental Synopsis for the Depleted UF6 Conversion Project.* In this report the authors state that

> In the event that the HF could not be sold commercially for unrestricted use, the concentrated HF may be converted to calcium fluoride (CaF2) for disposal. Based upon the PEIS, the total volume of CaF2 may range from 190,000 to 570,000 m3. ***It is unknown whether the CaF2 produced would be disposed of as nonhazardous solid waste or as LLW.*** If the CaF2 is classified as LLW, it would be expected to have a moderate impact on DOE's total waste management disposal capabilities.[18]

Thus, even after taking the experience of other deconversion facilities into account and making assumptions regarding the potential contamination of the resulting CaF2, the Department of Energy and Argonne National Laboratory still reached no final conclusion regarding the ultimate fate of the calcium fluoride and explicitly retained the possibility that disposal as LLW may be required.

---

[16] DOE PEIS 1999 (LES Ex. 18) p. F-12 (emphasis added).
[17] DOE PEIS 1999 (LES Ex. 18) p. F-64 (emphasis added).
[18] Paducah FEIS 2004 (LES Ex. 17) Appendix D p. 17 and Portsmouth FEIS 2004 (LES Ex. 16) Appendix D p. 17 (emphasis added).

LES's conclusion that it will be able to dispose of CaF2 in the Lea County landfill is very premature and without adequate foundation. It cannot form that basis of a plausible strategy for CaF2 disposal.

Q9. With respect to the cost of neutralizing the hydrofluoric acid what opinions were offered by the opposing experts in their direct testimony that you plan to discuss?

A9. The testimony of interest from Rod Krich, Leslie Compton, and Paul Harding was as follows:

> Q43. Please explain how LES accounted for HF neutralization costs.
>
> A43. (RMK, LMC, PJCH) LES views the cost of neutralizing the HF co-product of the deconversion process to be subsumed in the cost estimate provided by Urenco in its August 2004 business study. To clarify, while Urenco did not actually assume any credit for the sale of the HF in its business study, it did assume that such HF could be sold commercially. Therefore, while Urenco did not explicitly account for the cost of neutralizing the HF to CaF2, it did, however, account for the cost of the equipment needed to handle and store the HF prior to its commercial sale. In this regard, given the relatively simple nature of the neutralization process in which an alkaline material of base (*e.g.*, lime, which is inexpensive) is added to the HF, LES has concluded that neutralization would have no effect on its current overall estimate of deconversion-related costs. ***That is to say, the costs of neutralizing HF acid and storing the resulting CaF2 prior to its disposal and industrial solid waste are expected to be no greater than the costs associated with the handling and storage of HF prior to its sale*** (*i.e.*, the latter being costs the LES will not incur if it neutralizes the HF, as is presently assumed to be the case). Urenco agrees that the costs of HF storage/handling and HF neutralization would be roughly equivalent, and that LES's assumption in this regard is a reasonable one.[19]

Q10. What opinions have you formed regarding the reasonableness of LES's failure to include any cost allowance for neutralizing the aqueous hydrofluoric acid?

[19] LES Deconversion 2005 p. 26 (emphasis added).

A10. First, it is important to note that, despite the importance of the issue in the 1997 Claiborne Enrichment Center case (see below), there is no discussion of HF neutralization costs in the NRC Staff testimony. Second, as with the issue of decontamination and decommissioning costs for the deconversion facility, the Urenco business study upon which LES is relying does not appear to agree with LES's current cost estimate. In this case, the Urenco business study indicates that there will be a cost associated with the neutralization of the HF. Specifically, the study states that

[redacted][20]

Third, the LES conclusion regarding the lack of cost associated with neutralizing versus storing the HF is in conflict with the conclusion of the DOE Programmatic Environmental Impact Statement. In particular, the DOE PEIS states that:

> The process of HF neutralization with lime would convert the concentrated HF to CaF2 for disposal or possible sale. This step would avoid the potential hazards associated with the processing, general handling, storage, and transportation of large quantities of anhydrous HF. ***However, the value of CaF2 is significantly less than that of anhydrous HF, and large quantities of lime are required for neutralization, which would add to the cost of the neutralization option.*** It is also unknown whether the CaF2 produced would be sold, disposed of as nonhazardous solid waste, or disposed of as LLW. If disposal were required, there could be moderate impacts to waste management.[21]

Significantly, the alternative considered in the DOE PEIS was the production of anhydrous HF which would require additional processing of the aqueous HF produced during deconversion and the anhydrous HF would be more dangerous and expensive to store.

Fourth, the National Research Council of the U.S. National Academy of Sciences concluded that the cost of both neutralization and long-term storage of the calcium fluoride could <u>both</u> be quite significant. Specifically, the National Research Council study stated that

[20] LES Business Study 2004 (LES Ex. 91) p. 9/15.
[21] DOE PEIS 1999 (LES Ex. 18) p. F-12 (emphasis added).

> The committee has included in its analysis a small credit for the HF produced (see Table 7-5). The credit shown could be much larger if the material gains acceptance in the market. Much more important is avoiding the alternative, namely neutralization with lime and storage of the CaF2 produced as waste, possibly low-level radioactive waste. The additional cost of neutralization (capital and operating costs) scaled from the estimate given by MMES [Martin Marietta Energy Systems] is approximately $600 million; the storage cost for the CaF2 could be $800 million. (The storage cost is again scaled from an estimate given by MMES and must be considered approximate, inasmuch as long-term storage costs are uncertain at this time. The figure of $800 million appears to be at the high end of the range.)
>
> These costs for making and storing the CaF2 translate to an additional cost for disposal of the DUF6 of approximately $4/kg U.[22]

Finally, as I testified to in my direct testimony, the Atomic Safety and Licensing Board quite explicitly ruled in the Claiborne Enrichment Center case that there is a need to consider the substantial costs of neutralizing the HF in determining the cost of DU dispositioning. For example the Board ruled that:

> On the basis of the evidentiary record in this proceeding, we cannot find that the Applicant's estimated cost of $4.86/kgU (totaling $12 million annually and $360 million over 30 years of operation) is a reasonable estimate for converting DUF6 to U3O8. ***The LES estimate is deficient because it fails to include the significant cost of neutralizing the hydrofluoric acid byproduct of the conversion process.*** The evidentiary record is clear that the Applicant's cost estimate for converting DUF6 to U3O8 does not include any provision for incurring the additional substantial cost of neutralizing the byproduct HF from the primary conversion process.... Without evidence to show that there will be a sufficient market for the byproduct HF in the United States, we can only conclude that a domestic conversion facility, regardless of whether it is ultimately built and operated by COGEMA or some other entity, will have to neutralize the HF as an additional step in the conversion process and that the additional cost must be included in the cost of conversion.[23]
>
> Indeed, Mr. LeRoy [one of LES's expert witnesses in the CEC case] indicated that the Applicant's cost projections for disposal did not include any analysis of the future market for conversion byproducts and he acknowledged that there could be a glut of such byproducts on the market in the future from tails conversion. He further conceded that the question of the cost of neutralization of HF is not irrelevant to the LES cost estimate.... Accordingly, on the basis of this evidentiary record, ***we cannot find that the Applicant has met its burden of proof and demonstrated by a preponderance of the evidence that the LES cost estimate***

[22] NAS/NRC 1996 (NIRS/PC Ex. 150) p. 176.
[23] ASLB CEC 1997 (NIRS/PC Ex. 205) p. 10 of 18 (emphasis added).

> *for the conversion of DUF6 to U3O8 is a reasonable one because it fails to include the substantial costs for neutralizing the byproduct HF from the conversion process.*[24]

> For the reasons detailed in Part II.B.3, *we conclude that the Applicant's cost estimate of $12 million annually for the conversion of DUF6 to U3O8 is not a reasonable one given its failure to include the substantial costs of neutralizing the conversion process byproduct hydrofluoric acid.*[25]

The current LES claim that no cost is associated with neutralizing the CaF2 relative to storing the aqueous HF is clearly not a reasonable or credible assumption. Therefore, in the IEER cost estimate presented in the November 2004 report we included two estimates for the cost of neutralizing and disposing of the resulting calcium fluoride which should be added to the deconversion cost based on Cogema's experience at the Pierrelatte Plant (which sells the aqueous HF produced into the European market). These estimates included a low cost of $2.00 per kilogram of uranium based on information in the Lawrence Livermore cost analysis and a high cost of $4.00 per kilogram of uranium based on the above cited NAS/NRC study.[26]

Q11. Are there any other issues regarding the LES pre-filed direct testimony on deconversion issues that you feel should be discussed?

A11. Yes. The testimony of any LES or NRC Staff witness does not address the issue of the cost associated with the management of the emptied DUF6 cylinders. The need for considering the management of the emptied DUF6 cylinders was noted explicitly by the DOE in its Programmatic Environmental Impact Statement:

---

[24] ASLB CEC 1997 (NIRS/PC Ex. 205) p. 10 of 18 and 11 of 18 (emphasis added).
[25] ASLB CEC 1997 (NIRS/PC Ex. 205) p. 14 of 18 (emphasis added).
[26] Makhijani and Smith 2004 (NIRS/PC Ex. 190) p. 47-48.

> All of the conversion options would require the removal of depleted UF6 from the storage cylinders, resulting in a large number of empty cylinders. These empty UF6 cylinders from the conversion facility would be decontaminated at the cylinder treatment facility and then prepared for disposal as scrap metal.[27]

The PEIS went on to state that:

> It was assumed that the treated cylinders with a very low residual radiation level would become part of the DOE scrap metal inventory. If a disposal decision were made, the treated cylinders would be disposed of as LLW, representing a 3% addition to the projected DOE complexwide LLW disposal volume.[28]

In the deposition of Paul Harding the need for considering the management of the DUF6 cylinders after was also made quite clear:

> MR. LOVEJOY: Do your discussions with Cogema involve construction of the cylinder washing facility?
>
> WITNESS HARDING: No.
>
> MR. LOVEJOY: You're not planning to build that?
>
> WITNESS HARDING: We're looking at options. There are other plants available.
>
> MR. LOVEJOY: You're looking at other ways to supply that requirement?
>
> WITNESS HARDING: Yes.
>
> MR. LOVEJOY: I see. Do you plan to construct a cylinder washing facility of some sort?
>
> WITNESS HARDING: That's one option that we're evaluating, but it isn't the only option.
>
> MR. LOVEJOY: What are the others?
>
> WITNESS HARDING: To place a commercial contract with another service provider.
>
> MR. LOVEJOY: To provide what service?
>
> WITNESS HARDING: Washing cylinders where that's needed.[29]

---

[27] DOE PEIS 1999 (LES Ex. 18) p. F-66 to F-67.
[28] DOE PEIS 1999 (LES Ex. 18) p. F-67 to F-68.
[29] Deposition Compton et al. 2005/09/02 (NIRS/PC Ex. 229) p. 47-48.

In fact, the Urenco business study relied upon by LES for its cost estimate includes an entire section on "Cylinder Washing and Liquid Residue Recovery Facility." In this section of the business study, Urenco concludes that the cost of disposing of a cylinder would amount to [redacted] euros while the cost of washing and reusing the cylinders would be [redacted] euros.[30] Assuming 12 metric tons of DUF6 per cylinder and using the exchange rate proposed by LES, the cost per cylinder quoted in the Urenco business study would amount to at least $[redacted] per kilogram of uranium. If this additional cost was added to the current LES estimate of $2.69 per kilogram of uranium, it would represent at least a [redacted] percent increase in the overall estimated cost of deconversion. It is not reasonable for LES to exclude the cost of cylinder management from its cost estimate as it has apparently done.

Q12. In light of what you have testified to, what is your conclusion for the overall cost of deconversion, transportation, and disposal for the DUF6 that would be produced by the proposed NEF facility?

A12. I have concluded that, if DU is treated in a manner that respects the risks it poses, the likely cost of dispositioning the depleted uranium hexafluoride from the proposed NEF facility would fall between $18 per kilogram of uranium and $24 per kilogram of uranium after taking into account the Board-imposed subtractions from the estimates in our November 2004 and July 2005 report.

[30] LES Business Study 2004 (LES Ex. 86) p. 11/15.

In the table below, which is restricted to cost elements allowed by the October 4, 2005 directive of the Board, the "IEER WIPP Disposal Scenario 1" includes a low-end cost estimate for DU disposal based on experience at WIPP and an estimated calcium fluoride dispositioning cost based on the Lawrence Livermore National Laboratory analysis while the "IEER WIPP Disposal Scenario 2" includes a medium WIPP cost estimate and an estimated calcium fluoride cost based on a report from the National Research Council of the U.S. National Academy of Sciences.

Cost element*	IEER WIPP Disposal Scenario 1	IEER WIPP Disposal Scenario 2
Deconversion to U_3O_8, Transportation, and Storage	$7.10	$7.10
Disposal	$5.40	$8.00
CaF_2 (Neutralization and Disposition)	$2.00	$4.00
Contingency – NRC- minimum required (25 percent)	$3.63	$4.78
Total Cost per kg U	**$18.13**	**$23.88**

* This table is based on Table 9 of the November 2004 report and includes only those cost elements allowed by the October 4, 2005 directive of the Board..[31]

[redacted]

Our costs are significantly larger than the $5.85 per kilogram of uranium currently proposed by LES ($4.68 per kilogram of uranium plus a 25 percent contingency factor).

Q13. Does this conclude your testimony for today?

A13. Yes.

[31] Makhijani and Smith 2004 (NIRS/PC Ex. 190) p. 51.

References:

10 CFR 61 DEIS 1981 (NIRS/PC Ex. 167)	U.S. Nuclear Regulatory Commission, "Draft Environmental Impact Assessment on 10 CFR 61 'Licensing Requirements for Land Disposal of Radioactive Waste'", Main Report, September 1981 (NUREG-0782, Vol. 2)
10 CFR 61 DEIS 1981b (NIRS/PC Ex. 168)	U.S. Nuclear Regulatory Commission, "Draft Environmental Impact Assessment on 10 CFR 61 'Licensing Requirements for Land Disposal of Radioactive Waste'", Appendices G-Q, September 1981 (NUREG-0782, Vol. 4)
10 CFR 61 FEIS 1982 (NIRS/PC Ex. 169)	U.S. Nuclear Regulatory Commission, "Final Environmental Impact Assessment on 10 CFR 61 'Licensing Requirements for Land Disposal of Radioactive Waste'", Summary and Main Report, November 1982 (NUREG-0945, Vol. 1)
10 CFR 61 final rule 1982 (NIRS/PC Ex. 85)	U.S. Nuclear Regulatory Commission. "10 CFR parts 2, 19, 20, 21, 30, 40, 51, 61, 70, 73 and 170: licensing requirements for land disposal of radioactive waste. Final Rule." *Federal register*, v.47, no. 248 (Dec. 27, 1982). pp. 57446-57477.
40 CFR 141 2004 (NIRS/PC Ex. 202)	U.S. Code of Federal Regulations, "Title 40 – Protection of Environment: Chapter I – Environmental Protection Agency; Part 141 – National primary drinking water regulations", July 1, 2004, online at http://www.access.gpo.gov/nara/cfr/waisidx_04/40cfr141_04.html.
40 CFR 61 2004 (NIRS/PC Ex. 87)	U.S. Code of Federal Regulations, "Title 40 – Protection of Environment: Chapter I – Environmental Protection Agency; Part 61 – National emission standards for hazardous air pollutants", July 1, 2004, online at http://www.access.gpo.gov/nara/cfr/waisidx_04/40cfr61_04.html.
ACP DEIS 2005 (NIRS/PC Ex. 203)	U.S. Nuclear Regulatory Commission, Office of Waste Management and Environmental Protection, Office of Nuclear Material Safety and Safeguards, *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio*, Draft Report for Comment, August 2005 (NUREG-1834)
ASLB Aug 12 2005 (NIRS/PC Ex. 262)	U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P. (National Enrichment Facility), "Memorandum and Order: (Approving Settlement Agreement and Accepting Withdrawal of Parties)", Docket No. 70-3103-ML, ASLBP No. 04-826-01-ML, August 12, 2005.
ASLB Aug 4 2005 (NIRS/PC Ex. 204)	U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P. (National Enrichment Facility), "Memorandum and Order: (Ruling on Motion to Admit Late-Filed Amended and Supplemental Contentions)", Docket No. 70-3103-ML, ASLBP No. 04-826-01-ML, August 4, 2005.
ASLB CEC 1995 (NIRS/PC Ex. 263)	U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P.(Claiborne Enrichment Center), ASLBP No. 91-641-02-ML, 1995 WL 110611 (March 2, 1995)
ASLB CEC 1997 (NIRS/PC Ex. 205)	U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P.(Claiborne Enrichment Center), LBP-97-3, Docket No. 70-3070-ML, ASLBP No. 91-641-02-ML (Special Nuclear Material License), 45 N.R.C. 99, 1997 WL 345666 (N.R.C.), March 7, 1997.

ASLB June 30 2005 (NIRS/PC Ex. 206)	U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P.(National Enrichment Facility), "Memorandum and Order: (Ruling on NIRS/PC Late-Filed Contention Amendments)", Docket No. 70-3103-ML, ASLBP No. 04-826-01-ML, June 30, 2005.
Baird et al. 1990 (NIRS/PC Ex.170)	R.D. Baird, M.K. Bollenbacher, E.S. Murphy, R. Shuman, and P.B. Klein, "Evaluation of the Potential Public Health Impacts Associated with Radioactive Waste Disposal at a Site Near Clive, Utah", Rogers and Associates Engineering Corporation, June 1990 (RAE-9004/2-1)
Baird et al. 1990b (NIRS/PC Ex. 171)	R.D. Baird, G.B. Merrell, D.E. Bernhardt, and V.C. Rogers, "Additional Radionuclide Concentration Limits for the NORM Disposal Site at Clive, Utah", Rogers and Associates Engineering Corporation, August 1990 (RAE-9000/16-1)
Barron 2005 (NIRS/PC Ex. 207)	Jeff Barron, "Plant construction falls behind", *Portsmouth Daily Times*, July 15, 2005.
Bauman 2005 (NIRS/PC Ex. 172)	Joe Bauman, "Senate OKs Class B, C waste ban", *Deseret Morning News (Salt Lake City)*, February 3, 2005.
Bauman 2005b (NIRS/PC Ex. 173)	Joe Bauman, "House votes to ban importing of B, C wastes", *Deseret Morning News (Salt Lake City)*, February 10, 2005
Blevins 2005 (LES Ex. 104)	Memo to Scott Flanders from Matthew Blevins, "Telephone Summary Regarding Depleted Uranium Disposal", April 6, 2005. [Internal NRC memo regarding a February 24, 2005 teleconference]
Carr 2005 (NIRS/PC Ex. 174)	Letter from James R. Carr, Professor of Geological Sciences and Engineering at the University of Nevada, Reno, to Arjun Makhijani, Regarding the Potential for Erosion at the Proposed WCS Site, May 16, 2005.
CEC FEIS 1994 (NIRS/PC Ex. 58)	U.S. Nuclear Regulatory Commission, "Final Environmental Impact Statement for the Construction and Operation of Claiborne Enrichment Center, Homer, Louisiana", Volume 1, August 1994 (NUREG-1484)
Closing the Circle (NIRS/PC Ex. 208)	U.S. Department of Energy, *Closing the Circle on the Splitting of the Atom: The Environmental Legacy of Nuclear Weapons Production in the United States and What the Department of Energy is Doing About It*, DOE/EM-0266, Washington, D.C.: DOE Office of Environmental Management, Office of Strategic Planning and Analysis, January 1996.Closing the Circle on the Splitting of the Atom online at http://legacystory.apps.em.doe.gov/text/close/close2.htm.
Dallas Morning News 2005 (NIRS/PC Ex. 175)	Wire Reports, "Probation threatened for nuclear agency", *Dallas Morning News*, April 30, 2005.
Deposition Chater et al. 2004/10/04 (NIRS/PC Ex. 100)	*Deposition of Chris Chater, Bernard Duperret, Rodney H. Fisk, Rod Krich, Robert Pratt, Paul G. Schneider, Michael H. Schwartz, Julian J Steyn.* Monday, October 4, 2004. In the matter of Louisiana Energy Services (National Enrichment Facility) v. Nuclear Information and Resource Service and Public Citizen. U.S. Nuclear Regulatory Commission, Docket No. 70-3103-ML; ASLBP No. 03-816-01-ML. Transcript by Neal R. Gross. At head of title: Before the Commission. Deposition took place in offices of Winston & Strawn, Washington, DC.

Deposition Compton et al. 2005/09/02 (NIRS/PC Ex. 229)	Deposition of Leslie Compton, Bernard DuPerret, Paul Harding, Rod M. Krich, and Paul Schneider. Friday September 2, 2005. In the matter of Louisiana Energy Services (National Enrichment Facility) v. Nuclear Information and Resource Service and Public Citizen. U.S. Nuclear Regulatory Commission, Docket No. 70-3103-ML; ASLBP No. 03-816-01-ML. Transcript by Neal R. Gross. Deposition took place in offices of Winston & Strawn, Washington, DC.
DOE 1995 (NIRS/PC Ex. 176)	U.S. Department of Energy, "Integrated Data Base Report – 1994: U.S. Spent Nuclear Fuel and Radioactive Waste Inventories, Projections, and Characteristics", September 1995 (DOE/RW-0006, Rev. 11)
DOE 1997 (NIRS/PC Ex. 177)	U.S. Department of Energy, "Integrated Data Base Report – 1996: U.S. Spent Nuclear Fuel and Radioactive Waste Inventories, Projections, and Characteristics", December 1997 (DOE/RW-0006, Rev. 13)
DOE 1998 (NIRS/PC Ex. 102)	U.S. Department of Energy. Office of Environmental Management. *Department of Energy Response to 1997 IEER Environmental Management report.* [Washington, DC]: EM, March 18, 1998.
DOE 1998b (NIRS/PC Ex. 209)	U.S. Department of Energy, *The Current and Planned Low-Level Waste Disposal Capacity Report*, Revision 1, September 18, , 1998.
DOE 2000 (NIRS/PC Ex. 103)	U.S. Department of Energy. Office of Environmental Management. *Buried Transuranic-Contaminated Waste Information for U.S. Department of Energy Facilities*, Washington, DC: DOE EM, June 2000.
DOE 2001 (NIRS/PC Ex. 178)	U.S. Department of Energy, "Summary Data on the Radioactive Waste, Spent Nuclear Fuel, and Contaminated Media Managed by the U.S. Department of Energy", April 2001.
DOE Paducah ROD 2004 (NIRS/PC Ex. 105)	U.S. Department of Energy. "Record of decision for construction and operation of a depleted uranium hexafluoride conversion facility at the Paducah, KY, site." *Federal Register*, v. 69, no. 143 (July 27, 2004). pp. 44654-44658. On the Web at http://web.ead.anl.gov/uranium/pdf/PadRODRegister.pdf.
DOE PEIS 1999 (LES Ex. 18)	U.S. Department of Energy, "Final Programmatic Environmental Impact Statement For Alternative Strategies For The Long-Term Management And Use Of Depleted Uranium Hexafluoride", April 1999 (DOE/EIS-0269)
DOE Portsmouth ROD 2004 (NIRS/PC Ex. 106)	U.S. Department of Energy. "Record of decision for construction and operation of a depleted uranium hexafluoride conversion facility at the Portsmouth, OH, Site." *Federal Register*, v. 69, no. 143 (July 27, 2004). pp. 44649-44654. On the Web at http://web.ead.anl.gov/uranium/pdf/PortRODRegister.pdf.
Envirocare 2005 (NIRS/PC Ex.179)	Envirocare of Utah, LLC, "State of Utah Radioactive Material License UT 2300249: Amendment 22", adopted June 13, 2005, online at http://www.envllc.com/pages/lp/index.php (as viewed on July 1, 2005)
Envirocare 2005b (NIRS/PC Ex. 180)	Envirocare of Utah, LLC. Press Release, "Envirocare Purchased By Investor Group: New Owners Call for Ban of B & C Waste in the State of Utah", February 1, 2005
EPA 1999 (NIRS/PC Ex. 181)	U.S. Environmental Protection Agency, "Understanding Variation in Partition Coefficient, K_d, Values, Volume II: Review of Geochemistry and Available K_d Values for Cadmium, Cesium, Chromium, Lead, Plutonium, Radon, Strontium, Thorium, Tritium (^3H), and Uranium", August 1999 (EPA 402-R-99-004B)

EPA FGR 13 (NIRS/PC Ex. 111)	Keith F. Eckerman, Richard W. Leggett, Christopher B. Nelson, Jerome S. Puskin, Allan C.B. Richardson. *Cancer Risk Coefficients for Environmental Exposure to Radionuclides: Radionuclide-Specific Lifetime Radiogenic Cancer Risk Coefficients for the U.S. Population, Based on Age-Dependent Intake, Dosimetry, and Risk Models..* Federal Guidance Report No. 13. EPA 402-R-99-001. Oak Ridge, TN: Oak Ridge National Laboratory; Washington, DC: Office of Radiation and Indoor Air, United States Environmental Protection Agency, September 1999.
EPA FGR 13 CD Supplement 2002 (NIRS/PC Ex. 112)	EPA (2002). U.S. Environmental Protection Agency, *Federal Guidance Report 13 Cancer Risk Coefficients for Environmental Exposure to Radionuclides: CD Supplement*, EPA 402-C-99-001, Rev. 1 (Oak Ridge National Laboratory, Oak Ridge, TN; U.S. Environmental Protection Agency, Washington, DC).
Etter 1996 (NIRS/PC Ex. 182)	Memo to Susan White, Staff Attorney, From Stephen D. Etter, Staff Geologist for the Texas Natural Resource Conservation Commission, "Suitability of the Waste Control Specialists, Inc. Site, Andrews Country, Texas, for Disposal of Radioactive Wastes, Draft", April 1996.
Fioravanti & Makhijani 1997 (NIRS/PC Ex. 115)	Marc Fioravanti and Arjun Makhijani. *Containing the Cold War Mess: Restructuring the Environmental Management of the U.S. Nuclear Weapons Complex.* Takoma Park, Maryland: Institute for Energy and Environmental Research, October 1997. On the Web at http://www.ieer.org/reports/cleanup.
Fioravanti & Makhijani 1998 (NIRS/PC Ex. 116)	Marc Fioravanti and Arjun Makhijani. *Supplement to Containing the Cold War Mess* *IEER's Response to the Department of Energy's Review.* Takoma Park, Maryland: Institute for Energy and Environmental Research, March, 1998. On the Web at http://www.ieer.org/reports/cleanup/cln-supp.html.
Fisk 2004 (LES Ex. 98)	Rod Fisk to Rod Krich, "Costs", December 2, 2004. E-mail.
Fisk 2005 (LES Ex. 99)	Rod Fisk to Rod Krich, "Transportation of Depleted UF6 and U3O8", March 23, 2005. E-mail.
GAO 2004 (NIRS/PC Ex. 183)	U.S. General Accounting Office, "Low-Level Radioactive Waste: Disposal Availability Adequate in the Short Term, but Oversight Needed to Identify Any Future Shortfalls", Report to the Chairman, Committee on Energy and Natural Resources, U.S. Senate, June 2004 (GAO-04-604)
GAO/RCED-92-183 (NIRS/PC Ex. 211)	U.S. General Accounting Office, "Nuclear Waste: Defense Waste Processing Facility – Cost, Schedule, and Technical Issues", Report to the Chairman, Environment, Energy, and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, June 1992 (GAO/RCED-92-183)
GAO/RCED-93-87 (NIRS/PC Ex. 212)	U.S. General Accounting Office, "Federal Research: Super Collider is Over Budget and Behind Schedule", Report to the Congressional Requesters, February 1999 1993 (GAO/RCED-93-87)
GAO/RCED-97-63 (NIRS/PC Ex. 213)	U.S. General Accounting Office, "Department of Energy: Management and Oversight of Cleanup Activities at Fernald", Report to the Congressional Requesters, March 1997 (GAO/RCED-97-63)

GAO/T-RCED-93-58 (NIRS/PC Ex. 214)	U.S. General Accounting Office, "Nuclear Waste: Yucca Mountain Project Management and Funding Issues", Statement of Jim Wells, Testimony before the Subcommittee on Energy and Power, Committee on Energy and Commerce and the Subcommittee on Energy and Mineral Resources, Committee on Natural Resources, House of Representatives, July 1, 1993 (GAO/T-RCED-93-58)
GAO/T-RCED-99-21 (NIRS/PC Ex. 215)	U.S. General Accounting Office, "Nuclear Waste: Schedule, Cost, and Management Issues at DOE's Hanford Tank Waste Project", Statement of Ms. Gary L. Jones, Testimony before the Subcommittee on Oversight and Investigations, Committee on Commerce, House of Representatives, October 8, 1998 (GAO/T-RCED-99-21)
GAO-02-191 (NIRS/PC Ex. 216)	U.S. General Accounting Office, "Nuclear Waste: Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project", Report to the Congressional Requesters, December 2001 (GAO-02-191)
GAO-03-593 (NIRS/PC Ex. 217)	U.S. General Accounting Office, "Nuclear Waste: Challenges to Achieving Potential Savings in DOE's High-Level Waste Cleanup Program", Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives , June 2003 (GAO-03-593)
Henetz 2005 (NIRS/PC Ex. 184)	Patty Henetz, "Huntsman signs waste-ban measure; Class B and C: The material can be thousands of times hotter than what Envirocare of Utah deals in", *Salt Lake City Tribune*, February 26, 2005.
Hertzler et al. 1994 (NIRS/PC Ex. 117)	T.J. Hertzler, D.D. Nishimoto, and M.D. Otis. *Depleted uranium disposal options evaluation.* EGG-MS-11297. Idaho Falls, ID: Waste Management Technology Division, Science Applications International Corporation for EG&G Idaho, Inc. and the U.S. Department of Energy, Office of Environmental Restoration and Waste Management, May 1994.
Holt 2005 (NIRS/PC Ex. 219)	Mark Holt, "Civilian nuclear waste disposal", CRS Issue Brief for Congress, Order code IP92059, Congressional Research Service, Updated June 9, 2005.
Huntoon 2000 (NIRS/PC Ex. 118)	Letter from Carolyn L. Huntoon, Assistant Secretary for Environmental Management, U.S. Department of Energy, to Arjun Makhijani, July 18, 2000.
IAEA 2003 (NIRS/PC Ex. 185)	International Atomic Energy Agency, "Scientific and Technical Basis for the Geologic Disposal of Radioactive Wastes", Technical Reports Series No. 413, February 2003 (STI/DOC/010/413)
IAEA/NEA 2001 (NIRS/PC Ex. 186)	A Joint Report by the OECD Nuclear Energy Agency and the International Atomic Energy Agency, "Management of Depleted Uranium", 2001
ICRP 81 (NIRS/PC Ex. 122)	International Commission on Radiological Protection. *Radiation protection recommendations as applied to the disposal of long-lived solid radioactive waste.* Annals of the ICRP, v. 28, no. 4. ICRP publication 81. Kidlington, Oxford; Tarrytown, NY: Pergamon, 1998.
Johnson 2005 (NRC Staff Ex. 39)	Timothy C. Johnson to James W. Clifford, "April 19, 2005, In-Office Review Summary: Louisiana Energy Services Decommissioning Funding", April 29, 2005. Internal NRC memo.

Kozak et al. 1992 (NIRS/PC Ex. 128)	Matthew W. Kozak, Thomas A. Feeney, Christi D. Leigh, Harlan W. Stockman. *Performance assessment of the proposed disposal of depleted uranium as Class A Low-level Wastewaste.* FIN A1764 Final Letter Report submitted December 16, 1992 to F.W. Ross (Low-Level Waste Management Branch, Office of Nuclear Material Safety and Safeguards, Nuclear Regulatory Commission). Albuquerque, NM: Sandia National Laboratories, 1992.
Krich 2005 (NIRS/PC Ex. 187)	Letter to Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, From R.M. Krich, LES, "Clarifying Information Related to Depleted UF_6 Disposition Costs and Request for License Condition", March 29, 2005 (NEF#05-016)
Krich 2005b (NIRS/PC Ex. 188)	Letter to Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, From R.M. Krich, LES, "Clarifying Information Related to Depleted UF_6 Disposition Costs and Application for Withholding Information from Public Disclosure", April 8, 2005 (NEF#05-017)
Leeds 2000 (NIRS/PC Ex. 248)	Letter from Eric Leeds (Chief, Special Projects Branch, Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Materials Safety and Safeguards) to Depleted Uranium Hexafluoride Management (U.S. DOE), October 18, 2000
LES 2005/08/11 (NIRS/PC Ex. 221)	U.S. Nuclear Regulatory Commission, before the Atomic Safety and Licensing Board, In the Matter of Louisiana Energy Services, L.P. (National Enrichment Facility), "Applicant's Objections and Responses to Nuclear Information and Resource Service's and Public Citizen's Second Supplemental Interrogatories and Document Request", Docket No. 70-3103-ML, ASLBP No. 04-826-01-ML, August 11, 2005.
LES Business Study 2004 (LES Ex. 91)	*Business study: tails deconversion and cylinder washing plants at Urenco (Capenhurst) Limited.* 26th August 2004. Protected Materials. Bates no. LES-PRO-00631 etc.
LES NEF UF6 info sheet (NIRS/PC Ex. 134)	Louisiana Energy Services. *Uranium hexafluoride deconversion and disposal in the United States.* National Enrichment Facility Information Sheet, Version 2. 1-19-04. On the Web at http://www.nefnm.com/documents/infosheets/uranium.pdf.
LES SAR 2004 (NIRS/PC Ex. 222)	Louisiana Energy Services, "National Enrichment Facility License Application Safety Analysis Report", Revision 2, July 2004, On the Web at http://www.nrc.gov/materials/fuel-cycle-fac/ml042190038.pdf.
LLNL 1997 CA (NIRS/PC Ex. 56)	Hatem Elayat, Julie Zoller, Lisa Szytel. *Cost analysis report for the long-term management of depleted uranium hexafluoride.* UCRL-AR-127650. Livermore, CA: Lawrence Livermore National Laboratory, May 1997. Summary (26 p) on the Web at http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=575544&queryId=3&start=0.
LLNL 1997 EA (NIRS/PC Ex. 55)	J.W. Dubrin, J.N. Zoller, L. Rahm-Crites, et al. *Depleted Uranium Hexafluoride Program: Engineering analysis report for the long-term management of depleted uranium hexafluoride.* UCRL-AR-124080, Rev 2. Livermore, CA: Lawrence Livermore National Laboratory, May 1997. (Volumes I & II). On the Web at http://www.llnl.gov/tid/lof/documents/toc/231539.html.

LLNL Wilt 1997 (NIRS/PC Ex. 135)	Gloria Wilt. "Dealing with a Dangerous Surplus from the Cold War." Lawrence Livermore National Laboratory UCRL-52000-97-4. *Science & technology review* (April 1997) pp. 4-13. On the Web at http://www.llnl.gov/str/pdfs/04_97.pdf.
LMI 2004 (LES Ex. 86)	Eve M. Meek, David R. Gallay, Douglas A. Gray, and Gerald W. Westerbeck, "An Analysis of DOE's Cost to Dispose of DUF6", LMI Government Consulting, December 2004 (Report DE523T1)
Makhijani & Boyd 2001 (NIRS/PC Ex. 137)	Arjun Makhijani and Michele Boyd. *Poison in the Vadose Zone: An examination of the threats to the Snake River Plain aquifer from the Idaho National Engineering and Environmental Laboratory.* Takoma Park, Maryland: Institute for Energy and Environmental Research, October 2001. On the Web at http://www.ieer.org/reports/poison/pvz.pdf.
Makhijani & Boyd 2004 (NIRS/PC Ex. 136)	Arjun Makhijani and Michele Boyd. *Nuclear Dumps by the Riverside: Threats to the Savannah River from Radioactive Contamination at the Savannah River Site (SRS).* Takoma Park, Maryland: Institute for Energy and Environmental Research, March 11, 2004. On the Web at http://www.ieer.org/reports/srs/index.html.
Makhijani and Gopal 2001 (NIRS/PC Ex. 189)	Arjun Makhijani and Sriram Gopal, "Setting Cleanup Standards to Protect Future Generations: The Scientific Basis of the Subsistence Farmer Scenario and Its Application to the Estimation of Radionuclide Soil Action Levels (RSALs) for Rocky Flats", December 2001.
Makhijani and Smith 2004 (NIRS/PC Ex. 190)	Arjun Makhijani and Brice 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", November 24, 2004.
Makhijani October 2000 (NIRS/PC Ex. 138)	Arjun Makhijani. Letter from IEER to Carolyn Huntoon, Assistant Secretary for Environmental Management, United States Department of Energy October 13, 2000 On the Web http://www.ieer.org/comments/waste/tru2hunt.html.
MOA 2005 (LES Ex. 105)	E. James Ferland, President and CEO Louisiana Energy Services, L.P. and George E. Dials, President and COO Waste Control Specialists LLC, "Memorandum of Agreement between Louisiana Energy Services, L.P. and Waste Control Specialists LLC", January 14, 2005.
NAS/NRC 1996 (NIRS/PC Ex. 150)	National Research Council. Committee on Decontamination and Decommissioning of Uranium Enrichment Facilities. *Affordable Cleanup? Opportunities for cost reduction in the decontamination and decommissioning of the nation's uranium enrichment facilities.* Washington, DC: National Academies Press, 1996.
NAS/NRC 2003 (NIRS/PC Ex. 151)	National Research Council. Board on Radioactive Waste Management. Committee on Improving the Scientific Basis for Managing Nuclear Materials and Spent Nuclear Fuel through the Environmental Management Science Program. *Improving the Scientific Basis for Managing DOE's Excess Nuclear Materials and Spent Nuclear Fuel.* Washington, DC: National Academies Press, 2003.
NAS/NRC 2005 (NIRS/PC Ex. 225)	Richard R. Monson (Chair) et al., "Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII – Phase 2", Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, Board on Radiation Effects Research, National Academies Press, Washington, DC (2005)

NEF DEIS 2004 (NIRS/PC Ex. 152)	U.S. Nuclear Regulatory Commission, "Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico: Draft Report for Comment", September 2004 (NUREG-1790)
NEF FEIS 2005 (NIRS/PC Ex. 191)	U.S. Nuclear Regulatory Commission, "Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico: Final Report", Chapters 1 through 10 and Appendices A through G, June 2005 (NUREG-1790, Vol. 1)
NRC 1991 (NIRS/PC Ex. 193)	James M. Taylor, "Disposition of Depleted Uranium Tails from Enrichment Plants", Enclosure: Factors Involved in the Disposition of Depleted Uranium Hexafluoride DUF_6 Tails, January 25, 1991 (SECY-91-019)
NRC 2002 (NIRS/PC Ex. 88)	U.S. Nuclear Regulatory Commission, "Nuclear Regulatory Legislation: 107th Congress; 1st Session", June 2002 (NUREG-0980 Vol. 1, No. 6)
NRC 2005 (NIRS/PC Ex. 195)	U.S. Nuclear Regulatory Commission in the matter of Louisiana Energy Services, L.P. (National Enrichment Facility), "Memorandum and Order", CLI-05-05, Docket No. 70-3103-ML, January 18, 2005
NRC 2005b (NIRS/PC Ex. 264)	U.S. Nuclear Regulatory Commission, "Information Digest 2005-2006 Edition", NUREG-1350 Vol. 17, July 2005
NRC CEC EIS Final 1994 (NIRS/PC Ex. 58)	U.S. Nuclear Regulatory Commission. Office of Nuclear Material Safety and Safeguards. *Final Environmental Impact Statement for the Construction and Operation of Claiborne Enrichment Center, Homer, Louisiana.* NUREG-1484. Washington, DC, September 2004.
NUREG 1757, Vol.3 (NIRS/PC Ex. 249)	U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Division of Waste Management, *Consolidated NMSS Decommissioning Guidance: Financial Assurance, Recordkeeping, and Timeliness, Final Report*, Prepared by T.L. Fredrichs, E.R. Pogue, M.C. Maier, and R. N. Young, August 2005 (NUREG-1757 Vol.3)
Paducah FEIS 2004 (LES Ex. 17)	U.S. Department of Energy, "Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site", Volume 1: Main Text and Appendixes A–H, June 2004 (DOE/EIS-0359)
Portsmouth FEIS 2004 (LES Ex. 16)	U.S. Department of Energy, "Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site", Volume 1: Main Text and Appendixes A–H, June 2004 (DOE/EIS-0360)
Rod Krich Deposition August 26, 2005 (NIRS/PC Ex. 226)	*Deposition of Rod Krich.* Friday, August 26, 2005. In the matter of Louisiana Energy Services (National Enrichment Facility) v. Nuclear Information and Resource Service and Public Citizen. U.S. Nuclear Regulatory Commission, Docket No. 70-3103-ML; ASLBP No. 04-826-01-ML. Deposition took place in offices of Winston & Strawn, Washington, DC.
Rowberg 2001 (NIRS/PC Ex. 227)	Richard Rowberg, "The National Ignition Facility: Management, Technical, and Other Issues", CRS report for Congress, Order code RL30540, Congressional Research Service, Updated November 8, 2001.
Saunders and Young 1983 (NIRS/PC Ex. 196)	Ian Saunders and Anthony Young, "Rates of Surface Processes on Slopes, Slope Retreat, and Denudation", *Earth Surface Processes and Landforms*, Vol. 8, 473-501 (1983)

Schenk and Jackson 2002 (NIRS/PC Ex. 197)	H. Jochen Schenk and Robert B. Jackson, "Rooting depths, lateral root spreads and below-ground/above-ground allometries of plants in water-limited ecosystems", *Journal of Ecology*, Vol. 90, 480-494 (2002)
Smith 2004 (NIRS/PC Ex. 160)	Brice Smith. *What the DOE Knows it Doesn't Know about Grout: Serious Doubts Remain About the Durability of Concrete Proposed to Immobilize High-Level Nuclear Waste in the Tank Farms at the Savannah River Site and other DOE Sites*. Institute for Energy and Environmental Research, Takoma Park, Maryland updated October 18, 2004. On the web at http://www.ieer.org/reports/srs/grout.pdf.
TCEQ 2003 (NIRS/PC Ex. 228)	Texas Commission on Environmental Quality, "Lineup of Legislation, The TCEQ's playbook grows with new responsibilities, laws to implement", Natural Outlook, Summer 2003, online at http://www.tceq.state.tx.us/AC/comm_exec/forms_pubs/pubs/pd/020/03-03/legislation.html (Last Modified 8/4/05)
Texas Agreement 1963 (NIRS/PC Ex. 198)	Glenn T. Seaborg, Chairman of the Atomic Energy Commission, and Price Daniel, Governor of Texas, "Agreement Between the United States Atomic Energy Commission and the State of Texas for Discontinuance of Certain Commission Regulatory Authority and Responsibility Within the State Pursuant to Section 274 of the Atomic Energy Act of 1954, as Amended", 1963.
Utah Rule 2005/07/01 (NIRS/PC Ex. 259)	Utah. Division of Administrative Rules. Rule R313-15. Standards for protection against radiation, As in effect on July 1, 2005.
Washington Code 1998 (NIRS/PC Ex. 260)	Washington. Washington Administrative Code. Title 246. Health, Department of, Chapter 246-249 WAC, Radioactive waste -- Use of the commercial disposal site, Last Update: 4/22/98.
WCS 2004 (NIRS/PC Ex. 199)	Waste Control Specialists, LLC., "Application for License to Authorize Near-Surface Land Disposal of Low-Level Radioactive Waste", originally filed on August 4, 2004 and ruled Administratively Complete by the Texas Commission on Environmental Quality on February 18, 2005, available online at http://64.224.191.188/wcs/.
Wheatley 2005 (NIRS/PC Ex. 200)	Letter from Wade M. Wheatley to Glenn Shankle, "License Application for a Proposed Low-Level Radioactive Waste Disposal Facility: Evaluation of Merit", Texas Commission on Environmental Quality, April 26, 2005.
Yu et al. 1993 (NIRS/PC Ex. 201)	C. Yu, C. Loureiro, J.-J. Cheng, L.G. Jones, Y.Y. Wang, Y.P. Chia, and E. Faillace. *Data collection handbook to support modeling impacts of radioactive material in soil.* Argonne, IL: Environmental Assessment and Information Sciences Division, Argonne National Laboratory, April 1993. On the Web at http://web.ead.anl.gov/resrad/documents/data_collection.pdf.

CERTIFICATE OF SERVICE

Pursuant to 10 CFR § 2.305 the undersigned attorney of record certifies that on October 21, 2005, the foregoing Revised Rebuttal Testimony of Dr. Arjun Makhijani in Support of NIRS/PC Contentions EC-3/TC-1, EC-5/TC-2, and EC-6/TC-3 concerning LES's Deconversion Strategy and Cost Estimate was served by expedited delivery upon the following:

G. Paul Bollwerk, III
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Third Floor, Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738
e-mail: gpb@nrc.gov

Dr. Paul B. Abramson
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Third Floor, Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738
e-mail: pba@nrc.gov

Dr. Charles N. Kelber
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Third Floor, Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738
e-mail: CKelber@att.net

James Curtiss, Esq.
David A. Repka, Esq.
Martin J. O'Neill, Esq.
Winston & Strawn
1700 K Street, N.W.
Washington, D.C. 20006-3817
e-mail: jcurtiss@winston.com
drepka@winston.com
moneill@winston.com

John W. Lawrence, Esq.
National Enrichment Facility
100 Sun Ave., N.E.
Suite 204
Albuquerque, NM 87109 (by Fedex)
e-mail: jlawrence@nefnm.com

Office of the General Counsel
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738
Attention: Lisa B. Clark, Esq.
e-mail: OGCMailCenter@nrc.gov
lbc@nrc.gov
abc1@nrc.gov
jth@nrc.gov
dmr1@nrc.gov
dac3@nrc.gov

Office of Commission Appellate Adjudication
Mail Stop O-16C1
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Secretary
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738
Attention: Rulemakings and Adjudications Staff
e-mail: hearingdocket@nrc.gov

Lindsay A. Lovejoy, Jr.
by

Lindsay A. Lovejoy, Jr.
618 Paseo de Peralta, Unit B
Santa Fe, NM 87501
(505) 983-1800
(505) 983-0036 (facsimile)
e-mail: lindsay@lindsaylovejoy.com

1 MR. LOVEJOY: Thank you. Now, Your Honor,
2 there's been a ruling, I think October 20th, on
3 certain exhibits. And that's in the record. If you'd
4 like, I will read numbers of exhibits that were
5 ordered admitted in that decision.
6 CHAIR BOLLWERK: Right, I think we need to
7 do that simply to get them marked and then get them
8 admitted. So, you're right. I have a list. We'll
9 see if your list and our list jive. I guess that
10 would be the best way.
11 MR. LOVEJOY: Okay.
12 CHAIR BOLLWERK: It starts with 85, I
13 believe.
14 MR. LOVEJOY: Exhibit 85 we're offering,
15 which is a U.S. Nuclear Regulatory Commission 10 CFR
16 parts two, 18, 20, 21 and --
17 (Whereupon, the above-
18 referenced to document was
19 marked as NIRS/PC Exhibit No.
20 85 for identification.)
21 CHAIR BOLLWERK: Right. You can certainly
22 abbreviate this, just so long as we're both on the
23 same page. That's all we need.
24 MR. LOVEJOY: Okay. Exhibit 96 entitled
25 British Government Said to Underwrite Nuclear

1 Liabilities by Moss, published by Bellona Foundation.
2 (Whereupon, the above-
3 referenced to document was
4 marked as NIRS/PC Exhibit No.
5 96 for identification.)
6 MR. LOVEJOY: Exhibit 98, the Cleaver and
7 Freeze article, Chronology of International Monetary
8 Affairs.
9 (Whereupon, the above-
10 referenced to document was
11 marked as NIRS/PC Exhibit No.
12 98 for identification.)
13 MR. LOVEJOY: Exhibit 99 by Craft Et al,
14 entitled Depleted and Natural Uranium Chemistry and
15 Toxilogical Effects.
16 (Whereupon, the above-
17 referenced to document was
18 marked as NIRS/PC Exhibit No.
19 99 for identification.)
20 MR. LOVEJOY: Exhibit 100, Extracts from
21 the Deposition of Chris Chater and others, October 4
22 of '04.
23 (Whereupon, the above-
24 referenced to document was
25 marked as NIRS/PC Exhibit No.

1 100 for identification.)

2 CHAIR BOLLWERK: So, 105 and 106, I think

3 are the next two that I have. Those have already been

4 admitted.

5 MR. LOVEJOY: Yes. Okay, Exhibit 109,

6 U.S. EPA Waste Characterization Program Documents

7 Applicable to Transuranic Radioactive Waste from the

8 Handford Site.

9 (Whereupon, the above-

10 referenced to document was

11 marked as NIRS/PC Exhibit No.

12 109 for identification.)

13 MR. LOVEJOY: Exhibit 111 by Eckerman Et

14 al, EPA FGR13, Cancer Risk Coefficients for

15 Environmental Exposure to Radionuclides.

16 (Whereupon, the above-

17 referenced to document was

18 marked as NIRS/PC Exhibit No.

19 111 for identification.)

20 MR. LOVEJOY: Exhibit 117, Hertzler Et al.

21 CHAIR BOLLWERK: Right, that one's already

22 been admitted as well.

23 MR. LOVEJOY: Yes. Exhibit 122, issued by

24 the ICRP, Publication 81, Radiation Protection

25 Recommendations as Applied to the Disposal of Long-

1 Lived Solid Radioactive Waste.

2 (Whereupon, the above-
3 referenced to document was
4 marked as NIRS/PC Exhibit No.
5 122 for identification.)

6 MR. LOVEJOY: Exhibit 128 by Kozak Et al,
7 1992, Performance Assessment of the Proposed Disposal
8 of Depleted Uranium as Class A Low Level Waste.

9 (Whereupon, the above-
10 referenced to document was
11 marked as NIRS/PC Exhibit No.
12 128 for identification.)

13 MR. LOVEJOY: Exhibit 134, an information
14 sheet issued by LES entitled Uranium Hexafluoride
15 Deconversion and Disposal in the United States.

16 (Whereupon, the above-
17 referenced to document was
18 marked as NIRS/PC Exhibit No.
19 134 for identification.)

20 MR. LOVEJOY: Exhibit 55 was admitted in
21 February, I believe.

22 CHAIR BOLLWERK: Yes.

23 MR. LOVEJOY: As was Exhibit 56.

24 CHAIR BOLLWERK: That is correct.

25 MR. LOVEJOY: The Livermore cost analysis.

1 Exhibit 150, issued by the NRC, Committee on
2 Decontamination and Decommissioning of Uranium
3 Enrichment Facilities entitled Affordable Cleanup.
4 (Whereupon, the above-
5 referenced to document was
6 marked as NIRS/PC Exhibit No.
7 150 for identification.)
8 MR. LOVEJOY: Exhibit 151 issued by the
9 NRC Board on Radioactive Waste Management entitled
10 Improving the Scientific Basis for Managing DOE's
11 Excess Nuclear Materials and Spent Fuel.
12 (Whereupon, the above-
13 referenced to document was
14 marked as NIRS/PC Exhibit No.
15 151 for identification.)
16 MR. LOVEJOY: Exhibit 58 was, I believe,
17 admitted in February.
18 CHAIR BOLLWERK: Yes.
19 MR. LOVEJOY: It's the Claibourne final
20 EIS.
21 CHAIR BOLLWERK: All right.
22 MR. LOVEJOY: Exhibit 152, the Draft EIS,
23 it's extracts from that document, September 2004.
24 (Whereupon, the above-
25 referenced to document was

1 marked as NIRS/PC Exhibit No.
2 152 for identification.)
3 MR. LOVEJOY: Exhibit 169, it's the final
4 EIS on 10CFR's part 61 Licensing Requirements for Land
5 Disposal of Radioactive Waste.
6 (Whereupon, the above-
7 referenced to document was
8 marked as NIRS/PC Exhibit No.
9 169 for identification.)
10 CHAIR BOLLWERK: Can I stop? Can we check
11 on 168. We have 168 as one of that we would have --
12 MR. LOVEJOY: Admissible?
13 CHAIR BOLLWERK: Yes.
14 MR. LOVEJOY: We offer 168, draft
15 Environmental Impact Assessment on 10CFR part 61,
16 Licensing Requirements.
17 (Whereupon, the above-
18 referenced to document was
19 marked as NIRS/PC Exhibit No.
20 168 for identification.)
21 MR. LOVEJOY: Exhibit 185, issued by the
22 IAEA, Scientific and Technical Basis for the Geologic
23 Disposal of Radioactive Wastes.
24 (Whereupon, the above-
25 referenced to document was

1 marked as NIRS/PC Exhibit No.
2 185 for identification.)
3 MR. LOVEJOY: Exhibit 186, a Joint Report
4 by the OECD Nuclear Energy Agency and the IAEA,
5 Management of Depleted Uranium.
6 (Whereupon, the above-
7 referenced to document was
8 marked as NIRS/PC Exhibit No.
9 186 for identification.)
10 MR. LOVEJOY: Exhibit 188, the submission
11 by LES to the Commission Staff on April 8th of 2005.
12 (Whereupon, the above-
13 referenced to document was
14 marked as NIRS/PC Exhibit No.
15 188 for identification.)
16 MR. LOVEJOY: Exhibit 191, the NRC
17 Environmental Impact Statement for the Proposed NEF
18 Final Report, Chapters one through ten and Appendixes
19 A through G.
20 (Whereupon, the above-
21 referenced to document was
22 marked as NIRS/PC Exhibit No.
23 191 for identification.)
24 CHAIR BOLLWERK: Let me just stop you
25 right there, 190?

1 MR. LOVEJOY: that was 191.

2 CHAIR BOLLWERK: I'm sorry, I'm just

3 checking. We also had 190 as one of the ones.

4 MR. LOVEJOY: Okay. 190 is the study by

5 Makhijani and Smith entitled Costs and Risks of

6 Management and Disposal of Depleted Uranium from the

7 NEF Proposed to be build in Lea County, a proprietary

8 exhibit.

9 (Whereupon, the above-

10 referenced to document was

11 marked as NIRS/PC Exhibit No.

12 190 for identification.)

13 MR. LOVEJOY: So, 193 has been referred to

14 previously as SECY 91-019 by Taylor called Disposition

15 of Depleted Uranium Tails from Enrichment Plants.

16 (Whereupon, the above-

17 referenced to document was

18 marked as NIRS/PC Exhibit No.

19 193 for identification.)

20 MR. LOVEJOY: And 195 is a memorandum in

21 order of January 18 of '05 by the full Commission.

22 (Whereupon, the above-

23 referenced to document was

24 marked as NIRS/PC Exhibit No.

25 195 for identification.)

1 MR. LOVEJOY: Exhibit 201 is the data
2 collection handbook with respect to the rasrad
3 modeling program.
4 (Whereupon, the above-
5 referenced to document was
6 marked as NIRS/PC Exhibit No.
7 201 for identification.)
8 MR. LOVEJOY: Exhibit 203 is the
9 Environmental Impact Statement for the Proposed
10 American Centrifuge Plant, August 2005. That's the
11 draft EIS.
12 (Whereupon, the above-
13 referenced to document was
14 marked as NIRS/PC Exhibit No.
15 203 for identification.)
16 MR. LOVEJOY: Exhibit 204 is the order by
17 the Board of August 4 of this year in this case.
18 (Whereupon, the above-
19 referenced to document was
20 marked as NIRS/PC Exhibit No.
21 204 for identification.)
22 MR. LOVEJOY: Exhibit 205 is the order by
23 the Board in the Claibourne case, March 7 of 1997.
24 (Whereupon, the above-
25 referenced to document was

1 marked as NIRS/PC Exhibit No.
2 205 for identification.)
3 MR. LOVEJOY: Exhibit 206 is the order by
4 the Board in this proceeding June 30th of 2005.
5 (Whereupon, the above-
6 referenced to document was
7 marked as NIRS/PC Exhibit No.
8 206 for identification.)
9 MR. LOVEJOY: Exhibit 221 is the responses
10 -- objections and responses to interrogatories by
11 Applicant LES, dated August 11th of 2005.
12 (Whereupon, the above-
13 referenced to document was
14 marked as NIRS/PC Exhibit No.
15 221 for identification.)
16 MR. LOVEJOY: Exhibit 222 is the extracts
17 from the LES Safety Analysis Report of July 2004.
18
19
20
21
22 CHAIR BOLLWERK: Just let me check one
23 thing. We had that down as disposal exhibit rather
24 than a deconversion exhibit. Do you know if that's --
25 MR. LOVEJOY: Yes. Many of the following

1 are indicated as applying to both disposal and
2 deconversion.
3 CHAIR BOLLWERK: Right. We have a list of
4 deconversion. Up to this point our list and yours
5 basically are the same in terms of deconversion. The
6 next deconversion we actually have is 224.
7 MR. LOVEJOY: Okay. Exhibit 224 is a
8 report by Dr. Makhijani and Dr. Smith, Update to Costs
9 and Risks of Management and Disposal of Depleted
10 Uranium, July 5, 2005.
11 (Whereupon, the above-
12 referenced to document was
13 marked as NIRS/PC Exhibit No.
14 224 for identification.)
15 CHAIR BOLLWERK: I next have 229. I don't
16 know if that --
17 MR. LOVEJOY: I have, yes, designated
18 portions of the Compton DuPerret Harding et al
19 deposition on September 2.
20 CHAIR BOLLWERK: So, 229 was? I must have
21 missed -- hold on one second. That's right. It was
22 admitted yesterday. I'm running two lists here. And
23 I didn't get the right list. That's one already been
24 admitted then.
25 MR. LOVEJOY: Yes.

1 CHAIR BOLLWERK: I believe that's it, with
2 the exception of two, which are 170 and 171.
3 (Pause.)
4 MR. LOVEJOY: Yes, those are -- those can
5 be offered in the disposal phase.
6 CHAIR BOLLWERK: All right. Then those
7 are disposal as well. I'll just mark this. All
8 right. Hold on one second here. 168, did we mention
9 168?
10 MR. LOVEJOY: We did, I think.
11 CHAIR BOLLWERK: Okay. All right. Let me
12 just check. Ms. Engel advises me the 168 is Staff.
13 (Pause.)
14 CHAIR BOLLWERK: All right, but we're not
15 -- are they -- they haven't offered it. What
16 testimony did it relate to?
17 (No verbal response.)
18 CHAIR BOLLWERK: Okay. Let's go ahead.
19 We'll take, I have it down as deconversion. And it is
20 in the deconversion testimony, I take it. Let's go
21 ahead and admit it, deal with it here then.
22 CHAIR BOLLWERK: All right. Anything else
23 that you have Mr. Lovejoy?
24 MR. LOVEJOY: Those were all that I had
25 that were covered by the order.

1 CHAIR BOLLWERK: All right. Exhibit then
2 85 -- NIRS/PC Exhibit 85, 96, 98, 99, 100, 109, 111,
3 122, 128, 134, 150, 151, 152, 168, 169, 185, 186, 188,
4 190, 191, 193, 195, 201, 203, 204, 205, 206, 221, 224
5 as described by Counsel -- I'm sorry, and 224 as
6 described by Counsel have been marked for
7 identification.
8 Let me then see if there are any
9 objections to their admission.
10 MR. LOVEJOY: We offer them into evidence.
11 MR. CURTISS: Yes, there are two exhibits
12 here that I would like to renew our objection to under
13 the guidance by the Board that exhibits may be
14 admissible for certain purposes within the scope of
15 the hearing, but not for other purposes.
16 The two I'd like to focus on are Exhibits
17 96 and 98. And in LES' review of those two exhibits.
18 Exhibit 96 is British Government Set to Underwrite
19 Nuclear Reliabilities.
20 And 98 is the Exhibit entitled Chronology
21 of International Monetary Affairs. As we've reviewed
22 those two exhibits in their entirety, and subject to
23 any additional clarification the Counsel can provide,
24 we don't think they relate to any issue for this panel
25 or any other issue in this proceeding, and would

1 object to them on that basis.

2 CHAIR BOLLWERK: Can you point us to the

3 portion of the direct or rebuttal testimony they

4 relate to in terms of the footnote numbers or the

5 text, either one, 96 and 98?

6 MR. CURTISS: I'm advised that Exhibit 96

7 is not cited at all in the testimony. And 98, I would

8 have to look for the reference here. But, it's

9 clearly on the, I guess, currency issue that this

10 Board's previously addressed and speaks to the IMF

11 currency question or IMF history.

12 And we haven't been able to find an

13 admissible reason for this exhibit coming in.

14 CHAIR BOLLWERK: Let's take a brief

15 recess. I need to pull a document that I have in my

16 office. We'll take about two minutes. I'll be right

17 back.

18 (Whereupon, the above-entitled matter

19 went off the record at 3:45 p.m. and

20 went back on the record at 3:50 p.m.)

21 CHAIR BOLLWERK: All right. We can go

22 back on the record, please. All right. It looks as

23 if these two particular exhibits, while they were

24 listed originally on the list dealing with all issues,

25 in fact relate to some of the disposal testimony, or

1 at least they are cited in the disposal testimony,
2 rather than deconversion testimony.
3 I have them down as disposal. But they're
4 not listed here, in any event. So, I think at this
5 point we'll go ahead and leave them as identified. We
6 will not, unless you can point to a place in the
7 deconversion testimony where these two are cited, and
8 I think you will not find that, because I think my
9 notes now reflect that they are in fact in the
10 disposal testimony.
11 MR. LOVEJOY: Okay. Well, I can't do it
12 right now.
13 CHAIR BOLLWERK: Okay, that's fine. If we
14 need to rectify a problem, we will deal with it then.
15 Let's just leave them as identified. And I'll move
16 their admission.
17 And again, if I am correct that this in
18 fact relates to the disposal testimony, we can deal
19 with the objection when that comes up later.
20 MR. CURTISS: We'll reserve our objection
21 to that.
22 CHAIR BOLLWERK: All right. So, all
23 right. We're back to motion has been made that these
24 exhibits as identified with the exception of numbers
25 96 and 98, I believe those are the two, be admitted

1 into evidence.

2 Any objection to anything else other than

3 96 or 98?

4 (No verbal response.)

5 CHAIR BOLLWERK: All right. Then very

6 quickly, exhibits 85, 96, 98, 99, 100, 106, 109 --

7 these are NIRS/PC exhibits -- 111, 122, 128, 134, --

8 I'm sorry, did I say 96 and 98?

9 Strike that, if I did. I apologize,

10 that's not correct. 134, 150, 151, 152, 168, 169,

11 185, 186, 188, 190, 191, 193, 195, 201, 203, 204, 205,

12 206, 224 are admitted into evidence.

13 (The document referred to,

14 having been previously marked

15 for identification as NIRS/PC

16 Exhibit Nos. 85, 99, 100, 109,

17 111, 122, 128, 134, 150, 151,

18 152, 169, 168, 185, 186, 188,

19 191, 190, 193, 195, 201, 203,

20 204, 205, 206, 221, 224 were

21 admitted in evidence.)

22 CHAIR BOLLWERK: And again, I misstated 96

23 and 98. Those are not yet admitted. They are simply

24 identified for the record. Hold on, did I miss one?

25 If I did not say 221, then 221 as well.

1 Anything else?

2 (No verbal response.)

3 CHAIR BOLLWERK: All right. Thank you for

4 your patience. And, at this point I believe, if

5 there's nothing else, we're ready for -- is he --

6 cross examination?

7 MR. LOVEJOY: Well, I was going to request

8 an opportunity for a little surrebuttal.

9 CHAIR BOLLWERK: All right.

10 MR. LOVEJOY: There's been that

11 opportunity taken by others.

12 CHAIR BOLLWERK: All right.

13 MR. LOVEJOY: Let me give the witness one

14 particular item.

15 CHAIR BOLLWERK: You may need to point

16 your microphone slightly closer to you.

17 MR. LOVEJOY: Yes, I'll get that.

18 Do you have NIRS/PC exhibits over there?

19 WITNESS MAKHIJANI: Yes, I do.

20 MR. LOVEJOY: I'd like you to look at 188.

21 WITNESS MAKHIJANI: Yes.

22 MR. LOVEJOY: In the page numbered LES PRO

23 00774 there is a table that we've all been looking at

24 concerning a cost estimate. And, based on what you've

25 heard in the testimony these last couple days, can you

1 state your view as to the way the costs of
2 deconversion are presented in this table?
3 WITNESS MAKHIJANI: Yes, thank you. I
4 find this table is rather informal and irregular for
5 a four to five million dollar cost that we're talking
6 about in total when you factor in the 25 percent
7 contingency.
8 That's the order of magnitude of some
9 that's involved. I say those words advisedly for a
10 couple of different reasons. First of all, the 17
11 million and the 18 million are capital costs.
12 So, as we have discussed, they have to be
13 borrowed, and you have to pay a return, some mix of
14 borrowing from a bank and return on equity, which are
15 different rates.
16 And that is not reflected here. There's
17 no line here at all. First of all, those are up front
18 costs. So those are present valued costs at the time
19 of construction, leaving aside for the moment the
20 interest on construction.
21 And they are mixed in with annual
22 operating and maintenance costs. And then we have
23 heard what is not in the table. These are escalated
24 at three percent, which is not discussed in this
25 document.

1 And so, current operating costs and
2 current dollars are mixed up with a capital cost
3 that's simply divided by kilograms of uranium. And
4 so, this is kind of a very irregular mush.
5 You never see a cost calculation like
6 this. Normally you do a levelized cost calculation in
7 present value if you want to present how it looks like
8 today into the future.
9 The other thing I have to say is, the
10 description of these items is rather clear in the
11 sense that these items are described for what they
12 are.
13 And the operations and maintenance item is
14 a two sentence item. And I want to read that.
15 Operation and maintenance costs are mainly related to
16 employee wages.
17 Some replacement parts are factored into
18 the budget, along with anticipated regulatory fees and
19 utility costs. This would be normally what is called
20 operations and maintenance costs.
21 I've done quite a lot of cost analyses in
22 my time. And costs such as return on investment are
23 never part of operating and maintenance costs. And,
24 to suggest that they are without actually showing them
25 here is, let me say, extraordinary, to put it

1 politely.

2 JUDGE ABRAMSON: I agree, Dr. Makhijani.

3 This is a very unusual presentation.

4 WITNESS MAKHIJANI: And not only to say

5 that, but to NRC Staff has testified that they did not

6 understand that interest and return on equity was

7 varied.

8 We don't know what the interest rate is.

9 Normally in a business proposition if you go out and

10 borrow 50 percent in a bank and 50 on equity, you

11 would calculate a levelized payment at about ten

12 percent, Your Honor.

13 This would be a normal thing, which would

14 be in current dollars. So inflation, depreciation is

15 all factored into that ten percent. That's a very --

16 that's a low risk operation.

17 If you want a high risk operation you have

18 to pay a lot more than that. And I calculated that on

19 88 million dollars your annual payment would be about

20 11 million dollars odd, divide by the thru-put that is

21 given here, and you get a dollar something rather than

22 64 cents.

23 Actually, I woke up quite up early in the

24 morning worrying about these numbers and did a little

25 spreadsheet, Your Honor. And, using these assumptions

1 and proper method of calculation, and three percent
2 escalation for the variable costs, and a very low risk
3 capital investment, and a 16 year time over, which
4 this amount of depleted uranium is played out, and
5 using all the same assumptions without changing
6 anything, and I believe I added the 20 -- the only
7 thing I said was I added the [redacted] Euro cents for HF
8 neutralization, which I'd like to explain, I got a
9 different number.
10 JUDGE ABRAMSON: What did you do with the
11 O&M? Did you keep it at 12 and a half?
12 WITNESS MAKHIJANI: I kept as a dollar 79.
13 And I'd be happy to explain why I did that.
14 JUDGE ABRAMSON: That's okay.
15 WITNESS MAKHIJANI: Because I think this
16 seems like a post-factor rationalization to me, NRC
17 Staff was not told about it. We've had long silent
18 moments about what to do about explaining these
19 things, extraordinary long testimony for what I think
20 is a rather straightforward matter, which is done ever
21 day in simple spreadsheet as to how to take these
22 costs into account.
23 Spreadsheets have not been produced either
24 for the Staff or before us. I think these were -- it
25 is reasonable and conservative to double the labor

1 cost.

2 But, I don't believe that European

3 companies are going to pay ten percent escalating

4 health costs. And, if you're going to build a plant

5 here ten years from now, what the situation regarding

6 pensions, health costs, and wages is going to be in

7 this country is anybody's guess.

8 And what the Cogema subsidiary that's

9 incorporated in our fair town here, Bethesda -- or at

10 least has its headquarters here and is incorporated in

11 Delaware -- will be facing in terms of U.S. costs, is

12 a big risk factor.

13 And I think it's appropriate to double the

14 costs, especially as no effort seems to have been made

15 to determine carefully the cost differential between

16 European costs and here, and the various factors.

17 I find the proceeding to have been

18 extraordinarily informal for a 400 million dollar cost

19 item.

20 CHAIR BOLLWERK: All right. Mr. Lovejoy,

21 go ahead. Any questions?

22 MR. LOVEJOY: Well, what I see in the

23 table that you're discussing that the annual

24 operations and maintenance said to principally involve

25 labor costs, is a dollar 79 out of a total of 2.67.

1 Are there some factors that need to be
2 examined in making a transition from labor costs
3 expressed with regard to a French or British operation
4 and labor costs in a hypothetical U.S. operation?
5 WITNESS MAKHIJANI: Yes, Mr. Lovejoy, as
6 I have alluded to, especially if you're examining
7 costs for a facility that is to be built eight or ten
8 years from now and operated then, at least some thing
9 of the dynamic of the American economy versus the
10 European economies has to be taken into account.
11 U.S. healthcare costs are escalating very,
12 very rapidly. Our costs for healthcare here as a
13 percentage of GDP are 15 percent. They are only 10
14 percent in France with universal healthcare coverage,
15 I might add.
16 So that the demand for corporations to
17 plug into that kitty is not on the horizon in France,
18 whereas how the system is going to be reformed here
19 and whether it will yield anything, which it has not
20 in the last many years, is anybody's guess.
21 The pension situation and industrial labor
22 costs, how they're going to do with a lot of turmoil
23 in the organized labor sector, that is an unknown. And
24 certainly all is not calm in Europe.
25 So, you have to take the -- as I say, if

1 this were a few dollars here and there or a few
2 hundred thousand dollars in multi hundred million
3 dollar effort, this would be acceptable.
4 And you can say it's part of the noise and
5 you can brush it under the rug or throw a couple of
6 cents at it. But, this is a very major cost item. And
7 I believe it has not been examined at all, either by
8 LES or the Staff in the detail that it deserves.
9 JUDGE ABRAMSON: Dr. Makhijani, with
10 respect to some of these uncertainties going forward,
11 such as the cost of labor, the cost of health
12 insurance, etcetera, is there a reason?
13 We can do estimates in today's dollars and
14 get a good handle on what is going to be today or
15 maybe even next year, or the year after that. If we
16 think about what the Commission is doing right now,
17 which is to try to establish how much to fund for this
18 element for the next few years, is there a reason why
19 triennial adjustment to the decommissioning fund --
20 bearing in mind that what they're putting up here is
21 a bond that covers the entire amount, assuming that
22 that's what happens -- is there a reason why the
23 triennial adjustment could not accommodate the kinds
24 of uncertainties that you're thinking about?
25 We'll get to the contingency factor later,

1 that's not what we're focusing on now.

2 WITNESS MAKHIJANI: Yes.

3 JUDGE ABRAMSON: But just, is there a

4 reason why we couldn't accommodate these kinds of --

5 I don't want to say, I guess they are uncertainties,

6 but these kinds of changes that will undoubtedly take

7 place both ways on all of these elements?

8 Is there a reason we couldn't accommodate

9 those in the triennial adjustments?

10 WITNESS MAKHIJANI: Your Honor, I entirely

11 agree. These are foreseeable uncertainties so that

12 they don't need -- we don't need to go into the

13 contingency here.

14 I think that if they are to be taken into

15 account in the triennial adjustment, you should start

16 out with a good number. And that is extremely well

17 founded given how large this element is.

18 Or else, what has been done here is

19 acceptable to me, which is you fudge it a little on

20 the conservative side and say, this is going to my

21 operating and maintenance cost, which is why I use

22 this number, because I think if I were doing this cost

23 estimate and presenting it for a plant I wanted

24 licensed, I could argue -- as has been done here,

25 which I have not argued with that item before, as you

1 know, Your Honor. This is a reasonable thing to do.

2 JUDGE ABRAMSON: Now the -

3 WITNESS MAKHIJANI: If you want to wait

4 for the triennial adjustment, then you better have

5 some justification for where that [redacted] came

6 from, how all these differentials are going to play

7 out, and that you have a really precise adjustment, so

8 you have 40 cents left.

9 JUDGE ABRAMSON: So, what you're telling

10 me is you'd be comfortable assuming O&Ms double the

11 O&M for a single train or for the 3,500 ton?

12 WITNESS MAKHIJANI: Yes.

13 JUDGE ABRAMSON: But, you're not

14 comfortable with [redacted]. You think that's too

15 tight or you don't think that the extra, whatever that

16 percentage turns out to be, the extra [redacted] added

17 in, which is -- what did we say?

18 It's four million in change a year, that that

19 really represents available monies.

20 WITNESS MAKHIJANI: I don't believe it's

21 available money. I think that -- at least from what's

22 on paper and what I heard, they are two completely

23 different things.

24 And I don't believe it is available money.

25 I think that this is a reasonably conservative

1 estimate of labor costs given all the unknowns,
2 especially as you're projecting out into a situation
3 ten years from in areas of industrial labor cost that
4 are highly turbulent.
5 JUDGE ABRAMSON: But, if we got these
6 numbers right now, then the triennial adjustments
7 would be a sufficient way to deal with those kinds of
8 changes?
9 WITNESS MAKHIJANI: Well, you have to deal
10 with this turbulence at some length. Even 179 times
11 110 is more than 200 million dollars. You're talking
12 200 million dollars.
13 And that's a pretty big chunk of change
14 for the public purse.
15 MR. LOVEJOY: Well, Dr. Makhijani, did you
16 do some calculations of your own in which you
17 accounted for the cost of capital and lending capital
18 and equity capital to come up with some figures.
19 WITNESS MAKHIJANI: I did. Unfortunately
20 I've got so many papers here, I can't find my
21 spreadsheet. But, as I remember what's in my computer
22 -- and I'd be happy to check it at the break and
23 correct the record -- I used a ten percent for
24 everything, deprecation, return on investment, the mix
25 of loan and equity, and all of that, and a three

1 percent escalation rate going out to 16 years.

2 And it actually doesn't matter whether it

3 starts 10 years from now or it stars --

4 JUDGE ABRAMSON: If I take 10 percent on

5 the 88 million, I'm looking at 8.8 per year to take

6 care of this, to service this.

7 WITNESS MAKHIJANI: No, because you

8 actually, when you borrow the money you pay the

9 interest first. So you actually do a mortgage type of

10 payment. And so, your principal is --

11 JUDGE ABRAMSON: It depends on what your

12 lenders are willing to take, doesn't it? I mean, I've

13 seen projects financed where there's interest borrowed

14 for the first seven years and then they start.

15 It just depends on what your lenders are

16 willing to do.

17 WITNESS MAKHIJANI: Yes. Of course, if

18 you -- yes. This is a normal levelized payment here

19 you have a constant payment over the life of the plan.

20 If you're going to depreciate it faster,

21 then your interest payments will be smaller. Perhaps

22 you could get a better rate. But I did, I believe

23 assume a very low risk project in that if you multiply

24 my 16 you're talking 176 million dollars over of which

25 88 is capital and only the rest is risk interest. So,

1 I don't --

2 JUDGE ABRAMSON: So you're saying that,

3 over the term of the project, it needs to come up with

4 80 some million dollars or approximately 80 million

5 dollars to service its debt and service its equity

6 obligations?

7 WITNESS MAKHIJANI: Another 64 cents.

8 MR. CURTISS: I am compelled to ask

9 whether this analysis that's being referred to here,

10 with all due respect, the line of questioning, has

11 this been produced?

12 Or is it documented somewhere? And, if

13 not, it sounds to me like it's an analysis that this

14 witness is relying on and it hasn't been produced. I

15 move to strike all his testimony.

16 He indicated that he did it on his

17 computer and has done an analysis that he's testifying

18 to with no ability on the part of LES to see it or

19 rebut it.

20 MR. LOVEJOY: Well, we'll be happy to

21 print it out. I think it just happened.

22 WITNESS MAKHIJANI: Your Honor --

23 MR. LOVEJOY: These are matters which were

24 prompted by the testimony here today.

25 JUDGE ABRAMSON: Let me just say as an

1 observer and participant in these discussions that, if
2 I -- and I hope this will explain to the level that
3 everybody can understand it.
4 If you had 88 million dollars worth of
5 obligations that you either took as equity
6 contributions or as debt and you assumed a ten percent
7 return to the parties on that annually, that's 8.8
8 million a year.
9 If you took that over 16 years, you come
10 up with 16 times 8.8. So, these numbers don't strike
11 me as having any magic embedded in them. What I hear
12 the witness suggesting to us is that -- in fact, I
13 can't quote you exactly, but something like a Monday
14 morning quarterback attempt to put in to take the
15 doubling number and find embedded in the 12.5 million
16 enough to cover these obligations.
17 And we were certainly discussing earlier
18 with the LES team what the 12.5 covered. And I think
19 the upshot was that the 12.5 covered something like
20 eight plus of O&M.
21 And the remaining four or so per year
22 would then be available to serve as debt and equity.
23 And what Dr. Makhijani is saying is, wait a minute, it
24 should be at least ten percent, that's 8.8, not four.
25 So there's a gap. And that doesn't strike

1 me as magical. If anybody on the LES or the Staff
2 side thinks it needs more than that, we'll ask Dr.
3 Makhijani to put it in writing.
4 But it strikes me as fairly
5 straightforward. I have to admit, I'm relatively
6 facile with numbers. So, to me it's easy. Maybe it's
7 not for somebody else.
8 MR. CURTISS: Well, I think that's true.
9 It's perfectly understandable. But I will take
10 Counsel for NIRS up on his offer to produce the
11 document so that we can at least see the analysis
12 that's been done.
13 CHAIR BOLLWERK: I think that the document
14 we're talking about is a spreadsheet?
15 MR. LOVEJOY: Yes, it's in Excel, I think.
16 WITNESS MAKHIJANI: Your Honor, may I?
17 JUDGE ABRAMSON: Please, I'm trying to put
18 words in your mouth, and that's not --
19 WITNESS MAKHIJANI: No, Monday morning
20 quarterback was entirely felicitous. I am not used to
21 football, but this was my understanding.
22 CHAIR BOLLWERK: Where is this document?
23 WITNESS MAKHIJANI: It's in my computer
24 right here. But, I was reacting to a spreadsheet from
25 the LES that hasn't been produced. They've done some

1 things, which I think Monday morning quarterbacking
2 describes appropriately to what I can tell.
3 And I certainly would like to see the
4 spreadsheet myself that they've done and to examine in
5 detail exactly how they came up with this number
6 because they have testified that they come up with a
7 70 million dollar excess and then on top of that, if
8 I remember correctly, another 120 million dollar
9 excess because we're escalating at three percent.
10 You know, if escalate at three percent and
11 you get present value at three percent, you don't go
12 anywhere from there. It just keeps you in the same
13 place.
14 And the way I calculated it, they're at
15 least 50 million dollars short in a low risk project,
16 round numbers.
17 JUDGE ABRAMSON: If we took the 50 million
18 and spread it over the total of 2.6 -- I don't know
19 how many pounds is 40 cents --
20 WITNESS MAKHIJANI: Forty cents a kilogram
21 using all their numbers and excluded calcium fluoride
22 and just trying to do a straight calculation.
23 JUDGE ABRAMSON: Fifty million divided by
24 110,000.
25 WITNESS MAKHIJANI: If you took it to Wall

1 Street, what would happen to you?

2 JUDGE ABRAMSON: Okay.

3 CHAIR BOLLWERK: In terms of the document,

4 there are two ways that we can deal with it. One

5 would be, since it's on a laptop, to have Dr.

6 Makhijani, we can give him a disk or he can put it on

7 a memory key, or whatever he has, and we can try to

8 print it out for him.

9 Or, alternatively, we can hook a computer

10 into that desk right there and display it right here

11 in this room. So, whichever Counsel would prefer.

12 MR. CURTISS: I think the explanation and

13 the elicitation here is sufficient for our purposes.

14 CHAIR BOLLWERK: All right.

15 MR. CURTISS: We have on the record what

16 the assumptions were. And so, I think that's

17 sufficient.

18 CHAIR BOLLWERK: Okay.

19 JUDGE KELBER: Dr. Makhijani, would you be

20 prepared to do the same sort of thing with the LMI

21 estimate, which is not very much different?

22 WITNESS MAKHIJANI: I haven't looked at

23 the LMI estimate in detail except as it has been

24 discussed here in testimony. But I'd be happy to do

25 it for Your Honor.

1 CHAIR BOLLWERK: All right. Is there a
2 question pending here?
3 JUDGE ABRAMSON: We cut you off, and I
4 apologize.
5 MR. LOVEJOY: No, please. This is all
6 very important. Let me just ask you, Dr. Makhijani,
7 you sad you used a figure of ten percent in cost of
8 money.
9 But, do you have a view on what would be
10 a realistic cost of money for a deconversion plant in
11 far west Texas?
12 WITNESS MAKHIJANI: Well, no. That isn't
13 entirely the cost of money. That actually includes --
14 that is the cost of money. But the way I calculated
15 the payment of 11 million dollars includes the payment
16 of principal and includes inflation.
17 So, there's a kind of a three percent
18 factor in there. So the cost of real money is
19 something less than ten percent. No, I don't have an
20 opinion of what it might cost in west Texas.
21 But I think in the United States it might
22 cost something more than what is embedded in the
23 Cogema Urenco estimate that was provided in the
24 business study.
25 Because I believe the Cogema -- from what

1 I could calculate the Cogema business study does not
2 have a reasonably commercial rates embedded in it in
3 terms of its cost of three Euros, 2.85
4 MR. LOVEJOY: Okay. Let me go into a
5 couple of other points. Did you have a view on -
6 you've heard the testimony on how the costs of
7 neutralization of the hydrofluoric acid as been
8 handled. Do you have a view on that?
9 WITNESS MAKHIJANI: Yes, I think this is
10 another kind of fudging without putting any numbers on
11 the table that somehow costs offset each other and
12 therefore you come out even without actually ever
13 calculating a cost and saying what the cost elements
14 are.
15 Now, here the total cost elements are
16 smaller, I believe. If you're going to say that the
17 European hydrofluoric acid is very pure and can be
18 sold in less than on PPM, then you have to take into
19 account the testimony that was also offered that the
20 Europeans spend extra money in purifying that
21 hydrofluoric acid.
22 And therefore, if you spend that extra
23 money in purifying the hydrofluoric acid and therefore
24 get calcium fluoride that's very pure, and therefore
25 you can dispose of it off in an industrial landfill,

1 then you don't have that margin for, you know, that
2 you saved because your hydrofluoric acid is not so
3 exacting.
4 So we're taking credit for having a
5 hydrofluoric acid process that's very exacting because
6 we're disposing off the calcium fluoride in an
7 industrial landfill because it's unpolluted.
8 And at the same time we are saying that
9 we're going to have lower cost for hydrofluoric acid,
10 which would mean, of course, likely or possibly at
11 least more residual uranium and a possible disposal in
12 a low level waste facility.
13 But we don't want to do that. So we want
14 to have the best of all worlds and without putting any
15 numbers on the table. I think that if you look at the
16 -- the business study actually, I think, and I've
17 testified before, Your Honor, that I do agree that
18 Cogema has a lot of experience and is technically very
19 well qualified to produce these kinds of numbers.
20 But I note that neither Areva or Cogema
21 has provided a per kilogram cost number to LES. And
22 so, if I start with the numbers that Cogema and Urenco
23 have provided, that Urenco has provided here, and they
24 say that, despite the fact that they are purifying
25 this hydrofluoric acid for purposes of sale, so to low

1 contamination levels, they should make an extra
2 provision of [redacted] Eurocents.
3 You know, you can foresee scenarios where
4 it may not be necessary. But, Your Honor, the
5 question you just posed is what is prudent to do now,
6 which is what my analysis is focused on.
7 I think at least making a provision of [redacted]
8 Eurocents per kilogram for hydrofluoric acid
9 neutralization would appear appropriate.
10 JUDGE KELBER: Dr. Makhijani?
11 WITNESS MAKHIJANI: Yes.
12 JUDGE KELBER: Wasn't there testimony both
13 yesterday and today about experience with U.S. fuel
14 fabricators who have to dispose of hydrofluoric acid?
15 WITNESS MAKHIJANI: Yes, Your Honor.
16 JUDGE KELBER: And I believe that
17 testimony was to the effect that producing product
18 with less than one PPM was kind of routine.
19 WITNESS MAKHIJANI: I'm not disputing that
20 producing product at less than one PPM is routine.
21 But no cost figures for those have been put on the
22 table in terms of what it actually takes.
23 And fuel fabrication is a much smaller
24 scale operation than what is envisaged here because
25 they're dealing with much, much smaller quantities of

1 uranium.

2 JUDGE KELBER: So, the cost per unit would

3 be higher then?

4 WITNESS MAKHIJANI: It may be, but no cost

5 for unit for actually -- since we're talking about the

6 cost, I don't believe we've ever disputed that it's

7 possible to produce hydrofluoric acid with low

8 contamination.

9 The issues have been, is there a market

10 for it? What do you do with if you can't sell it?

11 And what is it prudent to make provision for in terms

12 of its disposition.

13 I don't believe that we're disputing a

14 scenario in which LES might in some circumstance be

15 able to sell this. I'm not arguing with that, Your

16 Honor.

17 CHAIR BOLLWERK: Dr. Kelber is finished.

18 MR. LOVEJOY: On a related point, what

19 would be prudent to address the question of CaF2

20 disposal?

21 WITNESS MAKHIJANI: Well, I think the

22 Environmental Impact Statement has made a prudent

23 assumption that was described a worst case assumption,

24 taking it a low level waste landfill.

25 This has been the normal assumption that

1 has been made in regulatory studies. It has also been
2 the normal assumption that has been in other studies,
3 like the Livermore study.
4 It doesn't -- it's not gainsaying the idea
5 that you may be able to sell it. It's from the point
6 of what provision should be made now. And I think
7 provisions should be made for its disposal as low
8 level waste.
9 And that's the only option that was
10 actually considered in the FEIS, as I've quoted, you
11 know. Of course, the theoretical possibilities of
12 sales, but that's not --
13 JUDGE ABRAMSON: And, Dr. Makhijani, am I
14 correct then in interpreting what you said that the
15 assumption in the EIS of putting the calcium fluoride
16 to a low level waste is sufficient for the purposes of
17 NEPA?
18 WITNESS MAKHIJANI: Yes.
19 JUDGE ABRAMSON: Thank you.
20 MR. LOVEJOY: Dr. Makhijani, there was
21 testimony about a facility conducting deconversion in
22 South Caroline processing thousands of tons of
23 depleted uranium. Do you know what facilities?
24 WITNESS MAKHIJANI: I'm not aware of any
25 facility that's processing thousands of tons of

1 depleted uranium a year in South Carolina. There is
2 a fuel fabrication plant there, I believe.
3 But I was a little surprised to hear this.
4 I believe, if it exists, that's the thing that we
5 should be talking about all the time. Forget about
6 Cogema.
7 (Pause.)
8 MR. LOVEJOY: Did you read the ruling by
9 the Commission that came down last Wednesday, the
10 October 19th ruling?
11 WITNESS MAKHIJANI: I did.
12 MR. LOVEJOY: What light does that shed,
13 in your view, on the questions to be dealt with in
14 assessing and determining costs of deconversion?
15 WITNESS MAKHIJANI: Well, when I read the
16 Commission's ruling, I read it as a kind of
17 affirmation of a lot of the work that we've done at
18 the institute for over a period of many years, both in
19 the context of this type of proceeding and other work.
20 In that the Commission affirmed what we
21 have said in our studies, that the rule that covers
22 the disposal of large amounts of depleted uranium from
23 enrichment plants, the rule as it exists now, the
24 clarification rule in terms of the environmental
25 impacts that were assessed, did not go into disposal

1 of large amounts of depleted uranium.

2 All of the -- so, if you go from that

3 observation to look at the environmental impacts of

4 disposal that have been studied, all the environmental

5 impact statements that have done that actually have

6 numbers, unlike the one in the present proceeding,

7 about shallow land burial, the Sandia study that was

8 done, the studies that we've done, the numbers in the

9 PEIS for erosion, for instance, all of these studies

10 indicate that the doses from shallow land burial are

11 well in excess of 25 --

12 JUDGE ABRAMSON: Do we want to tackle that

13 in the disposal section and focus now on deconversion?

14 I think it's probably better if we have it all in one

15 place?

16 WITNESS MAKHIJANI: There's a little

17 deconversion implication.

18 JUDGE ABRAMSON: Okay, tell me about the

19 deconversion implication.

20 WITNESS MAKHIJANI: The deconversion

21 implication is that -- and pardon me, because this is

22 my favorite topic. The deconversion topic is, if you

23 can dispose it off in shallow land burial, which is

24 possible, if the environmental impacts are greater

25 than 25 milligram a year, then you have to go back to

1 the drawing board and consider various kinds of
2 disposal.
3 And I think all of the studies that have
4 been done have examined alternative forms of
5 deconversion because of that very fact, that, in order
6 to marry the disposal option with the deconversion
7 option to meet the regulation 25 milligram, you need
8 to consider them together.
9 So, I believe that the deconversion
10 question will eventually be reopened if shallow land
11 burial if U3O8 is found to be unsuitable, and there is
12 a connection that is unavoidable.
13 JUDGE ABRAMSON: I appreciate that.
14 MR. CURTISS: It was my hunch that this
15 was going to be tied up to, although not explicitly,
16 to an inadmissible issue, the U02 question. So, to
17 the extent that that's the connection, I think we can
18 move on.
19 WITNESS MAKHIJANI: I have nothing more to
20 say about that.
21 CHAIR BOLLWERK: Thanks.
22 MR. LOVEJOY: That's all I have on
23 surrebuttal.
24 CHAIR BOLLWERK: All right. At this point
25 it's 4:30. Do we want to take a break? Or do you

1 want to proceed?

2 MR. CURTISS: Well, we're all warmed up in

3 here, I think.

4 CHAIR BOLLWERK: It's 78, that's right at

5 the agency's --

6 MR. CURTISS: I'll try not to heat it up

7 much more here and be brief. I think I can do this in

8 half an hour. And if you'd like to break after that

9 then --

10 JUDGE ABRAMSON: Lay it on.

11 MR. CURTISS: All right.

12 EXAMINATION BY MR. CURTISS OF:

13 ARJUN MAKHIJANI

14 MR. CURTISS: Welcome back, Dr. Makhijani.

15 WITNESS MAKHIJANI: Thank you, Mr.

16 Curtiss.

17 MR. CURTISS: You've covered some of the

18 things that I'd like to cover. I take it from your

19 statements here under surrebuttal that you're familiar

20 with the French company Cogema and their parent

21 company Areva?

22 WITNESS MAKHIJANI: I AM.

23 MR. CURTISS: Would you describe what you

24 know about the company?

25 WITNESS MAKHIJANI: Well, Cogema is a

1 subsidiary of Areva that has happened recently. For
2 a long time it was wholly owned by the French
3 government and was slightly privatized.
4 I believe these numbers may not be entire
5 current. But it's about 85 percent owned by the
6 French government. Technologically pretty
7 sophisticated company.
8 They run the largest reprocessing,
9 commercial reprocessing plant in the world at La
10 Hague. They have a purification plant there too. And
11 they do reprocessing services for the wholly owned
12 French utility, the Japanese, the Germans and so on.
13 They're also an international company that
14 is incorporated in various places, including in this
15 country.
16 MR. CURTISS: All right. Could you,
17 focusing in now on the issue is the subject of the
18 panel that we have here, are you familiar with the
19 company's experience relative to the deconversion of
20 depleted uranium hexafluoride to depleted U308?
21 WITNESS MAKHIJANI: Yes, I know about the
22 Pierrelatte plant.
23 MR. CURTISS: And do you, on that basis,
24 consider the company to be technically competent and
25 experienced in the process of deconversion?

1 WITNESS MAKHIJANI: Yes.

2 MR. CURTISS: And, if LES should decide to
3 employ that company for this purpose, is there any
4 reason to believe that it would not be plausible that
5 they could serve that role?

6 WITNESS MAKHIJANI: No, Mr. Curtiss, I
7 have already testified that, you know, from the
8 technological point of view, I think in so far as
9 plausibility is based on Cogema building and operating
10 the plant, I would not have any -- I think that it is
11 -- that's a piece of the plausible strategy. That's
12 fine.

13 MR. CURTISS: And is it plausible to
14 assume, based upon their expertise, that they could
15 get a license for that facility?

16 WITNESS MAKHIJANI: This is a larger
17 question. I think this is a question where Cogema's
18 record is a little more spotty in Europe. And I have
19 long urged this body and other bodies in this country
20 to pay due attention to what Cogema is doing in
21 Europe, notably the Oslo parties, the Oslo Paris
22 Accord parties, which are governments of Europe, have
23 asked both BNFL and Cogema to stop discharging liquid
24 radioactive wastes into oceans and bodies of water.

25 And Cogema, I believe -- and I've written

1 an article about this, it's on our website -- has both
2 arrogated itself the authority to redefine the science
3 of low level radiation in that three milligram were
4 considered at zero impact, which no international body
5 currently accepts.
6 And it declared itself that this would be
7 sufficient. And this has been part of my objection to
8 some of Cogema's proposals in this country, is I
9 believe in this country all of our regulations are
10 based on the idea of linear no-threshold hypothesis.
11 And, until the company explicitly accepts
12 this, I would be a little uncomfortable that they
13 could be licensed here.
14 MR. CURTISS: Could I ask you to take a
15 look at your deposition transcript, which we'll now
16 provide. And I'd like to mark it as Exhibit 117. I
17 think that's the next exhibit if I am correct about
18 that.
19 CHAIR BOLLWERK: That is correct, 117
20 would be the next number.
21 MR. CURTISS: If I could mark that as LES
22 Exhibit 117.
23 (Whereupon, the above-
24 referenced to document was
25 marked as LES Exhibit No. 117

1 for identification.)

2 MR. CURTISS: Do you recall, Dr.

3 Makhijani, that you gave a deposition in this

4 proceeding on July 21st of 2005?

5 WITNESS MAKHIJANI: About then, yes.

6 MR. CURTISS: And, could I ask you to turn

7 to page 48 of this Exhibit?

8 WITNESS MAKHIJANI: Yes.

9 MR. CURTISS: Do you see there on line two

10 a question that you were asked as to whether as a pre-

11 requisite to a plausible strategy that it's essential

12 that the entity that LES relies on has a license.

13 WITNESS MAKHIJANI: Could you repeat the

14 question, Mr. Curtiss?

15 MR. CURTISS: For purposes of the

16 plausible strategy showing an Applicant is required to

17 make in this proceeding, is it required as part of

18 that showing, the facilities that are to be employed

19 so forth and so on, must be licensed as a pre-

20 requisite to relying on them as a plausible strategy?

21 Do you see that?

22 CHAIR BOLLWERK: I was making a note. Can

23 you give me the page again?

24 MR. CURTISS: I'm sorry, page 48.

25 CHAIR BOLLWERK: Forty-eight, thank you.

1 MR. CURTISS: And I'm referring to the
2 question that I asked Dr. Makhijani beginning on line
3 two.
4 CHAIR BOLLWERK: Okay.
5 MR. CURTISS: And, if you could, read into
6 the record, if you would, the answer that you gave at
7 that time from line ten through line 21.
8 WITNESS MAKHIJANI: Sure. No, I've
9 already said that I would accept Cogema for
10 deconversion as a plausible strategy a deconversion
11 plant.
12 There has not even been a license
13 application for that. When I think on the face of it
14 and the facts on the ground, I mean, I can't predict
15 what the license application would say and what the
16 position would be when the license application is made
17 or what Cogema's track record would be at the time.
18 But, as we sit here, I would say that,
19 even without an actual license, it is certainly
20 plausible to assume that Cogema could get a license.
21 They have a license in a country with comparable
22 regulations.
23 They are operating a plant. And so it is
24 certainly plausible.
25 MR. CURTISS: So, your response to my

1 earlier question that you didn't think it was
2 plausible to assume that they would get a license,
3 have you changed your view since this time?
4 WITNESS MAKHIJANI: No, as I remember, you
5 know, haven't reviewed this recently, I just haven't
6 had the time. The answer that I gave here was in the
7 context of is Cogema a technologically competent
8 company.
9 And I've said this in these proceedings.
10 And I've said this outside these proceedings. Cogema
11 is a technologically competent company. So it is
12 plausible that they could get a license.
13 And I don't say that they couldn't get a
14 license. I'm just saying that, when they actually --
15 and perhaps, you know, I just remembered what I had
16 written about Cogema and three milligram and BEIR VII
17 has come out since the time we have talked.
18 And so, the risks of low level radiation
19 are quite uppermost in my mind since I have been
20 thinking about them quite a lot in the last couple of
21 months.
22 And I think that it's quite plausible that
23 they could get a license, but I think issues of low
24 level radiation and their position may be a little bit
25 tougher today than they were four months ago.

1 MR. CURTISS: But as you reflected here
2 there's a comparable regulatory framework. Cogema is
3 a technically confident company, and it's plausible to
4 think they could a license if LES pursued this path.
5 WITNESS MAKHIJANI: It's plausible that
6 they could get a license, yes. But I think they would
7 have a tougher time today.
8 JUDGE ABRAMSON: Let me ask a question,
9 Dr. Makhijani. I understand Cogema's -- I understand
10 your view of Cogema's posture on the 0 linear
11 threshold. Do you have some reason to believe that
12 Cogema would, in making an application here, elect not
13 to follow the laws and rules and regulations of the
14 U.S.?
15 WITNESS MAKHIJANI: No, Your Honor. I
16 think -- well, I have some hesitations. I don't have
17 -- I have some hesitations based on how they are
18 dealing with the governments of Europe.
19 So I think that they certainly would
20 commit to obeying the regulations of this country.
21 And three milligram is a dose within the regulations
22 of this country, so I don't that that would provide
23 either the Commission or any of us who follow these
24 things or Cogema with a great degree of discomfort.
25 What -- my hesitation is a little more

1 subtle. Especially as I have said, we followed the
2 BEIR VII process as everybody else, with a great deal
3 of care. And as you may know, my institute is the
4 only one that explicitly actually mentioned having its
5 own appendix in the BEIR VII report, because we
6 followed it that closely and raised careful questions
7 with that committee.
8 And I do hope -- let me just put it
9 differently, perhaps. I do hope that in the process
10 of getting a license that Cogema would be asked it's
11 opinion on the linear no threshold hypothesis, and I
12 would want them to give an unequivocal answer to that
13 question before they were granted a license.
14 And as I sit here and reflect on the low
15 level radiation controversy, I'm not clear that they
16 would do that. Is it plausible that they could get a
17 license? I think it is.
18 JUDGE ABRAMSON: Okay, so I think that the
19 plausibility question is answered.
20 MR. CURTISS: I'd move the introduction of
21 Exhibit number 117.
22 CHAIR BOLLWERK: All right. Let's first
23 indicate that Exhibit 117, the Makhijani transcripts
24 in the deposition of July 21st, '05 is marked for
25 identification. And then there's a motion to admit it

1 as -- into evidence. Any objections?

2 (No verbal response.)

3 CHAIR BOLLWERK: No objections. Then

4 Exhibit 117 as described previously is admitted into

5 evidence.

6 MR. CURTISS: Dr. Makhijani, in, you know,

7 following up on this line as it relates to the cost

8 estimate in response to a question that Counsel for

9 NIRS asked on surrebuttal, you said Cogema's qualified

10 to estimate the cost of facility.

11 WITNESS MAKHIJANI: Yes.

12 MR. CURTISS: So I take it the nature of

13 your concern is not so much with the underlying cost

14 estimate that they have provided, because they're

15 qualified to estimate the cost of the facility and the

16 basis for that, but rather as reflected in what they

17 proposed for the Capenhurst facility but rather more

18 narrowly limited on the adjustments that were taken

19 once the LES adjustments were made.

20 WITNESS MAKHIJANI: That's the bigger

21 concern. I mentioned a smaller concern in passing is

22 that with primarily government owned entities that

23 we're dealing with in Europe that have provided this

24 cost estimate, the underlying assumptions about

25 interest rates, which we don't know explicitly that

1 (Whereupon, the above-
2 referenced to document marked
3 as LES Exhibit No. 117 was
4 admitted into evidence.)
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

1 went into Cogema's cost estimation procedure may be
2 somewhat different than what Wall Street's cost
3 estimation procedure would be, because --
4 MR. CURTISS: Do you have any reason to
5 believe that this estimate was subsidized for some
6 reason?
7 WITNESS MAKHIJANI: Yes. Well, as I said,
8 I've done some -- a bunch of quick calculations. And
9 I asked Brice as we sat here actually to do a little
10 back calculation based on the information that's
11 provided in the various documents.
12 And one can back calculate from the dollar
13 79. If you half it you get the labor cost of a 3,500
14 ton plant. You can convert it back into Euros. And
15 so you can -- since the other costs are rather small
16 you can make a back of the envelope calculation for
17 the implicit cost of capital given that we know the
18 capital cost.
19 So I do -- I won't testify that it's true,
20 but I think it's certainly -- it's an issue that bears
21 looking into. It may be a factor in the cost, probably
22 small.
23 MR. CURTISS: Thank you. Moving to a
24 different subject, you testified that for purposes of
25 a plausible strategy you think there needs to be a

1 siting process in place for a deconversion facility.
2 WITNESS MAKHIJANI: Well, there has to be
3 an idea of how the siting process is. You know, where
4 it's going to be sited, how the sites are going to be
5 screened. As I said, I haven't reviewed my prior
6 testimony so I'm not sure of the exact words I said.
7 But I don't think you have to have a site
8 or a license. You have a company that's
9 technologically experienced, and a large company to be
10 able to do this if they are the ones that you finally
11 arrive at the agreement with, because everything is
12 very tentative so far. So this is a supposed
13 plausibility.
14 MR. CURTISS: And would it be sufficient
15 for purposes of that siting process to consider the
16 siting processes under NEPA including alternate sites
17 and the siting criteria under 10 CFR Part 40, which
18 would apply here which contains siting criteria to be
19 a sufficient siting process?
20 WITNESS MAKHIJANI: Yes, provided the
21 usual environmental justice and other rules are also
22 followed, which are issues in the previous proceeding
23 as you might remember.
24 MR. CURTISS: I can move quickly through
25 here and wrap up, I think, in just a little bit. I do

1 want to talk about the question of CaF contamination.
2 And I think this will be the last subject that I'll
3 deal with, so I only have a few more minutes.
4 Are you familiar -- could you refer to LES
5 Exhibit number 76? That was admitted before.
6 WITNESS MAKHIJANI: LES Exhibit 76, I
7 don't have it.
8 MR. CURTISS: All right. This was
9 admitted previously. The document's entitled
10 defluorination of depleted UF6 at the W defluorination
11 facility. And you heard the testimony earlier and can
12 see the information presented here that the level of
13 contamination of HF coming from the W facility is on
14 the order of one ppm.
15 WITNESS MAKHIJANI: Yes.
16 MR. CURTISS: Do you have any basis for
17 disagreeing or disputing that that's the actual
18 operational experience from the W facility?
19 WITNESS MAKHIJANI: No.
20 MR. CURTISS: Okay, and at that level of
21 contamination, would it be your view that if that's in
22 fact what the HF contamination level is that that
23 would nevertheless still be necessary to dispose of in
24 a low level radioactive waste disposal facility?
25 WITNESS MAKHIJANI: Well, as I have

1 written in my reports, the -- the reports that Dr.
2 Smith and I did, that there's no general free release
3 criterion for materials coming out of a nuclear
4 facility in such large quantities.
5 I do recognize that much smaller amounts
6 of CaF from fuel fabrication plants have been disposed
7 of. So I think that some kind of at least an
8 environmental assessment or NEPA proceeding is
9 necessary before hundreds of millions of pounds of CaF
10 are sent off to landfills.
11 We're not -- this is the same problem in
12 terms of, Your Honor, in terms of the small amounts of
13 depleted uranium and large amounts of depleted uranium
14 being disposed of. Even at one ppm you're talking a
15 hundred kilograms of uranium.
16 You're not talking about a small amount of
17 uranium because the amount of depleted uranium waste
18 is very large.
19 JUDGE ABRAMSON: But it is being deposited
20 in very dilute concentrations, right, because it's one
21 ppm --
22 WITNESS MAKHIJANI: Yes.
23 JUDGE ABRAMSON: -- in the CaF --
24 WITNESS MAKHIJANI: I'm not saying it
25 can't be done. What I'm saying is that whenever we

1 consider very large amounts and we don't have a rule,
2 what's the prudent thing to do.
3 And what I'm saying is as we sit here, and
4 so long as we don't have a rule, I think the
5 Environmental Impact Statements on all of the studies
6 that have been done, not just by my organization --
7 and we essentially tried to follow carefully the
8 scientific, you know, technical literature on the
9 subject like Sandia and Livermore and so on have made
10 this assumption not I believe as something as a
11 prediction of what would happen, but as a prudent
12 measure given that we done have a rule for large
13 amounts of calcium fluoride.
14 What we've disposed of so far are
15 relatively small amounts. And then my other
16 hesitation in this regard is the testimony that has
17 been offered is not willing to pay the costs of the
18 purification of hydrofluoric acid because they've
19 taken credit for it someplace else, you know, in the
20 lower facility costs because they don't want to make
21 provision for the calcium fluoride production.
22 And then they want to use the less than
23 one ppm to say we're going to be pure and we're going
24 to put it in the landfill.
25 JUDGE ABRAMSON: I would like to pursue

1 that question for a minute because I'm not sure I
2 understand the origin of the position you're
3 suggesting, Dr. Makhijani. Can you help me understand
4 why you feel, why you believe, that the -- there is
5 some embedded process to purify the hydrofluoric in
6 order to get the CaF to have this low concentration?
7 I'm -- that's where I'm lost in the
8 process, in the process of the process.
9 WITNESS MAKHIJANI: Your Honor, I -- as I
10 heard the testimony of LES, and I believe the Staff,
11 a little bit runs into each other since they were back
12 to back today, but I heard that if you're going to be
13 selling hydrofluoric acid you have to incur a lot of
14 extra costs.
15 And I am presuming that some part at least
16 of this would result in terms of low hydrofluoric
17 contamination is because the hydrofluoric acid is put
18 on the market.
19 JUDGE ABRAMSON: So your view is that in
20 the Cogema plant, and the W plant, that the
21 hydrofluoric acid that comes out the back end of the
22 process needs some further purification in order to
23 reduce the uranium concentration and that -- and let
24 me make sure I understand the position, and that
25 that's a cost that's embedded there that needs to be

1 reflected if instead of creating hydrofluoric acid
2 they're going to create CaF, and that the assumption
3 that the cost associated, let's say, with elegant
4 storage methods, with particular storage methods for
5 hydrofluoric is only a piece of the cost -- excess
6 cost associated with hydrofluoric and that there's
7 something more associated there with purification that
8 we're not seeing? Is that -- am I -- is that the --
9 WITNESS MAKHIJANI: Well, Your Honor, I'm
10 not clear as to where the extra cost elements are
11 because we haven't seen any of this. We've seen
12 verbal testimony about this, but we haven't seen any
13 technical data or financial numbers.
14 All I heard, and I'm just taking it at
15 face value, that if you're going to put it on the
16 market you have to have more monitoring, you have to
17 have more measuring, you have to have better storage,
18 you know.
19 There's an ensemble of elements that
20 produce higher costs if you're going to market your
21 hydrofluoric acid.
22 JUDGE ABRAMSON: Right.
23 WITNESS MAKHIJANI: And I think it's
24 reasonable to assume that part of your marketing
25 strategy is to ensure your customer I haven't actually

1 seen what the acceptance criteria are.

2 So I haven't gone into that much detail in

3 terms of what the French release criteria are, what

4 the acceptance criteria are for customers. But I

5 presume if they have this as a public result it

6 certainly would be a customer expectation.

7 And what I heard here from testimony, Your

8 Honor, was that it costs something to produce

9 hydrofluoric acid extra for sale. And if you're going

10 to neutralize it for disposal, then you can be more

11 relaxed and it will cost less.

12 And that extra margin that you have is

13 going to be used for calcium fluoride -- for

14 neutralization of hydrofluoric acid. And we don't

15 know how much it is. We don't know whether it's --

16 JUDGE ABRAMSON: Okay, I guess I didn't

17 hear that. And perhaps we can put Mr. Krich back on

18 the stand and get some information about how that

19 tradeoff was made, because that's -- is that the

20 origin of it? The tradeoff between making CaF and

21 making hydrofluoric --

22 WITNESS MAKHIJANI: Yes, I'd like to -- I

23 don't know if it's possible to review the record

24 that's been made so far, but that is certainly my

25 distinct memory of what has been said.

1 JUDGE KELBER: As I understand it, and I'm
2 asking you to correct me if I'm wrong, your basic
3 assumption is that before the hydrofluoric acid is
4 neutralized it has to be purified to at least some
5 extent. Is that correct?
6 WITNESS MAKHIJANI: Well, the hydrofluoric
7 acid production process from UF6 is in itself a
8 process of, you know, separation of fluorine and
9 uranium.
10 JUDGE KELBER: I understand. I'm asking
11 you a simple question.
12 WITNESS MAKHIJANI: Yes.
13 JUDGE KELBER: Is it your understanding in
14 considering the generation of calcium fluoride as a
15 product of the neutralization hydrofluoric acid that
16 the hydrofluoric acid first has to be somewhat
17 purified?
18 WITNESS MAKHIJANI: Well it would have to
19 be somewhat purified, but Your Honor, I must admit
20 that I have not looked at all of the technical details
21 of what it takes to purify it at various levels.
22 JUDGE KELBER: Is it not possible that the
23 process of taking the hydrofluoric acid and mixing it
24 with limestone and putting it through a filter press,
25 because of the free energies involved between the

1 formation of the water and the calcium fluoride will
2 in fact generate a significant separation?
3 WITNESS MAKHIJANI: It's possible, in
4 which case you might have contaminated water and --
5 JUDGE KELBER: That's another problem.
6 That we can deal with separately. Thank you.
7 WITNESS MAKHIJANI: Okay.
8 MR. CURTISS: I think, if I could sum up
9 what you said at least relative to the question of the
10 cost estimate for disposal of CaF, the one ppm level
11 that's being achieved operationally, you have no basis
12 for contesting based upon the expertise and technical
13 expertise of Cogema.
14 And your only question here relative to
15 our ability to dispose of it in a municipal landfill
16 is that there's not a process in place, you call it
17 free release, not a standard in place that would apply
18 generically. Is that correct?
19 WITNESS MAKHIJANI: Well, for large
20 amounts of calcium fluoride, yes. I think that until
21 there is that you have to assume that it would be
22 disposed of in a low level waste.
23 MR. CURTISS: And this would be a free
24 release standard that you think ought to be adopted,
25 or a below regulatory concern standard, something like

1 that?

2 WITNESS MAKHIJANI: Yes. As you know, Mr.
3 Curtiss, the latter phrase has been the object of at
4 least as much contention as the name of the uranium
5 compound I'm not allowed to say. So --

6 MR. CURTISS: Whether it's BRC or
7 clearance or free release, whatever that term is, it
8 contemplates that there would be a level of
9 radioactivity, let's say one ppm, below which, as LES
10 has proposed, you could dispose of it in a municipal
11 landfill.

12 WITNESS MAKHIJANI: Yes. I mean that
13 process has to play out. And then whether it's
14 allowed or not would be an outcome of that.

15 MR. CURTISS: Is there conceptually in
16 your view an understanding of standards not in place,
17 any level of radiation that you think would be
18 appropriate to dispose of in that way?

19 WITNESS MAKHIJANI: Well, you know, this
20 is a difficult question because it involves, as I
21 said, it involves how much total amount you're talking
22 about, and what is the purpose of this thing.

23 My position on imposed radiation has been
24 very clear personally, as an individual human being.
25 This is how I think about risks, that if I believe an

1 activity is -- I don't agree with it and I believe
2 it's not socially desirable then I'm not -- and
3 somebody's imposing it on me, then the amount of risk
4 I'm willing to take is low to none depending on the
5 activity.
6 Whereas when there's an activity that
7 either I see as a necessary evil like driving cars,
8 because you know, it's creating risks or creating
9 global warming or whatever, you try to minimize your
10 impact on your neighbors and your kid s and try to
11 work to socially reduce it in the future.
12 So I don't think there's a good general
13 answer I can give you to this question. That's why I
14 think this thing needs a specific proceeding. If I
15 had a simple answer for you I would have given it to
16 you.
17 MR. CURTISS: Well, let me get right to
18 there point. Whether it's called below regulatory
19 concern or free release or clearance, the notion of a
20 level below which it needn't be disposed of in a low
21 level radioactive waste facility, isn't it a fact that
22 not just you but your organization has consistently
23 and for a long time opposed the establishment of any
24 such standard?
25 WITNESS MAKHIJANI: Yes, I have -- well,

1 you know, I've from time to time supported people who
2 have opposed a standard. I can't say that it's been
3 very high on our horizon.
4 But from time to time I have sent letters
5 and so on saying for various reasons that below
6 regulatory -- the free release standards should not be
7 established because what I have seen of the process
8 doesn't seem very good and sound and protective to
9 public health to me.
10 MR. CURTISS: So the suggestion that there
11 ought to be a standard that's generically applied is
12 really a diversion because the fact of the matter is
13 you don't think there's any acceptable standard. Is
14 that correct?
15 WITNESS MAKHIJANI: No, what I've asked --
16 I didn't say generically for iron and steel to build
17 bridges and make spoons for kids, which is a lot of
18 what is at issue in the BRC question that you asked me
19 about, would I want my daughter to me wearing dentures
20 made out of slightly radioactive steel in which
21 somebody -- you know, that's a different question than
22 am I willing to contemplate a process in which a HF
23 neutralized with one ppm could be put in a landfill in
24 substantial quantities.
25 I'm willing to contemplate a process to

1 consider the latter, and an environmental outcome in
2 which it might be allowed. I can envision that. I
3 can envision society deciding that just as I can
4 envision society deciding four milligram for drinking
5 water or 25 milligram for activity that I don't
6 personally support but there's been a process, we've
7 gone through the rules, we all are kind of in the
8 public arena with our positions.
9 But I recognize the legitimacy of the
10 process. I certainly don't recognize the legitimacy
11 of a process in which Oakridge would release nickel
12 that would wind up in my daughter's teeth, sorry.
13 MR. CURTISS: And in the interim you've
14 heard the testimony here of the previous panels and
15 the reference to Exhibit 77 and 78, which are the
16 Department of Health and Environment in South
17 Carolina, it is in fact permissible, you may not agree
18 with the process, but it is in fact permissible to
19 make these determinations on a case by case basis as
20 those two exhibits reflect, and as the testimony
21 indicated yesterday, this material has actually been
22 disposed of in municipal landfills.
23 Now you may disagree with that but the
24 regulator responsible for applying the standard has
25 allowed this to be disposed of on the basis that it's

1 far below any level that they think ought to be
2 disposed of in a low level radioactive waste disposal
3 facility.
4 WITNESS MAKHIJANI: Yes, and I think --
5 well, LES has not taken the trouble to go get the
6 permit. And I note that when you talked in New Mexico
7 you didn't talk with the State Government even though
8 you had plenty of opportunity to do so, having
9 negotiated a rather complicated agreement with them.
10 It seems to have been a topic that was
11 sort of rather assiduously avoided. And you went to
12 the Lea County landfill to get an estimate, but didn't
13 go to the State of New Mexico environment department
14 to see if they would permit it knowing that they may
15 have slight allergy to this question of disposing of
16 radioactive wastes from this plant within the borders
17 of the state.
18 I can't second guess why you did or did
19 not do it. I'm simple noting here that you didn't do
20 it. And I'm encouraging you to do so. And until you
21 do that you have to assume that it'll be in a low
22 level waste landfill.
23 MR. CURTISS: Dr. Makhijani, I don't have
24 any further questions.
25 CHAIR BOLLWERK: All right. Turn then to

1 the Staff.

2 EXAMINATION BY MS. CLARK OF:

3 ARJUN MAKHIJANI

4 MS. CLARK: Yes. I just have a brief --

5 just a few questions for you, Dr. Makhijani. First of

6 all I'd like you to -- do you have the LES Exhibits

7 there?

8 WITNESS MAKHIJANI: I have only the

9 NIRS/PC exhibits, I believe.

10 MS. CLARK: Because I would like to have

11 you look at LES Exhibit 115.

12 WITNESS MAKHIJANI: One fifteen.

13 MR. SMITH: There should be a notebook up

14 there with those exhibits in there.

15 MS. CLARK: If you'll take a look you may

16 recall this. I think we've discussed this before in

17 the testimony. And this relates to the issue we've

18 been discussing which is the cost of neutralization of

19 the HF to produce calcium fluoride versus the cost of

20 selling HF.

21 WITNESS MAKHIJANI: Yes, I don't recall.

22 This is a very recent document.

23 MS. CLARK: Yes.

24 WITNESS MAKHIJANI: If I might take a

25 minute --

1 MS. CLARK: Certainly.

2 WITNESS MAKHIJANI: -- to look at it.

3 (Pause.)

4 WITNESS MAKHIJANI: Yes.

5 MS. CLARK: I'd like to direct your

6 attention to the paragraph that is under the caption

7 bulk HF. And the first sentence reads the facilities

8 and equipment necessary to produce bulk HF for sale

9 are substantially greater in size and cost than the

10 facilities to neutralize the HF.

11 Dr. Makhijani, do you have any reason to

12 believe that that statement is not correct?

13 WITNESS MAKHIJANI: I don't see a

14 letterhead. Who was this --

15 MS. CLARK: I don't recall. Perhaps --

16 WITNESS MAKHIJANI: I don't see -- I don't

17 recall this letter. I've been kind of traveling a lot

18 recently, and this is a very recent item. I'm sorry

19 that I can't remember having reviewed it.

20 And I don't see who has produced this or

21 any letterhead or --

22 MS. CLARK: Yes, do you -- I don't know --

23 MR. CURTISS: Yes, I can clarify that it

24 was addressed yesterday by Mr. Schneider. The

25 gentleman's experience is reflected in the first

1 paragraph of this letter.

2 And he's an individual with Fleur that is

3 an expert in this area, but his background and

4 experience is reflected in that first paragraph.

5 JUDGE ABRAMSON: Provided by him as an

6 employee of Fleur, or provided by him as an

7 individual?

8 MR. CURTISS: I believe as an employee of

9 Fleur.

10 WITNESS MAKHIJANI: It's not on Fleur

11 letterhead.

12 JUDGE ABRAMSON: It's an e-mail as I

13 recall. Or was it a letter?

14 MR. CURTISS: No it's actually a letter.

15 We can confirm that. But in any event, Dr. -- Mr.

16 Schneider described yesterday the gentleman's

17 background and his expertise.

18 And he's been involved in this area as he

19 described in the first paragraph. His affiliation is

20 less important than the expertise that he --

21 MS. CLARK: Right.

22 MR. CURTISS: -- has set forth in the

23 first paragraph.

24 MS. CLARK: And Dr. Makhijani, I'm not

25 asking you to testify to the authenticity of this

1 letter.

2 CHAIR BOLLWERK: It's been admitted into

3 evidence, so that's not an issue.

4 MS. CLARK: Yes. I'm just asking if you

5 have any reason to believe that that statement is not

6 accurate.

7 WITNESS MAKHIJANI: Well, that's -- I

8 wasn't questioning the authenticity of the letter,

9 Your Honor. I was just -- I haven't -- this was faxed

10 to Winston and Strawn October 17th.

11 I haven't had a chance to review this.

12 And so it's a complicated letter on complicated

13 subject about which a lot has been said. And I just

14 need a little more time to digest it.

15 It's -- and I need to know what is, you

16 know, where it came from in technical terms, not in

17 sort of logistical terms.

18 MS. CLARK: But based on first impression

19 and based on your knowledge, do you have any reason to

20 think that's not accurate?

21 WITNESS MAKHIJANI: What's not accurate?

22 MS. CLARK: That the facilities and

23 equipment necessary to produce bulk HF for sale are

24 substantially greater in size and cost than the

25 facilities to neutralize HF?

1 WITNESS MAKHIJANI: Well I think this is,
2 to use a term that's been mentioned earlier in
3 testimony, is conflating two different issues. The
4 bulk HF is going to be produced in a deconversion
5 facility.
6 There's no question about that. So we're
7 not talking about dispensing with bulk HF production.
8 Bulk HF goes with the territory of deconversion, so I
9 don't see where these two issues -- this is a
10 technical non-sequitur so far as I can see.
11 MS. CLARK: Well, it seems very simple to
12 me. It seems we're talking about on one hand
13 facilities and equipment that are necessary to produce
14 it for sale, and on the other hand those that are
15 necessary to neutralize the HF.
16 WITNESS MAKHIJANI: But they're two
17 separate things.
18 MS. CLARK: Exactly. And they're
19 comparing the cost and size.
20 WITNESS MAKHIJANI: Well, I don't
21 understand the point -- this is not even apples to
22 oranges. This is apples to peanuts. We're producing
23 bulk HF in a deconversion plant.
24 You have to produce it. You have to
25 handle it. That's like a bulk HF production plant

1 that had the complication of having uranium associated
2 with it.
3 So I don't see what it has to do in fact.
4 If you have to have any facilities for neutralization,
5 my point is you have to build them whether they're
6 small or big.
7 And we're not saying that it's a big cost,
8 we're saying it's a small cost. It's [redacted] Eurocents.
9 JUDGE ABRAMSON: I think Mr. -- Dr.
10 Makhijani, what we heard yesterday, if I can help
11 straighten out where Counsel for the Staff is going
12 with this, what I think we heard yesterday was that
13 there are some extra costs associated with the fact
14 that you now want to mark a DHF, and that does relate
15 it to storing it in special storage containers and
16 monitoring it.
17 And I was under the impression that those
18 were the costs that would be eliminated if one
19 converted it. Is that correct, Mr. Krich?
20 (No verbal response.)
21 JUDGE ABRAMSON: Okay, so --
22 MS. CLARK: Well, I'll move on.
23 WITNESS MAKHIJANI: Your honor, may I
24 respond to --
25 JUDGE ABRAMSON: Yes, that's what we want

1 to get --

2 WITNESS MAKHIJANI: -- my understanding as

3 to what I've been testifying since the question arose,

4 and maybe we can clear it up right here.

5 JUDGE ABRAMSON: Yes, please.

6 WITNESS MAKHIJANI: I have pretty much the

7 same understanding. And if these are the extra costs,

8 so if you're eliminating monitoring, if you're

9 eliminating the extra safeguards that the --

10 JUDGE ABRAMSON: The monitoring and the

11 special storage --

12 WITNESS MAKHIJANI: Special storage and

13 all those things, but monitoring being the component

14 that I want to --

15 JUDGE ABRAMSON: Right.

16 WITNESS MAKHIJANI: -- stress at the

17 moment, if you're monitoring the HF for sale than you

18 can certify it's less than one ppm. We already heard

19 from one of the experts, I believe an NRC expert, I'm

20 not sure, I'm mixing them up, that you could have

21 process upsets, you could have times when you had more

22 than one ppm.

23 So -- and I think it's much more unlikely

24 that you have that if you have a customer at the other

25 end than a landfill. And so what I'm simply saying is

1 you can't take credit for the cost margin of a lower
2 cost of not monitoring and so on and so on, and then
3 also say you're going to put it in a landfill.
4 What I'm saying is if you're going to put
5 it in the landfill you're going to have to pretend
6 that you're producing it for the market because it has
7 to be that clean, and it has to be that monitored.
8 JUDGE ABRAMSON: And I understand that.
9 And I guess we'll hear from Mr. Krich, I hope, before
10 we shut down for the day about what costs they thought
11 were eliminated and --
12 JUDGE KELBER: Well, I would like to
13 return to the earlier point that I was trying to
14 elicit from you, that there's a different chemical
15 process involved which makes a separation.
16 The uranium will by enlarge turn up, from
17 the dirty hydrogen fluoride, turn up in the water. You
18 just evaporate the water. Take the uranium leavings
19 and put them into making green vases.
20 The question is, in other words, you are
21 assuming that the chemical process does not produce
22 the necessary separation. It's not clear to me that
23 that is the case.
24 It may be, but in view of the free
25 energies involved I doubt it.

1 WITNESS MAKHIJANI: Your Honor, I don't
2 think I'm assuming that. What I'm saying --
3 JUDGE KELBER: I think you are, sir. You
4 don't have to start -- it is possible to use a
5 chemical process to do a separation.
6 WITNESS MAKHIJANI: Yes, Your Honor. If
7 I might clarify what I said, I did hear you. And the
8 -- what I'm going to is that there's going to be --
9 and I haven't examined this, as I said earlier,
10 there's going -- if you're not monitoring a product
11 there's going to be some variability in the product.
12 We haven't established what that is. I
13 don't know what measures are taken when you get more
14 than one ppm. This is an average number over some
15 time of stuff that's been marketed.
16 We don't know what was sent around or what
17 might have been neutralized. It's just a lot of
18 unknowns.
19 JUDGE KELBER: My question to you -- let
20 me put it a little differently. Is it possible to
21 have a chemical process which makes an effective
22 separation between uranium and the calcium fluoride?
23 WITNESS MAKHIJANI: Well that is --
24 hydrofluoric acid I presume you meant.
25 JUDGE ABRAMSON: Between uranium and the

1 fluorine.

2 WITNESS MAKHIJANI: And the fluorine.

3 Yes, obviously it is because it is being done.

4 JUDGE KELBER: Thank you.

5 MS. CLARK: I don't want to belabor this

6 but I do want to direct your attention to the next

7 sentence and then I will stop. The next sentence

8 reads HF produced for sale would require additional

9 filtration and certification steps not required if the

10 HF were being neutralized.

11 Now Dr. Makhijani, do you have any reason

12 to believe that that is not correct?

13 WITNESS MAKHIJANI: No, I don't.

14 MS. CLARK: Okay, thank you. Then -- next

15 I'd like to discuss your rebuttal testimony. And if

16 you would like to refer to is I'm going to discuss

17 your testimony beginning on page -- I'm sorry, your

18 direct testimony beginning on page 13.

19 WITNESS MAKHIJANI: My direct testimony?

20 MS. CLARK: Now if you want I'll just --

21 WITNESS MAKHIJANI: No, let me just open

22 it up, Ms. Clark.

23 MS. CLARK: Okay.

24 WITNESS MAKHIJANI: Yes.

25 MS. CLARK: Okay. As I read your

1 testimony, you're saying that the only option
2 considered by the NRC for disposal of calcium fluoride
3 is disposal at a low level waste facility.
4 The alternative of an industrial landfill
5 was not considered. And there's no legal or technical
6 basis for the NRC to grant a license for the LES plant
7 on the basis if industrial landfill disposal.
8 WITNESS MAKHIJANI: Do I have the same
9 pagination? Maybe I'm --
10 MS. CLARK: Perhaps --
11 WITNESS MAKHIJANI: I have --
12 MS. CLARK: Now I'm not reading -- I'm not
13 quoting.
14 WITNESS MAKHIJANI: Oh, you're not
15 quoting?
16 MS. CLARK: I am paraphrasing.
17 WITNESS MAKHIJANI: I'm sorry. I was
18 trying to find --
19 MS. CLARK: I'm sorry.
20 WITNESS MAKHIJANI: -- the words. Those
21 were your words, not mine --
22 MS. CLARK: Those were my words, I'm
23 sorry.
24 WITNESS MAKHIJANI: -- for the record.
25 MS. CLARK: I'm wondering if that's a

1 correct representation.

2 WITNESS MAKHIJANI: I can't -- if you

3 could point to what I said I'd be happy to comment on

4 it.

5 MS. CLARK: Okay, let's start on page 13.

6 WITNESS MAKHIJANI: Okay.

7 MS. CLARK: Where you say the disposal of

8 the calcium fluoride as low level waste was the only

9 option considered by the NRC Staff in either the DEIS

10 or FEIS for the proposed NEF, and thus must be the

11 choice of the applicant.

12 WITNESS MAKHIJANI: Yes.

13 MS. CLARK: Then I move on to page 14 at

14 the second paragraph. It says an alternative of an

15 industrial landfill has not been considered by the NRC

16 and no environment impacts of such an option have been

17 evaluated, hence there is no legal or technical basis

18 for the NRC to grant a license for the LES plant on

19 the basis of industrial landfill disposal of calcium

20 fluoride.

21 WITNESS MAKHIJANI: Yes.

22 MS. CLARK: And what I'd like to ask you

23 is what is the basis for your conclusion that there is

24 no legal grounds for the NRC to grant a license for

25 the LES plant on the basis of industrial landfill

1 disposal?

2 WITNESS MAKHIJANI: My answer of course is

3 not as a lawyer, but as somebody who has studied the

4 regulations for a long time and testified to them from

5 a technical point of view --

6 MS. CLARK: Let me stop you there.

7 WITNESS MAKHIJANI: -- and as familiar

8 with the NEPA process.

9 MS. CLARK: Let me stop you there, Dr.

10 Makhijani.

11 WITNESS MAKHIJANI: Yes.

12 MS. CLARK: Do you consider yourself an

13 expert on legal matters.

14 WITNESS MAKHIJANI: I am an expert on the

15 regulations.

16 MS. CLARK: You consider yourself an

17 expert on the -- NRC's regulations?

18 WITNESS MAKHIJANI: Yes. Many of -- not

19 all of them, certainly.

20 MS. CLARK: And on what do you base your

21 expertise?

22 WITNESS MAKHIJANI: I base my expertise on

23 the knowledge of the technical matters, on the

24 knowledge of the regulatory process, on the study of

25 the document, on analysis of the documents, on

1 independent studies, on my expertise in those --

2 MS. CLARK: Well, have you read all the --

3 WITNESS MAKHIJANI: May I finish my

4 answer, Ms. Clark?

5 MS. CLARK: I'm sorry.

6 WITNESS MAKHIJANI: On my expertise in

7 regard to dosimetry matters, on my expertise in regard

8 to the NEPA process and commenting, and how decisions

9 are made in the context of the NEPA process.

10 I've been part of the radiation advisory

11 committee of the EPA, on the subcommittee for setting

12 cleanup standards of the EPA. I've testified about

13 NRC regulations in court lawsuits and been accepted as

14 an expert, so I believe there shouldn't be a question

15 about my expertise in this area, at least so far as

16 I'm concerned.

17 MS. CLARK: Well, you've described a lot

18 of technical expertise. But wouldn't you consider

19 interpretation of regulations a legal matter?

20 WITNESS MAKHIJANI: Well, interpretation

21 of regulations is a legal as well as a technical

22 matter. And I'll give you an example as to something

23 I testified recently.

24 It came up -- in 1959 10 CFR 20 was

25 modified to prohibit incineration of radioactive

1 waste. And I was asked to testify whether the burning
2 of sodium in the sodium burning ground at a facility
3 in California was incineration.
4 And of course incineration is not a legal
5 matter, it is a chemical matter. And so
6 interpretation of the regulation does require some
7 technical expertise.
8 That's why I was there as a technical
9 expert and a lawyer didn't testify to it.
10 JUDGE ABRAMSON: Counsel, let me suggest
11 that rather than pursue whether he's a lawyer or not
12 you ask him what the foundation was for his position
13 that there -- that NRC didn't have a basis.
14 Maybe there's a sound technical
15 foundation, maybe there isn't. But why don't you go
16 that path instead of whether he's a lawyer.
17 MS. CLARK: All right. What is your basis
18 in law for this conclusion.
19 WITNESS MAKHIJANI: Well, my -- as I
20 testified just now, there is no free release standard
21 and there is no general rule for below regulatory
22 concern.
23 For large amounts of calcium fluoride
24 there are site specific regulations for particular
25 facilities as I've acknowledged and I think as

1 testimony has been presented.

2 It's my view -- so there's a two part

3 answer. The first part is it's my view that you could

4 not dispose of large amounts of calcium fluoride

5 unless a specific regulatory process has been gone

6 through, as I just responded with Mr. Curtiss.

7 He could go to the State of New Mexico and

8 ask them for a permit under their regulations.

9 They're not an agreement state, so I presume that they

10 would have to come to this body.

11 The other issue involved here is that

12 there isn't a below regulatory concern rule, and

13 there's no general process under which this is

14 decided.

15 This is material coming out of a nuclear

16 facility. And under -- I do not see how a record of

17 decision can be made about -- from a NEPA process in

18 which the alternative has not even been examined in

19 the NEPA process.

20 So far as I know you have to make -- and

21 you can correct me in regard to the law, but it is my

22 understanding that the technical alternatives do have

23 to be put on the table.

24 And their environmental impacts have to be

25 examined before a decision can be made about a

1 particular course of action that impacts public
2 health.
3 And I don't see that it has been done in
4 this case.
5 JUDGE ABRAMSON: Counsel, the Board is
6 capable of weighing his testimony, Dr. Makhijani's
7 testimony, in it's context and with his credentials.
8 And I don't think you need to pursue whether he's a
9 lawyer too far.
10 MS. CLARK: Okay, then I will conclude my
11 cross examination at this point.
12 CHAIR BOLLWERK: All right. Let me see
13 then if there's any what we'll call redirect, as it
14 were.
15 MR. LOVEJOY: Well, no redirect.
16 CHAIR BOLLWERK: All right. No other
17 questions from any of the parties, then?
18 MR. CURTISS: I just want to clarify for
19 the record that the letter from John Smets --
20 CHAIR BOLLWERK: Yes.
21 MR. CURTISS: -- Exhibit number 115 was
22 written in his personal capacity, not in his capacity
23 as an employee of Fleur.
24 CHAIR BOLLWERK: All right. So it's a
25 personal letter, which is why it doesn't have a

1 letterhead on it apparently.

2 MR. CURTISS: Yes, sir.

3 CHAIR BOLLWERK: All right. All right,

4 thank you for clarifying that for us.

5 JUDGE ABRAMSON: Before we go any farther

6 and before Dr. Makhijani leaves, perhaps Mr. Curtiss,

7 you could put Mr. Krich back on and clarify this

8 question of what got traded for what when they were

9 looking at elimination of some items related to HF

10 storage and monitoring and putting in some items

11 related to CaF creation?

12 MR. CURTISS: Without asking him, I'm sure

13 he's be enthusiastic to walk through that again.

14 MR. LOVEJOY: Your Honor, we've been going

15 for a couple of hours now. Is it okay -- time for a

16 short break?

17 CHAIR BOLLWERK: Yes, absolutely. We

18 should have offered one. I'm glad you asked. So

19 let's go ahead and take a ten minute break.

20 (Whereupon, the above-entitled matter

21 went off the record at 5:15 p.m. and

22 went back on the record at 5:30 p.m.)

23 CHAIR BOLLWERK: Okay. Let's go ahead and

24 go back on the record, please. All right. We're

25 dealing with, I guess, sort of concluding

1 deconversion.

2 And I think Mr. Krich is here. Sorry

3 about the request of the Board I think is the polite

4 way to put it. So sir, you have already been sworn

5 and you remain under oath.

6 WITNESS KRICH: Yes, sir.

7 JUDGE ABRAMSON: Okay. Want me to tackle

8 this? Mr. Krich, the question that seems to be

9 lingering here is when LES tried to determine a

10 capital cost of the deconversion facility there were

11 some facilities included in the underlying estimate

12 from Cogema that related to HF which LES deemed would

13 be unnecessary and would be replaced by other

14 facilities relating to conversion to CaF.

15 Can you tell us as much detail as you can

16 about what those facilities were and what they were

17 worth, and then second we'll address this question of

18 purity if there's any information you can give us on

19 it.

20 WITNESS KRICH: Yes. We didn't look at

21 actual dollar values. We did a qualitative assessment

22 of the extra tankage, the ventilation, plumbing, and

23 environmental monitoring, and extra monitoring of the

24 actual product that would have to take place for the

25 HF relative to basically the simple kiln that's needed

1 and other associated piping and appurtenances that
2 would be needed to neutralize the HF coming right from
3 the process stream.
4 JUDGE ABRAMSON: So the thought was you'd
5 have HF coming right straight out of the process, and
6 instead of pumping it out into tanks --
7 WITNESS KRICH: With special ventilation.
8 So in other words the monitoring to make sure of the
9 purity would still be there, but you would neutralize
10 it as part of the process stream.
11 JUDGE ABRAMSON: Okay. So there's no
12 change in the purification level of the HF, you're
13 simply eliminating equipment and manpower necessary or
14 associated with taking the HF at the end of it's
15 purification stream and pumping it off and storing it
16 on site and waiting for the buyer to want it as a --
17 and instead of that you're substituting an equipment
18 chain that feeds the HF and lime into a kiln and
19 converts it to CaF?
20 WITNESS KRICH: Pretty much, which
21 includes the monitoring. You have to monitor. We're
22 going to have to know what the product contains.
23 So the monitoring stays -- there's
24 additional monitoring for the CMTR. If you're
25 familiar with CMTRs that you have to give when you buy

1 materials.

2 JUDGE ABRAMSON: I'm not.

3 WITNESS KRICH: It's certificate,

4 basically, that certifies that this material is the

5 purity that the client has asked. There's additional

6 monitoring over and above what we would be required

7 for regulatory purposes in order to sell this to a --

8 sell the HF at a particular purity to a client.

9 So that's the extra monitoring we're

10 talking about. But we're not going to take off -- you

11 can't take off the monitoring to determine how much

12 uranium is in the product.

13 JUDGE ABRAMSON: Okay. So -- and when you

14 did that analysis that's the equipment that you looked

15 at qualitatively, say subjectively, to look at

16 substituting that equipment.

17 And it was your and your teams engineering

18 judgment that cost of the CaF related equipment was

19 comparable to or less than the cost of the HF storage

20 and monitoring related equipment.

21 WITNESS KRICH: Yes, Judge.

22 JUDGE ABRAMSON: Okay.

23 WITNESS KRICH: And we checked with Mr.

24 Harding. We spoke with Dr. Harding about that asking

25 for his opinion and then we got this additional

1 information from Mr. Smets who has significant
2 background in this area.
3 JUDGE ABRAMSON: Okay. That's all I
4 wanted to clarify. Mr. Lovejoy, do you want to pursue
5 this?
6 MR. LOVEJOY: Just a little bit. Do you
7 have NIRS/PC Exhibit 233 nearby, Mr. Krich? I'm
8 looking at the page with LES-PRO 00609 in the lower
9 right corner.
10 WITNESS KRICH: Two thirty-five?
11 MR. LOVEJOY: Exhibit 233 I think it was.
12 JUDGE ABRAMSON: I thought he said -- 233
13 is what I'm opening here. It's LES-PRO 059 --
14 MR. CURTISS: So 00595 is the first page.
15 JUDGE ABRAMSON: Five, nine, five.
16 MR. CURTISS: And I'm looking at page
17 00609.
18 CHAIR BOLLWERK: This has previously been
19 admitted, so --
20 MR. LOVEJOY: Yes.
21 WITNESS KRICH: And what page?
22 MR. LOVEJOY: It's 609.
23 WITNESS KRICH: Yes.
24 MR. LOVEJOY: And I see there's a listing
25 of equipment, etcetera. And the second line in the

1 box there in the first top half of the page says HF
2 processing, HF storage, [redacted] million Euros. You see
3 that?
4 WITNESS KRICH: Yes, I do.
5 MR. LOVEJOY: Now what of that equipment
6 shown as a line item would be eliminated by the
7 decision to go to neutralization?
8 WITNESS KRICH: I don't know. I don't
9 know in detail what would be eliminated and what would
10 stay of that equipment.
11 MR. LOVEJOY: You need to -- like someone
12 said --
13 WITNESS KRICH: As I said-- excuse me.
14 Let me finish my answer. As I just testified we did
15 a qualitative assessment. So we didn't get into line
16 items for costs.
17 This gives a cost for HF processing and HF
18 storage. It includes some of the equipment and some
19 of the piping, but as far as going into the actual
20 process diagrams, the process flow diagrams, figuring
21 out which parts would go out, which parts would stay
22 in, we didn't do that.
23 MR. LOVEJOY: But as someone said, if
24 you're doing deconversion you're generating HF
25 regardless, so you need some storage facilities and

1 processing facilities even if you're going to
2 neutralize it.
3 WITNESS KRICH: Well I think that actually
4 what was asked was comparing the equipment that you
5 would need to develop or to produce HF for sale versus
6 the equipment you need to neutralize.
7 That's a big difference. You're going to
8 produce -- everyone understands that you're going to
9 produce HF. That goes without saying. The issue was
10 the equipment that you need to have to produce or to
11 sell the HF versus neutralize it.
12 That's the issue. And that's a comparable
13 issue.
14 MR. LOVEJOY: Is it that the HF for sale
15 needs to be of a specific purity?
16 WITNESS KRICH: If you're going to sell
17 it, yes.
18 MR. LOVEJOY: Do you have a number for
19 that purity?
20 WITNESS KRICH: It depends on what the
21 client is asking for.
22 JUDGE ABRAMSON: I'm sorry, but is that
23 purity different then the purity you would have for
24 the HF when you start to neutralize it?
25 WITNESS KRICH: There's -- I guess there's

1 -- you know, the purity that we're talking about for
2 the CaF is what's the uranium content.
3 JUDGE ABRAMSON: Okay.
4 WITNESS KRICH: But then, you know, when
5 you go through the process of making the HF you could
6 have 40 percent HF -- of hydrofluoric acid. I'm sorry
7 Judge.
8 You can make 40 percent hydrofluoric acid,
9 70 percent hydrofluoric acid, that's the other --
10 JUDGE ABRAMSON: I see. So there's a
11 different -- so you can take the HF that comes off and
12 turn it into CaF without worrying about what the
13 concentration is. Is that what I'm hearing?
14 WITNESS KRICH: That's my understanding.
15 I know it's --
16 JUDGE ABRAMSON: And so that what -- the
17 equipment that's being eliminated is equipment which
18 would concentrate the HF more.
19 WITNESS KRICH: Which would make the
20 aqueous hydrofluoric acid and then make the prescribed
21 purity, the level of concentration.
22 JUDGE ABRAMSON: Like -- it's like the
23 proof in alcohol?
24 WITNESS KRICH: Something like that,
25 exactly. I like to think of that, especially at this

1 time of the day.

2 JUDGE ABRAMSON: Sorry. It's getting late

3 and I'm only getting started.

4 MR. LOVEJOY: So -- but Mr. Krich, doesn't

5 the Cogema design produce 70 percent HF?

6 WITNESS KRICH: Yes. In fact not only

7 does it -- not only does the Cogema design do that,

8 but the cost of that, or the response to the RFP that

9 Cogema provided to Urenco is for a plant that will

10 produce high purity HF for sale.

11 And that's why the cost estimate that

12 Urenco has that they used in their business study

13 already includes all the extra costs, as you've --

14 thank you for pointing it out, this line item about HF

15 processing and HF storage.

16 It already includes all that extra cost

17 for producing high quality HF, hydrofluoric acid for

18 sale. Therefore it was reasonable to say that if we

19 leave that estimate as is without changing it we're

20 probably conservative with respect to a plant that's

21 going to produce calcium fluoride.

22 MR. LOVEJOY: Would you look at Exhibit

23 115, LES Exhibit 115, which Dr. Makhijani was just

24 looking at?

25 WITNESS KRICH: Is that the Smets letter?

1 MR. LOVEJOY: It is.

2 WITNESS KRICH: I have it.

3 MR. LOVEJOY: I just want to zero in on
4 some of the same language he was asked about under
5 bulk HF.

6 WITNESS KRICH: Yes?

7 MR. LOVEJOY: It says HF produced for sale
8 would require additional filtration and certification
9 steps not required if the HF were being neutralized.

10 You've just been referring to that
11 phenomenon, right?

12 WITNESS KRICH: That's my understanding.

13 MR. LOVEJOY: Yes. Now if you're going to
14 be producing CaF2 from the HF, by a subsequent step,
15 of a purity low enough so that it could be disposed of
16 in a solid waste landfill, would you not need to
17 purity it to this extent also?

18 WITNESS KRICH: Mr. Lovejoy, you're mixing
19 some things here, I think. In making the HF acid
20 there are steps that you need to take. And I'm not an
21 expert in this area.

22 But I understand there are steps that you
23 need to take to attain the required purity. If we're
24 going to neutralize the HF in the process stream, then
25 the purity issue that we're concerned about is the

1 contamination of uranium.

2 So the other issues don't enter into this.

3 And I think that point -- I'm sorry, Judge, go ahead.

4 JUDGE ABRAMSON: I am just going to say it

5 sounds to me like in the absence of a process expert

6 this is the level of information we're going to get.

7 WITNESS KRICH: Yes, we had -- Mr.

8 Schneider was the process expert here yesterday.

9 MR. LOVEJOY: But the additional

10 filtration would remove some of the uranium, would it

11 not?

12 WITNESS KRICH: No, not that I'm aware of.

13 These are not -- the type of filters we're talking

14 about here are not that level of filter. To filter

15 out uranium from a liquid process stream, first you

16 have to precipitate it.

17 We're not -- you have to add potassium

18 nitrate in order to precipitate out the uranium.

19 That's not part of the process.

20 MR. LOVEJOY: That's all I have.

21 CHAIR BOLLWERK: Thank you very much.

22 WITNESS KRICH: Thank you.

23 CHAIR BOLLWERK: All right, ready for

24 transportation?

25 MR. CURTISS: We're ready to go if you

1 are.

2 CHAIR BOLLWERK: I think my colleagues may

3 not be as anxious as I am.

4 MR. CURTISS: We would be -- in the

5 subject the Board desires, we could proceed with the

6 introduction of the Exhibits this evening in the

7 testimony if you like, or we could defer that until

8 tomorrow.

9 CHAIR BOLLWERK: The only problem with

10 that is then you have a split transcript.

11 MR. CURTISS: That's fine.

12 CHAIR BOLLWERK: And generally for both

13 the purposes -- for your all's purposes and purposes

14 of Appellate review it makes it just simpler if it's

15 all together, simply if we know we're not going to get

16 significantly into the cross examination, which it

17 doesn't seem likely at this point.

18 Let me ask a couple procedural questions

19 here. The first is I understood that we had a

20 potential motion that we were going to be getting.

21 Okay, and that's there.

22 MR. CURTISS: yes.

23 CHAIR BOLLWERK: Looking at the schedule

24 it would appear that we could certainly do

25 transportation, assuming the cross examination stays

1 somewhat on track as terms of the estimates we're
2 given tomorrow morning.
3 Then we get into disposal, and finally the
4 contingency. Is there any reason to try to move
5 contingency up and do both transportation and
6 contingency tomorrow so that we can make sure we
7 finish those and then have the bulk of the time for
8 disposal, or is there anyone concerned we're not going
9 to be done by Friday afternoon?
10 MR. CURTISS: I'd be surprised if we're
11 not done by Friday afternoon.
12 CHAIR BOLLWERK: All right.
13 MR. CURTISS: But I would propose from our
14 perspective we think the transportation issue in so
15 far as our cross examination of Dr. Makhijani will
16 take no more than 15 minutes.
17 CHAIR BOLLWERK: All right.
18 MR. CURTISS: The issue is fairly focused.
19 CHAIR BOLLWERK: All right.
20 MR. CURTISS: And I wouldn't expect our
21 witness to be on subject of cross examination by Mr.
22 Lovejoy for any length of time. So I would we could
23 finish transportation in an hour.
24 JUDGE ABRAMSON: And move right straight
25 into something else.

1 MR. CURTISS: And I think we're prepared
2 to move into disposal.
3 CHAIR BOLLWERK: All right.
4 MR. CURTISS: And the contingency factor
5 which applies to all three logically fits at the end.
6 But I think we could certainly finish disposal
7 tomorrow too, or I hope we would.
8 JUDGE ABRAMSON: That would be good,
9 certainly maybe if we were to commit to try to finish
10 it tomorrow it might provide some incentive that we're
11 staying until midnight or we're going to get it done
12 before midnight, which as you know has been my
13 pension. Let's march on.
14 CHAIR BOLLWERK: Right. I mean again, the
15 concern -- I guess -- this has taken about a day and
16 a half and it was slightly less than that in terms of
17 the estimates that we got.
18 Disposal's approximately the same, and
19 again, if that runs over we are into Friday at that
20 point. But if we are, we are. I would be concerned
21 if we're not going to get done by Friday.
22 Obviously I dot want to -- everyone would
23 like to go home for the weekend. But -- you're right,
24 it is. Tuesday is gone and Wednesday is coming.
25 I'm just -- I'm looking ahead here, so I'm

1 being the pessimist, that's all. But if the parties
2 at this point feel that were in good shape to finish
3 certainly by Friday then we'll go from here and
4 proceed with transportation tomorrow and then move
5 into disposal.
6 MR. CURTISS: Yes. I think the disposal
7 issue has been narrowed by the Commission's decision.
8 And depending upon the resolution of the waiver maybe
9 further narrowed -- the pleading we just filed, but we
10 can't presuppose that.
11 But I think from our perspective we would
12 hope to be able to finish my Thursday, well within
13 close of business.
14 CHAIR BOLLWERK: All right. Anyone else
15 want to say anything about scheduling at this point?
16 (No verbal response.)
17 CHAIR BOLLWERK: No? All right.
18 Again, we would anticipate taking up this
19 motion I guess at the beginning of the disposal
20 portion of the proceeding unless someone else tells us
21 something else tomorrow that would move it up or back
22 for some reason, but that would seem to be the most
23 logical.
24 JUDGE ABRAMSON: can we start early
25 tomorrow?

1 CHAIR BOLLWERK: We'll start at nine.
2 That's what we set it for. I think that's a --
3 probably as good a time as any.
4 So all right, let me then see if there's
5 any other points anyone has procedurally we need to
6 take care of this evening.
7 Any other concerns? I think we've gotten
8 the direct examination and the rebuttal we needed.
9 All right, everything's all right with that. All
10 right then, it's about quarter to six.
11 We will be clearing -- closing up the
12 courtroom a little after six o'clock, so you're
13 welcome to do what you need to do to get cleaned up,
14 but after that we will be shutting it down.
15 We appreciate all your efforts today.
16 This -- we finished this first issue and we -- I know
17 I was talking with Judge Abramson during the break and
18 he feels that he's gotten a lot of good information
19 today from all the parties, feels much more
20 comfortable with the situation in this particular
21 issue right now.
22 So anyway, I would thank you again, and
23 we'll see you in the morning at nine. Thank you very
24 much.
25 Off the record.

1 (Whereupon, at 5:45 p.m., the above-
2 entitled matter was adjourned, to be resumed October
3 26th at 9 a.m.)
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25