UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

G. Paul Bollwerk, III, Chairman
Dr. Paul B. Abramson
Dr. Charles N. Kelber

In the Matter of	Docket No. 70-3103-ML
LOUISIANA ENERGY SERVICES, L.P.	ASLBP No. 04-826-01-ML
(National Enrichment Facility)	June 6, 2006

MEMORANDUM
(Notice Regarding Issuance of Redacted
Partial Initial Decision on Safety-Related Contentions)

In a May 31, 2006 memorandum, the Licensing Board advised the parties that it was issuing that date a partial initial decision ruling on the three safety-related contentions jointly submitted by intervenors Nuclear Information and Resource Service and Public Citizen (NIRS/PC) -- NIRS/PC Environmental Contention (EC)-3/Technical Contention (TC)-1 – Depleted Uranium Hexafluoride [(UF_6)] Storage and Disposal; NIRS/PC EC-5/TC-2 – Decommissioning Costs; and NIRS/PC EC-6/TC-3 – Costs of Management and Disposal of Depleted UF_6 -- that were the subject of October 2005 and February 2006 evidentiary hearing sessions. As the Board noted, however, the decision was being treated as not subject to public release pending review regarding whether proprietary information was used in the decision. In the decision, the Board also established a process for party input on the issue whether any information contained in the issuance needed to be afforded confidential treatment.

By a joint report dated June 6, 2006, the Board has been advised that the parties have reviewed the decision and have no objection to the Board's proposed redactions and, further,

do not propose any additional redactions. Accordingly, included as Attachment A to this memorandum is a copy of the decision, which varies from the version initially provided to the parties only in that (1) an identifying number -- LBP-06-15 -- has been added for the purpose of publication in the agency's "Nuclear Regulatory Commission Issuances"; (2) the footer "Handle as Proprietary Information Pending Review" has been replaced with "Publically-Available Version"; and (3) certain information has been redacted as indicated by "**xxxxxxx**" in the decision.

The Office of the Secretary is authorized to place the version of the Board's decision included as Attachment A into the agency's ADAMS electronic record keeping system as a publically-available document.

In addition, as applicant Louisiana Energy Services, L.P., (LES) noted in the June 6 joint report, the fact that in its partial initial decision the Board referenced transcript pages and/or exhibits the Board previously has determined should be withheld as containing proprietary information should not be construed as permitting public disclosure of any of the previously-withheld documents or portions thereof.

FOR THE ATOMIC SAFETY
AND LICENSING BOARD*

G. Paul Bollwerk, III
ADMINISTRATIVE JUDGE

Rockville, Maryland

June 6, 2006

* Copies of this memorandum and the accompanying attachment were sent this date by Internet e-mail transmission to counsel for (1) applicant LES; (2) intervenors NIRS/PC; and (3) the NRC staff.

ATTACHMENT A

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

LBP-06-15

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THIRD PARTIAL INITIAL DECISION
(Safety-Related Contentions)

-- PUBLICALLY-AVAILABLE VERSION --

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I. INTRODUCTION

1.1 On December 12, 2003, Louisiana Energy Services, L.P., (LES) filed an application with the NRC seeking a license to construct and operate a uranium enrichment facility -- designated the National Enrichment Facility (NEF) -- near Eunice, New Mexico. This third partial initial decision presents the Licensing Board's findings of fact and conclusions of law relative to the remaining contested matters proffered by intervenors Nuclear Information and Resource Service and Public Citizen (NIRS/PC), set forth in contentions NIRS/PC Environmental Contention (EC)-3/Technical Contention (TC)-1 – Depleted Uranium Hexafluoride [(UF_6)] Storage and Disposal; NIRS/PC EC-5/TC-2 – Decommissioning Costs; and NIRS/PC EC-6/TC-3 – Costs of Management and Disposal of Depleted UF_6. Each of these

admitted contentions challenges the adequacy of certain safety-related (as opposed to strictly environmental) aspects of the LES application, including its Safety Analysis Report (SAR).[1]

1.2 For the reasons set forth below, the Board finds that, in the face of the NIRS/PC safety-related challenges to the LES application reflected in (1) contention NIRS/PC EC-3/TC-1, which challenges LES's private deconversion strategy; (2) those portions of contention NIRS/PC EC-5/TC-2 that challenge the adequacy of LES's transportation cost estimate associated with the deconversion and disposal of depleted uranium (DU) tails generated by the NEF and the contingency factor applied to its overall dispositioning cost estimate; and (3) paragraph E (calcium fluoride (CaF_2) disposal costs), paragraph G (plausibility of LES's private deconversion strategy), and paragraph I (plausibility of engineered trench disposal) of contention NIRS/PC EC-6/TC-3, LES has carried its burden of proof to demonstrate the adequacy of that application in accordance with 10 C.F.R. §§ 30.35, 40.36, and 70.25, and the relevant guidance in NUREG-1757.[2] Regarding, however, the challenges to (1) LES's cost

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[1] Although each of the contentions we address in this partial initial decision was originally denominated an environmental/technical contention, the issues actually litigated relative to each of those contentions focused primarily on safety and technical matters. To the extent environmental issues are raised or addressed herein, our National Environmental Policy Act (NEPA)-related discussions in our two previous partial initial decisions provide context for those issues. See LBP-06-08, 63 NRC 241, 258-60 (2006); LBP-05-13, 61 NRC 385, 403-05 (2005).

[2] Throughout this decision, we use several terms -- namely, decommissioning, disposition(ing), deconversion, and disposal -- that all relate in some manner to the ultimate decommissioning of the NEF facility. To avoid confusion, we find it instructive to define those terms as we use them herein. As defined by 10 C.F.R. § 70.4, to decommission a facility "means to remove a facility or site safely from service and reduce residual radioactivity to a level that permits – (1) Release of the property for unrestricted use and termination of the license; or (2) Release of the property under restricted conditions and termination of the license." As relevant here, decommissioning includes decontamination of the proposed NEF facility and site, and dispositioning the DU produced by the NEF. Dispositioning, in turn, includes both deconversion of the DU, i.e., converting the DU from the chemical form DUF_6 to a (continued...)

estimate for private sector deconversion of DU from the NEF as set forth in contention NIRS/PC EC-5/TC-2 and paragraph G of contention NIRS/PC EC-6/TC-3; and (2) its cost estimate for disposal of NEF-generated DU as set forth in contention NIRS/PC EC-5/TC-2 and paragraph I of contention NIRS/PC EC-6/TC-3, the Board finds that LES has failed to carry its burden to demonstrate the adequacy of those cost estimates in accordance with 10 C.F.R. §§ 30.35, 40.36, and 70.25, and the relevant guidance in NUREG-1757. As a consequence, LES having failed to provide a comprehensive cost estimate regarding private sector disposition of NEF-related DU tailings, the Board concludes that for purposes of fulfilling the financial assurance/decommissioning funding plan (DFP) requirements of 10 C.F.R. §§ 30.35, 40.36, and 70.25, and the relevant guidance in NUREG-1757, agency licensing of the NEF facility should be based on the cost estimates that would be applicable under the plausible strategy associated with the United States Department of Energy (DOE) providing dispositioning services in accordance with section 3113 of the USEC Privatization Act, 42 U.S.C. § 2297h-11.

II. PROCEDURAL BACKGROUND

2.1 The Licensing Board has discussed the procedural history of the contested portion of this proceeding on several prior occasions, including in the context of our first and second partial initial decisions on environmental contentions, see LBP-06-8, 63 NRC 241, 250-58 (2006); LBP-05-13, 61 NRC 385, 392-402 (2005), and will not repeat that discussion here. Rather, to provide context for this third partial initial decision, we focus below on the

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[2](...continued)
more stable uranium oxide form, and ultimate disposal of that deconverted depleted uranium oxide at a low-level radioactive waste disposal facility.

history of this proceeding relative to several safety-related contentions championed by NIRS/PC.

A. Contention Admission

2.2 On January 30, 2004, the Commission issued a notice of hearing and opportunity to intervene in the proceeding regarding the December 2003 application for a thirty-year 10 C.F.R. Part 70 license to construct and operate the proposed NEF. See CLI-04-3, 59 NRC 10 (2004) (69 Fed. Reg. 5873 (Feb. 6, 2004)). NIRS/PC, as well as two state governmental intervenors, the New Mexico Environment Department (NMED) and the Attorney General of New Mexico (AGNM), responded to that notice by filing petitions to intervene pursuant to 10 C.F.R. § 2.309(a). See LBP-05-13, 61 NRC at 392. The Commission found that, as situs state government representatives, the New Mexico petitioners did not need to demonstrate their standing to intervene. Additionally, the Commission concluded that NIRS/PC had demonstrated the requisite standing and, accordingly, referred the AGNM, NMED, and NIRS/PC petitions to the Licensing Board Panel for consideration. See id. at 393. On April 15, 2004, this Licensing Board was constituted to preside over the LES adjudicatory proceeding, see id. at 392, and on June 15, 2004, the Board held a prehearing conference in Hobbs, New Mexico, during which the petitioners, LES, and the staff made oral presentations regarding the admissibility of each contention submitted by NMED, the AGNM, and NIRS/PC, including the three safety-related contentions at issue here, see LBP-04-14, 60 NRC 40, 52 (2004).

2.3 In their original forms as set forth in NIRS/PC's intervention petition,[3] the three NIRS/PC safety-related contentions at issue here provide as follows:

> NIRS/PC EC-3/TC-1 – DEPLETED URANIUM HEXAFLUORIDE STORAGE AND DISPOSAL
>
> CONTENTION: Petitioners contend that LES does not have [a] sound, reliable, or plausible strategy for disposal of the large amounts of radioactive and hazardous Depleted Uranium Hexafluoride ("DUF_6") waste that the operation of the plant would produce. See NRC Order, 69 Fed. Reg. 5873, 5877 (Feb. 6, 2004).
>
> * * * * *
>
> NIRS/PC EC-5/TC-2 – DECOMMISSIONING COSTS
>
> CONTENTION: 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 SAR 10.0 through 10.3; [Environmental Report (ER)] 4.13.3. Petitioners contest the sufficiency of such presentations.
>
> * * * * *
>
> NIRS/PC EC-6/TC-3 – COSTS OF MANAGEMENT AND DISPOSAL OF DEPLETED UF_6
>
> CONTENTION: Petitioners contend that LES's application seriously underestimates the costs and the feasibility of managing and disposing of the depleted UF_6 ("DUF_6") produced in the planned enrichment facility.

Id. at 67-69.[4]

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[3] The original contentions were further clarified by a Board-requested supplement to NIRS/PC's petition and a Board prehearing conference scheduling order, but none of these changes altered the substance of the contentions presented in the original intervention petition. See LBP-05-13, 61 NRC at 392-93.

[4] In addition to the three contentions that are the subject of the instant decision, the Board heard presentations on several other safety-related contentions proffered by NMED, the (continued...)

2.4 On July 19, 2004, the Board issued a memorandum and order admitting NMED, the AGNM, and NIRS/PC as parties to the proceeding, each having established the requisite standing to intervene and having proffered at least one admissible contention. See id. at 48. Specifically, the Board held that contention NIRS/PC EC-6/TC-3 was admissible as supported by bases sufficient to establish a genuine material dispute adequate to warrant further inquiry. See id. at 69. NIRS/PC EC-3/TC-1 was admitted to the extent that it averred LES did not have a plausible strategy for private sector disposal of DU, in that LES had provided a "grossly inadequate" statement regarding access to an exhausted uranium mine for disposal of DU; had provided a statement regarding discussions with COGEMA[5] concerning a private deconversion facility that were without substance; and had failed to address DU disposition based on the assumption that deep geologic disposal is required. See id. at 78. In addition, because the ruling admitting this contention raised a novel legal or policy question regarding the status of DU as low-level waste, the Board referred this ruling to the Commission pursuant to 10 C.F.R. § 2.323(f). See id. at 67. Finally, regarding contention NIRS/PC EC-5/TC-2, the Board found it admissible to the extent it challenged the sufficiency of the LES cost estimates as "based on a

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[4](...continued)
AGNM, or NIRS/PC, including contentions NMED TC-3/EC-4 – Radiation Protection Program, AGNM TC-i – Disposal Security, AGNM TC-ii – Disposal Cost Estimates, and NIRS/PC EC-9/TC-6 – Natural Gas-Related Accident Risks. See LBP-04-14, 60 NRC at 61, 62-63, 70-71. Each of these contentions, although subsequently admitted by the Board, since has been disposed of in some manner. The resolution of those issue statements are discussed in more detail below. See infra note 11 (contention NIRS/PC TC-6 withdrawn pursuant to parties' May 23, 2005 joint report); infra note 13 (contentions NMED TC-3/EC-4, AGNM TC-i, and AGNM TC-ii withdrawn pursuant to settlement agreement).

[5] COGEMA's corporate structure and relationship to LES is discussed further below, see infra pp. 49-50 and note 33.

contingency factor that is too low, a low estimate of the cost of capital, and an incorrect assumption the costs are for low-level waste only." Id. at 68.

2.5 To reflect these admissibility rulings, the Board set forth in Appendix A to its July 2004 ruling the following revised versions of contentions NIRS/PC EC-3/TC-1, NIRS/PC EC-6/TC-3, and NIRS/PC EC-5/TC-2:[6]

> NIRS/PC EC-3/TC-1 – DEPLETED URANIUM HEXAFLUORIDE STORAGE AND DISPOSAL
>
> CONTENTION: 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:
>
> (A) The statement (LES Environmental Report (ER) 4.13-8) that a ConverDyn partner, General Atomics, "may have access to an exhausted uranium mine . . . where depleted [uranium oxide (U_3O_8)] could be disposed" represents a grossly inadequate certitude for a "plausible strategy" determination, particularly for a radioactive and hazardous substance which has been accumulating in massive quantities in the United States for fifty-seven years without a plausible disposal program.
>
> (B) Similarly, the statement that "discussions have recently been held with [COGEMA] concerning a private conversion facility" (ER 4.13-8) is without substance.
>
> (C) The disposition of depleted uranium must be addressed based on the radiological hazards of

[6] Although, as originally admitted, contention NIRS/PC EC-5/TC-2 was consolidated with AGNM TC-i and renamed NIRS/PC EC-5/TC-2; AGNM TC-i to reflect that consolidation, because contention AGNM TC-i was later withdrawn pursuant to the AGNM's settlement agreement with LES, see infra note 13, we herein refer to this contention as NIRS/PC EC-5/TC-2.

this material that require that it be disposed of in a deep geological repository.

* * * * *

NIRS/PC EC-5/TC-2[] – DECOMMISSIONING COSTS

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 4.13.3. Petitioners contest the sufficiency of such presentations as based on (1) a contingency factor that is too low; (2) a low estimate of the cost of capital; and (3) an incorrect assumption that the costs are for low-level waste only.

NIRS/PC EC-6/TC-3 – COSTS OF MANAGEMENT AND DISPOSAL OF DEPLETED UF_6

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 ("DUF_6") produced in the planned enrichment facility in that:

(A) LES's reliance on the Lawrence Livermore National Laboratory (LLNL) Report as a basis for LES's cost estimate for deconversion and disposal is not justified given the report states its cost estimates as medians.

(B) LLNL cost estimates are based on travel distances of 1000 kilometers or 620 miles (§ 4.1.3, at 37; id. 92), but the data presented in the LES application show that travel over 1000 miles would be required to convert the DUF_6 at Paducah, Kentucky or Portsmouth, Ohio, and travel of an additional 1000 miles (Environmental Report (ER) Table 4.13-1) would be required to get the material to a disposal site.

(C) In LLNL's projections of the cost of decommissioning, it is assumed that materials such as steel used in the construction could be recycled. (See ER 4.13-17). Thus, it is assumed that such material would not constitute waste. However, such an assumption cannot be made.

(D) Significant revenues are assumed from the sale of [CaF_2]–$11.02 million per year (ER 4.13-17, Table 4.13-2; LLNL Report at 50). These assumptions are unfounded and cannot be incorporated in the calculation of the cost of decommissioning.

(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.

(F) There is an even more significant risk that the magnesium difluoride ("MgF_2") would also be contaminated. The LLNL report states that MgF_2 generated in decommissioning may be contaminated. (§ 6.3.2, at 119). Such contamination would require that such material be disposed of as radioactive waste. Such disposal would raise the cost of decommissioning by more than $400 million. (See Table 6.17, at 120).

(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.

(H) The mine disposal option advanced by LES (ER 4.13-11) *cannot be considered* plausible given the single mine identified in the application opposes use of its property and storage of the waste in a such mine will not be realistically approvable if DUF_6 is not considered low-level waste.

(I) The "engineered trench" method of waste disposal proposed by LES is not likely to be acceptable (ER 4.13-11, -19) if DUF_6 is not considered low-level waste.

Id. at 78-80.

B. Contention Amendment/Supplementation

2.6 Thereafter, NIRS/PC filed an October 20, 2004 motion seeking to amend and/or supplement certain of their admitted contentions, including the three safety-related contentions that are the subject of this decision, as follows (newly proffered material appears in **bold**):

NIRS/PC EC-3/TC-1 – DEPLETED URANIUM HEXAFLUORIDE STORAGE AND DISPOSAL

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 ("DUF_6") waste that the operation of the plant would produce.

* * * * *

(D) To show that it has a plausible strategy for disposal of depleted uranium, LES must set forth its strategy in sufficient detail so that the cost of pursuing the strategy can be estimated. LES has failed to set forth the strategy of private conversion and disposal with sufficient specificity. LES relies exclusively upon a cost estimate confirmed by Urenco, which estimate fails to describe any deconversion and disposal process

relevant to the NEF, because it involves conversion by a process not planned for use in any United States facility, and it does not involve disposal at all, but only storage of the converted DU_3O_8.

(E) It is not a plausible strategy for LES to propose to transfer DU to DOE under Sec. 3113 of the USEC Privatization Act, since it appears that the DU from the NEF would not be able to be converted in the DOE plants for several decades, and the cost of such conversion cannot be determined.

NIRS/PC EC-5/TC-2[] – DECOMMISSIONING COSTS

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 (1) a contingency factor that is too low; (2) a low estimate of the cost of capital; and (3) an incorrect assumption that the costs are for low-level waste only.

The [Draft Environmental Impact Statement (DEIS)] similarly states that the depleted uranium will be low-level radioactive waste, which is incorrect, and results in an incorrect and low estimate of disposal costs. (DEIS at 2-27, 2-31).

* * * * *

NIRS/PC EC-6/TC-3 – COSTS OF MANAGEMENT AND DISPOSAL OF DEPLETED UF_6

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 ("DUF_6") produced in the planned enrichment facility.

* * * * *

> **(J) In fact, LES does not have any relevant estimate for the cost of converting and disposing of depleted uranium, because it does not rely upon the three examples cited in the application, i.e., the [Claiborne Enrichment Center (CEC)] estimate from 1993, the LLNL Report, or the [Uranium Disposition Services (UDS)] contract. LES would not supply any estimate for dispositioning costs based on commercial contacts. LES refers only to the Urenco data from 2003 for its decommissioning and disposal cost estimate, and Urenco data are not relevant to establishment of costs in the United States.**

Licensing Board Memorandum and Order (Ruling on Late-Filed Contentions) (Nov. 22, 2004) at 12, 16 (unpublished) [hereinafter November 2004 Contention Ruling].

2.7 Relative to these NIRS/PC contention amendments, the Board found the proposed amendment to contention NIRS/PC EC-6/TC-3 admissible as sufficient to raise genuine issues of material fact adequate to warrant further inquiry, yet found it more appropriately related to NIRS/PC EC-5/TC-2 and, accordingly, admitted it as a supplement to that contention. See id. at 16-17. On the other hand, the Board found inadmissible the proffered amendments to contentions NIRS/PC EC-3/TC-1 and EC-5/TC-2. Paragraphs D and E to contention EC-3/TC-1 were found to have raised economic cost issues outside the scope of the contention, impermissibly challenged Commission regulations, and/or failed to provide adequate factual or expert opinion support. See id. at 12-14. The proposed amendment to EC-5/TC-2 once again raised the issue of whether DU constituted low-level waste, and the Board therefore declined to admit it on the ground that the issue was then

pending before the Commission, albeit in the context of contention NIRS/PC EC-3/TC-1. See id. at 16.

2.8 To reflect these rulings, the Board set forth a revised version of contention NIRS/PC EC-5/TC-2,[7] which stated:

> NIRS/PC EC-5/TC-2[] – DECOMMISSIONING COSTS
>
> 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 (1) a contingency factor that is too low; (2) a low estimate of the cost of capital; (3) an incorrect assumption that the costs are for low-level waste only; and (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.

See id. app. A at 2-3.

2.9 On January 18, 2005, the Commission issued its ruling on the Board-referred question as to whether DU constitutes low-level waste, concluding that, consistent with the Low-Level Radioactive Waste Policy Act, DU is properly considered low-level radioactive waste.[8]

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[7] Whether and to what degree the AGNM would have had the opportunity to participate relative to the amendment to this contention, or for that matter any future amendments proffered solely by NIRS/PC, is not a matter we need resolve given the AGNM subsequently withdrew from the proceeding. See infra note 13.

[8] The Commission also noted the narrow scope of its ruling, stating that "the only question to be answered is whether depleted uranium is a low-level radioactive waste, not whether it meets one of the particular low-level waste classifications, or whether a near-surface disposal facility will be adequate." CLI-05-5, 61 NRC 22, 34 (2005). The Commission further made clear that its decision did not resolve the question whether DU from the NEF would meet the 10 C.F.R. Part 61 regulatory requirements for near-surface disposal of that material, and that it "should not be read to intimate any Commission view on this issue, which relates both to the plausibility of LES's proposed private disposal options, and to financial assurance -- issues (continued...)

See CLI-05-5, 61 NRC 22, 34 (2005). With that ruling, the Commission reversed the Board's admission of paragraph C of contention NIRS/PC EC-3/TC-1. See id. at 36.

2.10 On February 2, 2005, NIRS/PC once again filed a motion seeking to amend previously-admitted contentions, purportedly on the basis of newly available information stemming from the Commission's low-level waste ruling in CLI-05-5, as well as a January 7, 2005 LES response to a staff Request for Additional Information (RAI). See Licensing Board Memorandum and Order (Ruling on NIRS/PC Late-Filed Contentions and Providing Administrative Directives) (May 3, 2005) at 4 (unpublished) [hereinafter May 2005 Contention Ruling]. As relevant here, NIRS/PC sought to amend NIRS/PC EC-3/TC-1 and NIRS/PC EC-5/TC-2, as follows (newly proffered material appears in **bold**):

> NIRS/PC EC-3/TC-1 – DEPLETED URANIUM HEXAFLUORIDE STORAGE AND DISPOSAL
>
> CONTENTION: Petitioners contend that Louisiana Energy Services, L.P. (LES) does not have a sound, reliable, or plausible strategy for 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:
>
> * * * * *
>
> **(D) LES has not presented any reasonable or credible plan for deconversion, transportation, and disposal that meets the Commission's standards for a "plausible strategy." LES has only stated cost estimates for deconversion, transportation, and disposal, without showing the elements of the plan to which such estimates apply or identifying the sources of the estimates.**

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[8](...continued)
that remain before the Board" in the context of contentions NIRS/PC EC-5/TC-2 and NIRS/PC EC-6/TC-3. Id. at 35 & n.64.

LES has no adequately described decommissioning strategy.

(E) Methods of disposal of depleted uranium described by LES or referred to by Commission Staff in the Draft Environmental Impact Statement, such as shallow land disposal or burial in an abandoned mine, do not constitute a plausible strategy, because such proposed methods would fail to meet applicable health requirements, such as the Commission's standards for disposal of low-level radioactive waste.

NIRS/PC EC-5/TC-2[] – DECOMMISSIONING COSTS

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 (1) a contingency factor that is too low; (2) a low estimate of the cost of capital; (3) an incorrect assumption that the costs are for low-level waste only; and (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, 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 and contain no factual bases or documented support. The amounts of the 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, are greatly inadequate to achieve safe management and disposal of depleted uranium and cannot be the basis for financial assurance.

Id. at 6, 11-12.

2.11 The Board once again declined to admit any amendment to NIRS/PC EC-3/TC-1 as failing to meet the late-filing criteria and general admissibility requirements set forth in 10 C.F.R. § 2.309(c) and (f), respectively. Specifically, NIRS/PC did not establish good cause to excuse the untimely filing as to either paragraph D or E, in that neither CLI-05-5 nor the LES RAI response provided a basis for those paragraphs and the information actually relied upon had been available to NIRS/PC for some time, and further failed to make a compelling showing as to the remaining late-filing criteria sufficient to outweigh the lack of good cause. See id. at 7-8. Even assuming that the proffered amendments were not barred by the fact of their late filing, the Board found paragraph D inadmissible as raising economic cost issues outside the scope of the contention,[9] and further determined that paragraph E failed to establish any genuine material dispute with the LES application or the Draft Environmental Impact Statement and sought to raise matters previously rejected by the Board or already admitted in the context of contention NIRS/PC EC-6/TC-3.[10] See id. at 9.

2.12 As to the proffered amendment to contention NIRS/PC EC-5/TC-2, the Board found that amendment admissible as supported by basis A to that contention, which relied on new information made available in the LES RAI response, sufficient to raise a genuine issue of material fact adequate to warrant further Board inquiry. See id. at 12-13. As to asserted bases B through J, the Board found those were barred by the fact of their late filing as well as

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[9] More specifically, as the Board noted in the context of its November 2004 ruling on a similar cost-related amendment to this contention proffered by NIRS/PC, while the issues of plausibility and cost are undoubtedly related inquiries, the Board expected to deal thoroughly with cost-related challenges in the context of other admitted NIRS/PC contentions regarding decommissioning funding. See November 2004 Contention Ruling at 13.

[10] Relative to contention NIRS/PC EC-3/TC-1, the Board also revised the text of that contention to delete paragraph C to reflect the Commission's low-level waste ruling in CLI-05-5. See May 2005 Contention Ruling at 9.

substantively inadmissible in that they relied on several posited "disposal scenarios" that conflicted with or contradicted the Commission's low-level waste ruling in CLI-05-5. See id. To reflect those rulings, the Board set forth the following revised version of contention NIRS/PC EC-5/TC-2:

> NIRS/PC EC-5/TC-2[] – DECOMMISSIONING COSTS
>
> 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 (1) a contingency factor that is too low; (2) a low estimate of the cost of capital; (3) an incorrect assumption that the costs are for low-level waste only; and (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, 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.

See id. app. A.

2.13 In addition, in Part III of that May 3 contention ruling, the Board directed the parties to address several issues related to case management and other administrative matters pertaining to the conduct of the evidentiary hearing on the safety-related contentions, particularly given the degree of overlap on cost-related and financial assurance matters within those contentions. As is relevant here, the Board requested that the parties determine: (1) an

appropriate constant dollar regime (e.g., year 2005 dollars) and waste disposal amounts (e.g., cost per ton) for comparison of cost estimates; and (2) whether, because of the degree of overlap of issues between the contentions, evidentiary presentations on those contentions might be consolidated to address those cross-cutting issues. See May 2005 Contention Ruling at 15-17. On May 23, 2005, the parties filed a joint report indicating, among other things, that evidentiary presentations on those financial assurance-related contentions would be consolidated to the extent practicable, see Joint Report in Response to the Licensing Board's May 3, 2005 Administrative Directives (May 23, 2005) at 5, and that the parties intended to present their cost-related testimony "principally in terms of the unit cost of dispositioning NEF-generated depleted uranium, stated in year 2004 dollars per kilogram of depleted uranium (kgU)," id. at 2.[11]

2.14 Thereafter, on May 16, 2005, NIRS/PC filed two separate motions, again seeking admission of amendments to contentions NIRS/PC EC-3/TC-1 and EC-5/TC-2, asserting that continuing disclosures by LES, including a memorandum of agreement (MOA) between LES and Waste Control Specialists (WCS) regarding LES's strategy for disposal of DU, provided new information on which their proffered amendments appropriately were based. See Licensing Board Memorandum and Order (Ruling on NIRS/PC Late-Filed Contention Amendments) (June 30, 2005) at 4-5 (unpublished) [hereinafter June 2005 Contention Ruling]. In addition, on May 20, 2005, NIRS/PC filed a second motion for the admission of additional bases in support of the amendment to NIRS/PC EC-5/TC-2 proffered in their May 16 motion.

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[11] In addition, in that joint report NIRS/PC counsel notified the Board that NIRS/PC were withdrawing from the proceeding contention NIRS/PC TC-6. See May 2005 Contention Ruling at 5.

See id. at 4-5. Specifically, NIRS/PC sought to amend those contentions as follows (newly proffered material appears in **bold**):

> NIRS/PC EC-3/TC-1 – DEPLETED URANIUM HEXAFLUORIDE STORAGE AND DISPOSAL
>
> CONTENTION: Petitioners contend that Louisiana Energy Services, L.P. (LES) does not have a sound, reliable, or plausible strategy for 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:
>
> * * * * *
>
> **(C) The disclosure by LES that it now apparently plans to dispose of depleted U_3O_8 in the near-surface disposal site of Waste Control Specialists ("WCS") indicates that LES has chosen a disposal strategy that the Commission could not consider plausible, because the application filed by WCS for a license to dispose of low-level radioactive waste does not consider the disposal of bulk DU_3O_8, and shows that WCS lacks the necessary understanding of uranium to enable it to project the performance of a nuclear waste disposal site, to manage uranium bearing wastes, or even to accept waste in a reliable and safe manner that would ensure that WCS understood that the shipments were in compliance with waste acceptance criteria and that the waste did not contain non-permitted materials.**
>
> NIRS/PC EC-5/TC-2[] – DECOMMISSIONING COSTS
>
> 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 (1) a

> contingency factor that is too low; (2) a low estimate of the cost of capital; (3) an incorrect assumption that the costs are for low-level waste only; and (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, 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.
>
> **Since January 7, 2005, LES has presented additional material to the Commission Staff concerning the costs of dispositioning of depleted uranium. However, the supplemental material fails to explain or support the cost estimates offered by LES. LES has not shown that its cost estimates account for several factors that must be considered in estimating the cost of dispositioning of depleted uranium, including the likely unsuitability of depleted uranium for near-surface disposal, scaling of cost estimates to fit facilities that would meet the needs of the NEF, exchange rate uncertainties, emerging scientific information on potential uranium risks, and licensing delays.**

Id. at 7, 13.

2.15 After receiving responses from LES and the staff as to the admissibility of the proffered contention amendments, the Board issued a June 30, 2005 ruling in which it declined to admit these requested amendments to either contention NIRS/PC EC-3/TC-1 or contention NIRS/PC EC-5/TC-2. As to EC-3/TC-1, the Board found that it was barred by its nontimely filing, in that, among other things, the MOA between LES and WCS was the only document that legitimately related to the proposed amendment, and that document became available well before the date of NIRS/PC's motion to amend that contention. See id. at 8-9. The Board

further found that even if the amendment were not barred by its late filing, because the proffered amendment contested the sufficiency of a WCS license application seeking to dispose of low-level radioactive waste that was properly before the Texas Commission on Environmental Quality (TCEQ), the Board does not have jurisdiction over that application and hence its sufficiency is a matter outside the scope of this proceeding.[12] See id. at 10-11. Finally, the Board noted that the potential use of WCS as a disposal site and the related cost estimates on which LES relied to support its own decommissioning cost estimates were certainly relevant in the context of admitted contention NIRS/PC EC-5/TC-2 given the close relationship between the requirement that LES demonstrate a "plausible strategy" for disposal and the costs associated with decommissioning funding. See id. at 12.

2.16 With regard to the proposed amendment to contention NIRS/PC EC-5/TC-2, the Board determined that to the degree it related to material matters within the scope of the proceeding, the amendment did not add anything to the previously-admitted contention that required rewording of the contention. See id. at 14. In other words, because the Board had previously admitted an amendment to EC-5/TC-2 alleging a lack of support for LES cost estimates for deconversion, transportation, and disposal of DU from the NEF relative to its decommissioning funding plan, it would consider any relevant information placed before it on the matters raised by that contention without the need for further modification. See id. at 14-15.

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[12] The Board also noted that although contention EC-3/TC-1 concerned LES's potential private strategies for disposal by two companies -- ConverDyn and COGEMA -- that LES expressly relied on to support its Environmental Report-espoused "preferred option" for private sector dispositioning of the DU waste from the NEF, to the Board's knowledge neither of those options had been further developed by LES, nor did the staff rely on or discuss either of those options in its Final Environmental Impact Statement. See June 2005 Contention Ruling at 11-12. The Board therefore directed LES to provide the Board with a filing indicating whether it continued to rely on the ConverDyn or COGEMA disposal options as a basis for its required plausible strategy showing. See id. at 12. We discuss this issue further infra at note 15.

The Board also made clear, however, that to the extent the proffered amendment to EC-5/TC-2 raised issues that the Board had previously determined were not admissible, those matters would not be litigable in the context of that contention.[13] See id. at 14 & n.13.

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[13] Apparently contemporaneously with the Board's consideration of these latest NIRS/PC motions to amend certain of their previously-admitted safety-related contentions, LES and the two New Mexico state governmental parties were in the midst of concluding settlement negotiations. On June 23, 2005, NMED, the AGNM, and LES filed with the Board a joint motion requesting approval of a settlement agreement between those parties, and asking the Board to accept the withdrawal of NMED and the AGNM from the proceeding and to dismiss the admitted contentions sponsored by those parties, namely NMED TC-3/EC-4, AGNM TC-i, and AGNM TC-ii. See Joint Motion for Approval of Settlement Agreement (June 23, 2005) [hereinafter First Settlement Motion]. Under the terms of the proposed agreement, LES generally agreed to (1) add certain license conditions to any NEF license that would, among other things, place time and quantity limitations on the storage and/or disposal of depleted uranium hexafluoride (DUF_6) generated at the proposed NEF; (2) limitations regarding financial assurance required for the disposition of the DUF_6, including the decommissioning cost estimate; and (3) permit, under certain specified conditions, NMED's participation in NRC-led inspections of the NEF's radiation protection program. See id. at 1-2.

In a July 5, 2005 response to the settlement motion, the staff requested that the Board not approve the agreement based on the staff's view that the settlement agreement did not represent all affected parties because its consent and approval was not obtained, and because the agreement included unenforceable conditions to the NEF license. See Licensing Board Memorandum and Order (Approving Settlement Agreement and Accepting Withdrawal of Parties) (Aug. 12, 2005) at 2. In their response that same day, NIRS/PC did not expressly object to the terms of the proposed settlement, but requested that the Board consider the staff's objections and further ensure that NIRS/PC's interests would not be affected by any settlement agreement between other parties to the litigation. See id.

Thereafter, with the Board's leave, the parties attempted to resolve the staff's concerns and on July 27, 2005, NMED, the AGNM, and LES filed a joint motion requesting approval of a revised settlement agreement, which the staff indicated in a July 29, 2005 response addressed its previously-expressed concerns. See id. According to the staff the agreement (1) assured the agreed-upon license conditions would be enforceable by the NRC and are sufficiently unambiguous and specific to permit NRC inspectors to determine whether LES is in compliance with a particular condition; and (2) made clear the NRC only has the authority to enforce the terms of any NEF license and the conditions thereto, not the terms of any agreement between LES and the New Mexico parties. See id. at 6. In addition, the staff noted that under the revised settlement agreement terms, any access by NMED to the NEF for inspection purposes is permitted only to the extent allowed by a specific agreement between the NRC and the State of New Mexico. See id. For their part, NIRS/PC in their August 1, 2005 response repeated

(continued...)

2.17 Following staff issuance on June 15, 2005, of its Final Environmental Impact Statement (FEIS) for the NEF, NIRS/PC once again filed a motion, dated July 5, 2005, requesting that the Board admit amendments to contentions NIRS/PC EC-3/TC-1 and EC-5/TC-2, as well as a new contention NIRS/PC EC-9 that challenged the staff's evaluation in the FEIS of DU disposal impacts. See Licensing Board Memorandum and Order (Ruling on Motion to Admit Late-Filed Amended and Supplemental Contentions) (Aug. 4, 2005) at 5-6 (unpublished) [hereinafter August 2005 Contention Ruling]. In essence, the proffered amendments to EC-3/TC-1 and EC-5/TC-2 raised similar issues to those previously brought before the Board in the context of, variously, NIRS/PC's October 2004, February 2005, and May 2005 contention motions, including presenting challenges to the WCS application pending before the TCEQ; the viability of Envirocare of Utah, a licensed low-level waste disposal facility, as a disposal site for DU from the NEF; and the adequacy of LES's consideration of certain factors in calculating its decommissioning cost estimates. See id. at 8-9, 14-16. The proposed amendment to EC-5/TC-2 also raised for the first time, however, the issue of the adequacy of dispositioning cost estimates provided by DOE to LES. See id. at 15-16. Contention EC-9, on

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[13](...continued)
their belief that the revised settlement agreement did not facially prejudice NIRS/PC, but requested that the Board ensure that their interests would not be impacted by the settlement agreement and, further, that the agreement would not restrict the authority of any State of New Mexico agency to raise future issues relative to the proposed NEF. See id. at 7.

The Board subsequently issued an August 12, 2005 memorandum and order in which, finding its actions in the public interest, it (1) approved the settlement agreement; (2) accepted the withdrawal of NMED and the AGNM from the proceeding; (3) dismissed admitted NMED and AGNM contentions NMED TC-3/EC-4 – Radiation Protection Program, and AGNM TC-ii – Disposal Cost Estimates from the proceeding; and (4) modified contention NIRS/PC EC-5/TC-2; AGNM TC-i – Decommissioning Costs, to delete the words "AGNM TC-i" from the contention's title. See id. at 7-8. A copy of the settlement agreement is included as an attachment to that Board memorandum and order. See id. att.

the other hand, asserted claims that had been previously raised in the context of admitted contention NIRS/PC EC-4 – Impacts of Waste Storage and Disposal, namely that the staff's analysis in the FEIS of the impacts of DU disposal was inadequate.[14] See id. at 22-23.

2.18 In a memorandum and order issued August 4, 2005, the Board found, in sum, each of the amendments to EC-3/TC-1 and EC-5/TC-2, as well as new contention EC-9, inadmissible because, to the extent they were not barred by their late filing under section 2.309(c), each of the proffered challenges failed to satisfy the substantive admissibility standards of section 2.309(f). See id. at 27. Specifically, as to EC-3/TC-1, proffered paragraph D once again challenged the sufficiency of the WCS application, a matter the Board found to be outside its jurisdiction and, accordingly, outside the scope of the proceeding, while paragraph E was found impermissibly to challenge Commission regulations and/or failed to contain adequate factual or expert opinion support. See id. at 12-13.[15] Relative to EC-5/TC-2,

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[14] The Board ruled on a majority of the substantive issues raised by proffered contention NIRS/PC EC-9 in the context of its second partial initial decision relative to contention NIRS/PC EC-4, as remanded. See LBP-06-8, 63 NRC at 269-87.

[15] Noting that, based on a July 25, 2005 LES clarification regarding its private sector "plausible strategy," LES no longer intended to rely on the "ConverDyn" geologic repository option that was the subject of paragraph A of this contention as originally admitted, see Final Response of [LES] to Licensing Board Request for Clarification Regarding Applicant's Private Sector "Plausible Strategy" for Disposition of Depleted Uranium (July 25, 2005) at 2, the Board dismissed that portion of the contention as moot and revised the contention to read:

> NIRS/PC EC-3/TC-1 – DEPLETED URANIUM HEXAFLUORIDE STORAGE AND DISPOSAL
>
> 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 ("DUF_6") waste that the operation of the plant would produce in that the statement that "discussions have recently been held with

(continued...)

the Board concluded paragraphs C and D raised issues that had previously been admitted to the proceeding and so did not require further revision of the contention, or reiterated matters the Board had previously rejected as inadmissible on various grounds, such as issues related to the WCS application and to the appropriate contingency factor to be applied to the LES decommissioning cost estimate. See id. at 19-21. In addition, because LES need only present one "plausible strategy," the Board found the particular suitability of the WCS or Envirocare facilities outside the scope of the proceeding. See id. at 20. As to the portion of proffered paragraph C and paragraph E, in its entirety, that challenged the cost estimates and supporting information provided by DOE to LES, the Board found those matters were not subject to challenge in this proceeding given that DOE is statutorily obligated by section 3113 of the USEC Privatization Act, 42 U.S.C. § 2297h-11, to accept DU waste from the NEF at LES's request and can set a rate of reimbursement for such disposal at whatever level it deems appropriate. See id. at 21-22. Finally, as to NIRS/PC EC-9, which ultimately challenged the purported lack of a site-specific NEPA-related impacts analysis of the WCS and Envirocare sites, the Board found that matter outside the scope of the proceeding and thus not material in that such a review should appropriately be conducted in connection with the license application for the specific disposal facility.[16] See id. at 25-26.

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[15](...continued)
[COGEMA] concerning a private conversion facility" (ER 4.13-8) is without substance.

August 2005 Contention Ruling app. A.

[16] Although the Board referred its rulings on each of the proffered challenges to the Commission pursuant to 10 C.F.R. § 2.323(f), in an October 19, 2005 memorandum and order, the Commission declined review of those Board-referred matters. See CLI-05-21, 62 NRC 538 (2005).

C. Contention Merits Adjudication

2.19 Several days after this final Board ruling regarding contentions admissibility, in an effort to streamline the upcoming evidentiary hearing on the remaining contested issues in this proceeding, LES and NIRS/PC submitted a joint stipulation with respect to contentions NIRS/PC EC-5/TC-2 and EC-6/TC-3. Specifically, those parties agreed that NIRS/PC would withdraw: (1) subparts one, two, and three of the first paragraph of contention NIRS/PC EC-5/TC-2, except that the first clause was withdrawn "only to the extent that it challenges the adequacy of the 25% contingency factor applied by LES to its estimated facility decommissioning costs," but not as to its adequacy as applied to LES's DU disposition costs; and (2) paragraphs A, B, C, D, and H of contention NIRS/PC EC-6/TC-3, i.e., leaving only paragraphs E, G, and I in contest, given NIRS/PC had withdrawn paragraph F in the context of a prior stipulation.[17] See Stipulation Between [LES] and NIRS/PC Concerning Contentions NIRS/PC EC-5/TC-2 and NIRS/PC EC-6/TC-3 (Aug. 11, 2005) at 2 & n.2 (citing Stipulation Between [LES] and [NIRS/PC] Concerning Contention NIRS/PC EC-6/TC-3) [hereinafter August 2005 Stipulation].

2.20 Thereafter, on September 15, 2005, NIRS/PC and the staff, and on September 16, 2005, LES, filed with the Board prefiled direct testimony relative to four general

[17] In return, LES agreed that it would not (1) rely on the mine disposal option to demonstrate its private sector strategy; (2) adduce as evidence, relative to its disposition cost estimate, cost information from the CEC proceeding, the 1997 LLNL report, or the UDS contract; (3) in presenting cost estimates for facility decommissioning, take credit for any salvage value of materials; and (4) in presenting its deconversion cost estimate, take credit for any sales of byproducts, such as calcium fluoride. See Stipulation Between [LES] and NIRS/PC Concerning Contentions NIRS/PC EC-5/TC-2 and NIRS/PC EC-6/TC-3 (Aug. 11, 2005) at 1-2. In addition, NIRS/PC agreed that it would not challenge the adequacy of LES's cost estimate for NEF facility decommissioning (as opposed to dispositioning NEF-related DU). See id. at 2.

subject matter areas: (1) deconversion plausibility and cost; (2) transportation cost; (3) disposal plausibility and cost; and (4) contingency factor.[18] In response to the NIRS/PC prefiled direct testimony, LES and the staff filed motions in limine seeking to exclude portions of the prefiled testimony of NIRS/PC witness Dr. Arjun Makhijani and, for its part, LES renewing an August 31, 2005 motion to dismiss contention NIRS/PC EC-3/TC-1 in its entirety and to dismiss the portion of NIRS/PC EC-5/TC-2 that challenged the adequacy of the contingency factor applied to LES's dispositioning cost estimate for DUF_6. See Licensing Board Memorandum and Order (Ruling on In Limine Motions and Motion to Dismiss) (Oct. 4, 2005) at 1-2 (unpublished). The Board declined to dismiss any of NIRS/PC's contentions or portions thereof, but ruled in favor of striking certain portions of Dr. Makhijani's prefiled direct testimony to the degree it fell outside the scope of any admitted contention. See id. at 2-17.

2.21 On October 11, 2005, NIRS/PC, LES, and the staff submitted prefiled rebuttal testimony as to each identified subject matter area and, in addition, NIRS/PC filed revised versions of Dr. Makhijani's prefiled direct testimony pursuant to the Board's October 4 in limine rulings. Thereafter, LES and the staff each filed a motion seeking exclusion of certain exhibits purportedly relevant to Dr. Makhijani's prefiled direct testimony, and subsequently filed in limine motions relative to Dr. Makhijani's prefiled rebuttal testimony and associated evidentiary materials. On October 20, 2005, the Board granted the motions relative to Dr. Makhijani's prefiled rebuttal testimony in part, striking those portions of his testimony that fell outside the scope of any admitted contention and/or the permissible scope of rebuttal testimony. See

[18] Because of the degree of overlap and interrelation between the three remaining contentions, the parties proposed to present, and the Board agreed to hear, testimony and evidence using a topical subject matter approach rather than contention by contention. See Licensing Board Memorandum and Order (Regarding Administrative Matters Relative to October 2005 Evidentiary Hearing) (Sept. 14, 2005) at 1-2 (unpublished).

Licensing Board Memorandum and Order (Ruling on In Limine Motions Regarding Prefiled Exhibits and Rebuttal Testimony) (Oct. 20, 2005) at 2-7 (unpublished). With regard to the NIRS/PC prefiled exhibits, the Board essentially ruled that any exhibits not cited in Dr. Makhijani's prefiled direct or rebuttal testimony would not be admitted in support of that testimony, but could feasibly be used for the purposes of cross-examination or oral surrebuttal testimony. See id. at 8-9.

2.22 On October 24-27, 2005, the Board held the scheduled evidentiary hearing on the remaining admitted NIRS/PC contentions,[19] see Tr. at 1738-3179, and on November 30, 2005, pursuant to 10 C.F.R. § 2.712 and the general schedule set forth in an August 12, 2005 Board issuance, see Licensing Board Memorandum and Order (Memorializing Results of Prehearing Conference) (Aug. 12, 2005) at 3 (unpublished), LES, the staff, and NIRS/PC filed proposed findings of fact and conclusions of law regarding the contentions litigated at that hearing. See Proposed Findings of Fact and Conclusions of Law Submitted on Behalf of Intervenors [NIRS/PC] Based Upon Evidence Taken on October 24-27, 2005 (Nov. 30, 2005) [hereinafter NIRS/PC Proposed Findings]; [LES] Proposed Findings of Fact and Conclusions of Law Concerning Contentions NIRS/PC EC-3/TC-1, EC-5/TC-2, EC-6/TC-3, and EC-4 (As Remanded) (Nov. 30, 2005) [hereinafter LES Proposed Findings]; NRC Staff's Proposed Finding of Fact and Conclusions of Law Concerning NIRS/PC Contentions [EC-3/TC-1], [EC-5/TC-2], [EC-6/TC-3], and [EC-4] (Nov. 30, 2005) [hereinafter Staff Proposed Findings]. Thereafter, each of the parties similarly filed reply findings of fact and conclusions of law in accordance with the Board's schedule, in which each party responded to the proposed findings

[19] The Board also heard evidentiary presentations relative to remanded contention NIRS/PC EC-4, a matter we discussed in detail in our second partial initial decision. See LBP-06-8, 63 NRC at 255-56, 270-71.

and conclusions proffered by the other parties. See [LES] Reply Findings of Fact and Conclusions of Law Concerning Contentions NIRS/PC EC-3/TC-1, EC-5/TC-2, EC-6/TC-3, and EC-4 (As Remanded) (Dec. 23, 2005) [hereinafter LES Reply Findings]; Reply Proposed Findings of Fact and Conclusions of Law Submitted on Behalf of Intervenors [NIRS/PC] Based Upon Evidence Taken on October 24-27, 2005 (Dec. 22, 2005) [hereinafter NIRS/PC Reply Findings]; NRC Staff Reply Findings of Fact Concerning NIRS/PC Contentions [EC-3/TC-1], [EC-5/TC-2], [EC-6/TC-3], and [EC-4] (Dec. 22, 2005) [hereinafter Staff Reply Findings].

2.23 Following the October evidentiary hearing, LES submitted a letter dated November 23, 2005 to the staff providing additional clarifying information on two cost-related issues raised during the hearing, namely the potential costs of managing empty DUF_6 cylinders and the manner in which LES accounted for the cost of capital associated with construction of a deconversion facility. See Licensing Board Memorandum and Order (Ruling on Motion to Supplement Record) (Dec. 13, 2005) at 1 (unpublished) [hereinafter Record Supplementation Ruling]. LES subsequently filed a motion with the Board, seeking to supplement the evidentiary record of the October hearing with a copy of that November 23 letter, denominated LES Exhibit 118. See id. The staff did not object to LES's motion, but NIRS/PC objected on the grounds that it had not been provided an opportunity to challenge the sufficiency or validity of the information offered by LES. See id. at 1-2. The Board agreed that fairness dictated that NIRS/PC should have an opportunity to contest the newly-proffered material via their own testimony and evidentiary material and through cross-examination of LES and staff witnesses, and established a schedule relative to a supplemental evidentiary hearing that was ultimately held on February 13, 2006. See id. at 3-4; see also Tr. at 3255-498.

2.24 Prior to the February supplemental hearing, the parties filed another round of prefiled direct testimony relative to the two cost-related matters at issue, which LES followed with a motion in limine relative to NIRS/PC witness Makhijani's testimony seeking to strike portions of that testimony as outside the scope of the issues for the supplemental hearing, see Licensing Board Memorandum and Order (Ruling on In Limine Motion) (Jan. 11, 2006) at 1 (unpublished). In its January 11, 2006 ruling on the motion, the Board granted in part LES's motion relative to Dr. Makhijani's testimony on the cost of capital issue, but declined to strike any of the testimony related to cylinder management. See id. at 3-7. Thereafter, LES, the staff, and NIRS/PC submitted prefiled rebuttal testimony, and NIRS/PC also filed a revised version of Dr. Makhijani's prefiled direct testimony to reflect the Board's in limine rulings. LES again moved to exclude as irrelevant portions of Dr. Makhijani's prefiled rebuttal testimony, a motion that the Board granted in part. See Licensing Board Memorandum and Order (Ruling on In Limine Motion) (Jan. 25, 2006) (unpublished). As noted above, the Board subsequently conducted a one-day supplemental evidentiary hearing on the cost of capital and cylinder management issues. See Tr. at 3255-498.

2.25 Finally, on February 28 and March 1, 2006, NIRS/PC, and LES and the staff, respectively, filed supplemental proposed findings of fact and conclusions of law relative to the issues litigated at the February 2006 hearing, see Proposed Findings of Fact and Conclusions of Law Submitted on Behalf of Intervenors [NIRS/PC] Based upon Evidence Taken on February 13, 2006 (Cost of Capital, Cylinder Management) (Feb. 28, 2006) [hereinafter NIRS/PC Supplemental Proposed Findings]; [LES] Proposed Findings of Fact and Conclusions of Law Concerning Cost of Cylinder Management and Cost of Capital Issues (Mar. 1, 2006); NRC Staff's Proposed Findings of Fact and Conclusions of Law Concerning Clarifying

Information Relating to the Cost Estimate of Deconversion (Mar. 1, 2006), followed by reply findings of fact and conclusions of law, see [LES] Reply Findings of Fact and Conclusions of Law Concerning Cost of Cylinder Management and Cost of Capital Issues (Mar. 17, 2006) [LES Supplemental Reply Findings]; NRC Staff's Reply Findings of Fact and Conclusions of Law Concerning Clarifying Information Relating to the Cost Estimate of Deconversion (Mar. 17, 2006); Reply Proposed Findings of Fact and Conclusions of Law Submitted on Behalf of Intervenors [NIRS/PC] Based upon Evidence Taken on February 13, 2006 (Cost of Capital, Cylinder Management) (Mar. 17, 2006). Finally, on March 13, 2006, the Board issued a memorandum and order adopting certain corrections to the February 13, 2006 transcript, placing on the record publically-available versions of that transcript and some associated evidentiary materials, and closing the evidentiary record on contested matters as of the date of that order.[20] See Licensing Board Memorandum and Order (Regarding Transcript Corrections; Public Availability of February 2006 Hearing Transcript and Exhibits; Closing Record of October 2005 and February 2006 Evidentiary Hearings) (Mar. 13, 2006) (unpublished).

III. APPLICABLE LEGAL STANDARDS

A. Decommissioning Funding Plan Requirements

3.1 The NRC's regulations require an applicant seeking a license to construct and operate a uranium enrichment facility to submit with its license application a proposed

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[20] The Board previously had adopted corrections to the transcript of the October 2005 evidentiary hearing, see Licensing Board Memorandum and Order (Adopting Transcript Corrections and Addressing Other Administrative Matters) (Nov. 29, 2005) at 1 (unpublished), and released publically-available versions of the transcripts and some exhibits associated with those sessions, see Licensing Board Memorandum (Public Availability of Previously Withheld Transcripts and Exhibits From October 2005 Evidentiary Hearing) (Jan. 9, 2006) at 1-2 (unpublished).

decommissioning funding plan. See 10 C.F.R. §§ 70.22(a)(9), 70.25(a).[21] The general purpose of the DFP is to ensure the applicant has considered the decommissioning activities that may be required over time, has presented a credible, site-specific cost estimate for conducting those activities, and has provided the NRC with financial assurance to cover those estimated costs should a third party have to take responsibility for decommissioning. See LES Exh. 81, at 10-1 (NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility, abstract & ch. 10 (Mar. 2002)) [hereinafter SRP].

3.2 Specifically, 10 C.F.R. § 70.25(e) requires that a DFP "contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning . . . including means for adjusting cost estimates and associated funding levels periodically over the life of the facility." Cost estimates must be adjusted at least once every three years. See id. Further, the DFP must provide a certification that financial assurance for decommissioning the facility has been provided in an amount equal to the decommissioning cost estimate, as well as a signed original or appropriate duplicate of the funding instrument whereby the applicant will provide financial assurance. See id. Section 70.25(f) discusses the methods by which financial assurance may be provided in the case of a private applicant, namely (1) prepayment into a segregated account, e.g., a trust or escrow account, prior to the start of facility operations; (2) a surety method, insurance, or other guarantee method; or (3) an external sinking fund, such as a trust or escrow account, into which annual deposits are made, coupled with a surety method or insurance, whereby the

[21] 10 C.F.R. §§ 30.35, 40.36 impose the same or substantially similar requirements on applicants for a license to possess and use byproduct material and source material, respectively, in excess of certain quantities.

surety value decreases over time by the amount accrued in the sinking fund. See id. § 70.25(f)(1)-(3).[22]

3.3 As noted above, section 70.25 requires an applicant to adjust its cost estimates and associated financial assurance levels at least triennially. In response to public comments regarding the need for periodic adjustments, the Commission noted that such updates "will help ensure that financial assurance obtained by licensees will not become inadequate as a result of changing disposal prices or other factors," such as inflation or changes in the scope of operations. See 68 Fed. Reg. 57,327, 57,332 (Oct. 3, 2003). Therefore, the triennial adjustments are intended to account for changes in a licensee's cost estimates regardless of the cause, and to ensure that adequate financial assurance is provided by the licensee at any given time.[23] To be sure, the initial cost estimates provided in an applicant's DFP must encompass those foreseeable activities associated with decommissioning the site, including

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[22] By way of background, we note that LES intends to utilize a surety bond instrument whereby payment is guaranteed by a qualified third party, and has submitted draft copies of the surety bond and associated information to the NRC, of which signed originals will be provided to the NRC before LES can receive licensed materials at the NEF. See LES Exh. 83, at 10.2-1 & apps. 10A to 10F ([NEF SAR], ch. 10 (May 2005)). Although the adequacy of LES's financial instrument is not at issue in the contested portion of the proceeding, it will be discussed in more detail in the context of the Board's forthcoming decision relative to uncontested matters that were raised in the context of the "mandatory" hearing on the LES application. See Licensing Board Memorandum and Order (Regarding NIRS/PC Motion for Leave to Participate in Mandatory Hearing) (Feb. 24, 2006) at 4-5 (unpublished).

[23] As we discuss further below, see, e.g., infra p. 116, LES has agreed to a license condition whereby it would adjust its cost estimates relative to facility decommissioning on a triennial basis, but has committed to update annually its cost estimates for DU dispositioning. See, e.g., Prefiled Rebuttal Testimony of Rod Krich, Paul Harding and Paul Schneider on Behalf of [LES] Regarding Applicant's Strategy and Cost Estimate for the Private Sector Deconversion of [DUF_6] (fol. Tr. at 1840) at 14; Prefiled Rebuttal Testimony of Rod Krich and Thomas Laguardia on Behalf of [LES] Regarding the Adequacy of Applicant's Contingency Factor (fol. Tr. at 3097) at 5-6; Staff Exh. 37, at 10-15 (NUREG-1827, Safety Evaluation Report for the [NEF] in Lea County, New Mexico, ch. 10 (June 2005)).

disposing of any waste produced, and must present a reasonably accurate estimate of the direct and indirect costs involved in decommissioning under routine facility conditions. See SRP at 10-1; LES Exh. 82, at 4-9, A-26 (NUREG-1757, Consolidated NMSS Decommissioning Guidance, vol. 3, 4-1 to 4-11, A-25 to A-30 (Sept. 2003)) [hereinafter NUREG-1757]. Thus, the availability of the periodic adjustment mechanism should have no bearing on the robustness of the initial cost estimate, in that it is not meant to provide a backstop for underestimation, but rather to account for costs unforeseen at the time of licensing.

3.4 Staff guidance documents generally do not constitute legally binding interpretations of agency regulations. See Hydro Resources, Inc. (P.O. Box 15910, Rio Rancho, NM 87174), CLI-04-33, 60 NRC 581, 596 (2004). In this instance, however, we find NUREG-1757, "Consolidated NMSS Decommissioning Guidance," particularly instructive as it provides guidance to the staff and applicants/licensees regarding, among other things, financial assurance and decommissioning cost estimates.[24] The staff reviews an applicant's cost estimate to ensure that estimate is "based on documented and reasonable assumptions" and so will provide sufficient funds to allow an independent third party to take responsibility for decommissioning the facility if the licensee is unable to do so. See NUREG-1757, at 4-9. As is relevant here, section 4.1 sets forth specific minimum criteria that a cost estimate must meet before the staff can find it acceptable. Specifically, NUREG-1757 states that the cost estimate must:

(1) meet all applicable regulatory requirements (e.g., 10 C.F.R. § 70.25(e));

(2) be based on documented and reasonable assumptions;

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[24] NUREG-1757 replaces NUREG-1727 (NMSS Decommissioning Standard Review Plan) and NUREG/BR-0241 (NMSS Handbook for Decommissioning Fuel Cycle and Materials Licensees). See NUREG-1757, at iii.

(3) use unit cost factors that are reasonable and consistent with NRC cost estimation reference documents;

(4) include costs for labor, equipment and supplies, overhead and contractor profit, sampling and laboratory analysis, and other miscellaneous expenses (e.g., license fees, insurance, and taxes);

(5) apply a contingency factor of at least 25 percent to the sum of all estimated costs;

(6) take no credit for (a) any salvage value from the sale of potential assets during or after decommissioning, or (b) reduced taxes based on payment of decommissioning or site control and maintenance costs;

(7) identify adequate means for adjusting the cost estimate and associated funding level over the life of the facility, as well as any storage or surveillance period;

(8) reflect decommissioning under normal facility conditions; and

(9) include costs for all major decommissioning and site control and maintenance activities, including (a) planning and preparation, (b) decontamination and/or dismantling of facility components, (c) packaging, shipment, and disposal of radioactive wastes, (d) a final radiation survey, (e) restoration of contaminated areas on facility grounds, if necessary, and (f) site stabilization and long-term surveillance, if necessary.

See id. at 4-10. Relative to the financial assurance mechanisms required as part of the DFP, the staff will review those items for adequacy, specifically (1) determining whether the proposed mechanisms are acceptable; and (2) reviewing the certification of financial assurance to ensure it specifies the correct amount of financial assurance and attests to compliance with the appropriate regulatory requirements. See id. at 4-6.

3.5 In addition, certain licensees, including LES should the NEF be issued a license, at the end of a facility's license period are required to submit a decommissioning plan (DP) for staff approval prior to beginning decommissioning activities. The purpose of the DP is in part to ensure that, as is envisioned in the DFP, the licensee has maintained adequate funding and financial assurance through the term of the license. See id. at 4-4. A DP must include (1) an

updated, detailed cost estimate for decommissioning; (2) a comparison of that estimate with the amount of funds presently set aside for decommissioning; and (3) a plan for assuring the availability of adequate funds to complete decommissioning activities. See id. at 4-5. In addition, the DP must provide for at least one financial assurance mechanism, including supporting documentation, that the staff will again review for adequacy. See id. at 4-6.

B. Plausible Strategy Demonstration

3.6 In its January 30, 2004 notice of hearing on the LES application, the Commission noted that if DUF_6 waste from the NEF

> meets the definition of "waste" in 10 CFR 61.2, the depleted tails are to be considered low-level radioactive waste within the meaning of 10 CFR Part 61 in which case an approach by LES to transfer to DOE for disposal by DOE of LES' depleted tails pursuant to Section 3113 of the USEC Privatization Act constitutes a "plausible strategy" for dispositioning the LES depleted tails.

69 Fed. Reg. at 5877. The Commission further elaborated on this "plausible strategy" concept in CLI-04-25, stating that "[w]hile a 'plausible strategy' for private conversion of the tails does not mean a definite or certain strategy, to include completion of all necessary contractual arrangements, it must represent more than mere speculation." See CLI-04-25, 60 NRC 223, 226 (2004).[25]

3.7 The concept of a "plausible strategy" for dispositioning depleted uranium tails apparently originated in connection with the previous application of LES to construct a uranium enrichment facility in Claiborne Parish, Louisiana, denominated the Claiborne Enrichment

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[25] To be clear, the "plausible strategy" challenge at issue here goes solely to the private strategy that LES has stated is its "preferred option," and should not be read as having any bearing or intimating any Board opinion on the DOE option, which, as we note infra Part IV.A, has already been determined by the Commission to be a plausible strategy.

Center. The Commission's hearing notice for that proceeding similarly directed that LES must have a "plausible strategy" for the disposition of DUF_6 from the CEC facility, and identified several avenues for tails disposition that might constitute a plausible strategy. See 56 Fed. Reg. 23,310, 23,313 (May 21, 1991). The Licensing Board in that proceeding interpreted the term "plausible strategy" as requiring the applicant to demonstrate "a reasonable or credible plan to dispose of the DUF_6 tails generated at the CEC . . . ," see Louisiana Energy Services, L.P. (Claiborne Enrichment Center), LBP-97-3, 45 NRC 99, 105 (1997), and further noted that "[t]he purpose of the [a]pplicant's tails disposal strategy is to enable the computation of reasonable cost estimates for the various essential elements of the decommissioning plan," id. at 108. With those standards in mind, the CEC Board went on to find that LES's proposed "plan to convert DUF_6 to U_3O_8 at an offsite facility in the United States and then ship that material as waste to a final [disposal] site . . . is a reasonable and credible plan for tails disposal." Id. Although no deconversion facility then existed in the United States, nor had LES presented any firm commitment, in the form of a contract or otherwise, by any entity to construct such a facility, the CEC Board determined that those facts "[did] not somehow make it unlikely, or unreasonable to assume, that one will be built here in the future," id., particularly since experience overseas had demonstrated that it was a "commercially feasible process" that could be used in the United States "without first having to overcome difficult technical hurdles," see id. It was similarly reasonable, concluded the CEC Board, to assume that an appropriate disposal site, though not immediately identifiable, would be available in the future.[26] See id.

[26] Although bearing in mind that the CEC Licensing Board's "plausible strategy" decision was (along with several other CEC Board determinations) ultimately vacated by the Commission when the application for that facility was withdrawn, see Louisiana Energy Services, L.P. (Claiborne Enrichment Center), CLI-98-5, 47 NRC 113 (1998), we think the

(continued...)

3.8 This Board also has intimated what we believe might be required of a "plausible strategy" on several occasions in the instant proceeding. First, in denying the admission of a proposed amendment by NIRS/PC to their contention EC-3/TC-1, which as admitted deals only with the plausibility of LES's private deconversion strategy, we held that "[w]hile the concepts of technical feasibility of a particular strategy and the costs of implementing such a strategy might arguably be linked in the common term 'plausible' . . . the cost of implementation of a particular strategy has no bearing upon whether any particular strategy is technically [feasible]."[27] See November 2004 Contention Ruling at 13. The sufficiency of a decommissioning cost estimate rests, at least in part, on whether a particular strategy is plausible, that is, a finding that a particular strategy is "plausible" is a necessary precursor to a finding that a cost estimate is "documented and reasonable." The mere fact that a strategy is "plausible" does not, however, establish that sufficiently documented and reasonable cost estimates can be developed for that strategy. Thus, the question of whether an applicant has presented a plausible strategy,

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[26](...continued)
Board's discussion of that issue and a comparison of the plausible strategy demonstration made by LES in the instant proceeding with that in CEC does provide useful insights. Specifically, with regard to its deconversion strategy, LES witnesses in the CEC proceeding testified that, although there were no existing deconversion facilities in the United States, COGEMA had "indicated to LES in writing its willingness to consider providing, in the United States, conversion services for DUF_6." CEC, LBP-97-3, 45 NRC at 106 (citation omitted). Similarly, regarding the availability of a disposal site for deep land burial of the resulting U_3O_8, LES recognized that there were no operating deep disposal sites, but contended it was "reasonable to assume such a site will be available in the future because in the United States there are dozens of underground uranium mines and other underground mines." Id. (citation omitted). In the instant proceeding, as we discuss infra in Parts IV.B.2 and IV.D.2, respectively, LES clearly has provided private deconversion and disposal strategies with considerably more definition than those provided in connection with the earlier CEC license application.

[27] Although the discussion in our November 2004 contention ruling used the term "technically plausible," we recognize that, for the sake of consistency, we should have used the term "technically feasible," and utilize that term now to reflect the Board's true intent.

although related to disposition costs, is a inquiry distinct from and precedent to the question of the adequacy of an applicant's dispositioning cost estimates.[28]

IV. FACTUAL FINDINGS AND LEGAL CONCLUSIONS

A. Role of the Department of Energy "Plausible Strategy"

4.1 As is apparent from the preceding discussion, the focus of much of this proceeding has been upon whether a plausible strategy exists for, and the concomitant cost of, dispositioning DUF_6 generated at the proposed NEF. In its license application, LES presented two alternative strategies: (1) the so-called "private sector" strategy, whereby LES would transfer DUF_6 from the NEF to a private facility for deconversion to a uranium oxide form (i.e., DU_3O_8), followed by transportation of the DU_3O_8 to an appropriate licensed disposal facility, a strategy we discuss at length in Parts IV.B to IV.E infra; and (2) the "DOE strategy," whereby LES would transfer the DUF_6 to DOE for dispositioning (i.e., deconversion and disposal) pursuant to section 3113 of the USEC Privitization Act, see 42 U.S.C. § 2297h-11, which requires DOE to accept for disposal any low-level radioactive waste (LLRW) generated by a domestic, NRC-licensed uranium enrichment facility and recoup its disposition costs plus a pro

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[28] In their proposed findings of fact and conclusions of law, NIRS/PC gave extensive treatment to what they contend a plausible strategy demonstration requires, see NIRS/PC Proposed Findings at 8-17, going so far as to propose a series of different standards for different entities under different circumstances whereby an entity would have to demonstrate, among other things, technical competence, willingness to make a concrete commitment, the strength of that potential commitment, a successful track record, "real world" experience with a similar licensed facility, and even possession of a license or permit, see id. at 14-15.

In the Board's view, NIRS/PC misapprehend the importance of the plausible strategy demonstration and, in some instances, directly contradict prior Commission holdings to the effect that a concrete commitment such as a contract is not required. See supra p. 36. We decline to go that far.

rata share of deconversion facility construction costs from the licensee or responsible third party. See LES Exh. 109, at 4.13-8 to -9 ([NEF ER], sec. 4.13 (July 2004)).

4.2 From the outset, LES has identified and pursued the private dispositioning strategy as its "preferred plausible strategy," while noting that DOE deconversion and disposal is an "alternative plausible strategy." As discussed above, see supra Part III.B, the Commission determined at the beginning of this proceeding that transfer to DOE constituted a "plausible strategy" for disposal provided the DUF_6 constituted low-level waste, a finding the Commission later made in CLI-05-5.[29] The primary purpose of the plausible strategy requirement is to provide a foundation upon which to build reasonable cost estimates for the various elements related to ultimate decommissioning of the proposed facility. Yet, even though a strategy (or a portion thereof) may well be "plausible," for a cost estimate based upon such a strategy to afford reasonable assurance there will be sufficient future funds to support decommissioning and so provide an adequate foundation for a DFP, it must be footed in "documented and reasonable assumptions," see NUREG-1757, at 4-10, which in the Board's view connotes that cost estimate must have a sufficient degree of reliability.[30] Indeed, the core of the matter now

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[29] The Board has repeatedly declined to allow NIRS/PC to challenge this Commission determination. See, e.g., November 2004 Contention Ruling at 12-14.

[30] In this context, we recognize that the staff guidance speaks in terms of a cost estimate that is based on assumptions (i.e., components) that are both "documented" and "reasonable." From our perspective, the combination of these two elements reflects the overall concept of "reliability," that is, an estimate that is sufficiently trustworthy and dependable to be utilized as a basis for making the requisite financial assurance findings. Indeed, the staff proposed findings of fact and conclusions of law, and related reply findings, indicate as much. See, e.g., Staff Proposed Findings at 39 ("The Staff accepted the cost estimate provided by the Applicant as reliable based on the fact that it was provided by a third party vendor.") (emphasis added); Staff Reply Findings at 4 ("The Staff determined that the cost information from [COGEMA] was reliable based on [COGEMA]'s extensive experience in operating a deconversion facility using the same technology in Pierrelatte, France.") (emphasis added); id. at 5 ("We agree with the Staff and LES that the cost estimates in the Urenco business study as (continued...)

before the Board in the context of the remaining contentions at issue is the question whether LES has delineated a reliable estimate of the cost of dispositioning DU from the NEF.

4.3 The determination by the Commission that the strategy of transferring DUF_6 waste from the NEF to DOE is "plausible" thus is not dispositive of the issue whether the cost estimate provided by DOE is sufficiently reliable for an initial estimate of decommissioning funding. As noted above, see supra p. 25, NIRS/PC attempted to challenge the DOE cost estimates via a proposed amendment to contention NIRS/PC EC-5/TC-2. The Board nonetheless declined to admit that challenge as raising issues outside the scope of this proceeding. Specifically, the Board found that section 3113 requires DOE to accept DUF_6 from LES for dispositioning and, when acting pursuant to that statutory authority/obligation, DOE can set the costs or, in this case, its cost estimates at whatever level it determines is appropriate. In other words, while section 3113 requires DOE to accept DUF_6 for deconversion and disposal at the request of an NRC-licensed uranium enrichment facility operator, it also gives DOE the exclusive authority to determine the amount of reimbursement required for disposition of that DU waste. Neither an intervenor nor an applicant/licensee (nor seemingly the NRC) has the authority to challenge or direct DOE's estimates of the fees it will charge to a uranium enrichment facility that requests DOE to disposition its DU waste. See, e.g., Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-836, 23 NRC 479, 499 (1986) (licensing boards do not undertake review of whether another federal agency complied with its own regulations); Arizona Public Service Co. (Palo Verde Nuclear Generating Station, Units 1, 2, and 3), LBP-82-117A, 16 NRC 1964, 1991 (1982) (licensing boards should not

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[30](...continued)
adjusted to "Americanize" them are a more reliable basis upon which to assess the cost of deconversion within the United States . . . .") (emphasis added).

entertain collateral attacks upon the actions of other federal agencies on a matter over which the Commission has no jurisdiction).

4.4 In this regard, when DOE acts pursuant to section 3113 in setting disposition costs or providing cost estimates, the situation is somewhat analogous to the circumstance in which we found LES and/or the staff are entitled to rely on statements of third-party market participants. See, e.g., LBP-05-13, 61 NRC at 440, 444-45 (LES can rely on public statements of market participants regarding plans to close old enrichment facilities or open new ones). In that sense, DOE cost estimates furnished to LES represent an arm's-length, third-party estimate of the cost of doing business, albeit in an instance when the party offering the estimate is statutorily bound to provide that service. Accordingly, the Board finds that the cost estimates provided relative to the DOE strategy are sufficiently reliable to provide the basis for an initial estimate of the portion of decommissioning funding for the NEF associated with disposition of the DUF_6 produced by the NEF.

4.5 By contrast, as we discuss further below, although the Board concludes that LES's proposed private dispositioning scheme is a "plausible strategy" upon which it might base its cost estimates for pursuing that strategy, we are unable to find that, taken as a whole, the cost estimate provided by LES for its private strategy is sufficiently reliable to form the basis of the portion of a decommissioning cost estimate associated with disposition of the DUF_6 generated by the NEF. As our exposition below indicates, LES has provided an estimate of the cost of each of the major elements involved in dispositioning NEF-generated DUF_6 through a series of contracts or other arrangements it would propose to make with third parties. Some of those elements are sufficiently grounded in estimates of the actual cost of providing a service from experienced third parties so as to be sufficiently reliable for establishing the initial estimate

of decommissioning funding associated with those elements.[31] One of the largest elements of this private strategy, however, involves deconversion of the DUF_6 to DU_3O_8, and the Board does not find LES's estimate of the cost associated with that element sufficiently reliable. In extensive testimony and discussion of this particular element, LES has failed to establish that the estimate of the cost of construction and operation of that facility, which it bases upon estimates it obtained from a business study done by one of its own owners, is indicative of either (1) the cost a third party would charge in an arm's-length transaction with LES to provide that service; or (2) what it would cost LES if it constructed and operated such a facility on its own. So too, the Board finds unreliable LES's "private strategy" estimate of the cost of disposing of DU generated at the NEF, in that LES has neither obtained an estimate from a qualified third party outlining what that party would charge to dispose of the DU nor conducted its own analysis to determine what that cost might be. Thus, while the Board recognizes the possibility that LES might, at some future date, establish a sufficiently reliable all-in cost estimate for a private disposition strategy, for the reasons detailed below, we find that the current cost estimate provided by LES for a private dispositioning strategy is not sufficiently reliable to form the basis of the portion of a decommissioning cost estimate associated with disposition of the NEF-generated DUF_6.

[31] This is not to say, however, that obtaining an estimate from an experienced third-party vendor is the only way for an applicant to demonstrate that its cost estimate is documented and reasonable, although it clearly is one way to reach that end. We discuss this matter further in Part IV.B.3 infra.

B. Findings Regarding Plausibility and Cost of Deconversion[32]

4.6 As the Board has earlier noted, whether a particular strategy is "plausible" relates to, but is not dispositive of, the issue whether a decommissioning cost estimate is sufficiently reliable to be used as a foundation for determining the appropriate size of an applicant/licensee's decommissioning fund. As we also noted, for a strategy to be "plausible" it must be more than merely technically feasible, but a strategy can be plausible and still not appropriately developed and documented to provide a sound footing on which to rest the public health and safety. In other words, the existence of a "plausible strategy" for dispositioning DUF_6 from the NEF is a necessary condition to a demonstration that an applicant has presented a reliable decommissioning cost estimate (i.e., one that is based on "documented and reasonable assumptions"), but is not, in and of itself, sufficient to satisfy that threshold. Accordingly, we decide below (1) whether LES has presented a plausible strategy for private deconversion of DUF_6 from the NEF; and (2) whether the cost estimates for that private deconversion strategy are sufficiently reliable.

1. Witnesses and Evidence Presented

4.7 LES, the staff, and NIRS/PC each presented witnesses in connection with the October 2005 evidentiary hearing in support of their respective positions on the plausibility and cost of LES's deconversion strategy for DUF_6 waste generated at the NEF. Each of these witnesses presented written direct and rebuttal testimony and gave oral testimony at the evidentiary hearing. For its part, LES presented a panel of four witnesses: (1) Rod M. Krich, LES Vice President of Licensing, Safety, and Nuclear Engineering; (2) Leslie M. Compton, an

[32] Because, as we have already noted, see supra pp. 26-27 and note 18, the parties presented testimony and evidence on certain subject matter areas as opposed to contention by contention, we address the remaining contested issues in the same manner.

independent consultant to LES on technical and financial matters; (3) Paul J.C. Harding, Managing Director of Urenco (Capenhurst) Limited in the United Kingdom; and (4) Paul G. Schneider, a technical and management consultant employed by SMG Inc., and retained as an expert consultant by LES. See Prefiled Direct Testimony of Rod Krich, Leslie Compton, Paul Harding, and Paul Schneider on Behalf of [LES] Regarding Applicant's Strategy and Cost Estimate for Private Sector Deconversion of [DUF_6] from the Proposed [NEF] (fol. Tr. at 1838) at 1-8 [hereinafter LES Deconversion Direct Testimony]. Mr. Krich testified before the Board at the February 2005 evidentiary hearing in this proceeding and his qualifications are outlined in the Board's first partial initial decision on environmental contentions. See LBP-05-13, 61 NRC at 420-21.

4.8 Ms. Compton received a Bachelor of Science degree in Materials Science and Engineering from the Massachusetts Institute of Technology and a Master of Business Administration from the Fuqua School of Business at Duke University, and has more than ten years of professional experience in the fields of materials engineering, proposal development and contract negotiation, and project and budget management, among others. As a consultant for LES, Ms. Compton provided assistance on technical and financial matters related to project financing and LES's private strategy for dispositioning DUF_6 generated at the NEF, and had principal responsibility for preparing the deconversion cost estimate for LES's private sector dispositioning strategy based on cost information obtained from Urenco. See LES Deconversion Direct Testimony at 3-4 & attached resume.

4.9 Dr. Harding holds an M.A. degree in Chemistry and a Doctor of Philosophy from Oxford University in England, and has approximately twenty-five years of technical and commercial experience in the area of uranium chemical processing, including knowledge of the transformations performed during the nuclear fuel cycle. As Managing Director of Urenco's

Capenhurst enrichment facility, Dr. Harding has a detailed understanding of facility operations and all related activities, and is generally familiar with external Urenco operations and activities, including the LES partnership. In addition, Dr. Harding was directly involved in Urenco's request for proposals (RFPs) for the construction and operation of a deconversion facility at Capenhurst, and AREVA's response to that request. See id. at 5-6 & attached resume.

4.10 As a consultant with SMG, Inc., Mr. Schneider provides management and technical oversight of various DOE and National Nuclear Security Agency projects. He received a Bachelor of Science degree in Physics and Mathematics from Wake Forest University, a Master of Science in Physics from Emory University, and has over forty years of experience in the nuclear industry, including in the design of chemical processing plants to convert DUF_6 to uranium oxide and a fluoride byproduct. In a prior position as Director of the Nuclear Fuel Cycle at USEC Inc., Mr. Schneider oversaw the preparation of a bid proposal to DOE to convert its stockpile of DUF_6, including selection of a cost-efficient process, determination of the best disposition of facility products, and preparation of a conceptual design of the processing plants, and managed the disposition of USEC's DUF_6, including disposal of the depleted uranium tetrafluoride and CaF_2 products. Mr. Schneider was retained by LES as an expert consultant on the issues associated with the disposal of CaF_2 produced as a byproduct of the deconversion of DU from the NEF. See id. at 6-7 & attached resume.

4.11 The staff presented a panel of five witnesses: (1) Timothy C. Johnson, NRC Project Manager for the licensing of the proposed NEF; (2) James Park, NRC Project Manager for the environmental review of the NEF license application; (3) Jennifer Mayer, consultant for ICF Consulting, providing testimony under a technical assistance contract with the NRC; (4) Craig Dean, consultant for ICF Consulting, providing testimony under a technical assistance contract with the NRC; and (5) Donald Palmrose, employee of Advanced Systems Technology

and Management, Inc., providing testimony under a technical assistance contract with the NRC. Dr. Palmrose provided testimony before the Board during the February 2005 evidentiary hearing on environmental contentions, and his qualifications are outlined in the Board's partial initial decision on those contentions. See LBP-05-13, 61 NRC at 427-28. The qualifications of the other four members of the staff panel have likewise been previously discussed by the Board in connection with its second partial initial decision in this proceeding, relative to the environmental impacts of disposal of depleted uranium. See LBP-06-8, 63 NRC 271-73.

4.12 NIRS/PC presented one witness, Arjun Makhijani, President and Senior Engineer at the Institute for Energy and Environmental Research (IEER). Dr. Makhijani has also provided previous testimony before the Board, including in the context of the February 2005 hearing on environmental contentions, and his qualifications are outlined in the Board's partial initial decision on those contentions. See LBP-05-13, 61 NRC at 428.

4.13 Based on the foregoing, and the respective background and experience of the proffered witnesses, the Board finds that each of these witnesses is qualified to testify as an expert witness on the subject of the plausibility and cost of LES's deconversion strategy.

4.14 In addition, each of the parties presented witnesses during the supplemental February 2006 hearing in support of their respective positions on the cost of capital and depleted uranium cylinder management associated with the deconversion of DU waste from the NEF, each of whom submitted written direct and rebuttal testimony and gave oral testimony at the hearing. See Tr. at 3255-498. To a large degree, the witnesses proffered at the February 2006 hearing overlapped with those presented on the more general topics of deconversion plausibility and cost at the October 2005 hearing. Specifically, LES presented testimony from Rod M. Krich, NIRS/PC presented testimony from Arjun Makhijani, and the staff presented testimony from a panel of four witnesses, including Timothy C. Johnson, Jennifer Mayer, and

Craig Dean. Based on the fact that the Board has found each of these witnesses qualified to testify on the broader issues of deconversion plausibility and cost, of which the cost of capital and cylinder management are a subset, the Board finds each of these witnesses qualified to testify as an expert witness on the issues of cost of capital and cylinder management associated with deconversion of DUF_6 from the NEF.

4.15 The staff panel also included an additional witness, John Collier, a consultant with ICF Consulting, who had not previously testified before the Board. Mr. Collier holds a Bachelor of Arts in Economics and a Master of Business Administration from the University of Chicago, and has more than fifteen years of experience in NRC financial assurance programs, financial analysis, and cost estimation. Pursuant to a technical assistance contract with the NRC, Mr. Collier assisted the staff in evaluating LES's estimates for the cost of capital associated with the construction of a private deconversion facility. See NRC Staff Prefiled Testimony Concerning Clarifying Information Relating to Cost Estimate of Deconversion (fol. Tr. at 3411) at 1-2 & attached resume. Based on the foregoing, the Board finds Mr. Collier qualified to testify as an expert witness on the issue of cost of capital associated with the construction of a private facility for deconversion of DUF_6 from the NEF.

2. Plausibility of Private Deconversion Strategy

4.16 As noted above, since the beginning of this proceeding LES has identified private sector deconversion and disposal as its "preferred strategy" for dispositioning DU waste from the NEF. Relative to the deconversion portion of that equation, NIRS/PC has pursued two separate but interrelated challenges. In contention NIRS/PC EC-3/TC-1, NIRS/PC claims that LES does not have a plausible strategy for private sector deconversion because LES's statement that discussions have been held with COGEMA regarding the construction of a private deconversion facility "is without substance." Paragraph G of contention NIRS/PC

EC-6/TC-3 contests the plausibility of the private deconversion strategy given that no such facility currently exists in the United States, "nor is [a facility] likely to be built to suit LES's timing and throughput requirements." See 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 (fol. Tr. at 2334) at 3, 4 [hereinafter NIRS/PC Deconversion Direct Testimony].

4.17 The process by which LES proposes to enrich natural uranium at the NEF will produce as a byproduct of that enrichment process DUF_6, a chemical form of depleted uranium that, if not properly treated, will react with moisture in the air to form hydrogen fluoride (HF), a corrosive chemical compound that can cause severe injury if ingested or inhaled. Accordingly, before long-term storage and disposal, the DUF_6 is converted, or "deconverted," to a non-reactive form of depleted uranium, such as a uranium oxide (e.g., DU_3O_8). See NRC Staff Testimony Concerning Admitted Contentions Relating to Deconversion (fol. Tr. at 2105) at 4 [hereinafter Staff Deconversion Direct Testimony]. The deconversion process also produces as a byproduct HF gas which, as discussed further below, can either be sold or further treated to produce a compound suitable for disposal.

4.18 As the Board has previously stated, to be "plausible" a strategy need not be definite or concrete, but rather present a technically feasible plan that could reasonably be implemented to suit LES's deconversion needs. To that end, LES entered into a memorandum of understanding (MOU) with AREVA Enterprises, Inc. (acting on behalf of COGEMA SA and Framatome ANP)[33] on January 21, 2005, whereby **xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**

[33] AREVA Enterprises, Inc., COGEMA SA, and Framatome ANP are all AREVA Group companies, see AREVA MOU at 1-2, and AREVA is the holding company for COGEMA and Framatome, see Tr. at 1870. Because the technology that would be deployed is in fact (continued...)

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxx. See LES Deconversion Direct Testimony at 14-15; LES Exh. 88, at 2 ([MOU] between [LES] and AREVA Enterprises, Inc. (Jan. 21, 2005)) [hereinafter AREVA MOU]. AREVA currently operates a deconversion facility in Pierrelatte, France, known as the "W" plant, that has been in operation for approximately twenty years, and is in the process of developing three other like plants, one in the United Kingdom and two in the United States, namely the proposed Portsmouth, Ohio and Paducah, Kentucky facilities. See LES Deconversion Direct Testimony at 15. The MOU states that the contemplated NEF-related facility will be based on the same technology currently in use at the "W" plant and expected to be deployed at the three planned facilities. See AREVA MOU at 2.

4.19 Mr. Krich testified for LES that the deployment of the AREVA deconversion facility contemplated by the MOU is a technically feasible process as demonstrated by the fact that the "W" plant has been in successful operation for more than two decades, and currently processes approximately 20,000 metric tons (MT) of DUF_6 on an annual basis.[34] See LES Deconversion Direct Testimony at 15-16. The basic deconversion process, according to Mr. Krich, is a well-known chemical process, also known as "defluorination," during which fluorine is removed from the DUF_6 to produce fluorine-free DU_3O_8 and HF gas, the latter of which is then dissolved in water to form aqueous HF acid that can be neutralized with lime to form CaF_2. See id. at 15. Mr. Krich concluded that, because this process has been successfully deployed at the

[33](...continued)
COGEMA technology, we will typically refer to COGEMA rather than AREVA when discussing the plausibility of the private deconversion strategy.

[34] By way of comparison, it is estimated that the NEF will produce approximately 7,000 MT of DUF_6 for deconversion each year. See Tr. at 1872.

"W" plant, it is a proven technology and the MOU between LES and AREVA reflects the belief that the same process can be implemented at a facility in the United States sufficient to fulfill the deconversion needs of the NEF. See id. at 16.

4.20 For their part, the staff witnesses testified, in sum, that LES's private deconversion strategy is plausible because it would utilize a proven technology, and further because the MOU demonstrates that LES has entered into good faith, substantive negotiations with COGEMA, a company with the technical and industry experience to construct the necessary facility. See Staff Deconversion Direct Testimony at 5-7. Specifically with regard to the technology, the staff witnesses pointed out that the process of converting DUF_6 to a uranium oxide such as U_3O_8 is well known throughout the industry, as the same process is used by domestic fuel fabricators in the process of producing nuclear fuel. See id. at 6. Therefore, the chemical process is a familiar one that is currently in use in facilities other than those that conduct enrichment operations, though on a smaller scale than LES is proposing, and COGEMA has the expertise to understand the technical feasibility of constructing a plant to handle the annual throughput requirements of the LES facility. See id. at 6-7. Finally, staff witnesses noted that COGEMA's experience makes it capable of tentatively projecting a timeline for construction of a deconversion facility to suit LES's needs, **xxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**. See id. at 7.

4.21 As witnesses for both LES and the staff pointed out, Dr. Makhijani did not contest that COGEMA has the technical expertise to construct and operate a deconversion facility in the United States. See Tr. at 2380-81. In fact, upon cross-examination and in response to Board questioning, Dr. Makhijani conceded that it is plausible that COGEMA could be granted a license to construct and operate a deconversion facility in the United States. See Tr. at 2383-87. Although Dr. Makhijani made several other discrete arguments about what else

might be required before the private deconversion strategy could be considered "plausible,"[35] in the Board's estimation none of those arguments detract from the plausibility demonstration made by LES.

4.22 While much has been made about the "plausible strategy" requirement throughout the course of this proceeding, particularly by NIRS/PC as evidenced by the extensive treatment given this subject in NIRS/PC's proposed findings of fact and conclusions of law, see NIRS/PC Proposed Findings at 8-17, 18-20, NIRS/PC in actuality present no substantial contest to the plausibility of LES's private strategy. As the Board discussed in Part III.B supra, a "plausible strategy" requires that the proposed plan at least be technically feasible, a point Dr. Makhijani has conceded relative to the deployment of COGEMA deconversion technology in the United States. While the parties thus appear to be in general agreement with the Board that something more than mere technical feasibility is required, there nonetheless is little agreement as to how much more is required. Compare NIRS/PC Proposed Findings at 8-17, 18-20, with LES Proposed Findings at 22-24, and Staff Proposed Findings at 7-8. The Commission certainly set the upper and lower bounds of the "what else" question when it stated that "[w]hile a 'plausible strategy' for private conversion of the tails does not mean a definite or certain strategy," which, for example, would "include completion of all

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[35] For example, in his written direct testimony on this issue Dr. Makhijani stated that "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." See NIRS/PC Deconversion Direct Testimony at 9. As Mr. Krich noted in his written rebuttal testimony, such a "siting process" is not relevant to this proceeding on the LES application, but rather will be pertinent to any application by COGEMA or a like entity to construct and operate a deconversion facility. See Prefiled Rebuttal Testimony of Rod Krich, Paul Harding and Paul Schneider on Behalf of [LES] Regarding Applicant's Strategy and Cost Estimate for the Private Sector Deconversion of [DUF_6] (fol. Tr. at 1840) at 3. Moreover, on cross-examination Dr. Makhijani agreed with LES counsel that following the NEPA requirements relative to siting as well as the applicable siting criteria in the NRC regulations would be a sufficient siting process. See Tr. at 2389-90.

necessary contractual arrangements," nonetheless, "it must represent more than mere speculation." CLI-04-25, 60 NRC at 226. Based on the particular circumstances of the case before the Board, we find that the MOU between LES and AREVA, which demonstrates the anticipation of both those parties that an appropriate deconversion facility could be constructed to meet LES's timing and throughput requirements, provides the additional indicia of feasibility necessary to demonstrate this strategy is more than "mere speculation" and falls well within the realm of a plausible proposed strategy. Further, it reflects an important part of that strategy, again in the particular circumstances of this case, because it demonstrates LES has identified a specific entity with pertinent, proven technology and experience as the basis for its private deconversion strategy.[36]

4.23 In sum, based on the foregoing considerations and the evidence and testimony on the record before the Board, we conclude that LES's private sector deconversion strategy, whereby COGEMA would construct and operate a deconversion facility in the United States sufficient to satisfy LES's projected timing and throughput requirements for the NEF, is a "plausible strategy." Accordingly, the Board resolves the matters raised by intervenors

[36] Indeed, in the CEC proceeding where LES had provided documentation even less concrete than an MOU (i.e., letters from COGEMA to LES), the Board found that LES had adequately demonstrated the plausibility of its deconversion strategy. See CEC, LBP-97-3, 45 NRC at 106-08.

NIRS/PC in contention NIRS/PC EC-3/TC-1 and, in relevant part, paragraph G of NIRS/PC EC-6/TC-3 in favor of applicant LES.

3. Adequacy of Cost Estimate for Private Deconversion Strategy[37]

4.24 With respect to the LES cost estimate for private sector deconversion, NIRS/PC asserted several challenges set forth in portions of two contentions, NIRS/PC EC-5/TC-2 and paragraph G of NIRS/PC EC-6/TC-3, including the adequacy of the overall LES cost estimate for deconversion, the need to account for cost of capital and HF neutralization, the adequacy of estimated CaF_2 disposal costs, and the costs related to managing empty DUF_6 cylinders. We address each of these issues below.

a. Estimated Cost of Deconversion Services

4.25 Before delving into the heart of the deconversion cost estimate question before the Board, a solid understanding of the complex manner in which LES's $2.67/kgU cost estimate for deconversion services was calculated is necessary. The LES deconversion cost estimate was principally derived from what generally has been referred to as the "Urenco business study." See LES Deconversion Direct Testimony at 18; LES Exh. 91 (Business Study, Tails Deconversion and Cylinder Washing Plants at Urenco (Capenhurst) Limited (Aug. 26, 2004)) [hereinafter Urenco Business Study]. As Dr. Harding explained on behalf of LES, Urenco, Ltd.[38] plans to construct and operate a deconversion facility to service its Capenhurst,

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[37] Judge Kelber did not participate in the February 2006 supplemental evidentiary hearing and, therefore, does not participate in the portion of this decision regarding the matters litigated at that hearing, namely cost of capital and cost of cylinder management.

[38] Also by way of background, we observe that LES is a limited partnership whose only business purpose is to provide uranium enrichment services for commercial nuclear power plants. Urenco Ltd. is the sole general partner in LES, and owns 90 percent of the company. The remaining 10 percent interest is held by companies representing three domestic electric utilities, namely Entergy Corp., Duke Energy Corp., and Exelon Generation Co. See Staff Exh.
(continued...)

United Kingdom enrichment facility and, in pursuit of that project, solicited proposals from potential suppliers of deconversion services, including COGEMA, a subsidiary of Urenco competitor AREVA. In June 2004, COGEMA provided Urenco with a proposal that included, as relevant here, the estimated cost of designing, constructing, and beginning operation of a 3,500 MT of uranium per year deconversion facility. To facilitate Urenco management's review of its deconversion options, including the COGEMA proposal, Urenco staff prepared the business study in evidence before the Board. See LES Deconversion Direct Testimony at 20-21.

4.26 From this Urenco business study, Mr. Krich and Ms. Compton testified, LES derived its private deconversion cost estimate by adjusting the cost information contained in the business study, as informed by the COGEMA proposal, to account for such variances as the differences in operating capacities between the Capenhurst facility (3,500 MT U per year) and the NEF (7,000 MT U per year); so-called "Americanization" costs, including NRC licensing fees and converting equipment standards; and currency conversion from Euros to dollars. See id. at 18. As calculated by LES, its deconversion cost estimate totaled approximately $109 million, including (1) $70 million for facility construction; (2) $18 million for licensing and engineering; (3) $12.5 million for annual facility operations and maintenance (O&M); and (4) $8.8 million for decontaminating and decommissioning (D&D) the facility. See id. When converted to a cost

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[38](...continued)
47, at 1-21 to 1-22 (NUREG-1790, Final Environmental Impact Statement for the Proposed [NEF] in Lea County, New Mexico, vols. 1 & 2 (June 2005)); Letter from J. Curtiss, Winston & Strawn, to Administrative Judges (Mar. 3, 2006) at 1-2 (ADAMS Accession No. ML060660126) (updating LES ownership information).

per kgU basis, LES's cost estimate equaled $2.67/kgU based on the total amount of DU expected to be processed over the NEF's operating life.[39] See id. at 19.

4.27 Witnesses Krich and Compton further explained how LES arrived at those particular cost components in their written testimony and in response to extensive Board inquiry at the October evidentiary hearing.[40] See, e.g., id. at 18-25; Tr. at 2266-308. Relative to the $88 million total for construction and licensing and engineering, LES obtained this amount by adding three separate figures obtained from Urenco: (1) a €**xxxx** million estimate from COGEMA for designing, constructing, and beginning operations at a 3,500 MT U per year plant; (2) a Urenco estimate of €**xxxx** million for project management, building and service provisions, and licensing; and (3) a €**xxxx** million estimate from COGEMA for doubling the plant capacity to 7,000 MT U per year. The first two cost figures were taken directly from the Urenco business study, see Urenco Business Study at 8; the third figure, however, was obtained by Urenco through a separate communication with COGEMA, see LES Exh. 95, at 1 (Notes of Telephone Discussion with B. Le Motais, COGEMA, prepared by C. Chater, Urenco (Aug. 16, 2004)) [hereinafter COGEMA Cost Clarification]; Tr. at 2314-15. When converted to dollars,[41] those capital costs totaled $83 million. Based on its experience with the NEF and the ratio of construction costs to licensing and engineering costs at that facility, LES allocated $70 million to the construction portion and $13 million to licensing and engineering. See Tr.

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[39] The deconversion cost estimate was discussed by the parties as both a $2.67/kgU and a $2.69/kgU figure at different points on the record. The $0.02/kgU differential accounts for LES's estimated cost of disposing of CaF_2 produced during the deconversion process, the adequacy of which we consider infra Part IV.B.3.c.

[40] As a general matter, when converting Euros to dollars LES used an exchange rate of approximately $1.29 to €1.00. See LES Deconversion Direct Testimony at 19.

[41] As discussed above, the parties agreed to state all costs in year 2004 dollars. See supra p. 18.

at 2271-75, 2297. To the $13 million figure, LES added an additional $5 million to account for "Americanization" costs, i.e., engineering modification to meet American standards and NRC licensing fees, see LES Exh. 93 (Summary of LES Commercial Cost Estimate prepared by LES for NRC (Apr. 19, 2005)) [hereinafter In Office Review Summary], and came up with a total of $88 million. See LES Exh. 92 (Memorandum of Estimated Costs for Deconversion of DUF_6 Using a Private Facility, prepared by LES for NRC (undated)) [hereinafter Undated Cost Summary]. As to the remaining cost figures, Mr. Krich and Ms. Compton testified that the annual O&M cost of $12.5 million was derived from a €**xxx** million figure in the Urenco business study, which LES converted to dollars and doubled to reflect the increased capacity of the NEF-related facility.[42] See LES Deconversion Direct Testimony at 19; Urenco Business Study at 8; In Office Review Summary. The last element, D&D costs, were estimated to be approximately 10 percent of the total capital costs, or $8.8 million. See LES Deconversion Direct Testimony at 20.

4.28 Finally, LES converted those total costs to a per kgU cost based on (1) spreading the total capital costs and D&D costs (i.e., $96.8 million) over an estimated total number of kilograms of DU produced by the NEF over its lifetime, i.e., approximately 110 million kgU; and (2) spreading the annual O&M costs of $12.5 million over the number of kilograms of DUF_6 anticipated to be processed on an annual basis, i.e., 7 million $kgUF_6$. See Undated Cost Summary at 2.

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[42] Mr. Krich also explained upon Board questioning that doubling the O&M estimate from the Urenco business study to accommodate the doubled capacity of the NEF-related facility is actually very conservative given that COGEMA confirmed for LES that doubled capacity would result in increased O&M costs of approximately **xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxx** because resources such as equipment and employees are shared. See, e.g., Tr. at 2277-78.

4.29 In the face of this evidence, NIRS/PC contended that, LES's deconversion cost estimates should be based on "real world" experience rather than on information contained in the Urenco business study. See NIRS/PC Deconversion Direct Testimony at 10. In his testimony, Dr. Makhijani asserted that such "real world" information is available to LES via the existing contract between Urenco and COGEMA whereby Urenco pays approximately €**x**/kgU to convert **xxx** MT UF_6 to U_3O_8 at COGEMA's "W" plant in France.[43] See id. This figure is comparable, Dr. Makhijani declared, to the range of €**xxxxxxxxxxx** cost estimate by Urenco for deconversion at their proposed Capenhurst facility, see Urenco Business Study at 13, and "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 UF_6 has actually changed hands and been processed." See NIRS/PC Deconversion Direct Testimony at 10. By contrast, Dr. Makhijani averred, LES's deconversion cost estimate relies on a business study regarding a facility that has not yet been built and, further, the $2.67/kgU figure proposed by LES is far below the €**x**/kgU, or $**xxxx**/kgU, number that is based on actual operating experience and a "real world" contract. See id. at 11.

4.30 For their part, staff witnesses took the position that the $2.67/kgU cost estimate offered by LES was reasonable and sufficiently reliable to protect the public health and safety because it was based on an independent response by COGEMA to a Urenco request for proposals for a facility that was "more or less unrelated to this proceeding," and the staff therefore "had no reason to believe that COGEMA would be incorrect in preparing the cost estimate in response to that request for a proposal." See Tr. at 2134-36. Essentially, according

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[43] The €**x**/kgU cost figure was taken directly from the Urenco-COGEMA contract, but this number was escalated to €**xxx**/kgU in the Urenco business study in accordance with the French price indices. See Urenco Business Study at 13-14.

to Mr. Dean, the staff found the cost information contained in the Urenco business study akin to an independent third party estimate like that LES obtained, for example, as an estimate of transportation costs. See Tr. at 2125, 2136. Accordingly, the staff concluded that the information submitted by LES was sufficient to provide a documented and reasonable basis for the deconversion cost estimate. See Staff Deconversion Direct Testimony at 12.

4.31 Based on the testimony and evidence on the record before the Board, we are unable to conclude that LES has carried its burden of demonstrating that its deconversion cost estimate is based on adequately "documented and reasonable assumptions" so as to render the $2.67/kgU figure presented by LES sufficiently reliable to be used in calculating decommissioning funding. The cost estimate provided by LES is based upon its scaling of a business study done by Urenco, the sole general partner in the LES venture, which in turn is based on cost estimates provided by COGEMA, a company admittedly experienced in deconversion. While we do not question the concept of estimating the cost to construct and operate a facility based on prior experience with a similar facility, in this instance the mere scaling up and adapting of those construction and operation costs, as opposed to obtaining an estimate of the entirety of expected costs to LES or a third party to construct and operate a facility to accommodate the deconversion needs of the NEF, see infra note 52, falls short in that it fails to provide a thorough analysis such as would typically be developed and used for any new project.[44] Without such an analysis, and in the absence of a bona fide third-party estimate

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[44] In this vein, the circumstances now before the Board can be distinguished from the Commission's decision in Hydro Resources, Inc., in which it found that, in estimating labor costs for its financial assurance plan relative to its proposed uranium mining operation, the applicant was entitled to draw upon its prior experience in that field as a basis for its cost estimates. See HRI, CLI-04-33, 60 NRC at 597. LES does not have any experience of its own to draw upon as a basis for its deconversion cost estimate. Nor, in fact, does its parent company Urenco, on whose business study the cost estimate is based. Rather, the only entity with actual experience (continued...)

of what that entity would charge to provide deconversion services for the NEF, such as LES provided for other components of its decommissioning funding estimate including transportation and CaF_2 disposal, we are unable to find the LES estimate acceptable.[45]

4.32 In sum, we cannot find on the record before us that LES's deconversion cost estimate is sufficiently developed or rests upon sufficiently supportable analyses and assumptions to permit reliance on that estimate, particularly given that the deconversion cost figure represents a material portion of the total decommissioning cost estimate. To be sure, some of the LES estimates and calculations relative to the deconversion estimate appear conservative on their face, e.g., doubling the annual O&M cost. But because the Board does not have confidence that the COGEMA cost estimate that is the basis for the Urenco business study accurately reflects all the variables customarily considered in establishing the cost of deconversion services (e.g., cost of capital), we are unable to conclude that the LES extrapolations from those numbers brings us to a reliable deconversion cost estimate.

4.33 On the other hand, the Board also declines the NIRS/PC invitation to find that the COGEMA-Urenco contract price constitutes a "contemporaneous third party price" on which the LES cost estimate should be based. See Tr. at 2175. Dr. Makhijani contended in his written testimony that the approximately €x/kgU is the most reliable cost estimate "to date,"

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[44](...continued)
in constructing and operating a deconversion facility, at least as is relevant here, is COGEMA, whose cost estimates and related statements are degrees removed from the instant proceeding.

[45] Each of these items are discussed further below. Having a third-party estimate for decommissioning costs is not necessarily mandated by the relevant NRC regulations and guidance; nonetheless, as the staff seems to suggest, having such a cost estimate adds significantly to the reliability of that estimate, see NRC Staff Testimony on the LES Transportation Cost Portion of the Decommissioning Cost Estimate (fol. Tr. at 2489) at 4; Tr. at 2505-06; Staff Exh. 37, at 10-11 to -12 (NUREG-1827, Safety Evaluation Report for the [NEF] in Lea County, New Mexico, ch. 10 (June 2005)).

albeit with several additional qualifications.[46] See NIRS/PC Deconversion Direct Testimony at 10. Counsel for NIRS/PC also pursued this theory on cross-examination of LES and staff witnesses. See Tr. at 1890-1904, 2173-78. We are not persuaded, however, that the current COGEMA-Urenco contract price provides any better estimate of LES's projected deconversion costs than do the figures derived from the Urenco business study. Indeed, a deconversion cost estimate based on that contract price suffers from the same deficiencies as the LES cost estimate to which NIRS/PC objects; namely, it provides neither a direct estimate of what a third party would charge LES to process its estimated annual throughput, nor a thorough analysis of what it would cost LES or another entity to construct and operate a facility to process the NEF's anticipated annual throughput.[47]

4.34 To be sure, LES asserted that the cost estimate based on the Urenco business study "is a good independent estimate that reflects a third party's cost at building a deconversion plant," Tr. at 2321, a premise the staff found sufficiently reliable to support this portion of LES's decommissioning funding requirement, see Tr. at 2125-27. But in the Board's view, that approach, which failed to encompass material, customary cost elements, was not adequate to provide a reliable private deconversion cost estimate. To do so, in the Board's

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[46] For example, Dr. Makhijani asserted that reliance on that number is only reasonable if, among other things, the cost were offered as part of an MOU between COGEMA and LES, and provisions were made for exchange rate considerations and cost escalation. See NIRS/PC Deconversion Direct Testimony at 10-11.

[47] As Mr. Johnson explained upon questioning by NIRS/PC counsel:

> [T]he cost of the small contract between Urenco and COGEMA doesn't necessarily represent the total cost of another entity building a full sized plant and operating [it]. All that reflects is the cost that Urenco happens to be paying COGEMA for processing a relatively small amount of depleted uranium.

Tr. at 2177.

estimation, would require LES to follow one of two paths: (1) obtain an estimate from a knowledgeable, experienced third-party of what that third party would charge to provide deconversion services for LES based on LES's proposed operation of the NEF; or (2) obtain a thorough analysis from a qualified, credible source of what it would cost either LES or a third party to build, own, operate, and decommission a deconversion facility at the proposed NEF or some other site.[48] LES having failed to provide a deconversion cost estimate that met either of these criteria, we are unable to conclude LES has satisfied its burden to provide a sufficiently documented and reasonable cost estimate for this element of decommissioning funding.

b. Cost of Capital and HF Neutralization Costs

4.35 In challenging the LES estimate of the cost of deconversion, Dr. Makhijani also contended on behalf of NIRS/PC that two additional costs must be included as separate "line-items" to LES's deconversion cost estimate, namely the cost of HF neutralization and cost of capital, see, e.g., NIRS/PC Deconversion Direct Testimony at 11-12; Tr. at 2364-65, each of which LES averred are subsumed in its $2.67/kgU deconversion cost estimate, see, e.g., LES Deconversion Direct Testimony at 26; Tr. at 2004, 2007. As to the first element, Mr. Krich testified that although LES did not specifically calculate a cost for HF neutralization, LES concluded that the costs associated with neutralizing HF and storing the CaF_2 product would not be more than the costs of handling and storing HF prior to sale, the latter of which were accounted for in the Urenco business study. See LES Deconversion Direct Testimony at 26. Dr. Makhijani contended, in response, that this assumption ignores previous cost estimates,

[48] In the former circumstance, a summary bid or price quote from an experienced third-party vendor would suffice. See, e.g., infra Part IV.C.2 (general estimate from nuclear materials transporter sufficient to provide basis for LES's transportation cost estimate). For the latter scenario, the same detailed cost analysis would be required regardless of whether the actual construction and operation of the deconversion facility was completed by LES or a third party, though the cost figures resulting from such an analysis would undoubtedly differ.

such as the Lawrence Livermore National Laboratory analysis that indicated that HF neutralization results in higher cost estimates than production and sale of anhydrous HF, as well as a statement in the Urenco business study that HF neutralization would increase the cost estimate by €**xxxx**/kgU. See NIRS/PC Deconversion Direct Testimony at 12.

4.36 Relative to the cost of capital,[49] i.e., costs incurred by a party seeking to finance the construction of a deconversion facility, Mr. Krich and Ms. Compton testified initially that, although it did not include a specific line item for this cost, LES's $2.67/kgU estimate contained a sufficient margin of "extra money" in its O&M costs and the revenues resulting from the annual three percent escalation of LES's $88 million capital cost estimate to cover the cost of capital. See, e.g., Tr. at 2004, 2007, 2016-23. Despite LES's professed view that its initial deconversion cost estimate contained sufficient overestimates of certain costs such that the cost of capital would be subsumed by those overestimates, it indicated to the staff in a November 23, 2005 letter, LES Exh. 118 (Letter from R. M. Krich, LES, to Director, NMSS, NRC (Nov. 23, 2005)) [hereinafter LES Record Supplement], that LES was "prepared to commit to an additional $0.40 per kgU to account for the cost of capital," a submission that ultimately led to the February 2006 evidentiary session on this issue. See supra pp. 29.

4.37 At the February 2006 hearing, Mr. Krich then took the position that LES was not required to account for the cost of capital either as a separate line item cost or as being subsumed within LES's $2.67/kgU cost estimate because NRC regulations require only that LES provide sufficient financial assurance to ensure that, at the end of the NEF's operating life, sufficient funds are available to cover the cost of deconversion by a third party. See

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[49] Although prior to the start of the October 2005 hearing LES and NIRS/PC stipulated that the cost of capital associated with a private deconversion facility would not be at issue during the evidentiary hearing, see August 2005 Stipulation at 2, the parties and the Board nonetheless pursued this line of inquiry without objection by any of the parties.

Supplemental Prefiled Direct Testimony of Rod Krich On Behalf of [LES] Regarding Cost of Cylinder Management and Cost of Capital Issues (fol. Tr. at 3279) at 17-18 [hereinafter LES Supplemental Deconversion Direct Testimony]. For his part, Dr. Makhijani contended that this LES position that cost of capital need not be accounted for at all "is entirely new and . . . not in accord with the schedule [in the MOU] on which LES cost estimates have been based." See Revised Prefiled Rebuttal Testimony of Dr. Arjun Makhijani in Support of NIRS/PC Contentions E'C-3/TC-1, EC-5/TC-2, and EC-6/TC-3 Concerning LES's Deconversion Strategy and Cost Estimate (Costs of Capital and Cylinder Management) (fol. Tr. at 3492) at 8 [hereinafter NIRS/PC Supplemental Deconversion Rebuttal Testimony].

4.38 Having concluded there is insufficient testimony and evidence on the record before us to find that LES's deconversion cost estimate of $2.67/kgU is sufficiently reliable to form the basis for this element of decommissioning funding, we also are unable to determine whether additional "line items" are necessary to account for the HF neutralization costs or cost of capital.[50] LES simply has not presented the Board, or the staff for that matter, with a sufficiently specific documented breakdown of the costs contained within the overall deconversion cost estimate.[51] Although the costs of HF handling and storage might well

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[50] We are persuaded, however, by LES's rebuttal of Dr. Makhijani's arguments relative to the LLNL analysis and the €xxxx/kgU additional cost figure from the Urenco business study, the former being relevant only to anhydrous HF, a chemical form LES has committed not to produce, and the latter referring to a scenario whereby Urenco would incur costs for both HF handling and storage for sale of that byproduct and HF neutralization, assuming that Urenco treated the HF for sale and subsequently could not offload it into the market. See Prefiled Rebuttal Testimony of Rod Krich, Paul Harding and Paul Schneider on Behalf of [LES] Regarding Applicant's Strategy and Cost Estimate for the Private Sector Deconversion of [DUF_6] (fol. Tr. at 1840) at 9, 11-12.

[51] More specifically, LES has provided two divergent lines of testimony and evidence. First, LES contended that costs for HF processing and storage are estimated by COGEMA to be €xxx million, see LES Exh. 90, at 5 (Letter from B. LeMotais, COGEMA, to C. Chater,

(continued...)

exceed the costs associated with HF neutralization, as LES asserted, the Board has not seen a sufficiently documented estimate of the costs of either of those processes such that we can be confident in holding either that HF neutralization costs are subsumed in the $2.67/kgU number or that, as NIRS/PC contended, the LES cost estimate must be increased by some amount to account for those neutralization costs.

4.39 The same holds true for cost of capital. Either of the two positions LES has taken on this matter may well be valid. LES may, as Mr. Krich claimed at the February 2006 hearing, have provided a deconversion cost estimate ($2.67/kgU) that amounts to adequate end-of-life financial assurance to cover third-party deconversion costs. And LES may, as Mr. Krich and Ms. Compton also averred, have sufficient excess funds in its estimated O&M costs and the revenues resulting from a three percent per annum escalation of LES's $88 million capital cost estimate to account for cost of capital. But this is not a determination the Board is able to make based on the record before it.[52] At bottom, LES's "new" position regarding the

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[51](...continued)
Urenco Ltd. (June 21, 2004)), a figure that was incorporated, via the Urenco business study, into LES's deconversion cost estimate, and that the €**xxxx** million added by LES to its cost estimate incorporated additional funding for HF handling and storage, among other things, see COGEMA Cost Clarification at 1. See also LES Reply Findings at 15. Second, LES presented a letter from John Smets, an expert in the deconversion services field providing information in his personal capacity, in which Mr. Smets conveyed his belief that "[t]he facilities and equipment necessary to produce bulk HF for sale are substantially greater in size and cost than the facilities to neutralize the HF." See LES Exh. 115 (Letter from J. Smets to P. Schneider, SMG, Inc. (Oct. 14, 2005)). However, in his letter Mr. Smets provides no quantitative estimates of those costs, and further appears to assume certain conditions (namely, the need for construction of a rail spur in the HF sale scenario) that make this piece of evidence considerably less reliable. See id. Thus, because LES has provided no true cost figures for comparison of the two scenarios, i.e., HF handling and storage versus HF neutralization, it has not provided sufficient information and documentation on which the Board could make a determination about whether HF neutralization costs are subsumed in the overall deconversion cost estimate.

[52] Certainly, there was no presentation of any detailed financial analysis incorporating,
(continued...)

need to account for cost of capital provides a distinction without a difference. Thus, because we find that LES has failed to provide a sufficiently reliable deconversion cost estimate, we are similarly not in a position to determine either whether (1) the $2.67/kgU estimate would result in sufficient end-of-life financial assurance to account for a third party's cost of deconversion, if that is indeed all the NRC regulations require;[53] or (2) the $2.67/kgU cost estimate provides sufficient excess funds to cover the cost of capital, if such costs are in fact required to be included as a part of decommissioning funding.

c. Estimated Cost of Landfill Disposal of CaF_2

4.40 With paragraph E of contention NIRS/PC EC-6/TC-3, NIRS/PC assert that LES "seriously underestimates" the costs of disposing of CaF_2, a byproduct of the conversion process. According to this portion of their contention, the CaF_2 will be contaminated with depleted uranium, which will require disposal in a low-level radioactive waste disposal facility rather than a landfill, as LES proposes.[54] See NIRS/PC Deconversion Direct Testimony at 12-13.

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[52](...continued)
for example, the funding costs and associated expected drawdowns and repayments.

[53] The Board takes no position at this juncture as to whether this is all the relevant NRC regulations require. We do, however, note NIRS/PC's argument set forth in their supplemental proposed findings of fact and conclusions of law to the effect that the Commission rules that LES relies on to support its argument that it need only provide sufficient end-of-life funding do not mention uranium enrichment facilities and, indeed, were drafted to apply to other types of licensees (e.g., materials licensees), and that the Commission might have inserted the "plausible strategy" standard into the LES application to account for the fact that enrichment facilities, for example, produce much larger quantities of waste and thus would require more substantial financial assurance. See NIRS/PC Supplemental Proposed Findings at 9.

[54] The resultant cost for disposal as LLRW would be materially higher, as indicated by the DOE estimate provided to LES which included a cost of **$xxxx**/kgU for disposal of CaF_2. See LES Exh. 87, encl. at 13 (Letter from R. M. Krich, LES, to Director, NMSS, NRC (Aug. 12, 2005)).

4.41 As discussed above, see supra p. 50, one of the byproducts of the DUF_6 deconversion process is aqueous HF. The HF produced by this process may be sold on the commercial market or, in the alternative, may be neutralized and converted to CaF_2 which itself may then be sold commercially or disposed of in some manner. See Staff Deconversion Direct Testimony at 13. The LES proposed strategy is to neutralize the HF to produce CaF_2 and dispose of it as industrial solid waste in a conventional landfill (e.g., the Lea County municipal landfill). See LES Deconversion Direct Testimony at 25. NIRS/PC contended that this "is not a reasonable or credible assumption at present" because there are currently no federal or state free release limits for uranium-contaminated CaF_2, and therefore the CaF_2 must be disposed of as LLRW. See NIRS/PC Deconversion Direct Testimony at 12.

4.42 The ultimate selection of a disposal site, and thus whether LES's plan to dispose of CaF_2 in a municipal landfill is reasonable, turns on whether the concentrations of uranium in the CaF_2 will be sufficiently low such that it will be acceptable for disposal in a landfill. Mr. Krich and Mr. Schneider testified for LES that "COGEMA has identified certain specifications of the HF co-product to be generated by its deconversion process," including a requirement that the uranium concentration be less than 5 parts per million (ppm). See LES Deconversion Direct Testimony at 27; LES Exh. 90, at 3 (Letter from B. LeMotais, COGEMA, to C. Chater, Urenco Ltd. (June 21, 2004)). They further noted that actual operational experience at COGEMA's "W" deconversion plant in Pierrelatte, France, confirms that HF uranium contamination is typically below 1 ppm for that plant. See LES Deconversion Direct Testimony at 27; LES Exh. 76 (AREVA-COGEMA, Defluorination of Depleted UF_6 – The W Defluorination Facility at 8 (Sept. 27, 2004)); see also LES Deconversion Direct Testimony at 27-28 (EISs for the Paducah, Kentucky and Portsmouth, Ohio deconversion facilities anticipated contamination levels of less than 1 ppm). Because of the purity of the byproduct HF, Mr. Krich and Mr.

Schneider concluded, any resulting CaF_2 will contain only trace amounts of uranium. See LES Deconversion Direct Testimony at 28.

4.43 Witnesses for the staff testified that the operational experience at three domestic fuel fabrication facilities, each of which produces aqueous HF as a DUF_6 deconversion byproduct, further buttresses the LES claim that the level of uranium contamination would be insufficient to preclude landfill disposal. Specifically, each fabricator is licensed by the NRC for unrestricted release of HF provided uranium contamination does not exceed 3 ppm, a level the NRC believes is sufficiently low to allow sale or disposal of HF or resulting CaF_2 as non-radioactive material. See Staff Deconversion Direct Testimony at 14-15. That those fabricators have been able to operate under the 3 ppm limit, asserted the staff witnesses, indicates that DUF_6 conversion results in only minimal HF uranium contamination. See id. at 15.

4.44 Dr. Makhijani, testifying for NIRS/PC, did not dispute that producing HF with a uranium contamination of 1 ppm is routine. See Tr. at 2373. Rather, NIRS/PC contended that landfill disposal has not been established as a "reasonable and credible" plan because (1) no generic "free release" standards exist for uranium-contaminated CaF_2, see, e.g., NIRS/PC Deconversion Direct Testimony at 12; and (2) disposal of uranium-contaminated CaF_2 at the Lea County, New Mexico landfill would ultimately require approval from NMED, and LES has not attempted to determine whether such approval would be granted. See LES Exh. 97, attach. at 1 (E-mail from R. Krich, LES, to J. Curtiss, Winston & Strawn LLP (Nov. 21, 2004)) [hereinafter CaF_2 Disposal Summary]; NIRS/PC Exh. 272, at 82-83 (New Mexico Solid Waste Management Regulations); Tr. at 1958, 2403. Therefore, declared Dr. Makhijani, the only available option for disposal of CaF_2 is at a LLRW disposal facility, resulting in a considerable increase to this element of the LES cost estimate. See NIRS/PC Deconversion Direct Testimony at 12-13.

4.45 In response, Mr. Krich and Mr. Schneider testified that the lack of a generic "free release" standard does not preclude the NRC or an appropriate Agreement State[55] from authorizing such release of uranium-contaminated CaF_2 on a case-by-case basis, albeit with certain contamination limits. See LES Deconversion Direct Testimony at 28. Mr. Krich and Mr. Schneider explained that the State of South Carolina has approved disposal of CaF_2 process waste with a uranium concentration not exceeding 30 picocuries per gram (pCi/g) as non-regulated waste at a solid waste landfill, see id.; LES Exh. 77 (Letter from V. R. Autry, South Carolina Department of Health and Environmental Control, to L. D. Garner, Starmet CMI (Apr. 1, 1999)),[56] which translates to a uranium contamination limit of approximately 70 ppm, see Tr. at 2060. Mr. Schneider further testified that he was aware of several instances when disposal of uranium-contaminated CaF_2 actually occurred in South Carolina municipal landfills, albeit in smaller quantities from fuel fabrication facilities. See Tr. at 2062-63.

4.46 Dr. Makhijani testified in response that the fact that small quantities of CaF_2 from fuel fabrication facilities had been disposed of in conventional landfills did not end the inquiry regarding the disposal of uranium-contaminated CaF_2 from uranium enrichment facilities, for which the quantities of material for disposal are much greater. See, e.g., Tr. at 2391-93. In support of this proposition, Dr. Makhijani pointed to several NEPA-related documents. In addition to three DOE NEPA-related documents that he asserted conclude that, even assuming

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[55] Under the NRC's Agreement State program, the NRC delegates certain regulatory authority to a state with respect to specified regulated materials, including the disposal of such materials. The Agreement State program is discussed in detail in our second partial initial decision. See LBP-06-8, 63 NRC at 260-61.

[56] Mr. Schneider also cited an instance when the South Carolina Department of Health and Environmental Control permitted disposal of waste of up to 250 pCi/g, or approximately 600 ppm, at WCS. See Tr. at 2061; LES Exh. 78, at 1 (Letter from V. R. Autry, South Carolina Department of Health and Environmental Control, to L. D. Garner, Starmet CMI (June 17, 1999)).

a uranium contamination of less than 1 ppm, it is unknown whether the CaF_2 resulting from the deconversion process would be sold or disposed of as nonhazardous solid waste or as LLRW, Dr. Makhijani declared that because the draft EIS and FEIS for the NEF only considered disposal of CaF_2 as LLRW, see 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 (fol. Tr. at 2236) at 9-11 [hereinafter NIRS/PC Deconversion Rebuttal Testimony], such disposal "must be [the] choice of the applicant," see NIRS/PC Deconversion Direct Testimony at 13. Upon cross-examination, however, Mr. Johnson explained for the staff that the purpose of the NEPA-related analysis conducted by the staff is to bound the environmental impacts of disposal of the CaF_2, and therefore that the EIS for the NEF considered the disposal pathway that would result in greater impacts,[57] but that the NEPA analysis "wasn't intended to define what is expected" or to limit LES's disposal options.[58] See Tr. at 2171-72. In fact, Dr. Palmrose stated, while the EIS mentions only low-level waste disposal, he "reviewed all reasonable options for their environmental impacts" and applied what he believed was the most conservative analysis, namely, disposal as LLRW. See Tr. at 2112-13. According to Dr. Palmrose, "this does not mean that other options that would have lower impacts are eliminated, but that [the LLRW disposal] analysis would bound those impacts." Tr. at 2113.

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[57] For example, Dr. Palmrose pointed out for the staff that disposal as low-level waste would result in environmental impacts related to potentially long distance transportation of the waste from the deconversion facility to a low-level waste disposal facility, as opposed to relatively short distance transportation to a conventional landfill. See Tr. at 2168.

[58] Indeed, nothing in NEPA requires agencies to select the most environmentally benign option or to require an applicant/licensee to do so. See Louisiana Energy Services, L.P. (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 88 (1998) (citations omitted).

4.47 In considering these arguments, we begin with the proposition that the actual method of disposal of CaF_2 is ultimately an issue that must be addressed in the first instance in the context of licensing any private deconversion facility. In other words, all the relevant NRC regulations and accompany guidance require at this juncture is that the LES cost estimate for disposal of CaF_2 be based on documented and reasonable assumptions. And on the record before the Board, we find that because it has been and currently is being done, conventional landfill disposal of CaF_2 contaminated with low concentrations of uranium that can reasonably be expected to result from the processes at issue here constitutes a reasonable and credible assumption for the purposes of calculating this aspect of LES's decommissioning cost estimate. LES and the staff have adequately demonstrated that it is reasonable to expect the CaF_2 uranium content will be below 1 ppm, and NIRS/PC has failed to show otherwise. There also have been several occasions in which the NRC or an appropriate Agreement State agency has authorized landfill disposal at concentrations (e.g., approximately 70 ppm) that far exceed the expected NEF-related concentration of 1 ppm. The fact that several landfills currently accept CaF_2 from similar processes for disposal, albeit in smaller quantities, further demonstrates the reasonableness of LES's assumption that the NEF-related CaF_2 may be disposed of in a municipal landfill.

4.48 Relative to the cost of disposing of CaF_2 in a conventional landfill, Mr. Krich testified that, based on the assumption that landfill disposal was appropriate, LES contractor Framatome ANP contacted the Lea County Public Works Director J.D. Norby to discuss the possibility of disposing of NEF-related CaF_2 at the Lea County landfill, including the estimated costs of disposal. See LES Deconversion Direct Testimony at 25; CaF_2 Disposal Summary, attach. at 1. Mr. Norby informed Framatome that the estimated cost of disposing of CaF_2 at the landfill beginning in 2005 would be $31/ton for bulk powder CaF_2, the disposal form LES

proposes, a number that was confirmed by an independent source. See CaF_2 Disposal Summary, attach. at 1. Based on an approximate density of 100 pounds per cubic foot for bulk CaF_2 powder, Framatome calculated the estimated disposal cost to be approximately $1.55 per cubic foot or $41.85 per cubic yard, see id., attach. at 2, which translates to approximately $0.02/kgU, see LES Deconversion Direct Testimony at 26. Mr. Krich also concluded that because disposal in a municipal landfill would likely not involve transporting the CaF_2 great distances, the cost of transporting that material is sufficiently covered by the $0.02/kgU estimate. See Tr. at 2078.

4.49 For its part, the staff determined that the $0.02/kgU cost estimate was based on documented and reasonable assumptions in that it was substantiated by an independent third party estimate. See Staff Deconversion Direct Testimony at 14; Tr. at 2125.

4.50 In fact, NIRS/PC presented no real contest to the $0.02/kgU figure itself. Rather, Dr. Makhijani's testimony, see NIRS/PC Deconversion Direct Testimony at 12-14; NIRS/PC Deconversion Rebuttal Testimony at 7-11, as well as NIRS/PC counsel's cross-examination of LES and staff witnesses, see Tr. at 1952-65, 2164-73, focused almost entirely on the appropriateness of landfill disposal for CaF_2 and, as a result, whether the cost estimate for disposal should be considerably larger to account for the need to dispose of the CaF_2 as low-level waste. NIRS/PC presented no testimony or evidence to directly contradict the LES-proffered estimate for disposing of CaF_2 in a landfill. In fact, as LES witness Krich pointed out in his written rebuttal testimony, one of the documents that NIRS/PC presented in support of their assertion that NEF-related CaF_2 must be disposed of as low-level waste (or at least the cost estimate must be based on such an assumption), the LLNL report, "states that the assumed disposal cost for disposal of CaF_2 as nonhazardous solid waste is $2 [per cubic foot]." See Prefiled Rebuttal Testimony of Rod Krich, Paul Harding and Paul Schneider on Behalf of

[LES] Regarding Applicant's Strategy and Cost Estimate for the Private Sector Deconversion of [DUF_6] (fol. Tr. at 1840) at 12 (citing NIRS/PC Exh. 56, at 118 (Hatem Elayat, et al., Cost Analysis Report For the Long-term Management of [DUF_6] (LLNL May 1997) [hereinafter LLNL Report]. As Mr. Krich noted, however, the difference between the $2 per cubic foot cost figure and the $1.55 per cubic foot estimate from the Lea County landfill is de minimis once those figures are converted to cost per kgU.[59] See id.

4.51 After reviewing the testimony and evidence before the Board, we resolve paragraph E of contention NIRS/PC EC-6/TC-3 in favor of LES, in that LES has carried its burden of demonstrating that landfill disposal of CaF_2 resulting from NEF operations at a rate of $0.02/kgU (including transportation to the landfill) is sufficiently reliable to be used for computation of this element of the required decommissioning funding estimate.

d. Estimated Costs of Cylinder Management

4.52 In connection with contention NIRS/PC EC-5/TC-2, NIRS/PC contend that LES's deconversion cost estimate improperly excludes the estimated cost of managing empty DUF_6 cylinders. During the October 2005 hearing, Mr. Krich testified on behalf of LES that he anticipated that the DUF_6 cylinders would be reused throughout the life of the NEF, therefore the costs associated with cylinder management (e.g., washing and recertification) were properly considered operational costs of the NEF and need not be included as a separate line item in its deconversion cost estimate for the purposes of estimating decommissioning funding. See Tr. at 1965-69, 2313. On surrebuttal, however, Ms. Mayer testified for the staff that Mr. Krich's assessment about the need (or lack thereof) to account for cylinder management in the cost

[59] Further, as LES counsel elicited on surrebuttal, LES used the $31/ton figure instead of $24/ton, see CaF_2 Disposal Summary, attach. at 1, the latter of which corresponds to the agreement the parties made to refer to costs in terms of 2004 dollars, thereby making LES's use of the $31/ton even more conservative. See Tr. at 2064-65.

estimate relative to the decommissioning funding plan was only partially accurate. Specifically, Ms. Mayer noted that while such a cost might normally be considered an operational cost, when, as here, a deconversion facility does not yet exist, it is reasonable to include a separate line-item cost for any cylinder washing and/or recertification that might be required before the deconverter could reuse or otherwise benefit from possession of the cylinders. See Tr. at 2140-41. In fact, as Ms. Mayer testified, the staff apparently was not aware that the LES deconversion cost estimate did not account for the cost of cylinder management until they received Dr. Makhijani's prefiled testimony a few weeks prior to the October evidentiary hearing, see Tr. at 2138-39, and, as Mr. Johnson testified on cross-examination, because the staff views cylinder washing as "a legitimate cost to add to decommissioning funding," the staff indicated that it would need to have further discussions with LES regarding that issue, see Tr. at 2222.

4.53 Although LES apparently continues to view the cost of managing empty DUF_6 cylinders as an operational cost that need not be included in its initial decommissioning cost estimate, in a November 23, 2005 letter to the staff, LES nonetheless "commit[ed] to an additional $0.60 per kgU for the cost of cylinder washing," see Record Supplement at 2. Because LES has agreed to include cylinder washing as a separate line item cost in its decommissioning funding cost estimate, the only question for the Board is whether this $0.60 figure constitutes a reliable cost estimate based on documented and reasonable assumptions.[60]

[60] Indeed, the Board noted in its order scheduling the February 2006 evidentiary hearing, "the Board is interested in testimony and evidence from NIRS/PC that might challenge or contradict the approximately $0.59 per kgU cost figure derived from the Urenco business study and, therefore, the $0.60 per kgU LES cost estimate." See Record Supplementation Ruling at 3 n.4.

4.54 At the February 2006 evidentiary hearing, NIRS/PC took the basic position that, while the $0.60 cost figure might be appropriate for the washing aspect of cylinder management costs, assuming the cylinders are recycled for use in the industry, see Tr. at 3390-91; Revised Prefiled 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 (Costs of Capital and Cylinder Management) (fol. Tr. at 3492) at 14 [hereinafter NIRS/PC Supplemental Deconversion Direct Testimony],[61] LES still has not adequately demonstrated what would be done with the cylinders after such cleaning (i.e., recycling, disposal, or free release), and, further, has not demonstrated the costs associated with cylinder disposal or free release. See NIRS/PC Supplemental Proposed Findings at 31. While NIRS/PC thus does not present any substantial challenge to the $0.60/kgU cost estimate provided by LES "for what it does,"[62] see Tr. at 3390-91, they do contend that LES has not substantiated its claim that the empty cylinders will actually be washed and certified for reuse, rather than disposed of or

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[61] In the course of drafting the instant decision, it came to the Board's attention that the copy of Dr. Makhijani's supplemental direct testimony regarding deconversion included in the transcript of the February 2006 evidentiary hearing was missing several pages. Given that the Board provided NIRS/PC the opportunity to propose corrections to that transcript, see Licensing Board Memorandum and Order (Post-Hearing Administrative Matters) (Feb. 16, 2006) at 1 (unpublished), and NIRS/PC failed to point out the error in the transcript, we would be justified in discounting those omitted portions of Dr. Makhijani's written testimony in that they were not made part of the evidentiary record, we nonetheless considered the version of Dr. Makhijani's prefiled direct testimony in reaching our decision here, see Revised Prefiled 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 (Costs of Capital and Cylinder Management) (Jan. 13, 2006).

[62] Although Dr. Makhijani stated in his written direct testimony on this issue that conversion of the Euros per cylinder cost from the Urenco business study to $/kgU resulted in a figure of $0.61/kgU to $0.68/kgU, see NIRS/PC Supplemental Deconversion Direct Testimony at 14, he did not explain how he arrived at these figures, or why they were different than the $0.59/kgU cost he calculated using the Urenco business study in the context of his October 2005 testimony on this subject, see NIRS/PC Deconversion Rebuttal Testimony at 16. We therefore decline to consider Dr. Makhijani's revised cost figures.

prepared for "free release," and has not demonstrated either the cost of, or strategy for, dealing with the cylinders should reuse not be possible.

4.55 As to the first point -- the feasibility of recycling or reusing the cylinders following facility decommissioning -- Dr. Makhijani contended on behalf of NIRS/PC that reliance on the $0.60/kgU cost estimate is reasonable only if LES completes "an additional analysis of marketability of the cylinders at the projected time of decommissioning." See NIRS/PC Supplemental Deconversion Rebuttal Testimony at 4-5. Because LES has not completed such a market analysis, the cost estimate for cylinder management must, according to Dr. Makhijani, be based on the assumption that those cylinders will be disposed of as low-level waste. See NIRS/PC Supplemental Deconversion Direct Testimony at 15.

4.56 As the Board has previously pointed out, LES is not required, as a basis for its initial decommissioning funding cost estimate, to make projections or otherwise speculate about what events may or may not occur in the distant future. The initial decommissioning cost estimate thus is appropriately based on demonstrable current market conditions, and any future changes in the market that would impact LES's cost estimate should be accounted for as part of the periodic update process. Relative to cylinder usage, Mr. Krich and Dr. Harding both testified that empty cylinders would be a valuable commercial resource to either LES or a third party operator of a deconversion facility because such cylinders could be continuously reused or recycled within the industry. See Tr. at 1965-77;[63] LES Supplemental Deconversion Direct Testimony at 6. That cylinder reuse or recycling is a reasonable assumption is further supported by a number of factors, including evidence to the effect that (1) Cameco Corp.

[63] In fact, Dr. Harding asserted that disposing of the empty cylinders "would be a ludicrous thing to do . . . . It would be a waste of disposal space, a total waste of a resource to scrap them off." See Tr. at 1975.

routinely washes and recertifies cylinders for its customers, see Supplemental Prefiled Rebuttal Testimony of Rod Krich on Behalf of [LES] Regarding Cost of Cylinder Management and Cost of Capital Issues (fol. Tr. at 3281) at 4; LES Exh. 123 (Letter from A. Oliver, Cameco Corp., to R. M. Krich, LES (Jan. 9, 2006)) [hereinafter Cameco Letter]; (2) fifty-year old cylinders are still in circulation, see Tr. at 3386; and (3) when the Sequoyah Fuels UF_6 production facility shut down, it had no problem getting rid of its cylinders, see Tr. at 3388. Thus, we find no merit in Dr. Makhijani's argument that LES's cylinder management cost estimate must be based on the assumption that those cylinders will have to be disposed of as low-level waste.[64]

4.57 In sum, and particularly in the absence of any contrary evidence, the Board declines at this juncture to speculate about what the market might be at some point in the future for the reuse or sale of empty DUF_6 cylinders from the NEF. Based on the evidence presented, we find that it is reasonable for LES to assume, as the basis of this aspect of its decommissioning cost estimate, that the empty cylinders will represent a resource for the operator of the deconversion facility (or another facility or user) and, therefore, that LES is required only to provide a cost estimate for cleaning those cylinders to a level that allows their unrestricted release for reuse. The Board further finds that LES has adequately demonstrated via information from a third-party commercial entity that $0.60/kgU represents a reliable

[64] Indeed, Dr. Makhijani's primary argument, that "in planning for the DOE inventory of depleted uranium, DOE has assumed that the DUF_6 cylinders would be disposed of," NIRS/PC Supplemental Deconversion Direct Testimony at 14, was sufficiently rebutted by LES. Specifically, as Mr. Krich testified, the DOE study referred to by Dr. Makhijani assumes that its cylinders will be used as DU disposal containers, and thus there is no evidence that the cylinders themselves will be considered low-level waste. See Tr. at 3399; see also LES Supplemental Reply Findings at 16.

estimate of the cost of washing to the applicable "free release" standards empty DUF_6 cylinders from the NEF, such that it may be utilized for purposes of decommissioning funding.[65]

e. Overall Holding Regarding Deconversion-Related Costs

4.58 In sum, with respect to NIRS/PC's challenges to the overall LES deconversion cost estimate, we find that LES has failed to carry its burden to demonstrate the adequacy of that cost estimate, and thus find in favor of NIRS/PC relative to the portions of NIRS/PC EC-5/TC-2 and paragraph G of NIRS/PC EC-6/TC-3 that challenge the overall deconversion cost estimate. With regard to the LES cost estimate for CaF_2 disposal and DUF_6 cylinder management costs, however, we find that LES has carried its burden in the face of NIRS/PC challenges to the adequacy of those costs.

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[65] More specifically, at the February evidentiary hearing, Mr. Krich produced a letter from Cameco Corp., an entity with considerable experience in cylinder washing and recertification, that stated:

> LES's cost estimate is conservative, and should be more than sufficient to cover the costs of the activities mentioned above based on Cameco's experience. Cameco provides cylinder washing and recertification services (to the current ANSI N14.1 standard) for third party customers. The price that Cameco charges for performing these activities in 2006 is $2,500 per cylinder (or $0.29 per kgU as UF_6). This price, which includes overhead and profit[,] is about half of the figure cited by LES in its license application.

Cameco Letter at 1.

Mr. Krich further demonstrated the inherent conservativism in its $0.60/kgU cost estimate in that LES assumed that each cylinder would be used only once, whereas in reality it is most likely that many of the cylinders will be reused by LES throughout the life of the NEF. See, e.g., Tr. at 2311-12; LES Supplemental Deconversion Direct Testimony at 9.

C. Findings Regarding Transportation Costs

4.59 Another item at issue in connection with LES financial assurance is the estimate of the costs involved in transporting DUF_6 from the NEF to a deconversion facility and then transporting the resulting U_3O_8 from the deconversion facility to a disposal site. LES presented this estimate by means of an "average" cost to cover transit of this material over the entire circuit from the NEF to the deconversion facility to the disposal facility, a figure that NIRS/PC has contested for several reasons.

4.60 In relevant part, contention NIRS/PC EC-5/TC-2 provides:

> 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 . . . .
>
> 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 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., . . . $0.85/kgU for transportation, and . . . cannot be the basis for financial assurance.

According to NIRS/PC, the LES transportation figure of $0.85/kgU is not an appropriate cost estimate measure because it reflects an average, rather than the sum, of the separate cost estimates provided to LES for DUF_6 and U_3O_8 transportation, the basis for which has not been sufficiently justified by LES or the staff. See Revised Direct Testimony of Dr. Arjun Makhijani in Support of NIRS/PC Contention EC-5/TC-2 Concerning LES's Transportation Cost Estimate (fol. Tr. at 2515) at 10-11 [hereinafter NIRS/PC Transportation Cost Direct Testimony].

1. Witnesses and Evidence Presented

4.61 Addressing this issue on behalf of LES was Rod Krich, LES Vice President of Licensing, Safety, and Nuclear Engineering. Mr. Krich's qualifications have been described previously. See Part IV.B.1 supra. On this transportation cost matter, the staff's panel consisted of Timothy C. Johnson, Jennifer Mayer, and Craig Dean, all of whom previously testified regarding other aspects of the safety matters at issue in the October 2005/February 2006 evidentiary hearings and whose training and experience have been described previously. See Part IV.B.1 supra. Finally, Dr. Arjun Makhijani, who was a witness on other issues and whose training and experience likewise have been described previously, see Part IV.B.1 supra, was the sole NIRS/PC witness on this matter.

4.62 Based on the respective qualifications presented in their written testimony on the adequacy of the LES transportation cost estimate, the Board finds that each of the LES, staff, and NIRS/PC witnesses is qualified as an expert on the transportation aspect of this financial assurance matter for the purposes of this proceeding.

4.63 In his testimony, Dr. Makhijani noted that LES originally obtained an e-mail estimate from Rod Fisk, Chief Executive Officer (CEO) of Transportation Logistics International (TLI), that provided a cost range for transportation of both UF_6 and U_3O_8, and that Mr. Fisk in a subsequent e-mail stated that these transportation costs were dominated by overhead-associated items and thus were essentially independent of distance. Relying on this information, Mr. Krich averaged the lowest value from the range of UF_6 and DU_3O_8 costs to arrive at the LES estimate of $0.85/kgU for the transportation cost. But in doing so, Dr. Makhijani maintained, Mr. Krich made two mistakes. First, in contravention of NRC guidelines requiring that, at a minimum, all cost estimates be "based on documented and reasonable assumptions," NUREG-1757, at 4-10, the exchange of vague e-mails between Mr. Krich and

Mr. Fisk provide the costs, but without detailed justification so as to make the estimates insufficient to document the assumptions or provide a basis for determining if they are reasonable. Similarly, according to Dr. Makhijani, the LES claim that the overhead costs predominate among the costs for transit also is unquantified beyond the statement that "time and fuel[] amounts to fractions of a cent per kilogram/mile." LES Exh. 99 (E-Mail from Rod Fisk, CEO, TLI, to Rod Krich, Vice President, LES (Mar. 23, 2005 2:44 p.m. EST)) [hereinafter Fisk March 2005 E-Mail]. Moreover, Dr. Makhijani declared, the significance of this documentation deficiency is enhanced by Mr. Fisk's withdrawal as an LES expert witness, with the result that the individual who developed the estimates did not testify before the Board, leaving only the recipient of the e-mails to address their meaning. See NIRS/PC Transportation Cost Direct Testimony at 9-10.

4.64 Additionally, according to Dr. Makhijani, given that Rod Fisk asserted transportation costs are effectively independent of distance because overhead costs predominant, the cost of transporting the material both from the NEF to the deconversion facility and then from the deconversion facility to a disposal site will be incurred for every kilogram of DU that is generated by the proposed LES facility. Thus, Dr. Makhijani argued that instead of averaging the costs as Mr. Krich did, an action with which the staff apparently agreed, LES should have added the costs to reflect the costs of both legs of the journey. Adding the costs would change the LES transportation estimate to the range of from **$xxxx** to **$xxxx** per kgU based on the range of TLI-quoted prices, thereby adding between $111 million and $148 million to the LES financial assurance figures, assuming the proposed NEF generates 133,000 metric tons of DU. See id. at 10-11; see Revised Rebuttal Testimony of Dr. Arjun Makhijani in Support of NIRS/PC Contention EC-5/TC-2 Concerning LES's Transportation Cost Estimate (fol. Tr. at 2516) at 3 [hereinafter NIRS/PC Transportation Cost Rebuttal Testimony]. So too, Dr.

Makhijani declared, relative to the cost elements allowed by the Board's October 4, 2005 issuance, the "IEER [Waste Isolation Pilot Project (WIPP)] Disposal Scenario 1," reflects a low-end DU cost disposal estimate footed in experience at WIPP and an estimated CaF_2 dispositioning cost based on the LLNL analysis, while the "IEER WIPP Disposal Scenario 2" involves a medium WIPP cost estimate and an estimated CaF_2 cost arising from a report of the National Research Council of the National Academy of Sciences that in total would support a disposal cost estimate per kgU of between $18.13 and $23.88, as opposed to the $5.85/kgU proposed by LES. See NIRS/PC Transportation Cost Rebuttal Testimony at 4-5.

4.65 In his testimony on behalf of LES, Mr. Krich stated that the LES estimate for transportation was $0.85/kgU for transportation of DUF_6 and DU_3O_8, which is independent of the distance the material is actually being shipped. Mr. Krich further indicated that the LES transportation cost estimate from TLI, which specializes in the domestic and international transport of radioactive materials, including UF_6 and U_3O_8 in particular, was initially provided on December 2, 2004, via an e-mail that was a follow-up to a prior LES phone conversation with Mark Lambert of TLI. See Prefiled Direct Testimony of Rod Krich on Behalf of [LES] Regarding the Adequacy of Applicant's Cost Estimate for the Transportation of [DU] from the Proposed [NEF] (fol. Tr. at 2449) at 3-4, 5 [hereinafter LES Transportation Cost Direct Testimony]; Tr. at 2484. According to Mr. Krich's testimony, he asked TLI for cost estimates for moving depleted uranium either in the form of UF_6 or in the oxide form (i.e., U_3O_8), from the NEF site to a deconversion facility, and then on to a disposal site. See Tr. at 2460, 2461, 2484-85. Mr. Krich stated that the e-mail estimates from TLI CEO Rod Fisk provided two sets of cost ranges: (1) **$xxxxxxxxxxxxx** per kg for DUF_6, and (2) **$xxxxxxxxxxxxx** per kg for U_3O_8. These costs are for transporting by truck DUF_6 in 48X/48Y cylinders, and DU_3O_8 in fifty-five-gallon drums within a twenty-foot International Organization for Standardization container, which are standard

industry methods for transporting such materials. See LES Transportation Cost Direct Testimony at 5.

4.66 Thereafter, from this cost information, Mr. Krich estimated the average cost of transporting DU to be $0.85/kgU. He did this by computing the average of the two lower-end cost values provided by TLI, i.e., the $xxxx per kg for DUF_6 and $xxxx per kg for DU_3O_8, which according to his testimony he believed to be appropriate in view of Mr. Fisk's characterization of the TLI cost figures supplied in his e-mail as "'very conservative.'" Id. at 6 (quoting LES Exh. 98 (E-Mail from Rod Fisk, CEO, TLI, to Rod Krich, Vice President, LES (Dec. 2, 2004 1:51 p.m. EST)) [hereinafter Fisk December 2004 E-Mail]. To compute this average, he first adjusted the two figures, using appropriate conversion factors, to state both cost figures in common terms, i.e., in dollars per kgU, as follows: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx. The average of these two values is $0.85/kgU, which is the updated value included by LES in its revised license application. See id.

4.67 Additionally, in connection with this estimate Mr. Krich noted that the characterization of it as "independent of distance" is based on a statement contained in a March 23, 2005 e-mail he received from Mr. Fisk. In that e-mail, Mr. Fisk explained the "impact of additional mileage, which affects only time and fuel, amounts to fractions of a cent per kilogram/mile." Fisk March 2005 E-Mail. Thus, according to Mr. Krich, only a negligible portion of the overhead costs for transportation of radioactive materials are associated with increases in distance traveled. Mr. Krich testified further that overhead costs make up the bulk of the transportation cost estimate and include, among other things, material packaging, marking and labeling, communications, vehicle tracking, vehicle maintenance, driver training, security,

loading and unloading of cargo, and insurance. See LES Transportation Cost Direct Testimony at 6.

4.68 In terms of Dr. Makhijani's concerns regarding the sufficiency of the LES evidentiary showing, relative to the assertion that the Fisk e-mails are "too vague" to serve as the basis for the requisite "documented and reasonable assumptions" upon which such an estimate must be based, Mr. Krich declared that an applicant should be able to rely on third-party market participants statements or representations, including price quotes from commercial vendors. Certainly, he asserted, the cost ranges provided by Mr. Fisk have ample precision to permit a reasonable per kgU cost estimate to be computed. Moreover, he maintained that Mr. Fisk's March 2005 e-mail provides a sufficiently qualitative explanation of why distance has a minimal effect on overall transportation costs. Indeed, according to Mr. Krich, Mr. Fisk's point that additional time and fuel costs account for a small portion of a transporter's overall costs is consistent with statements contained in the 1997 LLNL cost analysis report, which Mr. Krich declared has been referenced frequently by NIRS/PC in this proceeding, that states:

> The loading, shipping, and unloading costs represent less than one quarter of the transportation costs. Changing the shipping distance does not change the ranking of strategies by cost. Distance affects only the shipping component of transportation costs, which will vary linearly with the distance between facilities. Total transportation costs are therefore relatively insensitive to distances between facilities. There is significant flexibility, therefore, in choosing off-site locations for [de]conversion, manufacturing, storage, and disposal facilities.

Prefiled Rebuttal Testimony of Rod Krich on Behalf of [LES] Regarding the Applicant's Private Sector Cost Estimate for the Transportation of [DU] (fol. Tr. at 2451) at 4 (emphasis omitted) (quoting LLNL Report at 92) [hereinafter LES Transportation Cost Rebuttal Testimony]. Because NRC guidance requires only a "reasonably accurate" estimate or "best approximation"

of expected costs, the quantitative assessment or justification suggested by Dr. Makhijani is not necessary, Mr. Krich declared, particularly in light of Mr. Fisk's knowledge and expertise regarding the transportation of radioactive materials and the attendant costs. See id.

4.69 Addressing Dr. Makhijani's second criticism, Mr. Krich asserted that it is footed in the notion that since NEF-generated DU transportation involves moving two distinct DU forms -- DUF_6 and DU_3O_8 -- LES should effectively double its transportation cost estimate by adding, rather than averaging, the TLI-provided cost values. Mr. Krich maintained, however, that Dr. Makhijani's argument is based on a clear misunderstanding of the cost information provided by Mr. Fisk. In this regard, he testified that, based on his initial telephone conversation with TLI personnel, and Mr. Fisk's later clarification that distance has a "minimal effect" on overall transportation costs, Fisk March 2005 E-Mail, it was his understanding that the TLI-provided cost ranges were meant to allow him to calculate a consolidated or "cradle-to-grave" unit cost for disposing of each NEF-generated kilogram of DU. As a consequence, the LES $0.85/kgU cost estimate would include the total cost of transporting each NEF-generated kilogram of DU, both in its pre-deconversion DUF_6 form and in its post-deconversion DU_3O_8 form. Further, according to Mr. Krich, to do away with any potential additional uncertainty regarding the matter, he asked Mr. Fisk to affirm the validity of his interpretation and his use of the TLI cost information, which Mr. Fisk did in a letter dated October 6, 2005. See id. (citing LES Exh. 110 (Letter from Rod Fisk, CEO, TLI, to Rod Krich, Vice President, LES (Oct. 6, 2005) [hereinafter Fisk Letter]).

4.70 In their testimony, staff witnesses indicated they understood that (1) the NEF-associated transportation cost encompasses both the cost of shipping the DUF_6 from the NEF to the conversion facility and the expense of transporting the U_3O_8 from the conversion facility to the disposal site; (2) the cost was based on a TLI estimate; (3) TLI provided two

ranges of estimates, one for DUF_6 and one for oxides, and represented that its quote is very conservative; and (4) LES used the average of the lower range estimate for each material, after converting the cost to $/kgU. These witnesses further declared that (1) the staff considered the cost information relied on by LES to be reliable because it was provided by an independent third party vendor; and (2) the LES use of the lower end of the range of costs was acceptable because of the conservative nature of the quotation. See NRC Staff Testimony on the LES Transportation Cost Portion of the Decommissioning Cost Estimate (fol. Tr. at 2489) at 3-4. And relative to the latter points, the staff witnesses indicated they disagreed with Dr. Makhijani's assertion that the transportation cost estimate was insufficiently documented given LES provided documentation from a senior official of independent third-party vendor TLI, who cited specific cost numbers for DUF_6 and uranium oxides transport and explained the costs were conservative and independent of distance because overhead expenses were the principal cost elements.[66] See NRC Staff Rebuttal Testimony Regarding Transportation (fol. Tr. at 2491) at 2 [hereinafter Staff Transportation Cost Rebuttal Testimony].

4.71 Moreover, as to Dr. Makhijani's assertion that LES underestimated transportation costs by averaging the TLI-provided costs for UF_6 and uranium oxides instead of adding them, the staff witnesses noted that for the purpose of decommissioning, the NEF-produced tails must first be transported as UF_6 to a deconversion facility, where they are converted to a uranium oxide, U_3O_8, which is then transported to a disposal site. As a result, the staff observed, in order to accomplish final tails disposition, both these transportation segments are required and so the disposition-associated transportation costs must include the transportation costs for both segments. According to the staff, because the TLI estimate relied upon by LES contains two

[66] Although the staff described this information as coming from the TLI Chief Financial Officer, it is the Board's understanding that Mr. Fisk's title is CEO.

costs -- one for UF_6 transport and the other for U_3O_8 transport -- the LES cost estimates included both transportation segments required for disposal, i.e., from the proposed enrichment facility to the deconversion facility and from the deconversion facility to the ultimate disposal site, for each type of material being transported. As a result, the staff concluded it was appropriate for LES to use the average of the two costs. See id. at 2-3.

4.72 This could be contrasted, the staff witnesses indicated, with Dr. Makhijani's assertion that LES should have derived its cost estimate for transportation by adding the costs for transport of UF_6 and U_3O_8, which incorrectly assumes that the cost information for each type of material -- UF_6 and uranium oxide -- refers only to one leg of the journey. In the staff's estimation, this would not be appropriate because the third-party cost estimates already provided include both segments of the transportation necessary to dispose of depleted uranium.[67]

2. Adequacy of Transportation Cost Estimate

4.73 The NIRS/PC challenges to the LES evidentiary submissions regarding its transportation cost estimate fall roughly into two categories, i.e., concerns about (1) the viability of the evidentiary material that LES proffered in support of its estimate, in particular its use of

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[67] The staff went on to observe, however, that even if one accepted Dr. Makhijani's assumption that the cost estimates reflect only one portion of the journey, adding the two costs together would likely result in an excessively conservative cost estimate because not all costs would be incurred twice. According to the staff, TLI stated that the overhead costs involved included material packaging, marking and labeling, communications, vehicle tracking, vehicle maintenance, driver training, security, loading and unloading of cargo, and insurance. Some of these cost elements may be incurred independently for each segment of the trip, i.e, loading and unloading; however, other elements, such as driver training, vehicle maintenance and tracking, and insurance, should not be counted twice as these costs would be shared between both segments of the trip. Additionally, the staff asserted, the same trucks used to deliver the UF_6 to the deconversion facility would be able to take the U_3O_8 produced by the deconversion facility to the disposal site. See Staff Transportation Cost Rebuttal Testimony at 3-4; Tr. at 2508-09.

two e-mails and a letter from TLI executive Rod Fisk (Fisk December 2004 E-Mail; Fisk March 2005 E-Mail; Fisk Letter) in lieu of having Mr. Fisk testify under oath; and (2) the substantive validity of that information, that is, whether that information provides an adequate estimate of the costs likely to be incurred in moving DU from the NEF to a deconversion facility, and then to a disposal facility.

4.74 Relative to the first concern, the procedures employed are worth noting. Mr. Krich was deposed regarding the nature of the LES cost estimates, including his discussions with Mr. Fisk. See NIRS/PC Exh. 226, at 12-14 (Deposition of Rod Krich (Aug. 26, 2005)). Moreover, the Fisk e-mails and letter were not the subject of in limine motions when they were included as supporting material for Mr. Krich's prefiled direct and rebuttal testimony and later were admitted into evidence at the October 2005 hearing without objection. See Tr. at 2453. NIRS/PC, however, still questioned their use on two grounds: (1) the documentary materials fail to meet the staff guideline that cost estimates be sufficiently "documented," see NUREG-1757, at 4-10; and (2) the documents should not be given any weight before the Board, given their tainted lineage as hearsay submissions from a witness who was not made available to NIRS/PC for questioning during discovery or cross-examination.

4.75 As to the first point, we find the information, which was provided by a senior official of an independent third party, TLI, whose experience and expertise in nuclear materials transportation has not been challenged, is sufficiently detailed to document the basis for the LES estimate, both as it relates to the cost estimate amount and the impact of shipping distance on that estimate. More oblique, perhaps, is the issue whether, in this context, the LES withdrawal of Mr. Fisk as a witness (and a potential deponent), in the face of Mr. Krich's admission that he has no expertise in transportation cost estimation, see Tr. at 2460, provides a basis for disqualifying or disregarding this information, including the October 6 letter. Given,

however, that Mr. Fisk was identified as the source of the information and, notwithstanding his removal from the LES witness list, seemingly could have, if NIRS/PC chose, been subjected to discovery and compelled to provide testimony before the Board, see 10 C.F.R. §§ 2.702(a), 2.706(a), we find no compelling basis for discounting the TLI hearsay information as unreliable. Compare Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-367, 5 NRC 92, 121 (1977) (non-expert's testimony based on what he was told by anonymous expert stricken as unreliable hearsay).

4.76 On the additional matter of whether the information presented in the Fisk e-mails and letter, as modified by Mr. Krich, provides a reasonable transportation cost estimate, we are frank to state it is not apparent to the Board why LES chose to create what seems to be unnecessary confusion by requesting separate estimates from TLI for UF_6 and U_3O_8 for the entire NEF/deconversion/disposal transportation cycle for each when, in fact, each of these products generally will only be transported through a portion of that cycle. See Tr. at 2484. Nonetheless, given the evidence before us regarding the conservative nature of the TLI estimates and the relative insensitivity of those estimates to the distance the material must actually travel (overhead, and more specifically packaging, being a primary cost driver, see Tr. at 2511),[68] and the lack of any compelling contrary showing by NIRS/PC,[69] we conclude that the

[68] Although not reflected on the evidentiary record before us (or posited as a item that would justify reopening that record) and, according to the information provided by Mr. Fisk, a factor (like shipping distance) that apparently is not likely to affect transportation costs significantly, the impact of sustained, radically higher fuel costs nonetheless might be an item for the staff to consider as part of a periodic update to the LES dispositioning cost estimates..

[69] Although Dr. Makhijani in his rebuttal testimony sought to provide some evidence based on WIPP cost estimates that he indicated suggested the LES transportation estimate was grossly understated, see NIRS/PC Transportation Cost Rebuttal Testimony at 4-5, the information he proffers fails to provide sufficient granularity relative to transportation costs to be probative. At the same time, there is some indication that DOE transportation costs would be

(continued...)

figure of $0.85/kgU arrived at by Mr. Krich by converting the lower end cost values in the TLI estimates to per kgU and then averaging them is sufficient to meet the LES burden to provide, at this stage, a reliable cost estimate for transportation for use in the initial estimate of decommissioning funding. We, therefore, resolve the portion of contention NIRS/PC EC-5/TC-2 related to transportation cost in favor of LES.

D. Findings Regarding Plausibility and Cost of Disposal

4.77 NIRS/PC also raised several challenges to the plausibility and cost of LES's private disposal strategy; namely, with paragraph I of contention NIRS/PC EC-6/TC-2, they claim that LES's $1.14/kgU cost estimate for disposal presents a serious underestimation of the actual costs because its proposed strategy of near-surface, or "engineered trench," disposal is not plausible, and with contention EC-5/TC-2, NIRS/PC claims that the $1.14/kgU cost figure is not reliable in that it lacks a factual basis and documentary support. We address each of these matters below.

1. Witnesses and Evidence Presented

4.78 LES presented a panel of two witnesses to address the issues associated with the plausibility and cost of DU_3O_8 disposal: (1) Rod Krich, Vice President of Licensing, Safety, and Nuclear Engineering for LES; and (2) Thomas E. Potter, an independent radiation protection consultant. As we note above, see Part IV.B.1 supra, Mr. Krich has previously testified before this Board and his background and qualifications are discussed at length in our first partial initial decision. Mr. Potter received a Bachelor of Science in Chemistry from the

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[69](...continued)
lower than the LES estimate, see Tr. at 2510. While it has no bearing on our ultimate determination here regarding the adequacy of the proffered LES initial cost estimate for transportation, see supra p. 34,the periodic update process nonetheless would be the vehicle by which any cost discrepancies would be addressed.

University of Pittsburgh and a Master of Science in Environmental Science with a Radiation Protection focus from the University of Michigan, and has more than thirty years of professional experience in the field of radiation protection. As an independent consultant, Mr. Potter provides technical advice to materials licensees on a range of radiation protection issues, including radiation assessments associated with operations and decommissioning, commenting on proposed radiation protection regulations, and conducting radiation protection program audits. He was hired by LES to testify as an expert witness about the proper waste classification of DU pursuant to 10 C.F.R. Part 61, as well as the radiological properties of DU as relevant to the plausibility of near-surface disposal of DU from the NEF. As it is relevant to those issues, Mr. Potter has experience in health physics, waste management, and environmental matters regarding the handling and processing of uranium, trans-uranium, fission product and activation product radionuclides, and facility decommissioning, including waste classification evaluations. See Prefiled Direct Testimony of Rod Krich and Thomas Potter on Behalf of [LES] Regarding Applicant's Strategy and Cost Estimate for the Private Sector Disposal of [DU] from the Proposed [NEF] (fol. Tr. at 2607) at 3-4 [hereinafter LES Disposal Direct Testimony].

4.79 The staff presented a panel consisting of: (1) Timothy C. Johnson, NRC *Project* Manager for NEF licensing; (2) James Park, NRC Project Manager for environmental review of NEF application; (3) Jennifer Mayer, consultant for ICF Consulting; (4) Craig Dean, consultant for ICF Consulting; and (5) Donald Palmrose, an employee of Advanced Systems Technology and Management, Inc. See NRC Staff Testimony Regarding Disposal (fol. Tr. at 2831) at 1-2 [hereinafter Staff Disposal Direct Testimony]. The Board has previously described the background and qualifications of each of these witnesses in Part IV.B.1. For their part, NIRS/PC presented one witness, Arjun Makhijani, President of IEER. See 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 Disposal Strategy and Cost Estimate (fol. Tr. at 2968) at 1 [hereinafter NIRS/PC Disposal Direct Testimony]. As with many of the other witnesses, Dr. Makhijani has previously testified before this Board and his background and qualifications are treated in Part IV.B.1.

4.80 Based on the foregoing, and the respective background and experience of the proffered witnesses, the Board finds that each of these witnesses is qualified to testify as an expert witness on the subject of the plausibility and cost of LES's disposal strategy.

2. Plausibility of Near-Surface Disposal

4.81 As part of its private dispositioning strategy, LES proposes that following deconversion of NEF-produced UF_6 to U_3O_8 at a commercial deconversion facility, the U_3O_8 would be transferred to a facility where it can be disposed of by some method of near-surface disposal, most likely "engineered trench" disposal, the subject of paragraph I of NIRS/PC EC-6/TC-3. Essentially, NIRS/PC claim such disposal would not meet the 10 C.F.R. Part 61 requirements for land disposal of radioactive wastes.

4.82 As the Board discussed at length in our second partial initial decision, 10 C.F.R. Part 61 sets forth the licensing requirements for land disposal of LLRW, of which near-surface disposal is a subset. See LBP-06-8, 63 NRC at 263-68. Near-surface disposal, in turn, refers to disposal within 30 meters of the earth's surface, though burial deeper than 30 meters may be permitted under certain circumstances. See id. at 264 & n.18. "Engineered trench" disposal, the type of disposal referred to in paragraph I of NIRS/PC EC-6/TC-3, is a near-surface disposal method that involves disposal in a relatively shallow earthen structure or excavation and, according to LES witnesses Krich and Potter, "is one of the most commonly used methods of [LLRW] disposal, particularly in arid climates." See LES Disposal Direct Testimony at 7.

4.83 In their written testimony on this subject, Mr. Krich and Mr. Potter provided a brief explanation of what "engineered trench" disposal involves. Generally, the disposal facility operator digs a trench to a depth of no more than 30 meters, with the specific trench parameters (e.g., depth, length, and width) determined based on the particular characteristics of the disposal site and the volume of waste requiring disposal. The containers holding the waste sit atop a stable structural pad surrounded by barrier walls made up of compacted clay, which is meant to provide both structural integrity and a relatively impermeable barrier to prevent migration of waste from the trench. The waste containers themselves are stacked tightly in layers in the bottom of the trench, and any remaining spaces between the containers are filled with materials such as sand, gravel, and concrete. After the trench is completely filled, a thick engineered cap consisting of clay and other fill materials is generally placed over the top of the waste and compacted to provide additional waste isolation and prevent migration. Additional material, such as gravel and rocks, may then be placed over the cap to provide for drainage and prevent erosion. See id. at 7-8.

4.84 Before we consider the merits of NIRS/PC's plausibility contention, it is important to note that the scope of the matters still at issue relative to this contention was narrowed considerably by our second partial initial decision, which concerned the environmental impacts of near-surface disposal. In that decision, the Board recognized that the Commission has found that, under existing NRC regulations, depleted uranium is appropriately categorized as low-level waste and, further, under a plain reading of 10 C.F.R. § 61.55(a), is deemed Class A waste. See LBP-06-8, 63 NRC at 265. The Board also noted in that decision, however, that the question of whether, as NIRS/PC assert, geologic disposal of depleted uranium from the NEF would be required, would be addressed in the context of the Board's ruling on NIRS/PC's remaining safety contentions. See id. at 268 n.22. Thus, the question facing the Board today is

whether LES has established that "engineered trench" disposal, or some similar method of near-surface disposal, is plausible, or whether something more, such as geologic disposal, is required.

4.85 The parties all agree that waste classification does not necessarily end the inquiry into whether near-surface disposal is appropriate for NEF-generated DU. That the Commission has determined that DU is Class A waste merely makes that waste eligible for near-surface disposal. The final determination rests instead with the question of whether near-surface disposal meets the Part 61, Subpart C performance objectives. See id. at 275. In his written and oral testimony on this matter, Dr. Makhijani concluded that near-surface disposal of depleted uranium from the NEF cannot be considered a "plausible strategy" because the radiological properties of depleted uranium are "most comparable to transuranic (TRU) waste which is similar to the classification of Greater than Class C (GTCC) waste under 10 C.F.R. [§ 61.]55(a)" and "shallow land disposal for these wastes (TRU or GTCC) is generally not appropriate and they are considered to require deep geologic disposal." NIRS/PC Disposal Direct Testimony at 21. In other words, in Dr. Makhijani's estimation, near-surface disposal of depleted uranium is unlikely to meet the radiation dose limits of Subpart C. See 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 Disposal Strategy and Cost Estimate (fol. Tr. at 2969) at 20 [hereinafter NIRS/PC Disposal Rebuttal Testimony]. Thus, Dr. Makhijani contended, "depleted uranium from the proposed NEF facility will require disposal in a deep geologic repository comparable to the Waste Isolation Pilot Plant (WIPP) now operating in New Mexico." NIRS/PC Disposal Direct Testimony at 26.

4.86 For their part, LES and the staff took the same basic position on this issue, namely that near-surface disposal of DU from the NEF may be plausible at certain domestic

facilities provided the particular site characteristics permit compliance with the technical requirements and performance objectives at that site. For each, whether near-surface disposal at a particular site would meet the requirements of Part 61 is the bottom line inquiry relative to the plausibility of such disposal. See, e.g., LES Disposal Direct Testimony at 9-11; Staff Disposal Direct Testimony at 5.

4.87 Despite the voluminous testimony and evidence presented on this matter, the Board's inquiry is fairly straightforward and does not require that we delve into the questions of the radiological properties of depleted uranium. As we explained in LBP-06-8, Envirocare has been licensed by the State of Utah, an Agreement State, to accept depleted uranium in the form and quantities that will be produced at the NEF. See LBP-06-8, 63 NRC at 279. In other words, the Utah Division of Radiation Control (DRC), the relevant Agreement State agency, determined that near-surface disposal of DU_3O_8 would meet the state analog to the Part 61 regulations and further imposed no quantity limitations on the Envirocare license. See, e.g., id. at 280. As LES witnesses Krich and Potter explained, LES contacted Envirocare and received confirmation that Envirocare indeed could dispose of depleted uranium from the NEF and, further, that Envirocare in fact has previously disposed of DU_3O_8 via shallow land burial utilizing a capped Class A disposal cell. See LES Disposal Direct Testimony at 15; LES Exh. 103 (Letter from A. Rafati, Envirocare, to E. J. Ferland, LES (Feb. 3, 2005)) [hereinafter Rafati Letter]. The DRC subsequently verified Envirocare's statements during a telephone conference with the staff, stating that it has "no reservations about accepting DU in an oxide form (specifically DU_3O_8)" and that the Envirocare license contains no volume restrictions for acceptance of depleted uranium. See LES Disposal Direct Testimony at 16; LES Exh. 104, attach. at 2 (Memorandum from M. Blevins, NRC, to Scott Flanders, NRC (Apr. 6, 2005)). Dr.

Makhijani presented no relevant evidence to controvert LES's showing that Envirocare is indeed licensed to accept DU_3O_8 without quantity limitation.[70]

4.88 Based on the foregoing, and the relevant Board findings in LBP-06-8, it is apparent that near-surface disposal at Envirocare is most certainly a plausible strategy for disposal, in that Envirocare has the technical qualifications to dispose of DU and is in fact licensed to do so at that facility. Put another way, LES has adequately demonstrated that disposal at Envirocare is a reasonable and plausible strategy in that the Utah DRC has determined that near-surface disposal of DU at that site, without quantity limitation, would comply with the Part 61 performance objectives as currently in force. And as we have said before, it is not for this Board to question the validity of Envirocare's license, or the State of Utah's determination to license Envirocare to accept DU. Thus, we find that deep geologic disposal is not required for DU from the NEF.[71]

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[70] In his written rebuttal testimony on this matter, Dr. Makhijani indicated that, contrary to LES and the staff's testimony, amendment 22 to Envirocare's license demonstrates that the license does indeed contain a possession limit for depleted uranium, and that the NEF-produced DU would exceed the associated concentration limit. See NIRS/PC Disposal Rebuttal Testimony at 16. As Mr. Johnson testified for the staff, however, this limitation is not a general limitation on depleted uranium disposal, but rather refers to the possession of a drum-check source that was specifically built for Envirocare for use in calibrating an instrument used to measure the quantity of depleted uranium in a given container, a point that was also confirmed by a letter from the DRC staff. See Tr. at 2878-79; Staff Exh. 44 (Letter from D. Finerfrock, State of Utah, Department of Environmental Quality, to P. Lohaus, NRC (Sept. 19, 2005)).

[71] As we noted in our partial initial decision regarding DU disposal impacts, our findings here regarding the appropriateness of near-surface disposal of DU hinge on the fact that the current Part 61 regulations mandate that DU is a Class A waste. As we said there,

> the Commission has directed the staff to examine, outside of this adjudication, whether the quantities of depleted uranium from enrichment facilities warrant amending section 61.55(a)(6), or the waste classification tables of section 61.55(a). Should the Commission make a determination in the course of that

(continued...)

4.89 To the extent that LES is not required to have more than one plausible strategy,[72] our inquiry could reasonably end here. We believe, however, that the testimony and evidence presented regarding, for example, the analysis of near-surface disposal of depleted uranium in the DOE Programmatic Environmental Impact Statement (PEIS), in combination with the fact that the Envirocare facility actually has been licensed to accept unlimited quantities of DU_3O_8 for disposal, demonstrate that near-surface disposal at some other LLRW disposal facility with similar characteristics might be plausible as well.

4.90 As Mr. Krich averred in his written testimony, DOE "concluded that near-surface disposal of DU_3O_8 in a dry environment is acceptable from a radiological health standpoint." LES Disposal Direct Testimony at 16 (citing LES Exh. 18, app. I (Final [PEIS] for Alternative Strategies for the Long-Term Management and Use of [DUF_6], DOE/EIS-0269, DOE Office of Nuclear Energy, Science and Technology (April 1999)) [hereinafter PEIS]). Specifically, as LES witnesses Krich and Potter further expounded on rebuttal, DOE conducted generic analyses of near-surface disposal for its own inventory of DU from deconversion operations, set forth in Appendix I to the PEIS, that indicated groundwater doses would be below regulatory limits for

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[71](...continued)
> rulemaking proceeding that section 61.55 or other portions of Part 61 need revision to address the impacts resulting from the waste stream from uranium enrichment facilities, such a determination may well require that licenses for near-surface disposal facilities, including Envirocare, be evaluated in light of any new requirements imposed by any revised Part 61 regulations.

LBP-06-8, 63 NRC at 286-87. In such a case, LES's disposal cost estimates would likewise have to be reevaluated by the staff, an inquiry that presumably would be conducted in the context of the periodic update process.

[72] Or, in this case, because LES has continued to pursue the private sector disposal strategy and related cost estimate, two plausible strategies – transfer to DOE and a separate private sector strategy.

disposal facilities in "dry" or arid climates, including disposal in shallow earthen structures (e.g., engineered trenches). See LES Disposal Rebuttal Testimony at 11; see also PEIS at sec. 2.4.5; PEIS app. I, at sec. I.4. By contrast, the generic DOE analyses concluded that groundwater doses would exceed regulatory limits for land disposal in a "wet" or humid environment, including for both near-surface and deeper "mine" disposal. See LES Disposal Rebuttal Testimony at 11; PEIS at sec. 2.4.5; PEIS app. I, at sec. I.4. Notably, according to witnesses Krich and Potter, in conducting its analyses DOE considered a range of representative generic facilities with varying site characteristics and conditions that were selected "to represent the range of actual conditions that could occur," see LES Disposal Rebuttal Testimony at 12 (quoting PEIS app. I, at I-3 to I-4), and, further, "were generally selected in a manner intended to produce conservative estimates of impact [i.e., overestimation]," PEIS app. I, at I-69. In addition, relative to the plausibility of near-surface disposal of DU from deconversion operations, DOE concluded in its Final EISs for its Paducah, Kentucky and Portsmouth, Ohio deconversion facilities that:

> Studies conducted by [a DOE contractor] indicate that both the Nevada Test Site (NTS) (a DOE facility) and Envirocare of Utah, Inc. (a commercial facility) are potential disposal facilities for depleted uranium . . . [in that] either facility would have the capacity needed to dispose of the U_3O_8 product from the proposed DOE DUF_6 conversion program, and that the U_3O_8 material to be sent to these facilities would likely meet each site's waste acceptance criteria.

LES Exh. 16, at 1-20 (Final Environmental Impact Statement for Construction and Operation of a [DUF_6] Conversion Facility at the Portsmouth, Ohio Site, DOE/EIS-0360, Oak Ridge Operations, DOE Office of Environmental Management (June 2004)) (citation omitted); LES Exh. 17, at 1-20 (Final Environmental Impact Statement for the Construction and Operation of a

[DUF_6] Conversion Facility at the Paducah, Kentucky Site, DOE/EIS-0359, Oak Ridge Operations, DOE Office of Environmental Management (June 2004)) (citation omitted).

4.91 Dr. Makhijani, for his part, eschewed reliance on the DOE PEIS in support of the plausibility and appropriateness of near-surface disposal of DU even in "dry" environments, averring that the PEIS actually supports the NIRS/PC argument that something more than near-surface disposal is required for DU from the NEF. Specifically, he asserted, the PEIS actually concluded that doses exceeding regulatory limits in "dry" environments would not occur within the first 1,000 years following facility failure, but that exposures in excess of regulatory limits could occur several thousand years later, even in a dry environment, "if the cover material were to erode and expose the uranium material." See NIRS/PC Disposal Rebuttal Testimony at 17 (quoting PEIS app. I, at I-19).

4.92 DOE did not, for obvious reasons, explicitly use the term of art "plausible strategy" in the PEIS or the Paducah or Portsmouth EISs. At least to the Board's knowledge, however, the implications of its analyses and related conclusions make it clear that DOE has made a reasoned determination that disposal of its inventory of DU_3O_8 via shallow burial at a facility located in a dry or arid environment is a plausible (i.e., reasonable or credible) strategy for disposing of that waste.

4.93 Given the combination of the representations by DOE regarding the suitability of DU for near-surface disposal at a facility with site characteristics and conditions falling within a certain range and the third-party representations by Envirocare and the Utah DRC that Envirocare can in fact accept DU for near-surface disposal, we conclude that LES has adequately demonstrated that its proposed near-surface disposal strategy is plausible. Accordingly, to the extent paragraph I of contention NIRS/PC EC-6/TC-3 contends otherwise, we resolve that portion of the contention in favor of LES.

3. Adequacy of LES Cost Estimate for Near-Surface Disposal

4.94 As noted above, NIRS/PC contest the validity of LES's cost estimate for ultimate disposal of the converted DUF_6 in two respects: (1) first, with paragraph I of contention EC-6/TC-3, NIRS/PC asserts that LES "seriously underestimates" the costs of disposal of DU_3O_8 because "engineered trench," or near-surface, burial is not an acceptable method for disposal of that waste; and (2) second, contention NIRS/PC EC-5/TC-2 asserts, in relevant part, that LES's $1.14/kgU cost estimate for disposal is insufficient because LES has provided no factual or documented support for that number.

4.95 The LES cost estimate of $1.14/kgU for disposal of DU_3O_8 is based primarily on information provided by two commercial sources, Waste Control Specialists (WCS), a waste processing and disposal facility in Andrews County, Texas, and Envirocare. As Mr. Krich explained on behalf of LES, see LES Disposal Direct Testimony at 16, on January 14, 2005, LES entered into a memorandum of agreement with WCS, whereby those parties "**xxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx**," LES Exh. 105, at 2 ([MOA] Between [LES] and [WCS] (Jan. 14, 2005)) [hereinafter WCS MOA]. In the MOA, WCS estimated that the price for disposal of NEF-generated depleted uranium at the WCS site would be in the range of approximately $**xxxxxxxxxx** per cubic foot of DU. See id. Mr. Krich further testified that Envirocare had previously estimated that disposal of large quantities of bulk LLRW would cost approximately $75 per cubic foot. See LES Disposal Direct Testimony at 17; LES Exh. 106 (Notes of Telephone Discussion between L. Lessard, Framatome-ANP, and J. Harrison, Envirocare (Dec. 30, 2002)). According to Mr. Krich, LES selected the lower end of the WCS cost estimate ($**xx** per cubic foot) based in part on the estimate provided by

Envirocare and on the projected quantities of DUF_6 and appropriate densities and volumetric conversion factors for DU_3O_8, and computed an average disposal cost of $1.14/kgU. See LES Disposal Direct Testimony at 17; LES Exh. 96, at encl. (Letter from R. M. Krich, LES, to Director, Office of Nuclear Material Safety and Safeguards (NMSS), NRC, cover letter & encl. (Mar. 29, 2005)); NIRS/PC Exh. 188, attach. 3 (Letter from R. M. Krich, LES, to Director, NMSS, NRC (Apr. 8, 2005)).

4.96 According to the staff's written and oral testimony, the staff reviewed that cost estimate and the supporting bases, including the WCS MOA and communications with Envirocare, and determined that the $1.14/kgU estimate was premised on a documented and reasonable basis. See Staff Direct Disposal Testimony at 7-9; Tr. at 2948-49; see also Staff Exh. 37, at 10-12 (NUREG-1827, Safety Evaluation Report for the [NEF] in Lea County, New Mexico, ch. 10 (June 2005)). Specifically, the staff determined that because so few facilities are licensed to accept LLRW, obtaining a cost estimate from such a facility "provides a solid basis for the estimate." See Staff Disposal Direct Testimony at 8. Further, asserted the staff, the cost estimate relied upon is "considerably higher" (i.e., more conservative) than other low-level waste disposal estimates reviewed by the staff, albeit for materials other than DU, such as bulk contaminated soil. See id.; see also Staff. Exh. 43, at 6 & n.11 (STP-04-003, NRC Process to Identify Decommissioning Sites with Inadequate Funding for Remediation (Jan. 16, 2004)) ("NRC confirmed that ~$11 [per cubic foot] is an 'average' low-level waste disposal rate at Envirocare and that a range of $5-17 [per cubic foot] . . . adequately describes the anticipated low-level waste disposal costs."). Ms. Mayer also noted on cross-examination that the estimate relied upon by LES was conservative based on her personal experience in reviewing and preparing other decommissioning cost estimates. See Tr. at 2957.

4.97 Testifying on behalf of NIRS/PC, Dr. Makhijani made two principal points with respect to why the cost estimate for disposal was not sufficiently grounded in documented and reasonable assumptions.[73] Dr. Makhijani first took issue with fact that LES bases its cost estimate on the WCS quotation provided in the MOA, contending that cost estimate is unreliable given that WCS is not currently licensed to accept LLRW and, further, is not in a position to set its own prices for disposal of NEF-generated depleted uranium at the WCS site. See NIRS/PC Disposal Direct Testimony at 17-19. Specifically, Dr. Makhijani argued that because WCS currently does not have a license to dispose of low-level waste, and separate regulatory actions are necessary to permit DU disposal at WCS, any discussions stemming from the MOA "are contingent upon the WCS assumption that it will receive a license from the Texas Commission on Environmental Quality." Id. at 18. In addition, according to Dr. Makhijani, because the Texas Compact Commission, not WCS, would set the prices for disposal at WCS should it be licensed, a number of questions exist as to when, why, or how that cost estimate might be changed. See id. at 19. Finally, Dr. Makhijani averred that the disclaimer in the MOA to the effect that "xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxx," further undercuts the reliability of this cost estimate. See id. (quoting WCS MOA at 4).

[73] In addition, on cross-examination of both the staff and LES witnesses counsel for NIRS/PC pursued the issue of whether the depleted uranium waste would be "grouted" (i.e., mixed with cement and repackaged in drums), and the impact that might have on LES's disposal cost estimate. See, e.g., Tr. at 2811-13, 2948-49. As Mr. Krich explained at the hearing, whether the waste will be grouted before disposal is a decision that will be made by the disposal site operator, and that decision has no impact on what LES would be required to pay, and, consequently, no impact on its $1.14/kgU cost estimate. In other words, in providing the cost information to LES, WCS and Envirocare understood that grouting might be necessary and the cost estimates provided to LES reflected that knowledge. See Tr. at 2811-13.

For all those reasons, Dr. Makhijani asserted, the WCS cost estimate cannot be considered reasonable or credible.

4.98 Second, Dr. Makhijani asserted in his testimony that he did not believe that statements made by Envirocare, in particular a one-page letter from Envirocare's Executive Vice President Al Rafati relative to LES's cost estimates, provided any further support for those estimates. See id. at 19-20. In that letter, Mr. Rafati stated that he believed the disposal cost estimates included in LES's license application were conservative, but, Dr. Makhijani pointed out, that letter was written when the application contained cost estimates of $1.47/kgU and $2.17/kgU, see id. at 19, and was not an offer to dispose of the material at that cost, see id. at 20.

4.99 In response to Dr. Makhijani's testimony, Mr. Krich asserted that "[n]one of Dr. Makhijani's assertions call into question the reasonableness or credibility of LES's DU disposal cost estimate." LES Disposal Rebuttal Testimony at 16. First, Mr. Krich declared that the fact WCS will not ultimately be responsible for setting its disposal prices does not undercut the MOA cost information given WCS provided that information based on (1) the current projected costs of the WCS facility; and (2) the volume of waste expected to be disposed of at that facility. See id. Second, the **$xx** per cubic foot estimate used by LES to calculate its disposal cost estimate is "clearly conservative," averred Mr. Krich, when compared to the typical prices charged for low-level waste disposal at Envirocare. See id. Finally, with regard to Dr. Makhijani's argument that WCS cost estimates could change at any time, Mr. Krich stated that the purpose of the periodic adjustments to its decommissioning cost estimate is to account for such changes in costs, including disposal costs. See id. at 16-17.

4.100 On the basis of the evidentiary record before the Board, we cannot conclude that relative to either the estimate obtained for WCS or Envirocare, LES has obtained a true

third-party estimate of the cost of near-surface disposal of NEF-generated DU of the type we previously have indicated would be sufficient to constitute a reliable estimate. With regard to the WCS estimate, WCS is not licensed to accept DU from the NEF and has no experience in disposing of radioactive waste such as NEF-generated DU. While we have repeatedly declined to evaluate the likelihood that WCS will receive a license to dispose of LLRW, including DU from enrichment operations, and express no view on that matter now, the crux of our inquiry relative to the reliability of third-party cost estimates goes to whether that entity is in a position to provide a credible estimate of a particular cost element based on its experience with the activity to which that cost estimate is related. We do not believe that WCS, at this juncture, is in a position to provide a reliable cost estimate for near-surface disposal of NEF-generated DU.

4.101 So too, we cannot find that the $75 per cubic foot estimate provided to LES by Envirocare represents a reliable cost estimate for near-surface disposal of the concentrations and quantities of DU that will be generated by the NEF. First, that $75 figure in no way represents an estimate of what Envirocare would charge LES to dispose of NEF-generated DU via near-surface methods at the Envirocare facility. To the contrary, that cost estimate, as NIRS/PC counsel pointed out during cross-examination of LES and staff witnesses, see Tr. at 2795, 2945, reflects an informal estimate of the amount Envirocare would charge for near-surface disposal of reactor decommissioning waste, not what it would charge LES to dispose of DU generated from uranium enrichment operations at the NEF.[74]

[74] Notably, Ms. Mayer testified that the staff was unaware that the $75 per cubic foot cost estimate represented the cost of disposing of reactor decommissioning waste prior to Mr. Krich's statement to that effect on cross-examination, see Tr. at 2945-46, and thus the staff apparently did not have that information when it made its determination that the LES disposal cost estimate was sufficiently reliable to provide a basis for decommissioning funding.

4.102 Furthermore, the letter provided to LES by Mr. Rafati of Envirocare, which states that the LES disposal cost estimate is "conservative," falls short of providing reliable third-party support for LES's cost estimate. As Dr. Makhijani pointed out, the $1.14/kgU estimate apparently was not in the LES application at the time Mr. Rafati reviewed the numbers and found the LES estimate "conservative." Rather, the application contained a range of $1.47/kgU to $2.17/kgU, and it is not clear to the Board (or, apparently, the staff, see Tr. at 2947) what cost figures Mr. Rafati had in mind when he communicated to LES that its cost estimate represented a conservative estimate of what it would cost to dispose of DU_3O_8 at Envirocare. On cross-examination, Mr. Krich stated that Mr. Rafati was aware that the $2.17/kgU cost figure contained in the NEF application represented an estimated cost of disposal in a concrete vault, and thus was irrelevant to his review of the LES cost estimate because Envirocare does not provide concrete vault disposal. See Tr. at 2797-98. But LES provided no evidence that this was the case and, in fact, the plain language of Mr. Rafati's letter seems to suggest otherwise, stating that "the cost range presented in the current LES license application is a conservative estimate" of the cost of DU_3O_8 disposal at Envirocare. See Rafati Letter (emphasis added). Even were we to read the testimony and evidence in the light most favorable to LES (i.e., by assuming Mr. Rafati considered only the $1.47/kgU estimate), Mr. Rafati's statement that such a number is conservative does not, as Mr. Krich suggested, see Tr. at 2798, provide a basis for a finding that LES's $1.14/kgU cost estimate likewise is conservative.[75] Nor can the Board find, as we might otherwise have done, that the $1.47/kgU figure represents a reliable estimate of

[75] On the other hand, contrary to Dr. Makhijani's assertions, it is not significant that Mr. Rafati's letter did not represent an "offer" to provide disposal services at that cost. Neither the staff nor the Board has ever found that a cost estimate must be, or even should be, presented in the form of an offer before it can be relied upon as a basis for estimating decommissioning funding.

the cost of near-surface disposal of DU_3O_8 given that this figure was not developed with the NEF in mind, but rather was derived from DUF_6 and DU_3O_8 disposition costs provided to the NRC in connection with LES's earlier CEC application. See LES Exh. 83 tbl. 10.3-1 ([NEF SAR], ch. 10 (May 2005)).

4.103 The fact that LES has not obtained a reliable third-party estimate for this element of its dispositioning cost estimate does not, however, end our inquiry. As we noted above, see supra note 43, nothing in the applicable NRC regulations or guidance documents requires that LES provide a third-party estimate as a basis for its cost estimate for a particular element of decommissioning funding. But, as we also noted there, an estimate from a third party certainly adds significantly to its reliability. Nonetheless, where, as here, no credible third-party estimate has been proffered, an applicant's summary showing to demonstrate the reliability of its cost estimate may well not suffice.

4.104 In this vein, LES contended that, aside from the specific estimates provided by WCS and Envirocare, there is sufficient additional testimony and evidence on the record to support a finding that LES's estimate of $1.14/kgU is reasonable and conservative. Specifically, in his written and oral testimony on this matter, Mr. Krich set forth a series of cost figures from various sources that purportedly support a finding that LES's $1.14/kgU estimate is more than sufficient. First, Mr. Krich declared, DOE's cost estimate for near-surface disposal of DU_3O_8 is **$xxxx**/kgU based on the price quote provided to a DOE contractor by Envirocare of **$xxxxx** per cubic foot, a figure nearly five times less than LES's cost estimate. See Tr. at 2802-03; LES Exh. 87, at 10, 13 (Letter from R. M. Krich, LES, to Director, NMSS, NRC (Aug. 12, 2005)). Second, Mr. Krich pointed out, this number is consistent with an article from the DOE website that identifies a disposal cost range of approximately $250 to $1,100 per cubic meter, which translates to roughly $7 to $31 per cubic foot. See LES Disposal Direct Testimony

at 17; Tr. at 2805-06; LES Exh. 108 (Excerpt from DOE website, Frequently Asked Questions, DUF_6 Management and Disposal (printed Sept. 14, 2005)). Finally, according to Mr. Krich, the testimony of LES witness Thomas LaGuardia provides further support for the reasonableness and conservativeness of the LES estimate, in that Mr. LaGuardia informed Mr. Krich that the typical fees charged by Envirocare for commercial LLRW disposal are in the range of $25 per cubic foot. See LES Disposal Direct Testimony at 18 (citing Prefiled Direct Testimony of Rod Krich and Thomas LaGuardia on Behalf of [LES] Regarding the Adequacy of the Contingency Factor Applied By LES to its Cost Estimate for [DU] Dispositioning (fol. Tr. at 3096)); Tr. at 2807-08.

4.105 There is no doubt that the record before us contains a great deal of evidence about various disposal costs. The record contains evidence of what Envirocare might charge to dispose of a variety of types of low-level waste, including reactor decommissioning waste and bulk contaminated soil. It contains evidence of what Envirocare might charge DOE to dispose of its inventory of DU waste. But what the record does not contain is a sufficiently reliable statement from a knowledgeable, experienced third party, or a thorough analysis from a qualified and credible source, of the estimated cost of disposing of NEF-generated DU. Each of the costs identified by Mr. Krich that purportedly support a Board finding that LES's $1.14/kgU estimate is conservative go to the particular cost estimate for disposing of that particular type and quantity of waste, which nonetheless has not been demonstrated to be the cost of disposing of DU generated at the NEF. LES's cost estimate may well be reasonable, particularly when compared with what appear to be the going rates for low-level waste disposal generally, but reasonableness does not, in and of itself, beget reliability.[76] We decline to rest

[76] Though we conclude the record contains insufficient evidentiary support to explain
(continued...)

our public health and safety findings on a cost estimate that, while perhaps not wholly unreasonable on its face, nonetheless is fundamentally unsupported by either a true third-party estimate or a thorough cost analysis that reflects specific consideration of material of the type and quantity that is being contemplated in this instance.

4.106 Thus, based on the testimony and evidence on the record before the Board, we are unable to conclude that LES has carried its burden of demonstrating that its disposal cost estimate is based on documented and reasonable assumptions such that the $1.14/kgU figure presented by LES is sufficiently reliable to provide an appropriate basis for this portion of LES's decommissioning cost estimate and associated funding. Accordingly, to the extent contention NIRS/PC EC-5/TC-2 and paragraph I of contention NIRS/PC EC-6/TC-3 contest the validity of LES's disposal cost estimate, LES has failed to prevail on those contentions.

E. Findings Regarding Adequacy of Contingency Factor

4.107 As we previously noted, one of the elements of the LES decommissioning cost estimate challenged by NIRS/PC in its contention EC-5/TC-2 is the use of a twenty-five percent contingency factor, which NIRS/PC challenges as inadequate on several counts. In relevant part, this contention provides:

> 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

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[76](...continued)
adequately this significant differential, there may well be merit to the NIRS/PC position that Envirocare might have quoted DOE a "very favorable price" based on the large quantities of DOE depleted uranium waste, which might in part account for the difference between the LES and DOE disposal cost estimates, see NIRS/PC Reply Findings at 31; Tr. at 2810, particularly in light of the staff's statement in its proposed findings of fact and conclusions of law to the effect that Envirocare negotiates its prices with individual clients, see Staff Proposed Findings at 52.

> sufficiency of such presentations as based on (1) a contingency factor that is too low . . . .

LBP-04-14, 60 NRC at 78 (emphasis added). More specifically, NIRS/PC contended that this figure is inadequate because (1) "scaling" uncertainties alone warrant a twenty-five percent contingency factor, see 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 the Contingency Factor Applicable to LES's Cost Estimate (fol. Tr. at 3152) at 10 [hereinafter NIRS/PC Contingency Factor Direct Testimony]; (2) LES improperly relied upon costs associated with WCS or Envirocare in arriving at its disposal cost estimate, see id. at 10-13; and (3) the triennial adjustment under 10 C.F.R. § 70.25(e) is intended to account only for minor decommissioning cost estimate modifications, see id. at 14-16.

1. Witnesses and Evidence Presented

4.108 In dealing with this issue, LES proffered a two-person panel consisting of Rod Krich, LES Vice President of Licensing, Safety, and Nuclear Engineering, and Thomas S. LaGuardia, President of TLG Services. Mr. Krich's qualifications have been described previously. See Part IV.B.1 supra. Mr. LaGuardia, who holds a Bachelor of Science in Mechanical Engineering from Polytechnic Institute of Brooklyn and a Master of Science in Mechanical Engineering from the University of Connecticut, is a registered Professional Engineer in Connecticut, New York, New Jersey, Virginia, and California and a Certified Cost Engineer. With a total of thirty-seven years of experience in the nuclear industry, during the last thirty-two years Mr. LaGuardia has specialized in the field of decontamination and decommissioning. As TLG Services president since 1982, he has overseen this consulting engineering company's operations as it provides planning and management for decontamination and decommissioning projects and decommissioning cost estimating and

funding support for power plants and other nuclear facilities, including preparing decommissioning feasibility and cost studies that assess handling, packaging, storage, and disposal requirements for nuclear waste. See Prefiled Direct Testimony of Rod Krich and Thomas LaGuardia on Behalf of [LES] Regarding the Adequacy of the Contingency Factor Applied By LES to its Cost Estimate for [DU] Dispositioning (fol. Tr. at 3095) at 3-4 [hereinafter LES Contingency Factor Direct Testimony].

4.109 The staff's panel regarding this contingency factor issue consisted of Timothy C. Johnson, Jennifer Mayer, and Craig Dean, all of whom previously testified regarding other aspects of the safety matters at issue in the October 2005/February 2006 evidentiary hearings and whose training and experience have been described previously. See Part IV.B.1 supra. So too, the sole NIRS/PC witness on this matter, Dr. Arjun Makhijani, was a witness on other matters and his training and experience likewise have been described previously. See Part IV.B.1 supra.

4.110 Based on the respective qualifications presented in their written testimony on the adequacy of the LES contingency factor, the Board finds that each of the LES, staff, and NIRS/PC witnesses is qualified as an expert on the contingency factor aspect of this financial assurance matter for the purposes of this proceeding.

4.111 As to the specifics of the evidentiary presentations regarding this item, while noting that LES has committed to a twenty-five percent contingency factor to cover unforeseeable costs such as industrial accidents and unexpected construction delays or operational shutdowns, NIRS/PC witness Makhijani contended that this figure (or certainly anything less than twenty-five percent) will be insufficient for a number of different reasons. One is the inadequacy of the LES deconversion cost estimate, shortfalls from which will result in the amount set aside under the contingency factor also being inadequate to cover all the

costs associated with deconversion. A principal basis for Dr. Makhijani's concern about the LES deconversion cost estimate is his assertion that its private deconversion option is based on COGEMA's "W" facility in Pierrelatte, France. Noting that this facility has a throughput that is more than 2.5 times larger than the deconversion plant that would be built to process the DUF_6 from the proposed NEF, Dr. Makhijani cited an LLNL report that he declared indicated the unit cost of a deconversion facility producing DU_3O_8 would increase by approximately seventy-three percent if the facility throughput is reduced by fifty percent. According to Dr. Makhijani, this significant scaling uncertainty, along with previously identified problems with the LES "Americanization" cost modifications and the fact that the LES cost estimate is based on preliminary design information, means that a contingency factor of twenty-five percent will not be adequate to cover foreseeable costs, much less unforeseeable costs. See NIRS/PC Contingency Factor Direct Testimony at 10; 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 the Contingency Factor Applicable to LES's Cost Estimate (fol. Tr. at 3152) at 5-7 [hereinafter NIRS/PC Contingency Factor Rebuttal Testimony].

4.112 So too, Dr. Makhijani maintained, a contingency factor of twenty-five percent is unlikely to be sufficient to cover the inadequate LES cost estimate for foreseeable disposal expenses, making it inadequate to cover unforeseen expenses as well. Shortfalls in funding to cover both noncontingent disposal costs and otherwise contingent costs will result from LES reliance on what Dr. Makhijani contended is wholly unreasonable DU disposal cost information from either Envirocare or WCS, the former having provided only a vague and unsupported statement and the latter lacking a license to accept radioactive waste. Nor did he accept LES and staff assertions that a twenty-five percent contingency factor is adequate given the supposed "simple" nature of such disposal by shallow land burial. Such a claim, he asserted, is

directly contrary to a National Academy of Sciences/National Research Council finding so as to make such disposal unprecedented and highly uncertain, as well as being suspect because an environmental impact analysis of DU shallow land disposal has not been prepared in this proceeding. See NIRS/PC Contingency Factor Direct Testimony at 10-13; NIRS/PC Contingency Factor Rebuttal Testimony at 7-8.

4.113 Finally, Dr. Makhijani suggested that the triennial cost adjustment will be inadequate to mitigate the impacts of shortcomings in the various LES cost estimates, notwithstanding the contingency factor.[77] According to Dr. Makhijani, the triennial cost adjustment is meant to allow only minor modifications to the decommissioning cost estimate to address changes such as fluctuations in inflation rates, not major adjustments to reflect the cost of significant departures from the decommissioning funding plan. His demonstration that LES has failed to include an adequate cost estimate for the neutralization of HF and the low-level waste disposal of the resulting CaF_2, Dr. Makhijani asserted, establishes that the costs of DU land disposal will be far higher than what LES has proposed, causing the NEF to shut down after three to six years without covering these higher decommissioning funding costs, notwithstanding the triennial adjustment. See NIRS/PC Contingency Factor Direct Testimony at 14-16.

4.114 According to LES witnesses Krich and LaGuardia, the twenty-five percent contingency factor was developed as a component of estimated decommissioning costs that must be generated by an applicant to address the Atomic Energy Act and agency requirements that mandate such cost estimates. See LES Contingency Factor Direct Testimony at 4-5 (citing 42 U.S.C. § 2243; 10 C.F.R. §§ 30.35, 40.36, 70.25). Further, these LES witnesses declared,

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[77] In fact, as we noted above, see supra note 23, LES has committed to annual adjustments of its dispositioning cost estimate.

this contingency factor amount is the product of staff guidance to all materials license applicants found in NUREG-1757, which provides:

> Because of the uncertainty in contamination levels, waste disposal costs, and other costs associated with decommissioning, the cost estimate should apply a contingency factor of 25 percent to the sum of all estimated decommissioning costs. The 25 percent contingency factor provides reasonable assurance for unforeseen circumstances that could increase decommissioning costs, and should not be reduced or eliminated simply because foreseeable costs are low.

NUREG-1757, at A-29. Also of note, these LES witnesses asserted, is the reliance placed by the staff in NUREG-1757 on an early guidance document, NUREG/CR-6477, that applied a twenty-five percent contingency factory to estimated decommissioning costs associated with power reactors. See LES Contingency Factor Direct Testimony at 4-5.

4.115 Acknowledging that LES has committed to apply a twenty-five percent contingency as part of the LES decommissioning cost estimate in response to this guidance and an October 20, 2004 staff Request for Additional Information, these LES witnesses also declared that this estimate is, in fact, appropriate. According to Mr. LaGuardia, based on his experience since the 1970s in preparing decommissioning cost estimates for power reactors, including preparing the initial cost estimate study for the Atomic Industrial Forum in 1976 that involved determining the appropriate amount for such a contingency, a twenty-five percent contingency is adequate to account for unforeseen circumstances that fall within the defined scope of projects, such as power reactor decommissioning, that are considerably more complex than the decommissioning and DU dispositioning that will be involved with the proposed NEF. In this regard, Mr. LaGuardia noted that as to each of the three activities or operations that must be taken into account relative to DU -- transportation, deconversion, and disposal -- all

have relatively low levels of uncertainty associated with them so as not to be likely to generate substantial cost increases. See id. at 6-9

4.116 According to Mr. LaGuardia, the LES estimate for DU transportation was developed based on specific, conservative information obtained from a credible, experienced vendor. Moreover, the potential uncertainties associated with such transportation, which has been going on safely within the United States for decades, is limited, according to Mr. LaGuardia, because the drivers involved have diligently checked and exemplary records, and the vehicles involved are high-quality and subjected to inspection before each trip. So too, according to Mr. LaGuardia, as described in the LES testimony, the deconversion of UF_6 to U_3O_8 has its basis in a well-understood chemical process that has been successfully utilized in Europe for more than twenty years. Moreover, according to LES witness Krich, Dr. Makhijani's concerns about scaling are misplaced, given that Urenco's Capenhurst, United Kingdom facility, rather than the "W" plant, was used as the basis for its private deconversion facility cost estimate and that estimate was based on appropriate information, as was discussed in other LES deconversion strategy and cost issue testimony. The same is true relative to the cost estimate for DU disposal in an engineered trench, which Mr. LaGuardia declared he found fairly predictable both as to logistics and cost given his experience in dealing with Envirocare and other LLRW disposal services in submitting fixed-price bids that require a high degree of certainty. He also found that to be the case for the WCS estimate that underlies the LES cost figure for disposing of DU_3O_8. See id. at 9-10; Prefiled Rebuttal Testimony of Rod Krich and Thomas LaGuardia on Behalf of [LES] Regarding the Adequacy of Applicant's Contingency Factor (fol. Tr. at 3097) at 3-4 [hereinafter LES Contingency Factor Rebuttal Testimony]. Further, Mr. LaGuardia indicated on cross-examination that, based on his experience, a disposal process that involved emplacement in a geologic repository would not involve a level of

difficulty that would cause him to recommend a contingency factor of more than twenty-five percent. See Tr. at 3115-19.

4.117 As to the twenty-five percent figure, Mr. LaGuardia found it to be more than adequate in light of what the figure is intended to cover, i.e., potential uncertainties falling within the scope of DU dispositioning activities rather than speculative events that do not arise directly from the dispositioning activities. In this regard, he noted that the flat twenty-five percent figure, as opposed to a line-item type estimate sometimes used for facility decommissioning, is more than adequate. While more complex decommissioning projects such as power reactor facilities may well use a line-item breakdown for contingency estimate activities, such as decontamination, removal, packaging, shipping, and disposal, with some items assigned low factors (such as fifteen percent project management) and others given very high figures (such as seventy-five percent for reactor vessel segmentation), there is nothing about the LES project that suggests the need for such segmentation. Indeed, Mr. LaGuardia observed, substantial "real world" experience has demonstrated that when such contingencies are individually broken out and averaged, the result is an overall contingency of no more than twenty-five percent. See LES Contingency Factor Direct Testimony at 10-11; see also Tr. at 3099-103.

4.118 With regard to the nature of the contingency factor itself, Mr. LaGuardia testified that it is intended to account for any unforeseen circumstances within the scope of the work that are not accounted for in the base cost estimate. According to Mr. LaGuardia, relative to DU disposition, the defined project scope would include DU transportation to and from a deconversion facility, DUF_6 deconversion to DU_3O_8, and near-surface disposal of the DU_3O_8 at a licensed LLRW disposal facility, while the LES base cost for DU dispositioning would be the aggregate of the cost estimates associated with each of the constituent activities as derived from cost information provided by relevant third-party commercial sources. Mr. LaGuardia

further asserted that examples of unforeseen circumstances that the contingency factor is intended to cover are such things as a drill breaking, heavy equipment mechanical failure, disposal trench flooding, or an industrial accident. The increased costs of such events are deemed to be within the defined scope of the project because they occur during conduct of an activity that is included in the base cost estimate, but are unforeseeable because they cannot be predicted. See LES Contingency Factor Direct Testimony at 12; see also Tr. at 3103-04.

4.119 Finally, LES witnesses Krich and LaGuardia found the NIRS/PC characterization of the section 70.25(e) triennial update to be unduly narrow. They first noted that, besides having to update the decommissioning costs every three years, LES will be required by commitment and license condition to update its DU dispositioning cost estimate annually after the first triennial review. Further, consistent with the staff's NUREG-1757 guidance, these LES witnesses asserted that once an additional cost or cost increase, whether major or minor, becomes foreseeable, a licensee must account for that additional cost and provide appropriate funding. As a consequence, these LES witnesses maintained, the periodic update process provides an additional assurance that adequate facility decommissioning and waste dispositioning funds will be available when needed. See LES Contingency Factor Rebuttal Testimony at 5-6 (citing NUREG-1757, at 4-10).

4.120 In their testimony, staff witnesses Johnson, Mayer, and Dean noted that the purpose of the contingency factor is to ensure that funds are available to pay for any unforeseen circumstances that could increase decommissioning costs. On the other hand, factors that affect decommissioning costs and are foreseeable should be accounted for in the cost estimate. This includes costs that, while foreseeable, are not known for certain; such uncertain costs should be accounted for in the decommissioning cost estimate, using the best available documentation. As such, the staff witnesses asserted, items such as the scaling

factors cited by NIRS/PC, which are already identified, are matters that should be addressed in connection with the current LES cost estimate, and not put forth as a reason for applying a contingency factor. See NRC Staff Testimony Regarding the Contingency Factor Used by LES in the Decommissioning Cost Estimate (fol. Tr. at 3128) at 3 [hereinafter Staff Contingency Factor Direct Testimony]; NRC Staff Rebuttal Testimony Regarding Contingency Factor (fol. Tr. at 3130) at 2 [hereinafter Staff Contingency Factor Rebuttal Testimony].

4.121 These staff witnesses also observed that as circumstances change over time, a licensee must account for those changes through periodic updates in its DFP. In the case of LES, the staff witnesses noted, this will be done yearly for tails disposition costs in accordance with a license condition and, under agency regulations, every three years for facility decommissioning. If the costs of decommissioning increase, according to the staff witnesses, the contingency factor would not provide a basis for LES to seek to keep its funding level constant on the premise that the increase is accounted for by the contingency. Those increased costs would be foreseeable as well, such that LES would be required by the agency's regulations and the license condition to increase its decommissioning fund to cover those costs. See Staff Contingency Factor Direct Testimony at 3-4.

4.122 The staff's witnesses also declared that they accepted a twenty-five percent contingency for the NEF based on the fact that the decommissioning activities involved with the NEF were relatively simple and straightforward such that, consistent with NUREG-1757, they deemed it extremely unlikely that unforeseen costs would become so large that the twenty-five percent contingency would become insufficient. See id. at 4-5.

4.123 Finally, the staff expressed its disagreement with the NIRS/PC position that the required, periodic adjustments under section 70.25(e) will only cover minor cost modifications, asserting that such a position is inconsistent with its NUREG-1757 guidance and would

undermine the very purpose of the requirement. According to the staff testimony, changes in facility conditions, operations, or expected decommissioning procedures would need to be accounted for in the periodic cost updates and could be substantial if, for example, a licensee switched its decommissioning cost estimate from one based on unrestricted site release to one involving restricted site release conditions. See Staff Contingency Factor Rebuttal Testimony at 2-3. Staff witness Johnson also noted on redirect examination, however, that the periodic updates did not mitigate in any way the need for an appropriate contingency factor. See Tr. at 3150.

2. Adequacy of Twenty-Five Percent Contingency Factor

4.124 In assessing the parties' presentations regarding the twenty-five percent contingency factor, as should be apparent from the Board's discussion regarding the LES cost estimates for other aspects of its DFP, we are in basic agreement with the NIRS/PC assertion, as reflected in the staff's guidance regarding a section 70.25 decommissioning funding plan, that the cost estimate provided in an applicant's DFP for a uranium enrichment facility must encompass those foreseeable activities associated with decommissioning the site chosen by the applicant, including waste disposition, and must provide a credible estimate of the cost of undertaking those activities, i.e., an estimate that is based on documented and reasonable assumptions and is reasonably accurate in portraying the direct and indirect costs involved in decommissioning under routine facility conditions. See SRP at 10-1; NUREG-1757, at 4-9, A-26. The problem for NIRS/PC, however, is that the contingency factor under challenge is directed at encompassing the unforeseeable elements that arise in the course of the dispositioning process. As a consequence, their efforts to challenge the adequacy of various foreseeable items associated with the LES cost estimates, including deconversion facility scaling and DU disposal methods, see NIRS/PC Reply Findings at 32-33, are, at least as they

relate to the contingency factor, wholly misplaced. The viability of those estimates should have been, and indeed has been, questioned as a direct challenge to those cost estimate elements, rather than as part of an attempt to use the contingency factor as a bootstrap to increase funding to cover otherwise foreseeable costs. As such, we find the renewed NIRS/PC challenges to these items fail to provide any grounds for increasing or otherwise modifying the twenty-five percent contingency factor adopted by LES, a figure we find on solid footing consistent with the reasoning outlined in Mr. LaGuardia's testimony.[78]

4.125 The Board also thinks it worth noting in this context that we find misplaced, as well as inaccurate, NIRS/PC's assertion that the periodic adjustment under section 70.25(e) has some bearing on the adequacy of the contingency factor because that adjustment cannot be the basis for major revisions in an applicant's DFP to address new information. In making this argument, NIRS/PC seems to assume that the Board's willingness to approve the LES decommissioning funding in this instance is tied directly to an assumption on our part, albeit erroneous, that we need not be concerned with the accuracy of the LES cost estimates because the periodic adjustment provides a safety valve by which everything eventually will work out to correct LES mistakes and inaccuracies at some point in the future.

4.126 As we believe we have made apparent with this ruling, a cost estimate that lacks a reliable basis is not one that the Board will endorse as the basis for a decommissioning funding plan. Although, as the Commission has made apparent, the Board is not to be involved

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[78] In this regard, during cross-examination of Mr. LaGuardia, see Tr. at 3117-20, NIRS/PC counsel did pose a series of questions regarding the adequacy of the twenty-five percent contingency factor if it were determined that deep rather than shallow disposal were required for the DU associated with operation of the NEF. Although, as we discuss in this opinion, see Part IV.D.2 supra, we find an adequate basis for the LES plan to utilize shallow disposal, we also find Mr. LaGuardia's testimony provides a reasonable basis for utilizing a twenty-five percent contingency factor even if deep disposal were the disposal option employed by LES.

simply in "formalistic" redrafting in connection with such a plan, see Yankee Atomic Electric Co. (Yankee Nuclear Power Station), CLI-96-1, 43 NRC 1, 9 (1996), if the applicant's cost estimate lacks sufficient support regarding the direct and indirect costs involved, then the availability of the periodic adjustment should not be the basis, in and of itself, for passing the plan forward with the hope that its deficiencies will be rectified at some point in the future.

4.127 On the other hand, as it is often described in the vernacular, "stuff happens." As a consequence, to the degree future developments impact upon the cost of otherwise foreseeable items, as the periodic adjustment recognizes, regardless of the size of the change or revision that is needed, the cost estimates, and the decommissioning funding for which they provide the basis, would be adjusted as they become apparent through that process.[79] The Board thus is unable to endorse the crabbed NIRS/PC view of the periodic adjustment and its purpose.

[79] In their testimony and proposed findings, NIRS/PC made much of a scenario in which LES enters bankruptcy within several years of starting operations because of significant increases in disposal costs as a result of having to use deep rather than shallow disposal. Although the Board's substantive findings regarding disposal do not support this scenario, see Part IV.D supra, the Board also finds nothing in this record that causes us to conclude that the agency's existing authority to deal with such circumstances through enforcement orders and other mechanisms, including the periodic updates, see Tr. at 3138-39, is insufficient to address such an event.

4.128 In sum, we conclude that on the basis of the record before the Board, LES has meet its burden to establish the sufficiency of a proposed contingency factor of twenty-five percent.[80]

V. SUMMARY FINDINGS OF FACT AND CONCLUSIONS OF LAW

5.1 In its application and on numerous subsequent occasions, LES has indicated that its preferred option for disposition of the NEF-generated waste material was to utilize a private deconversion facility followed by commercial disposal, with DOE disposition services being a secondary possibility. As a consequence, its various financial assurance-related cost estimates, including those for deconversion and disposal services, have been based on its preferred private disposition strategy. Although we conclude in this decision that, in the face of challenges by intervenors NIRS/PC, the LES private deconversion and disposal strategies are plausible and certain elements of those private disposition-related cost estimates have been shown to be reliable, i.e., the costs associated with CaF_2 disposal, DUF_6 cylinder management costs, DU transportation, and the contingency factor applied to its overall dispositioning cost estimate, we also find that the reliability of two major contested elements of those estimated costs, i.e., the costs associated with private deconversion and private near-surface disposal services, are not adequately supported on the record before us.

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[80] As part of their challenge to the LES-proposed contingency factor, NIRS/PC made the point that there was no testimony regarding the contingency factor applicable to the DOE cost estimate to provide deconversion and disposal services. See NIRS/PC Proposed Findings at 119-20. Although the Board has previously ruled that the sufficiency of the DOE cost estimate is not subject to litigation in this contested portion of the NEF licensing proceeding, see August 2005 Contention Ruling at 21-22, we note that this subject (along with a number of others, including financial assurance instruments, nuclear criticality, materials compatibility, fire safety, and cylinder rupture accidents) will be addressed in the context of our partial initial decision regarding the mandatory or uncontested portion of this proceeding.

5.2 As a consequence, as it is relevant to the financial assurance and decommissioning funding findings and determinations that must be made by the staff in accordance with 10 C.F.R. §§ 30.35, 40.36, and 70.25, including ensuring the applicant has in place sufficient funding mechanisms to assure facility decommissioning, the staff must utilize, in toto,[81] the cost estimates attendant to the "plausible strategy" of the United States Department of Energy providing disposition services in accordance with section 3113 of the USEC Privatization Act, 42 U.S.C. § 2297h-11. Those costs estimates, which were not at issue in this contested portion of this proceeding, will be one of the subjects of the Board's mandatory hearing-related partial initial decision.[82]

6.1 Pursuant to 10 C.F.R. § 2.713, it is this thirty-first day of May 2006, ORDERED, that this third partial initial decision will constitute a final decision of the Commission forty (40) days from the date of issuance, i.e., on Monday, July 10, 2006, unless a petition for review is filed in accordance with 10 C.F.R. § 2.341, or the Commission directs otherwise. Any party wishing to file a petition for review on the grounds specified in 10 C.F.R. § 2.341(b)(4) must do

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[81] Given the central role of the deconversion and disposal estimates in establishing the overall LES decommissioning cost estimate, as well as some uncertainty, at least on the current record, about to the exact relationship between each of the individual elements of the LES cost estimate vis a vis the DOE cost estimate, we are unwilling to attempt to substitute the individual components of the LES estimate for items in the DOE estimate, or visa versa.

[82] The result of our ruling today puts LES in the same posture it would have been if (as it could have) it had placed principal reliance upon DOE deconversion and disposal as the basis for its plausible strategy and its financial assurance cost estimates. Whether any future LES-proffered cost estimates associated with a private deconversion and disposal strategy would be sufficient to serve as the basis for supplanting or supplementing the DOE cost estimates as a component of the LES decommissioning funding plan, and in what context such cost estimates would be considered (e.g., periodic adjustment, license amendment), are *matters for future consideration if and when such an LES showing is presented.*

so within fifteen (15) days after service of this third partial initial decision. The filing of a petition for review is mandatory for a party to have exhausted its administrative remedies before seeking judicial review. Within ten (10) days after service of a petition for review, parties to the proceeding may file an answer supporting or opposing Commission review. Any petition for review and any answer shall conform to the requirements of 10 C.F.R. § 2.341(b)(2)-(3).

6.2 Although this ruling resolves all contested matters before the Licensing Board in connection with the December 2003 application of LES for authorization to construct and operate the NEF, staff issuance of a 10 C.F.R. Part 70 license authorizing the construction and operation of that facility must abide, among other things, the issuance by this Board of its partial initial decision regarding the uncontested, mandatory hearing portion of this proceeding.

6.3 Additionally, because a portion of the evidentiary hearing and certain exhibits involved information that was claimed to be proprietary under 10 C.F.R. § 2.390, at the time of issuance this decision is being treated as containing proprietary information pending further review. In an effort to expedite the review process, the Board today is providing to the parties by overnight/express mail (or in the case of the staff, internal agency mail) copies of this decision that contain proposed redactions based upon the Board's understanding of what items previously have been identified as proprietary information.[83] On or before Tuesday, June 6, 2006, LES, NIRS/PC, and the staff shall provide the Board with a joint filing outlining each (1) proposed redaction from this decision to which there is no objection; (2) proposed redaction from this decision to which there is an objection; and (3) additional proposed redaction that has not been identified by the Board. If any party seeks an additional proposed redaction, the

[83] In the absence of a previous Board ruling regarding a particular withholding claim, the Board's effort to identify proposed redactions is without prejudice to the right of any party to claim that any information in this decision is, or is not, proprietary or otherwise sensitive so as to warrant being withheld from public disclosure.

particular word or phrase should be specified; blanket requests for withholding are disfavored. Further, in accordance with section 2.390, the party seeking a proposed redaction (whether or not identified by the Board) shall at the same time provide a supplement to the joint report that describes with specificity (as supported by any necessary affidavits) the reasons for withholding each proposed redaction from the public. Responses to proposed redactions by any party objecting to the redaction shall be filed on or before Friday, June 9, 2006. Thereafter, following a final ruling on any proposed redactions, the Board will make this decision publically available.

THE ATOMIC SAFETY
AND LICENSING BOARD[84]

Original Signed By
G. Paul Bollwerk, III
ADMINISTRATIVE JUDGE

Original Signed By
Paul B. Abramson
ADMINISTRATIVE JUDGE

Original Signed By
Charles N. Kelber
ADMINISTRATIVE JUDGE

Rockville, Maryland

May 31, 2006

[84] Copies of this partial initial decision were sent this date by overnight express delivery to counsel for (1) applicant LES; and (2) intervenors NIRS/PC. Copies for counsel for the staff were placed in the agency's interoffice mail.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LB MEMORANDUM (NOTICE REGARDING ISSUANCE OF REDACTED PARTIAL INITIAL DECISION ON SAFETY-RELATED CONTENTIONS) WITH ATTACHMENT A - LBP-06-15 (PUBLICLY AVAILABLE VERSION OF THIRD PARTIAL INITIAL DECISION (SAFETY-RELATED CONTENTIONS) have been served upon the following persons by deposit in the U.S. mail, first class, or through NRC internal distribution.

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Docket No. 70-3103-ML
LB MEMORANDUM (NOTICE REGARDING ISSUANCE OF REDACTED PARTIAL INITIAL DECISION ON SAFETY-RELATED CONTENTIONS) WITH ATTACHMENT A - LBP-06-15 (PUBLICLY AVAILABLE VERSION OF THIRD PARTIAL INITIAL DECISION (SAFETY-RELATED CONTENTIONS)

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Dated at Rockville, Maryland,
this 6th day of June 2006