

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

LBP-05-13

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 8, 2005

FIRST PARTIAL INITIAL DECISION
(Environmental Contentions)

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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 authority to construct and operate a uranium enrichment facility -- designated the National Enrichment Facility (NEF) -- near Eunice, New Mexico. This first partial initial decision presents the Licensing Board's findings of fact and conclusions of law relative to several admitted environmental contentions (ECs) jointly proffered by intervenors Nuclear Information and Resource Service and Public Citizen (NIRS/PC) -- NIRS/PC EC-1 - Impacts Upon Ground and Surface Water; NIRS/PC EC-2 - Impact Upon Water Supplies; NIRS/PC EC-4 - Impacts of Waste Storage; and NIRS/PC EC-7 - Need for the Facility -- challenging the adequacy of either or both the Environmental Report (ER) contained in the NEF application or

the Draft Environmental Impact Statement (DEIS) prepared by the NRC staff.

1.2 For the reasons set forth below, the Board finds that, in the face of the NIRS/PC challenges to the ER and DEIS as reflected in contentions NIRS/PC EC-1, NIRS/PC EC-2, NIRS/PC EC-4, and NIRS/PC EC-7, the staff and/or LES have carried their respective burdens of proof to demonstrate the adequacy of the ER and/or DEIS in accordance with 10 C.F.R. §§ 51.20, 51.45, 51.71. Thus, the Board concludes that the NIRS/PC claims in those contentions regarding the sufficiency of the ER and/or DEIS cannot be sustained.

II. PROCEDURAL BACKGROUND

2.1 Following the December 2003 submission by LES of its application for a thirty-year 10 C.F.R. Part 70 license to operate the proposed NEF, the Commission issued a January 30, 2004 notice of hearing and opportunity to intervene in the LES application, which was subsequently published in the Federal Register. See CLI-04-3, 59 NRC 10 (2004) (69 Fed. Reg. 5873 (Feb. 6, 2004)). Several entities responded by filing petitions asking to be admitted as a party to the proceeding on the application. On March 23, April 5, and April 6, 2004, respectively, the New Mexico Environment Department (NMED), the Attorney General of New Mexico (AGNM), and NIRS/PC each submitted petitions to intervene pursuant to 10 C.F.R. § 2.309(a). See [NMED] Request for Hearing and Petition for Leave To Intervene (Mar. 23, 2004); [AGNM] Request for Hearing and Petition for Leave To Intervene (Apr. 5, 2004); Petition To Intervene by [NIRS/PC] (Apr. 6, 2004).

2.2 In response to these intervention requests, on April 15, 2004, this Licensing Board was constituted to preside over the LES adjudicatory proceeding. See 69 Fed. Reg. 22,100 (Apr. 23, 2004). That same day, the Board issued an initial prehearing order that, among other things, directed the petitioners to supplement their initial intervention petitions by categorizing the already-submitted contentions within at least one of three groups: (1) technical contentions (TC) relating primarily to the application's Safety Analysis Report (SAR); (2) environmental contentions relating primarily to the ER; or (3) miscellaneous contentions (MC) that did not fall into either of these two groups. See Licensing Board Memorandum and Order (Initial Prehearing Order) (Apr. 15, 2004) at 2-3 (unpublished).

2.3 In the interim, the Commission issued an order ruling on the standing of each petitioner, a matter the Commission previously had reserved to itself. See CLI-04-3, 59 NRC at 13; LBP-04-14, 60 NRC 40, 53-54 (2004). The Commission determined that, as state representatives, NMED and the AGNM need not demonstrate standing to intervene, and that NIRS/PC had demonstrated the requisite standing to intervene in the proceeding, see LBP-04-14, 60 NRC at 53-54, and accordingly referred the three petitions to the Board. See CLI-04-15, 59 NRC 256, 256-57 (2004).

2.4 NIRS/PC filed its supplement to its intervention petition on May 27, 2004, designating certain of its contentions as environmental, and certain others as both environmental and technical. See Supplement to Petition To Intervene on Behalf of [NIRS/PC] (May 27, 2004) [hereinafter NIRS/PC Petition Supplement]. The Board

issued an order the following day setting the schedule for the initial prehearing conference at which time the petitioners, LES and the staff would make arguments regarding the admissibility of proffered contentions. See Licensing Board Memorandum and Order (Initial Prehearing Conference Schedule; Opportunity for Written Limited Appearance Statements) (May 28, 2004) (unpublished) [hereinafter Prehearing Conference Scheduling Order]. This order also renumbered and designated certain contentions as environmental or environmental/technical contentions. See id. at 2-5.

2.5 In their original forms as set forth in the NIRS/PC intervention petition, and as further characterized by the NIRS/PC supplement and the Board's prehearing conference scheduling order, see NIRS/PC Petition Supplement at 1-5; Prehearing Conference Scheduling Order at 2-5, the NIRS/PC environmental contentions provided:

NIRS/PC EC-1 — IMPACTS UPON GROUND AND SURFACE WATER

CONTENTION: Petitioners contend that the Environmental Report ("ER") contained in the application does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project on ground and surface water, contrary to the requirements of 10 C.F.R. 51.45.

NIRS/PC EC-2 — IMPACT UPON WATER SUPPLIES

CONTENTION: Petitioners contend that the ER contained in the application does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project upon water supplies in the area of the project, contrary to 10 C.F.R. 51.45.

To introduce a new industrial facility with significant water needs in an area with a projected water shortage runs counter to the federal responsibility to act "as a trustee of the environment for succeeding generations," according to the National Environmental Policy Act (NEPA) § 101(b)(1) and 55 U.S.C. § 4331(b)(1). To present a full statement of the costs and benefits of the proposed

facility the ER should set forth the impacts of the NEF on groundwater supplies.

NIRS/PC EC-4 — IMPACTS OF WASTE STORAGE AND DISPOSAL

CONTENTION: Petitioners contend that the LES ER lacks adequate information to make an informed licensing judgment, contrary to the requirements of 10 C.F.R. Part 51. The ER fails to discuss the impacts of construction and operation of deconversion and disposal facilities that are required in conjunction with the proposed enrichment plant.

NIRS/PC EC-7/TC-4 — NEED FOR THE FACILITY

CONTENTION: Petitioners contend that the Environmental Report ("ER") does not adequately describe or weigh the environmental, social, and economic impacts and costs of operation the National Enrichment Facility ("NEF") (See ER 1.1.1 et seq.).

LBP-04-14, 60 NRC at 66-70.

2.6 In accordance with the prehearing conference scheduling order, the Board conducted a one-day prehearing conference on June 15, 2004, 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 four environmental contentions at issue here. See id. at 52.

2.7 In a July 19, 2004 memorandum and order, the Board ruled on the admissibility of each of the contentions set forth by NMED, the AGNM, and NIRS/PC, and found that only NIRS/PC had advanced admissible environmental contentions. See id. at 59-71. Specifically, the Board held that NIRS/PC EC-1 and NIRS/PC EC-2 were each admitted as supported by bases sufficient to raise genuine issues of material fact adequate to warrant further inquiry. See id. at 66-67. NIRS/PC EC-4

was admitted to the extent that its bases challenged the ER as failing to evaluate environmental effects of the construction and operation of the NEF, which was sufficient to establish a genuine material dispute adequate to warrant further inquiry. See id. at 68.

2.8 Finally, the Board admitted NIRS/PC EC-7/TC-4 to the extent that certain bases were sufficient to establish a genuine material dispute with the ER adequate to warrant further inquiry. To the extent that this contention challenged the failure of LES to demonstrate profitability of the proposed NEF or to otherwise present a "business case," the Board found it inadmissible. Therefore, contention NIRS/PC EC-7/TC-4 was admitted as an environmental contention only. See id. at 69-70. Given the Commission's May 20, 2004 finding that NIRS/PC had standing to intervene, see id. at 50, and the Board's finding that NIRS/PC had proffered at least one admissible contention, NIRS/PC was admitted as a party to the proceeding. See id. at 48.

2.9 To reflect these admissibility rulings, the Board set forth in Appendix A to its July 19 memorandum and order revised versions of contentions NIRS/PC EC-4 and EC-7/TC-4 that read:

NIRS/PC EC-4 - IMPACTS OF WASTE STORAGE AND DISPOSAL

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

NIRS/PC EC-7 - NEED FOR THE FACILITY

CONTENTION: Petitioners contend that the Environmental Report (ER) does not adequately describe or weigh the environmental, social, and economic impacts and costs of operating the National Enrichment Facility (See ER 1.1.1 et seq.) in that:

- (A) Louisiana Energy Services, L.P.'s (LES) presentation erroneously assumes that there is a shortage of enrichment capacity.
- (B) LES's statements of "need" for the LES plant (ER 1.1) depend primarily upon global projections of need rather than projections of need for enrichment services in the U.S.
- (C) LES has referred to supply and demand in the uranium enrichment market (ER 1.1), but it has not shown how LES would effectively enter this market in the face of existing and anticipated competitors and contribute some public benefit.

Id. at 78, 80. Contentions NIRS/PC EC-1 and EC-2 were admitted without modification and as set forth in paragraph 2.5 above.

2.10 Thereafter, by memorandum and order dated August 16, 2004, the Board set forth a general schedule for this proceeding. As is relevant here, that schedule set an October 20, 2004 deadline for submitting late-filed environmental contentions or amendments and/or supplements to previously admitted environmental contentions. See Licensing Board Memorandum and Order (Memorializing and Ruling on Matters Raised in Conjunction with August 3, 2004 Conference Call and Setting General Schedule for Proceeding) (Aug. 16, 2004) at App. A

(unpublished). In accordance with this schedule, on October 20, NIRS/PC submitted a motion to amend and/or supplement several previously admitted contentions based on the September 2004 issuance of the staff's DEIS with regard to the NEF, as well as information revealed during the discovery process.¹ See Motion on Behalf of [NIRS/PC] To Amend and Supplement Contentions (Oct. 20, 2004).

2.11 As set forth in their late-filing motion, NIRS/PC sought to amend the relevant environmental contentions as follows (new material appears in **bold**):

NIRS/PC EC-1 – IMPACTS UPON GROUND AND SURFACE WATER

CONTENTION: **Petitioners contend that the Environmental Report contained in the application does not contain a complete or adequate assessment of the potential**

¹ Although section 2.332(d) of the recently amended agency Rules of Practice suggests that an evidentiary hearing regarding environmental issues should not go forward until the final EIS has been issued, in this instance all the parties involved in such issues, including the staff, agreed to go forward on the admitted environmental contentions following issuance of the staff's draft EIS. While our ruling today is not necessarily dispositive of any subsequently filed contention/amended contention request regarding the staff's final EIS, such a motion made in connection with the matters raised in the four NIRS/PC contentions that are addressed in this decision would necessarily also require a showing to support reopening the record. See 10 C.F.R. § 2.326.

environmental impacts of the proposed project on ground and surface water, contrary to the requirements of 10 C.F.R. 51.45.

The Draft Environmental Impact Statement, NUREG-1790 (September 2004) (“DEIS”) does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project on ground and surface water, contrary to the requirements of 10 C.F.R. Part 51.

NIRS/PC EC-2 — IMPACT UPON WATER SUPPLIES

CONTENTION: Petitioners contend that the Environmental Report (ER) contained in the application does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project upon water supplies in the area of the project, contrary to 10 C.F.R. 51.45.

To introduce a new industrial facility with significant water needs in an area with a projected water shortage runs counter to the federal responsibility to act “as a trustee of the environment for succeeding generations,” according to the National Environmental Policy Act § 101(b)(1) and 55 U.S.C. § 4331(b)(1). To present a full statement of the costs and benefits of the proposed facility the ER should set forth the impacts of the National Enrichment Facility on groundwater supplies.

The water used at the proposed facility would be pumped from the Hobbs well field (Lea County Underground Water Basin, Ogallala Aquifer) (ER Rev. 2 at 4.4-5). Groundwater in the Basin is being pumped at a rate faster than it is being recharged (Lea County Regional Water Plan, prepared for Lea County Water Users Association, Summary at 1; at 5-4). The DEIS compares the water use of the proposed facility to the amount of water stored in the Ogallala Aquifer in the entire State of New Mexico (DEIS at 4-15). However, NRC has not shown in the DEIS how this pumpage

would affect water levels and the long-term productivity of the Hobbs well field or the Lea County Underground Water Basin.

NIRS/PC EC-4 — IMPACTS OF WASTE STORAGE AND DISPOSAL

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

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

The DEIS contains an incorrect analysis of the environmental impacts of the disposal of depleted uranium hexafluoride waste. The DEIS assumes that depleted uranium may be disposed of as low-level waste, which is incorrect. The DEIS fails to recognize the Commission's stated position that depleted uranium is not appropriate for near-surface disposal. The DEIS fails to support or explain the modeling of disposal of depleted uranium.

NIRS/PC EC-7 — NEED FOR THE FACILITY

CONTENTION: Petitioners contend that the Environmental Report (ER) does not adequately describe or weigh the environmental, social, and economic impacts and costs of operating the National Enrichment Facility (See ER 1.1.1 et seq.).

The DEIS likewise omits to discuss the impact of the proposed NEF, in particular upon the market for enrichment

services, by failing to consider the effect of the addition of the NEF to the existing range of suppliers and other forthcoming suppliers, the nature of competition that will occur, and the impacts upon market participants and consumers.

See Licensing Board Memorandum and Order (Ruling on Late-Filed Contentions) (Nov. 22, 2004) at 8, 10, 14, 17 (unpublished) [hereinafter November Late-Filing Ruling].

2.12 The Board ruled on the admissibility of these and other late-filed contentions in a November 22, 2004 memorandum and order. In so doing, as to each contention the Board ruled on both the question of whether a balancing of the late-filing criteria set forth in 10 C.F.R. § 2.309(c) barred the contention's admissibility, and whether the contention met the general admissibility requirements of 10 C.F.R. § 2.309(f). See November Late-Filing Ruling. As to EC-1, the Board found it admissible as supported by Bases C, D, F, G and I, each of which met both the late-filing criteria and the general admissibility requirements. Basis B was precluded by its late-filing, and the remaining Bases A, E, and H were inadmissible in that they lacked sufficient factual support or expert opinion and/or failed to raise a genuine material dispute with the DEIS. See id. at 8-10. To clarify the scope of this contention and highlight the particular ways in which NIRS/PC challenged the DEIS as incomplete or inadequate, the Board revised EC-1 to include several new paragraphs denominated (A) through (E), each representing the support given to the contention amendment by a particular basis. See id., App. A at 1-2.

2.13 The proffered amendment to EC-2 was also admitted in part, in that the last two sentences were supported by bases sufficient to raise genuine issues of material fact adequate to warrant further inquiry. The first two sentences were found to be inadmissible in that they were precluded by their late-filing. See id. at 11. As to EC-4, the Board declined to admit proposed paragraph 3 in that it concerned an issue awaiting review by the Commission, but admitted paragraph 2 to the extent it was supported by Basis A. Basis B did not support admission of the amendment in that it raised the issue of economic cost that the Board previously had held was outside the scope of this contention. To further clarify the scope of this contention, the Board modified the title of EC-4 to delete the words "and Disposal." See id. at 14-15. Finally, as to EC-7, the Board found the amendment inadmissible in that it also sought to discuss economic issues outside the scope of the contention. See id. at 17-18.

2.14 To reflect these rulings on the late-filed contentions, the Board set forth revised versions of the modified contentions that read:

NIRS/PC EC-1 – IMPACTS UPON GROUND AND SURFACE WATER

CONTENTION: Petitioners contend that the Environmental Report contained in the application does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project on ground and surface water, contrary to the requirements of 10 C.F.R. 51.45.

The Draft Environmental Impact Statement, NUREG-1790 (September 2004) ("DEIS") likewise does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project on ground and surface water, contrary to the requirements of 10 C.F.R. Part 51 in that:

- (A) The DEIS correctly notes that leakage from the stormwater detention basin and the septic leach fields will probably cause formation of perched bodies of groundwater at the alluvium/Chinle interface. (DEIS, 4-13, 4-14). The DEIS contains estimates of the dimensions of such water bodies, flow rates, and discharge areas. However, NRC provides no explanation of such calculations, and it is not possible to determine whether they are reasonable.
- (B) The DEIS does not contain an estimate of the probability and frequency of leakage through the liners of the treated effluent basin or the stormwater detention basin. The basins are to be lined with geosynthetic materials (DEIS at 4-11, 4-12), such liners are known to leak (EPA, Hydrologic Evaluation of Landfill Performance (HELP) Model, User's Guide for Version 3, EPA/600/R-94/168a, Sept. 1994), and such information is necessary to demonstrate the impact of such leakage. The DEIS should contain an estimate of the leakage rate and should show the fate of water and contaminants that leak from the basins.
- (C) According to the DEIS, "... no precipitation recharge (i.e., rainfall seeping deeply into the ground) occurs in thick, desert vadose zones with desert vegetation (Walvoord et al., 2002)" (DEIS at 3-35). However, cuttings from one of the borings drilled in September 2003 were "slightly moist" (ER Rev. 2 at 3.4-2). In addition, the clay at the bottom of boring B-2 was "moist" (SAR at Fig. 3.2-11). The DEIS should explain the presence of this moisture, which conflicts with its statements about lack of recharge.
- (D) The DEIS states: "Although the presence of fracture zones that can significantly increase vertical water transport through the Chinle Formation has not been precluded, the low measured permeabilities indicate the absence of such zones." (DEIS at 3-35). Two permeability measurements have been made on the Chinle Formation at or near the site: laboratory measurement of core samples (ER Rev. 2 Table

3.3-2) and a slug test performed in MW-2 (Cook-Joyce, Hydrogeologic Investigation, Sec. 32, T. 21 R. 38, Nov. 19, 2003). Such extremely limited measurements, where faults are present, cannot describe the permeability of the entire site, and NRC should explain its reliance on such restricted data.

- (E) The stormwater basin will discharge runoff containing numerous contaminants, which are not adequately identified in the DEIS, nor is their monitoring explained. LES has stated that the runoff will contain small amounts of oil and grease typically found in runoff from paved roadways and parking areas (RAI Response, May 20, 2004, at 33). However, other contaminants may be present, such as PAHs (USGS, Concentrations of PAHs and Major and Trace Elements in Simulated Rainfall Runoff from parking lots, 2003, Open File Report 2004-1208), other organics such as aliphatic hydrocarbons and alcohols (Barrett, M.E, et al., Review and Evaluation of Literature Pertaining to the Quality and Control of Pollution from Highway Runoff and Construction, Tech. Report CRWR 239, April 1993), and other contaminants from spills and accidents. Their presence should be disclosed. Further, stormwater should be monitored for such contaminants.

NIRS/PC EC-2 — IMPACT UPON WATER SUPPLIES

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To introduce a new industrial facility with significant water needs in an area with a projected water shortage runs counter to the federal responsibility to act “as a trustee of the environment for succeeding generations,” according to the National Environmental Policy Act § 101(b)(1) and 55 U.S.C. § 4331(b)(1). To present a full statement of the costs and benefits of the proposed facility the ER should set forth the impacts of the National Enrichment Facility on groundwater supplies.

The DEIS does compare the water use of the proposed facility to the amount of water stored in the Ogallala Aquifer in the entire State of New Mexico (DEIS at 4-15). However, NRC has not shown in the DEIS how this pumpage would affect water levels and the long-term productivity of the Hobbs well field or the Lea County Underground Water Basin.

NIRS/PC EC-4 — IMPACTS OF WASTE STORAGE

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

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

See November Late-Filing Ruling at App. A. Contention NIRS/PC EC-7 remained unmodified, as set forth in paragraph 2.9 above.

2.15 Thereafter, in preparation for the evidentiary hearing on environmental contentions, NIRS/PC, LES, and the NRC staff filed prefiled direct testimony with the Board on January 7, 2005. In response to the NIRS/PC prefiled direct testimony, LES and the staff filed motions in limine seeking variously to disqualify certain NIRS/PC witnesses as experts and to strike portions of the prefiled testimony of certain witnesses and associated exhibits. See Licensing Board Memorandum and Order (Ruling on In Limine Motions and Providing Administrative

Directives) (Jan. 21, 2005) (unpublished) [hereinafter First In Limine Ruling]. The Board declined to disqualify any of the NIRS/PC witnesses, but ruled in favor of striking certain portions of the NIRS/PC prefiled direct testimony to the degree that testimony fell outside the scope of the contentions as admitted. See id.

2.16 On January 28, 2005, NIRS/PC, LES, and the staff submitted prefiled rebuttal testimony as to each contention and, in addition, NIRS/PC filed revised versions of the prefiled direct testimony of its witnesses pursuant to the Board's January 21 in limine ruling. On February 1, 2005, LES again filed an motion in limine, this time with regard to NIRS/PC's rebuttal testimony, asking that the Board strike certain portions of that testimony as outside the scope of the contentions as admitted. See Licensing Board Memorandum and Order (Ruling on In Limine Motions Regarding Prefiled Direct and Rebuttal Testimony and Providing Administrative Directives) (Feb. 4, 2005) at 2-5 (unpublished). In addition, on February 3, 2005, NIRS/PC filed a motion in limine asking that the Board strike in its entirety the testimony of the staff's witness with regard to contention EC-2 based on the staff's alleged failure to serve that testimony on NIRS/PC. See id. at 5-6. The Board ruled on both motions in a February 4, 2005 memorandum and order, striking certain portions of the NIRS/PC rebuttal testimony as outside the scope of the relevant admitted contentions, but declining to strike the staff's prefiled direct testimony as to EC-2, opting instead to allow the NIRS/PC witness to

give "live" rebuttal testimony relative to the staff's prefiled direct testimony at the evidentiary hearing. See id. at 6.

2.17 Finally, on February 4, 2005, the last business day before the scheduled evidentiary hearing, the NRC staff filed a motion in limine seeking to exclude certain portions of the prefiled rebuttal testimony of the NIRS/PC witness regarding EC-4 as outside the scope of the contention. See NRC Staff's Motion in Limine to Exclude Portions of the Prefiled Rebuttal Testimony of NIRS/PC Witness Dr. Arjun Makhijani (Feb. 4, 2005). Because of the timing of this motion, the Board set no schedule for responses to the motion, but planned instead to hear any responses orally at the evidentiary hearing. LES nevertheless filed a response on February 6, 2005, essentially supporting the staff's motion, see Response of [LES] to NRC Staff's Motion in Limine to Exclude Portions of the Prefiled Rebuttal Testimony of NIRS/PC Witness Dr. Arjun Makhijani (Feb. 6, 2005), while NIRS/PC responded orally at the evidentiary hearing. See Tr. at 1092-94. The Board granted the staff's motion in part and denied it in part, striking those portions of the prefiled rebuttal testimony falling outside the scope of the admitted contention. See Tr. at 1095-96.

2.18 In accordance with the general schedule set forth in the Board's August 16 memorandum and order, on February 7-10, 2005, the Board held evidentiary hearings in Hobbs, New Mexico, on environmental contentions EC-1, EC-2, EC-4, and EC-7, during which witnesses

testified on behalf of NIRS/PC, LES, and the NRC staff.² See Tr. at 340-1692.

² Additionally, in accord with 10 C.F.R. § 2.315(a), on the morning and afternoon of February 12, 2005, the Board conducted limited appearance sessions in Eunice, New Mexico, during which approximately three dozen members of the public provided comments regarding the proposed NEF.

2.19 Pursuant to 10 C.F.R. § 2.712 and the general schedule set forth in Appendix A to the Board's August 16 order, on March 14, 2005, NIRS/PC, LES, and the staff filed with the Board proposed findings of fact and conclusions of law regarding those environmental contentions. See Proposed Findings of Fact and Conclusions of Law Based Upon Evidentiary Hearing Held on February 7 through 10, 2005 Submitted on Behalf of Intervenors [NIRS/PC] (Mar. 14, 2005); NRC Staff's Proposed Findings of Fact and Conclusions of Law Concerning NIRS/PC Contentions [EC-1], [EC-2], [EC-4], and [EC-7] (Mar. 14, 2005); [LES] Proposed Findings of Fact and Conclusions of Law Regarding Environmental Contentions (Mar. 14, 2005). Each party similarly filed reply findings of fact and conclusions of law on April 4, 2005. See Reply Proposed Findings of Fact and Conclusions of Law Based Upon Evidentiary Hearing Held on February 7 through 10, 2005 Submitted on Behalf of Intervenors [NIRS/PC] (Apr. 4, 2005) [hereinafter NIRS/PC Reply Findings]; [LES] Reply Findings of Fact and Conclusions of Law Regarding Environmental Contentions (Apr. 4, 2005); NRC Staff's Reply Findings of Fact and Conclusions of Law Concerning NIRS/PC Contentions [EC-1], [EC-2], [EC-4], and [EC-7] (Apr. 4, 2005). Meanwhile, in a March 22, 2005 order adopting certain corrections to the February 2005 hearing transcripts, the Board closed the evidentiary record as of that date. See Licensing Board Order (Adopting Transcript Corrections Regarding February 2005 Evidentiary Hearing and Closing Record) (Mar. 22, 2005) at 2 (unpublished).³

³ In a footnote to that March 22 order, the Board noted that on

February 2, 2005, a few days prior to the evidentiary hearings on environmental contentions, NIRS/PC filed a second motion to amend certain previously-admitted contentions, including contention EC-4. See Motion on Behalf of Intervenors [NIRS/PC] For Admission of Late-Filed Contentions (Feb. 2, 2005). LES and the staff filed responses to the motion on March 3, 2005, each objecting on various grounds to the admission of any further amendment to EC-4. See Answer of [LES] to Motion on Behalf of [NIRS/PC] For Admission of Late-Filed Contentions (Mar. 3, 2005) at 6-7; NRC Staff Response to Motion on Behalf of Intervenors [NIRS/PC] For Admission of Late-Filed Contentions (Mar. 3, 2005) at 5-10. In a May 3, 2005 memorandum and order, the Board declined to allow any further amendment to EC-4, ruling that the proposed amendment failed to meet both the section 2.309(c) late-filing standards and the section 2.309(f) general admissibility requirements. See Licensing Board Memorandum and Order (Ruling on NIRS/PC Late-Filed Contentions and Providing Administrative Directives) (May 3, 2005) at 9-11 (unpublished). Therefore, the Board's ruling in the instant decision represents its final determination regarding contention EC-4.

III. APPLICABLE LEGAL STANDARDS

3.1 The environmental contentions at issue here -- NIRS/PC EC-1, EC-2, EC-4, and EC-7 -- arise under the National Environmental Policy Act (NEPA) and the NRC regulations implementing the agency's responsibilities pursuant to that Act. See 42 U.S.C. §§ 4321 et seq.; 10 C.F.R. Part 51. Together, this statute and the corresponding regulations require an applicant and the staff to consider the potential environmental effects of the proposed action. In addition, the Council on Environmental Quality (CEQ) has implemented regulations which provide guidance on agency compliance with NEPA. See 40 C.F.R. Part 1500. While these regulations are not binding on the NRC when the agency has not expressly adopted them, they are entitled to considerable deference. See Limerick Ecology Action, Inc. v. NRC, 869 F.2d 719, 725, 743 (3rd Cir. 1989).

A. NEPA Requirements

3.2 NEPA requires generally that federal agencies consider the environmental impacts of their proposed actions, and take these considerations into account in their decision-making process. In other words, NEPA imposes procedural restraints, calling for an agency to take a "hard look" at the environmental impacts of a proposed action, as well as reasonable alternatives to that action. See Louisiana Energy Services, L.P. (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 87-88 (1998). This "hard look" is, however, subject to a "rule of reason" in that the consideration of environmental impacts need not address every impact that could possibly result, but rather only those which are reasonably foreseeable or have some likelihood of occurring. See, e.g., Long Island Lighting Co. (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 836 (1973). Agencies are given broad discretion in determining how thoroughly to analyze a particular subject, see Claiborne, CLI-98-3, 47 NRC at 103, and may decline to examine issues the agency in good faith considers "remote and speculative" or "inconsequentially small," Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 44 (1989) (citing Limerick Ecology Action, 869 F.2d at 739). To that end, when reviewing a license application filed by a private applicant, as opposed to a federally-sponsored project, an agency may give substantial weight to the stated preferences of the applicant with regard to issues such as site selection and facility design. See Claiborne, CLI-98-3, 47 NRC at 104; Hydro Resources, Inc. (P.O. Box 15910, Rio Rancho NM 87174), CLI-01-4, 53 NRC 31, 55 (2001).

3.3 Finally, the CEQ regulations state that an agency EIS must address both direct and indirect effects of an action. See 40 C.F.R. §§ 1502.16, 1508.8. Direct effects are those caused by the federal action, and occurring at the same time and place as that action, while indirect effects are caused by the action at a later time or more distant place, yet are still reasonably foreseeable. See 10 C.F.R. § 1508.8. But if effects are remote or speculative, the EIS need not discuss them. See Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., 435 U.S. 519, 551 (1978).

3.4 In connection with any admitted NEPA contentions, the Licensing Board's role in the NEPA analysis is similar to that of a federal court, in that the Board's job is "to ensure that the agency has adequately considered and disclosed the environmental impact of its actions" See Coalition on Sensible Transp., Inc. v. Dole, 826 F.2d 60, 66 (D.C. Cir. 1987) (citation omitted). And in this regard, recognizing that because a principal goal of an EIS is to force an agency to take a "hard look" at the environmental consequences of a proposed project, the EIS must reflect such consideration by providing a reasoned discussion of the relevant issues. See Tongass Conservation Soc'y v. Cheney, 924 F.2d 1137, 1140 (D.C. Cir. 1991). In the context of an NRC adjudicatory proceeding, however, even if an EIS prepared by the staff is found to be inadequate in certain respects, the ultimate NEPA judgments regarding a facility can be made on the basis of the entire record before a presiding officer, such that the EIS can be deemed to be amended pro

tanto. See Allied-General Nuclear Services (Barnwell Nuclear Fuel Plant Separations Facility), ALAB-296, 2 NRC 671, 680 (1975); see also Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-03-30, 58 NRC 454, 473-74 (2003).

B. 10 C.F.R. Part 51 Requirements

3.5 The NRC's Part 51 regulations require an applicant for a 10 C.F.R. Part 70 license for a uranium enrichment facility to file an Environmental Report with its application. See 10 C.F.R. §§ 51.20, .50. This ER must contain "a description of the proposed action, a statement of its purposes, and a description of the environment affected" Id. § 51.45(b). The ER must also discuss (1) the impact of the proposed action on the environment; (2) any unavoidable adverse environmental impacts of the action; (3) alternatives to the proposed action; (4) the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and (5) any irreversible and irretrievable commitment of resources involved in the proposed action, if implemented. Id. § 51.45(b)(1)-(5).

3.6 In addition, the regulations require the NRC staff to review the ER and prepare a draft environmental impact statement, id. § 51.20(b)(10), in which the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives for reducing or avoiding adverse environmental impacts must be considered and weighed. Id. § 51.71(d).
Though the DEIS may rely in part on the ER, the regulations require

the staff to "independently evaluate and be responsible for the reliability of all information used in the [DEIS]." Id. § 51.70(b). The DEIS is then distributed for public comment, and based on the comments received, a review of information provided by the applicant, and supplemental independent information and analysis, the staff prepares and issues a final environmental impact statement (FEIS). Id. §§ 51.73, 51.91.

3.7 As noted above, the staff is generally required to independently evaluate and substantiate all information contained in the DEIS. It is, however, within the agency's discretion to rely on an EIS, draft or otherwise, prepared by another federal agency if such reliance will aid in the presentation of issues, eliminate repetition, or reduce the length of an EIS. Id. Part 51, App. A, § 1(b). This "tiering" or "incorporation by reference" allows the staff to adopt the underlying scientific data and inferences from the analysis conducted by the other agency without independent review, so long as it exercises independent judgment with respect to conclusions about the environmental impacts relative to the current proposed agency action. See Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), LBP-82-43A, 15 NRC 1423, 1467-68 (1982).

IV. FACTUAL FINDINGS AND LEGAL CONCLUSIONS

A. Findings Regarding Contention NIRS/PC EC-1

4.1 As admitted by the Licensing Board in its July 19 memorandum and order, see LBP-04-14, 60 NRC at 66, and modified by its November

22 ruling on late-filed contentions, see November Late-Filing Ruling at 8-10, contention NIRS/PC EC-1 reads:

NIRS/PC EC-1 – IMPACTS UPON GROUND AND SURFACE WATER

CONTENTION: Petitioners contend that the Environmental Report contained in the application does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project on ground and surface water, contrary to the requirements of 10 C.F.R. 51.45.

The Draft Environmental Impact Statement, NUREG-1790 (September 2004) (“DEIS”) likewise does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project on ground and surface water, contrary to the requirements of 10 C.F.R. Part 51 in that:

- (A) The DEIS correctly notes that leakage from the stormwater detention basin and the septic leach fields will probably cause formation of perched bodies of groundwater at the alluvium/Chinle interface. (DEIS, 4-13, 4-14). The DEIS contains estimates of the dimensions of such water bodies, flow rates, and discharge areas. However, NRC provides no explanation of such calculations, and it is not possible to determine whether they are reasonable.
- (B) The DEIS does not contain an estimate of the probability and frequency of leakage through the liners of the treated effluent basin or the stormwater detention basin. The basins are to be lined with geosynthetic materials (DEIS at 4-11, 4-12), such liners are known to leak (EPA, Hydrologic Evaluation of Landfill Performance (HELP) Model, User’s Guide for Version 3, EPA/600/R-94/168a, Sept. 1994), and such information is necessary to demonstrate the impact of such leakage. The DEIS should contain an estimate of the leakage rate and should show the fate of water and contaminants that leak from the basins.

- (C) According to the DEIS, "... no precipitation recharge (i.e., rainfall seeping deeply into the ground) occurs in thick, desert vadose zones with desert vegetation (Walvoord et al., 2002)" (DEIS at 3-35). However, cuttings from one of the borings drilled in September 2003 were "slightly moist" (ER Rev. 2 at 3.4-2). In addition, the clay at the bottom of boring B-2 was "moist" (SAR at Fig. 3.2-11). The DEIS should explain the presence of this moisture, which conflicts with its statements about lack of recharge.
- (D) The DEIS states: "Although the presence of fracture zones that can significantly increase vertical water transport through the Chinle Formation has not been precluded, the low measured permeabilities indicate the absence of such zones." (DEIS at 3-35). Two permeability measurements have been made on the Chinle Formation at or near the site: laboratory measurement of core samples (ER Rev. 2 Table 3.3-2) and a slug test performed in MW-2 (Cook-Joyce, Hydrogeologic Investigation, Sec. 32, T. 21 R. 38, Nov. 19, 2003). Such extremely limited measurements, where faults are present, cannot describe the permeability of the entire site, and NRC should explain its reliance on such restricted data.
- (E) The stormwater basin will discharge runoff containing numerous contaminants, which are not adequately identified in the DEIS, nor is their monitoring explained. LES has stated that the runoff will contain small amounts of oil and grease typically found in runoff from paved roadways and parking areas (RAI Response, May 20, 2004, at 33). However, other contaminants may be present, such as PAHs (USGS, Concentrations of PAHs and Major and Trace Elements in Simulated Rainfall Runoff from parking lots, 2003, Open File Report 2004-1208), other organics such as aliphatic hydrocarbons and alcohols (Barrett, M.E, et al., Review and Evaluation

of Literature Pertaining to the Quality and Control of Pollution from Highway Runoff and Construction, Tech. Report CRWR 239, April 1993), and other contaminants from spills and accidents. Their presence should be disclosed. Further, stormwater should be monitored for such contaminants.

4.2 As an initial matter, it is important that the Board clarify the scope and subject matter of this contention. While formulated as a general contention that neither the ER nor the DEIS contains a complete or adequate assessment of the potential environmental impacts of the proposed project on ground and surface water, the substance is most properly addressed by focusing upon the details of the challenge, which concern ground water and the potential effects of the proposed NEF upon ground water. In fact, no testimony was presented regarding surface water, and the testimony is uncontroverted that the United States Army Corps of Engineers (USACE) has notified LES that there are no jurisdictional surface water bodies or drainage features at the NEF site. See Tr. at 388-89; LES Exh. 3, Tab D (Letter from J. E. Mace, USACE, to G. Harper, Framatone ANP, Inc. (Mar. 17, 2004)).

4.3 LES, the staff, and NIRS/PC presented witnesses in support of their respective positions on contention NIRS/PC EC-1, each of whom submitted written direct and rebuttal testimony as well as giving oral testimony at the evidentiary hearing. See Tr. at 340-872.⁴ LES

⁴ Despite the Board's standard practice of citing to the prefiled testimony of expert witnesses, in this case the court reporter bound and numbered the parties' prefiled direct and rebuttal testimonies sequentially in the transcript with the oral testimony given at the February 2005 evidentiary hearing. Therefore, the Board will cite to those numbered pages of the transcript throughout this decision.

presented two witnesses: George A. Harper, Manager of Regulatory Compliance Programs at Framatome ANP, who assisted in preparing the NEF application, see Tr. at 375-76, and Roger L. Peery, Senior Hydrogeologist and Chief Executive Officer at John Shomaker & Associates, Inc., hired by LES as an expert witness on hydrogeological and water resources issues. See Tr. at 377-78.

4.4 According to the evidence presented, Mr. Harper received a Bachelor of Science and a Master of Science in Civil Engineering from the University of Massachusetts, and is a registered professional engineer in several states. Tr. at 376. He has more than twenty-five years of experience in engineering, environmental, licensing, and regulatory compliance matters, including analyzing environmental, hydrologic, geotechnical, and groundwater issues relating to nuclear facilities. Id. Mr. Harper is familiar with the NEF and the corresponding license application in that he assisted in preparing certain portions of that application, including the ER and SAR, and in preparing LES's application for a groundwater discharge permit from the State of New Mexico. Tr. at 376-77. Based on the foregoing, the Board finds that Mr. Harper is qualified to testify as an expert witness on the subject of the impacts of the NEF on ground and surface water.

4.5 Mr. Peery has a Bachelor of Science in Geology and a Master of Science in Water Resources, both received from the University of New Mexico, and is a registered Professional Geologist. Tr. at 378. He has over fifteen years of experience as a hydrogeologist, and on

numerous occasions has provided expert testimony on water resources issues before various State of New Mexico commissions and committees. Id. Mr. Peery was hired by LES as an expert witness on hydrogeological and water resources issues, and reviewed the relevant portions of the NEF license application in preparation for the evidentiary hearing. Tr. at 378-79. Based on the foregoing, the Board finds that Mr. Peery is qualified to testify as an expert witness on the subject of the impacts of the NEF on ground and surface water.

4.6 The NRC staff presented one witness concerning this contention, Alan Toblin. Tr. at 650. Mr. Toblin is a consultant with Advanced Technologies and Laboratories International, Inc., and assisted the staff in evaluating the potential environmental impacts related to the construction, operation, and decommissioning of the NEF, as well as in preparing the NEF DEIS and staff responses to certain NIRS/PC interrogatories. Tr. at 650-51. He received a Bachelor of Engineering in Chemical Engineering from Cooper Union, and a Master of Science in Chemical Engineering from the University of Maryland. Tr. at 677. Mr. Toblin's experience consists of more than thirty-two years as a Principal Investigator and Technical Manager for analyses of contaminant transport in groundwater, surface water, and air environments, and has performed such analyses for various industrial sites and government agencies in support of construction, operation, and clean-up activities. Id. Based on the foregoing, the Board finds that Mr. Toblin is qualified to testify as an expert

witness on the subject of the impacts of the NEF on ground and surface water.

4.7 Finally, NIRS/PC presented one witness, groundwater hydrologist George Rice. Tr. at 770. Mr. Rice received a Bachelor of Science in Hydrology and a Master of Science in Hydrology, both from the University of Arizona. Tr. at 797. He has over twenty years of experience in hazardous waste investigations and ground water hydrology, including experience in modeling groundwater flow and contaminant transport and designing and installing monitoring networks. Id. Mr. Rice has also served as principal hydrologist responsible for the hydrologic characterization of several low-level radioactive and hazardous waste sites in the western United States. Tr. at 798. Based on the foregoing, the Board finds that Mr. Rice is qualified to testify as an expert witness on the subject of the impacts of the NEF on ground and surface water.

1. NEF Site Location and Description

4.8 The 543-acre proposed NEF site is located in the southeastern corner of New Mexico in Lea County, approximately one-half mile west of the New Mexico-Texas state line, twenty miles south of Hobbs, New Mexico, and five miles east of Eunice, New Mexico. See Staff Exh. 1b, at 3-2 (Draft Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico, NUREG-1790 (Sept. 2004) (redacted non-sensitive version) [hereinafter NEF DEIS]). The site is currently owned by the State of New Mexico, and consists mostly of undeveloped land used for cattle grazing. See id. The area surrounding the site consists of vacant land and various industrial developments, including a railroad spur, a sand/aggregate quarry, and an oil reclamation operation. See id.

4.9 A hazardous waste treatment facility operated by Waste Control Specialists (WCS) is located in the State of Texas, approximately one mile east of the proposed NEF site. See id. WCS holds a seven-year renewable license for the temporary storage of low-level radioactive and mixed wastes, and owns buffer areas immediately adjacent to the eastern boundary of the proposed NEF site. See id. at 3-2 to 3-3. In addition, the Lea County landfill is located to the southeast of the proposed NEF site; the landfill disposes of municipal and solid wastes for Lea County, its municipalities, and other municipalities within a 100-mile radius. See id. at 3-3. DD Landfarm, a petroleum-contaminated-soil treatment facility, is located just to the west of the proposed site, and Dynergy Midstream Services,

a natural gas gathering and processing plant, is located approximately four miles to the west. See id. Finally, a historical marker and picnic area are located approximately two miles west of the proposed site. See id.

4.10 The underlying geology of the proposed NEF site, as relevant to contention NIRS/PC EC-1, consists of three primary geologic formations: the Santa Rosa Formation, the Chinle Formation, and the Antlers Formation or alluvium. See Tr. at 386-87. The Antlers Formation lies closest to the surface, reaching between one and fifty-five feet below the ground, and is described as alluvial deposits comprised of sand and silty sand, with sand and gravel at the base. See Tr. at 387. Beneath the alluvium is the Chinle Formation, which is made up of claystone, siltstone, sandstone, and silty clay, and extends to a depth of approximately 1,100 feet below surface level. See Tr. at 654-55. Finally, the Santa Rosa Formation is directly beneath the Chinle and ranges to a depth of approximately 1,400 feet. See id. at 655. It is comprised primarily of sandy red beds. See Tr. at 387. In addition, two water-bearing siltstone or sandstone units are found within the Chinle at depths of approximately 220 feet and 600 feet. See NEF DEIS at 3-35 to 3-36. The first well-defined aquifer located below the site is found within the Santa Rosa Formation at a depth of more than 1,100 feet. See id. at 3-36.

2. NEF Site Characterization

4.11 The hydrology and geology at the NEF site can be reasonably well understood from the extensive studies made of neighboring sites, taken together with the specific studies performed on the NEF site, and the fact that the geology and hydrology are consistent across the region encompassed by the studies. See Tr. at 383-85. Specifically, as to studies of neighboring sites, the WCS site, the Lea County landfill site, and the formerly-proposed Atomic Vapor Laser Isotope Separation (AVLIS) site (located adjacent to the proposed NEF site) were all studied in preparation for their respective construction. See Tr. at 383, 500-07. In total, more than 200 soil borings were drilled and over 100 monitoring wells and piezometers installed in an effort to characterize the hydrogeologic conditions in areas surrounding the NEF site. See, e.g., LES Exh. 3, Tab 0, at 5-1 to 5-4 (Cook-Joyce, Inc. & Intera, Inc., Section VI, Geology Report, prepared for Waste Control Specialists (Feb. 2004)); id. Tbls. 6.5-1, 6.5-2.

4.12 In addition, LES performed site-specific investigations to supplement the studies of the neighboring sites. Cooke-Joyce, Inc., (CJI) the company that completed characterization investigations at the WCS site, performed a field investigation at the NEF site in September 2003 in an effort to further characterize the hydrogeologic conditions of the water-bearing zone located at approximately 220 feet below the NEF site. See Tr. at 384. Nine soil borings were installed to determine whether saturated conditions were present in the shallow alluvium, and the depth to the Chinle Formation below the alluvial

layer. See, e.g., LES Exh. 3, Tab L, at 3 (CJI, Hydrogeologic Investigation, Section 32; Township 21 Range 38; Eunice, New Mexico (Nov. 19, 2003)) [hereinafter CJI Study]. CJI did not find groundwater in the shallow alluvium, and, accordingly, drilled three monitoring wells to a depth of 220 feet, the shallowest occurrence of saturated conditions beneath the NEF. See Tr. at 385. Only one of those wells has produced water thus far. See id. Also in September 2003, contractors for LES performed a preliminary geotechnical study of the NEF site, which consisted of drilling five borings in the proposed construction area at depths ranging from 40 to 100 feet. See id. Together with the studies conducted at neighboring sites, these two studies confirm that the hydrogeology of the NEF site is consistent with that of the surrounding area. See Tr. at 500-07.

3. NRC Staff Calculations Regarding Perched Bodies of Groundwater

4.13 The parties essentially agree that groundwater may be found in "perched" bodies underground, and that in the geological conditions found at the NEF site, water would travel from the surface downward through the alluvium until it reached the Chinle Formation. See, e.g., Tr. at 655. Because, as discussed further in paragraph 4.34 below, the Chinle is comprised of low-permeability materials, it essentially creates a barrier to further downward water movement, and perched groundwater could form at that interface. See id. Any perched bodies that formed along the interface could then potentially flow downgradient along the surface of the Chinle toward Monument Draw, an intermittent stream located approximately three miles from the proposed NEF site. See Tr. at 694-95. Discharge from the stormwater detention basin and septic leach fields at the NEF site is one possible source of water that could enter the ground and potentially create perched bodies of groundwater at the alluvium/Chinle interface. See Tr. at 655.

4.14 Regarding the portion of this contention (paragraph (A)) that alleges the DEIS inadequately describes the computations of the dimensions of the water bodies, flow rates, and discharge areas related to the possible formation of perched bodies of groundwater at the alluvium/Chinle interface, as the Board noted in its January 21, 2005 memorandum and order, this portion of the contention focuses on the staff's purported failure to provide an explanation relative to

these DEIS calculations. See First In Limine Ruling at 4-5. In other words, this paragraph asserts a contention of omission which, upon cure, becomes moot. See, e.g., Duke Energy Corp. (McGuire Nuclear Station, Units 1 and 2), CLI-02-28, 56 NRC 373, 383 (2002), clarifying CLI-02-17, 56 NRC 1 (2002).

4.15 The staff provided explanations for its determinations of flow rates and dimensions of potential perched water bodies and discharge rates in both its November 10, 2004 response to NIRS/PC interrogatories and the prefiled testimony of witness Alan Toblin.⁵ See NRC Staff's Response to Interrogatories and Document Request By Petitioners [NIRS/PC] To Commission Staff (Nov. 10, 2004) at 7-9; Tr. at 655-60. As a consequence, the Board concludes that the omission

⁵ Specifically, the staff applied Darcy's Law to determine the estimated impact of the unlined stormwater detention basin. With regard to flow rates of potential perched water bodies, staff calculations resulted in an estimated rate of 0.0002 cm/sec or 63.1 meters per year, see Tr. at 658; with regard to basin discharge rate, the staff estimated a flow of 180,000 cubic meters per year (m^3/yr), see Tr. at 657; and with regard to potential dimensions of those bodies, the staff estimated the cross-sectional areas of perched water from the detention basin and septic system to be 2850 square meters (m^2) and 116 m^2 , respectively, see Tr. at 659, and the depth of those bodies to be approximately 2.85 m and 1.16 m, respectively, see id.

alleged in this contention has been cured, and the DEIS is no longer defective in the alleged respect.

4. Estimate of Probability/Frequency of Leakage From Lined Basins

4.16 Regarding the portion of this contention (paragraph (B)) that asserts the DEIS does not contain an estimate of the probability and frequency of leakage through the liners of the treated effluent basin or the stormwater retention basin,⁶ we begin with the observation that there is no perfect (100 percent probability) engineered system. That is precisely the reason the NRC has adopted its "defense-in-depth" approach, which requires a series of engineered barriers to protect against radiation exposures to the public and the environment. See 10 C.F.R. § 70.64(b).

4.17 NIRS/PC put forth evidence, discussed further below, of leakage data for various liners. See Tr. at 786-87. Witnesses for each of the parties testified about the possibility that liners, on occasion, may leak, and that this possibility could not be absolutely precluded at the NEF site. See, e.g., Tr. at 664, 786-87; NIRS/PC Exh. 17, at 117-18 (Deposition Transcript of G. Harper and R. Peery (Sept. 17, 2004)). Therefore, while the Board agrees with NIRS/PC that it is unlikely a liner will be 100 percent leak-free, such a "no

⁶ Although paragraph (B) of this contention makes reference to the "stormwater detention basin," given the focus in this paragraph on basin liners coupled with the fact that the stormwater detention basin is not a lined basin, and the lack of contradictory information on the record before us, the Board assumes that NIRS/PC intended to reference the lined "stormwater retention basin."

leak" requirement does not exist in this instance. Rather, each basin of the NEF system must be reasonably engineered, constructed, and maintained to minimize leakage and to alert the NEF when leakage that could endanger human health or the environment occurs.

4.18 Section 4.2.6.2 of the DEIS describes the two lined basins at the proposed NEF, the treated effluent evaporative basin (TEEB) and the uranium byproduct cylinder storage pad stormwater retention basin (USPSRB), as well as the unlined stormwater detention basin. See NEF DEIS at 4-12 to 4-13. Figure 4-2 of the DEIS depicts the basins and septic tank system locations at the proposed site. Id. at 4-12.

4.19 The TEEB is a double-lined basin with a leak-detection system between the liners consisting of, from the bottom up, a two-foot prepared clay layer, a membrane liner, a drainage collection system (which will be used to detect leakage between the liners), a second membrane liner, and a layer of clay at least one foot deep. See Tr. at 602. Uranium-bearing effluent from the Liquid Effluent Collection and Treatment System, and shower, hand wash, and laundry effluents will be collected in the TEEB. See Tr. at 393, 662.

4.20 The USPSRB, which will hold cooling tower blowdown discharges, heating boiler blowdown discharges, and stormwater runoff from the Uranium Byproduct Cylinders (UBC) Storage Pad, see Tr. at 393, is made of, from the bottom up, a two-foot layer of clay, a membrane liner, and a one-foot clay layer. See Tr. at 603. The water collected in the USPSRB will contain normal components of drinking water, such as calcium, chloride, magnesium, sodium and sulfate. See

Tr. at 662-63; NEF DEIS at 3-41. In addition, the UBCs containing depleted uranium hexafluoride (DUF_6) will be surveyed for external contamination prior to being placed on the UBC Storage Pad and will be monitored during their storage on the pad. Tr. at 396. Water and sediment samples will be collected quarterly from the USPSRB to ensure that uranic material is not deposited in the basin. Tr. at 397. Therefore, runoff from these sources is not reasonably expected to contain NRC-regulated materials.

4.21 LES witnesses testified that all three liners, two in the TEEB and one in the USPSRB, will be installed in accordance with NMED Guidelines, will be pre-approved by both a professional engineer and NMED prior to installation, see Tr. at 603, and will be installed by manufacturer-certified installers according to project specifications, see Tr. at 420. The liner maintenance program at the NEF includes methods to identify, locate, and patch leaks. See id. In addition, six monitoring wells will be installed at five locations to monitor groundwater in the shallowest saturated unit approximately 220 feet below ground surface, see Tr. at 395-96, 609, and the drainage piping between the two liners of the TEEB will be monitored, see Tr. at 420.

4.22 LES witnesses further testified they expect approximately 390 microcuries per year of uranium to be discharged to the TEEB and, as a point of comparison, noted that if all the uranium expected to be discharged to the TEEB over thirty years were uniformly distributed in the soil below the TEEB over a depth of twenty feet, that uranium concentration would be equivalent to the naturally occurring uranium

concentration in the soil at the proposed NEF site. See Tr. at 395; LES Exh. 10, at 1 (Framatome ANP, Inc., Calculation Summary Sheet, TEEB Soil Concentration and Integrated Liner Dose (Nov. 18, 2004)). While this is not a definitive indication of any specific, expected uranium release concentration, it does provide a good indicator of the actual aggregate amounts involved. Furthermore, the relatively impermeable clay layer underlying the lower synthetic liner of the TEEB is expected to absorb leakage and during that process absorb and hold any small amount of uranium that might be released, thereby preventing the escape of uranium beyond this layer. See Tr. at 664-65.

4.23 Nonetheless, NIRS/PC contends that, because there is the possibility of leakage from these lined basins, the DEIS must provide estimates of the probability and frequency of leakage, as well as the leakage rate. NIRS/PC witness Rice presented evidence regarding leakage data on various liners and indicated that, although the specific liners studied may not be the same as those used at the NEF, the factors that cause liners to leak, such as manufacturing defects, installation defects, and deterioration after installation, are common to all liners. See Tr. at 786-87, 814-15. Mr. Rice thus concluded that the possibility of leakage should be examined, and leakage rates estimated. See Tr. at 814.

4.24 Staff witness Toblin testified that, even given the evidence presented by NIRS/PC regarding leakage data for various liners, currently it is not possible to predict leakage rates based on many

uncertainties underlying the proposed calculations. See Tr. at 661. Initially, he indicated that the specific designs for the TEEB and USPSRB have not yet been finalized and, therefore, it is not known what specific liner materials will be utilized. See Tr. at 713. Additionally, Mr. Toblin testified that even with information regarding the specific design, he would have to assign numerical values to the number of tears over a particular liner area and the number of tears expected over time, values that the study referred to by Mr. Rice could not provide. See Tr. at 661, 761. Finally, Mr. Toblin testified that in calculating a leakage rate, he would have to include the additional factor of whether, and for how long, water was present in the particular lined basin, thereby adding a third uncertainty to the calculation. Tr. at 661. Given these uncertainties, Mr. Toblin concluded, he could not provide a meaningful quantitative assessment of the probability and frequency of liner leakage or the leakage rate. Id.

4.25 Agreeing with Mr. Toblin's view, we find there currently is no scientifically sound means of estimating the probability, frequency, and rate of liner leakage from the lined basins proposed to be constructed at the NEF. Therefore, the fact the staff did not perform such an analysis does not represent a shortcoming in the DEIS.

Furthermore, when considered in conjunction with Mr. Toblin's testimony, we find the DEIS contains a sufficient analysis of leakage, and the fate of water and contaminants that might leak, from the lined basins in question.

5. Explanation of Moisture Presence in Borings

4.26 Regarding the portion of this contention (paragraph (C)) that claims the DEIS should explain the presence of moisture found in boring B-9 and boring B-2, and the asserted conflict with DEIS statements about lack of recharge, section 3.8.1 of the DEIS discusses site and regional hydrogeology, including the lack of precipitation recharge, and notes that field investigations and computer modeling indicated that no precipitation recharge occurs at sites with thick vadose zones such as the proposed NEF. See NEF DEIS at 3-34 to 3-35.

4.27 As noted in paragraph 4.12 above, as part of its effort to characterize the hydrogeology of the NEF site, fourteen borings were drilled at the site, which included nine groundwater exploration borings taken by CJI and five geotechnical borings taken by Mactec Engineering and Consulting. See Tr. at 404. Moisture was found in boring B-2, a geotechnical boring that was described as "moist" at a depth of 35 to 41.4 feet, and boring B-9, a groundwater exploration boring that was labeled as "slightly moist" at a depth of 6 to 14 feet. See CJI Study at App. A. While some moisture was indeed found in those two borings, no moisture was found in any of the other boring locations. See id. In addition, at least 55 soil borings were taken at the neighboring site, many of which were found to be "moist," "slightly moist," or "damp" at a depth of approximately 200 feet. See Tr. at 449; LES Exh. 3, Tab G (Terra Dynamic, Inc., Soil Boring Logs, [WCS] Andrews County Landfill Site, 1992-1993).

4.28 NIRS/PC witness Rice posited that the moisture in the two borings at the NEF site was an indication of episodic recharge because a portion of infiltrated precipitation would make its way to the alluvial/Chinle contact and flow along that contact. See Tr. at 810.

As further evidence of such recharge, Mr. Rice cited the moisture found in the borings at the WCS site, which in his view indicated that some recharge currently occurs at that site. See Tr. at 776.

4.29 Mr. Peery testified, however, that LES had been advised by the individuals who prepared the boring logs for the NEF site that the moisture logged was not a reflection of the existence of saturated conditions at the site and, in his opinion, represented some "residual" moisture attributable to the moisture storage capacity of the soil in the vadose zone. See Tr. at 424, 540. Mr. Peery further testified that, with regard to the WCS borings, the moisture was logged at the alluvial/Chinle contact, followed by a notation of dry conditions in the Chinle below it, indicating that water does not migrate vertically through the Chinle red bed surface. See Tr. at 544. According to the LES panel, findings of moisture at that depth are also consistent with the groundwater zone known to exist at a depth of approximately 220 feet. See Tr. at 449; supra paragraph 4.10; NEF DEIS at 3-35.

4.30 In addition, Mr. Toblin pointed out that, given the relatively uniform subsurface conditions in the area, precipitation recharge would be expected to be present over a wide area at multiple borings if it were occurring and, therefore, the presence of moisture

in the two NEF borings does not indicate precipitation recharge at the proposed site, particularly given the presence of "very dry" soils above and below the levels of the moisture found in the B-9 boring. See Tr. at 666-67. Mr. Toblin further observed that the absence of moisture below the moist area is consistent with the conclusion that precipitation does not seep deeply into the ground at the proposed site. Instead, precipitation that does infiltrate into the subsurface is subject to upward hydraulic gradients caused by vaporization and evapotranspiration, both of which draw water upwards toward the surface. See Tr. at 667; NEF DEIS at 3-35.

4.31 Based upon the Board's review of the evidence and the testimony presented, the Board finds that the isolated presence of moisture in borings B-2 and B-9 at the proposed NEF site could be attributed to a variety of sources and is not, in and of itself, indicative of precipitation recharge and, therefore, such isolated moisture is not inconsistent with a finding that there is no precipitation recharge. Nor is the moisture found in the WCS borings inconsistent with a determination there is no precipitation recharge at or around the NEF site. The Board, therefore, finds that the conclusion in the NEF DEIS that there is no precipitation recharge at the proposed NEF site is reasonably supported.

6. Adequacy of Staff Assessment of Potential Fracture Zones

4.32 Regarding the portion of this contention (paragraph (D)) asserting that, given its admission that the presence of fracture zones that can significantly increase vertical water transport through the Chinle Formation has not been precluded, the staff should explain why it relied upon only two permeability measurements for its NEF DEIS conclusion that the low measured permeabilities indicate the absence of such fractures. The issue for the Board in this context is whether the staff can reasonably conclude there are no material flow paths between various aquifers below the proposed NEF site and the surrounding region.

4.33 As noted above, NIRS/PC contends the staff relied upon only two permeability measurements. In our view, however, it is more accurate to say that the staff relied upon two types of permeability measurements, i.e., an in situ slug test from the NEF site and laboratory tests conducted on samples taken from the WCS site. See Tr. at 670, 779. Slug tests, which measure permeability at a site by suddenly changing the static water level in a well, are conducted by rapidly adding or removing water and measuring the time it takes to return to its static level. See Tr. at 670. The NEF site slug test was performed at a monitoring well installed at the site -- MW-2 -- that had been found to produce groundwater. See CJI Study at 6-8. Thirty-six vertical permeability tests and six horizontal permeability tests were performed in the laboratory on the WCS site samples. See Tr. at 670; LES Exh. 3, Tab E, at 10 (Jack Holt & Associates, Inc.,

Geotechnical Investigation and Engineering Analysis for [WCS] Landfill Project, Andrews County, Texas (Mar. 12, 1993)). The staff determined that the permeability findings from these samples are applicable to the proposed NEF site given their similar underlying geologic structures, including the Chinle Formation. See Tr. at 670.

4.34 The laboratory tests show that the Chinle Formation clays at the WCS site are highly impervious, see Tr. at 390-91, and that the siltstones/sandstones within the Chinle also have very low permeabilities and do not readily transmit water, see Tr. at 553-54. Permeabilities determined by those tests range from less than 10^{-9} to 1.76×10^{-8} centimeters per second (cm/sec) for the clay taken from the Chinle Formation. Tr. at 671. Tests on the sandstone and siltstone beds determined a range of permeabilities from 2.58×10^{-8} to 1.93×10^{-6} cm/sec. Id. By comparison, a permeability of 3.7×10^{-6} cm/sec was measured with the slug test performed at MW-2 at the NEF site. Id.

4.35 While there was significant disagreement over whether in situ measurements of permeability produce more accurate measurement than laboratory tests performed on samples, see, e.g., Tr. at 459-61, 692-93, 779-80, the difference in the results is not important given that the soil in question is clay, which is of very low permeability.

From our perspective, the dispute is over whether the permeability number is extremely small, or minuscule.

4.36 Also underlying this contention is the question whether the staff took a "hard look" at the possible existence of networks of fractures in the Chinle red beds that, collectively, could be

sufficient to allow water at the interface of the Antlers and Chinle Formations to flow into the sandstone aquifer located approximately 220 feet below ground level. See, e.g., Tr. at 779. This is relevant only because of the concern there are "fast flow paths" that could carry leakage or runoff from any of the basins on the NEF site down into the aquifer. And in this regard, independent of the fact a large number of permeability measurements were made in the area that provide a good indication of the overall and average permeability between the alluvium and the aquifer, ample evidence was elicited during the cross-examination of Mr. Peery and Mr. Harper that many well logs showed a variety of fractures, or evidence of fractures with mineralization. See Tr. at 547-85. While some of these fractures may have been induced by the sampling method, see Tr. at 557, there appears little reason to doubt that fractures do exist within the Chinle Formation. The question, then, is whether further investigation is needed to determine if some or all of these cracks form such a strongly interconnected and sufficiently open network that it offers a relatively permeable flow path from the surface through the alluvium to the saturated sandstone aquifer.

4.37 In considerable measure, this matter is resolved by the fact that when a well was drilled into the sandstone at approximately 220 feet below the surface, water rose slowly into the hole to a level of about 120 feet below the surface. See Tr. at 585-86, 591. This indicates that the aquifer is confined with a hydrostatic head sufficient to lift water approximately 100 feet if relieved. In other

words, about forty-three pounds per square inch of pressure is exerted on the aquifer. Were there a significant flow path, or set of flow paths, through the alluvium to the aquifer in question, one would expect to find material amounts of water at levels well above the aquifer, even if confined to pockets formed around such flow paths. See Tr. at 591-92. In addition, if the flow path were sufficiently unrestricted, one would expect to find water at the height to which it eventually rose in the well that was drilled into the aquifer. See Id. Since none of the borings found water at such locations, it is reasonable to conclude that, although there might be very localized pockets of water formed around fractures that do not permit good hydraulic communication between the aquifer and soil levels above it, there are no flow paths sufficient to relieve the over-pressure in the aquifer, and thus there are no material flow paths that would allow water to flow in the reverse direction (i.e., that would allow reasonably unrestricted flow of water from the surface through the alluvium to the aquifer). In addition, Mr. Peery noted that the various water-bearing zones beneath the proposed NEF site have very large differences in hydraulic head (i.e., pressure), which indicates a lack of hydraulic communication and strongly suggests there are no fracture zones that act as fast flow paths. See Tr. at 389, 452. Staff witness Toblin presented confirmatory testimony, noting the results of the investigations near the proposed NEF site indicate it is unlikely there are fracture zones that lead to fast flow paths. See Tr. at 672.

4.38 This does not, of course, rule out the possibility that one or more small pathways exist, but offer so high a resistance to flow that the pressure in the aquifer is maintained. It does, however, indicate there can be no pathway that would permit a substantial flow of water between the alluvium and the sandstone aquifer. This finding is consistent with statements of LES witnesses to the effect that the low permeability of the Chinle red beds underlying the proposed site suggest the lack of highly fractured zones because, if these subsurface units were highly fractured, their hydraulic conductivities would be much higher than previously determined for the NEF and WCS sites. See Tr. at 403.

4.39 Based on the foregoing, the Board finds the NEF DEIS is not based, as NIRS/PC contends, upon "extremely limited measurements . . . [that] cannot describe the permeability of the entire site"; rather, the Board finds the measurements at neighboring sites provide relevant information regarding the NEF site and, taken together, adequately inform the investigation for the NEF. Furthermore, while the Board finds the evidence supports the conclusion that limited localized faults are present, the evidence clearly indicates there are no material faults or fast flow pathways that would permit significant hydraulic connectivity between any of the aquifers at issue or from one or more of those aquifers to the surface. The Board finds that, on the whole, the information utilized by the staff in developing the NEF DEIS provided reliable bases for concluding that the permeability of the soil beneath the proposed site is very low, and that the staff

has adequately explained the basis for its determination regarding vertical water transport through the Chinle Formation.

7. Presence and Monitoring of Contaminants

4.40 Regarding the portion of this contention (paragraph (E)) that maintains that the stormwater detention basin⁷ will discharge runoff containing numerous contaminants that the staff in the NEF DEIS has neither properly identified nor provided an adequate explanation of how they will be monitored, the DEIS (1) addresses generally the contents of the stormwater runoff at pages 4-10 to 4-11, see Tr. at 673; (2) reviews and evaluates LES's planned implementation of the Spill Prevention Control and Countermeasures Plan and its Stormwater Pollution Prevention Plan at pages 4-10 and 4-15, respectively, see Tr. at 673-74; (3) lists in Table 4-21 all contaminants the staff believes would be expected to be involved in an industrial accident (and lists all process chemicals and gases that would be used at the proposed NEF), see Tr. at 674; Staff Exh. 1a, at 4-70 to 4-71 (Draft Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico, NUREG-1790 (Sept. 2004) (unredacted sensitive version)); and (4) describes LES's monitoring program including setting out in Table 6-9, the parameters that will be monitored, see Tr. at 673; NEF DEIS at 6-18. In addition,

⁷ Similar to paragraph (B) of this contention, paragraph (E) is somewhat ambiguous on its face as to whether the stormwater retention or detention basin is at issue. Given the context of paragraph (E) itself, and the testimony and evidence on the record before the Board, it is clear that the stormwater detention basin is the subject of this part of the contention.

section 6.2 of the ER sets forth LES's proposed physiochemical monitoring program, which encompasses the Site Stormwater Detention Basin, see LES Exh. 2, at 6.2-1 to 6.2-5 (LES, National Enrichment Facility Environmental Report §§ 6.1, 6.2 (2004)), and ER Table 6.2-2 sets forth the various parameters to be monitored by LES, as well as the monitoring frequency, sample type, and lower limit of detection, with respect to stormwater detention basin discharges, see Tr. at 426.

4.41 NIRS/PC, however, has specifically raised the question of detection and control of contaminants typically associated with roads, parking lots, and industrial facilities, such as polycyclic aromatic hydrocarbons (PAHs) and other organics. Mr. Rice testified that biological oxygen demand (BOD) and chemical oxygen demand (COD) analyses, mentioned in DEIS Table 6-9, do not detect the presence of individual contaminants such as PAHs, but instead are gross measures of the amount of organic matter in water, as indicated by changes in the concentration of oxygen or some other oxidant. See Tr. at 826; NIRS/PC Exh. 16, at 3 (Hach Co., The Science of Chemical Oxygen Demand, Technical Information Series, Booklet No. 9 (2004)) . Furthermore, according to Mr. Rice, the detection limits proposed for BOD and COD are 2 milligrams per liter (mg/L) and 1 mg/L, respectively, whereas the drinking water standards for some PAHs are much lower than these detection limits. See Tr. at 826. For example, the human health standard for the PAH benzo-a-pyrene is 0.0007 mg/L. See NIRS/PC Exh. 36, at 12 (New Mexico Water Quality Control Commission, Regulations, 20.6.2 NMAC (2002)). Thus, Mr. Rice

declares, even if PAHs could be detected by BOD or COD analyses, some of them only would be detected once their concentrations exceeded standards by a factor of more than 1000. See Tr. at 826.

4.42 The staff acknowledged that PAHs and other organics can be introduced into the environment of an industrial facility such as the proposed NEF through emissions from generators or motor vehicles, or can result from runoff from surface sealed parking lots. See Tr. at 674-75. Mr. Toblin testified that the presence of these contaminants is detected by the monitoring of COD and BOD, both of which are listed in Table 6-9 of the NEF DEIS as being monitored. See Tr. at 675-76. Instead of addressing specific detection limits, however, staff witness Toblin pointed out that the NEF ER contains a commitment to have its monitoring program reflect applicable regulatory requirements, and that the Site Stormwater Detention Basin will adhere to the requirements of the Groundwater Discharge Permit/Plan from the New Mexico Water Quality Board. See Tr. at 426.

4.43 It is important to recognize that monitoring of these contaminants is regulated through the State of New Mexico's Groundwater Discharge Permit, not by the NRC. Therefore, the Board need not address NIRS/PC's argument that the levels of detection and control are insufficient because this is a matter outside the Board's purview. While the DEIS must address the monitoring of contaminants in the effluent, compliance with State requirements is, in the first instance, a matter for the State. See Consolidated Edison Co. of New

York, Inc. (Indian Point Station, Unit No. 2), ALAB-453, 7 NRC 31, 34 (1978).

4.44 Accordingly, as to the assertion that contaminants in the stormwater runoff are neither adequately identified in the DEIS nor is their monitoring sufficiently explained or implemented, the Board finds that (1) the staff has disclosed potential contaminants and described LES's proposed monitoring for those items of concern to NIRS/PC, which is sufficient to satisfy the staff's NEPA obligation in this instance; and (2) regulatory authority over those items is outside the purview of this agency, belonging instead to the State of New Mexico, with whose requirements LES has committed, and presumably will be held, to comply.

8. Overall Holding

4.45 Based upon the foregoing, and the testimony and evidence in the record before the Board, relative to the matters raised by intervenor NIRS/PC in its contention EC-1, we find the Environmental Report contained in the NEF application and the Draft Environmental Impact Statement for the NEF do, in fact, contain an adequate assessment of the potential environmental impacts of the proposed project on ground and surface water.

B. Findings Regarding Contention NIRS/PC EC-2

4.46 As admitted by the Licensing Board in its July 19 memorandum and order, see LBP-04-14, 60 NRC at 66-67, and modified by its November 22 ruling on late-filed contentions, see November Late-Filing Ruling at 10-11, contention NIRS/PC EC-2 states that:

NIRS/PC EC-2 - IMPACT UPON WATER SUPPLIES

CONTENTION: Petitioners contend that the Environmental Report (ER) contained in the application does not contain a complete or adequate assessment of the potential environmental impacts of the proposed project upon water supplies in the area of the project, contrary to 10 C.F.R. 51.45.

To introduce a new industrial facility with significant water needs in an area with a projected water shortage runs counter to the federal responsibility to act "as a trustee of the environment for succeeding generations," according to the National Environmental Policy Act § 101(b)(1) and 55 U.S.C. § 4331(b)(1). To present a full statement of the costs and benefits of the proposed facility the ER should set forth the impacts of the National Enrichment Facility on groundwater supplies.

The DEIS does compare the water use of the proposed facility to the amount of water stored in the Ogallala Aquifer in the entire State of New Mexico (DEIS at 4-15). However, NRC has not shown in the DEIS how this pumpage would affect water levels and the long-term productivity of the Hobbs well field or the Lea County Underground Water Basin.

4.47 Each of the parties presented witnesses with regard to contention NIRS/PC EC-2, each of whom submitted written direct and rebuttal testimony for the record and gave oral testimony at the evidentiary hearing. See Tr. at 1169-1380. LES presented a panel of five witnesses: (1) Rod M. Krich, Vice President of Licensing Projects for Exelon Nuclear, who is "on loan" to LES as Vice President of Licensing, Safety and Nuclear Engineering, see Tr. at 1184; (2) George R. Campbell, Senior Mechanical Engineering Consultant for Lockwood Greene Engineering and Construction Co., a primary contractor on the NEF project, see Tr. at 1186-87; (3) Roger L. Peery, Senior Hydrogeologist and Chief Executive Officer at John Shomaker & Associates, Inc., who has been hired by LES as an expert witness on hydrogeological and water resources issues, see Tr. at 1187-89; (4) Len R. Stokes, an independent consultant and founder and President of Progressive Environmental Systems, Inc., who has been hired by LES as an expert witness on water resource issues, see Tr. at 1189-90; and (5) Timothy M. Woomer, Director of Utilities for the City of Hobbs, New Mexico, who negotiated and executed a memorandum of understanding (MOU) with LES regarding the availability of the Hobbs municipal water supply system for use at the NEF, see Tr. at 1191-92.

4.48 Mr. Krich holds a Bachelor of Science in Mechanical Engineering from the New Jersey Institute of Technology, and a Master of Science in Nuclear Engineering from the University of Illinois, and has more than thirty years of experience in the nuclear industry, including engineering, licensing, and regulatory matters. See Tr. at

1185. In his position at LES, Mr. Krich has overall responsibility for licensing and engineering matters related to the NEF, and oversaw the preparation and submittal of the NEF license application. Id. In addition, Mr. Krich is responsible for the preparation of all state and federal permit applications related to the NEF. Id. Based on the foregoing, the Board finds that Mr. Krich is qualified to testify as an expert witness on the subject of the impacts of the NEF on water supplies.

4.49 According to the evidence presented, Mr. Campbell received a Bachelor's Degree in Mechanical Engineering Technology from the University of North Carolina at Charlotte, and has more than thirty years of experience in mechanical and process engineering, twelve of which he has spent in the nuclear industry in activities associated with power plant design and engineering supervision. Tr. at 1187. As a Mechanical Engineer at Lockwood Greene, Mr. Campbell was involved in preparing certain portions of the NEF application, including supervising the design effort for the liquid effluent collection and treatment system, and facility engineering for the decontamination and waste storage and disposal systems. Id. In addition, Mr. Campbell played a principal role in estimating the NEF's water usage requirements, assessing potential water supply options, and negotiating agreements with the City of Hobbs and the City of Eunice for use of their municipal water supply systems. Id. Based on the foregoing, the Board finds that Mr. Campbell is qualified to testify

as an expert witness on the subject of the impacts of the NEF on water supplies.

4.50 Mr. Peery's background and expert qualifications are discussed at p. 25 supra. Based on that discussion and the subject matter of the contention at hand, the Board finds that Mr. Peery is qualified to testify as an expert witness on the subject of the impacts of the NEF on water supplies.

4.51 Mr. Stokes's educational background includes studies at New Mexico State University. Tr. at 1190. He has worked as a water resource consultant in the State of New Mexico for approximately ten years, and has provided water rights negotiation, permitting, contracting, and consulting services to numerous clients, including in the development and review of the Lea County Regional Water Plan. Id. In addition, Mr. Stokes has provided testimony in administrative proceedings before the New Mexico Office of the State Engineer, and expert testimony on water supply and water rights issues before the Federal Bankruptcy Court in New Mexico. Id. Mr. Stokes was hired by LES as an expert witness on water resource issues, and he has reviewed the relevant portions of the NEF license application and the DEIS in preparation for his testimony. Id. Based on the foregoing, the Board finds that Mr. Stokes is qualified to testify as an expert witness on the subject of the impacts of the NEF on water supplies.

4.52 Finally, Mr. Woomer holds a Bachelor of Science in Mining Engineering from West Virginia University, has over a decade of experience as a mine engineer, and currently serves as the Director of

Utilities for the City of Hobbs. See Tr. at 1192. As Director of Utilities, Mr. Woomer is responsible for managing and supervising, among others, the water production and water distribution for the City of Hobbs, including formulating, evaluating, and implementing short- and long-term plans to meet the city's present and future water needs. Tr. at 1191. He was also responsible for negotiating and executing an MOU between the City of Hobbs and LES that would make water available to the NEF from the Hobbs municipal water supply system, and thus has some familiarity with the projected NEF water requirements. Tr. at 1192. Based on the foregoing, the Board finds that Mr. Woomer is qualified to testify as an expert witness on the subject of the impacts of the NEF on local water supplies.

4.53 The staff presented one witness regarding contention EC-2, Alan Toblin. See Tr. at 1311. Mr. Toblin's background and professional qualifications are discussed in detail at p. 25 supra. Based on that discussion and the subject matter of the contention at hand, the Board finds that Mr. Toblin is qualified to testify as an expert witness on the subject of the impacts of the NEF on water supplies.

4.54 NIRS/PC also presented one witness, George Rice, whose background and professional qualifications are laid out at p. 26 supra. Based on that discussion and the subject matter of the contention at hand, the Board finds that Mr. Rice is qualified to testify as an expert witness on the subject of the impacts of the NEF on water supplies.

1. Water Usage Requirements for the NEF

4.55 The NEF ER contains estimates of the anticipated average and peak plant water consumption for the NEF at Tables 3.4-4 and 3.4-5. See LES Exh. 1 at Tbls. 3.4-4 and 3.4-5 (LES, National Enrichment Facility Environmental Report, §§ 3.3, 3.4, 4.4 (2004)) [hereinafter ER 3.3, 3.4, 4.4]. On a typical day, the NEF would require water for routine process and mechanical operations, including decontamination, rinse water, sludge removal, and operation of the cooling water tower, and other typical sanitary purposes such as laundry, showers, and hand washing. See Tr. at 1196; ER 3.3, 3.4, 4.4, at Tbl. 3.4-4. The projected water use for the NEF during such regular operation is expected to be approximately 63,423 gallons per day, or 71.1 acre-feet per year. See id.

4.56 The estimated NEF peak water usage rate is 378 gallons per minute, or approximately 540,000 gallons per day. See Tr. at 1196; ER 3.3, 3.4, 4.4, at 4.4-6, Tbl. 3.4-5. This peak rate will, however, occur only when the NEF fills its fire water tanks, an event that, in addition to the initial fill, is expected to occur only a few times over the life of the facility and is accomplished in eight hours. See Tr. at 1195-96, 1246.

2. Source of NEF Water Supply

4.57 Witnesses for LES testified that the NEF intends to get 100 percent of its water supply from either the City of Hobbs, New Mexico, or the City of Eunice, New Mexico, and has an MOU with each entity to supply the full requirements of the NEF. See Tr. at 1195; see also LES Exh. 22 (Letter from T. Woomeer, Director of Utilities for City of Hobbs, New Mexico, to J. Shaw, Lockwood Greene/LES (Dec. 30, 2003)); LES Exh. 23 (Letter from J. Shaw, Lockwood Greene/LES, to J. Brown, Mayor of Eunice, New Mexico (Jan. 21, 2004)). Therefore, the NEF will not utilize surface or ground water from the NEF site. See Tr. at 1195; NEF DEIS at 3-37; ER 3.3, 3.4, 4.4, at 3.4-9.

4.58 The Hobbs and Eunice municipal water supply systems both draw their water from the Ogallala Aquifer, an underground reservoir extending under the high plains from west of the Mississippi River to east of the Rocky Mountains, and underlying 450,000 square kilometers (174,000 square miles) in parts of eight states, including New Mexico and Texas. See NEF DEIS at 3-37. Approximately 1.5 percent of the Ogallala Aquifer's water (60 billion cubic meters, or 16 trillion gallons) is located under New Mexico. See Tr. at 1313; NEF DEIS at 3-37. The portion of the Ogallala Aquifer that lies below Lea County is called the Lea County Underground Water Basin, and that basin supplies the Hobbs well field, a set of wells from which both the Hobbs and Eunice municipal systems draw. See Tr. at 1313. In 1995, the total groundwater withdrawal in Lea County was approximately 600,000 cubic meters (160 million gallons) per day, the majority of which was from the Lea County Underground Water Basin. Id.; see also LES Exh. 26,

Executive Summary at 1 (Leedshill-Herkenhoff, Inc., John Shomaker & Associates, Inc., Montgomery & Andrews, P.A., Final Report - Lea County Regional Water Plan (Dec. 7, 2000)) [hereinafter Water Plan].

4.59 The projected daily water requirements for the NEF are quite small when viewed in relation to the current capacities of the Hobbs and Eunice municipal water supply systems. The Hobbs system has a current capacity of 20 million gallons per day, and the Eunice system a capacity of 4.32 million gallons per day. See ER 3.3, 3.4, 4.4 at 4.4-6. The projected usages during normal operations thus total approximately 0.3 percent of the daily capacity of the Hobbs system and approximately 1.5 percent of the Eunice system daily capacity. See Tr. at 1197. This estimated daily usage rate is, by one estimate, approximately the same amount of water needed to irrigate 25 acres of farmland. See Tr. at 1198; LES Exh. 24 (Lea County Water Users Association, Press Release Regarding NEF Water Usage Requirements (Sept. 29, 2003)). By means of comparison, while the NEF is projected to require 71.1 acre-feet of water per year, the Eunice golf course, the Hobbs Country Club, and the New Mexico Game Commission each use, respectively, 210 acre-feet per year, 283 acre-feet per year, and 170 acre-feet per year. See Tr. at 1198.

3. Relative Impact of NEF Water Usage on Lea County Water Supply

4.60 In the State of New Mexico, all water is public water. In the case of declared administrative water basins such as the Lea County Underground Water Basin, however, no water may be used without

a "water right." See Tr. at 1203. Water rights are granted by permits issued by the New Mexico Office of the State Engineer and are provided only for "beneficial uses," including industrial uses. See Tr. at 1203. The City of Hobbs holds in excess of 20,000 acre-feet per year of permitted water rights, of which it currently uses less than 9000 acre-feet per year, and the City of Eunice holds approximately 3300 acre-feet per year, of which it currently uses about fifty percent. See Tr. at 1202. Given that the NEF is projected to require only approximately 71.1 acre-feet of water per year, and both the Hobbs and Eunice systems have more than enough permitted water rights available to meet that requirement, the anticipated NEF water supply is, from a regulatory standpoint, already being "used" by the cities of Hobbs and Eunice. See Tr. at 1204. Therefore, under the current usage rates in Hobbs and Eunice, the amount of water rights permitted to each city, and the projected usage at the NEF, the NEF will not place any significant additional strain on the region's water supplies.

4.61 NIRS/PC pointed out that the Lea County Regional Water Plan indicates that groundwater in the Lea County Underground Water Basin is being pumped at a rate faster than it is being recharged, i.e., the basin is a "mined" basin. See Tr. at 1354; Water Plan at 5-4. NIRS/PC expert Mr. Rice stated that neither the staff nor LES had determined how pumpage for the proposed NEF would affect the long-term productivity of the Hobbs well field or the Lea County Underground Water Basin, see Tr. at 1355, and suggested that the long term effects

of NEF water use "could be estimated by simulating pumpage from the Hobbs well field both with and without the additional pumpage required for the proposed NEF," id.

4.62 LES witnesses concluded that no such analysis is necessary because of the extremely small portion of the Hobbs water rights and usage that would be consumed by the NEF. See Tr. at 1236. Mr. Woomer, the Director of Utilities for the City of Hobbs, testified that the annual actual use of water within the City of Hobbs varies from year-to-year by hundreds of acre-feet, and that the small incremental use by the NEF (approximately 71.1 acre-feet) is within that normal variation. See Tr. at 1282. Mr. Stokes added that such a de minimis number would not justify running a computational simulation. See Tr. at 1295.

4.63 Mr. Toblin, on the other hand, testified for the staff that he had obtained a copy of the computer model of the Lea County Underground Water Basin from the New Mexico Office of the State Engineer to run a simulation similar to that suggested by Mr. Rice. See Tr. at 1315-16; Staff Exh. 21 (G. Musharrafieh and M. Chudnoff, New Mexico Office of the State Engineer, Hydrology Bureau Report 99-1, Numerical Simulation of Groundwater Flow for Water Rights Administration in the Lea County Underground Water Basin New Mexico (Jan. 1999)). Specifically, Mr. Toblin applied all model assumptions and parameters used by the State (based on historical water levels within the basin from 1948 to 1996), including hydraulic conductivity, evapotranspiration, and recharge rate, and used the model to compute

the effect on continued withdrawals on water levels in the Lea County Underground Water Basin to the year 2040. See Tr. at 1315-16. He first checked his input and the code by running it with the State's input and reproduced the 1996 and 2040 results for drawdown and saturated water depth given in the State's report. See id. He then modeled the additional water withdrawal from a node representing the Hobbs well field attributed to usage by the proposed NEF for 2010 and 2040, and found that thirty years of water withdrawn for NEF usage would result in 1.2 feet of additional drawdown locally at the Hobbs well field. See Tr. at 1316. According to Mr. Toblin's testimony, these computations indicate that the remaining saturated thickness at Hobbs in the year 2040 would be reduced from approximately 38.2 feet without NEF usage to approximately 37 feet with NEF usage, and that the effect would decrease materially with distance from the withdrawal point, so that at approximately two miles away from that point, the differential would be only approximately 0.1 feet. See id.

4.64 In his oral rebuttal testimony, NIRS/PC witness Rice argued that he could not evaluate the accuracy of these computations because, although he had access to the model, he did not have access to backup data accompanying Mr. Toblin's computations nor his input/output files. See Tr. at 1374-75. Without giving any weight to the foregoing computations, we find the evidence before us clearly establishes that the effects of the additional NEF-related water withdrawal are de minimis when compared with any relevant water resource, rights, or usage. Because the Board reaches this conclusion

without regard to the staff's computations, we need not address the merits of the challenge to this testimony posed by the oral rebuttal testimony of NIRS/PC witness Rice or the additional argument put forth by the staff, i.e., that because the alleged omission was cured and NIRS/PC made no proper formal effort to amend their contention, this particular challenge is moot.

4.65 Sections 4.2.6.3, 4.3.6, and 4.4.3 of the DEIS set forth the staff's full evaluation of potential impacts of construction, operation, and decommissioning of the proposed NEF on water supplies in Lea County. See Tr. at 1314; NEF DEIS at 4-14 to 4-15, 4-62, 4-66.

Mr. Toblin testified that the staff finds such impacts to be small. See Tr. at 1314. In this regard, he testified that NEF average water use would amount to only 0.26 percent of the combined capacity of the Hobbs and Eunice municipal water systems and that the total projected NEF water use over the life of the facility would consume only 0.004 percent of the Ogallala Aquifer's reserves within the State of New Mexico. See Tr. at 1315.

4.66 Based upon the foregoing, and the testimony and evidence in the record before the Board, we find that there is no credible qualitative or quantitative evidence to support this NIRS/PC contention in that (1) the ER contains an adequate assessment of the potential environmental impacts of the proposed project upon water supplies in the area of the project; and (2) the staff has adequately shown in the DEIS how this pumpage would affect water levels and the

long-term productivity of the Hobbs well field or the Lea County Underground Water Basin.⁸

C. Findings Regarding Contention NIRS/PC EC-4

4.67 As admitted by the Licensing Board in its July 19 memorandum and order, see LBP-04-14, 60 NRC at 67-68, and modified by its November 22 ruling on late-filed contentions, see November Late-Filing Ruling at 14-15, contention NIRS/PC EC-4 reads:

NIRS/PC EC-4 - IMPACTS OF WASTE STORAGE

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

⁸ Although NIRS/PC assert that additional impact analysis is required by the "uninterruptable" nature of LES's water supply needs that potentially will require water use curtailment by other users, see NIRS/PC Reply Findings at 20, we find this unpersuasive as a basis for declaring the DEIS inadequate given (1) that LES has no priority user status with either the City of Hobbs or the City of Eunice, see Tr. at 1303-05; and (2) the de minimis nature of the LES water usage, particularly when compared to what are other much larger, but apparently deferrable, water usages in the local area, see Tr. at 1284.

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

4.68 Each of the parties presented witnesses with regard to contention NIRS/PC EC-4, each of whom submitted written direct and rebuttal testimony for the record and gave oral testimony at the evidentiary hearing. See Tr. at 873-1168. For its part, LES presented two witnesses in support of the NEF application relative to this contention, Rod M. Krich, Vice President of Licensing, Safety and Nuclear Engineering for LES and Vice President, Licensing Projects for Exelon Nuclear, see Tr. at 885, and Paul Schneider, a technical management consultant working for SMG, Inc., a consulting services company, and retained as an expert consultant by LES, see Tr. at 907-08.

4.69 Mr. Krich's background and professional qualifications are described above in connection with his testimony on NIRS/PC EC-2. See supra p. 45. Mr. Schneider received a Bachelor of Science in Physics and Mathematics from Wake Forest University, a Master of Science degree 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 depleted uranium hexafluoride to uranium oxide and a fluoride byproduct. See Tr. at 908. LES retained

Mr. Schneider as an expert consultant to assist in evaluating issues associated with the environmental impacts of deconverting DUF_6 to U_3O_8 . See Tr. at 907-08. Based on the foregoing, the prior discussion of Mr. Krich's background and qualifications, and the subject matter of this contention, the Board finds that Mr. Krich and Mr. Schneider are each qualified to testify as an expert witness on the subject of the impacts of waste storage at the NEF site.

4.70 The staff presented one witness, Dr. Donald E. Palmrose, Senior Nuclear Safety Engineer with Advanced Technologies and Laboratories International, Inc., (ATL) a technical contractor for the NRC. See Tr. at 996. Dr. Palmrose received a Bachelor of Science in Nuclear Engineering from Oregon State University, and a Master of Science and Ph.D. in Nuclear Engineering from Texas A&M University. See Tr. at 1008. In his position at ATL, Dr. Palmrose managed a team of engineers, consultants, and support personnel in the development of the NEF DEIS, particularly with regard to those sections concerning public and occupational health impacts, and waste management impacts including disposition of depleted uranium. See Tr. at 996-97. Based on the foregoing, the Board finds that Dr. Palmrose is qualified to testify as an expert witness on the subject of the impacts of waste storage at the NEF site.

4.71 Finally, NIRS/PC presented one witness, Dr. Arjun Makhijani, President of the Institute for Energy and Environmental Research, an organization which assesses environmental damage from nuclear fuel facility operations and estimates those facilities' compliance with

environmental regulations. See Tr. at 1064. Dr. Makhijani received a Bachelor of Engineering Degree from the University of Bombay in Bombay, India, a Master of Science in Electrical Engineering from Washington State University, and a Ph.D. in Electrical Engineering from the University of California, Berkeley. See Tr. at 1080. He has authored or co-authored many studies, articles, and books on nuclear-related issues, including nuclear fuel cycle-related issues and nuclear waste. See Tr. at 1065. In preparation for his testimony, Dr. Makhijani reviewed relevant portions of the NEF application and the DEIS, as well as several supporting documents. See Tr. at 1066-68. Based on the foregoing, the Board finds that Dr. Makhijani is qualified to testify as an expert witness on the subject of the impacts of waste storage at the NEF site.

4.72 The NEF's proposed gas centrifuge enrichment process will produce as a byproduct DUF_6 , which LES will need to dispose of prior to decommissioning the NEF. See NEF DEIS at 2-27. Prior to decommissioning, the NEF will convert the DUF_6 to a more stable form suitable for disposal. See id. at 2-27 to 2-28. This conversion, commonly referred to as "deconversion," will be performed at a separate facility through an as-yet-unselected chemical process by which the DUF_6 will be treated to produce aqueous hydrofluoric acid (HF). See Tr. at 1001. One such chemical deconversion method involves using lime to neutralize the HF to produce calcium fluoride (CaF_2) for disposal or sale; another converts the DUF_6 to anhydrous HF through a process involving distillation. See id.

4.73 Because deconversion is necessary and foreseeable, the environmental impacts of such a process must be considered as part of the staff's NEPA review. At the time LES submitted its application to the NRC and, indeed, even at the time prefiled testimony was prepared for submission in this proceeding, LES left open the question of whether it would convert the DUF_6 to CaF_2 or distill it to create anhydrous HF. See Tr. at 912-13. At the evidentiary hearing on this contention, however, LES represented and committed to amend the NEF license application to reflect that anhydrous HF will not be employed at a deconversion facility selected for deconversion of DUF_6 generated at the proposed NEF. See Tr. at 932-34. Specifically, Mr. Krich stated under oath during the hearing that LES (1) was "willing to put into the license application [LES's] commitment not to use the anhydrous hydrofluoric acid option"; (2) would put terms into any contract with a deconversion vendor that would give LES an enforceable right to ensure that the anhydrous HF process was not used; and (3) accepted that this commitment would form the basis of a condition on the license. See Tr. at 933-34. In fact, LES has since submitted a license amendment to that effect, a submission of which we take judicial notice. See NEF SAR at 10.3-2 (ADAMS Access No. ML050750070).

4.74 As reflected in Dr. Makhijani's testimony, the focus of contention NIRS/PC EC-4 was upon the adequacy of the ER and DEIS analyses of deconversion of DUF_6 utilizing a process that will produce anhydrous HF, including lack of analysis of anhydrous HF generation

process; lack of analysis of any process other than deconversion of DUF_6 to U_3O_8 ; assumed use of a deconversion process that generates CaF_2 as a byproduct; lack of analysis of off-normal or accident conditions; and lack of analysis of transportation impacts. See, e.g., Tr. at 1068-79, 1101-06. Also raised by NIRS/PC were related questions regarding (1) ER and DEIS incorporation of the DOE PEIS regarding DUF_6 deconversion and disposal and the FEISs for DOE DUF_6 conversion facilities currently being constructed at Paducah, Kentucky, and Portsmouth, Ohio; and (2) reliance on the Claiborne Enrichment Center FEIS. See, e.g., Tr. at 958-72. Although, as is noted above, LES has since amended its license application to reflect that anhydrous HF will not be employed at any facility selected for deconversion of DUF_6 generated at the NEF, raising the possibility it is no longer reasonably foreseeable that anhydrous HF will need to be managed when the DUF_6 produced by the proposed NEF is converted, the Board nonetheless has considered that option as it assessed the adequacy of the NEPA analysis in connection with this contention.

1. Staff Reliance on DOE Environmental Impact Statements

4.75 The staff is required to perform its own independent NEPA analysis and, as noted above, see supra paragraphs 3.6 to 3.7, although it may glean information from the ER, the ultimate responsibility for NEPA compliance rests with the staff. Section 2.1.9 of the NEF DEIS discusses environmental impacts associated with the various alternative processes for deconversion of DUF_6 to U_3O_8 and subsequent disposal of that waste. See NEF DEIS at 2-27 to 2-33. Specifically, the DEIS considers deconversion at a yet-to-be-constructed private sector facility, see id. at 2-29 to 2-30, or possible transport of the DUF_6 to either of two DOE facilities currently being constructed at Paducah, Kentucky, and Portsmouth, Ohio, for deconversion and disposal. See id. at 2-31 to 2-33. DEIS chapter 4 presents the staff's evaluation of potential environmental impacts associated with the construction, operation, and decommissioning of the proposed NEF, and section 4.2.14.3 specifically addresses environmental impacts of DUF_6 waste management. See id. at 4-52 to 4-59. This analysis covers a range of storage possibilities, from temporary onsite storage at the proposed NEF to use of the private or DOE options for deconversion. See id. at 4-53 to 4-56.

4.76 Following these analyses, the staff concluded in the DEIS that (1) the potential environmental impacts of the DUF_6 waste management option utilizing temporary onsite storage at the proposed NEF would be small to moderate, see id. at 4-53; (2) the potential environmental impacts of use of a private deconversion facility would

be small, see id. at 4-54; (3) the impacts from use of a private deconversion facility adjacent to the NEF would be small, see id. at 4-55; and (4) additional environmental impacts from converting the DUF₆ at offsite DOE facilities, such as Paducah or Portsmouth, would be small, see id. at 4-57.

4.77 Dr. Palmrose testified for the staff that his review in the DEIS of the impacts of deconversion relied in large part on examination of three environmental impact statements prepared by DOE that related to the DUF₆ deconversion facilities at Paducah and Portsmouth: the Paducah FEIS, the Portsmouth FEIS, and a Programmatic Environmental Impact Statement (PEIS) prepared by DOE in developing a strategy for managing DUF₆. See Tr. at 1000; see also LES Exh. 17 (Final Environmental Impact Statement for the Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky Site, DOE/EIS-0359, Oak Ridge Operations, DOE Office of Environmental Management (June 2004)) [hereinafter Paducah FEIS]; LES Exh. 16 (Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site, DOE/EIS-0360, Oak Ridge Operations, DOE Office of Environmental Management (June 2004)) [hereinafter Portsmouth FEIS]; LES Exh. 18 (Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride, DOE/EIS-0269, DOE Office of Nuclear Energy, Science and Technology (April 1999)) [hereinafter PEIS].

4.78 Specifically, Dr. Palmrose reviewed the impacts presented in the DOE documents and, based on his past experience and his review of the assumptions and the information available in those documents, see Tr. at 1027-28, concluded that DOE had provided a reasonable assessment of the impacts of deconversion of DUF_6 to U_3O_8 , see Tr. at 1044. In addition, in the hearing notice for this proceeding, the Commission indicated that, relative to the environmental impacts associated with the management of DUF_6 , it was appropriate for the staff to consider DOE EIS analysis. See CLI-04-3, 59 NRC at 22. Based on the foregoing, the Board finds that the staff appropriately relied upon and incorporated portions of the analyses from the DOE EIS documents into the NEF DEIS.

2. Adequacy of DOE EISs Regarding Deconversion Facility Impacts

4.79 As an initial matter, Dr. Palmrose testified for the staff that, with regard to the PEIS, the potential environmental impacts of three deconversion options examined in that document were not site-specific because the location of a DOE deconversion facility would not be determined until some later date after DOE had decided whether to construct a deconversion facility. See Tr. at 1000-01. He noted, however, that both the site-specific Paducah and Portsmouth FEISs prepared by DOE incorporate by reference the PEIS. See Tr. at 1004; see also Tr. at 991, Portsmouth FEIS at S-13; Paducah FEIS at S-13.

4.80 Dr. Palmrose further testified that in Appendix F to the PEIS, DOE evaluated the environmental impacts of three options:

deconversion to U_3O_8 , deconversion to UO_2 , and deconversion to metal. See Tr. at 1000; PEIS at F-2. Moreover, with regard to the first option, Dr. Palmrose noted that DOE considered the effects of the processes for managing the concentrated aqueous HF produced by that deconversion method, i.e., neutralization with lime to produce CaF_2 and distillation to produce anhydrous HF, the second of which is the process of concern to NIRS/PC. See Tr. at 1001; PEIS at F-11 to F-12.

Dr. Palmrose noted that DOE, while concluding that for most PEIS-analyzed environmental areas environmental impacts would be the same no matter which of these options was selected for treatment of the aqueous HF, focused on significant impacts of the deconversion processes, which did not always involve the use of anhydrous HF. See Tr. at 1002.

4.81 Dr. Palmrose testified that the PEIS examined a broad range of environmental impacts regarding the construction and operation of a deconversion facility, which, in the Board's view, likewise are relevant to an evaluation of the environmental impacts of the proposed NEF facility. Specifically, DOE discussed in the PEIS effects on human health during normal operations and from accidents, impacts on air quality, water and soil, socioeconomic impacts, ecological impacts, waste management, resource requirements, land use, and transportation. See id. Dr. Palmrose further testified that DOE found that deconversion to U_3O_8 would result in an average radiation exposure of about 300 millirem (mrem) per year to involved workers, and less than 0.01 mrem per year for noninvolved workers and members

of the public based on normal operations. See id. The PEIS concluded that (1) because of the similarity of the processes, the airborne emission rates of uranium compounds and the material handling activities would be expected to vary only slightly among these processes, resulting in similar radiological impacts; (2) total transportation risks associated with DUF_6 deconversion would be low for all three deconversion processes and associated management of HF; and (3) no adverse chemical health effects would be expected during normal operations. See Tr. at 1002-03; see also PEIS at F-16, F-21, J-27.

4.82 Dr. Palmrose testified that the PEIS also "examined a range of accidents from high-frequency/low-consequence to low-frequency/high-consequence accidents and noted the results for radiological and chemical health impacts for the highest-consequence accident in each frequency category." Tr. at 1002; see also PEIS at F-23 to F-37. In so doing, DOE concluded that the maximum risk values would be less than one person injured for all accidents studied, except impact to workers from corroded cylinder spills (wet or dry conditions) and ammonia stripper overpressure. See Tr. at 1002; PEIS at F-36. According to Dr. Palmrose's testimony, the PEIS found that impacts due to chemical overexposure from HF-related rail transportation accidents could result in an overall risk to the public (defined as the product of the accident consequence and the probability over the duration of the program) of one permanent physical injury or fatality. See Tr. at 1003; PEIS at J-28. In addition, while a postulated accident involving anhydrous HF could

have releases, the PEIS concluded that rapid mitigation and the small volume of release contaminants would result in negligible impacts.

See Tr. at 1003; see also PEIS at F-47, F-50, F-52.

4.83 Dr. Palmrose then testified that other potential impacts considered by the PEIS included impacts on cultural resources, environmental justice, visual impacts, recreational resources, noise levels, and impacts of decontamination and decommissioning. See Tr. at 1003-04. Dr. Palmrose noted, however, that these impacts were not analyzed in detail in the PEIS because they require consideration of specific sites, which the PEIS did not explore. See id.; see also PEIS at F-72. Finally, Dr. Palmrose testified DOE concluded in the PEIS that there were lower potential impacts from physical hazards from deconversion to U_3O_8 as compared to other deconversion options (e.g., to UO_2), and that there are essentially no differences between HF management options. See Tr. at 1002-03; PEIS at F-37.

4.84 Dr. Palmrose further testified that although the PEIS explored the impacts of the anhydrous HF deconversion process, the FEISs prepared for the Paducah and Portsmouth facilities did not specifically discuss that option because DOE selected conversion to CaF_2 as the process for those facilities. See Tr. at 1004. With regard to the NRC's reliance on the DOE FEISs in developing the NEF DEIS, however, Dr. Palmrose testified he believed the impacts for private deconversion of DUF_6 to U_3O_8 would be bounded by (i.e., similar to or less than) those for the Paducah and Portsmouth facilities, and therefore used the values from the DOE analyses in reaching his

conclusions regarding the anticipated environmental impacts from a private facility in section 4.2.14.3 of the DEIS. See Tr. at 1005, 1042.

4.85 Also with regard to the anhydrous technology, Dr. Palmrose testified that besides the fact no current deconversion facility uses the anhydrous technology, (1) there is no current plan to construct such a facility; (2) the process used to distill HF to an anhydrous form has not been fully developed and any assessment of the impacts resulting from distillation would have a high degree of uncertainty; and (3) any analysis would have to be derived from the evaluation of similar technologies. See Tr. at 1006. Furthermore, from the perspective of trying to develop a reasonable study of alternatives, Dr. Palmrose pointed out that specific analyses of the impacts from the neutralization process are contained in the Paducah, Kentucky and Portsmouth, Ohio FEISs in which DOE presented analyses relying on data from similar technologies and presented a range of impacts designed to provide a reasonable estimate of their magnitude, taking into account the uncertainty relative to the specific technology and site. See id.; PEIS at F-4. Given these uncertainties and based on current knowledge, Dr. Palmrose thus concluded the analysis performed by DOE in the PEIS that he reviewed in preparing the DEIS presented a thorough critique of impacts of a deconversion facility that would be using an as-yet-to-be-commercially-established distillation process to produce anhydrous HF, and that any more specific analysis would require knowledge of the particular processes that would be used to

perform the distillation process and the specific site at which the facility would be constructed. See Tr. at 1006-07. While acknowledging he would not be able to address the impacts of an anhydrous HF deconversion process with the same degree of specificity used in the DEIS regarding the CaF₂ deconversion process, given the uncertainty that exists relative to the anhydrous HF deconversion process because it is not a fully developed technology, he considered the PEIS analysis that relied on data from similar technologies to be a thorough, adequate assessment of the impacts of that process. See Tr. at 1005-07.

4.86 During his testimony on behalf of LES, while noting that if during his review of these DOE analyses on behalf of LES he found conclusions that appeared to be out of line he would inquire of the author or conduct his own analysis, see Tr. at 971, Mr. Krich further declared that he generally agreed with the staff conclusions regarding the adequacy of, and the propriety of relying on, the DOE EISs. Specifically, he declared that (1) the PEIS and the two site-specific EISs for Paducah and Portsmouth contain a comprehensive evaluation of the environmental impacts of construction, operation, and decommissioning of those facilities; (2) these EISs appropriately address and bound the environmental effects that might be associated with construction, operation, and decommissioning of a private sector deconversion facility as NEF contemplates such an option, particularly as the environmental evaluation made in the PEIS was for a facility with four times the capacity needed for processing NEF DUF₆; (3) DOE's

PEIS comprehensively evaluated all relevant environmental impacts that might be associated with constructing, operating, and decommissioning a deconversion facility; and (4) DOE's PEIS had a comprehensive evaluation of the environmental effects of transportation of the DUF_6 cylinders and the deconversion product U_3O_8 , as well as the chemicals associated with the processes involved. See Tr. at 893-97. Mr. Krich further noted that if a private deconversion facility were to be located in the vicinity of the NEF, the population density in the area would be less than one-fifth of that considered in the DOE PEIS, which DOE had determined to be representative of potential sites for a deconversion facility. See Tr. at 895.

3. Other Items Regarding Anhydrous HF Deconversion Process

4.87 Dr. Makhijani also testified for NIRS/PC regarding his concern that HF filter technology used in the deconversion process may not be as efficient as assumed in the DOE PEIS and FEISs and, therefore, the impacts of lower filter efficiency should be considered. See Tr. at 1077. Upon cross-examination, however, Dr. Makhijani acknowledged he had no current information and was not expert in that topic area. See Tr. at 1156-57. By contrast, Mr. Schneider testified for LES that (1) the study to which Dr. Makhijani referred in his testimony regarding filter technology has no applicability to the HF filter system that would be utilized by a deconversion facility; (2) the plant of concern to NIRS/PC was constructed more than fifty years ago; and (3) filter technology had materially improved in the intervening years. See Tr. at 915-17.

4.88 Finally, Dr. Makhijani raised questions about the DEIS consideration of transportation matters, including transportation routes; the chemicals being shipped on those routes, in particular anhydrous ammonia; and possible transportation accidents, including the July 2001 train fire in Baltimore, Maryland, and the January 2005 Graniteville, South Carolina rail accident involving a chlorine gas release. See Tr. at 1105-06, 1135-37. Yet, as Dr. Makhijani acknowledged, the transportation route issue, which was originally framed in terms of transportation distances, was one DOE had already considered. See Tr. at 1136-37. Further, with regard to chemical shipments, while the PEIS contains a discussion of ammonia transportation, as Dr. Makhijani also acknowledged, see Tr. at 1158-59; see also PEIS at J-10 to J-12, the site-specific DOE EISs consider the issue of transporting anhydrous ammonia and, in fact, analyze a larger number of shipments than the PEIS, compare, e.g., Paducah FEIS at 2-33, 5-71 with PEIS at 5-47. And with regard to transportation accidents, in addition to the PEIS analysis of normal operations and accident conditions, see Tr. at 898, the PEIS did analyze a severe accident regarding a railcar release of anhydrous HF in an urban area, see PEIS at 5-49 (in addition to 300 fatalities, 30,000 persons might experience irreversible adverse effects).

4. Board Findings

4.89 As we noted in paragraph 4.73, although LES has now firmly committed not to use the anhydrous process, the Board nonetheless has considered that option for the purpose of determining the adequacy of

the NEPA analysis in connection with this contention. Indeed, Dr. Makhijani's principal focus with regard to this contention was his criticism that neither the ER nor the DEIS addresses the environmental impacts of the deconversion processes, and in particular that involving anhydrous HF. See, e.g., Tr. at 1071-76, 1101-04. In contrast, Mr. Krich testified for LES that DOE thoroughly investigated those processes in its PEIS, incorporated by reference into the Paducah and Portsmouth FEISs and subsequently into the ER and DEIS,⁹ see Tr. at 896-97, 912, and Dr. Palmrose agreed with that assessment, see Tr. at 1006-07.

4.90 In this regard, Dr. Palmrose noted that the PEIS contains an analysis of the deconversion options of U₃O₈ deconversion, deconversion to UO₂, and deconversion to metal. See Tr. at 1000; PEIS at F-2. Moreover, although he noted that the specific analysis of

⁹ Also relative to the NIRS/PC assertion that the initial license application for the NEF does not address the impacts of a deconversion facility, NIRS/PC did acknowledge that Revision 2 of the application does reference environmental impact evaluations of a proposed DUF₆ deconversion facility conducted by the NRC in the Claiborne Enrichment Center (CEC) FEIS, and DOE's evaluations contained in the Paducah, Kentucky and Portsmouth, Ohio deconversion facility EISs. See Tr. at 1068. This purported omission was cured by the amendment referencing the NRC's CEC FEIS and the two DOE EISs which, in turn, incorporate by reference the PEIS.

U₃O₈ deconversion impacts in the Paducah and Portsmouth FEISs contains only an analysis of the CaF₂ neutralization process, with no current deconversion facility using the anhydrous HF distillation technology and no current plan to construct such a facility, he believes that any assessment of the impacts resulting from the distillation process would have a high degree of uncertainty and would have to be derived from the evaluation of similar technologies. See Tr. at 1006. Dr. Palmrose also pointed out that just this type of analysis was done by DOE in the PEIS, presenting a range of impacts designed to provide a reasonable estimate of their magnitude, taking into account the uncertainty relative to the specific technology and site. See Tr. at 1006; PEIS at F-4. Given these uncertainties, and based on current knowledge, Dr. Palmrose concluded that the analysis performed by DOE in the PEIS presented a thorough analysis of impacts of a deconversion facility using an as-yet-to-be-commercially-established distillation process to produce anhydrous HF. See Tr. at 1006-07.

4.91 Based upon the testimony and other evidence in the record before it, the Board finds the staff has adequately considered and presented in the DEIS the environmental impacts reasonably associated with construction and lifetime operation of a U₃O₈ conversion plant for the DUF₆ waste required in conjunction with the proposed enrichment plant. In addition, notwithstanding LES's commitment to not use an anhydrous HF process (which the Board assumes will be a condition of any license that might eventually be issued in this proceeding¹⁰),

¹⁰ In light of the clear record before us of LES's unequivocal,

based on the testimony of Dr. Palmrose as it supplemented the staff DEIS, the Board finds sufficient information exists to demonstrate there has been adequate consideration of the impacts of the management of anhydrous HF. Further, in the absence of technical support for his concern, the Board finds no merit to Dr. Makhijani's claims regarding filter technology. Nor does the Board find that the evidentiary record provides a basis for the NIRS/PC concerns about the adequacy of the DEIS transportation analysis given the bounding analyses of accidents and ammonia transportation in the DOE PEIS and/or site-specific FEISs. Moreover, as was noted on the record, the licensing process for any private sector deconversion facility would require the cognizant regulatory entity to conduct an appropriate evaluation of site-specific impacts, presumably including an analysis of potential transportation routes, see Tr. at 894.

4.92 Accordingly, the Board concludes that relative to the matters raised by NIRS/PC in connection with its contention EC-4, the staff's analysis, as supplemented by the testimony and evidence submitted in this proceeding, meets the requirements of NEPA in that it adequately discusses the environmental impacts of construction and lifetime operation of a conversion plant for the DUF₆ waste that is required in conjunction with the proposed enrichment plant.

sworn commitment to a non-anhydrous HF process, the Board believes it is unnecessary to direct the imposition of a license condition to that effect, leaving it to the staff to ensure that this LES obligation is appropriately incorporated into any licensing document that might be issued to LES if it ultimately is successful in this proceeding.

D. Findings Regarding Contention NIRS/PC EC-7

4.93 As admitted by the Licensing Board in its July 19 memorandum and order, see LBP-04-14, 60 NRC at 69-70, contention NIRS/PC EC-7 reads:

NIRS/PC EC-7 - NEED FOR THE FACILITY

CONTENTION: Petitioners contend that the Environmental Report (ER) does not adequately describe or weigh the environmental, social, and economic impacts and costs of operating the National Enrichment Facility (See ER 1.1.1 et seq.) in that:

- (A) Louisiana Energy Services, L.P.'s (LES) presentation erroneously assumes that there is a shortage of enrichment capacity.
- (B) LES's statements of "need" for the LES plant (ER 1.1) depend primarily upon global projections of need rather than projections of need for enrichment services in the U.S.
- (C) LES has referred to supply and demand in the uranium enrichment market (ER 1.1), but it has not shown how LES would effectively enter this market in the face of existing and anticipated competitors and contribute some public benefit.

4.94 Thus, at issue in connection with this contention are three distinct, narrow questions: (1) does the ER incorrectly assume a "shortage of enrichment capacity"; (2) does the LES projected need for enrichment services "depend primarily upon global projections . . . rather than [domestic] projections"; and (3) has LES demonstrated how it will effectively enter the enrichment services market.

4.95 In addressing these matters, LES, the staff, and intervenors NIRS/PC presented witnesses, each of whom submitted written direct and rebuttal testimony for the record and gave oral testimony at the evidentiary hearing. See Tr. at 1381-692. Applicant LES presented three witnesses with regard to this contention: (1) Kirk S. Schnoebelen, Marketing Manager for Urenco, Inc., see Tr. at 1389; (2) Michael H. Schwartz, Chairman of the Board of Energy Resources International, Inc., (ERI) a Washington, D.C. consulting firm, see Tr. at 1431; and (3) Rod M. Krich, Vice President of Licensing, Safety and Nuclear Engineering for LES and Vice President, Licensing Projects for Exelon Nuclear, see Tr. at 1433-34

4.96 Mr. Schnoebelen holds a Bachelor of Science degree and Master of Science degree in Nuclear Engineering from the University of Wisconsin, Madison, and a Master of Business Administration degree from the University of Minnesota. See Tr. at 1389. He has more than twenty years of experience in the nuclear industry, including as a nuclear engineer and as a purchaser and seller of enrichment services. See Tr. at 1389-90. In his position with Urenco, Inc., Mr. Schnoebelen is responsible for the marketing and sale of uranium enrichment services to United States utilities for both Urenco Enrichment Company and LES. See Tr. at 1389. Based on the foregoing, the Board finds that Mr. Schnoebelen is qualified to testify as an expert witness on the subject of the need for the NEF.

4.97 Mr. Schwartz received both a Bachelor of Science in Engineering, Nuclear Engineering and a Master of Science in

Engineering, Nuclear Engineering from the University of Michigan, is a registered Professional Engineer in the District of Columbia and California, and has been a consultant on nuclear fuel cycle issues for more than twenty-five years. See Tr. at 1432-33. As Chairman of the Board at ERI, a firm that provides energy and resource consulting services to electric utilities, private industry, institutions and associations, and government agencies, Mr. Schwartz oversees all consulting services, including those related to nuclear fuel supply and management, uranium enrichment and conversion, and spent fuel storage. See Tr. at 1431-32. He also has involvement in activities associated with analysis of the domestic and global markets for uranium enrichment services. See Tr. at 1432. Pursuant to a technical assistance contract with LES, Mr. Schwartz oversaw ERI's preparation of a market analysis of uranium enrichment supply and requirements. See Tr. at 1433. Based on the foregoing, the Board finds that Mr. Schwartz is qualified to testify as an expert witness on the subject of the need for the NEF.

4.98 Mr. Krich's background and qualifications are discussed at length with regard to contention EC-2, see supra p. 45. Based on that discussion and the subject matter at hand here, the Board finds that Mr. Krich is qualified to testify as an expert witness on the subject of the need for the NEF.

4.99 The NRC staff presented one witness, Rick Nevin, Vice President with IFC Consulting. See Tr. at 1541-42. Mr. Nevin has a Bachelor of Arts in Economics and Mathematics and a Master of Arts in

Economics, both from Boston University, and a Masters in Management with concentrations in Finance, Managerial Economics, and Strategy from Northwestern University. See Tr. at 1541. As a consultant at IFC, Mr. Nevin has provided financial, economic, and environmental risk analysis for several government agencies, including the NRC. See id. Neither Mr. Nevin nor IFC had any part in the preparation of the NEF DEIS, but Mr. Nevin reviewed the relevant portions of the ER, the NEF DEIS, sources cited in both documents, and additional information relating to the domestic and global market for uranium enrichment services in preparation for his testimony. See Tr. at 1542. Based on the foregoing, the Board finds that Mr. Nevin is qualified to testify as an expert witness on the subject of the need for the NEF.

4.100 Finally, NIRS/PC presented one witness in support of this contention, Michael F. Sheehan, a partner in the firm of Osterberg & Sheehan, Public Utility Economists. See Tr. at 1581. Dr. Sheehan holds a Bachelor of Science, a Master of Arts, and a Ph.D. in Economics from the University of California at Riverside, and a Juris Doctor degree from the University of Iowa College of Law. See id. He has taught courses in economics, environmental policy and planning, public utility policy and planning, and local energy planning, among others, at both the undergraduate and graduate level, and has more than twenty years of experience in environmental planning and regulation. See Tr. at 1581-82. Dr. Sheehan has also provided testimony on issues related to utility planning and regulation and energy management before numerous state agencies, and has submitted

testimony to the NRC on three prior occasions regarding issues including financial capability, cost benefit, and need. See Tr. at 1582-84. In preparation for his testimony with regard to contention EC-7, he reviewed the relevant portions of the NEF application, NEF DEIS, NRC rules, and other discovery materials. See Tr. at 1584-85. Based on the foregoing, the Board finds that Dr. Sheehan is qualified to testify as an expert witness on the subject of the need for the NEF.

4.101 The scope of this contention, and therefore the Board's analysis of the testimony and evidence, is in material part governed by what it does not cover. In considering the admission of this contention and proposed amendments to it, the Board has held that LES is not required under NEPA to present a business plan, to make its "business case," or to demonstrate the profitability of its proposed facility, nor is it under any obligation to provide detailed market analysis. See LBP-04-14, 60 NRC at 69-70; November Late-Filing Ruling at 17-18. Therefore, the Board's inquiry relative to this contention does not address any matters associated with the projected cost of supplying enrichment services, or the potential prices that might be paid for those services. Rather, the Board's inquiry focused upon the projected demand (based on current operating and anticipated new reactors) and the expected supply based upon the actual commitments or statements of the parties involved in supply production.¹¹

¹¹ Also in connection with the scope of contention NIRS/PC EC-7, we note that the staff proffered Mr. Nevin as its supporting witness regarding this issue statement, and we have found that by reason of

his training and experience he could be considered an expert relative to its subject matter. Nonetheless, given his admitted lack of involvement in reviewing the LES ER for the purpose of preparing the DEIS or, indeed, in any aspect of DEIS development, see Tr. at 1542, it is not apparent what, if any, relevant or otherwise useful insights the staff intended that the Board derive from his testimony.

1. Analysis of Uranium Enrichment Capacity

4.102 To determine whether there is a "shortage" of enrichment capacity requires an examination of the demand for and supply of such capacity. In analyzing the potential demand, LES made an extensive examination and analysis of both the world-wide expected installed nuclear capacity and the related demand for enrichment services. See LES Exh. 30, at 1.1-4 to 1.1-7 (LES, National Enrichment Facility Environmental Report §§ 1.1.1 to 1.1.3, Tbls. 1.1-1 to 1.1-8, Figs. 1.1-1 to 1.1-8 (2004)) [hereinafter ER Purpose and Need]. Dr. Sheehan testified on cross-examination that the analyses relied on by LES were "accepted in the community" and were "reasonable to be relied upon in this context," and he did not take issue with either of the two demand projections relied upon by LES in its ER. See Tr. at 1668-69. In addition, the analyses performed for LES by ERI forecast trends in United States nuclear generating capacity, see, e.g., Tr. at 1443-44, 1446-49, and the ER includes a forecast of United States uranium enrichment requirements, see ER Purpose and Need at Tbl. 1.1-3. As a consequence, the Board finds the projected demand side of the supply-demand analysis has been reasonably estimated relative to the matters at issue here.

4.103 In assessing supply, several key issues have been presented to the Board, including (1) will USEC, Inc., (USEC) shut down its gaseous diffusion uranium enrichment plant and, if so, when; (2) for how long will the High Enriched Uranium (HEU) Agreement between the United States and Russia continue to be a source of enriched

materials; and (3) what is the projected market demand for enrichment services from the NEF.

4.104 The only current domestic supplier of enrichment services in the United States is the USEC Gaseous Diffusion Plant (GDP) in Paducah, Kentucky, see Tr. at 1461, but USEC has announced plans to cease enrichment services production at its Paducah GDP when its proposed American Centrifuge Plant (ACP) becomes operational, see id.; see also ER Purpose and Need at Tbl. 1.1-5; LES Exh. 64 (USEC, Environmental Report for the American Centrifuge Plant in Piketon, Ohio (Aug. 2004)). In fact, USEC already has ceased operations at its other GDP in Portsmouth, Ohio. See NEF DEIS at 1-3.

4.105 In his testimony for NIRS/PC, Dr. Sheehan explained that USEC was once essentially a part of DOE, but was privatized in the late 1990s after passage of the USEC Privatization Act in 1996. See Tr. at 1586; see also 42 U.S.C. § 2297h et seq. He also noted that USEC, in its agreement with DOE pursuant to the Privatization Act, committed to "continue to operate the outdated Paducah plant until 2010 and develop, build, and bring on line a new state-of-the-art centrifuge plant by the time Paducah closes." See Tr. at 1586. Dr. Sheehan essentially argues, however, that when and if the Paducah GDP will shut down depends upon the economics of the marketplace and, therefore, one cannot properly assume that this domestic source of enrichment services will be eliminated without examining the economics of the market. See Tr. at 1646, 1649.

4.106 In this context, however, we do not believe either LES or the staff is required to disregard the public statements of USEC or assume those statements are erroneous. Rather, the Board finds that such statements are likely more reliable as a basis for assumptions about market supply than efforts to make projections in an otherwise extremely complex economic marketplace. In other words, it is reasonable, in making an effort to project market supply and demand, to rely upon the public statements of market participants, particularly those whose interests seemingly are not aligned with LES, regarding their corporate intent to build new facilities and/or shutter old ones.¹² The relevant inquiry under NEPA is not whether the assumptions made are perfect or unchallengeable, but whether they are reasonable. See Louisiana Energy Services (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331, 355 (1996), rev'd on other grounds, CLI-97-15, 46 NRC 294 (1997); see also Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant, Units 1, 2, 3, and 4), ALAB-490, 8 NRC 234, 237, 241 (1978). In assessing potential domestic sources of enrichment services, we find it is reasonable to assume that the Paducah GDP will cease operation in the time frame in which its owner says it will.

¹² In this regard, it is important to note that the Board is not simply relying upon market statements made by LES, but rather is assessing the reasonableness of statements and policies made by a variety of independent actors, including USEC (which seemingly has no reason to put forth statements in support of LES or its positions) and the United States Congress in the context of the HEU agreement.

4.107 Regarding the United States-Russia HEU agreement whereby the United States purchases previously highly enriched materials from Russia, there has been some disagreement about whether it is proper to assume a possible extension of the HEU agreement past its stated termination date of 2013. See, e.g., Tr. at 1664-66. From our perspective, any assumption about whether this agreement will be extended beyond its stated time period would be speculative and, by the same token, there is no sound basis for concluding that the HEU program will not continue into 2013 as the United States-Russia agreement provides. See NEF DEIS at 1-3.

4.108 Dr. Sheehan also asserted there is no economic need for both the NEF and the ACP, and that economic factors will determine whether the ACP will actually be constructed, particularly if the NEF is built. See Tr. at 1651-54. Nonetheless, aware of LES efforts to construct and operate the NEF, the public record reflects that USEC has submitted its application for a 10 C.F.R. Part 70 license for its planned ACP and there is no evidence before us to indicate any change in USEC corporate policy regarding building the ACP. See USEC, Inc. (American Centrifuge Plant), CLI-04-30, 60 NRC 426 (69 Fed. Reg. 61,411 (Oct. 18, 2004)). Based on the foregoing, as well as the evidence and testimony presented, the Board finds it is reasonable to conclude that USEC will proceed as it has publicly announced, and that any other finding would not to provide a sound basis for a market analysis.

4.109 Addressing the potential for a shortfall in enrichment capacity can therefore be reasonably projected based on the analytical assumptions that the ACP will be constructed within the time frame its owner projects, that the Paducah GDP will be shut down when the ACP comes on line, and that the United States-Russia HEU Agreement will terminate in 2013 in accordance with its terms. The LES "best estimate" case analysis assumes that both the NEF and the ACP will be built as scheduled, but also incorporates the conservative assumption that the HEU Agreement will be extended beyond its current expiration date, an assumption that actually causes it to underestimate the demand for enrichment services from other sources. See Tr. at 1664-66.

4.110 Based on the foregoing, in its ER LES indicates that its "best estimate" is that from 2011 to 2020 the available supply of and demand for uranium enrichment services will be roughly equal, including the conservative assumption (with respect to forecasts after 2013) that the HEU Agreement will not expire in 2013 in accordance with its terms. See Tr. at 1546; ER Purpose and Need at 1.1-14 to 1.1-15, Tbls. 1.1-3, 1.1-5. The ER also presents seven other possible supply projections incorporating different assumptions about the enrichment services supply sources. See ER Purpose and Need at 1.1-15 to 1.1-17. Those other scenarios all assume that the NEF will not be constructed and each projects that some other source will be necessary to fill the supply gap. See id. at 1.1-23 to 1.1-24. This view is supported by studies performed for LES by ERI, which concluded that

forecast demand for enrichment capacity, both globally and in the U.S., exceeds supply if the NEF is not included, particularly after 2010, shortly before peak production at the NEF would begin. See Tr. at 1440-64. The study further concludes that a shortfall is projected if it is assumed that the NEF and the ACP both begin operations, even with the additional assumption that the United States-Russia agreement is extended.¹³ See Tr. at 1664-65.

4.111 Given the Board's determination that in this context the soundest approach to making projections is to rely upon what facility owners state is their corporate intent regarding a facility's future, we also find reasonable the LES projection that there will be a shortage of enrichment capacity on the supply side of the supply-demand analysis.

2. Analysis of Domestic/International Need for Enrichment Services

4.112 In addition to the foregoing LES "supply" analysis, both LES and the staff declare that the dominant need for the NEF is to address a domestic national security issue, i.e., to ensure a diverse domestic supply of uranium enrichment services. In addition, all parties addressed the "need" (which we take to mean, in this context, the

¹³ The Board also notes that the ER supply forecast assumes the closure of Eurodif's Georges Besse GDP in 2012, in accordance with the plans of its owner, when Eurodif's own centrifuge plant comes on line. See ER Purpose and Need at 1.1-9, Tbl. 1.1-5.

question of whether there is a "shortage" of enrichment capacity) for enrichment services in both a domestic and an international context.

a. National Security Need

4.113 LES asserts that a primary basis supporting the need for the NEF is to meet a national policy goal of promoting energy and national security through a diverse, reliable domestic enrichment supply. See, e.g., Tr. at 1436-37; ER Purpose and Need at 1.1-1 to 1.1-3. The DEIS likewise reflects this position. See NEF DEIS at 1-2 to 1-3. This appears to be an accurate assessment of national needs and goals. The United States Congress has made a number of statements to the effect that uranium enrichment is a strategically important domestic industry of vital national interest that is essential to national and energy security in that the United States nuclear industry cannot become dependent upon foreign sources of enriched uranium. See ER Purpose and Need, at 1.1-2; LES Exh. 32, at 45, 55-56 (Staff of Senate Subcomm. of the Comm. on Appropriations, 108th Cong., Energy and Water Development Appropriations for Fiscal Year 2004 (Comm. Print 2003)). In addition, DOE has stressed in public statements and letters to the NRC the importance from a national energy security perspective of establishing additional reliable and economical uranium enrichment capacity in the United States. See ER Purpose and Need at 1.1-1; NEF DEIS at 1-3; see also LES Exh. 31 (Letter from W.D. Magwood, IV, DOE, to M.J. Virgilio, NRC (July 25, 2002)); LES Exh. 33 (DOE, Effect of U.S./Russia HEU Agreement (Dec. 31, 2001)).

4.114 This need basis rests in large part upon a decline in domestic uranium enrichment from a capacity greater than domestic demand to a level less than half of domestic requirements, see ER Purpose and Need at 1.1-1, such that only about fifteen percent of the separative work units (SWUs), the common unit of measurement for uranium enrichment services, purchased by United States nuclear power reactors are currently produced by enrichment plants in the United States, see NEF DEIS at 1-3. As a consequence, the addition of the NEF to the enrichment services supply mix would substantially improve the aggregate contribution of domestic enrichment sources,¹⁴ as is reflected by the fact LES currently has in place several firm contractual commitments, with the strong possibility of another supply agreement that, in the aggregate, would commit LES to supply enrichment services to operators of approximately forty percent of the current operating nuclear reactors in the United States. See Tr. at 1395.

4.115 NIRS/PC point out, however, that these supply contracts as executed do not require LES to supply the enrichment services from the NEF and, therefore, LES could use these contracts to supply enrichment services using Urenco or any other non-domestic supplier. See Tr. at 1409-10. On behalf of LES, Mr. Schnoebelen testified that (1) this is

¹⁴ NIRS/PC also question whether the NEF would in fact be a "domestic" supplier because LES is owned largely by foreign entities. See Tr. at 1649. Although this matter is outside the scope of this contention, we note that the company that owns the facility is a domestic company and that the NEF itself will be located in the United States and subject to the control of federal and state governmental entities.

a standard contract provision; (2) the contracts are null and void if LES does not receive the NEF license from the NRC and are voidable should LES decide not to construct the NEF; and (3) there is no requirement for Urenco or any other third party to supply the enrichment services if LES does not. See Tr. at 1408-12.

4.116 The national need for a diverse, reliable domestic source of enrichment services seems clear. Moreover, in the Board's view, the contract provision of concern to NIRS/PC is simply designed to ensure that the purchaser will get the services it has contracted to purchase, even if the supplier has difficulties at its facility. Without more than the bare assertions of NIRS/PC, that provision cannot be taken to portend that LES will not build or operate the NEF but instead will merely use the agency's license application process, in concert with the contracts, as a subterfuge for providing enrichment services from one of its overseas owners. See Tr. at 1409-10. The Board thus finds that the addition of the NEF would create the desired national security benefit.

b. Domestic v. Global Need

4.117 As was noted in paragraph 4.101 above, LES examined in depth both the international and the domestic demand for enrichment services, presenting a detailed country-by-country study of projected demand. In this regard, NIRS/PC contends in paragraph (B) of contention EC-7 that the LES ER statements of need for the NEF "depend primarily upon global projections of need rather than projections of need for enrichment services in the U.S."

4.118 Regarding the importance of global projections to such an analysis, as LES witnesses Krich and Schwartz testified, NUREG-1520, the "Standard Review Plan for the Review of a License Application for Fuel Cycle Facility," specifically requests information about "foreign requirements for the services" and "alternative sources of supply." See Tr. at 1466; see also ER Purpose and Need at 1.1-4. These LES witnesses further testified that the nature of the enrichment market necessitates a global analysis so that the ERI analysis of demand for enrichment services contained in the NEF ER encompassed all countries with nuclear power plants. See Tr. at 1440-41, 1467; see also ER Purpose and Need at 1.1-7.

4.119 Based on the foregoing, the Board finds it was both necessary and useful to examine the international market for enrichment services, notwithstanding that an identified primary need for the NEF is to establish a viable domestic source for enrichment services. Accordingly, the Board finds that LES did not rely improperly upon an international analysis to substantiate the need for the NEF.

3. LES Ability to Enter the Market

4.120 Finally, regarding the NIRS/PC challenge to whether the NEF can effectively enter the enrichment market in the face of existing and anticipated competitors and contribute some public benefit, LES has put into evidence five executed contracts with utility companies for the purchase of enrichment services. See LES Exh. 65 (Uranium Enrichment Services Contract between LES and Utility #1); LES Exh. 66 (Uranium Enrichment Services Contract between LES and Utility #2); LES Exh. 67 (Uranium Enrichment Services Contract between LES and Utility #3); LES Exh. 69 (Uranium Enrichment Services Contract between LES and Utility #5); LES Exh. 70 (Uranium Enrichment Services Contract between LES and Utility #6) . Together, these contracts constitute sixty-seven percent of the NEF's expected production capacity for its first ten years of production, and deliveries of more than 3.7 million SWU between 2018 and 2026. See Tr. at 1397. In addition, LES expert Schnoebelen testified that LES is currently finalizing a contract with another utility which, upon execution, would raise the committed production capacity to approximately seventy-two percent of the NEF's output through the facility's initial ten years of production. See Tr. at 1394, 1397-98; see also LES Exh. 68 (Draft Uranium Enrichment Services Contract between LES and Utility #4). These six contracts together would require LES to supply enrichment services to the operators of forty-two of the nation's approximately 100 nuclear power plants, a material increase from the current situation in which less than fifteen percent of the nation's enrichment needs are being met by domestic suppliers. See Tr. at 1395; ER Purpose and Need at 1.1-1.

4.121 The Board finds that the best evidence of LES's ability to enter its market is the willingness of its potential customers to purchase its product. Certainly, that type of evidence is better than the results of efforts to model the exceedingly complex economic and policy factors that are involved in any projections of supply and demand. Indeed, the latter are, of necessity, entirely dependent for their accuracy upon the ability of the modeler to (1) determine what factors affect the market and how their effects would be manifested; (2) mathematically model properly the relationships that would be involved; and (3) accurately predict how those factors would behave over the term of the forecast. For its part, LES has avoided this potentially difficult problem by substituting facts for speculative projections. Therefore, the Board finds that LES has reasonably demonstrated its ability to enter the market.¹⁵

¹⁵ Dr. Sheehan also testified for NIRS/PC that he does not believe that these contracts indicate that LES entry into the market for enrichment services will provide a public benefit. Dr. Sheehan first asserts that some of the previously cited contracts are with the domestic partners of LES, who have a nonpublic, i.e., private, incentive to see LES enter the market. See Tr. at 1650. Secondly, he argues that other utilities may see the possible entrance of LES into the market as a signal that USEC will not survive in the marketplace,

V. SUMMARY FINDINGS OF FACT AND CONCLUSIONS OF LAW

and thus are signing contracts with LES now rather than waiting for USEC's collapse, which could hardly be described as a public benefit. See Tr. at 1650. We, however, find Dr. Sheehan's attempts to label the contracts as indicative of the lack of public benefit to be derived from the NEF speculative and lacking any evidentiary basis.

5.1 Having considered all of the evidence submitted and testimony given by the parties in this proceeding relative to environmental contentions NIRS/PC EC-1 - Impacts Upon Ground and Surface Water; NIRS/PC EC-2 - Impact Upon Water Supplies; NIRS/PC EC-4 - Impacts of Waste Storage; and NIRS/PC EC-7 - Need for the Facility, as well as the proposed findings of fact and conclusions of law submitted by the parties, based on the findings and conclusions set forth in Part IV above, the Board finds that LES and/or the staff have met their burden with regard to each of the above contentions to establish the adequacy of the ER and/or DEIS in accordance with 10 C.F.R. §§ 51.20, 51.45, 51.71. Therefore, relative to the issues raised in connection with contentions NIRS/PC EC-1, NIRS/PC EC-2, NIRS/PC EC-4, and NIRS/PC EC-7, that were the subject of the February 2005 evidentiary hearing, the Board finds that these contentions are resolved in favor of LES and/or the staff.

6.1 Pursuant to 10 C.F.R. § 2.713, it is this eighth day of June 2005, ORDERED, that this first partial initial decision will constitute a final decision of the Commission forty (40) days from the date of issuance, i.e., on Monday, July 18, 2005, 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 so within fifteen (15) days after service of this first partial

initial decision. The filing of a petition for review is mandatory in order 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 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.

On or before Thursday, June 16, 2005, 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; and (2) proposed redaction from this decision to which there is an objection. In the event any party seeks a redaction, the particular word or phrase should be specified; blanket requests for withholding are disfavored. Further, in accordance with section 2.390, the party seeking the proposed redaction 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 Thursday, June 23, 2005.

Thereafter, following a final ruling on any proposed redactions, the Board will make this decision publically available.

THE ATOMIC SAFETY
AND LICENSING BOARD¹⁶

/RA/

G. Paul Bollwerk, III
ADMINISTRATIVE JUDGE

/RA/

Paul B. Abramson
ADMINISTRATIVE JUDGE

/RA/

Charles N. Kelber
ADMINISTRATIVE JUDGE

Rockville, Maryland

June 8, 2005

¹⁶ Copies of this memorandum and order were sent this date by overnight express delivery to counsel for (1) applicant LES; and (2) intervenors NMED, the AGNM, and NIRS/PC. Copies for counsel for the staff were placed in the agency's interoffice mail.