

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

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NRC STAFF'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW  
CONCERNING NIRS/PC CONTENTIONS  
EC-1 (IMPACTS UPON GROUND AND SURFACE WATER), EC-2 (IMPACT ON WATER  
SUPPLIES), EC-4 (IMPACTS OF WASTE STORAGE), AND EC-7 (NEED FOR THE  
FACILITY)

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I. INTRODUCTION

1.1 These findings and rulings address all outstanding issues with respect to contentions NIRS/PC EC-1 (Impacts Upon Ground and Surface Water), NIRS/PC EC-2 (Impact on Water Supplies), NIRS/PC EC-4 (Impacts of Waste Storage), and NIRS/PC EC-7 (Need for the Facility) concerning the application filed on December 15, 2003, by Louisiana Energy Services, L.P. ("LES" or "Applicant"), for a license under 10 C.F.R. Part 70 to possess and use source, byproduct, and special nuclear material and to enrich natural uranium to a maximum of five percent U-235 by the gas centrifuge process. LES proposes to construct and operate the enrichment facility, to be known as the National Enrichment Facility ("NEF"), near Eunice, which is in Lea County, New Mexico.

1.2 For the reasons stated below, the Licensing Board makes the following findings of fact and conclusions of law with respect to NIRS/PC EC-1, NIRS/PC EC-2, NIRS/PC EC-4, and NIRS/PC EC-7, and decides all of the matters in controversy with respect to the four admitted environmental contentions in favor of the Applicant.

## II. PROCEDURAL BACKGROUND

2.1 Notice of the Nuclear Regulatory Commission (“NRC”)’s receipt and consideration of the LES NEF license application was published in the *Federal Register* on February 6, 2004. “Notice of Receipt of Application for License; Notice of Availability of Applicant’s Environmental Report; Notice of Consideration of Issuance of License; and Notice of Hearing and Commission Order,” CLI-04-03, 59 NRC 10, 69 Fed. Reg. 5873 (February 6, 2004) (“Notice of Hearing”). The notice advised the Applicant and any person whose interest may be affected by the proceeding of their right to request a hearing by filing such a request and a petition for leave to intervene. Additionally, the Commission provided instructions on a number of matters related to the mandatory hearing and other aspects of the adjudication, including the adjudication of contentions, discovery management, and scheduling. *Id.*

2.2 In response to the notice, the New Mexico Environment Department (“NMED”) and the New Mexico Attorney General (“NMAG”) filed petitions to intervene pursuant to 10 C.F.R. § 2.309(a), on March 23, 2004, and April 5, 2004, respectively, challenging certain aspects of the LES application. See “New Mexico Environment Department’s Request for Hearing and Petition for Leave to Intervene,” March 23, 2004; “The New Mexico Attorney General’s Request for Hearing and Petition for Leave to Intervene in the Louisiana Energy Services Proceeding,” April 5, 2004. Additionally, Nuclear Information and Resource Service and Public Citizen (“NIRS/PC”) filed a joint petition to intervene on April 6, 2004. See “Petition to Intervene by Nuclear Information and Resource Service and Public Citizen in the Louisiana Energy Services Proceeding.”

2.3 On April 6, 2004, this Atomic Safety and Licensing Board was established to rule on petitions for hearing and for leave to intervene, and to preside over the adjudicatory proceeding held in connection with the LES application, “Louisiana Energy Services, L.P.; Establishment of Atomic Safety and Licensing Board,” 69 Fed. Reg. 22100 (Apr. 23, 2004), with the exception of certain issues, including standing of the parties, over which the Commission retained jurisdiction.

Notice of Hearing, CLI-04-03, 59 NRC at 13-15.

2.4 Pursuant to a Board Order, NMED, the NMAG, and NIRS/PC supplemented their initial intervention petitions by categorizing each of their already-submitted issue statements within at least one of three groups, i.e., as a technical contention (“TC”) relating primarily to the safety-analysis report (“SAR”) portion of the LES application, as an environmental contention (“EC”) relating primarily to the environmental report (“ER”) portion of the LES application, or as a miscellaneous contention (“MC”) not fitting into either of the two categories. On April 22, 2004, the Licensing Board scheduled an initial prehearing conference for June 15, 2004, in the Hobbs, New Mexico area. Licensing Board Memorandum and Order (Scheduling Initial Prehearing Conference) (Apr. 22, 2004), at 1.

2.5 On May 20, 2004, the Commission issued an Order in which it determined, that, pursuant to 10 C.F.R. § 2.309(d)(2)(I), as state representatives, the NMAG and the NMED did not need to demonstrate standing to intervene in this proceeding. *Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-04-15, 59 NRC 256 (2004). In addition, the Commission determined that NIRS/PC had standing to intervene in the proceeding. *Id.* at 257. Accordingly, the Commission referred the petitioners’ hearing requests to the Licensing Board. *Id.*

2.6 After LES and the NRC Staff (“Staff”) had the opportunity to respond to the petitioners’ submissions with respect to the admissibility of petitioners’ contentions under the NRC’s contentions requirements,<sup>1</sup> the Board held a one-day prehearing conference with the

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<sup>1</sup> The Staff and LES filed responses seeking exclusion of some of petitioners’ contentions on the grounds that the petitions for intervention did not meet the NRC’s contentions requirements found in 10 C.F.R. § 2.309(f). Petitioners filed replies, in which the NMAG and NMED attempted to amend and supplement their contentions and to add new bases without addressing the late-filing criteria found in 10 C.F.R. § 2.309(c). After obtaining leave from the Board, the Staff and LES both filed surreplies, objecting to the NMAG and NMED’s attempt to set forth new information in a reply filing. In its July 19, 2004 decision, the Board rejected the new information submitted by the NMAG and NMED in their reply filings. For a detailed discussion, see *Louisiana Energy Services, LBP-04-14*, 60 NRC 40, 49-52, *aff’d by Commission*, CLI-04-25, 60 NRC 223 (2004).

petitioners, LES, and the Staff in Hobbs, New Mexico, during which those participants made oral arguments regarding the admissibility of the thirty-two submitted contentions. See Tr. at 1-277.

2.7 On July 19, 2004, the Board issued a Memorandum and Order admitting certain contentions, including at least one contention from each petitioner, and therefore, admitted each of the petitioners as a party to the proceeding. *Louisiana Energy Services, L.P.* (National Enrichment Facility), LBP-04-14, 60 NRC 40 (2004). The Board rejected other contentions as failing to meet NRC regulations governing admissible contentions as found in 10 C.F.R. § 2.309(f). *Id.* In addition, the Board separated the environmental and technical/safety contentions, admitting six technical and four environmental contentions. *Id.* at 77-80.

2.8 In our July 19, 2004 decision, the Board found that NIRS/PC had advanced four admissible environmental contentions: NIRS/PC EC-1, dealing with the impacts of the NEF on ground and surface water, NIRS/PC EC-2, dealing with the NEF's impacts on local water supplies, NIRS/PC EC-4, dealing with the environmental impacts of the deconversion facility, and NIRS/PC EC-7, dealing with the need for the facility. The Board found that only NIRS/PC had advanced admissible environmental contentions. LBP-04-14, 60 NRC at 48, 75, 77-80.<sup>2</sup>

2.9 In an August 16, 2004, Memorandum and Order, the Board set a discovery schedule and provided that the first phase of the proceeding would involve the environmental contentions and the evidentiary hearing regarding those contentions would take place between February 7<sup>th</sup> and February 16<sup>th</sup>, 2005. The second phase of the hearing would involve the technical contentions and

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<sup>2</sup> The Board referred several of its rulings on petitioners' contentions to the Commission on the grounds that they raised novel policy questions. *National Enrichment Facility*, LBP-04-14, 60 NRC at 75. The Commission, in an August 18, 2004 opinion, affirmed the Board's ruling, in all respects but one. *Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-04-25, 60 NRC 223, 224 (2004). The Commission chose to review further, and solicit briefs on, the issue of whether the classification of depleted uranium as low level waste was appropriate. In a decision on January 18, 2005, the Commission concluded that depleted uranium was properly classified as low-level waste. Memorandum and Order, CLI-05-05, 60 NRC \_\_, \_\_, slip op. at 17 (January 18, 2005).

the evidentiary hearing regarding these contentions would take place between October 24<sup>th</sup> and November 7<sup>th</sup>, 2005. The Board scheduled the mandatory hearing to take place between November 8<sup>th</sup> and November 11<sup>th</sup>, 2005. See *Memorandum and Order* (Memorializing and Ruling on Matters Raised in Conjunction with August 3, 2004 Conference Call and Setting General Schedule for Proceeding), (August 16, 2004), Appendix A.

2.10 In September, 2004, the Staff issued NUREG-1790, the Draft Environmental Impact Statement ("DEIS") for the Proposed National Enrichment Facility in Lea County, New Mexico and began accepting public comments, in accordance with its obligations under the National Environmental Policy Act ("NEPA"), 42 U.S.C. §§ 4321 *et seq.*.

2.11 On October 20, 2004, NMED and NIRS/PC filed motions to amend and supplement their contentions to address the recently issued DEIS, contending that the DEIS did not sufficiently address certain environmental issues. See "Motion on Behalf of Petitioners Nuclear Information and Resource Service and Public Citizen to Amend and Supplement Contentions," October 20, 2004; "NMED's Motion to File Late Filed Contentions." With respect to the environmental contentions, the Board admitted some of NIRS/PC's supplemental contentions and amendments dealing with whether the DEIS properly considered the impacts of the NEF on ground and surface water, the impact on local water supplies, and the impacts of the deconversion process, and rejected other attempts to amend and supplement NIRS/PC's admitted environmental contentions. See *Memorandum and Order* (Ruling on Late-Filed Contentions), (Nov. 22, 2004). The Board denied NMED's motion to file late-filed contentions in its entirety. *Id.* at 6-7.

2.12 This Board held an evidentiary hearing on the environmental contentions, NIRS/PC EC-1, NIRS/PC EC-2, NIRS/PC EC-4, and NIRS/PC EC-7, in Hobbs, New Mexico, from February 7-10, 2005, in accordance with a notice of hearing published in the Federal Register. See "Memorandum and Order; Notice of Hearing and of Opportunity to Make Oral or Written Limited Appearance Statements," 70 Fed. Reg. 2429 (Jan. 13, 2005). Various witnesses appeared on

behalf of LES, the Staff, and NIRS/PC, as summarized below. In addition, limited appearance statements were received from many members of the public, in special sessions held in Eunice, New Mexico, on February 12, 2005.

2.13 These proposed findings of fact and conclusions of law present the Licensing Board's findings of fact with respect to the evidence presented at the 2005 hearing concerning the admitted environmental contentions, NIRS/PC EC-1, NIRS/PC EC-2, NIRS/PC EC-4, and NIRS/PC EC-7, and the Board's conclusions of law with respect thereto.

### III. APPLICABLE LEGAL STANDARDS

#### A. 10 C.F.R. Part 51 Requirements

3.1 The National Environmental Policy Act of 1969, as amended, ("NEPA") is the federal legislation governing contentions NIRS/PC EC-1, NIRS/PC EC-2, NIRS/PC EC-4, and NIRS/PC EC-7. In 10 C.F.R. Part 51, the Commission has established a comprehensive set of regulations addressing and implementing its responsibilities under NEPA.

3.2 Under the NRC's regulations implementing NEPA, an applicant for a uranium enrichment facility under 10 C.F.R. Part 70 must file an environmental report ("ER"), which must contain a description of the proposed action, a statement of its purposes, and a description of the environment affected. 10 C.F.R. §§ 51.20, 51.45, 51.50.

3.3 The applicant's environmental report must discuss the following considerations: (1) The impact of the proposed action on the environment; (2) Any adverse environmental effects which cannot be avoided should the proposal be implemented; (3) Alternatives to the proposed action; (4) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and (5) Any irreversible and irretrievable commitments of resources involved in the proposed action. In addition, the environmental report must include an analysis that considers and balances the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives available

for reducing or avoiding adverse environmental effects. 10 C.F.R. § 51.45(b)-(c).

3.4 Under 10 C.F.R. § 51.20(b)(10), before issuing a license for a uranium enrichment facility, the Staff must review the ER submitted by the applicant and issue a draft environmental impact statement (“DEIS”). The DEIS must include a preliminary analysis that considers and weighs the environmental effects of the proposed action; the environmental impacts of alternatives to the proposed action; and alternatives available for reducing or avoiding adverse environmental effects. 10 C.F.R. §§ 51.70, 51.71. The draft EIS examines and reviews the ER submitted by the applicant and may rely upon it in part, but the Staff is required to independently evaluate and is responsible for all information contained in the EIS. 10 C.F.R. § 51.70(b). Then, based on a review of information provided by the applicant, information provided by commentors on the draft EIS and information and analysis that the Staff itself obtains, the Staff must issue its final EIS (“FEIS”). 10 C.F.R. § 51.97(c).

#### B. National Environmental Policy Act (“NEPA”)

3.5 NEPA is a procedural statute that requires federal agencies to take a “hard look” at the environmental consequences of the proposed action, as well as reasonable alternatives to that action. See *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-98-03, 47 NRC 77, 89 (1998); *Boston Edison Co.* (Pilgrim Nuclear Generating Station, Unit 2), ALAB-479, 7 NRC 774, 779 (1978).

3.6 When reviewing a license application filed by a private applicant, a federal agency may appropriately “accord substantial weight to the preferences of the applicant...in the design of the project.” *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho NM 87174), CLI-01-4, 53 NRC 31, 55 (2001); *Louisiana Energy Services, L.P.*, CLI-98-3, 47 NRC at 104 (internal citations omitted). NEPA does not require the agencies to analyze the environmental consequences of alternatives it has in good faith rejected as too remote, speculative, impractical, or ineffective. *Custer County Action Ass’n v. Garvey*, 256 F.3d 1024, 1039 (10th Cir. 2001).

3.7 Rather, NEPA is to be interpreted as a “rule of reason.” See *Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 44 (1989), citing *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719, 739 (3d Cir. 1989) and *San Luis Obispo Mothers for Peace v. NRC*, 751 F.2d 1287, 1300 (D.C. Cir. 1984), *aff’d en banc*, 789 F.2d 26, *cert. denied* 479 U.S. 923 (1986). NEPA requires only the consideration of those impacts that are “reasonably foreseeable” and does not require consideration of impacts that are “remote and speculative.” See, e.g., *Scientists’ Institute for Public Information, Inc. v. AEC*, 481 F.2d 1079, 1092 (D.C. Cir. 1973); *Public Service Electric and Gas Co.* (Hope Creek Generating Station, Units 1 and 2), ALAB-518, 9 NRC 14, 38-39 (1979)

3.8 The “rule of reason” is used to determine whether the agency has given a “hard look” at the environmental impacts and, as a minimum, requires the EIS to disclose the environmental impacts of the proposed action. *Coalition on Sensible Transportation, Inc. v. Dole*, 826 F.2d 60, 66 (D.C. Cir. 1987). When evaluating the adequacy of an EIS, it is always possible to imagine exploring a subject more deeply and discussing it more thoroughly. *Id.* However, the discretion to determine how thoroughly to examine a subject is vested in the agencies. *Id.* The role of the courts “...is simply to ensure that the agency has adequately considered and disclosed the environmental impact of its actions...” *Id.*, quoting *Baltimore Gas and Electric Co. v. NRDC*, 462 U.S. 87, 97-98 (1983).

3.9 The scope of an agency’s inquiries in an EIS must remain manageable if NEPA’s goal of ensuring a fully informed and well considered decision is to be accomplished. *Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 776 (1983), citing *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 558 (1978). Therefore, agencies are given broad discretion to contain their inquiries within appropriate and manageable boundaries. *Louisiana Energy Services, LP* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 103 (1998), citing *South Louisiana Environmental Council, Inc. v. Sand*, 629 F.2d 1005, 1011 (5th Cir. 1980).

3.10 This principle is a recognition of the need to place reasonable bounds on the analysis an agency is required to undertake. Thus, courts have noted that “there must be an end to the process somewhere.” *Providence Road Community Association v. EPA*, 683 F.2d 80, 83 (4th Cir. 1982). Otherwise, so long as there are “unexplored and undiscussed alternatives that inventive minds can suggest,” there would never be a federal project. *Id.*, citing *Fayetteville Area Chamber of Commerce v. Volpe*, 515 F.2d 1021 (4th Cir. 1975). If NEPA were construed broadly to require a full examination of every conceivable aspect of federally licensed projects, “available resources may be spread so thin that agencies are unable adequately to pursue protection of the physical environment and natural resources.” *Louisiana Energy Services, L.P.*, CLI-98-3, 47 NRC at 102-03, citing *Metropolitan Edison Co.*, 460 U.S. at 776.

3.11 Therefore, in assessing the adequacy of an agency’s discussion of the impacts of a proposed action and any reasonable alternatives set forth in an EIS, a rule of reason test is employed to determine whether the EIS contains “a reasonably thorough discussion of the significant aspects of probable environmental consequences.” *Hells Canyon Alliance v. United States Forest Service*, 227 F.3d 1170, 1177 (9th Cir. 2000), citing *Neighbors of Cuddy Mountain v. United States Forest Service*, 137 F.3d 1372, 1376 (9th Cir. 1998); See *Maine Yankee Atomic Power Co. (Maine Yankee Atomic Power Station)*, ALAB-161, 6 AEC 1003, 1011-12 (1973). The rule of reason governs both “which alternatives the agency must discuss” and “the extent to which it must discuss them.” *Tongass Conservation Society v. Cheney*, 924 F.2d 1137, 1141-42 (D.C. Cir. 1991), quoting *Natural Resources Defense Council, Inc. v. Hodel*, 865 F.2d 288, 294 (D.C. Cir. 1988) (emphasis in original).

3.12 The environmental review mandated by NEPA need not include all theoretically possible environmental effects arising out of an action, but may be limited to effects which are shown to have some likelihood of occurring. *Northern States Power Company (Prairie Island Nuclear Generating Plant, Units 1 & 2)*, ALAB-455, 7 NRC 41, 48, 49 (1978). This conclusion

draws direct support from the judicial interpretation of the statutory command imposing the obligation to make reasonable forecasts of the future. *Id.*, citing, *Natural Resources Defense Council v. Morton*, 458 F.2d 827, 837-38 (D.C. Cir. 1972).

3.13 Thus, NEPA requires that a Federal agency make a "good faith" effort to predict reasonably foreseeable environmental impacts and that the agency apply a "rule of reason" after taking a "hard look" at potential environmental impacts. But an agency need not have complete information on all issues before proceeding. *Public Service Company of Oklahoma* (Black Fox Station, Units 1 & 2), LBP-78-26, 8 NRC 102, 141 (1978). Furthermore, it is reasonable for administrative agencies to consider prior studies, draft or otherwise, in their EISs and to include them by reference. *Conservation Law Foundation v. Federal Highway Administration*, 24 F.3d 1465, 1474 n.1(1st Cir. 1994).

#### C. NEPA Requirements Concerning Indirect Impacts

3.14 Council on Environmental Quality (CEQ) regulations, which offer agencies guidance on NEPA compliance, provide in 40 C.F.R. § 1502.16, that the EIS must discuss direct and indirect effects of the action. See *Private Fuel Storage* (Independent Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340, 348 (2002).<sup>3</sup> Direct effects are "caused by the action and occur at the same time and place." 10 C.F.R. § 1508.8(b). Indirect effects are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable," such as growth-inducing effects. 10 C.F.R. § 1508.8(b).

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<sup>3</sup> While the Commission agrees that CEQ's regulations are entitled to substantial deference where applicable, the Commission is not bound by CEQ regulations that it has not expressly adopted. See *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719, 725, 743 (3rd Cir. 1989). The Commission stated that the NRC is not bound by those portions of the CEQ's NEPA regulations that have some substantive impact on the way in which the Commission performs its regulatory functions. 49 Fed. Reg. 9352 (Mar. 12, 1984); *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), CLI-91-02, 33 NRC 61 (1991).

3.15 An agency is not required to discuss the indirect effects of an action that is remote or speculative. *Presidio Golf Club v. Nat'l Park Serv.* 155 F.3d 1153 (9th Cir. 1998); *Enos v. Marsh*, 769 F.2d 1363 (9th Cir. 1985).

3.16 While merely guidance, CEQ regulation 40 C.F.R. § 1502.22 states that when the indirect effects of an action may not be remote or speculative, but information is incomplete or unavailable, agencies must disclose that the information is incomplete or unavailable and must obtain the information "if the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of doing so are not exorbitant." See *Colorado Env'tl. Coalition v. Dombeck*, 185 F.3d 1162 (10th Cir. 1999).

D. Incorporation By Reference/Tiering

3.17 The Commission's environmental regulations in 10 C.F.R. Part 51, Subpart A, Appendix A.1(b) permit the use of adoption, tiering, and incorporation of EISs of other federal agencies in the preparation of material in NRC's EISs as described in the CEQ regulations. See also *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 424 (2001). Thus the Commission has explicitly permitted use of CEQ's NEPA regulations, 40 C.F.R. § 1502.20, 10 C.F.R. § 1508.28, and 10 C.F.R. § 1502.21, to "aid in the presentation of issues, eliminate repetition or reduce the size of an environmental impact statement." *Id.*

3.18 CEQ's NEPA regulations define tiering in 40 C.F.R. § 1508.28 as:

... the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basinwide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared. Tiering is appropriate when the sequence of statements or analyses is: (a) From a program, plan, or policy environmental impact statement to a program, plan, or policy statement or analysis of lesser scope or to a site-specific statement or analysis. (b) From an environmental impact statement on a

specific action at an early stage...to a supplement...or a subsequent statement or analysis at a later stage... Tiering in such cases is appropriate when it helps the lead agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe.

3.19 CEQ's NEPA regulation 40 C.F.R. § 1502.20 addresses the use of tiering, stating:

Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review.... Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement and incorporate discussions from the broader statement by reference and shall concentrate on the issues specific to the subsequent action. The subsequent document shall state where the earlier document is available. Tiering may also be appropriate for different stages of actions....

3.20 The CEQ regulations also address the concept of incorporating by reference in 40 C.F.R. § 1502.21 which states:

Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment.

3.21 Reliance and reference to information, studies and analyses already conducted which show environmental effects of a similar project under substantially identical conditions, can be used to supply the necessary detail to comply with NEPA requirements. *See Brooks v. Volpe*, 350 F.Supp. 269, 279-80 (W.D. Wash. 1972).

#### E. Commitments Made By Applicants

3.22 When statements in applicant's proposed findings, which are based on applicant statements by witnesses under oath before the presiding officer or as part of its application, indicate a willingness to comply with all or a portion of specific, nationally recognized consensus standards, little purpose would be served in repeating the terms of these commitments as license

conditions. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-00-35, 52 NRC 364, 410 (2000) (*citing Commonwealth Edison Co.* (Zion Station, Units 1 and 2), ALAB-616, 12 NRC 419, 423-24 (1980)), *aff'd Private Fuel Storage*, CLI-01-09, 53 NRC 232 (2001).

3.23 The penalties that flow from making a false statement to a presiding officer and the NRC staff, including the possibility of criminal violations under 18 U.S.C. § 1001 and agency enforcement actions, can be sufficient to ensure compliance without the additional step of incorporating into a decision a list of commitments that an applicant has clearly acknowledged it accepts and will fulfill. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-01-9, 53 NRC 232, 410 (2001), *citing, Florida Power and Light Co.* (Turkey Point Nuclear Generating Plants, Units 3 and 4), ALAB-898, 28 NRC 36, 41 n.20 (1988).

#### IV. FINDINGS OF FACT

##### A. NIRS/PC EC-1 (Impacts Upon Ground and Surface Water)

##### 1. Background

4.1 As admitted by the Licensing Board in its Memorandum and Order (Rulings Regarding Standing, Contentions, and Procedural/Administrative Matters) of July 19, 2004, and modified by the Licensing Board's Memorandum and Order (Ruling on Late-Filed Contentions) of November 22, 2004, EC-1 states that:

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.

2. Testimony Presented

4.2 In accordance with the Licensing Board's scheduling orders, prefiled written testimony concerning NIRS/PC EC-1 was submitted by the Applicant, NIRS/PC and the NRC Staff. The Applicant's witnesses appeared first, followed by the Staff's witnesses, with NIRS/PC's witnesses testifying last.

4.3 The Applicant presented two witnesses in support of this contention. These were: (1) Mr. George A. Harper, Manager of Regulatory Programs at Framatome ANP, whose duties in this proceeding include assistance in preparation of the NEF license application, including the NEF Environmental Report ("Prefiled Testimony of George A. Harper and Roger L. Peery on Behalf of Louisiana Energy Services, L.P., Concerning Contention NIRS/PC EC-1 ("Impacts Upon Ground and Surface Water") ("Harper/Peery"), Tr. at 375-6); and (2) Mr. Roger L. Peery, Chief Executive Officer and Senior Hydrologist at John Shomaker & Associates, Inc. (which contributed to the *Lea County Regional Water Plan*), who was hired by LES as an expert witness on hydrogeological and water resource issues in this proceeding. Harper/Peery, Tr. at 377-8.

4.4 Applicant witness George Harper received a Bachelor of Science and Master of Science in Civil Engineering from the University of Massachusetts. Harper Statement of Professional Qualifications attached to Harper/Peery, Tr. at 430. He is a registered professional engineer. Tr. 431. Mr. Harper has over 25 years of nuclear industry experience in analyzing environmental, hydrologic, hydraulic, seismic, geotechnical, groundwater, tornado and tornado missile, and probabilistic risk assessment issues relating to nuclear power plants. *Id.* at 429. In association with the NEF, Mr. Harper is responsible for overall management of the environmental

report, development of portions of the environmental report, integrated safety analysis and portions of the security threat assessment. *Id.* The Licensing Board finds Mr. Harper to be well-qualified as an expert on the subject of the impacts of the NEF on ground and surface water.

4.5 Applicant witness Roger Peery was awarded a Bachelor of Science in Geology and Master of Science in Water Resources from the University of New Mexico. Peery Statement of Professional Qualifications attached to Harper/Peery, Tr. at 433. He is a licensed professional geologist in Texas and a professional geologist in Wyoming; New Mexico does not register geologists. *Id.* at 434. He has over 15 years of experience on water-resource evaluations, water-resource development, and water-well siting. *Id.* at 433. Mr. Peery has also served as project manager for regional and local water planning, including two regional water plans accepted by the New Mexico Interstate Streams Commission. *Id.* Based on his extensive experience, the Board finds Mr. Peery to be well-qualified as an expert witness on the subject of impacts of the NEF on ground and surface water.

4.6 The Staff presented one witness concerning EC-1: Mr. Alan Toblin, a consultant with Advanced Technologies and Laboratories International, Inc., who assisted the Staff in evaluating the potential environmental impacts related to the construction, operation, and decommissioning of the NEF. “NRC Staff Testimony of Alan Toblin Concerning Nuclear Information and Resource Service and Public Citizen Environmental Contention 1 (“NIRS/PC EC-1”) (Impacts Upon Ground and Surface Water)” (“Toblin EC-1”), Tr. at 650-1. Mr. Toblin also assisted in preparation of the Staff’s DEIS and portions of the “NRC Staff’s Response to Interrogatories and Document Request by Petitioners Nuclear Information and Resource Service and Public Citizen to Commission Staff.” *Id.* at 651.

4.7 Staff witness Alan Toblin received a Bachelor of Engineering in Chemical Engineering from Cooper Union and a Master of Science in Chemical Engineering from the University of Maryland. Statement of Professional Qualifications attached to Toblin EC-1, Tr. at 677. He has

over 32 years of professional experience as a Principal Investigator and Technical Manager for analyses of contaminant (chemical, radionuclide, thermal) transport in groundwater, surface water, and air environments. *Id.* Mr. Toblin has performed such analyses for numerous major industrial sites and government agencies, including major Department of Energy (“DOE”) sites, in support of construction, operations, and clean-up activities. *Id.* His work experience includes determining water quality impacts, evaluating hydrologic transport of contaminants, and groundwater quality and quantity modeling. *Id.* at 677-8. The Licensing Board finds Mr. Toblin to be well-qualified as an expert on the subject of the impacts of the NEF on ground and surface water.

4.8 NIRS/PC presented one witness, Mr. George Rice, in support of its contention. Mr. Rice is a groundwater hydrologist consultant. “Direct Testimony of George Rice on Behalf of Nuclear Information and Resource Service and Public Citizen, NIRS/PC Contention EC-1, Revised Jan. 28, 2005” (“Rice EC-1”), Tr. at 770.

4.9 NIRS/PC witness George Rice obtained a Bachelor of Science and Master of Science in Hydrology from the University of Arizona. Resume attached to Rice EC-1, Tr. at 797. His experience includes designing and installing monitor well networks; designing, performing and analyzing aquifer tests; designing and installing vadose zone monitor networks; designing and conducting groundwater sampling programs, and using groundwater flow and contaminant transport models to predict the fate of groundwater contaminants. *Id.* Mr. Rice has served as the principal hydrologist responsible for the hydrologic characterization of low-level radioactive and hazardous waste sites throughout the western United States. *Id.* at 798. The Licensing Board finds that Mr. Rice is well-qualified as an expert witness on the subject of the impacts of the NEF on ground and surface water.

3. Site Location and Description

4.10 In making our determination as to whether the Staff conducted a complete or adequate assessment of the potential environmental impacts of the proposed project on ground

and surface water in satisfaction of 10 C.F.R. Part 51, we will begin by describing the location of the proposed NEF site and describing the geology underlying the proposed NEF site. We then begin Basis (A) by describing potential perched water bodies; discussing the Staff's calculations of the flow rates and dimensions of any such perched water bodies; and discussing the Staff's determination of possible discharge areas.

4.11 The proposed NEF site is located in southeastern New Mexico in Lea County, approximately 32 kilometers (20 miles) south of Hobbs, New Mexico; 8 kilometers (5 miles) east of Eunice, New Mexico; and about 0.8 kilometers (0.5 miles) from the New Mexico-Texas border. *Draft Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*, NUREG-1790, September 2004 (Redacted Non-Sensitive Version), Staff Exh. 1b at p.3-2. The site consists of mostly undeveloped land that is used for cattle grazing. *Id.* The area surrounding the proposed site consists of vacant land and industrial developments. Figure 3-3 of the DEIS depicts land use within 8 kilometers (5 miles) of the proposed NEF site. *Id.* at p. 3-3. The northern side of the site is bordered by a railroad spur, beyond which is a sand/aggregate quarry operated by Wallach Concrete, Inc. and an oil-reclamation operation owned by Sundance Services, Inc. *Id.* at p. 3-2. The Sundance facility disposes of oil industry solid wastes in a disposal facility and treats soils contaminated with hydrocarbons via landfarming. *Id.*

4.12 Approximately 1 mile east of the proposed site is a hazardous waste facility operated by Waste Control Specialists ("WCS"), situated in the State of Texas. Staff Exh. 1b at p. 3-2. The WCS facility owns buffer areas that border the immediate eastern boundary of the proposed NEF site, and holds a renewable seven-year license to temporarily store low-level radioactive and mixed wastes. *Id.* at p. 3-3.

4.13 The Lea County Landfill is located to the southeast and across New Mexico State Highway 234 from the proposed NEF. Staff Exh. 1b at p. 3-3. This landfill disposes of municipal and solid wastes for Lea County and its municipalities, and other communities within a

160 kilometer (100 mile) radius. *Id.*

4.14 Bordering the proposed site from the west is privately held land, beyond which is the DD Landfarm, a petroleum-contaminated-soil treatment facility. Staff Exh. 1b at p. 3-3. A historical marker and picnic area are also situated approximately 3.2 kilometers (2 miles) west of the proposed NEF site. *Id.* Also, Dynegy Midstream Services, a gathering and processing plant of natural gas, is located 6 kilometers (4 miles) west of the proposed site. *Id.*

4.15 The geology underlying the proposed NEF site is critical to addressing EC-1. From top to bottom, three significant geologic formations underlie the proposed NEF site: the Antlers Formation or "alluvium", the Chinle Formation, and the Santa Rosa Formation. The Chinle and Santa Rosa Formations are sedimentary rocks of the Triassic-aged Dockum Group. Harper/Peery, Tr. at 386. The alluvium, comprised mainly of sand and silty sand, on average extends from a depth of 1.4 feet to 39 feet below the ground. Toblin EC-1, Tr. at 654. Beneath the alluvium is the Chinle Formation, a highly impermeable claystone and silty clay layer with interbedded siltstone and sandstone. *Id.* at 655. The Chinle Formation extends from a depth of 39 feet to 1,115 feet below the proposed NEF site. *Id.* Groundwater occurs beneath the surface of the Chinle at two distinct and distant elevations. Staff Exh. 1b, at p. 3-35. The most shallow of these occurs approximately 67 meters (220 feet) beneath the land surface, just below the surface of the Chinle red-bed unit. *Id.* This siltstone or silty sandstone unit has low permeability and does not yield groundwater readily. *Id.* There is also a 30.5 meter-thick (100-foot thick) water-bearing sandstone layer at about 183 meters (600 feet) below ground surface. *Id.* at p. 3-36. Beneath the Chinle Formation is the Santa Rosa Formation, which ranges in depth from 1,115 feet to 1,425 feet below the surface at the proposed NEF site. Toblin EC-1, Tr. at 655. The Santa Rosa Formation includes sandy beds containing a groundwater aquifer. *Id.* Potential groundwater migration to the Santa Rosa Aquifer is inhibited by the low permeability of the overlying Chinle and by the fact that there is no indication of a hydraulic connection between the two formations. *Id.*

4. Basis (A)

4.16 Groundwater may be found in “perched” bodies underground. In these geological conditions, water would travel from the surface downward through the alluvium until it reached the Chinle Formation, which is an impermeable layer which creates a barrier to further downward water movement. Toblin EC-1, Tr. at 655. Perched groundwater could form at the interface between the alluvial deposits and the Chinle Formation, which is higher than and apart from underlying aquifers. *Id.* Discharge from the stormwater detention basin and septic fields at the proposed NEF site would be one possible source of any water entering the ground and could create perched bodies of water. *Id.*

4.17 The NRC Staff performed a calculation to determine what the flow rates of potential perched bodies of groundwater at the alluvium/Chinle interface would be. Toblin EC-1, Tr. at 656-9. The Staff’s estimation of groundwater velocity of the basin and septic discharge at the alluvium/Chinle interface is based on an application of Darcy’s Law. Toblin EC-1, Tr. at 656. The Darcy Velocity ( $V_d$ ) is equal to the hydraulic conductivity ( $kh$ ) of the formation multiplied by the gradient/slope of the groundwater surface ( $dh/dl$ ). *Flow Through Porous Media* R.J.M. DeWiest, Academic Press, NY, NY, 1969, p. 3, Staff Exh. 2. The Staff used  $kh = 0.01$  cm/sec because it is on the conservative side of the range of site surface soils hydraulic conductivity provided in the LES ER, at pp. 3.4-14 and 3.4-15, and in literature. Toblin EC-1, Tr. at 657; *National Enrichment Facility Environmental Report*, Sections 3.3, 3.4 and 4.4, LES Exh. 1; *Data Collection Handbook to Support Modeling Impacts of Radioactive Material in Soil*, C. Yu, et al., Argonne National Laboratory, April 1993, Staff Exh. 6. The Staff assumed the gradient of the groundwater surface to follow the slope of the Chinle Formation surface, 0.02 cm/cm towards the south-southwest, as set forth on DEIS page 3-35. Toblin EC-1, Tr. at 657; Staff Exh. 1b. These figures result in a Darcy Velocity  $V_d = 0.0002$  cm/sec or 63.1 m/yr. Toblin EC-1, Tr. at 658.

4.18 For the stormwater detention basin, the Staff estimated the volumetric rate of water

movement from the basin as the precipitation rate (46.1 cm/yr) falling on the basin's drainage area of 39 hectares. Toblin EC-1, Tr. at 657. The Staff used this rate because it represented a conservative value since it assumes a greater volume of available water by not accounting for runoff infiltration, evaporation of runoff water and basin water, or evapotranspiration. *Id.* The Staff's resulting estimate of flow from the stormwater detention basin (the product of the precipitation rate and the drainage area) was 180,000 m<sup>3</sup>/yr. *Id.*

4.19 The velocity through the soil pores ( $V_p$ ) was determined by dividing the Darcy Velocity ( $V_d$ ) by the site soil porosity ( $p$ ). The Staff used a conservative value of 0.25 as the value for  $p$ . Toblin EC-1, Tr. at 658; Staff Exh. 6; Staff Exh. 1b. The Staff found the resulting pore velocity ( $V_p$ ) to be 252 m/yr. Toblin EC-1, Tr. at 658.

4.20 The Staff also performed a calculation to determine the dimensions of potential perched bodies of groundwater at the alluvium/Chinle interface. The Staff performed separate calculations for the dimensions of potential perched water which may flow from the stormwater detention basin, and for that which may flow from the septic field. Toblin EC-1, Tr. at 658-9. For the stormwater detention basin, the Staff determined the cross-sectional area of the perched water body to be 2850 m<sup>2</sup> (the flow rate from the stormwater detention basin (180,000 m<sup>3</sup>/yr) divided by the  $V_d$  of 63 m/yr). *Id.* at 659. For the septic system, the Staff determined the cross-sectional area of the perched water body to be 116 m<sup>2</sup> (the actual system discharge (7.3 million liters/yr) divided by the  $V_d$  of 63 m/yr). *Id.* The Staff then added the results of these calculations together to determine the total area of potential perched water. *Id.*

4.21 Because the calculation of the dimensions of potential perched water from the stormwater detention basin explained above provides only a one-dimensional surface area, the Staff performed additional calculations to estimate the depth of this potential perched water body. For the stormwater detention basin, the Staff assumed that the average width of the underlying perched water body would be 1000 meters, approximately twice the width of the basin

perpendicular to the direction of flow. Toblin EC-1, Tr. at 659. Therefore, the perched water body depth, 2.85 meters, is its cross-sectional area (2850 m<sup>2</sup>) divided by the assumed width (1000 m). *Id.*

4.22 The Staff also performed an additional calculation to estimate the depth of any perched water body forming under the septic system. The Staff assumed that the average width of the underlying perched water body would be 100 meters, approximately three times its characteristic length of the square root of the combined area of the leach fields (892 square meters, or 9600 square feet). Toblin EC-1, Tr. at 659; LES Exh. 1. Therefore, the perched water body depth, 1.16 meters, is its cross-sectional area (116 m<sup>2</sup>) divided by its assumed width (100 m). *Id.* at 659.

4.23 Although “calculations” per se are not performed in order to determine possible discharge areas for potential perched water bodies at the proposed NEF, the NRC Staff considered whether any springs were identified near the site and downgradient from it. Toblin EC-1, Tr. at 660. Finding none, Mr. Toblin then looked to the nearest downgradient water body into which perched water might discharge. *Id.* Mr. Toblin found that Monument Draw, approximately 3 miles south-southwest of the site, is an intermittent stream and the nearest downgradient water body to the proposed site. *Id.*; Staff Exh. 1b. The Staff therefore concluded that if any perched water does not evapotranspire before it reaches Monument Draw, it will discharge there. Toblin EC-1, Tr. at 660. However, the Staff noted that because of the intermittent nature of flow in Monument Draw, it is an unpredictable and unreliable source of water. *Id.*

4.24 The Licensing Board notes that during the hearing and in its pre-filed testimony, NIRS/PC elicited testimony regarding gravel underlying the proposed site. Tr. at 498, 700-701. The apparent purpose of this testimony was to challenge the reasonableness of aspects of the NRC Staff’s calculation of flow rates of potential perched water bodies. However, as the Board noted in its January 21, 2005 ruling, “this portion of the contention focused on the staff’s purported

failure to provide an explanation relative to these DEIS calculations, an omission that the staff, in the evidentiary materials being presented to the Board, apparently is prepared to indicate has been corrected.” Memorandum and Order (Ruling on In Limine Motions and Providing Administrative Directives), at p. 5. In this Order, the Board concluded that, if at the point NIRS/PC had a concern about the substance of the Staff’s response, the appropriate action would have been promptly to amend their contention to specify the nature of their concerns with that response. *Id.* Because NIRS/PC failed to do so, Basis (A) of the contention as admitted relates only to the omission by the Staff of explaining the calculations provided in the DEIS; it does not allow for challenges as to the adequacy and reasonableness of those calculations. The Board finds that since the NRC Staff provided explanations for its determinations of flow rates and dimensions of potential perched water bodies and discharge areas in both its November 10, 2004 NRC Response to NIRS/PC Interrogatories and in pre-filed testimony of Alan Toblin (Toblin EC-1), the omission alleged in Basis (A) has been cured.

5. Basis (B)

4.25 Section 4.2.6.2 of the DEIS describes the two lined basins at the proposed NEF. Staff Exh. 1b. Figure 4-2 of the DEIS depicts the basins and septic tank system locations at the proposed site. *Id.* at p. 4-12.

4.26 The parties presented testimony regarding the possibility of leakage from two lined basins at the proposed NEF: the treated effluent evaporative basin (“TEEB”) and the uranium byproduct cylinder storage pad stormwater retention basin (“USPSRB”). We begin first with the argument presented by NIRS/PC, discuss the testimony presented by the LES panel on this basis, and then discuss the testimony of the NRC Staff.

4.27 Mr. Harper of the LES panel on NIRS/PC EC-1 testified that both the TEEB and USPSRB are lined basins. The TEEB is a double-lined basin with a leak-detection system between the liners. Harper/Peery, Tr. at 393. The structure of the TEEB from the bottom up is: a two foot

prepared clay layer, membrane liner, drainage collection (leak detection) system consisting of pipes and a drainage map, a second liner, and a layer of clay at least one foot deep. Tr. at 602. The TEEB would contain uranium-bearing effluent from the Liquid Effluent Collection and Treatment System. Harper/Peery, Tr. at 393; Toblin EC-1, Tr. at 662. The TEEB will also be utilized to collect and contain shower, hand wash, and laundry effluents. Harper/Peery, Tr. at 393. The structure of the USPSRB from the bottom up is: a two foot layer of clay, the liner, and one foot of clay. Tr. at 603. The USPSRB will serve to collect and contain (1) cooling tower blowdown discharges, (2) heating boiler blowdown discharges, and (3) stormwater runoff from the UBC Storage Pad. Harper/Perry, Tr. at 393. These sources are not expected to be contaminated with NRC-licensed material. The blowdown contained in the USPSRB are normal components of drinking water, such as calcium, chloride, magnesium, sodium and sulfate. Staff Exh. 1b, at p. 3-41.

4.28 Mr. Harper also testified that liners for both basins will be installed in accordance with New Mexico Environment Department (“NMED”) Guidelines and will be pre-approved by both a professional engineer and NMED prior to installation. Tr. at 603. In response to the Board’s questioning, Mr. Harper indicated that these liners are in wide use, and therefore, there is much experience with their installation. *Id.* at 604. In further response to the Board’s questioning, Mr. Harper noted that there are methods to identify, locate and patch leaks. *Id.* at 603.

4.29 Uranium will only be expected in the TEEB, which has the added protection of two liners and a leak detection system. Nevertheless, LES expects that 390 microcuries per year of uranium will be discharged to the TEEB. Harper/Peery, Tr. at 395. LES determined that, even if one assumed the total amount of uranium to be discharged to the TEEB over 30 years were assumed to infiltrate into the soil to a depth of 20 feet below ground surface and over an area equal to that of the TEEB, that uranium would be equivalent to the uranium naturally occurring in the NEF site soil. *Id.*; *Calculation Summary Sheet, “TEEB Soil Concentration and Integrated Liner Dose (Document Identifier 32-2400589-00),”* LES Exh. 10. LES further testified that it will install

6 monitoring wells at 5 locations to monitor groundwater in the shallowest saturated unit approximately 220 feet below ground surface. *Id.* at 396; Tr. at 609. A water balance of the TEEB indicated that the basin would be dry for 1 to 8 months of the year, depending on precipitation rates. Harper/Peery, Tr. at 395; *Excerpts from NEF #04-019, "Response to NRC Request for Additional Information Regarding the National Enrichment Facility Environmental Report"* (May 20, 2004) (sensitive information omitted), LES Exh. 3, at Attachment 1; *Calculation Summary Sheet, "Water Balance Table for National Enrichment Facility Basins (Documents Identifier 32-5047375-00),"* LES Exh. 9.

4.30 With regard to the USPSRB, LES presented testimony that it is highly unlikely that water discharges to this basin would include contamination in any appreciable amounts for several reasons. Harper/Peery, Tr. at 396. One such reason is that Uranium Byproduct Cylinders ("UBC") containing any DUF<sub>6</sub> will be surveyed for external contamination before being placed on the UBC Storage Pad and will also be monitored during their storage on the pad. *Id.* The USPSRB will remain dry for 2 to 12 months of the year, depending on precipitation rates. *Id.* at 397; LES Exh. 9; *LES Revision to Applications for a Material License Under 10 CFR 70 "Domestic licensing of special nuclear material," 10 CFR 40 "Domestic licensing of source material," & 10 CFR 30 "Rules of general applicability to domestic licensing of byproduct material,"* July 30, 2004, Staff Exh. 13. LES testified that water and sediment samples will be collected quarterly from the USPSRB to ensure that uranic material is not being deposited in the basin. Harper/Peery, Tr. at 397.

4.31 Mr. Toblin of the NRC Staff testified that there is no way to predict the probability, frequency or rate of leakage that will occur with any degree of certainty because these depend on the performance of the specific liner material used in these types of basins over time. Toblin EC-1, Tr. at 661. Although NIRS/PC pointed to a study conducted by the Southwest Research Institute to survey liner leakage, the Staff emphasized that the results of the survey were based on observations of a variety of materials and thicknesses and a wide range of sizes and types of

basins, and therefore do not reflect the specific conditions at the proposed NEF. *Id.* Mr. Toblin indicated that the designs for the TEEB and USPSRB have not been finalized, but that even with this information, one would not be able to analyze the probability of leakage of any particular liner. The NRC Staff reiterated that although the Southwest Research Institute had conducted a survey of liner leakage, no valid conclusions could be drawn on the relationship of liner material type to numbers and types of leaks. Tr. at 761; *Detection and Location of Leaks in Geomembrane Liners Using an Electrical Method: Case Histories*, D.L. Laine & M.P. Miklas, Southwest Research Institute, San Antonio, Texas (Nov. 1989), LES Exh. 72, at p. 39. As stated in the survey, relied upon by NIRS/PC to support its claim that determining liner leakage was possible, “[n]o significant numerical relationships between leaks, leak occurrence, and types of leaks can be developed on leaks discovered beneath soil covers because of the limited field testing experience in such environments.” Tr. at 761; LES Exh. 72, at p. 39.

4.32 Mr. Toblin stated that it is possible to minimize leakage of lined basins through proper installation and adherence to industry standards. Toblin EC-1, Tr. at 663. Reiterating the testimony of the LES panel, Mr. Toblin stated that LES has committed to assuring that liners for the TEEB and USPSRB be installed according to specific NMED guidelines, and would be performed by manufacturer-certified installers. *Id.*

4.33 Mr. Toblin indicated that, should a leak develop and depending on the size of the leak, water from the TEEB or USPSRB could eventually saturate the clay underlying the basin. Toblin EC-1, Tr. at 664. Since compacted clay would be used, its permeability would be very low. *Id.* This clay layer underlying the lower synthetic liner of the TEEB would also tend to adsorb and hold any small amount of uranium that might be released, thereby preventing the escape of uranium beyond this layer. *Id.* at 665. The NRC Staff determined that any water that could potentially leak from the lined basins could eventually make its way down to the alluvium/Chinle interface and mix with water from the stormwater detention basin and septic systems, or would

evapotranspire. *Id.* at 664. For the foregoing reasons, assuming a leak in the TEEB liners or USPSRB liner, the NRC Staff concluded that any potential water leaked would not be of significant environmental concern. *Id.*

4.34 NIRS/PC testified that LES and the NRC Staff had not addressed the possibility that lined basins at the proposed NEF site would leak. Rice, EC-1, Tr. at 786. Mr. Rice stated that LES and the NRC should investigate the possibility that the lined basins may leak, and then use the results of this investigation to determine the fate of any water and contaminants that may leak. *Id.* at 787. During cross-examination of Mr. Toblin on Basis (B), NIRS/PC focused much of its questions on what information is needed in order to project a probability and frequency of leakage of lined basins. Tr. at 718. In doing so, NIRS/PC relied heavily upon incidents of leakage surveyed in the Southwest Research Institute article discussed in Section 4.31, *supra*. *Id.* at 717. For the reasons previously explained in Section 4.31, we are not persuaded by NIRS/PC's position regarding the ability to predict probability and frequency of liner leakage, and find that the Staff's position is more appropriate.

4.35 The Licensing Board, upon careful evaluation of the evidence presented by the parties, concludes that a scientifically sound means of estimating the probability and frequency of liner leakage from the lined basins proposed to be constructed at the NEF has not been presented based on the information currently available. Therefore, the fact that the Staff did not perform such an analysis does not represent a shortcoming in the DEIS. Furthermore, we find that the NRC Staff adequately explained the fate of any water and contaminants that may leak from these lined basins, as set forth in the EC-1 direct pre-filed testimony of Mr. Toblin and addressed in Section 4.33, *supra*.

6. Basis (C)

4.36 Recharge is defined as "the entry into the saturated zone of water made available at the water-table surface, together with the associated flow away from the water table within the

saturated zone.” “Revised Prefiled Rebuttal Testimony of George A. Harper and Roger L. Peery on Behalf of Louisiana Energy Services, L.P. on Contention NIRS/PC EC-1 (“Impacts Upon Ground and Surface Water”), February 3, 2005” (“Harper/Peery Rebuttal”), Tr. at 447. Precipitation recharge is a factor used to assess movement of water and any potential contaminants in that water. Toblin EC-1, Tr. at 666. Section 3.8.1 of the DEIS discusses site and regional hydrogeology, including the lack of precipitation recharge. The DEIS noted that field investigations and computer modeling show that no precipitation recharge occurs at sites with thick vadose zones, such as the proposed NEF. Staff Exh. 1b, at p. 3-35.

4.37 Information about the hydrogeological conditions (including the presence of water) at the NEF and surrounding areas were obtained in part through an analysis of borings. At the neighboring WCS site, 55 soil borings were taken to depths of 200 to 300 feet, and 12 soil borings were taken to a depth of 45 feet. Tr. at 501; LES Exh. 3, Tab E, at p. 2. Fourteen soil borings were taken from the NEF site itself, all of which were drilled to the top of the Chinle. LES Exh. 3, Tab L, at Appendix A; *Draft Report of Preliminary Subsurface Exploration, Proposed National Enrichment Facility, Lea County, New Mexico*, Mactec Engineering and Consulting, Inc. (Oct. 2003), p. 7, Staff Exh. 8.

4.38 The parties presented testimony on the presence of moisture found in 2 of the 14 borings drilled at the proposed NEF site. The first boring is Cook-Joyce groundwater exploration boring B-9, which indicated slight moisture in the 6 to 14 foot range below ground. LES Exh. 3, Tab L, at Appendix A. The second boring is Mactec geotechnical boring B-2, which indicated that it was “moist” in the range of 35 to 41.4 feet below ground. *Id.* Other than these 2 occurrences, all soil layer notations from the 14 borings taken from the NEF site were reported as being dry. Toblin EC-1, Tr. at 667. NIRS/PC posited that the moisture in these 2 borings were indications of episodic recharge because its witness, Mr. Rice, believed that a portion of infiltrated precipitation would make its way to the alluvial/Chinle contact and flow along the contact. “Rebuttal

Testimony of George Rice on Behalf of Nuclear Information and Resource Service and Public Citizen, NIRS/PC Contention EC-1, Jan. 28, 2005" ("Rice EC-1 Rebuttal"), Tr. at 810.

4.39 LES witness Mr. Peery testified that the moisture observed in the two samples likely represented some "residual" moisture attributable to the moisture storage capacity of the soil in the vadose zone. Harper/Peery, Tr. at 424. Mr. Peery stated that the moisture that was logged was not a reflection of the existence of saturated conditions at the site. *Id.* As evidence of this, Mr. Peery pointed to the fact that these were two isolated findings showing a limited amount of moisture out of extensive boring data from the NEF site, the remainder of which showed entirely dry conditions. Mr. Peery concluded that the totality of the boring information indicated that saturated conditions do not exist in the alluvium beneath those sites, and that the first continuous saturated unit beneath the proposed NEF site occurs at a depth of approximately 220 feet. *Id.*

4.40 During cross-examination of the LES panel, NIRS/PC focused extensively on the presence of moisture found in borings taken at the WCS site. Tr. at 538-544. LES experts testified that the individuals who logged these moist borings indicated that these notations are only indicative of moisture, not of saturated conditions. *Id.* at 540. Mr. Peery testified that for the WCS borings noted as having moisture, the moisture was logged at the alluvial/red bed contact, followed by a notation of dry conditions at the Chinle below it, indicating that water does not migrate vertically through the Chinle red bed surface. *Id.* at 544.

4.41 The NRC Staff expert witness testified that despite the presence of moisture in the 2 borings, it was his professional opinion that there is no precipitation recharge at the proposed site. Mr. Toblin noted that precipitation recharge is a phenomenon that would be noted over a wide area at multiple borings and that, given the consistency of the alluvial soil and the relatively small size of the proposed site, if precipitation recharge existed there, one would expect multiple borings across the site to produce cuttings that were moist. Toblin EC-1, Tr. at 666.

4.42 DEIS Figure 3-21 depicts the breadth and spacing of the 14 borings that were drilled

at the proposed NEF site. Staff Exh. 1b, at p. 3-36. As indicated by Mr. Toblin, the breadth and spacing of these borings are such that precipitation recharge would be detected through the presence of moisture at multiple borings, which was not the case. Toblin EC-1, Tr. at 666. In fact, of the multiple (approximately 5) layers logged at the each of the 14 borings, only 1 layer of one boring was logged as “moist” and only 1 layer of another boring was logged as having “slight moisture.” *Id.* at 667.

4.43 The Staff indicated that the presence of moisture in boring B-9 does not conflict with the statement in the DEIS regarding the lack of precipitation recharge. By way of explanation, Mr. Toblin noted that the moisture in boring B-9 was at a depth of 6 to 14 feet below ground, and that both above and below these layers, the soils are noted as very dry. Toblin EC-1, Tr. at 667; LES Exh. 3, Tab L, at Appendix A. He testified that the lack of any evidence of the moisture seeping further downward is consistent with the conclusion that precipitation does not seep deeply into the ground at the proposed site. Toblin EC-1, Tr. at 667. Mr. Toblin indicated that instead, precipitation can infiltrate into shallow portions of the subsurface where it is subject to upward hydraulic gradients caused by vaporization and evapotranspiration, drawing water upwards. *Id.*; Staff Exh. 1b, at p. 3-35. The Staff further noted that the indication of moisture in the top of the Chinle Formation in boring B-2 is an isolated observation. Toblin EC-1, Tr. at 667.

4.44 After considering the evidence presented by the parties, the Licensing Board finds that, notwithstanding the presence of moisture in borings B-2 and B-9 at the proposed NEF site, the statement in the DEIS that there is no precipitation recharge is reasonably supported. The Board finds that there is sufficient evidence that precipitation recharge does not exist at the proposed site, and that NIRS/PC's offering that “the most straightforward explanation for the presence of this moisture is that it represents residual water from episodic recharge events” (Rice EC-1, Tr. at 776) is unconvincing in the face of the other evidence presented.

7. Basis (D)

4.45 Section 3.8.1 of the DEIS states that “[a]lthough 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.” Staff Exh. 1b, at p. 3-35. The DEIS also explains that visual inspection of the Chinle clay has shown that it is continuous, solid, and tight with few fracture planes. *Id.* Permeability pertains to the ability of a soil or rock mass to transmit fluids. Toblin EC-1, Tr. at 669. When discussing hydrogeology, the terms of permeability and hydraulic conductivity are often used interchangeably. *Id.* Permeability can be measured in the laboratory or in the field. *Id.* In the laboratory, permeability is typically determined by measuring the flow transmitted by field samples of the geologic medium being investigated under conditions of known hydraulic head. *Id.* Slug tests are a common method of in-situ field testing used for measuring permeability; the test consists of suddenly changing the static water level in a well by, for example, adding or removing water. *Id.* at 670. As the water level returns back to its static level, it is tracked and the water level over time is compared with theoretical models. *Id.*

4.46 LES experts testified that the various investigations performed and the data available for the NEF and WCS sites suggest that there are no subsurface fractures or other fast pathways that would allow water to flow rapidly from the alluvium to the Chinle, or from the Chinle to the Santa Rosa. Harper/Peery, Tr. at 402. Mr. Harper and Mr. Peery pointed to the confined nature of the water-bearing unit at approximately 220 feet below ground surface as an indication that there are no highly fractured zones that serve as fast flow paths. *Id.* at 403. The LES witnesses further stated that the low permeability of the Chinle red beds underlying the proposed site also 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. *Id.* Mr. Peery summarized that the various water-bearing zones beneath the proposed NEF

were of a confined nature and have very large differences in hydraulic head, which is a measurement of the pressure in a confined saturated body. Harper/Peery Rebuttal, Tr. at 452. Differences in hydraulic head indicate a lack of hydraulic communication and strongly suggest that there are no fracture zones that act as fast flow paths. Harper/Peery, Tr. at 389; Harper/Peery Rebuttal, Tr. at 452.

4.47 LES experts indicated that even if the fractures did exist, they are not necessarily continuous or interconnected to a degree which would be conducive to enhanced fluid flow. Harper/Peery, Tr. at 403; Tr. at 580-581. Mr. Harper and Mr. Peery testified that it is unlikely that fractures/fracture zones would extend the entire depth of the alluvium or the Chinle clays, and that any such fractures may be “self-healing” in nature due to the presence of clay within the fractures, which swells as it becomes hydrated. Harper/Peery, Tr. at 403.

4.48 The NRC Staff’s witness essentially agreed with the Applicant on this issue. Mr. Toblin stated that the results of the investigations near the proposed NEF site indicate that it is unlikely that there are fracture zones which lead to fast flow paths. Toblin EC-1, Tr. at 672. Mr. Toblin testified that fracture orientation is an important characteristic of determining whether the presence of fracture zones indicates fast flow paths; fractures have to be aligned parallel to the direction in which water would flow in order to provide effective pathways for water flow. *Id.* at 669. Mr. Toblin further indicated that the fractures would have to remain open and not be filled with cementing materials, such as clay or carbonate materials. *Id.* Fractures in this type of material are subject to closure over time due to swelling of the surrounding clay. *Id.* at 671-672; Peery, Tr. at 578. Overall, the lack of interconnectivity, the lack of proper orientation, or the filling of fracture apertures with minerals can result in the absence of fast flow paths even where fractures are known to exist. *Id.* at 669.

4.49 Two types of permeability measurements were taken at or near the proposed NEF site. The first consisted of laboratory measurements of core samples. A total of 36 tests of vertical

permeabilities and 6 horizontal permeabilities were performed in the laboratory on samples taken from the Chinle Formation under the WCS site. Toblin EC-1, Tr. at 670; LES Exh. 3, Tab E. The second permeability measurement consisted of a slug test performed in Monitoring Well 2 ("MW-2"), located approximately 220 feet beneath the proposed NEF site. Toblin EC-1, Tr. at 670; LES Exh. 3, Tab L.

4.50 Permeabilities determined by the lab tests at WCS range from less than  $10^{-9}$  to  $1.76 \times 10^{-8}$  cm/sec for the clay taken from the Chinle Formation. Toblin EC-1, Tr. at 671. Lab tests on the sandstone and siltstone beds determined a range of permeabilities from  $2.58 \times 10^{-8}$  to  $1.93 \times 10^{-6}$  cm/sec. *Id.* A permeability of  $3.7 \times 10^{-6}$  cm/sec was measured with the slug test performed for the 220 foot elevation siltstone bed within the Chinle Formation in MW-2 at the proposed NEF site. *Id.*

4.51 LES witness Mr. Peery emphasized that, contrary to NIRS/PC's assertions, the permeability measurements taken at or near the proposed NEF site were in no way "limited." He indicated that these measurements were gathered from a variety of investigations conducted at the proposed NEF site, the neighboring WCS site, and the nearby Lea County Landfill. Harper/Peery, Tr. at 390-392. According to Mr. Peery, the extensive permeability and hydraulic conductivity data obtained from these sites confirm that the Chinle Formation sediments underlying the site are not highly transmissive. Harper/Peery Rebuttal, Tr. at 452.

4.52 The NRC Staff agreed that the permeability findings from samples taken from the WCS site were applicable to the proposed NEF site because of their similar underlying geologic structures, including the Chinle Formation. Toblin EC-1, Tr. at 670. Mr. Toblin found that the large number of samples taken within the Chinle Formation in close proximity to and at the proposed NEF site represent a reliable indicator of the permeability of this geologic unit. *Id.* at 671.

4.53 NIRS/PC argued that laboratory measurement of core samples may underestimate the bulk of permeability of a unit because they do not account for fractures and other features that

may act as preferential flow paths. Rice EC-1, Tr. at 779. NIRS/PC presented an illustration by Mr. Rice purporting to depict the underestimation of a unit's permeability in laboratory measurements. *Laboratory Hydraulic Conductivity*, Figure 2, G. Rice, NIRS Exh. 39.

4.54 The Staff noted that Mr. Rice's illustration entitled "Field vs. Laboratory Hydraulic Conductivity" (NIRS/PC Exh. 39) does not apply to the laboratory measurements taken of the Chinle. "NRC Staff Rebuttal Testimony of Alan Toblin Concerning Nuclear Information and Resource Service and Public Citizen Environmental Contention 1 ("NIRS/PC EC-1") (Impacts Upon Ground and Surface Water)," February 3, 2005 ("Toblin EC-1 Rebuttal"), Tr. at 692. Mr. Toblin emphasized that Mr. Rice's figure was drawn from a source (*Measurement of the Hydraulic Conductivity of Fine-Grained Soils*, R.E. Olson & D.E. Daniel, ASTM Special Technical Publication 746, 1981, NIRS/PC Exh. 43) which describes the relationship between laboratory and field measurements of fine-grained soils. *Id.* Field-measured conductivities are often greater than those measured in the laboratory for such material because the soil which is brought to the lab has been subject to compaction during drilling and handling. *Id.* However, consolidated (rock-like) formations like the Chinle show different behavior, in that such material is subjected to fracturing (caused by drilling and handling), rather than compaction. *Id.* Therefore, permeabilities of material taken from the Chinle and measured in the lab would tend to be greater than those obtained in the field. *Id.* Mr. Peery agreed with the Staff's explanation of this phenomenon at the hearing. Tr. at 557-558.

4.55 Based on the foregoing, the Licensing Board finds that adequate investigation of the proposed site has been conducted by virtue of the permeability and hydraulic conductivity data obtained from WCS, the Lea County Municipal Landfill, and the NEF, all of which suggest that fractures are not present under the proposed site. Considered in the context of that information, we find that the laboratory measurements and slug test relied upon by the Staff are not "restricted" data, but are reliable bases for concluding that the permeability of the soil beneath the proposed

site is very low. Therefore, the Staff's conclusion in the DEIS that fracture zones are unlikely to exist at the proposed site is reasonable and based on a thorough analysis of site conditions. Considering this information in light of credible expert testimony, we also conclude that even in the event that fractures do exist below the proposed NEF site, their mere presence does not necessarily form fast flow paths for the transport of water.

8. Basis (E)

4.56 The Site Stormwater Detention Basin ("SSDB") to which Basis (E) refers will collect and contain stormwater from the developed areas of the site (other than the UBC Storage Pad). Toblin EC-1, Tr. at 673. The SSDB has a drainage area of 39 hectares (96 acres) and would have approximately 123,350 cubic meters (100 acre-feet) storage capacity. *Id.* The surface area of the SSDB at high water elevation would be 19 acres, and the SSDB would be sized to contain the volume equal to that for the 24-hour, 100-year return period storm. *Id.*; *New Mexico Groundwater Discharge Permit Application for the National Enrichment Facility* (Apr. 26, 2004, as revised on Oct. 14, 2004), LES Exh. 4 at p. 11.

4.57 Mr. Harper testified that facility effluents and site runoff are not expected to contain contaminants in levels that exceed any applicable regulatory limits. Harper/Peery, Tr. at 411. Mr. Harper reiterated that LES plans to install monitoring wells at 5 locations at the proposed site. *Id.* The monitoring wells will be located as follows: one well at the northern boundary of the site, between the NEF site and the Wallach quarry; two wells on the southern edge of the UBC Storage Pad; and one well located on the southeastern corner of the SSDB. *Id.* The proposed location of these wells are depicted at Figure 6-2 of the DEIS. Staff Exh. 1b, at p. 6-2. Mr. Harper indicated that these wells will be used to monitor the siltstone/silty sandstone unit at approximately 220 feet below ground surface. *Id.* At the upgradient background monitoring well location (at the northern boundary of the proposed site), a well will be screened to monitor any water that might occur in the vicinity of the alluvium/Chinle contact, although LES has not found water in this zone during its site

investigations. *Id.* at 412.

4.58 Mr. Harper further testified that LES will conduct monitoring of site stormwater runoff in accordance with applicable Federal/State requirements. Harper/Peery, Tr. at 426. The NEF ER also states LES's commitment to have its monitoring program reflect applicable regulatory requirements, and for the SSDB to adhere to the requirements of the Groundwater Discharge Permit/Plan from the New Mexico Water Quality Board. *Id.* Mr. Harper testified that he believes LES's proposed plan is adequate in view of applicable regulatory requirements and site conditions, and the fact that the applicable permitting processes were still in progress. *Id.*

4.59 The SSDB is described in the DEIS at page 4-13. Staff Exh. 1b. The DEIS also addresses the contents of the stormwater runoff at pages 4-10 & 4-11. *Id.* LES's planned implementation of the Spill Prevention Control and Countermeasures Plan and its Stormwater Pollution Prevention Plan are discussed at DEIS pages 4-10 and 4-15, respectively. *Id.* The DEIS further discloses the presence of all contaminants one would expect to be involved in an industrial accident in Table 4-21 of the DEIS, which lists all process chemicals and gases which would be used at the proposed NEF. *Id.* In describing LES's monitoring program, the DEIS sets forth the parameters which will be monitored in Table 6-9. *Draft Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*, NUREG-1790, September 2004 (Unredacted Sensitive Version), Staff Exh. 1a, at p. 6-18.

4.60 Mr. Toblin testified that he expected some contamination of stormwater runoff at the proposed NEF site, but that these contaminants would be typical of industrial facility activities such as vehicle maintenance and fueling, filling storage tanks, and painting operations. Toblin EC-1, Tr. at 673; Staff Exh. 1b, at pp. 4-10, 4-11. Mr. Toblin acknowledged that not all potential contaminants are specifically listed in the DEIS, but that the general categories which encompass them are listed as the parameters that will be evaluated as part of the stormwater monitoring program. Toblin EC-1, Tr. at 673; Staff Exh. 1b, at Table 6-9.

4.61 Mr. Toblin further stated that although it is possible that stormwater runoff could be contaminated by spills and accidents, the DEIS at page 4-10 discusses LES's planned implementation of the Spill Prevention Control and Countermeasures Plan during construction and operation. Toblin EC-1, Tr. at 673. This plan would minimize releases from spills and accidents to site soils and would thereby reduce the impact of spills and releases into stormwater runoff. *Id.* at 674. Mr. Toblin also indicated that the potential contaminants one would expect to be involved in an industrial accident are included in the list of all process chemicals and gases to be used at the proposed NEF at Table 4-21 of the DEIS. *Id.*; Staff Exh. 1a.

4.62 With respect to the presence of PAHs and other organics referred to in Basis (E), Mr. Toblin testified that these contaminants are traditionally 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. Toblin EC-1, Tr. at 674. PAHs and other organics would typically be expected near highways, major roadways, and parking lots in the vicinity of an industrial facility. *Id.* at 675. Mr. Toblin testified that he believed there was no reason to expect that the presence of PAHs and other organics at the proposed NEF would be any greater than at any other facility located near highways and with parking lots. *Id.*

4.63 Finally, with regard to monitoring stormwater contaminants, the Staff reiterated that LES's Stormwater Monitoring Program, implemented by NMED through the Groundwater Discharge Permit, would include quarterly monitoring of stormwater in the SSDB. Toblin EC-1, Tr. at 675; Staff Exh. 1b, at p. 6-18. Mr. Toblin also noted that Table 6-9 of the DEIS sets forth the parameters to be monitored (oil and grease, total suspended solids, Biological Oxygen Demand "BOD", Chemical Oxygen Demand "COD", phosphorous, nitrogen, pH, nitrates, and metals), but does not specifically include PAHs, aliphatic hydrocarbons or alcohols. *Id.* at 675-676. However, Mr. Toblin explained that the monitoring of two of the parameters listed in the DEIS, BODs and CODs, would detect the presence of these contaminants. *Id.*

4.64 The Licensing Board finds that the DEIS sufficiently identifies the potential contaminants in the stormwater runoff and adequately explains their monitoring through the Stormwater Monitoring Program. We need not address NIRS/PC's argument that simply because certain contaminants such as PAHs and other organics are not specifically identified, they will not be adequately monitored. Monitoring of these contaminants is regulated through the Groundwater Discharge Permit by the State, not the NRC. Therefore, while the Staff is required to explain the monitoring in its DEIS, it is not tasked with determining compliance with State requirements; that will be determined through the State permitting process. The Board also finds that the contaminants identified by NIRS/PC – PAHs and other organics – are covered in the BOD and COD monitoring parameters as described in Table 6-9 of the DEIS. The amount of detail required in an EIS has been described as “that which is sufficient to enable those who did not have a part in its compilation to understand and consider meaningfully the factors involved.” *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719, 737 (3d Cir. 1989); *Environmental Defense Fund, Inc. v. Corps of Engineers*, 492 F.2d 1123, 1136 (5th Cir. 1974). Based on this standard, the Licensing Board finds that the Staff has disclosed potential contaminants and described LES's proposed monitoring in sufficient detail to satisfy its NEPA obligation.

B. NIRS/PC EC-2 (Impacts Upon Water Supplies)

1. Background

4.65 As admitted by the Licensing Board in its Memorandum and Order (Rulings Regarding Standing, Contentions, and Procedural/Administrative Matters) of July 19, 2004, and modified by the Licensing Board's Memorandum and Order (Ruling on Late-Filed Contentions) of November 22, 2004, EC-2 states that:

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 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.

## 2. Testimony Presented

4.66 In accordance with the Licensing Board's scheduling orders, prefiled written testimony concerning NIRS/PC EC-2 was submitted by the Applicant, NIRS/PC and the NRC Staff. The Applicant's witnesses appeared first, followed by the Staff's witnesses, with NIRS/PC's witnesses testifying last.

4.67 The Applicant presented five witnesses in support of this contention. These were: (1) Mr. Rod M. Krich, Vice President of Licensing, Safety and Nuclear Engineering for LES, the license applicant in this matter, and Exelon Vice President Licensing Projects ("Prefiled Testimony of Rod M. Krich, George R. Campbell, Roger L. Peery, Len R. Stokes, and Timothy Woomer on Behalf of Louisiana Energy Services, L.P. Regarding Contention NIRS/PC EC-2 ("Impacts Upon Water Supplies")" ("Krich, et al. EC-2"), Tr. at 1184); (2) Mr. George R. Campbell, Senior Mechanical Engineering Consultant for Lockwood Greene Engineering & Construction, who served as a primary contractor on the NEF project (Krich, et al. EC-2, Tr. at 1186-7); (3) Mr. Roger L. Peery, Chief Executive Officer and Senior Hydrologist at John Shomaker & Associates, Inc. (which contributed to the *Lea County Regional Water Plan*), who was hired by LES as an expert witness on hydrogeological and water resource issues in this proceeding (Krich, et al. EC-2, Tr. at 1187-9); (4) Mr. Len R. Stokes, independent consultant and founder and President of Progressive

Environmental Systems, Inc., who was involved in the development and review of the *Lea County Regional Water Plan* and hired by LES as an expert witness on water resources issues (Krich, et al. EC-2, Tr. at 1189-90); and (5) Mr. Timothy M. Woomer, Director of Utilities for the City of Hobbs, New Mexico, who negotiated and executed a memorandum of understanding with LES in which Hobbs agreed to make potable water from the Hobbs municipal system available to the NEF for the life of the facility (Krich, et al. EC-2, Tr. at 1191-2).

4.68 Applicant witness Rod Krich received a Master of Science degree in Nuclear Engineering from the University of Illinois, and a Bachelor of Science degree in Mechanical Engineering for the New Jersey Institute of Technology. Krich, et al. EC-2, Tr. at 1185. Mr. Krich is responsible for leading LES's effort to obtain a license from the NRC, as well as other relevant state and federal permits, to construct and operate the proposed NEF. *Id.* In addition, he has over 30 years of experience in the nuclear industry, in such areas as engineering, licensing, and regulatory matters. *Id.* This experience encompasses design, licensing and operation of nuclear facilities. *Id.* Mr. Krich is also responsible for the implementation of the Quality Assurance Program, as well as ensuring that quality of engineering products and services provided by contractors are acceptable to LES. *Id.* As the Vice President of Licensing, Safety, and Nuclear Engineering for LES, he has overall responsibility for licensing and engineering matters related to the NEF project. *Id.* Mr. Krich oversaw the preparation and submittal of the license application for the NEF, as well as the engineering design of the facility processes and safety systems, and is thus familiar with both the application and NRC requirements and guidance related to the contents of the application. *Id.* He also serves as LES's lead contact with respect to matters related to the NRC Staff's review of the NEF license application. *Id.* The Licensing Board finds that Mr. Krich is familiar with the NEF application, and is well-qualified as an expert on issues related to water supply dealt with therein.

4.69 Applicant witness George R. Campbell holds a Bachelor of Mechanical Engineering Technology from the University of North Carolina at Charlotte. Krich, et al. EC-2, Tr. at 1186. He has over 30 years of experience in the areas of mechanical and process engineering. *Id.* Specifically, he has over 12 years of experience in the nuclear industry that includes power plant design and engineering supervision. *Id.* Mr. Campbell's primary nuclear experience has been piping design and analysis including static and dynamic Class 1, 2, and 3 systems, the development of process and mechanical "Mod Packages," pipe support engineering and analysis, Bulletin 79-14 and 79-04 responsibility for H.B. Robinson Nuclear Plant, and engineering supervision. *Id.* at 1186-7. In his capacity as a Mechanical Engineer at Lockwood Greene, Mr. Campbell was involved in the preparation of certain portions of the NEF application, including the supervision of the design effort for the liquid effluent collection and treatment system, facility engineering for systems such as decontamination, and waste storage and disposal. *Id.* at 1187. He played a principal role in estimating the NEF's water usage requirements, assessing water supply options for the NEF, and negotiating agreements with the cities of Hobbs and Eunice, New Mexico, for the use of water from their municipal water supply systems. *Id.* The Licensing Board finds Mr. Campbell to be well-qualified as an expert on the subject of impacts of the NEF on water supplies.

4.70 The qualifications of Applicant witness Roger Peery were previously discussed in Section 4.5, *supra*. Based on that discussion, the Board finds Mr. Peery to be well-qualified as an expert on the subject of impacts of the NEF on water supplies.

4.71 Len. R. Stokes is President of Progressive Environmental Systems, Inc. ("PES"), where he oversees all professional consulting and project management services provided by PES on water, wastewater, and environmental permitting matters. Krich, et al. EC-2, Tr. at 1190. As President of PES, Mr. Stokes has worked as a water resource consultant in New Mexico for approximately 10 years. *Id.* In this capacity, he has provided water-rights-negotiation, permitting,

contracting and consulting services to numerous clients, including the Lea County Water Users Association. *Id.* He has been certified as an expert witness on water supply and water rights issues by the Federal Bankruptcy Court in Albuquerque, New Mexico. *Id.* Mr. Stokes has carefully reviewed relevant portions of the NEF license application (including the ER) and the DEIS. *Id.* Based on his professional experience, the Licensing Board finds Mr. Stokes to be well-qualified as an expert on the subject of impacts of the NEF on water supplies.

4.72 Timothy M. Woomer obtained a B.S. in Mining Engineering from West Virginia University. As Director of Utilities for the City of Hobbs, New Mexico, Mr. Woomer is responsible for managing and supervising the water production, water distribution, wastewater collection, wastewater treatment, GIS/GPS mapping, billing and warehousing divisions of the City of Hobbs to achieve goals within available resources. Kirch et al., Tr. at 1191. He formulates, evaluates and implements short and long range plans to meet the present and future needs in water, wastewater and solid waste for the City of Hobbs. Mr. Woomer is responsible for maintaining regular contact with consulting engineers, construction project engineers, City, County, State and Federal agencies, professional and technical groups and the general public regarding division activities and services. *Id.* at 1192. He also evaluates and makes recommendations concerning issues and options regarding utilities operations. *Id.* Mr. Woomer negotiated and executed a Memorandum of Understanding with LES, in which the City of Hobbs agreed to make potable water from the Hobbs municipal water supply system available to the NEF for the life of the facility. *Id.* Based on his experience, the Licensing Board finds Mr. Woomer to be well-qualified as an expert on the subject of impacts of the NEF on water supplies.

4.73 The NRC Staff presented one witness, Mr. Alan Toblin, to testify on NIRS/PC EC-2. The professional qualifications of Mr. Toblin were previously discussed in Sections 4.6 - 4.7, *supra*. Based on that discussion, the Licensing Board finds Mr. Toblin to be well-qualified as an expert on the subject of the impacts of the NEF on water supplies.

4.74 NIRS/PC presented one witness, Mr. George Rice, in support of its contention. Mr. Rice's professional qualifications were previously discussed in Section 4.8 - 4.9, *supra*. Based on that discussion, the Licensing Board finds that Mr. Rice is well-qualified as an expert on the subject of the impacts of the NEF on water supplies.

4.75 As set forth in detail below, having considered the testimony and other evidence presented by the parties, we find that the evidence supports a conclusion that the Staff has adequately assessed the potential environmental impacts of the proposed project on water supplies, in accordance with the requirements of 10 C.F.R. Part 51.

3. Merits of NIRS/PC Contention EC-2

4.76 In making our determination as to whether the Staff conducted a complete or adequate assessment of the potential environmental impacts of the proposed project on water supplies in satisfaction of 10 C.F.R. Part 51, we will weigh the parties' testimony on the contention. We first describe the various sources of regional water, move to a discussion of projected water use by the proposed NEF and the adequacy of the NEF ER, and conclude by discussing the Staff's calculations of how pumpage from the proposed NEF would affect water levels and the long-term productivity of the Hobbs well field and the Lea County Underground Water Basin.

4.77 The Ogallala Aquifer is an underground reservoir created millions of years ago that supplies water to the region which includes the proposed NEF site. Toblin EC-2, Tr. at 1313. The aquifer extends under the High Plains from west of the Mississippi River to east of the Rocky Mountains. *Id.* The aquifer system underlies 450,000 square kilometers (174,000 square miles) in parts of eight states (Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming) and approximately 1.5 percent of its water (60 billion cubic meters, or 16 trillion gallons) is located under New Mexico. *Id.* Section 3.8.2.1 of the DEIS, found at page 3-37, provides further details on the Ogallala Aquifer. *Id.*; Staff Exh. 1b.

4.78 The Lea County Underground Water Basin is the portion of the Ogallala Aquifer that lies within Lea County. The groundwater withdrawal in Lea County in 1995 was approximately 600,000 cubic meters (160 million gallons) per day, the majority of which was from the Lea County Underground Water Basin. Toblin EC-2, Tr. at 1313; *Final Report – Lea County Regional Water Plan*, Leedshill-Herkenhoof, Inc., John Shomaker & Associates, Inc., and Montgomery & Andrews, P.A. (Dec. 7, 2000) (no appendices), LES Exh. 26, at p. 1.

4.79 The Hobbs well field is located within the Lea County Underground Water Basin. The well field is north of the city of Hobbs and consists of a set of wells that supply water to the Hobbs and Eunice municipal systems. Toblin EC-2, Tr. at 1313. The Eunice and Hobbs municipal water-supply systems have capacities of 16,350 cubic meters per day (4.32 million gallons) and 75,700 cubic meters per day (20 million gallons), respectively. *Id.* at 1313-4; Krich, et al. EC-2, Tr. at 1196-7; Staff Exh. 1b, at p. 3-39. The combined current usage of both municipal systems is 35,280 cubic meters (9.32 million gallons) per day. *Id.*

4.80 NIRS/PC cited to the *Lea County Regional Water Plan* to emphasize that groundwater in the Lea County Underground Water Basin, a source of water for the proposed facility, is being pumped at a rate faster than it is being recharged. Rice EC-2, Tr. at 1354, LES Exh. 26. NIRS/PC expert Mr. Rice stated that neither the NRC 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. Rice EC-2, Tr. at 1354. Mr. Rice concluded his pre-filed direct testimony by indicating that this alleged deficiency could be solved by simulating pumpage from the Hobbs well field both with and without the additional pumpage required for the NEF. *Id.* at 1355.

4.81 The LES witness panel emphasized the memoranda of understanding between LES and the cities of Hobbs and Eunice to permit the NEF to obtain water from those cities' municipal water supply system. Krich, et al. EC-2, Tr. at 1195; *Letter from T. Woomey, Director of Utilities*

for the City of Hobbs, to J. Shaw, Lockwood Green/Louisiana Energy Services, L.P., RE: NEF Memorandum of Understanding – November 14, 2003 (Jan. 6, 2004), LES Exh. 22; Letter from J. Shaw, Lockwood Green/Louisiana Energy Services, L.P., to Honorable James Brown, Mayor of Eunice, NM, “Subject: National Enrichment Facility (NEF) Memorandum of Understanding” (Jan. 21, 2004), LES Exh. 23. As stated in the NEF ER, the proposed NEF will obtain 100 percent of its water for operational purposes from the municipal water systems of Hobbs and/or Eunice. Krich, et al. EC-2, Tr. at 1195; LES Exh. 1, at Sections 3.4.6, 3.47 and 4.4.5. The NEF ER contains estimates of the proposed NEF’s anticipated normal and peak plant water consumption at Tables 3.4-4 and 3.4-5. LES Exh. 1. The projected water use for the proposed NEF during operation is expected to be approximately 63,423 gallons per day (71.1 acre-feet/year). Krich et al., Tr. at 1196. The estimated peak water usage, which is expected to occur for short periods only a few times over the life of the facility (only when needed to fill the fire water tanks), is 540,000 gallons per day. *Id.* at 1195-6; LES Exh. 1, at Section 4.4.5. The water obtained from Hobbs and/or Eunice will be used for a number of routine process and mechanical applications. Krich, et al. EC-2, Tr. at 1196. The proposed NEF will use the water for things such as decontamination, rinse water, degreasing, operating the cooling water tower, and typical sanitary purposes. *Id.*

4.82 The LES witness panel testified that the projected water usage requirements of the proposed NEF are very small when viewed relative to the current capacities and usages of the Hobbs and Eunice municipal water supply systems. Krich et al., Tr. at 1197. The LES witnesses stated that the projected average (normal) daily water usage by the proposed NEF constitutes only 0.32 percent of the Hobbs system capacity, and 1.02 percent of the current Hobbs system usage rate. *Id.* Similarly, the projected average (normal) daily water usage by the proposed NEF constitutes only 1.47 percent of the Eunice system capacity, and 4.29 percent of the current Eunice system usage rate. *Id.* When combining the Hobbs and Eunice water supply system capacities and usage rates, the projected usage by the proposed NEF amounts to 0.26 percent and

0.83 percent, respectively. *Id.*

4.83 To emphasize its conclusion that withdrawal by the NEF would have negligible impacts on regional water supplies, LES witnesses compared the projected NEF usage to existing withdrawal by other facilities. For example, a press release issued by the Lea County Water Users Association stated that the NEF's expected water usage requirements would amount to roughly 75 acre-feet of water annually, approximately the same amount of water needed to irrigate 25 acres of farmland. Krich, et al. EC-2, Tr. at 1198; *Lea County Water Users Association Press Release Regarding NEF Water Usage Requirements* (Sept. 29, 2003), LES Exh. 24. LES witnesses emphasized that NEF usage is anticipated to be 71.1 acre-feet/year, while the Eunice golf course uses 210 acre-feet/year, the Hobbs Country Club uses 283 acre-feet/year, and the New Mexico Game Commission uses 170 acre-feet/year. *Id.*

4.84 Sections 4.2.6.3, 4.3.6 and 4.4.3 of the DEIS set forth the NRC Staff's evaluation of potential impacts of the proposed NEF on water supplies in Lea County. Toblin EC-2, Tr. at 1314; Staff Exh. 1b. Mr. Toblin testified that the NRC Staff finds such impacts to be small. Toblin EC-2, Tr. at 1314. In making this conclusion, Mr. Toblin compared the projected NEF water use with the capacity of the municipal supply systems of Eunice and Hobbs. *Id.* at 1315. He agreed with LES's testimony that the average water use by the proposed facility would amount to only 0.26 percent of the combined capacity of these two systems. *Id.* Furthermore, Mr. Toblin compared the total projected NEF water use over the life of the facility with the reserves of the Ogallala Aquifer, and found that it would use only 0.004 percent of the Aquifer's reserves within the State of New Mexico. *Id.*

4.85 Mr. Toblin also testified that, by employing the finite-difference numerical computer model of the Lea County Underground Water Basin provided by the New Mexico Office of the State Engineer, he considered how pumpage for the proposed NEF would affect water levels and the long-term productivity of the Hobbs well field or the Lea County Underground Water Basin. Toblin

EC-2, Tr. at 1315; *Numerical Simulation of Groundwater Flow for Water Rights Administration in the Lea County Underground Water Basin New Mexico*, G. Musharrafieh and M. Chudnoff, New Mexico Office of the State Engineer, Hydrology Bureau Report 99-1, January 1999, Staff Exh. 21. He found that the amount of drawdown caused by projected water use by the proposed NEF would only result in a small impact on the long-term water supplies of Lea County. Toblin EC-2, Tr. at 1316.

4.86 Mr. Toblin applied all model assumptions and parameters that were determined by the State based on historical water levels within the basin from 1948 to 1996. Toblin EC-2, Tr. at 1315-6. These parameters were hydraulic conductivity, evapotranspiration, and recharge rate. *Id.* at 1315. Respectively, these parameters govern the rates at which water flows within, is removed from, and is added naturally to the modeled area. *Id.* at 1315-6. The State then used this model to estimate the effect of continued withdrawals on water levels in the Lea County Underground Water Basin to the year 2040. *Id.* at 1316. Using the input files supplied by the State, Mr. Toblin ran the model and reproduced the 1996 and 2040 results for drawdown and saturated water depth given in the State's report. *Id.* He then modeled the additional water withdrawal specifically from the Hobbs well field attributed to usage by the proposed NEF for 2010 to 2040. *Id.* Mr. Toblin stated that he accomplished this by using the same model as described above, but changing the input to reflect the increased water withdrawal specifically from the area north of the city of Hobbs by the projected NEF water usage. *Id.*

4.87 Mr. Toblin stated that his simulation showed that 30 years of water withdrawn for NEF usage would result in 1.2 feet of additional drawdown locally at the Hobbs well field. Toblin EC-2, Tr. at 1316. He testified that this drawdown would decrease with distance so that at approximately 1 and 2 miles from the withdrawal location, the additional drawdown would be 0.4 feet and less than 0.1 feet, respectively, after 30 years. *Id.* Mr. Toblin compared the drawdown which would result from NEF water usage to the remaining saturated thickness at Hobbs in the

year 2040 and found that after accounting for NEF water use, the saturated thickness at Hobbs is approximately 37 feet. *Id.* By comparison, the saturated thickness at Hobbs in 2040 without NEF water use would be approximately 38.2 feet. *Id.*

4.88 After weighing the testimony and evidence presented by the parties, the Licensing Board finds that the Applicant has completely and adequately assessed the potential environmental impacts of the proposed NEF on water supplies. LES sufficiently addressed the amount of water the proposed NEF would use, as well as the sources from which the water would be drawn. The Licensing Board similarly finds that, through the pre-filed direct testimony of Mr. Toblin, the NRC Staff has demonstrated how pumpage from the NEF would affect water levels and long-term productivity of the Hobbs well field and the Lea County Underground Water Basin. Mr. Rice's testimony states that "the long-term effects of water use by the NEF could be estimated by simulating pumpage from the Hobbs well field both with, and without, the additional pumpage required for the proposed NEF." Rice EC-2, Tr. at 1355. We find that the NRC Staff did exactly as Mr. Rice suggested by performing the simulation described in Mr. Toblin's pre-filed direct testimony.

4.89 The Licensing Board takes this opportunity to reiterate a point similarly made in our Ruling on In Limine Motions of January 21, 2005. NIRS/PC Contention EC-2 is partially based on the premise that the NRC Staff had not demonstrated the effects of NEF water usage on the Hobbs well field or Lea County Underground Water Basin. To this extent, it is a contention of omission. The NRC Staff cured this alleged omission when it performed the sought-after simulation and adequately described it in Mr. Toblin's pre-filed direct EC-2 testimony. If, upon receipt of this testimony, NIRS/PC had a concern about the substance of the simulation (i.e. the parameters used, etc.), the appropriate action would have been promptly to amend their contention to specify the nature of their concerns with that response. NIRS/PC took no such action, but nonetheless attempted to challenge the simulation through oral rebuttal testimony of its expert witness,

Mr. Rice.<sup>4</sup> Tr. at 1372-6. Mr. Rice claimed that he could not confirm the results of Mr. Toblin's simulation without having the accompanying backup data and input/output files. *Id.* at 1373. However, no formal request was made to the NRC Staff to produce such files and, more importantly, no revision of its contention to challenge the Staff's simulation was made. Therefore, as a contention of omission, NIRS/PC can only challenge whether the Staff in fact performed any such calculation, but cannot challenge the simulation's reasonableness without amending the contention itself. The testimony presented by the Staff cures the deficiency alleged in this contention. Therefore, we find that NIRS/PC Contention EC-2 is now moot.

C. NIRS/PC EC-4 (Impacts of Waste Storage)

1. Background

4.90 As admitted by the Licensing Board, Contention NIRS/PC EC-4, as amended, asserts that both the Applicant's Environmental Report (ER), and the NRC's Draft Environmental Impact Statement (DEIS) fail to address the environmental impacts of deconversion of Depleted Uranium Hexafluoride (DUF<sub>6</sub>) into a more stable waste form. As a basis for this contention, NIRS/PC asserted that impacts of DUF<sub>6</sub> deconversion, specifically the management of hydrofluoric acid (HF) generated from the DUF<sub>6</sub> deconversion, were not addressed in the ER or the DEIS. NIRS/PC asserts in its basis for Contention EC-4 that the DEIS relies on EISs for two DOE deconversion facilities which do not consider the impacts of the distillation process generating anhydrous HF that NIRS/PC believed had been chosen by LES, nor the safety aspects of such operation, nor the impacts of sale, transportation, and use of anhydrous HF:

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<sup>4</sup> For reasons explained in its February 3, 2005 motion, NIRS/PC did not file prefiled rebuttal testimony to Mr. Toblin's prefiled direct testimony for EC-2. "Motion on Behalf of Nuclear Information and Resource Service and Public Citizen to Strike Testimony of Commission Staff Witness Concerning NIRS/PC Contention EC-2." Mr. Rice presented "live" oral rebuttal testimony to the Staff's pre-filed direct testimony for EC-2 according to the Licensing Board's Order dated February 4, 2005. Memorandum and Order (Ruling on In Limine Motions Regarding Prefiled Direct and Rebuttal Testimony and Providing Administrative Directives) (Feb. 4, 2005), at p. 6.

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 ("UF<sub>6</sub>") 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.

The ER does not, for example, include environmental impacts of construction and lifetime operation of a conversion plant for the UF<sub>6</sub> waste (suggesting that construction and operation of such a plant is not seriously considered). The suggestion that Cogema and/or ConVerDyn may build and operate such a facility for the conversion of LES's UF<sub>6</sub> waste shows that the ER is deficient in not addressing the cumulative environmental impacts of construction and operation of such a facility, which would in fact be an integral part of LES's operations. Specifically, the disposition of contaminated hydrofluoric acid ("HF") would be a significant issue. Radioactively contaminated materials should not be released into open commerce. Treating HF as a waste or transporting it for reuse in the manufacture of UF<sub>6</sub> would be expensive and would create risks. Both the costs and risks must be analyzed.

LES has chosen to focus its planning for a private conversion facility on a process different from the process to be used in the DOE plants. LES will adopt a process that generates anhydrous hydrofluoric acid ("AHF") (see LES Answer to Petitions of NIRS/PC and New Mexico Attorney General, May 3, 2004, at 72). The process discussed in the EISs for the Paducah and Portsmouth conversion plants is a different one, which generate aqueous HF and calcium fluoride (CaF<sub>2</sub>) (See Paducah EIS, DOE-0359, at S-19, 1-18; Portsmouth EIS, DOE-0360, at S-17, 1-19).

Thus, the facilities and processes analyzed in the conversion plant EISs do not fully correspond to the configuration proposed for construction by LES. In particular, the use of a distillation process to upgrade the HF resulting from the conversion process to AHF is not considered in the EIS for either the Paducah or Portsmouth facilities. In addition, when the engineering analysis for these

proposed facilities was conducted, the distillation option was not even commercially developed. The Draft Engineering Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride - Rev. 2, Lawrence Livermore National Laboratory (LLNL)(1997), which is included as supporting material to the conversion plant EISs, states:

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

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

## 2. Testimony Presented

4.91 The Applicant presented a panel of two witnesses for Contention EC-4, in support of the application. These witnesses were (1) Mr. Rod M. Krich, Vice President of Licensing, Safety and Nuclear Engineering for LES and Exelon Vice President Licensing Projects ("Prefiled Testimony of Rod M. Krich on Behalf of Louisiana Energy Services, L.P. Regarding Contention NIRS/PC EC-4 ("Impacts of Waste Storage")" ("Krich"), Tr. at 885); and (2) Mr. Paul Schneider, a technical and management consultant working for SMG Inc., a consulting service, retained as an expert consultant by LES to assist in the evaluation of issues associated with the environmental impacts of converting  $\text{DUF}_6$  to  $\text{U}_3\text{O}_8$  ("Revised Prefiled Rebuttal Testimony of Rod M. Krich and Paul G. Schneider on Behalf of Louisiana Energy Services, L.P. On Contention NIRS/PC EC-4 ("Impacts of Waste Storage")" ("Rebuttal Krich/Schneider"), Tr. at 907-8).

4.92 Details of the qualifications of the Applicant's witness Rod Krich have already been discussed in Section 4.68, related to Contention EC-2. Based upon his overall responsibility for licensing and engineering matters related to the NEF project and his oversight of the preparation and submittal of the license application for the NEF the Licensing Board finds that Mr. Krich is familiar with the NEF application, and is well-qualified as an expert witness on the NEF application and issues related to  $\text{DUF}_6$  deconversion dealt with therein.

4.93 Applicant witness Paul Schneider has a Master of Science degree in Physics from Emory University, and a Bachelor of Science degree in Physics and Mathematics from Wake Forest University. Rebuttal Krich/Schneider, Tr. at 908. Mr. Schneider has more than 40 years of experience in the nuclear industry, including the design of chemical processing plants converting  $\text{DUF}_6$  to  $\text{U}_3\text{O}_8$ . *Id.* Mr. Schneider was employed by USEC Inc. as the Director of the Nuclear Fuel Cycle, where his responsibilities included direction of activities to prepare a bid proposal to the Department of Energy to convert the stockpile of  $\text{DUF}_6$  to a more stable form for permanent disposal. *Id.* He also led USEC's activities to select a cost-efficient process, determine best disposition of its products and then prepare a conceptual design of the processing plants. *Id.* While at USEC, Mr. Schneider also managed the disposition of USEC's  $\text{DUF}_6$  at the Sarmet plant in Barnwell South Carolina, which involved the deconversion by Sarmet of the  $\text{DUF}_6$  to  $\text{DUF}_4$  and  $\text{CaF}_2$ . *Id.* In this capacity, he oversaw the disposal of the  $\text{DUF}_4$  and  $\text{CaF}_2$ . *Id.* Mr. Schneider was also previously employed by Lockheed Martin as Director of the Atomic Vapor Laser Isotope Separation Program. *Id.* Based on his extensive experience, the Licensing Board finds Mr. Schneider to be well-qualified as an expert witness on the subjects related to EC-4, concerning deconversion of  $\text{DUF}_6$  to  $\text{U}_3\text{O}_8$ .

4.94 The Staff presented one witness for Contention EC-4. This witness was Dr. Donald E. Palmrose, who is the Senior Nuclear Safety Engineer with Advanced Technologies and Laboratories International, Inc. (ATL), under a technical assistance contract with the NRC, and

manages the personnel responsible for the development of the Draft Environmental Impact Statement (DEIS) for the NEF. “NRC Staff Testimony of Donald E. Palmrose Concerning Nuclear Information and Resource Service and Public Citizen Environmental Contention 4 (“NIRS/PC EC-4”) (Impacts of Waste Storage) (“Palmrose”), Tr. at 996.

4.95 Staff witness Dr. Donald Palmrose received a Ph.D. in Nuclear Engineering from Texas A&M University, a Master of Science degree in Nuclear Engineering from Texas A&M University, and a Bachelor of Science in Nuclear Engineering from Oregon State University. “Curriculum Vitae of Donald E. Palmrose, Ph.D.” attached to Palmrose (Palmrose Qualifications), Tr. at 1008. Dr. Palmrose has 25 years of management and technical expertise in Risk Assessments, NEPA assessments and documentation, Nuclear Safety Analysis, Radiation Protection, Criticality Safety, and Thermal-Hydraulic Analysis. *Id.* Dr. Palmrose has been a project manager, technical lead, and trainer for the evaluation of the risk from the use of byproduct material by industry, medical applications, and research supporting the NRC Office of Nuclear Material Safety and Safeguards (NMSS). *Id.* He has participated in the preparation of several key NEPA documents for the U.S. Department of Energy (DOE) and the NRC that include construction and operation of new fuel cycle facilities, decommissioning of shutdown facilities; the processing and deposition of transuranic wastes, and in developing strategies encompassing the transport and disposition of plutonium-bearing material within the DOE complex. *Id.* At various times, he has been a team member for audits and training for activities that include operational readiness reviews, safety analysis reports, documented safety analyses, safety evaluation reports, and risk assessments. *Id.* He has six years of managerial and operational experience on nuclear power plants and is a specialist in development and application of computer analysis for radiological dose assessments and of nuclear power plant operations for nuclear safety. *Id.* Dr. Palmrose, as a Senior Nuclear Safety Engineer with ATL, manages the team of engineers, consultants and support personnel that is responsible for the development of the DEIS for the proposed NEF. Palmrose,

Tr. at 996. Dr. Palmrose has also developed or contributed to the development of the sections and appendices of the DEIS for the proposed NEF which pertain to public and occupational health impacts under normal operations; waste management impacts, including depleted uranium disposition; land use; visual and scenic impacts; cumulative impacts; and the no-action alternative. *Id.* at 996-7. He also supervised the overall development of Chapter 4, "Environmental Impacts," and associated appendices of the DEIS. *Id.* at 997. Dr. Palmrose reviewed the LES Environmental Report (ER) and the Safety Analysis Report (SAR) for the proposed NEF, pertaining to public and occupational health, waste management, and other impact areas analyzed in Chapter 4 of the DEIS, as well as the LES's response to NRC Staff requests for additional information. *Id.* In addition to documents he found through independent research, he reviewed documents referenced in LES's ER, previously published or available NRC documents, and DOE documents. *Id.* Dr. Palmrose was the principal contributor of DEIS sections 2.1.9, 4.2.12, 4.2.14, C.1 through C.3 of Appendix C, and was a technical contributor for sections 2.1.7, 2.2.2.4, 2.4, 4.2.1, 4.2.3, 4.4 and 4.8. *Id.* The Licensing Board finds Dr. Palmrose to be well-qualified as an expert witness on subjects related to deconversion of  $\text{DUF}_6$  to  $\text{U}_3\text{O}_8$  in the NEF application and NRC DEIS.

4.96 NIRS/PC presented one witness, Dr. Arjun Makhijani, in support of its Contention EC-4. Dr. Makhijani is the President of the Institute for Energy and Environmental Research (IEER), which assesses environmental damage from nuclear fuel facility operations, and estimates compliance of such facilities with environmental regulations. "Direct Testimony of Dr. Arjun Makhijani Regarding Nuclear Information and Resource Service and Public Citizens's Contention EC-4 Revised Jan. 28, 2005" ("Makhijani"), Tr. at 1064.

4.97 Dr. Makhijani received a Ph.D. in Engineering from the University of California at Berkeley, a Master of Science degree in Electrical Engineering from Washington State University, and a Bachelor of Engineering degree in Electrical Engineering from the University of Bombay. "Curriculum Vitae of Arjun Makhijani" attached to Makhijani (Makhijani Qualifications), Tr. at 1080.

Dr. Makhijani has authored and co-authored numerous studies, articles and books examining nuclear-related issues. Makhijani, Tr. at 1065. He also authored the first independent source term reconstruction from a nuclear weapons plant, the Feed Material Production Center. *Id.* He has served on the Radiation Advisory Committee of the Science Advisory Board of the US Environmental Protection Agency (EPA), and on the EPA's advisory subcommittee on Radiation Cleanup Standards of the National Advisory Committee on Environmental Policy and Technology. *Id.* Dr. Makhijani has reviewed various parts of the LES application for the NEF, including the ER and SAR, that relate to depleted uranium that is to be generated by the proposed NEF, the management of such material and its deconversion and disposal. *Id.* at 1066-7. He also reviewed various documents prepared by LES and persons working for LES dealing with plans for disposition of depleted uranium. *Id.* at 1067. Dr. Makhijani has also reviewed the DEIS prepared for the Claiborne Enrichment Center, related DOE documents including EIS's for the proposed Paducah and Portsmouth deconversion plants and the DOE Programmatic EIS for Alternative Strategies for the Long-Term Management and Use of  $\text{DUF}_6$ . *Id.* He also reviewed some supporting documents for the aforementioned studies. *Id.* The Licensing Board finds Dr. Makhijani to be well-qualified as an expert witness on subjects related to deconversion of  $\text{DUF}_6$  to  $\text{U}_3\text{O}_8$  in the NEF application and NRC DEIS.

3. Analysis of Environmental Impacts of Facility Converting  $\text{DUF}_6$  to  $\text{U}_3\text{O}_8$

4.98 LES has submitted a license application to construct, operate and decommission a gas centrifuge uranium enrichment facility near Eunice, New Mexico, in Lea County. A byproduct of the proposed gas centrifuge facility is  $\text{DUF}_6$ , which will be disposed of prior to decommissioning. Staff Exh. 1b at 2-27. Prior to disposing of the  $\text{DUF}_6$  it will be converted to a more stable waste form, referred to in this decision as "deconversion." This deconversion will be accomplished through a chemical process which will be done at a separate deconversion facility. Various chemical processes can be used for converting  $\text{DUF}_6$  to a more stable form. Palmrose,

Tr. at 1001. All of the processes involve treatment of the  $UF_6$  to produce aqueous HF which must be managed. One method of managing the resultant HF is neutralizing it with lime to produce  $CaF_2$  for disposal or sale. *Id.* The aqueous HF could also be upgraded to anhydrous HF for sale through a process of distillation. *Id.* Because the deconversion process is necessary and foreseeable, the environmental impacts of this process must be considered in the Staff's NEPA review.<sup>5</sup>

4.99 The NRC Staff's analysis contained in the DEIS is necessarily based on the Applicant's proposal. NIRS/PC asserts in Contention EC-4, as testified to by Dr. Makhijani, that the initial license application for the NEF does not address the impacts of a deconversion facility. Makhijani, Tr. at 1068. However, Dr. Makhijani acknowledges that Revision 2 of the license application for the NEF cites to previous environmental impact evaluations of a proposed  $UF_6$  deconversion facility conducted by the NRC in the CEC FEIS, and DOE's evaluations contained in the Paducah, Kentucky and Portsmouth, Ohio deconversion facility EISs. *Id.* Therefore, while the ER initially did not address these impacts, this omission was cured by amendment referencing the NRC's CEC FEIS and DOE EIS's. Thus, the Board finds that this aspect of Contention EC-4 is rendered moot.

4.100 The significance of the ER is to provide sufficient information to inform the Staff's EIS. The Staff is required to perform an independent analysis, and the ultimate responsibility for NEPA compliance lies with the Staff. As such, the DEIS contains discussions of impacts from deconversion of  $DUF_6$  to  $U_3O_8$ , proposed by the applicant. Various  $DUF_6$  disposition options are specifically discussed in Section 2.1.9 of the DEIS, including the Applicant's preferred private sector deconversion option. Staff Exh. 1b at 2-29 to 2-30. The DEIS also examines the alternative

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<sup>5</sup> Initially, LES had left open the use of neutralization or distillation as HF management options. As will be discussed subsequently, the use of distillation is no longer an option, and thus no longer a foreseeable impact required to be analyzed by NEPA. Nevertheless, at the time the DEIS was prepared, distillation to anhydrous HF was an option, and thus the Board chooses to examine the adequacy of that review, notwithstanding our subsequent decision that this issue is rendered moot.

deconversion option which would transport the DUF<sub>6</sub> to DOE sites like the Paducah, Kentucky and Portsmouth, Ohio facilities. *Id.* at 2-31. Chapter 4 of the DEIS presents the NRC Staff's evaluation of potential environmental impacts associated with the construction, operation, and decommissioning of the proposed NEF. *Id.* at 4-1. Specifically, Section 4.2.14.3 addresses DUF<sub>6</sub> waste management impacts. *Id.* at 4-52 to 4-57. The analysis of impacts covers temporary onsite storage at the proposed NEF, as well as the various options for deconversion, including use of a private sector deconversion facility, and use of DOE deconversion facilities at Paducah, Kentucky and Portsmouth, Ohio. *Id.* In examining the impacts from private sector deconversion, the NRC Staff analyzed both the use of an adjacent as well as an offsite facility. *Id.* at 4-53 to 4-54.

4.101 As set forth in the DEIS, the NRC Staff concluded that the potential environmental impacts of the DUF<sub>6</sub> waste management option utilizing temporary onsite storage of DUF<sub>6</sub> at the proposed NEF would be small to moderate. Staff Exh. 1b at 4-53. Environmental impacts of the disposition option using a private deconversion facility that would convert the DUF<sub>6</sub> to U<sub>3</sub>O<sub>8</sub> would be small. *Id.* at 4-54. The Staff determined that the impacts from the option using an adjacent deconversion facility that converted DUF<sub>6</sub> to U<sub>3</sub>O<sub>8</sub>, would be small. *Id.* at 4-55. Finally, with respect to DUF<sub>6</sub> management options, the Staff concluded that the additional impacts from converting the DUF<sub>6</sub> to U<sub>3</sub>O<sub>8</sub> at offsite DOE facilities, such as Paducah, Kentucky or Portsmouth, Ohio, would be small. *Id.* at 4-57.

4.102 NRC witness Dr. Palmrose testified as to the nature of the review he conducted in preparing the sections of the DEIS addressing impacts of deconversion of DUF<sub>6</sub>, including HF management. Dr. Palmrose testified that the environmental impacts of deconversion of DUF<sub>6</sub> were addressed in the DEIS since it is a necessary step in disposal of DUF<sub>6</sub> generated by the proposed NEF. Palmrose, Tr. at 999. Dr. Palmrose testified that his review of the impacts of deconversion relied in part, on examination of three environmental review documents prepared by DOE that related to DUF<sub>6</sub> deconversion facilities at Paducah, Kentucky and Portsmouth, Ohio. Palmrose,

Tr. at 1000. The three DOE documents Dr. Palmrose reviewed were the Final Environmental Impact Statement for the Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site DOE/EIS-0359, Oak Ridge Operations, Office of Environmental Management, U.S. Department of Energy, June 2004 (Paducah FEIS) (LES Exh. 17), the Final Environmental Impact Statement for the Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site, DOE/EIS-0360, Oak Ridge Operations, Office of Environmental Management, U.S. Department of Energy, June 2004 (Portsmouth FEIS) (LES Exh. 16), and a Final Programmatic Environmental Impact Statement for the Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride, DOE/EIS-0269, Office of Nuclear Energy, Science and Technology, U.S. Department of Energy, April 1999 (PEIS) (LES Exh. 18) which was initially prepared in developing a strategy for  $\text{DUF}_6$  management. *Id.* Dr. Palmrose testified that he reviewed the impacts presented in the DOE documents to determine whether they were reasonable, based on the information he had available and his past experiences. Tr. at 1027. Based on his expertise and review of the DOE EIS's, Dr. Palmrose concluded that they were a reasonable assessment of the impacts of deconversion of  $\text{DUF}_6$  to  $\text{U}_3\text{O}_8$ . Tr. at 1044. Therefore, in preparing the DEIS, Dr. Palmrose relied upon and incorporated the analyses and results from the DOE documents, when appropriate. Tr. at 1048.

4.103 Dr. Palmrose testified that DOE prepared the PEIS as a preliminary step in developing a strategy to manage the  $\text{DUF}_6$  inventory at its two uranium enrichment facilities at Paducah, Kentucky and Portsmouth, Ohio. *Id.* at 1000-01. In Appendix F of the PEIS, DOE evaluated the environmental impacts of three deconversion options: deconversion to  $\text{U}_3\text{O}_8$ , deconversion to  $\text{UO}_2$ , or deconversion to metal. *Id.* at 1000; LES Exh. 18 at F-2. The potential impacts were not site-specific because the location of a deconversion facility, if constructed, would not be decided until some time in the future. Palmrose, Tr. at 1000-01; LES Exh. 18 at F-4.

4.104 Of particular note, Dr. Palmrose testified that in analyzing deconversion to  $U_3O_8$ , the PEIS specifically considered HF management options following deconversion of the  $DUF_6$  to  $U_3O_8$  and concentrated HF. Palmrose, Tr. at 1001; LES Exh. 18 at F-11. The HF product would be in aqueous form, and DOE analyzed two processes for managing the HF produced. Palmrose, Tr. at 1001; LES Exh. 18 at F-11 to F-12. Dr. Palmrose stated that one of the processes analyzed by DOE in the PEIS was neutralization of the HF to  $CaF_2$ . Palmrose, Tr. at 1001, LES Exh. 18 at F-12. The second process involved upgrading the concentrated HF to anhydrous HF for sale. Palmrose, Tr. at 1001; LES Exh. 18 at F-12. For most environmental areas analyzed in the PEIS, Dr. Palmrose noted that DOE concluded that the impacts would be the same, regardless of what process was selected for management of HF. Palmrose, Tr. at 1002.

4.105 The PEIS discussed the environmental impacts on human health from construction and operations of a deconversion facility for normal operations and accidents, air quality, water and soil, socioeconomics, ecology, waste management, resource requirements, land use and transportation. Palmrose, Tr. at 1002. For radiological impacts from normal operations, DOE found that deconversion to  $U_3O_8$  would result in an average radiation exposure of about 300 mrem/yr to involved workers and less than 0.01 mrem/yr for noninvolved workers and members of the public. *Id.* The PEIS also noted that because of the similarity of the deconversion processes which would be used to manage the HF produced by deconversion to  $U_3O_8$ , the airborne emission rates of uranium compounds and the material handling activities would be expected to vary only slightly from each other, resulting in similar radiological impacts. Palmrose, Tr. at 1002; LES Exh. 18 at F-16. DOE found that no adverse chemical health effects would be expected during normal operations. Palmrose, Tr. at 1002; LES Exh. 18 at F-21.

4.106 Dr. Palmrose testified that the PEIS “examined a range of accidents from high-frequency/low-consequence to low-frequency/high-consequence accidents and noted the results for radiological and chemical health impacts for the highest-consequence accident in each

frequency category.” Palmrose, Tr. at 1002; LES Exh. 18 at F-23 to F-37. Furthermore, he stated that DOE found that the maximum risk values would be less than 1 person injured for all accidents except for impact to workers from corroded cylinder spills (wet or dry conditions) and ammonia stripper overpressure. Palmrose, Tr. at 1002; LES Exh. 18 at F-36. For physical hazards, DOE determined there were lower impacts from deconversion to  $U_3O_8$ , compared to other deconversion options, and that there are essentially no differences between HF management options. Palmrose, Tr. at 1002-03; LES Exh. 18 at F-37.

4.107 Dr. Palmrose testified that overall, the waste input resulting from normal operations for deconversion to  $U_3O_8$  would be expected to have a moderate impact on waste management. Palmrose, Tr. at 1003; LES Exh. 18 at F-64. The PEIS also concludes that the total transportation risks associated with  $DUF_6$  deconversion would be low for all three deconversion processes and associated management of HF. Palmrose, Tr. at 1003; LES Exh. 18 at F-27. In particular, no radiological fatalities would be expected as a result of routine shipments or a potential severe accident. Palmrose, Tr. at 1003. Impacts due to chemical exposure from a severe accident could result in an overall risk to the public (defined as the product of the accident consequence and the probability over the duration of the program) of 1 permanent physical injury or fatality (defined as irreversible adverse effects) due to HF-related rail transportation accidents. Palmrose, Tr. at 1003; LES Exh. 18 at F-28.

4.108 The PEIS concluded that air quality, water and soil, socioeconomics, ecology, resource requirements, and land use impacts would have no or very small differences for the management options for HF. Palmrose, Tr. at 1003; LES Exh. 18 at F-37 to F-40, F-45, to F-52, F-68, F-69 and F-70. The PEIS did note that while a postulated accident involving anhydrous HF could have releases, that rapid mitigation and the small volume of release contaminants would result in negligible impacts. Palmrose, Tr. at 1003; LES Exh. 18 at F-47, F-50, and F-52. Other impacts considered by the PEIS that could potentially occur include cultural resources,

environmental justice, visual, recreational resources, noise levels, and decontamination and decommissioning. Palmrose, Tr. at 1003-04. However, they were not analyzed in detail because they require consideration of specific sites. Palmrose, Tr. at 1003-04; LES Exh. 18 at F-72.

4.109 Dr. Palmrose noted in his testimony, that following the development of the PEIS, DOE solicited bids for the design, construction and operation of the  $\text{DUF}_6$  deconversion facilities at the Paducah, Kentucky and Portsmouth, Ohio sites. Palmrose, Tr. at 1004. DOE selected a proposal in which the  $\text{DUF}_6$  would be converted to  $\text{U}_3\text{O}_8$  using a dry conversion process and the resulting aqueous HF would be marketed for sale or neutralized producing  $\text{CaF}_2$ . Palmrose, Tr. at 1004; LES Exh. 16 at S-11, S-12, 2-5; LES Exh. 17 at S-11, S-12, 2-5. Dr. Palmrose testified that in preparing his discussion of the impacts that would result from a private deconversion facility, he assumed that the impacts for deconversion of  $\text{DUF}_6$  to  $\text{U}_3\text{O}_8$  would be similar to those for the Paducah, Kentucky and Portsmouth, Ohio facilities, and therefore he used the values from the DOE analyses in reaching his conclusions regarding the expected impacts in Section 4.2.14.3 of the DEIS. Palmrose, Tr. at 1005. He noted that he included the impacts from this type of facility in the DEIS because specific information was available from the DOE analyses and that this technology was likely to be used in the deconversion process. *Id.* Dr. Palmrose testified that he believed this was the case because if LES chose to convert the  $\text{DUF}_6$  produced at the proposed NEF as permitted under the USEC Privatization Act, the deconversion would take place at either the Paducah, Kentucky or Portsmouth, Ohio facilities. *Id.* While the technology that would be used at a private deconversion facility is not certain, DOE selection of a process which does not produce anhydrous HF indicates that the anhydrous HF option is not currently a cost effective option. *Id.* This is further evidenced by the fact that the other existing deconversion facilities do not produce anhydrous HF. *Id.*

4.110 After testifying to the nature of his detailed review and the information he relied upon contained in DOE analyses, Dr. Palmrose addressed whether the anhydrous HF option should or

could be analyzed further in the DEIS. He pointed out that specific analyses of the impacts from the neutralization process are contained in the Paducah, Kentucky and Portsmouth, Ohio FEISs, and that with regard to a process of distillation resulting in anhydrous HF, there is no current deconversion facility that uses this technology. *Id.* at 1006. Furthermore, there is no plan to construct such a facility, therefore, the process used to distill HF to an anhydrous form has not been fully developed and any assessment of the impacts resulting from distillation would have a high degree of uncertainty and any analysis would have to be derived from the evaluation of similar technologies. *Id.* In the PEIS, DOE performed this type of analysis by relying on data from similar technologies and presented the potential impacts as a range of impacts designed to provide a reasonable estimate of their magnitude, taking into account the uncertainty relative to the specific technology and site. Palmrose, Tr. at 1006; LES Exh. 18 at F-4. Given these uncertainties and based on current knowledge, Dr. Palmrose concluded that the analysis performed by DOE in the PEIS, which he reviewed in preparing the DEIS, presented a thorough analysis of impacts of a deconversion facility using an as yet to be commercially established distillation process to produce anhydrous HF and that a more specific analysis would require knowledge of the specific processes which would be used to perform the distillation process and the specific site at which the facility would be constructed. Palmrose, Tr. at 1006-07.

4.111 The Board finds that it is clear, based upon the review in the DEIS as supplemented by the testimony presented by the Staff's witness in the hearing, that the Staff has adequately considered impacts of the management of anhydrous HF because the DOE analysis in the PEIS is the most complete that can be done given the limited amount of information available. Accordingly, we conclude that the NRC Staff's analysis, as supplemented by the Staff's testimony in this proceeding, would meet the requirements of NEPA.

4.112 The fundamental premise of Contention EC-4 is that LES has chosen to manage the HF generated in the deconversion of  $\text{DUF}_6$  utilizing a process that will produce anhydrous HF.

The basis of Contention EC-4 clearly states that LES has chosen to focus its planning for a private deconversion facility on a process of deconversion that will generate anhydrous HF, and that this is different from the process to be used in the DOE plants. This contention both limits and defines the contention. At the hearing, LES represented, and committed in the proceeding, for deconversion of  $\text{DUF}_6$  generated by the proposed NEF, an anhydrous HF option or process would not be used. Tr. at 932-4. Furthermore, LES has committed to amending its license application to reflect that anhydrous HF will not be employed at a deconversion facility selected for deconversion of  $\text{DUF}_6$  generated at the proposed NEF. *Id.* Specifically, Mr. Krich stated under oath during the hearing, that LES was “willing to put into the license application [LES’s] commitment not to use the anhydrous hydrofluoric acid option.” Tr. at 933.

4.113 At the time of the hearing no contracts were in place concerning the deconversion of  $\text{DUF}_6$ , however, Mr. Krich agreed that LES would put terms into any contract with a deconversion vendor that would give an enforceable right to ensure that the anhydrous HF process was not used. Tr. 933-4. Mr. Krich further acknowledged at the hearing his understanding that this commitment would form the basis of a condition on the license, and thus LES would be obligated to enforce said contractual terms to prevent use of an anhydrous HF process. Tr. at 934.

4.114 As the Applicant has specifically committed to not use the process of upgrading to anhydrous HF in the deconversion of  $\text{DUF}_6$  produced at the proposed NEF, it is no longer reasonably foreseeable that anhydrous HF will be produced and managed when the  $\text{DUF}_6$  produced by the proposed NEF is converted. This information therefore obviates the need for the Staff to analyze the impacts of management of anhydrous HF in its DIES.

4.115 The Licensing Board, therefore, concludes that given the review Dr. Palmrose conducted, examining the extensive analyses prepared by DOE on  $\text{DUF}_6$  deconversion, including the review of DOE’s PEIS which provided the best available analysis of anhydrous HF impacts, that the Staff has adequately demonstrated that it performed the requisite ‘hard look’ at the

environmental impacts of DUF<sub>6</sub> deconversion. Furthermore, the Board concludes, that although the Staff has adequately analyzed deconversion impacts, including anhydrous HF; given the commitment by the Applicant not to use a process which generates anhydrous HF, the production of anhydrous HF is not a reasonably foreseeable outcome of the deconversion process and therefore need not be considered in evaluating the environmental impacts of the proposed NEF.

D. NIRS/PC EC - 7 (Need for the Facility)

1. Background

4.116 As amended and admitted by this Board, Contention NIRS/PC EC-7 states as follows:

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.

4.117 In admitting this contention, this Board specifically stated that LES was not required under NEPA to present a business plan, to make its "business case", or to demonstrate the profitability of its proposed facility. See LBP-04-14, 60 NRC at 69-70. In addition, this Board rejected an attempt by NIRS/PC to amend and supplement NIRS/PC EC-7 to include "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,"

stating that such consideration was outside the scope of this proceeding and that LES was under no obligation to “present a ‘business case’ or provide detailed market analysis” See Memorandum and Order (Ruling on Late-Filed Contentions), slip op. at 17-18, November 22, 2004.

4.118 In *Private Fuel Storage* (Independent Spent Fuel Storage Installation), CLI-04-22, 60 NRC 125 (2004), the Commission noted that, in the context of a cost-benefit analysis for a need for the facility question, “we ask not whether every assumption contained in the [EIS] was the best or whether it will turn out true, but ‘whether the economic assumptions of the [EIS] were so distorted as to impair fair consideration of those environmental effects.’” *Id.* at 145, citing *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 89 (1998); see also *Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 466 (4th Cir. 1996); *South Louisiana Environmental Council, Inc. v. Sand*, 629 F.2d 1005, 1011 (5th Cir. 1980). The relevant inquiry into the ER and DEIS, then, is not whether the assumptions made are perfect or unchallengeable, but only whether they are reasonable. *Louisiana Energy Services* (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331, 355 (1996).

## 2. Testimony Presented

4.119 Prefiled written direct and rebuttal testimony was submitted by the Applicant, NIRS/PC, and NRC Staff. At the February 2005 evidentiary hearing, Applicant’s witnesses appeared first, followed by the Staff’s witnesses, and last, by those of NIRS/PC. We identify and discuss the witnesses in the same order.

4.120 The Applicant presented three witnesses in support of the application. These were: (1) Mr. Kirk Schnoebelen, the Marketing Manager for Urenco, Inc., responsible for marketing and sales of enrichment services to U.S. utilities on behalf of both Urenco Enrichment Company, which owns and operates three European enrichment sites, and LES, which intends to operate the NEF in New Mexico (“Revised Prefiled Direct Testimony of Kirk S. Schnoebelen on Behalf of Louisiana Energy Services, L.P. Concerning Contention NIRS/PC EC-7 (‘Need for the Facility’)”)

("Schnoebelen"), Tr. at 1389; (2) Mr. Rod Krich, the Vice President for Licensing, Safety, and Nuclear Engineering for LES, responsible for licensing and engineering matters related to the NEF project; ("Prefiled Testimony of Michael H. Schwartz and Rod M. Krich on Behalf of Louisiana Energy Services, L.P. Concerning Contention NIRS/PC EC-7 ('Need for the Facility')") ("Schwartz/Krich"), Tr. at 1431-32; and (3) Mr. Michael Schwartz, the Chairman of the Board of Energy Resources International, Inc. ("ERI"), a consulting firm located in Washington D.C., responsible for the market analysis of uranium enrichment supply and requirements presented in the Environmental Report contained in LES's license application. Schwartz/Krich, Tr. at 1431-1433.

4.121 Applicant witness Kirk Schnoebelen received a Bachelor of Science degree from the University of Wisconsin - Madison, where he majored in Nuclear Engineering, a Master of Science degree from the University of Wisconsin - Madison in Nuclear Engineering, and a Master of Business Administration degree from the University of Minnesota. Schnoebelen, Tr. at 1402. He has worked as a nuclear engineer for the Florida Power and Light and Northern States Power Company, and was responsible for purchasing nuclear fuel, including enrichment services, for Northern States Power from 1992 to 1998. Schnoebelen, Tr. at 1390. For the past six-and-one-half years, he has marketed uranium and enrichment services to U.S. utilities on behalf of, at different times, both Cameco, Inc., and Urenco, Inc. *Id.* Presently, he is responsible for the marketing and sale of enrichment services to be provided by LES's proposed NEF. *Id.* The Licensing Board finds that Mr. Schnoebelen is familiar with the enrichment services contracts that LES has executed with U.S. utilities, as well as the status of ongoing contract negotiations that will lead to the execution of additional enrichment services contracts.

4.122 Applicant witness Rod Krich received a Bachelor of Science degree in mechanical engineering from the New Jersey Institute of Technology and a Master of Science degree in Nuclear Engineering from the University of Illinois. Schwartz/Krich, Tr. at 1434. He has over thirty years of experience in the nuclear field encompassing nuclear engineering, licensing, and

regulatory matters. *Id.* This experience encompasses the design, licensing, and operation of nuclear facilities. *Id.* As Vice President of Licensing, Safety, and Nuclear Engineering for LES, he was responsible for the preparation and submittal of the NEF license application, as well as the engineering design of the facility processes and safety systems. *Id.* at 1435. He is also LES's lead contact with respect to matters related to the NRC Staff's review of the NEF license application, and is also responsible for the preparation of all state and federal permit applications related to the U.S. *Id.* The Licensing Board finds that Mr. Krich is familiar with the NEF license application and with the preparation and contents of that application.

4.123 Applicant witness Michael Schwartz received Bachelor of Science and Master of Science degrees in Nuclear Engineering from the University of Michigan and has completed graduate level courses in finance, economics, and management. Schwartz/Krich, Tr. at 1432. He is a registered Professional Engineer in the District of Columbia and the State of California. *Id.* He has twenty-five years of experience consulting on issues related to the nuclear fuel cycle. *Id.* at 1432-33. Prior to that, he worked as a nuclear engineer at General Atomic International and Consumers Power Company. *Id.* at 1433. Pursuant to a technical assistance contract with LES, ERI, the consulting firm of which Mr. Schwartz is Chairman of the Board, prepared the market analysis of uranium enrichment supply and requirements presented in Section 1.1.2 of the Environmental Report contained in the license application for the proposed NEF. *Id.* Therefore, the Licensing Board finds that Mr. Schwartz is familiar with the market analysis of the supply of and demand for enrichment services contained in LES's ER, and that he is well-qualified as an expert witness on the subject of the market for uranium enrichment services.

4.124 The Staff presented one witness, Rick Nevin, concerning this contention. Mr. Nevin is a Vice-President with ICF Consulting, where he is responsible for conducting and managing analytical projects for public and private sector clients. "NRC Staff Testimony of Rick Nevin Concerning Nuclear Information and Resource Service and Public Citizen Environmental

Contention 7 ('NIRS/PC EC-7') (Need for the Facility) ("Nevin"), Tr. at 1542. Mr. Nevin submitted both prefiled direct and prefiled rebuttal testimony, which was incorporated into the record. Tr. at 1540, 1556; "NRC Staff Rebuttal Testimony of Rick Nevin Concerning [NIRS/PC EC-7] (Need for the Facility)" ("Nevin Rebuttal"), Tr. at 1557.

4.125 Staff witness Rick Nevin received a Bachelor of Arts in Economics and Mathematics and a Master of Arts in Economics from Boston University, as well as a Masters in Management with concentrations in Finance, Managerial Economics, and Strategy from Northwestern University. Nevin, Tr. at 1541. He has twenty-five years of experience conducting and managing financial, economic, and environmental risk analyses, including seventeen years with ICF Consulting, where he has provided analyses for the Nuclear Regulatory Commission, the Environmental Protection Agency, the Department of Housing and Urban Development, the Department of Energy, the President's Task Force on Environmental and Safety Risks to Children, and a number of trade organizations and other private sector clients. *Id.*

4.126 Mr. Nevin did not prepare the "need for the facility" portion of the Staff's Draft Environmental Impact Statement ("DEIS"), but reviewed the portions of the NEF ER and the DEIS relating to need for the facility, supporting documentation cited in those documents, and additional information relating to the subject of the market for enrichment services within the U.S. and throughout the world. *Id.* The Licensing Board finds that Mr. Nevin is familiar with the market analyses in the NEF ER and the DEIS, and well-qualified as an expert witness on the subject of market analysis.

4.127 NIRS/PC presented one witness, Michael Sheehan, in support of contention NIRS/PC EC-7. Dr. Sheehan is a partner in the firm of Osterberg & Sheehan, Public Utility Economists. "Direct Testimony of Michael F. Sheehan on Behalf of Nuclear Information and Resource Service and Public Citizen NIRS/PC Contention EC-7," ("Sheehan"), Tr. at 1578. Dr. Sheehan reviewed the NEF ER and DEIS, NRC regulations, discovery materials, and publicly

available data on the enrichment industry, including data supplied by LES in the discovery process, in order to give testimony on EC-7. *Id.* at 1585.

4.128 Dr. Sheehan received a Bachelor of Science degree, a Master of Arts degree, and a Ph.D. in economics from the University of California at Riverside. *Id.* at 1581. He has taught project analysis, quantitative economics, and operations research, as well as basic, intermediate, and graduate courses in economic theory and policy at the Graduate School of Administration at the University of California at Riverside, at California State College, San Bernardino, and in the Graduate Program at Chapman College. *Id.* He has taught environmental policy and planning, public utility policy and planning, planning economics, local energy planning, and state and local development finance at the Graduate Program in Urban Regional Planning at the University of Iowa. *Id.* He has published several articles in scholarly journals and chapters in books. *Id.* In addition, he received a Juris Doctorate degree from the College of Law of the University of Iowa and is admitted to practice law in Oregon and Iowa. *Id.* His legal practice focuses primarily on land use law and related matters. *Id.* Dr. Sheehan has twenty years of experience in the areas of environmental planning and regulation, and has testified before commissions and legislative committees in several states regarding utility planning and rate design, including testimony before the Illinois Commission on utility planning issues in the nuclear context. *Id.* at 1581-1584. He has submitted testimony before the Nuclear Regulatory Commission on three occasions, including testimony in cases related to cost-benefit analysis, need, and NEPA. *Id.* at 1584. Therefore, the Licensing Board finds that Dr. Sheehan is qualified as an expert witness on the subject of economics and market analysis.

4.129 As more fully set forth below, having considered the testimony and other evidence presented by the parties, we find that the evidence supports a conclusion that the ER and DEIS accurately and thoroughly explain the market for enrichment services and reasonably discuss issues and concerns raised in NIRS/PC EC-7, and, therefore, have satisfied the requirements of

10 C.F.R. Part 51 and NEPA with respect to Contention NIRS/PC EC-7. Our evaluation of this matter follows in the discussion below.

4.130 In making our determination as to whether the ER and DEIS adequately discuss the current and future markets for uranium enrichment services and adequately deal with the issues raised in NIRS/PC EC-7, we will weigh the testimony of the parties on the statements of need contained in the ER and the DEIS and on the nature and characteristics of the current and expected market for uranium enrichment services as explained in those documents.

4.131 As stated in the NEF ER and the DEIS, the primary basis for the need for the NEF involves the stated national policy goals of ensuring diverse, reliable domestic enrichment supply. *National Enrichment Facility Environmental Report*, LES Exh. 30, p. 1.1-1 - 1.1-3; *Draft Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*, NUREG-1790, September 2004 (Redacted Non-Sensitive Version), Staff Exh. 1b, p. 1-2-1-3. Neither Basis A, which deals with whether there is a shortage of enrichment supply, nor Basis B, which deals with LES's use of global projections, address this issue.

4.132 According to both the ER and the DEIS, uranium enrichment is critical to the production of fuel for U.S. commercial nuclear power plants, which currently supply approximately 20 percent of the nation's electricity requirements. LES Exh. 30, p. 1.1-1 - 1.1-2; Staff Exh. 1b, p. 1-3. However, in recent years, domestic uranium enrichment has fallen from a capacity greater than domestic demand to a level that is less than half of domestic requirements. LES Exh. 30, p. 1.1-1. Currently, only about 15 percent of the separative work units (SWUs) purchased by U.S. nuclear reactors are produced by enrichment plants in the United States. Staff Exh. 1b, p. 1-3.

4.133 The DEIS notes that, presently, the only domestic supplier of enrichment services in the U.S. is the United States Enrichment Corporation ("USEC")'s Gaseous Diffusion Plant ("GDP") in Paducah, Kentucky. Staff Exh. 1b, p. 1-3. The end of enriched uranium production at USEC's other gaseous diffusion plant, in Portsmouth, Ohio, has put the reliability of U.S. supply

at risk. *Id.* In addition, deliveries pursuant to the High Enriched Uranium (“HEU”) Agreement between the U.S. and Russia, a government-to-government agreement implemented by USEC, provide for additional U.S. product; however this agreement is scheduled to expire in 2013 and it is not certain whether it will be renewed. *Id.* A supply disruption of either of these sources could put the national energy security of the U.S. at risk and make it completely dependant on foreign sources of enrichment services. *Id.*

4.134 Both the ER and the DEIS note that the U.S. Department of Energy has therefore 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 U.S.. LES Exh. 30, 1.1-1; LES Exh. 31; Staff Exh. 1b, p. 1-3. Similarly, Congress has recognized the importance of domestic sources of uranium enrichment. LES Exh. 30, 1.1-2. The NRC noted in its DEIS that the proposed NEF “is intended to satisfy the need for an additional reliable and economical domestic source of enrichment services” and that the NEF “would contribute to the attainment of the national energy security policy objectives.” NRC Staff Exh. 1b, p. 1-2.

3. Basis (A)

4.135 The ER states that, based on market projections, from 2011 to 2020, available supply of and demand for uranium enrichment services will be roughly equal, *assuming* the NEF is built and commences operations on schedule. LES Exh. 30, p. 1.1-14-1.1-15, Table 1.1-3, 1.1-5. World enrichment supply, the ER forecasts, will be 40.7 million SWU/year in 2003 and 42.2 million SWU/year in 2016, including 3.0 million SWU/year from the NEF. *Id.*, Table 1.1-5. World enrichment requirements after adjusting for plutonium recycle in mixed oxide fuel, the ER forecasts, were be 40.2 million SWU/year in 2003 and will be 41.6 million SWU/year in 2016. *Id.*, Table 1.1-3. Therefore, without the NEF, the ER notes, there will be a supply deficit, all other things being equal. *Id.*, pp. 1.1-23 - 1.1-24; Schwartz/Krich, Tr. at 1458. The DEIS similarly concludes that “[f]orecasts of installed nuclear-generating capacity suggest a continuing demand for uranium enrichment

services both in the United States and abroad.” Staff Exh. 1b, p. 1-3.

4.136 Basis A of NIRS/PC EC-7 claims that LES “erroneously assumes a shortage of enrichment capacity.” LES presented testimony that, based on a comprehensive analysis of supply and demand, Energy Resources International (“ERI”), an energy consulting firm contracted by LES, concluded that forecasted demand for enrichment capacity, both globally and in the U.S., does exceed supply if the NEF is not included, especially after 2010, shortly before peak production at the NEF would begin. Krich/Schwartz, Tr. at 1440-1464. ERI concluded that the need for new enrichment capacity in the U.S. is even more apparent in view of forecasted enrichment services requirements and supplies after 2010, including the planned shutdown of the Paducah GDP. *Id.* at 1462-1464. This shortage exists even if one assumes that the NEF and USEC’s planned American Centrifuge Plant (“ACP”) both commence operations, and the HEU agreement is extended, which is by no means a certainty. *Id.* at 1664-65.

4.137 The Staff expert testified that the DEIS shows that LES’s forecasts of demand for enrichment services in the ER are conservative compared to those of the Energy Information Agency (“EIA”), since the EIA actually forecasts greater demand for enrichment services in the U.S. than does the ER. Nevin, Tr. at 1545; Staff Exh. 1b, p. 1-3 - 1-4. The indicators relied on by the ER are World Nuclear Association (“WNA”) and EIA forecasts, both of which are generally accepted as reliable indicators in the nuclear industry. Nevin, Tr. at 1544-45; Tr. at 1669. Indeed, Dr. Sheehan, NIRS/PC’s witness, 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 did not take issue with the EIA or WNA demand projections. Tr. at 1669.

4.138 In terms of supply, the ER supply forecast can be found at Table 1.1-5 of the ER and is based on the plans announced by USEC that production of enrichment services at its Paducah GDP facility will ultimately cease when the USEC’s proposed ACP plant becomes operational. Schwartz/Krich, Tr. at 1461; *Excerpt from the “Environmental Report for the American*

*Centrifuge Plant in Piketon, Ohio (Revision 0)*,” NRC Docket No. 70-7004, United States Enrichment Corporation (Aug. 2004), pp. 1-10 to 1-11, 2-2, LES Exh. 64; LES Exh. 30, Table 1.1-5. From a global perspective, the ER supply forecast also assumes the closure of Eurodif’s Georges Besse GDP in 2013, after production slows beginning in 2007 as Eurodif builds its own centrifuge plant. LES Exh. 30, Table 1.1-5. The ER supply forecast also assumes the continuation of the Russian HEU agreement, a conservative assumption that is by no means certain. Nevin, Tr. at 1546; Tr. at 1666. Dr. Sheehan, in his testimony, did not dispute the projections in the ER in terms of supply, and in fact noted that USEC, in its agreement with DOE, agreed 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 that Paducah closes,” consistent with the ER forecast for the closure of the Paducah facility and the production of the new USEC ACP between 2003 and 2016. Sheehan, Tr. at 1586; Nevin Rebuttal, Tr. at 1560. In the Claiborne proceeding, the Board noted that, in the context of need, forecasts of supply and demand must be judged based on their reasonableness. *Louisiana Energy Services (Claiborne Enrichment Center)*, LBP-96-25, 44 NRC 331, 355 (1996). Therefore, the Licensing Board finds that LES’s supply forecast in the ER is reasonably based on announced plans to build new centrifuge facilities and to close old diffusion facilities.

4.139 The Licensing Board finds that the information presented by LES in the ER therefore presents a reasonable projection of both future supply and demand for enrichment services based on current indicators, showing a very close balance of supply and demand, including production from the NEF, after 2010. If the ACP does not come on line as scheduled or the HEU agreement is not extended, demand would even further exceed supply and even more of a shortage would exist.

4.140 Similarly, the Staff presented testimony that the DEIS shows that domestic demand for enrichment services exceeds domestic supply, indicating a need for additional domestic supply,

especially in the context of the projected balance of global supply and demand. Staff Exh. 1b, p. 1-4; Nevin, Tr. at 1546. The DEIS showed that EIA and LES domestic demand projections “were generally consistent” and EIA and ER global demand projections were also similar. Staff Exh. 1b, p. 1-4; LES Exh. 30, Fig. 1.1-4. The DEIS especially highlighted the shortfall of domestic supply relative to domestic demand and the need for additional domestic supply “to ensure national energy security” but also considered the implications of this domestic forecast in the context of global forecasts for installed nuclear-generating capacity that “suggest a continuing demand for uranium enrichment services both in the United States and abroad.” Staff Exh. 1b, p. 1-3, 1-4.

4.141 Therefore, the Licensing Board finds that the ER and DEIS contain reasonable projections of supply and demand for enrichment services and reflect sound economic assumptions upon which to assess the need for the NEF, showing that domestic demand for enrichment services exceeds domestic supply after 2010, and global supply of and global demand for enrichment services are in close balance after 2010, including the NEF as a supply source. Therefore, LES and the Staff both reasonably forecast a shortage of enrichment capacity unless the NEF is operated.

4. Basis (B)

4.142 Basis B of NIRS/PC EC-7 contends that LES’s statements of need for the NEF depend erroneously on global rather than domestic projections of demand. Although NIRS/PC did briefly question the Staff’s expert regarding the use of domestic versus global projections, Tr. at 1571, NIRS/PC did not itself present significant testimony on this issue. See Sheehan, Tr. at 1578-1588; Sheehan Rebuttal, Tr. at 1638-1655.

4.143 The NEF ER, in its ERI analysis, does make reference to the global supply of and global demand for uranium enrichment services. LES testimony indicated, however, that the ERI market analysis to which NIRS/PC refers is a secondary component of LES’s statement of need, the primary component of which is the national policy reasons stated above. See Staff Exh. 1b,

p.1-2 - 1-3; Schwartz/Krich, Tr. at 1436-37, 1466; LES Exh. 30; "Letter From W.D. Magwood, IV, U.S. Department of Energy, to M.J. Virgilio, U.S. Nuclear Regulatory Commission" (July 25, 2002), LES Exh. 31; Staff of Senate Subcommittee of the Committee on Appropriations, 108<sup>th</sup> Congress, "Energy and Water Development Appropriations for Fiscal Year 2004," pp.1, 45, 55-56 (Comm. Print 2003) (Mar. 12, 2003), LES Exh. 32; U.S. Department of Energy, "Effect of U.S./Russia Highly Enriched Uranium Agreement" (Dec. 31, 2001), LES Exh. 33.

4.144 In addition, LES presented testimony that its use of global supply and demand figures is intended to and does comport with the NRC guidance document NUREG-1520, "Standard Review Plan for the Review of a License Application for Fuel Cycle Facility" (March 2000), which specifically requests information about "foreign requirements for the services" and "alternative sources of supply". LES Exh. 30, p. 1.1-4, Schwartz/Krich, Tr. at 1466. Therefore, NUREG-1520 seeks information on global supply and requirements. In addition, the nature of the enrichment market necessitates a global analysis. LES Exh. 30, p. 1.1-7, Schwartz/Krich, Tr. at 1467; Tr. at 1571. The Board in the Claiborne proceeding found the uranium enrichment market to be a global market and therefore found that a global analysis of enrichment supply and demand was appropriate to analyze the need for a uranium enrichment facility, partially based on testimony by Dr. Sheehan's partner, Mr. David E. Osterberg. *Claiborne Enrichment Center*, LBP-96-25, 44 NRC 331, 351-359, 360-61.

4.145 LES testimony indicates that the ERI analysis of demand for enrichment services contained in the NEF ER encompassed all countries with nuclear power plants. Schwartz/Krich, Tr. at 1440-41. In addition, the ERI analysis did include forecasted trends in U.S. nuclear generating capacity, so it did in fact consider the U.S. market. Schwartz/Krich, Tr. at 1443-44, 1446-49, 1467. Table 1.1-3 of the ER, to which Dr. Sheehan cites in his testimony, does include a forecast of U.S. uranium enrichment requirements. LES Exh. 30, Table 1.1-3.

4.146 Finally, the Staff's expert testified that the DEIS in particular focuses on domestic supply and demand and demonstrates a substantial shortfall of domestic supply versus domestic demand. Nevin, Tr. at 1548, Staff Exh. 1b, p.1-4. Table 1-1 on DEIS page 1-4 specifically charts projected Uranium Enrichment demand in the United States from 2002-2025 and compares EIA forecasts with LES forecasts.

4.147 Based on the evidence presented, which is uncontroverted, the Licensing Board finds that global projections of enrichment supply and demand are relevant in determining the need for a uranium enrichment facility, given the character of the market and the NRC's guidance documents. The Licensing Board finds that the market for enrichment services is an international market and that therefore both global and domestic enrichment supply and requirements are relevant to the need for a uranium enrichment facility. In addition, to the extent that an analysis of the domestic market for enrichment services is required, the Licensing Board finds that the DEIS does adequately consider and analyze the domestic supply and demand market for enrichment services, and that therefore, the statements of need contained in the ER and the DEIS rely on both domestic and global projections.

5. Basis (C)

4.148 Basis C of NIRS/PC EC-7 alleges that LES has not shown how it "would effectively enter this market in the face of existing and anticipated competitors and contribute some public benefit." The Licensing Board reiterates that LES is not required, by NEPA or otherwise, to set forth a business plan or to demonstrate its competitiveness or profitability.

4.149 LES witness Schnoebelen presented evidence that LES has already executed five contracts with utility companies for enrichment services. Schnoebelen, Tr. at 1393 (Proprietary Information); Proprietary Executed Uranium Enrichment Services Contract Between LES and Utility #1 (redacted version), LES Exh. 65; Proprietary Executed Uranium Enrichment Services Contract Between LES and Utility #2 (redacted version), LES Exh. 66; Proprietary Executed Uranium

Enrichment Services Contract Between LES and Utility #3 (redacted version), LES Exh. 67; Proprietary Executed Uranium Enrichment Services Contract Between LES and Utility #6 (redacted version), LES Exh. 70; Proprietary Draft Uranium Enrichment Services Contract Between LES and Utility #5 (redacted version); LES Exh. 69. Together, these already-executed contracts represent two-thirds or 67 percent of the NEF's expected production capacity through 2017, i.e. the first ten years of production for the NEF, as well as additional deliveries of more than 3.7 million SWU between 2018 and 2026. Schnoebelen, Tr. at 1397 (Proprietary Information). In addition, LES is currently finalizing contractual language with another utility. Schnoebelen, Tr. at 1394 (Proprietary Information). LES has described the status of that contract as "imminent", and expects that the contract will be executed in the first half of 2005. *Id.* at 1394 (Proprietary Information). When that contract is executed, LES will have executed contracts accounting for approximately 72 percent of the NEF's output through the facility's initial 10 years of production. *Id.* at 1398 (Proprietary Information).

4.150 Both the ER and the DEIS state that the primary public benefit provided by LES will be a secure, reliable, domestic source of uranium enrichment that will be primarily devoted to serving the needs of the U.S. nuclear energy industry. Schwartz/Krich, Tr. at 1436-37. As nuclear energy provides approximately 20 percent of the Nation's electricity, the public benefits of the NEF have been recognized and endorsed by the U.S. government. *Id.*; LES Exh. 30-32. In addition, a public benefit will be conferred by giving U.S. utility companies diversity in domestic supply. Schwartz/Krich, Tr. at 1461; Tr. at 1667.

4.151 The Licensing Board finds that the already-executed and imminent contracts between LES and U.S. utilities, the supply and demand information in the ER and the DEIS, and the discussion in the ER and the DEIS of public policy considerations all establish that LES will in fact be able to enter the enrichment market and will confer a public benefit.

## V. CONCLUSIONS OF LAW

5.1 We conclude that the NRC Staff has provided sufficient explanation of the calculations it performed in determining the dimensions and flow rates of perched bodies of groundwater that may form at the alluvial/Chinle interface. We also conclude that the Staff adequately explained its rationale for its determination of possible discharge areas for potential perched water bodies at the proposed NEF. These explanations were provided by the Staff in Mr. Toblin's pre-filed testimony for EC-1. Therefore, we find that the deficiencies alleged in NIRS/PC EC-1 have been cured, and that this contention has been rendered moot.

5.2 For the reasons discussed above, we conclude that a scientifically sound means of estimating the probability and frequency of liner leakage from the lined basins proposed to be constructed at the NEF has not been presented. Therefore, we find the fact that the Staff did not perform such an analysis does not represent a shortcoming in the DEIS. Furthermore, we conclude that the Staff has sufficiently addressed the fate of any water and contaminants that may leak from these lined basins, as set forth in the EC-1 pre-filed direct testimony of Mr. Toblin and discussed in Section 3.34, *supra*.

5.3 The Licensing Board also concludes that the statement on page 3-35 of the DEIS regarding the lack of precipitation recharge at the proposed NEF is reasonably supported by the totality of the evidence presented, notwithstanding the existence of moisture in 2 of the borings at the site.

5.4 We further conclude that adequate investigation of the proposed site has been conducted to support the finding on page 3-35 of the DEIS that fracture zones are absent from the proposed site. With respect to this issue, we also conclude that even if fractures do exist beneath the proposed NEF, their mere presence does not necessarily form fast flow paths for transporting water. Finally, we find that the laboratory measurements and slug test relied up on the by the Staff are not "limited" measurements, but are reliable bases for concluding that the permeability of the

soil beneath the NEF site is very low.

5.5 With regard to the sufficiency of the DEIS's discussion of LES's Stormwater Monitoring Program, we conclude that the DEIS adequately identified the potential contaminants in the stormwater runoff and sufficiently explains their monitoring.

5.6 We conclude that Applicant has completely and adequately assessed the potential environmental impacts of the proposed NEF on water supplies. We further conclude that, through the pre-filed direct testimony of Mr. Toblin on EC-2, the Staff has sufficiently demonstrated how pumpage from the NEF would affect water levels and long-term productivity of the Hobbs well field and the Lea County Underground Water Basin. In so doing, the NRC Staff has adequately assessed the potential environmental impacts of the proposed NEF on water supplies in satisfaction of NEPA requirements.

5.7 The Licensing Board has considered all of the evidence presented by the parties on Contention EC-4. Based on review of the entire record in this proceeding and the proposed findings of fact and conclusions of law submitted by the parties, and based on the findings of fact set forth herein, which are supported by reliable, probative, and substantial evidence in the record, the Board has decided all matters in controversy concerning this contention and reaches the following conclusions.

5.8 Pursuant to NEPA, the Staff must take a 'hard look' at environmental consequences, as well as reasonable alternatives, of the proposed action.

5.9 We conclude that LES's ER for the proposed NEF provided information concerning deconversion of DUF<sub>6</sub>, sufficient to inform the NRC's DEIS. While the ER initially did not address these impacts, this omission was cured by amendment referencing the NRC's CEC FEIS and DOE's EIS's.

5.10 The Board also concludes that based upon the review contained in the DEIS, as supplemented by the testimony presented by the Staff's witness in the hearing, that the Staff

adequately considered deconversion impacts, including anhydrous HF, and their analysis would satisfy requirements of NEPA.

5.11 However, the underlying basis for the challenge to the ER and DEIS in Contention EC-4 presupposes a decision by LES to focus on a process that will generate anhydrous HF. In light of the commitment of the Applicant not to pursue a deconversion process that would generate anhydrous HF we conclude that the production of anhydrous HF is not a reasonably foreseeable outcome of the deconversion process. While the Staff has adequately considered deconversion impacts, including AHF, as noted above, the Board concludes that anhydrous HF does not need to be considered in evaluating the environmental impacts of the proposed NEF.

5.12 The Licensing Board has considered all of the evidence presented by the parties on Contention NIRS/PC EC-7 (Need for the Facility). Based upon a review of the entire record in this proceeding and the proposed findings of fact and conclusions of law submitted by the parties, and based upon the findings of fact set forth herein, which are supported by reliable, probative, and substantial evidence in the record, the Board has decided all matters in controversy concerning this contention and reaches the following conclusions.

5.13 Pursuant to NEPA, the Staff, in its EIS, is required to take a "hard look" at the environmental consequences of the proposed action. Under the NRC's regulations implementing NEPA, the Staff is required to state the purpose and need for the proposed action. These duties are governed by the rule of reason.

5.14 The requirement of the Staff to include a statement of purpose and need in the EIS is essentially a requirement to state the benefits of the proposed facility. See *Claiborne Enrichment Center*, CLI-98-3, 47 NRC at 89-90, citing *Claiborne Enrichment Center*, LBP-96-25, 44 NRC at 348-49.

5.15 We conclude that both the ER and the DEIS state that the primary benefit of the NEF is that it will serve the need for an additional reliable and economical domestic source of

enrichment services. See Staff Exh. 1b, p. 1-2; LES Exh. 30, p. 1.1-1 - 1.1-3. In addition, the DEIS notes that the NEF would contribute to the attainment of the national energy security policy objectives. Staff Exh. 1b, p. 1-2. Neither Basis A nor Basis B of NIRS/PC EC-7 relate to this component of the need for the facility.

5.16 We conclude that the ER, in Section 1.1, and the DEIS, in Section 1.3, accurately describe the character and nature of the current uranium enrichment market. We further conclude that the ER and DEIS are based on sound and reasonable assumptions and predictions regarding the future market for uranium enrichment services.

5.17 We conclude that the ER reasonably predicts that if the NEF is not constructed or does not begin production on schedule, that global requirements for uranium enrichment will exceed global supply between 2010 and 2020. See LES Exh. 30, p. 1.1-13 - 1.1-15, Tables 1.1-3, 1.1-5. The ER also reasonably predicts that, assuming the construction and operation of the NEF, global supply and demand are in close balance during this time period. *Id.*

5.18 We conclude that the DEIS reasonably forecasts a continuing demand for uranium enrichment services, both in the U.S. and abroad. Staff Exh. 1b, p. 1-3.

5.19 We further conclude that the ER reasonably and appropriately uses global projections of need, given NRC guidance and the character of the enrichment services market. In addition, we conclude that the ER and DEIS do reasonably analyze projections of demand for uranium enrichment in the U.S. and do include the U.S. market for enrichment services in their statements of need.

5.20 Further, we conclude that LES has reasonably shown, based both on forecasts of supply and requirements of uranium enrichment services and on executed and imminent contracts with utility companies, that it will enter the uranium enrichment services market and will contribute a public benefit. See LES Exh. 30, 65-70.

5.21 Finally, we conclude that both the ER and the DEIS adequately describe and state the benefit of the NEF and therefore both make adequate statements of the need and purpose for the proposed action. Therefore, we conclude that the Staff has fulfilled its duties under NEPA with regard to the need for the facility.

Respectfully submitted,

*/RA/*

Lisa B. Clark  
Counsel for NRC Staff

Dated at Rockville, Maryland  
this 14<sup>th</sup> day of March, 2005

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW CONCERNING NIRS/PC CONTENTIONS EC-1 (IMPACTS UPON GROUND AND SURFACE WATER), EC-2 (IMPACT ON WATER SUPPLIES), EC-4 (IMPACTS OF WASTE STORAGE), AND EC-7 (NEED FOR THE FACILITY)" in the above-captioned proceedings have been served on the following by deposit in the United States mail; through deposit in the Nuclear Regulatory Commission's internal system as indicated by an asterisk (\*), and by electronic mail as indicated by a double asterisk (\*\*) on this 14<sup>th</sup> day of March, 2005.

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