RAS 9187

January 12, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED
USNRC

January 13, 2005 (7:47 am)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

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)	)	

MOTION IN LIMINE ON BEHALF OF LOUISIANA ENERGY SERVICES, L.P. TO EXCLUDE PORTIONS OF PREFILED DIRECT TESTIMONY OF NIRS/PC WITNESSES GEORGE RICE, ARJUN MAKHIJANI, MICHAEL SHEEHAN AND CHARLES KOMANOFF AS IRRELEVANT

I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.323, § 2.337(a), and the Atomic Safety and Licensing Board's ("Board") Order (Schedule for Prefiled Testimony and Related Filings) of December 30, 2004, Louisiana Energy Services, L.P. ("LES") herein moves to exclude portions of the direct testimony of four witnesses proffered on behalf of Nuclear Information and Resource Service and Public Citizen ("NIRS/PC") on January 7, 2004. Specifically, LES seeks to strike portions of the prefiled direct testimony of (1) George Rice, (2) Arjun Makhijani, (3) Michael Sheehan, and (4) Charles Komanoff as being outside the scope of the contentions admitted in this proceeding.[1]

II. ARGUMENT

NRC regulations governing the admission of evidence provide that "[o]nly *relevant, material, and reliable* evidence which is not unduly repetitious will be admitted. *Immaterial or irrelevant parts* of an admissible document will be segregated and excluded so far as is practicable." 10 C.F.R. § 2.337(a) (emphasis added). As the Commission stated in the *Claiborne* proceeding:

[1] LES reserves its right, pursuant to 10 C.F.R. § 2.704(c)(3), to object to the admissibility of any exhibits or other documents identified by NIRS/PC in connection with the submittal of its prefiled testimony of January 7, 2005.

Template=SECY-041

ML050250

SECY-02

"Our own longstanding practice requires adjudicatory boards to adhere to the terms of admitted contentions . . . ." *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 105 (1998) (citation omitted). In particular, "[w]here an issue arises over the scope of an admitted contention, NRC opinions have long referred back to the bases set forth in support of the contention." *See Duke Energy Corporation* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-28, 56 NRC 373, 379 (2002) (citation omitted). Accordingly, the Board should exclude the portions of the NIRS/PC testimony identified below.

A. Irrelevant/Inadmissible Portions of Direct Testimony of George Rice

NIRS/PC witness George Rice purports to present opinions and conclusions relative to Contentions NIRS/PC EC-1 and EC-2. One of the issues addressed by Mr. Rice, however, was expressly rejected by the Board in its ruling on late-filed contentions. Specifically, the Board rejected late-filed Basis E, regarding the alleged need for LES and the NRC Staff to investigate a water-bearing sandstone unit located approximately 600 feet below the NEF site.[2] Notwithstanding the Board's ruling, Mr. Rice's testimony states, in pertinent part:

> Information is lacking regarding two water-bearing units. First, there is reported to be a 100-foot think water-bearing sandstone layer at a depth of about 600 feet. However, LES and NRC have not done the investigations needed to answer basis questions about this water-bearing layer, such as its presence and areal extent below the NEF site, its conductivity, the chemical quality of the water, and the magnitude and direction of flow. The installation of monitoring wells would provide the answers.[3]

Figures 1 and 3 of Mr. Rice's testimony, *i.e.*, crude "geologic cross-sections" prepared by Mr. Rice, contain depictions of the water-bearing sandstone unit at 600 feet. With regard to Figure 1, Mr. Rice states that "[t]he question marks in the figure indicate uncertainty regarding existence of fractures and water-bearing zone at 600 feet." Rice Direct Testimony at 5. In view of its prior

---

2 Memorandum and Order (Ruling on Late-Filed Contentions) (unpublished) (Nov. 22, 2004), at 10 ("Ruling on Late-Filed Contentions").

3 Rice Direct Testimony at 8-9.

ruling, the Board should strike the foregoing statements by Mr. Rice and Figures 1 and 2 (or at least the current versions of these figures) from Mr. Rice's prefiled testimony.[4]

B. Irrelevant/Inadmissible Portions of Direct Testimony of Arjun Makhijani

The prefiled direct testimony of Arjun Makhijani purports to relate to Contention NIRS/PC EC-4. As the Board clarified in its December 15 order, this contention is focused on (1) whether LES's Environmental Report ("ER") and the NRC Staff's DEIS discuss the environmental impacts of constructing and operating a conversion plant, and (2) the validity of DEIS reliance on Paducah and Portsmouth final EISs for evaluation of environmental impacts. Importantly, in seeking to amend this contention on October 20, 2004, NIRS/PC focused on the *specific process* to be employed by LES in a private facility for deconverting the depleted uranium hexafluoride ("DUF_6").[5] NIRS/PC contended that "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," *purportedly* by adopting an anhydrous hydrofluoric acid ("AHF") rather than an aqueous HF process. NIRS/PC also sought to amend the contention to include bases related to the disposal of depleted uranium (as opposed to deconversion of DUF_6 to a different chemical form). Significantly, the Board rejected these proposed additional bases related to disposal, explicitly stating that "to clarify the scope of this contention, we will delete the words 'and Disposal' from its title." Board Ruling on Late-Filed Contentions at 15.

Only limited portions of Dr. Makhijani's prefiled testimony relate to the admitted contention; the remainder delves impermissibly into issues associated with the ultimate disposal of depleted uranium. In particular, Dr. Makhijani's discussion of deconversion of the DUF_6 to UO_2

---

[4] In view of the reasoning underlying the Board's rejection of the late-filed NIRS/PC argument regarding the purported need to investigate the water-bearing unit at 600 feet below ground surface, it appears that Mr. Rice's comparable testimony regarding the asserted need to investigate the Santa Rosa Aquifer warrants exclusion as well.

[5] *See* "Motion on Behalf of Petitioners Nuclear Information and Resource Service and Public Citizen to Amend and Supplement Contentions," dated October 20, 2004, at 12-14.

rather than to U_3O_8 (the latter being the form proposed by LES) actually relates to the issue of disposal of NEF-generated depleted uranium. Any discussion of these issues is beyond the scope of Contention NIRS/PC EC-4 and should be stricken accordingly. Indeed, Dr. Makhijani, like the Board itself, explicitly recognizes that deconversion and disposal (including Dr. Makhijani's recommendation to deconvert DUF_6 to UO_2) "are closely related but *distinct* problems."[6] Makhijani Prefiled Testimony at 11.

A second irrelevant issue raised by Dr. Makhijani is that of waste classification. He argues that DUF_6 is not low-level radioactive waste, and must therefore be disposed of in a mined repository, such as the Waste Isolation Pilot Plant ("WIPP"). *Id.* at 15. Again, this issue exceeds the scope of Contention NIRS/PC EC-4 and should be excluded from Dr. Makhijani's testimony. Indeed, the issue is the subject of another contention and currently before the Commission.

Finally, Dr. Makhijani raises yet another inadmissible issue in his testimony. He states that "[c]urrently there are no DOE or general guidelines that govern the free release of contaminated hydrofluoric acid or calcium fluoride." *Id.* at 7. In addition to being inaccurate, this statement has nothing to do with the alleged differences between the deconversion process employed by a potential NEF-elated commercial deconversion facility and the process employed by the deconversion facilities analyzed by DOE in its EISs (*i.e.*, the core issue raised in Contention NIRS/PC EC-4). Therefore, any discussion of this issue should be excluded.

In sum, the foregoing issues are beyond the scope of the admitted contention. This narrow contention is concerned with whether the Paducah/Portsmouth EISs relied upon by LES and

---

[6] In several other places, Dr. Makhijani explicitly acknowledges that the "UO_2" issue is, in reality, a disposal-related issue. For example, he states that "[t]he likelihood that the production of UO_2 rather than U_3O_8 by the deconversion process would be more suited for *final disposal* should be considered by LES and the NRC in the ER and the EIS." *Id.* at 8. He then adds: "One of the most important inputs to such a decision is the suitability of the deconversion product for *ultimate disposal*." *Id.* at 11. He also asserts that: "No *final disposal strategy* has been chosen or fully analyzed by the DOE in relation to the management of its depleted uranium stockpile." *Id.* at 12. All of these statements broach an issue – disposal of depleted uranium – beyond the contention's scope as specifically clarified by the Licensing Board.

the NRC Staff adequately bound the potential environmental impacts of the specific deconversion process that might be employed at a commercial deconversion facility constructed to process NEF-generated depleted uranium. The attached markup of Dr. Makhijani's direct testimony (Attachment 1) identifies in yellow those sections of the testimony that should be stricken by the Board.

C. Irrelevant/Inadmissible Portions of Direct Testimony of Michael Sheehan

The prefiled testimony of Michael Sheehan purports to present the opinions and conclusions of Dr. Sheehan relative to Contention NIRS/PC EC-7, regarding the "need" for the proposed facility for purposes of the National Environmental Policy Act ("NEPA"). The Board has clarified the scope of this contention repeatedly. For example, in rejecting two NIRS/PC motions to compel discovery, the Board stated:

> . . . [T]he particular bases which the Board found supported admission of this contention were *narrowly focused* upon whether (1) there is a shortfall of enrichment capacity as LES asserts (Basis A); (2) LES statements of need depend primarily on projections of global rather than United States enrichment needs (Basis B); and (3) LES can effectively enter the market in the face of existing and anticipated competitors, albeit without examination of the "business case" or profitability of the NEF venture. *In contrast, the remaining two contested bases for this particular contention were expressly disallowed by the Board because they focused upon these business case/profitability aspects.*[7]

Notably, the Board outright *rejected* the late-filed NIRS/PC argument that the NRC Staff must consider "the effect of the addition of the NEF to the existing range of suppliers and forthcoming suppliers, the nature of competition that will occur, and the impacts upon market participants and consumers."[8]

Regrettably, NIRS/PC have failed to heed the admonition implicit in the Board's statement that it "would take NIRS/PC at their word that they intend to address only relevant

---

[7] Memorandum and Order (Discovery Rulings) (unpublished) (Oct. 20, 2004), at 17-18.

[8] Board Ruling on Late-Filed Contentions, at 17-18. *See also* Memorandum and Order (Ruling on Applicant Motion to Restrict Scope and Staff Motion In Limine) (unpublished) (Dec. 30, 2004), at 3 (enumerating the specific "matters obviously relevant to the admitted environmental contentions").

matters in their prefiled testimony." In his testimony, Dr. Sheehan strays far afield, pontificating on issues that are, without dispute, beyond the scope of the admitted contention and the objects of prior Board rejection. Distilled to its essence, Dr. Sheehan's testimony seeks to establish the following:

- The HEU Agreement with the Russians is essential to the national security of the United States and, given the state of security in the former Soviet Union, getting this material out of Russia is "clearly in the national security interest of the United States." Sheehan Direct Testimony at 18.

- "To the extent that LEU from the Russian HEU is marketed in the United States at competitive prices, it exercises downward pressure on enrichment prices. Such pressure works to the disadvantage of Urenco." *Id.*

- "To the extent that Urenco and its allies can drive USEC out of the market as a viable contender, their market share would increase sharply; and, especially if they could also sabotage the Russian HEU Agreement, they would dominate the United States market, and prices for their product would soar." *Id.*

- The success of USEC's American Centrifuge Plant "probably depends in large measure on whether this Urenco plant, the NEF, is built." *Id.*

- "USEC is not as strong financially as Urenco and its allies; USEC may have difficulty attracting financing for the American Centrifuge Plan if Urenco's NEF is licensed first." *Id.* at 19.

- "USEC would almost certainly be in the weaker position financially, compared to Urenco, in a price war in this natural monopoly market." *Id.* at 19.

- Urenco intends to install the Urenco/Areva centrifuges in New Mexico, which is ostensibly problematic insofar as the "empires" of Urenco and Areva are "rapidly expanding their centrifuge enrichment capacity." *Id.* at 24.

- "If Urenco enters this market before USEC gets its American Centrifuge plant up and running more likely than not USEC will not be able to get the American Centrifuge Plant up and running. Moreover, even if USEC did get its plant up and running first, Urenco's deep pockets, derived from its many profitable operations elsewhere, would allow it to prevail in a price war against USEC, which has a single plant in the market at issue and no financial reserves." *Id.* at 29.

- "Urenco as a company has poor record with disastrous consequences when it comes to keeping dangerous technologies and other sensitive information out of the hands of people or nations where it doesn't belong." *Id.* at 32.

- "The job and tax benefits claimed for the construction and operation of the NEF will be offset by a loss of corresponding benefits if the construction of the Urenco plant results

in the elimination of the American Centrifuge Plant in Ohio and the Paducah plant in Kentucky." *Id.* at 34.

- "[W]ater for the NEF will come from the Ogallala Aquifer, which is "a very important, multi-state water resource, currently being progressively overdrawn," such that "establishing the NEF plant will exacerbate this problem, unlike constructing a plant in non-arid Ohio." *Id.* at 34-35.

- "LES is equivocal about its commitment to have all DU offsite from the NEF plant by 2038." *Id.* at 35.

In short, Dr. Sheehan raises issues related to nuclear nonproliferation (*i.e.* the effect of the NEF on the U.S.-Russian HEU Agreement); the alleged anti-competitive business objectives of Urenco and Areva; USEC's finances; the postulated effect of NEF operations on USEC's proposed American Centrifuge Plant;[9] Urenco management integrity; the job and tax benefits of the NEF; the effect of the NEF on the Ogallala Aquifer; and LES's disposition of depleted uranium tails. None of these claims, however, is relevant to Contention NIRS/PC EC-7, which is limited in scope to whether: (1) there is a shortage of uranium enrichment capacity (*i.e.*, the uranium enrichment supply-demand balance); (2) LES's statement of "need" focuses on the "need" in the United States or the global need; and (3) LES can effectively enter the market in the face of existing and anticipated competitors. Dr. Sheehan's direct testimony should be stricken in its entirety.[10]

D. Irrelevant/Inadmissible Portions of Direct Testimony of Charles Komanoff

Charles Komanoff also purports to testify regarding Contention NIRS/PC EC-7. However, like Dr. Sheehan's testimony, Mr. Komanoff's testimony goes beyond the scope of the

---

[9] Ironically, Basis C of Contention NIRS/PC EC-7 challenges the ability of LES to enter the enrichment services market in the face of existing and anticipated competitors, yet Dr. Sheehan takes precisely the opposite position, *i.e.*, that, because it is supported by Urenco, the NEF will be so successful as to preclude competition from USEC.

[10] The irrelevant and inadmissible points summarized above are extracted from Sections V through VIII of his prefiled testimony, which LES maintains should be stricken in their entirety. While Sections I through IV of his testimony principally purport to provide background information (the accuracy of which LES does not concede), they should be stricken as well. They serve simply to lay the framework for the irrelevant and groundless opinions expressed by Dr. Sheehan in Sections V through VIII, and, by themselves, do not constitute expert opinion or testimony.

admitted contention and also should be stricken in its entirety. In fact, Mr. Komanoff does not contest Basis B (LES's asserted reliance on global rather than domestic enrichment services projections) or Basis C (LES's ability to enter the market). Arguably, the only basis to which Mr. Komanoff's proffered testimony could relate is Basis A, regarding LES's purported "assumption" that there is a shortage of enrichment capacity.

Closer inspection reveals, however, that Mr. Komanoff's testimony fails to address even Basis A. At no point in his testimony does Mr. Komanoff take issue with LES's forecasts of enrichment services requirements and supplies, or take a position on the supply-demand balance (*i.e.*, on whether there is, in fact, currently a shortage of enrichment capacity). Instead, Mr. Komanoff merely "hypothesizes" that, "if LES is unable to build and operate the NEF, the worldwide nuclear power and electricity sectors could easily absorb the loss of uranium enrichment capacity and produce the same volume of enriched uranium and nuclear-generated electricity *by simply increasing the tails assay – the average U-235 content in the uranium tails – in other enrichment facilities around the world.*" Komanoff Direct Testimony at 2 (emphasis added). In essence, after apparently conceding (or at least not contesting) the need for additional 3 million SWU that the NEF would produce annually, Mr. Komanoff seeks to "manufacture" the 3 million SWU per year output of the proposed NEF by merely manipulating, without any reasoned or defensible basis, certain assumptions in the computer program used to generate LES's forecasts of enrichment services requirements. He states: "Using the program, I changed the assumed values of the tails assays for the various regional subgroups of nuclear plants so as to produce an aggregate worldwide enrichment output that was approximately 3 million SWU less than the value in LES's program for the year 2020." *Id.* at 4. He makes no attempt to justify his proposed tails assays values, or to explain how such changes would be accomplished in the real world. He merely implies a world-wide change in tails assays might somehow be dictated.

At bottom, Mr. Komanoff merely suggests another way – an untenable way – to provide the enrichment capacity of the proposed NEF, without examining the current supply-demand balance (the crux of Bases A and B). In effect, he is alleging that there is another "alternative" that LES should have evaluated in its ER. At no point heretofore have NIRS/PC identified the approach now suggested by Mr. Komanoff. In fact, the only "alternatives" argument raised by NIRS/PC – *i.e.*, relying on existing and future HEU from Russian and U.S. stockpiles (Bases B, C, and D of proposed Contention 5.2) – was rejected by the Board in its July 19, 2004 ruling on contention admissibility. NIRS/PC cannot now seek to inject a new "alternatives" argument into this proceeding.

Aside from being an impermissible attempt to raise a new "alternatives" argument, Mr. Komanoff's testimony goes well beyond the proper scope of a NEPA evaluation. It is well established that only "reasonable alternatives" to a proposed action need be considered under NEPA.[11] In this regard, a "proposed alternative is reasonable only if it will bring about the ends of the federal action."[12] Moreover, "[w]hen the purpose is to accomplish one thing, it makes no sense to consider the alternative ways by which another thing might be achieved."[13] Mr. Komanoff's proposal that "tails assay at other enrichment facilities around the world" be "simply" increased is unreasonable; it is neither technically feasible nor consistent with the underlying need for the proposed NEF – *i.e.*, the need for diverse, reliable domestic enrichment capacity.[14]

---

11 *See Vermont Yankee Nuclear Power Corp. v. Natural Res. Defense Council*, 435 U.S. 519, 551 (1978); *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-04, 53 NRC 31, 48, 55-56 (2001); 10 C.F.R. Part 51, Subpt. A, App. A, ¶ 5.

12 *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 195 (D.C. Cir.), *cert. denied*, 502 U.S. 1994 (1991) (citing *City of New York v. DOT*, 715 F.2d 732, 742-43 (2d Cir. 1983)).

13 *Id.* (citing *City of Angoon v. Hodel*, 803 F.2d 1016, 1021 (9th Cir. 1986), *cert. denied*, 484 U.S. 870 (1987)).

14 Indeed, Mr. Komanoff, himself, acknowledges that, if his suggested alternative were somehow brought to fruition, then enrichment plants would be used less efficiently, an additional 20 million pounds if uranium would have to be produced, and an additional 7,500 metric tons of depleted uranium would be produced, collectively resulting in a cost of somewhere in the range of $450 million to $1.24 billion. Clearly, these are not indicia of a "reasonable alternative" to the operation of the NEF. Komanoff Direct Testimony at 6-10.

III. CONCLUSION

For the reasons discussed above, the Board should exclude from the evidentiary record in this proceeding those portions of the prefiled direct testimony of NIRS/PC identified above insofar as that testimony is outside the scope of the admitted contentions.

Respectfully submitted,

James R. Curtiss, Esq.
David A. Repka, Esq.
Martin J. O'Neill, Esq.
WINSTON & STRAWN LLP
1400 L Street, N.W.
Washington, DC 20005-3502
(202) 371-5700

John W. Lawrence, Esq.
LOUISIANA ENERGY SERVICES, L.P.
100 Sun Avenue, NE
Suite 204
Albuquerque, NM 87109

Dated at Washington, District of Columbia
this 12th day of January 2005

ATTACHMENT 1

January 7, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

DIRECT TESTIMONY OF DR. ARJUN MAKHIJANI REGARDING NUCLEAR INFORMATION AND RESOURCE SERVICE AND PUBLIC CITIZENS'S CONTENTION EC-4

Q: Please state your name, affiliation, and qualifications.

A. My name is Dr. Arjun Makhijani. Among my credentials is a doctorate in Engineering from the Electrical Engineering Department of the University of California at Berkeley (1972, specialization: the application of plasma physics to controlled nuclear fusion). I am President of the Institute for Energy and Environmental Research (IEER), an organization, which, among its activities, assesses environmental damage from the operation of nuclear fuel facilities, and estimates the compliance of those facilities with environmental regulations, mainly relating to radioactive materials and wastes and to radioactivity exposures. In addition, I am, in my personal capacity as part of a non-IEER team, currently one of the principal personnel who have

A. DOE released two very similar environmental impact statements for the Paducah and Portsmouth deconversion facilities. A few main points can be noted about these documents:

- Currently there are no DOE or general NRC guidelines that govern the free release of contaminated hydrofluoric acid or calcium fluoride.[1]

- In the analysis of proposals to construct and build the DOE deconversion facility it was determined that the accident scenarios with the largest consequences were primarily those involving hydrofluoric acid.[2] If the preferred option of neutralizing the HF and disposing of the calcium fluoride as LLW is replaced by a decision by LES to produce and ship anhydrous HF (AHF), the potential impacts on the environment are likely to be higher. However, given that no existing facility for UF_6 deconversion currently produces AHF, the fact that the cumulative transportation distances considered for the DOE facilities are different from those that may be required for shipping the material generated by the proposed LES facility[3], as well as the fact that the health and environmental impacts on routine operation from the greater volatility and general hazards posed by anhydrous HF versus aqueous HF were not analyzed by the DOE EIS for the

[1] DOE Paducah ROD 2004 p. 44657 - 44658 and DOE Portsmouth ROD 2004 p. 44652 - 44653
[2] Paducah EIS from Appendix D page 18-19
[3] Currently no commercial deconversion facility exists in the U.S. that would be able to accept the DUF6 from the proposed LES enrichment facility and thus no quantification of this potential impact was attempted.

Paducah or Portsmouth facilities cited by the NRC in the LES DEIS analysis[4], it is not possible at this time to quantify the potential impacts of such a decision.

- The ultimate disposal of the depleted uranium presents even more difficult issues than does deconversion. No final disposal strategy has been chosen or fully analyzed by the DOE in relation to the management of its depleted uranium stockpile since the DOE is still considering possible, but unlikely, uses for its DU.[5] No credible environmental analysis can be done on a generic basis. A plausible strategy necessarily includes identification of a specific site and a process for its thorough characterization and licensing, as well as a reasonable scientific expectation that it will be able to meet the established dose limits. The likelihood that the production of UO_2 rather than U_3O_8 by the deconversion process would be more suited for final disposal should be considered by LES and the NRC in the ER and EIS which is not done in the DOE EISs referred to. For a further discussion I refer you to the report by Makhijani and Smith, Costs and Risks of Management and Disposal of Depleted Uranium from the National Enrichment Facility Proposed to be Built in Lea County, New Mexico by LES, Nov. 24, 2004, filed in this proceeding.

Q. Moving to the proposal before the Commission, what do you understand LES proposes to do with the DUF_6 from the NEF?

[4] NRC NEF EIS Draft 2004 p. 2-30
[5] DOE Paducah EIS 2004 p. 2-11, 2-17, and 2-25

LES has not decided whether the hydrofluoric acid generated will be neutralized to form calcium fluoride (CaF_2) or distilled to form anhydrous hydrofluoric acid (AHF), however, the NRC stated that CaF_2 disposal was the only scenario that was reasonable to include in the DEIS:

> The hydrofluoric acid could be sold to a commercial hydrofluoric acid supplier for reuse if the radioactive content is below free release limits, or it could be converted to calcium fluoride (CaF2) for sale or disposal. Because conversion of the large quantities of DUF6 at the DOE Portsmouth and Paducah Gaseous Diffusion Plant sites would be occurring at the same time the proposed NEF would be in operation, it is not certain that the market for hydrofluoric acid and calcium fluoride would allow for the economic reuse of the material generated by the proposed NEF. Therefore, only immediate neutralization of the hydrofluoric acid by conversion to calcium fluoride with disposal at a licensed low-level radioactive waste disposal facility is considered in this analysis.[6]

Q. With these understandings, what criticisms do you have of the disclosure that has been made in the ER and the DEIS of the impacts of conversion of depleted uranium?

A. The specific steps in the deconversion of DUF_6 to a more stable chemical form for long-term disposal depends on the final choice for which potential form is to be produced. In particular, the steps for producing uranium oxide (U_3O_8) or uranium dioxide (UO_2) are different and result in different impacts such as the level of contamination in the resulting hydrofluoric acid or calcium fluoride. The choice of disposal strategy will have a significant impact on the choice of which deconversion process is to be pursued.

The choice of deconversion process that is to be pursued involves important trade-offs that require additional analysis by LES and the NRC. In addition, if any consideration is to be given by LES to the possible production and sale of anhydrous hydrofluoric acid for reuse, than an examination of this option's environmental impacts should also be carried out.

[6] NRC NEF EIS Draft 2004 p. 2-29

Q. The regulations require an ER and a DEIS to consider appropriate alternatives for achieving the aims of the project. (10 CFR 51.45(b)(3), (c); 51.71(a), (d)). Please explain the respects in which the ER and DEIS disclosure does not cover all deconversion products that are appropriate to be considered for deconversion.

A. In analyzing the impacts of the deconversion process, the choice must be made between deconversion product (i.e. U_3O_8 or UO_2). The choice of deconversion process that is to be pursued involves important trade-offs that require additional analysis by LES and the NRC. One of the most important inputs to such a decision is the suitability of the deconversion product for ultimate disposal. The enrichment plant that LES proposes to build will generate significant quantities of DU over the coming decades which will also likely be a time of rapid and significant expansions in the understanding of uranium and its various health effects both in isolation and in combination with other environmental stressors. In this context LES and the NRC, which is legally charged with protecting the public health, must pursue a management and disposal strategy that will have a high probability of doing just that and they must also be prepared to modify and adapt this plan in the event that radiation risks in general and uranium risks in specific are found to be greater than previously considered and that provisions are undertaken to specifically protect both women and children's health. While conversion reduces the risk of DU storage, it does not, in itself, represent a strategy for long-term disposal. The two are closely related but distinct problems.

Uranium is still officially classified as a source material by the U.S. Department of Energy (DOE) as well as by the NRC. This will remain the case in the absence of a specific ruling from the Commission that depleted uranium is a waste. No final disposal strategy has been chosen or fully analyzed by the DOE in relation to the management of its depleted uranium stockpile since the DOE is still considering possible, but unlikely, uses for its DU. LES has also not definitively decided whether it considers the depleted uranium to be generated by the proposed enrichment facility to be a resource or a waste, though it claims that it can decide this question without reference to any regulatory authority.

In the present LES case, the NRC staff has again taken the position that DU is Class A low-level waste and that it might be disposed of by shallow land burial in a dry location. Although a number of low-level waste disposal sites were noted in the LES DEIS, no specific option was chosen and none of the indicated sites would likely be able to safely dispose of the DU in shallow trenches. Significantly, no estimates of the possible doses under dry conditions for any locations are given in the DEIS in support of this proposed disposal option despite the failure of the eastern site considered for shallow disposal in the CEC case to meet the 25 mrem annual dose limit. The NRC also states that doses from deep disposal of depleted uranium in a mine would be low and provides estimates of doses under a well water and river water scenario. As presented in the DEIS these estimates are greatly below the regulatory limit of 25 mrem per year for LLW disposal.[7] The estimates as provided are stated to be based on the CEC estimates in the FEIS of 1994. However, despite this assertion, the NRC has failed to provide the methods and assumptions underlying the dose calculation and the details of the CEC FEIS calculation are apparently no longer available, even to the NRC itself. Moreover, the doses in the current LES

[7] NRC NEF EIS Draft 2004 p. 4-59

DEIS are not broken down by radionuclide and the totals as presented are different from those reported in the CEC FEIS by nearly a factor of 2 with one notable exception. The difference in most of the results may be explained, at least in part, by the fact that the proposed LES enrichment facility will generate roughly twice the amount of depleted uranium tails that must be disposed of. However, the estimate for the drinking water dose in the river drinking water scenario following disposal in a sandstone/basalt site are almost 54,000 times lower in the LES DEIS than the results presented in the CEC FEIS.[8]

The doses from U-238 estimated in the CEC FEIS for deep disposal are incredibly low (literally). The annual background dose due to drinking water with approximately 0.1 pCi/liter of uranium in it amounts to about 0.02 mrem EDE (effective dose equivalent). The drinking water dose estimated from the disposal of pure DU_3O_8 powder in a mine was estimated by the NRC in the CEC case to be a million to a trillion times lower than this typical background level. Indeed, the highest well water dose estimated by the NRC is less than that caused by the ingestion of an amount of uranium that would result in just the disintegration of six uranium atoms in the entire body over an entire year. The lowest drinking water dose for U-238 reported would imply that the total amount of energy deposited in a 70 kilogram adult from the uranium absorbed through the drinking water would be equal to less than the amount of energy required to ionize a single hydrogen atom.[9]

Given the specific activity of uranium, its increasing radioactivity over time due to the ingrowth of decay products, and uranium's other chemo-toxic characteristics, it will likely be difficult to

[8] NRC NEF EIS Draft 2004 p. 4-55, 4-59 and NRC CEC EIS Final 1994 p. A-1, A-14 to A-15
[9] NRC CEC EIS Final 1994 p. A-14 to A-15

find an adequate site for the disposal of DU, whatever classification it might be given by the Commission, that will be able to demonstrate compliance with the 25 mrem dose criteria and all other health restrictions with reasonable assurance. Thus the proposal of a generic site in lieu of a detailed investigation of a particular site cannot be considered a plausible strategy for the ultimate disposal of the large amount of depleted uranium that would be generated by the proposed LES enrichment facility. The likelihood that the production of UO_2 rather than U_3O_8 by the deconversion process would be more suited for final disposal should be considered by LES and the NRC in the ER and EIS which is not done in the DOE EISs referred to. For a further discussion of this point I refer you to the report by Makhijani and Smith, Costs and Risks of Management and Disposal of Depleted Uranium from the National Enrichment Facility Proposed to be Built in Lea County, New Mexico by LES, Nov. 24, 2004, filed in this proceeding.

In addition, the specific steps in the deconversion of DUF_6 to a more stable chemical form for long-term disposal depends on the final choice for which potential form is to be produced. In particular, the steps for producing uranium oxide (U_3O_8) or uranium dioxide (UO_2) are different and result in different impacts such as the level of contamination in the resulting hydrofluoric acid or calcium fluoride. The choice of disposal strategy will have a significant impact on the choice of which deconversion process is to be pursued.

LES has stated that its preferred option is the deconversion of the DUF_6 to DU_3O_8 followed by its disposal as a bulk powder in an abandoned mine or potentially at a shallow land disposal

facility. In addition, LES has stated that it will consider the following reactions for producing the DU_3O_8

$$UF_6 + 2\ H_2O \rightarrow UO_2F_2 + 4\ HF$$

followed by

$$3\ UO_2F_2 + H_2 + 2\ H_2O \rightarrow U_3O_8 + 6\ HF$$

On the other hand, depleted uranium hexafluoride may also be converted into UO_2 instead by the following reactions

$$UF_6 + 2\ H_2O \rightarrow UO_2F_2 + 4\ HF$$

followed by

$$UO_2F_2 + H_2 \rightarrow UO_2 + 2\ HF$$

As discussed in Makhijani and Smith, Costs and Risks of Management and Disposal of Depleted Uranium from the National Enrichment Facility Proposed to be Built in Lea County, New Mexico by LES, Nov. 24, 2004, the depleted uranium that would be produced as a result of the proposed LES enrichment facility is analogous to transuranic waste and, if ultimately declared a waste by the Commission, will likely require fabrication into a suitable waste form and disposal in a mined repository such as the Waste Isolation Pilot Plant. The DU_3O_8 that would result from the first deconversion process shown above would be less dense and less uniform in particle size than the DUO_2 that would result from the second process. These properties make it less suitable for processing into a waste form that would aid in the development of a disposal strategy protective of the public health and capable of meeting the existing regulatory limits for uranium

exposure. On the other hand, the smaller more uniform particle size of the DUO_2 that is an advantage in waste form processing also adds to the level of uranium contamination in the resulting byproducts (i.e. the hydrofluoric acid and the calcium fluoride that would result from neutralizing the HF) as well as adding to the airborne releases of uranium from the process building stack of the deconversion facility. The estimated stack releases of uranium for a DUO_2 facility are more than three and a half times those of a DU_3O_8 facility.[10] The ER and the DEIS do not address the relative environmental performance of DU_3O_8 and DUO_2 or of their fabrication in waste forms suitable for disposal in such as way that would have a high probability of protecting the public heath.

Q. In listing appropriate alternative deconversion products, what alternatives should be included?

A. A possible waste form that should be examined for the ultimate disposition of depleted uranium is the encapsulation of DUO_2 in an engineered ceramic that locks up the material on the atomic scale and has been demonstrated to have a very low leach rate. An example of such a waste for would be Synroc or an equivalent titanate ceramic as has been proposed for the immobilization of high level waste as well as for plutonium waste. Potential unknowns surrounding this option include the fact that little industrial experience exists with these ceramic materials and the experience that does exist is for a relatively low throughput facility.[11] In considering the impacts that this type of waste form preparation would have on the mobility of the depleted uranium, and thus on the peak doses that would be expected, the analysis needs to

[10] LLNL 1997 (EA) p. 6.4-7-2, 6.5-7-2, 6.6-7-2, and 6.7-7-2
[11] LLNL Wilt 1997 p. 11

also examine the environmental impacts that would accompany the mining and processing of mineral sands in sufficient quantities to manufacture the large amounts of ceramic material needed for the disposal of such a large quantity of depleted uranium as that which would be generated by the proposed LES facility. These factors are not analyzed in the ER or the DEIS.

Q. Please explain what is lacking in the ER and the DEIS as regards analysis of deconversion processes.

A. There is no adequate discussion in the ER, the LES DEIS, or the DOE EISs for the Paducah and Portsmouth facilities of the anhydrous hydrofluoric acid (AHF) process or its operations issues, environmental impacts and transportation risks. LES has not yet formally selected a deconversion process, and the production of AHF process is one alternative under possible consideration.

When the engineering analysis was completed in 1997, apparently no large-scale facility had been put into routine industrial use anywhere. The "Draft Engineering Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride - Rev. 2" from the Lawrence Livermore National Laboratory (LLNL), which is included as supporting material to the DOE programmatic EIS, states that

> Distillation is a common industrial process and was the design basis for this suboption. The processing of the azeotrope and the process parameters for the conversion reactors were patterned after the General Atomics/Allied Signal response to the RFR and the Sequoyah Fuels Corp. patented process. This representative process has not been industrialized, but the initial research and development have been completed.[12]

[12] LLNL 1997 (EA) p. 3-8.

Cogema has not itself operated a deconversion facility that converts the HF into anhydrous hydrofluoric acid (AHF) at its plant in France. The costs, operations issues, environmental impacts and transportation risks of AHF in the context of deconversion of DUF_6 are at this stage not based on actual experience. If the preferred option of neutralizing the HF and disposing of the calcium fluoride as LLW is replaced by a decision to produce and ship anhydrous HF, the potential impacts on the environment are likely to be higher and should be considered in the LES EIS.

Q. In analyzing the impacts of the AHF process, what factors would need to be considered?

A. If any consideration is to be given by LES to the possible production and sale of anhydrous hydrofluoric acid for reuse, then an examination of this option's operations issues, environmental impacts and transportation risks should also be carried out. This analysis would require the identification of

- A location for the deconversion plant.
- A design of the deconversion plant that corresponds to a firm disposal strategy that has been approved by the NRC at the Commission level. This NRC approval is necessary because the end point of the deconversion depends on the final waste form of the DU and the disposal strategy. Specifically, whether the final form would be U_3O_8 or UO_2 and whether disposal would be as a powder, grout, or ceramic form would be needed for a design of the plant, even if all the processing did not take place there. For instance, processing into a zircon waste form would mean that UO_2 powder would be produced but it would not be compacted. By contrast, compaction would likely be required if the DU were to be disposed of as a powder.

- A specific, firm location for a DU disposal site that has a certified characterization and licensing process to assure compliance with the appropriate regulations and with the protection of the public health.

This has not yet been done in the ER or DEIS nor in the DOE EISs for the Paducah or Portsmouth facilities.

In the analysis of proposals to construct and build the DOE deconversion facility it was determined that the accident scenarios with the largest consequences were primarily those involving hydrofluoric acid.[13] In considering the differences between the properties of aqueous HF and anhydrous HF, the EIS for the Paducah deconversion facility points out that

> It should be noted that there may be differences in the accident impacts between releases of AHF and aqueous HF, and that these differences were not fully evaluated in the critique... Anhydrous HF has a much higher volatility than aqueous HF, and therefore would result in a larger amount of material being dispersed to the environment if equal amounts were spilled. At this time, it is not clear if production of aqueous HF would result in a significant reduction in accident risk.[14]

In the same EIS, it was also reported that an accident involving a railcar in an urban setting under unfavorable weather conditions could potentially cause irreversible damage to people within an area covering seven square miles downwind with up to 300 fatalities. For comparison, this is an area roughly one-fifth of the size of Santa Fe, New Mexico. The DOE analysis goes on to

[13] Paducah EIS from Appendix D page 18-19
[14] Paducah EIS from Appendix D page 19

included in the assessment of the routine impacts of the deconversion facility. Low scrubber efficiency was frequently experienced in the scrap recovery operations at the uranium plant near Fernald, Ohio, for instance.[13]

Q. What disposition should be considered for the HF?

A. Currently there are no DOE or general NRC guidelines that govern the free release of contaminated hydrofluoric acid or calcium fluoride.[14] The NRC has granted a license to the Framatome Advanced Nuclear Power, Inc. uranium fuel fabrication facility in Richland, Washington, for the release of HF containing up to 6.4 ppm of uranium and the European limit for release of HF from the Cogema Pierrelatte deconversion plant is 5 ppm.[15] The cost analysis of a uranium deconversion plant intended to process the DOE's stockpile of DUF_6 conducted by Lawrence Livermore National Laboratory concluded, however, that

> In addition to the uncertain market, there is concern about possible public reaction to uranium contaminants. If the fluorine chemical is to be sold in North America, it may be subjected to higher purity standards due to the source material.[16]

The implied uranium concentrations of uranium in the hydrofluoric acid given in the above table assume that no uranium oxide was removed by the HF scrubber and, therefore, the actual total contamination of the acid is likely to be higher than these levels. Given the fact that the value for the DU_3O_8 facility is close to the existing U.S. and European benchmarks and the fact that the value for the DUO_2 facility is roughly twice as large, as well as the caution raised by the LLNL

[13] Viollequé et al. 1995, Appendix I. See especially Table I-10 through I-13, which indicate highly variable scrubber performance, ranging from better than manufacturer specifications to nearly complete failure of scrubbers. Sodium hydroxide was the scrub fluid. Thus, even if a 99.9 percent efficiency scrubber is installed, maintaining the efficiency at such a high level would be difficult and expensive due to the corrosive nature of HF.
[14] DOE Paducah ROD 2004 p. 44657 - 44658 and DOE Portsmouth ROD 2004 p. 44652 - 44653,
[15] DOE Paducah EIS 2004 p. E-13 and LLNL Cost Analysis 1997 p. 50-51
[16] LLNL Cost Analysis 1997 p, 50-51

analysis regarding the potential for even tighter standards in the U.S. in the future, suggests that it should be assumed that the hydrofluoric acid resulting from the deconversion of the DUF_6 from the proposed LES facility will not be able to be resold on the open market.

One possibility for the use of this material that would not be hampered by the projected levels of contamination would be its reuse in manufacturing new UF_6 from natural uranium. However, in the present context this is not likely to be a plausible option for LES given the very large amounts of hydrofluoric acid that will be being produced by the government's deconversion facility for the DOE stockpile of depleted uranium. In particular, the suggested use of the HF by the uranium fuel facility in Metropolis, Illinois, is not likely to be attractive given the proximity of the Paducah deconversion plant to be operating in nearby Paducah, Kentucky. The Portsmouth deconversion plant in Piketon, Ohio, which would also generate large amounts of HF, is also much closer than the proposed LES facility in southeastern New Mexico. These facts were explicitly considered by the NRC and in the DEIS for the proposed LES facility when it concluded that CaF_2 disposal as LLW was the only scenario that was reasonable to include in the DEIS. The potential need for disposing of the calcium fluoride (CaF_2) as LLW comes from the fact that it is expected to be contaminated by the presence of the uranium in the hydrofluoric acid.[17]

Assuming that, other than the presence of uranium, the calcium fluoride can be considered non-hazardous waste, the contaminated CaF_2 would qualify as Class A low-level waste that could likely be disposed of in a suitable 10 CFR 61.55(a) facility. The treatment and disposal of this waste stream would add to the environmental impacts of the routine operation of the

[17] Paducah EIS p. E-5

deconversion facility and these impacts should be considered for the specific case of the proposed LES facility in the ER and DEIS.

Q. Are there other impacts that you believe should be considered in the DEIS?

A. There are impacts involving the cost of different deconversion options, and impacts concerning the impact and cost of various disposal methods. It is my understanding that such questions have been scheduled for consideration at a later time. If they are under consideration at this point, I respectfully refer the Board to the report Makhijani and Smith, Costs and Risks of Management and Disposal of Depleted Uranium from the National Enrichment Facility Proposed to be Built in Lea County, New Mexico by LES, Nov. 24, 2004, filed in this proceeding.

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)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the "MOTION IN LIMINE ON BEHALF OF LOUISIANA ENERGY SERVICES, L.P. TO EXCLUDE PORTIONS OF PREFILED DIRECT TESTIMONY OF NIRS/PC WITNESSES GEORGE RICE, ARJUN MAKHIJANI, MICHAEL SHEEHAN, AND CHARLES KOMANOFF AS IRRELEVANT" in the captioned proceeding have been served on the following by e-mail service, designated by **, on January 12, 2005 as shown below. Additional service has been made by deposit in the United States mail, first class, this 12th day of January 2005.

Chairman Nils J. Diaz
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Commissioner Edward McGaffigan, Jr.
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Commissioner Jeffrey S. Merrifield
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Office of the Secretary**
Attn: Rulemakings and Adjudications Staff
U.S. Nuclear Regulatory Commission
Mail Stop O-16C1
Washington, DC 20555-0001
(original + two copies)
e-mail: HEARINGDOCKET@nrc.gov

Office of Commission Appellate
Adjudication
Mail Stop O-16C1
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Office of the General Counsel**
Attn: Associate General Counsel for
Hearings, Enforcement and
Administration
Lisa B. Clark, Esq.**
Angela B. Coggins, Esq.**
Darani M. Reddick**
Mail Stop O-15D21
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
e-mail: OGCMailCenter@nrc.gov
e-mail: lbc@nrc.gov
e-mail: abc1@nrc.gov
e-mail: dmr1@nrc.gov

Ron Curry, Esq.
Tannis L. Fox, Esq.**
New Mexico Environment Department
1190 St. Francis Drive
Santa Fe, NM 87502-6110
e-mail: tannis_fox@nmenv.state.nm.us

Administrative Judge
Paul B. Abramson**
Atomic Safety and Licensing Board Panel
Mail Stop T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
e-mail: pba@nrc.gov

Administrative Judge
G. Paul Bollwerk, III, Chair**
Atomic Safety and Licensing Board Panel
Mail Stop T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
e-mail: gpb@nrc.gov

Administrative Judge
Charles N. Kelber**
Atomic Safety and Licensing Board Panel
Mail Stop T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
e-mail: cnk@nrc.gov

Christopher D. Coppin, Esq.**
David M. Pato, Esq.**
Stephen R. Farris, Esq.**
Glenn R. Smith, Esq.**
Office of the New Mexico Attorney General
P.O. Box Drawer 1508
Santa Fe, NM 87504-1508
e-mail: ccoppin@ago.state.nm.us
e-mail: dpato@ago.state.nm.us
e-mail: sfarris@ago.state.nm.us
e-mail: gsmith@ago.state.nm.us

Lindsay A. Lovejoy, Jr.**
618 Pasco de Peralta, Unit B
Santa Fe, NM 87501
e-mail: lindsay@lindsaylovejoy.com

Lisa A. Campagna**
Assistant General Counsel
Westinghouse Electric Co., LLC
P.O. Box 355
Pittsburgh, PA 15230-0355
e-mail: campagla@westinghouse.com

James R. Curtiss
Counsel for Louisiana Energy Services, L.P.