March 14, 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.<br>National Enrichment Facility | ASLBP No. 04-826-01-ML |

---

# PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW BASED UPON EVIDENTIARY HEARING HELD ON FEBRUARY 7 THROUGH 10, 2005 SUBMITTED ON BEHALF OF INTERVENORS NUCLEAR INFORMATION AND RESOURCE SERVICE AND PUBLIC CITIZEN

## Preliminary statement

The following Proposed Findings of Fact and Conclusions of Law are submitted on behalf of Nuclear Information and Resource Service and Public Citizen, Intervenors herein ("NIRS/PC"), pursuant to the orders of the Atomic Safety and Licensing Board (the "Board") dated August 16, 2004 and February 14, 2005:

### a. Proposed Findings of Fact concerning NIRS/PC Contention EC-1:

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

FINDINGS:

1. Disclosure in the Applicant's Environmental Report ("ER") concerning the impact of the proposed National Enrichment Facility ("NEF") upon water resources appears in LES Ex. 1, ER Sec. 3.3 through 3.4 and 4.4, with accompanying tables and figures. The ER identifies the location of the proposed NEF and the local geology. The ER states that, of nine subsurface borings drilled

in September 2003, only one produced cuttings that were slightly moist at 1.8 to 4.2 m (6 to 14 ft) below ground surface; "other cuttings were very dry." (at 3.4-2; see also 3.4-5; 3.4-13). It is also stated that evapotranspiration processes are significant enough to short-circuit any potential ground water recharge. (id.; see also 3.4-4, 3.4-5). The ER states that the Chinle Formation, underlying the alluvial sediments, has an estimate hydraulic conductivity of $2 \times 10^{-8}$ cm/s. (at 3.4-5).

2. The ER states that water-bearing layers occur at 200-300 feet, at 600 feet, and 800 feet (or 1115 feet) below the surface. (LES Ex. 1, ER at 3.4-5; see also 3.4-13, 3.4-15). The ER further states that the NEF would discharge water only into engineered basins, i.e., the Treated Effluent Evaporative Basin ("TEEB"), the Site Stormwater Detention Basin ("SSDB"), the Uranium Byproduct Cylinder Storage Pad Stormwater Retention Basin ("UBCSPSRB"), and a standard septic system. (ER at 3.4-6, -7). The TEEB is double lined, and the UBCSPSRB is single-lined. (id.).
3. The ER states that groundwater occurs in the stratum above the Chinle Formation in locations north and east of the NEF site, and it states that these occurrences are due to local infiltration mechanisms, such as fractures in the caprock caliche and infiltration from "buffalo wallow" depressions that form ponds. (LES Ex. 1 at 3.4-15). The ER states that such conditions do not occur at the NEF site. (id.).
4. Chapter 4 of the ER further describes the discharges of water from the proposed NEF and states that the NEF will not "discharge any process effluents onto the site or into surface waters other than into engineered basins." (LES Ex. 1 at 4.4-3). It states that "no impacts on natural water systems quality due to facility water

use are expected." (at 4.4-4; see also 4.4-6, 4.4-9).

5. Disclosure in the Draft Environmental Impact Statement, NUREG-1790 (Sept. 2004) (NRC Staff Ex. 1A, 1B) ("DEIS") concerning the environmental impacts of the proposed NEF upon water resources appears in sections 3.8.1, 4.2.6, and 4.4.3. The DEIS discussion parallels that in the ER and states that field investigation and computer modeling were used to show that

> "no precipitation recharge (i.e., rainfall seeping deeply into the ground) occurs in thick, desert vadose zones with desert vegetation (Walvoord et al. 2002). Precipitation that infiltrates into the subsurface is, instead, efficiently transpired by the native vegetation." (NRC Staff Ex. 1A, DEIS at 3-35).

The DEIS describes the "buffalo wallows" (at 3-35). It states that the presence of the thick Chinle Formation clay beneath the site isolates the deep and shallow hydrologic systems. (id.). It identifies the water-bearing layers within the Chinle and the Santa Rosa (at 3-36). The DEIS states that in the late 2003 drilling the cuttings taken from the boreholes were dry or contained only residual saturation. (at 3-36).

6. Concerning discharges from the NEF, the DEIS states that the TEEB and the UBCSPSRB would have small impact due to the evaporation of the contents. (NRC Staff Ex. 1A, DEIS at 4-12, -13). The DEIS contains an estimate of the size of the plume coming from the SSDB and states that it could move at the rate of 252 meters per year. (at 4-13). A similar estimate is made as to the septic system. (at 4-14).

**A. Basis:** In this situation, the ER has several serious shortcomings: The ER fails to demonstrate that there has been any evaluation of the fate of waste waters and runoff that enter the subsurface at the NEF. To determine where this water will go, LES should answer the following questions:

a. How much water would infiltrate into the alluvium from:

- The treated effluent basin?
- The UBC storage pad and cooling tower blowdown basin?
- The stormwater basin?
- The septic leach field?

(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.

7. Intervenors Nuclear Information and Resources Service and Public Citizen presented expert evidence by Mr. George Rice, a groundwater hydrologist. Mr. Rice received a B.S. and a M.S. degree in hydrology from the University of Arizona and has practiced in ground water hydrology for more than 20 years. He is experienced in ground water modeling, monitoring and aquifer flow testing. He has conducted hydrologic characterization of low-level radioactive and hazardous waste sites throughout the western United States, with the purpose of determining the presence of contamination and estimating the rate and direction of contaminant travel. (Tr. 797-99).

8. Contrary to the statements in the ER and the DEIS, the witnesses agreed that lined basins do, from time to time, leak. (Rice, Tr. 786-87; Harper dep., NIRS/PC Ex. 17 at 117-18) (See also EPA, NIRS/PC Ex. 10, at 34; Yadzani, NIRS/PC Ex. 49, at 1; Murphy & Garwell, NIRS/PC Ex. 34, at xii; Reddy & Botul, NIRS/PC Ex. 45, at 19, 25, 108; Laine & Miklas, LES Ex. 72, at 36). Lined basins often leak. They leak because the liners contain defects. These defects exist for a variety of reasons:

    a. Manufacturing defects: typical geomembranes contain 0.5 to 1 pinholes per acre. (NIRS/PC Ex. 10 at 34).

b. Installation defects: these include unsealed seams, punctures from sharp objects, and damage caused by the operation of heavy equipment. (NIRS/PC Ex. 49 at 1). The number of defects can be reduced by careful installation. However, even with the best quality control during installation, one can expect 1 to 2 defects per acre. (NIRS/PC Ex. 34 at xii).

c. Deterioration after installation: this includes rupture due to creep, stress cracking, and degradation due to exposure to chemicals and heat. (NIRS/PC Ex. 45 at 19, 25, 108).

Therefore, examination of the impacts of the NEF should assume some likelihood of leakage.

9. Neither the ER nor the DEIS contains an estimate of the likelihood that one of the lined basins (the TEEB and the UBCSPSRB) might leak and release water to the underlying alluvium. Laine and Miklas (LES Ex. 72) examined 61 geosynthetic-lined facilities. The facilities included landfills and impoundments. Most of the geosynthetic liners were made of HDPE, but some were made of PVC (e.g., XR-5) or polyethylene. Leaks were detected in 58 of the 61 facilities. The average density of leaks at all facilities was about 13 per acre. The EPA recently released a report describing various methods for detecting leaks beneath lined landfills and impoundments. (NIRS/PC Ex. 13; Tr. 787).

10. The witness for the NRC Staff, Mr. Toblin, first said that there is no way to assign any probability to leakage. (Tr. 713). He stated that one would need to assign a value to the number of penetrations per unit of area and per unit of time, and that no data exist to support such calculations. (Tr. 713-14). He was then shown the

EPA data concerning the Hydrologic Evaluation of Landfill Performance ("HELP") model, showing defect densities in geomembranes, and he said that he would need to know "what was behind this information"—something that he had not investigated. (Tr. 715). When shown the study by Laine and Miklas (LES Ex. 72) of 61 sites, which identified 1409 leaks, for an average of 3.2 leaks per 10,000 square feet of liner, Mr. Toblin said that he would still need data about the type and age of the liners and the head on the liners, but he had not tried to locate such information. (Tr. 717). The Board finds that reasonable investigation should disclose data sufficient to assign a probability to leakage of liners of the basins.

11. Mr. Toblin also stated that any uranium contaminants contained in water leaking from the TEEB or the UBCSPSRB would be absorbed by the clay liners of those basins. (Tr. 718-19), relying on NRC Staff Ex. 6. On cross examination he conceded that he was relying on a published distribution coefficient ($K_d$) for uranium in pond clay, which he had not determined experimentally, and that the $K_d$ for a particular material actually depends on the specific form of uranium, such as oxidation state or complexation. (Tr. 720). Mr. Toblin stated that his opinion that uranium absorbs on clay was simply "off the top of my head." (Tr. 721).

h. In addition, LES does not intend to investigate the Santa Rosa Aquifer at the proposed NEF site (ER 3.4-13). LES plans to install only two monitor wells (ER 6.1-7 and figure 6.1-2). Presumably, these wells will be completed in the alluvium. This does not appear to be adequate. There will be at least four potential sources of groundwater contamination at the site (three evaporation basins and the septic leach field). At least one well should be up gradient of the site (background).

i. Further, the detection limit for most metals in groundwater will be 5 ppm (ER table 6.2-1). This is much higher than the health-based standards established for many metals (e.g., arsenic = 0.05 ppm, chromium = 0.1 ppm). [40 CFR sec. 141.11, 141.62] The detection limits for each metal should be no higher than the health-based standard.

j. Also, the full composition of the $UF_6$ feedstock has not been specified (ER at 1.2-2). LES should identify the other hazardous materials that may be contained in the feedstock (e.g., metals).

(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.

12. LES and NRC have not clearly stated which groundwater zones will be monitored. The DEIS states that groundwater in the 220-foot zone will be monitored. (DEIS, NRC Staff Ex. 1A, at 6-13). However, it does not state whether wells will be installed to monitor the perched bodies of groundwater that may form at the alluvial/Chinle interface. (Tr. 789). Testimony established that water that emerges from the NEF basins and reaches the alluvial-Chinle contact would not be detected by the monitoring system proposed by LES. (Tr. 610-17). The New Mexico Environment Department has stated that it will probably require additional monitoring wells to detect leakage perching on the alluvial-Chinle contact. (NIRS/PC Ex. 35, at 4, 5).
13. NRC and LES have not explained how they will distinguish between groundwater contamination caused by the NEF and contamination caused by other potential sources (e.g., Wallach Concrete, Sundance Services, Waste Control Specialists ("WCS") site, Lea County Landfill). (Tr. 789). NRC claims that contaminants from Wallach Concrete and Sundance Services would consist primarily of hydrocarbons. (DEIS, NRC Staff Ex. 1A, at 6-13). NRC also claims that the

proposed NEF would not emit hydrocarbons in detectable quantities. (id.). However, NRC has provided no basis for these claims. LES and NRC have not addressed potential contamination from WCS or the Lea County Landfill. (Tr. 789). The Lea County landfill is less than 500 feet from the southeast corner of the NEF site. (DEIS, NRC Staff Ex. 1A, at 3-2, Fig. 3-2).

14. Constituents of the feedstock have been identified. (Tr. 412-13).

15. The water discharged to the stormwater runoff basin may contain a wide variety of contaminants. According to LES, the discharge to the stormwater basin:

> " … will be typical of runoff from building roofs and paved areas from any industrial facility." (LES Ex. 3, at 33)

The discharge will include:

> "… small amounts of oil and grease typically found in runoff from paved roadways and parking areas, … ." (LES Ex. 3, at 33).

The discharge may also contain pesticides and fertilizers that will be applied around the facility. (NIRS/PC Ex. 32, at 4). In addition to constituents identified by LES, the discharge may contain other contaminants associated with roads, parking lots and industrial facilities. These include: polycyclic aromatic hydrocarbons (PAHs) (PAHs include acenaphthylene, benzo-a-pyrene, fluoranthene, naphthalene, and other compounds; (NIRS/PC Ex. 47, Table 3), other organic compounds (e.g., aliphatic hydrocarbons, alcohols)(NIRS/PC Ex. 2, table 3.5), and miscellaneous contaminants resulting from spills and accidents. However, the Stormwater Monitoring Program (DEIS, NRC Staff Ex. 1A, at 6-18, Table 6-9) does not include monitoring of PAHs, pesticides, or other organics. These potential contaminants should be included in the Stormwater

Monitoring Program. The only analysis in DEIS Table 6-9 that might directly detect the presence of fuel components is 'Oil and Grease'. However, the detection limit for the Oil and Grease analysis is 0.5 ppm, while the human health standard for the fuel component benzene is 0.01 ppm (NIRS/PC Exhibit 36, at 12). Therefore, the analyses listed in DEIS table 6-9 are not sufficient to monitor fuels in stormwater runoff. (Tr. 790-91).

16. Moreover, BOD and COD analyses, mentioned in DEIS Table 6-9, do not detect the presence of individual contaminants. Instead, they are gross measures of the amount of organic matter in water, as indicated by changes in the concentration of oxygen or some other oxidant. (NIRS/PC Ex. 16 at 3). Furthermore, the detection limits proposed for BOD and COD are 2 mg/L and 1 mg/L, respectively (DEIS, NRC Staff Ex. 1A at 6-18, Table 6-9). However, the drinking water standards for some PAHs are much lower that these detection limits. For example, the human health standard for benzo-a-pyrene is 0.0007 mg/L (NIRS/PC Ex. 36 at 12). Thus, even if PAHs could be detected by BOD or COD analyses, some of them would only be detected once their concentrations exceeded standards by a factor of more than 1000. Testimony established that the proposed monitoring system would not identify various hazardous constituents at their health-based levels (Tr. 752-55).

**A. Basis:** In this situation, the ER has several serious shortcomings: The ER fails to demonstrate that there has been any evaluation of the fate of waste waters and runoff that enter the subsurface at the NEF. To determine where this water will go, LES should answer the following questions:

b. Where would water flowing along the alluvial/Chinle contact be discharged?

c. How long would it take for water from the NEF to reach the discharge area?

d. Are there 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?

f. LES has also failed to adequately address whether groundwater exists in the alluvium at the proposed NEF site. LES has installed three Chinle monitor wells (ER 3.2-17) and drilled 14 borings at the site (ER 3.2-20). LES has provided logs for five borings (ER figures 3.2-10 – 3.2-14), but not for the other nine borings or the monitor wells. LES should provide all logs and descriptions of subsurface materials so that its claim that there is no groundwater in the alluvium (ER 3.4-5) can be thoroughly evaluated. The five logs that were provided indicate that the borings were backfilled on the same day they were drilled (ER figures 3.2-10 – 3.2-14). Thus, LES may not have allowed sufficient time for water to enter the borings. Water levels in the alluvial groundwater system at the WCS site are known to recover slowly (ER 3.2-15). Further, the clay at the bottom of boring B-2 was described as "moist" (ER figure 3.2-11). This could be due to the presence of water in the alluvium. In addition, groundwater is known to exist in the alluvium at three places near the NEF site: 1) about ½ mile north at the Wallach sand and gravel quarry (ER 3.4-2), 2) about ½ mile northeast at Baker Spring (ER 3.4-2 and 3.4-3), and 3) about 2/3 mile east at the WCS site (ER 3.4-3 and 3.4-4). In this situation, the ER should also have addressed questions such as: What are the sources (recharge points) of groundwater in the Chinle and Santa Rosa? How will LES distinguish between groundwater contamination caused by the NEF and contamination caused by other potential sources (e.g., Wallach quarry, WCS site, Lea County Landfill)?

17. Groundwater is known to exist in the alluvium at three places near the NEF site: 1) about one-half mile north at the Wallach sand and gravel quarry (LES Ex. 1, at 3.4-2), 2) about one-half mile northeast at Baker Spring (id.), and 3) about two-thirds mile east at the WCS site (id. 3.4-3 and -4). There are no downgradient groundwater users within two miles of the proposed site. (DEIS, NRC Staff Ex. 1A, at 4-13). However, groundwater in the alluvium and the Dockum Group (Chinle Formation or the Santa Rosa Aquifer) has been used in the vicinity of the site. (LES Ex. 26 at 6-12). Alluvial wells approximately three miles west of the proposed site have been used for domestic purposes. (NIRS/PC Ex. 37, at 80 and plate 2). The City of Eunice had an old public supply well in the Dockum. This well was about six miles west of the site. (id.). The town of Oil Center, about 12 miles northwest of the site, obtains water from the Dockum Group. (id. 69 and plate 2; LES Ex. 26 at 6-12). According to the Lea County Regional Water Plan,

deeper aquifers such as the Dockum Group may be developed for future water supplies. (LES Ex. 26 at 8-5; Tr. 773-74).

18. It is known that water can penetrate into the alluvium. At the WCS site, surface depressions known as "buffalo wallows" form ponds, and water seeps beneath them into the subsurface, causing localized perched water systems in the alluvium. (Peery, Tr. 407, 514; see also Cook-Joyce 2004 report, LES Ex. 3, Tab O, at 4-18). Mr. Toblin likewise noted that the WCS site has known areas of saturation associated with surface depressions that constitute recharge points. (Tr. 735). Water ponds in the depressions and moves down to the alluvial/Chinle contact. (Tr. 736).
19. Basins planned to be built at the NEF would constitute similar depressions. When asked whether a perched water body would form under a storm water basin, if water leaked downwards, Mr. Peery said that it would depend on the amount of precipitation and the saturation of the underlying sediments (Tr. 518-20), but he conceded that infiltration would take place. (Tr. 530-32).
20. The stormwater basin would function like a playa. It would fill with rainfall or snowmelt, and water would leak into the subsurface. Perched bodies of water are likely to form beneath the stormwater basin, just as they form beneath the playas. In fact, LES states: "Excavations into, and naturally occurring surface depressions ("buffalo wallows") in, the alluvium can act as "bowls" where water can more readily accumulate on top of the red-beds, which may allow localized perched zones to develop." (Tr. 407). The NEF stormwater basin would be an unlined excavation into the alluvium. (Rice, Tr. 784, 806-07).
21. NRC has also stated that perched bodies of water could be expected to form at the

alluvial-Chinle contact as a result of leakage from the stormwater detention basin and discharges from the septic systems. (DEIS, NRC Staff Ex. 1 at 4-13, 4-14).

22. Both Mr. Peery and Mr. Toblin attempted to explain the presence of perched water in the alluvium on the nearby WCS site by the presence of caliche, which they said had fractured and allowed water to seep through the caliche, but then prevented its evaporation. (Tr. 546-47; Tr. 737-38). However, Mr. Peery conceded that groundwater is present in several areas within the WCS site that are not overlain by the caliche (Tr. 550), and Mr. Toblin agreed. (Tr. 739-42).
23. At the NEF site LES found indications of moisture at two locations. Moisture has been found in cuttings from two borings drilled at the site. This moisture was in the unsaturated (vadose) zone. At boring B-9, sand, silt, and gravel from depths of 6 – 14 feet were described as "slightly moist." (Rice, Tr. 775; LES Ex. 1, at 3.4-2). At boring B-2, the clay at the alluvial/Chinle contact was described as "moist." (Rice, Tr. 775; Cook-Joyce report, LES Ex. 3, Tab L, soil test boring record, B-2, at 35 feet).
24. The most likely explanation for the presence of this moisture, given by Mr. Rice, is that it represents residual water from episodic recharge events. (Rice, Tr. 776). That is, from time to time, rainwater or snowmelt will flow downward from the land surface to the interface of the alluvium and the Chinle. The moist clay in boring B-2 is likely to be the result of recharge that ponded along the interface between the alluvial materials and the relatively impermeable Chinle. The clay retains water longer than the overlying alluvium. Moist clay at the alluvial/Chinle contact also occurs at the WCS site. In a study conducted in the early 1990s, moist clay was found in most of the borings that penetrated the contact. (LES Ex.

3, Tabs E, F, G). This moisture found in the borings probably indicates that some recharge currently occurs at the site. There is no reason to believe that this recharge will not occur in the future. (Rice, Tr. 776).

25. Episodic recharge may enter the subsurface along preferential flow paths that result from water ponding in depressions or beneath sand dunes. Preferential flow paths may also result from variations in the permeability of the shallow materials underlying the site. (Rice, Tr. 776).

26. The question of recent recharge might be answered by using radioisotopes to date moisture in the vadose zone. The absence of tritium and chlorine-36 would indicate that the moisture entered the subsurface before the atmospheric testing of nuclear weapons. Low carbon-14 concentrations would also indicate that the moisture was not recent. LES has not carried out radioisotope dating. (Rice, Tr. 776-77).

27. As to the moisture in borehole B-9, Mr. Peery did not know whether it was moving upwards or downwards when detected. (Tr. 510-12). Mr. Toblin likewise did not know whether it was seeping up or down. (Tr. 723-24). Mr. Toblin did not know how long it took for the water in borehole B-9 to get to the zone where it was detected. (Tr. 725).

28. Mr. Peery said that he did not know how long it took the water in borehole B-2 to get down to the alluvial-Chinle contact. (Tr. 544-45). Mr. Toblin referred to the moist clay in borehole B-2, at the depth of 35 to 40 feet at the top of the Chinle, as an "isolated observation." (Tr. 726). Mr. Toblin stated that in the alluvium, water could penetrate to any depth, depending on the material properties, i.e., permeability. (Tr. 728-29). He stated that he was not shocked to see water at the

depths where it was found in the vadose zone. (Tr. 729).

29. LES and NRC have conducted no investigation of the hydrologic characteristics of the alluvium. (Peery; Tr. 555-56; NIRS/PC Ex. 17 at 54). Hydraulic conductivities are required to estimate the flow rates of water that will leak from the proposed facility. Hydraulic conductivities could be measured by a number of techniques, including infiltrometer tests (NIRS/PC Ex. 17 at 54), and the reverse auger method. (NIRS/PC Ex. 30, at 9 (interrogatory 8); NIRS/PC Ex. 3, at 129). These tests have not been done. (NIRS/PC Ex. 30 at 9).

(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.

30. LES and NRC claim that no groundwater recharge occurs at the proposed site. (LES Ex. 1, at 3.4-4; DEIS, NRC Staff Ex. 1A at 3-35; NIRS/PC Ex. 17 at 35). LES appears to claim that no recharge has occurred for thousands of years (recharge being defined as infiltration beneath the base of the root zone, LES Ex. 1 at 3.4-4), and that no recharge will occur after the facility is built. (NIRS/PC Ex. 17 at 35-37; LES Ex. 1 at 3.4-2, -4). However, the fact remains that moisture was found in boreholes B-2 and B-9 at the NEF site. Moreover, investigations of nearby sites likewise indicate recharge. Holt found ground water in the alluvium at 26 feet and at 32.4 feet. (LES Ex. 3, Tab E, at 11). The Lehman-Rainwater Report said that groundwater in the WCS-Flying W Ranch area "is found almost exclusively in the lower sandy part of the Antlers Formation," which is the alluvial stratum. (LES Ex. 3, Tab I, at 7). The same report states that "groundwater here likely reflects local recharge and not regional lateral flow

within the 'High Plains aquifer.' The many closed surface depressions along the crest of the 'Red Bed Ridge' could act as local recharge points." (id. 17). Cook-Joyce reported saturated conditions in the OAG unit (the alluvium) in seven boreholes at the WCS site. (LES Ex. 3, Tab O, at 6-2). The Terra Dynamics report for WCS states that recharge to the upper Dockum Aquifer is provided by vertical infiltration of precipitation from the overlying units of the Quaternary-Tertiary Aquifer and the High Plains Aquifer. (LES Ex. 3, Tab M, at VI.B.-5).

31. Mr. Peery reviewed borehole logs in the Holt report (LES Ex. 3, Tab G) and acknowledged that moisture was found at the alluvial-Chinle contact. (Tr. 538-44). Moisture is shown at that point in logs of boreholes B-23, B-37, B-18, B-33, B-13, B-27, B-46, B-36, B-44, B-19, B-25, B-35, B-20, B-45, B-51, and B-52. (LES Ex. 3, Tab G). Mr. Peery noted a "repeated pattern" of moisture at the alluvial contact. (Tr. 544). Mr. Toblin acknowledged the presence of water above the Chinle. (Tr. 726-27).

32. Mr. Harper conceded that in its Groundwater Discharge Permit Application LES had stated that water emerging from the TEEB, the UBCSPSRB, and the SSDB would infiltrate to the alluvium and recharge the groundwater system. (Tr. 594-98).

33. Mr. Peery and Mr. Toblin relied upon the modeling of Walvoord, et al. (LES Ex. 5) to contend that any water penetrating the surface at the NEF site would not reach a point of recharge, because the water would be removed by evapotranspiration. (Tr. 520-21; 723-24). The Walvoord paper is cited in the ER (LES Ex. 1 at 3.4-4) and in the DEIS (NRC Staff Ex. 1A at 3-35). However, the Walvoord model is a general model of the arid southwest, and it has not been

shown that it applies specifically to the NEF site. (Rice, Tr. 811; Peery, Tr. 522-23), The model assumes that one-dimensional vertical flow adequately represents the system hydrodynamics and that fractures, macropores, or other preferential flow paths do not affect the system. (LES Ex. 5 at 44-5). Mr. Peery acknowledged that the Walvoord model did not allow for preferential flow paths and that the sensitivity analyses carried out to test it did not include preferential flow paths. (Tr. 524-26). Likewise, Mr. Toblin agreed that the Walvoord model does not account for fast flow paths, preferential flow paths, fractures, or macropores. (Tr. 730-32).

(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.

34. NRC Staff calculated that water flowing through the alluvium would emerge at Monument Draw. (Tr. 699-700). The time required to reach a discharge point was as little as 19 years under NRC Staff's analysis. (Tr. 402). NRC Staff's analysis of the size and movement of the plume used porosity values and hydraulic conductivity values derived from literature rather than site data. (Tr. 700-01). NRC Staff's values do not assume the presence of gravel in the subsurface. However, borehole logs in the 2003 Cook-Joyce report for LES (LES Ex. 3, Tab L, Appx. A) report the presence of "gravel" or "abundant gravel." Boreholes B-1-, B-2, B-3, B-4, B-6, B-7, and B-8 show gravel between 15 feet and 23 feet, and boreholes B-1, B-4, and B-5 show gravel at 37 feet to 40 feet. (id. Appx. A). Mr. Toblin first said that "it wouldn't be a continuous gravel layer" (Tr. 706), but then backtracked, saying that he relied on the language in the

report, finding "minimal amounts of gravel in certain zones but gravel is not consistently present throughout the site" (LES Ex. 3, Tab L, at 9) (Tr. 706), and said that "it's not my judgment" not to correlate the gravel identified in the boreholes. (Tr. 707).

35. Mr. Rice explained that the question is not whether gravel is "consistently present" but whether continuous zones of gravel extend beneath and beyond the site; such zones may act as fast flow paths. Stream channel deposits primarily consisting of coarse-grained materials (sand and gravel) may extend for miles. (Rice, Tr. 818-19). Mr. Toblin admitted that the gravel would be a stream bed deposit (Tr. 709); thus, it would not be expected to be a continuous layer (id.) but might be linear or curving. (Tr. 709-10). He said that a stream bed might provide a flow path, and, as between gravel, sand, or silt, the gravel would be the most permeable by an order of magnitude or two. (Tr. 710-12).

36. It is undisputed that alluvial water is used for livestock and domestic use. (NIRS/PC Ex. 37 at 80). Mr. Peery conceded that some of the wells that extract water from the alluvium at Monument Draw are located downgradient from the NEF site "approximately where a theoretical plume would arrive." (Tr. 634).

37. Groundwater in the alluvium along Monument Draw has been used as a source of domestic supply (Rice, Tr. 774). This source is within two miles of the proposed site (NIRS/PC Ex. 37, plate 2). Based on the limited information available, Monument Draw appears to be hydraulically down gradient of any leakage that would flow from the NEF. The slope of the alluvial/Chinle contact is approximately 2% toward the south-southwest (Tr. 657; NIRS/PC Ex. 4 at 8 and figure 4). According to NRC's estimate of the flow rate along the contact (252

m/yr, 0.16 mi/yr), leakage emanating from the NEF could travel over four miles in 30 years (Tr. 657-58; Rice, Tr. 785). This leakage would continue flowing for some period after the NEF stopped operating. (Rice, Tr. 821-22).

g. There are other questions not adequately addressed in the ER which demand answers before the ER can be considered a complete and adequate assessment of potential impacts on groundwater. For example, there is a mystery as to the depth of the Santa Rosa Aquifer at the NEF site. LES states that the depth is 800 feet (SAR 1.3-9). This is contradicted by the statement that the top of the Permian is at a depth of 760 feet (ER 3.3-3). The Santa Rosa is above the Permian.[1] According to ER table 3.3-1, the top of the Santa Rosa is approximately 450 feet below land surface. There is a Dockum Group well approximately 3 miles from proposed NEF site (T22S, R38E Sec. 18, 234).[2] The water-bearing unit is at a depth of 325 feet. This may be the Santa Rosa Aquifer.

k. The permeabilities presented in ER table 3.3-2 of the Environmental Report may be derived from laboratory measurements. Laboratory measurements often underestimate the bulk permeability of a rock body because they do not account for fractures and other features that may act as fast flow paths.

(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.

38. Water released from the NEF may penetrate through the alluvium and through the Chinle to the Santa Rosa Formation. Such prospect calls for thorough analysis of the characteristics of the NEF site. In fact, the NEF site has not been characterized as fully as nearby sites. The 1993 Holt report was based upon 55 borings to 100 to 300 feet; 12 borings to 45 feet were made to obtain cores, and eight monitor wells were installed. (LES Ex. 3, Tab E at 2). Weaver-Boos did 26 boreholes in 1997 to the west and southwest of the RCRA landfill. (LES Ex. 3, Tab O, at 5-2). In 1998 an additional 65 borings were done for WCS to

[1] Nicholson and Clebsch, 1961, table 3 (NIRS/PC Ex. 37).
[2] Nicholson and Clebsch, 1961, plate 2 (NIRS/PC Ex. 37).

investigate for disposal of 11(e)2 material. (LES Ex. 3, Tab O, at 5-2). In 1996 and 1998 nine borings and 23 monitor wells were made around the RCRA landfill. (LES Ex. 3, Tab O, at 5-3). The 2000 Lehman-Rainwater report on the WCS site was based on 35 air rotary boreholes. (LES Ex. 3, Tab I, at 1). In 2001 Cook-Joyce installed 12 monitor wells and 13 piezometers in the eastern part of the site for 11(e)2 purposes. (LES Ex. 3, Tab O, at 5-3). The February 2004 Cook-Joyce report for WCS was based on 220 borings. (LES Ex. 3, Tab O, at 5-5; see id. Table 6.5-1). In comparison, at the NEF site Cook-Joyce drilled nine boreholes to 35 to 60 feet and installed three monitor wells. (LES Ex. 3, Tab L, at 3-4). In addition, five geotechnical borings were drilled to plan construction. (NIRS/PC Ex. 4, Appx A).

39. The ER at 3.4-13 states that water occurs in the Chinle between depths of 214 and 222 feet. (LES Ex. 1 at 3.4-13). However, at the NEF site only one of three monitor wells found water. (NIRS/PC Ex. 4, Table 2 and Fig. 5; NIRS/PC Ex. 17 at 54). The ER also states that there is a 30.5 meter (100-foot) thick water bearing layer at about 183 meters (600 feet) below ground surface within the Chinle Formation clay. (LES Ex. 1 at 3.4-13). However, LES has drilled only to 240 feet at the NEF site and therefore cannot claim to have located this aquifer. (NIRS/PC Ex. 4, Appx. D).
40. LES seems to have acknowledged that the Santa Rosa Formation occurs at 1115 feet (LES Ex. 1 at 3.4-13), although some references to an 800 foot depth remain. (id. 3.4-5).
41. There has been only one in situ permeability test on the NEF site. (LES Ex. 3, Tab L, at 8). Such a test only measures the permeability of the immediately

surrounding area. (NIRS/PC Ex. 11 at 1). Permeabilities reported in the ER (LES Ex. 1, Table 3.3-2) are otherwise from laboratory tests of rock samples. Such laboratory tests do not account for any fractures missed in taking a sample. (Peery, Tr. 557, 558; Toblin, Tr. 743; Rice, Tr. 843-44; Linsley et al., NIRS/PC Ex. 25, at 131; Davis & Dewiest, NIRS/PC Ex. 6, at 165; Olson & Daniel, NIRS/PC Ex. 43, at 20). In fact, Olson & Daniel (NIRS/PC Ex. 43) show that in a sample of 72 permeability tests, lab test values exceeded field test values in only 13 instances; in 54 of 72 cases field values exceed lab values. (Table 4).

42. As the Board stated, "[n]obody doubts that there are fractures." (Tr. 858). Drilling into the Chinle has produced numerous reports of fractures. In the early 1990s Holt examined cores from the Chinle at the WCS site. (LES Ex. 3, Tab E). Fractures were found in most of the boreholes. (id.). Fractures were found at various depths, from the alluvial/Chinle contact (id., Tab G, borehole B-45(11-E)) to more than 200 feet below ground surface. (id., Tab G, borehole B-4(7-G). In some cases the fractures had 'healed.' (id., Tab G, borehole B-49(8-B). In other cases mineral deposits indicate that the fractures have acted as groundwater flow paths (id., Tab E, borehole B-36 (10-C). The 1993 Holt report borehole logs (LES Ex. 3, Tab G) show fractures at numerous levels within the Chinle. (See boreholes B-43, B-4, B-49, B-18, B-32, B-46, B-21, B-50, B-36, B-44, B-35, B-20, B-45).

43. Witnesses for LES, NRC Staff, and NIRS/PC acknowledged the presence of fractures shown in the Holt report logs. (Tr. 572, 576-80, 582-84, 746, 848-49). In addition, Mr. Peery testified on deposition that if there were fracturing in the Chinle, one would expect those fractures to continue on down into the aquifer that

is present at 220 feet, because, he said, it is very difficult to fracture the upper part of a formation without some movement that fractures the lower part of the formation. (NIRS/PC Ex. 17, at 22-23). Mr. Peery conceded that he cannot actually state whether the fractures are localized. (Tr. 587-88).

44. The recent study of a fault disclosed at the WCS site does not establish that the fractures in the Chinle Formation were closed. (Toblin, Tr. 747). Fractures may continue to exist. (Tr. 748). Mr. Toblin stated that he could not tell from Mr. Holt's borehole logs whether fractures were interconnected, nor whether the fractures had gaps that water could get through. (Tr. 749). Neither would he assume that mineralization always closes a fracture. (Tr. 750).

45. Whether the Chinle fractures form one or more interconnected flow paths has not been investigated. (Rice, Tr. 848-49). Mr. Peery said that he would need to see moisture in the fractures to establish an interconnected flow path (Tr. 580-81). Some of the Holt borehole logs identify moisture at fractures. (Tr. 751-52). (LES Ex. 3, Tab G, boreholes B-23 (7-I, 37'-54'), B-18 (8-D, 45'-71'), B-32 (8-E, 96.8'-101.4'), B-46 (9-E, 37'-40.9'), B-25 (10F, 19.5'-31'), B-20 (11-D, 22'-48'), B-45 (11-E, 19'-24')). However, as Mr. Rice explained (Tr. 778, 780), if episodic flows occur, moisture would not constantly be present. Further, Holt reported mineralization in fractures, which the witnesses agreed indicates the travel of moisture transporting minerals. (Tr. 573, 576, 579, 749-50). Mr. Peery said that he cannot tell when the minerals were deposited in fractures. (Tr. 589-90).

46. Whether fractures that may act as preferential flow paths exist could be determined by closely examining cores from the Dockum Group. To maximize the chances of intercepting near-vertical fractures, cores should be collected from

angled borings. (Rice, Tr. 780).

47. Contrary to the opinion of Mr. Peery (Tr. 559), the presence of flow paths to water bearing strata is not negated by differences in observed heads. Mr. Rice explained that a completely confined aquifer is a rare thing, and that "this notion that somehow if there are large differences in hydraulic head between units that means that there isn't flow between the units, that's simply incorrect." (Tr. 855). He stated that there may be flow between units which have large differences in hydraulic heads; for example, at Los Alamos, New Mexico, water moves through fractures from one perched aquifer to another and to the regional aquifer, and yet there are large head differences between these aquifers. (Tr. 855). He said, "the same thing could happen here." (Tr. 856).

48. The dryness of the Chinle does not negate the existence of flow paths. In response to episodic recharge events, water may flow along fractures only a few times each year, or perhaps only every few years. At Yucca Mountain, Nevada, significant flow through fractures is believed to occur only every few years. (DOE, NIRS/PC Exhibit 7, at 20-21). Such episodic flows would wet the area immediately adjacent to a fracture, but would not be expected to wet large volumes beyond the fracture. Thus, the generally dry conditions found in the Chinle do not mean that fracture flow does not occur. Some of Holt's boreholes were originally logged as being dry and filled up after they were drilled. (Tr. 590). Holt's log of borehole B-20 shows the borehole was dry (LES Ex. 3, Tab G), but the Rainwater report shows that B-20 had more than 100 feet of standing water. (Rainwater, LES Ex. 3, Tab H, Table A-1, well 11-D). Holt's log of borehole B-21 shows the borehole was dry (LES Ex. 3, Tab G), but the Rainwater

report shows that B-21 had six feet of standing water. (Rainwater, LES Ex. 3, Tab H, Table A-1, well 9-G3). In the absence of laboratory measurements of moisture content, one cannot assume that an interval of the Chinle is dry merely because it was logged as dry in the field. (Rice, Tr. 778-79).

e. LES also should have determined the ages of water in the Chinle and Santa Rosa. Relatively young water would indicate that water reaches these units along fast flow paths.

49. The ages of groundwater in the saturated units beneath the site should be estimated. Relatively young water would indicate that water reaches these units along preferential flow paths. The amount of flow between the Dockum Formation and overlying units depends on site-specific conditions. In the absence of site-specific information, it is not reasonable to assume that the Dockum constitutes an effective barrier to flow from overlying units. (LES Ex. 1 at 3.4-15; DEIS, NRC Staff Ex. 1A at 3-35). According to the paper cited by LES (LES Ex. 6), the estimates of groundwater ages for the Santa Rosa are not based on any data from the vicinity of the site. As the authors (Dutton and Simpkins) state: " … data coverage in the Dockum Group beneath the Southern High Plains is poor." (LES Ex. 6 at 10). The paper contains no tritium or chlorine-36 data from the Santa Rosa. A later paper by Dutton does contain tritium data from four wells in the lower Dockum (Santa Rosa?) (NIRS/PC Ex. 8). These data indicate that the Dockum water does not contain a significant component of young water. However, the closest tritium measurement is from a well more than 100 miles from the proposed site. (NIRS/PC Ex. 8 at 222, 225, and 227). Thus, these data are not directly applicable to the NEF site. The bulk of the water in the Santa Rosa Aquifer at the site is probably quite old. The question is, however, whether it contains a young component. There are no data from the site, or even from

within 100 miles of the site, that would answer this question. (Rice, Tr. 817-18).

50. LES and NRC have not collected the information necessary to determine whether water from the alluvium may flow into the Chinle or the Santa Rosa at the proposed site. This information could be obtained through studies of fractures, measurements of stable isotope ratios in groundwater, and the dating of groundwater. (Rice, Tr. 780).

It should be noted that a pesticide has been detected in a groundwater sample collected from Chinle monitor well (MW-2) (ER 3.4-7). This finding may indicate a connection to the surface such as a fast flow path from the alluvium to the Chinle. LES says only that the detection is probably a false positive (ER 3.4-7).

51. Concerning the detection of a pesticide, Mr. Rice has stated, and the Board finds, that the pesticide detection was probably caused by contaminated surface soils that were introduced into MW-2 as it was drilled. Some soil samples taken at the site contained the same pesticide found in MW-2. (NIRS/PC Exhibit 28, analyses of soil samples) (Rice, Tr. 816-17).

l. LES states that water in the Santa Rosa Aquifer is "considered not potable." (ER 4.12-9) The basis for this statement is not given. The Santa Rosa Aquifer is used as a source of domestic and livestock water in Lea County.

52. It is established that water from the Santa Rosa Formation is used for domestic and livestock purposes. LES witnesses so conceded. (Tr. 483-87) (Lea County Regional Water Plan, LES Ex. 26, at 6-12; Nicholson & Clebsch, NIRS/PC Ex. 37, at 69). The Santa Rosa is the principal source of groundwater for domestic and livestock uses in the southwestern portion of the county and was the principal aquifer for the city of Jal before 1954. (Tr. 484-87; LES Ex. 26 at 6-12). The Lea County Regional Water Plan recommends evaluation of the potential for water development in the Santa Rosa Aquifer. (Peery, Tr. 487).

**b. Proposed Findings of Fact concerning NIRS/PC Contention EC-2**

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

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

FINDINGS:

49. Disclosure of the impact of the proposed NEF upon ground water supplies contained in the ER appears at sections 3.4.6, 3.4.7, and 4.4.5 of the ER. (Tr. 1195; LES Ex. 1). The ER states that Memoranda of Understanding have been made with the cities of Hobbs and Eunice, which obtain water from wells near Hobbs. (LES Ex. 1 at 3.4-9). The current capacities of the Hobbs and Eunice water systems are stated as 20 million and 4.32 million gallons per day ("gpd"), and NEF requirements are given as 63,423 gpd and 378 gallons per minute. (id. 4.4-6).

50. Disclosure of the impact of the proposed NEF on ground water supplies in the DEIS appears at sections 3.8.2 (NRC Staff Ex. 1A at 3-37 through 3-40) and 4.2.6.3 (at 4-14 through 4-15). The DEIS states that average and peak water requirements of the NEF would be 63,243 gpd and 539,000 gpd. (at 4-14). The DEIS states that "[t]hese usage rates are well within the excess capacities of both water systems and would not affect local uses." (at 4-14). The DEIS states that the usage of the NEF during its life would be approximately 695 million gallons, which is a small percentage of the 16 trillion gallons of Ogallala Aquifer reserves

within the State of New Mexico; therefore the DEIS concludes that impacts of the NEF on water resources would be small. (DEIS at 4-15).

51. Intervenors Nuclear Information and Resources Service and Public Citizen presented expert evidence by Mr. George Rice, a groundwater hydrologist. Mr. Rice received a B.S. and a M.S. degree in hydrology from the University of Arizona and has practiced in ground water hydrology for more than 20 years. He is experienced in ground water modeling, monitoring and aquifer flow testing and modeling. (Tr. 1358).

52. It is relevant to the impact of the proposed NEF to consider the relation between its peak usage and the demand of other users. The estimated peak water usage of the NEF is approximately 540,000 gpd. (LES Ex. 1, Sec. 4.4.5). The average usage of the Hobbs water system is 6.2 million gpd and of the Eunice water system is 1.48 gpd. (id.). Therefore, the peak rate of usage of the NEF would be 8.7% of current usage for the Hobbs system and 36% of the current usage for the Eunice system. (Tr. 1245, 1254-55).

53. It is also important to consider not only the current capacity of municipal systems and the demand of the NEF but also such capacity and demand throughout the operating life of the NEF. The NEF is projected to operate for 30 years, beginning in 2006. (NRC Staff Ex. 1A, at 2-1, 2-8). Moreover, as Mr. Krich stated, it is necessary for the NEF to have an uninterrupted water supply, for purposes of "asset protection." (Tr. 1303-04).

54. Witnesses for LES were asked about statements contained in their direct testimony about the ability of the municipal water systems to supply the NEF without significantly affecting that supply, other users, water levels, or long-term

productivity of the Hobbs well field. The witnesses cited no modeling analyses to support such statements, even when it was specifically pointed out that the issue involves projecting 40 years ahead. (Tr. 1293-96).

55. Mr. Stokes, witness for LES, stated that he would not consider any impact on water supplies to be adverse, so long as it was authorized by the State Engineer. (Tr. 1280-81; see also Tr. 1205). However, the issue here is not impact on State of New Mexico water policies but impact upon the environment.

56. The cities of Hobbs and Eunice own water rights to serve the planned facility (Tr. 1265); however, it is also acknowledged that one may own water rights but lack the water to use such rights. (Tr. 1265).

57. Water for the NEF would be extracted from the Lea County Underground Water Basin ("LCUWB"), which is part of the Ogallala Aquifer. (Tr. 1201). The water levels in the LCUWB, and the Ogallala Aquifer in general, have declined during the last half century due to water withdrawals. (Tr. 1260-61). Mr. Stokes, witness for LES, stated that in some areas of the LCUWB there have been draw downs in excess of 60 feet since 1940. (Tr. 1288-89). A model cited in the Lea County Regional Water Plan (LES Ex. 26) ("LCRWP") predicts that the saturated thickness will decrease by another 50 to 100 feet in the area between the state line and the communities of Hobbs, Lovington, and Tatum within the next 40 years. (LES Ex. 26 at 6-9; Tr. 1288-89).

58. The New Mexico State Engineer estimates that the annual ground water recharge within the LCUWB is approximately 29,000 acre feet, and criteria permit annual withdrawal of 440,000 acre feet. (LES Ex. 26, at 5-4; Tr. 1286-87). The State Engineer predicts significant ground water depletion in and around municipalities

in Lea County over the next 40 years; this draw-down may render existing municipal well fields incapable of providing a sufficient supply of potable water. (LES Ex. 26 at 5-6). LES witnesses concurred with these statements. (Tr. 1287).

59. The NRC Staff witness, Mr. Toblin, relied upon the State Engineer's model. (NRC Staff Ex. 21). In applying the model, Mr. Toblin accepted its assumptions, including the assumption that pumping in New Mexico and Texas would continue to 2040 at the rate in effect in 1993-96. (Tr. 1341). He modeled withdrawals from the Hobbs well field for the NEF in 2010 through 2040. (Tr. 1316).

60. The State Engineer's model (NRC Staff Ex. 21) predicts that a few areas located along the New Mexico/Texas state line will be dewatered by the year 2040, and in the vicinity of Hobbs for the year 2040 the remaining saturated thickness will range between 50 and 100 feet to the north to less than 50 feet to the south of the city. (Tr. 1337).

61. The State Engineer's model (NRC Staff Ex. 21) projects that by the year 2040 saturated thickness from which water will be extracted for the NEF will diminish to approximately 38.2 feet. (Rice; Tr. 1373). With the addition of the demand to serve the NEF, the saturated thickness would diminish to 37 feet. (Tr. 1373).

62. Mr. Peery said that the State Engineer's model "still indicated saturated thicknesses of approximately 50 to 150 feet in the Hobbs well field, particularly in the northern portion of the well field. The saturated thickness is still quite high over there. And it's very little change in the thicknesses from the year 2000 part of the simulation." (Tr. 1296). However, the State Engineer's model in fact projects that the saturated thickness will fall to 38.2 feet by 2040. (Tr. 1373).

63. Mr. Stokes observed that water use over the years for agriculture varies

dramatically. (Tr. 1271). However, he and the other LES witnesses stated that they assumed that water use would stay essentially the same over the next 40 years. (Tr. 1270). Mr. Peery also stated that he thought that pumping would not continue in Texas at the current rate, although he acknowledged that there is no legal restriction upon such pumping. (Tr. 1263-64; 1291-92).

64. In contrast, the LCRWP projects as follows:

> "Ground water diversions from Lea County are projected to more than double by the year 2040, primarily in response to increased agricultural demands for the dairy industry. While an ample number of water rights exist to meet this projected demand, the reality is there physically not enough water in the Basin to maintain an annual diversion of this magnitude." (LES Ex. 26, executive summary, p. 1).

This plan states:

> "Over the next 40 years—if unrestrained—the water use in Lea County is estimated to increase to approximately 360,000 acre-feet, 105% greater than the 1995 total" (id. 2).

Both Mr. Peery and Mr. Stokes had a part in writing the LCRWP, reviewed it before it was issued, and had an opportunity to make corrections. (Tr. 1256-58).

65. The State Engineer's model (NRC Staff Ex. 21) assumes use of about 40% of existing water rights. (Tr. 1339). Mr. Toblin declined to classify such analysis as a conservative one. (Tr. 1338-39). Mr. Rice questioned whether the analysis by Mr. Toblin is conservative. (Tr. 1372-73). The State Engineer's model is not a conservative one.

66. The City of Hobbs has a population of about 30,000 and uses about 8500 to 9000 acre feet of water per year. (Tr. 1278). The City currently projects population growth of approximately 1% per year, reaching 39,000 by the year 2028 (Tr. 1276, 1277). Such a 30% increase should be accounted for in projecting usage of the LCUWB and in analyzing the impact of the proposed NEF.

67. The State Engineer's model of water usage and impact (NRC Staff Ex. 21) contains the following caution:

> "Current depletion rates are not indefinitely sustainable and would eventually de-water the basin. It should be noted that these projections are based on the present irrigation of approximately 51,000 acres. According to OSE records there are approximately 120,000 acres with permitted irrigation rights (annual report of basin administration). The annual rate of water level decline could increase if additional permitted acreages are brought back into irrigation." (NRC Staff Ex. 21, at 53).

68. The prospect of water usage greater than that projected by the State Engineer's model should be disclosed in setting forth the impact of the propose NEF on water resources. At a minimum, low, medium, and high estimates of water usage should be set forth, and the impact of the proposed NEF should be shown under each estimate. Projections, including the projection of an increase in usage of 105% from 1995 from the LCRWP, should be set forth, and the impact of the proposed NEF upon water usage and availability should be analyzed in light of such projections.

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.

69. The NRC Staff witness, Mr. Toblin, was asked whether the ratio between the lifetime usage projected for the NEF and the quantity of Ogallala reserves within the State of New Mexico is a relevant scientific ratio, and he said that he would not expect the impact of the NEF's usage to be reflected over that entire area. (Tr. 1335-36). Thus, the calculation in the DEIS (NRC Staff ex. 1A, at 4-15) is not a relevant measure of impact.

**c. Proposed Findings of Fact concerning NIRS/PC Contention EC-4**

CONTENTION: Petitioners contend that the Louisiana Energy Services, L.P.

Environmental Report (ER) lacks adequate information to make an informed licensing judgment, contrary to the requirements of 10 C.F.R. Part 51. The ER fails to discuss the environmental impacts of construction and lifetime operation of a conversion plant for the Depleted Uranium Hexafluoride ("$UF_6$") 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.

FINDINGS:

70. Disclosure concerning the impacts of deconversion of depleted $UF_6$ in the ER is as follows: The initial application, filed in December 2003, does not discuss the impact of deconversion. There is reference to the fact that DOE has contracted for the construction of $DUF_6$ conversion plants at Paducah and Portsmouth in the first Environmental Report at page 4.13-2, but there is no discussion of the impact of such plants. (Tr. 1068). Revision 2 of the application contains the following language at page 4.13-3:

> "The environmental impact of a $UF_6$ conversion facility was previously evaluated generically for the Claiborne Enrichment Center (CEC) and is documented in Section 4.2.2.8 of the NRC Final Environmental Impact Statement (FEIS) (NRC, 1994a). After scaling to account for the increased capacity of the NEF compared to the CEC, this evaluation remains valid for the NEF. In addition, the Department of Energy has recently issued FEISs (DOE, 2004a; DOE, 2004b) for the $UF_6$ conversion facilities to be constructed and operated at Paducah, KY and Portsmouth, OH. These FEISs consider the construction, operation, maintenance, and decontamination and decommissioning of the conversion facilities and are also valid evaluations for the NEF." (LES Ex. 14, at 4.13-3).

71. Discussion of the environmental impact of deconversion of depleted $UF_6$ in the DEIS consists of the following: The DEIS states that the NEF would produce up to 7800 metric tons of $DUF_6$ per year. (DEIS, NRC Staff Ex. 1A, at 2-16). The

DEIS assumes that the proposed deconversion facility for the NEF will use the same technology as the DOE plants; this is described as a continuous dry conversion process based on the process used by Framatome ANP in Richland, Washington. (id. 2-28). As for location, the DEIS states that the deconversion plant could be located (a) at Metropolis, Illinois (id. 2-29, 2-30) or (b) at or near to the proposed NEF (id. 2-30). It also states that deconversion might be carried out at the DOE plants by extending their operation (id. 2-31).

72. The DEIS states that the "impacts of conversion at a private conversion facility or at DOE conversion facilities are similar because it is assumed that the facility design of a private conversion facility would be similar to the DOE conversion facilities." (DEIS, NRC Staff Ex. 1A, at 4-53; see also 4-54). The DEIS states:

> "Because the operations would be the same as the DOE conversion facilities, the environmental impacts from normal operations of an adjacent conversion facility would be representative of the impacts of the DOE facilities and the proposed NEF. Therefore, the maximum occupational and member of the public annual exposures would be approximately 6.9 millisieverts (690 millirem) and $5.3 \times 10^{-5}$ millisieverts ($5.3 \times 10^{-5}$ millirem), respectively. The impacts due to accidents would be bounded by the proposed NEF's highest accident consequence—the hydraulic rupture of a $UF_6$ cylinder. This maximum accident impact would be a collective dose of 12 person-sieverts (12,000 person-rem) or equivalent to 7 latent cancer fatalities." (NRC Staff Ex. 1A, at 4-54).

The DEIS also states that the impact of use of DOE conversion facilities would be scaled to the impact of the operation of those facilities to process DOE depleted uranium. (id. 4-56).

73. Intervenors Nuclear Information and Resource Service and Public Citizen offered expert testimony of Dr. Arjun Makhijani, who has received a doctorate in engineering from the University of California at Berkeley and is now the President of the Institute for Energy and Environmental Research, an organization

that assesses environmental damage caused by nuclear facilities and evaluates compliance by such facilities with environmental regulations. (Tr. 1064).

74. LES witnesses have testified that LES has determined to deconvert $DUF_6$ to $U_3O_8$, rather than to $UO_2$ or another form. (Tr. 888). LES Ex. 20, a statement issued by the Commission to DOE, recommends that DOE "identify the dense dioxide form as the baseline." (at 2). NIRS/PC offered to show that deconversion to $UO_2$ has certain advantages and generates different environmental impacts at the deconversion stage and at the disposal stage. Such evidence was rejected. (Tr. 942-50).

75. LES has advised the Board that it has signed a Memorandum of Understanding with Areva, S.A., to conduct negotiations toward construction and operation of a deconversion plant. (LES Ex. 79; Tr. 934). LES also stated that it had determined not to use a deconversion process that generates anhydrous hydrofluoric acid ("AHF") and to assent to license conditions that require LES to obtain commitments from suppliers not to use a process that generates AHF. (Tr. 931-34). LES still wishes to obtain NEPA consideration of processes that generate AHF, as an alternative. (Tr. 1120-34).

76. The ER and the DEIS rely heavily upon analyses contained in other documents of the impact of other facilities. The ER refers to the Final Environmental Impact Statements ("FEISs") for the Claiborne, Portsmouth and Paducah facilities. (LES Ex. 14, at 4.13-3). The Claiborne EIS analyzes deconversion of $DUF_6$ to $U_3O_8$; it does not analyze deconversion to any other conversion product. (NIRS/PC Ex. 58, at 4-65). The Claiborne EIS also assumes the use of a deconversion process that generates calcium fluoride, $CaF_2$, as a byproduct. (Tr. 962; NIRS/PC Ex. 58,

Appx A at A-1 through A-3); it contains no analysis of a process that generates AHF. The Claiborne EIS analyzes impacts from the routine operation of a deconversion facility but does not analyze off-normal or accidental events. (NIRS/PC Ex. 58 at A-4 through A-7). Therefore, the Claiborne EIS could not satisfy the requirements of NEPA for a deconversion plant for the NEF.

77. At the hearing, no witness explained or testified in support of the calculations contained in the Claiborne EIS. Mr. Krich, LES's expert witness, did not know how the estimates of projected releases were calculated. (Tr. 963, 964).

78. The Portsmouth and Paducah EISs are similar to one another. They describe a process that generates hydrofluoric acid ("HF") for possible resale and, if not resold, for neutralization to $CaF_2$. (LES Ex. 16 at S-19, 2-8 through 2-10; LES Ex. 17 at S-17 through S-20, 2-8 through 2-12). They contain no analysis of a process that generates AHF.

79. At the hearing, no witness explained or testified in support of the calculations contained in the Portsmouth or Paducah EIS. Mr. Krich stated that he had read the Portsmouth and Paducah EISs but had not done any calculations to verify their estimates of impacts. (Tr. 965-66). He stated that he applied a "top-of-the-head test" in his review. (Tr. 966).

80. The NRC Staff witness, Mr. Palmrose, stated that he reviewed the DOE EISs for the Portsmouth and Paducah deconversion plants but had not performed any calculations nor checked any of the calculations reflected in the DOE EISs. (Tr. 1026-27, 1037-38). Mr. Palmrose accepted the DOE calculations on their face without verifying them and then said, assuming those are right, the environmental effects of the NEF facility will be bounded by the DOE results; he did not

independently verify the DOE calculations. (Tr. 1041; 1044). Dr. Makhijani stated that disagreed with the use of environmental reports prepared by others without checking them. (Tr. 1162).

81. Mr. Palmrose stated that NRC had assumed that any deconversion plant would use a $CaF_2$ process. (Tr. 1044). He testified also that the impacts of a private deconversion facility constructed in Metropolis, Illinois, would be bounded by the impact from the DOE Paducah conversion facility, in the sense that the impacts from such a facility would be similar or less than the impacts of the DOE Paducah facility, based upon a comparison of the capacity of the two plants. (Tr. 1041-43).

82. Mr. Krich also said that the Department of Energy Programmatic Environmental Impact Statement (LES Ex. 18) ("DOE PEIS") comprehensively evaluated the impacts of a deconversion facility. (Tr. 894-96; 966-71). Mr. Krich took the position that the analysis in the DOE PEIS bounds the impacts of a deconversion facility for the NEF, based upon a comparison of the throughputs of the facilities under study. (Tr. 973-76). However, the ER does not refer to the DOE PEIS. At the hearing, no witness explained or testified in support of the calculations contained in the DOE PEIS. Mr. Krich reviewed parts of the DOE PEIS, but he did no calculations to check its results. (Tr. 966-71).

83. The DEIS does not cite the DOE PEIS as a reference for any environmental analyses. Mr. Palmrose stated that in the DEIS the NRC had not cited to the DOE PEIS because the DOE PEIS does not contain the most current analysis. (Tr. 1052-53). Dr. Makhijani pointed out that in any case one cannot analyze a specific plant using a general programmatic approach. (Tr. 1122, 1161).

84. The DOE PEIS cannot be relied upon to satisfy NEPA requirements applicable to

the ER or the DEIS. The ER does not even refer to the DOE PEIS in citing documents that purportedly address environmental impacts. (LES Ex. 14 at 4.13-3). The DEIS refers to the DOE PEIS with regard to various disposition options but does not refer to any analysis therein of deconversion impacts. (DEIS, NRC Staff Ex. 1A, at 2-42). It is not sufficient to state that the DEIS refers to the DOE site-specific EISs for Portsmouth and Paducah (DEIS at 4-53 though 4-58), and that those in turn refer to the DOE PEIS, because the reference in those DOE EISs is merely historical and does not incorporate substance. (LES Ex. 16, at 1-6, 1-25; LES Ex. 17 at 1-6, 1-25).

85. The DEIS does not discuss the different and greater risks of the deconversion process that generates AHF. (Tr. 1044-45). A deconversion process generating AHF is an appropriate alternative that should be considered in analyzing the environmental impacts of deconversion of depleted uranium from the NEF. In the analysis of proposals to construct and build DOE deconversion facilities it was determined that the accident scenarios with the largest consequences were primarily those involving hydrofluoric acid. (LES Ex. 17, Appx D at 18-19). In considering the differences between the properties of aqueous HF and AHF, 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." (LES Ex. 17 at 19).

The same EIS 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 of seven square miles downwind with up to 300 fatalities. DOE concluded that, "[a]s noted above, shipment of aqueous HF may have different risks than shipment of AHF." (id. 20).

86. 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 AHF, the potential impacts on the environment are likely to be higher. As a deconversion product, AHF is riskier than $CaF_2$ because it is more volatile and more concentrated. (Tr. 1133-34). There is no adequate discussion in the ER, the DEIS, or the DOE EISs for the Paducah and Portsmouth facilities of the AHF process or its operations issues, environmental impacts and transportation risks.

87. When the programmatic engineering analysis for DOE was completed in 1997, apparently no large-scale facility producing AHF 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) (NIRS/PC Exhibit 55 at 3-8) states that

> "Distillation is a common industrial process and was the design basis for this suboption. . . . This representative process has not been industrialized, but the initial research and development have been completed."

The costs, operations issues, environmental impacts and transportation risks of AHF as a product of deconversion of $DUF_6$ are not based on experience.

88. Mr. Palmrose stated that he chose to omit the AHF process from the DEIS as not

technically effective, in the sense that it has not been proven for industrial use. (Tr. 1045). However, DOE considered the AHF process an appropriate alternative for the PEIS. (Tr. 896; LES Ex. 18 at F-11-12). Moreover, Cogema has operated such a process in France, although it encountered difficulties. (NIRS/PC Ex. 61). No general analysis of the AHF process is contained in the DEIS, and neither is there any accident analysis addressing a specific site. (Tr. 1121). Since the DOE PEIS, the technology for an AHF process has changed, so that the DOE PEIS is obsolete on impacts of deconversion through an AHF process. (Tr. 1122-26).

89. As Dr. Makhijani testified, it is difficult to sustain LES's and NRC Staff's claims of bounding impacts. (Tr. 1102-04). The 1997 LLNL analysis assumed that the process of direct distillation would be used, as did the DOE PEIS. (NIRS/PC Ex. 55 at 3-8; LES Ex. 18 at F-12). The distillation process is not used in any existing deconversion plants. The LLNL analysis noted that

> "Although anhydrous HF is not produced as the by-product from the Cogema facility, distillation (the assumed process to upgrade the aqueous HF) is well established. Again, any uncertainties with the specific distillation process and its integration assumed for the engineering analysis (see Section 3.2.1.1) would be addressed in a subsequent engineering development phase of the Program." (NIRS/PC Ex. 55 at 3-7).

However, Cogema abandoned the distillation process, reporting that it "required more sensitive kiln technology and was more corrosive." (NIRS/PC Ex. 61). Cogema also stated:

> "Studies have been carried out to convert this 70% [aqueous] HF to anhydrous HF, which can be sold on the European market at a much higher price. Five different processes have been technically compared. Direct distillation has been discarded because of the lack of commercial market for the 38% azeotrope by-product and the problems associated with its direct re-injection inside the

> defluorination kiln (such as the design of a special super-heating system)." (id.).

Therefore, NRC and LES should perform additional analyses based upon technologies more likely to be put into operation. The DOE PEIS itself states that

> "A more detailed assessment of specific technologies and site conditions will be conducted, as appropriate, as part of the second phase (tier) of the programmatic National Environmental Policy Act (NEPA) approach" (LES Ex. 18 at F-4),

and that

> "The cumulative impacts of conversion, long-term storage, and disposal activities could not be determined because specific sites and technologies have not been designated for these options. Further analyses of cumulative impacts would be performed as required by NEPA and DOE regulations for any technology or siting proposals that would involve these facilities." (id. 4-29).

Given that the PEIS considers only distillation, it is not possible to determine whether its reported impacts actually bound the possible impacts of a facility using alternative technologies to generate AHF. (Tr. 1073-76; 1102-04).

90. Another impact, not considered in the ER or the DEIS, is that generation of HF in large amounts results in exhaust gases that are highly acidic and chemically hazardous if sufficiently concentrated. (Tr. 1076-77). A scrubber system is needed to remove most of the HF. According to the LLNL engineering analysis, the proposed scrubber could remove up to 99.9 percent of the HF from exhaust gases. The estimated composition of the exhaust gases under four appropriate scenarios ranges from zero to 11.7 ppm uranium, depending on the deconversion product and whether a $CaF_2$ or an AHF process is used. (NIRS/PC Ex. 55 at 6.4-7-2 through 6.7-7-2). These releases correspond to routine annual airborne emissions of approximately 0.51 to 1.9 millicuries of uranium. (A private conversion facility for the NEF output would have proportionally lower absolute

levels of emissions, assuming the same scrubber efficiencies.) However, low scrubber efficiency was frequently experienced in the scrap recovery operations at the uranium plant near Fernald, Ohio, which was designed to remove uranium and acid from scrap recovery exhausts. (Tr. 1156; NIRS/PC Ex. 57, Appx I, Tables I-10 through I-13, indicating highly variable performance). Therefore, it is necessary to consider impacts of lower filter efficiency in projecting impacts of deconversion.

91. The DEIS does not analyze the specific transportation routes applicable to a deconversion plant to serve the NEF. Such analysis would properly consider the severity, probability, and consequences of transportation accidents. (Tr. 1136-37; 1138-39).

92. Further, transportation analysis, even in the DOE PEIS, does not consider all process chemicals that might be transported for a private deconversion facility. (Tr. 1105-06). For example, the DOE site-specific EISs consider transportation of anhydrous ammonia, which is more volatile and hazardous than the ammonia considered in the PEIS. In addition, the site-specific EISs considered larger numbers of shipments of anhydrous ammonia than the PEIS. (LES Ex. 18 at 5-47; LES Ex. 17 at 2-33, 5-71). Such issues arise in transitioning from the programmatic level to specific plants; programmatic analysis cannot bound impacts of a specific plant. (Tr. 1105).

93. DOE's transportation analyses apparently did not report impacts of a serious train fire, much less a bounding accident like the Baltimore CSX train fire of mid-July 2001 (NIRS/PC Ex. 62) or the January 6, 2005 rail accident in Graniteville, S.C. involving release of chlorine gas, in which nine people died, 250 were injured,

and 5,400 were evacuated. (NIRS/PC Ex. 63). Such accidents should be fully addressed in the DEIS. (Tr. 1106).

94. Further, there are no DOE or general NRC guidelines for free release of contaminated hydrofluoric acid or calcium fluoride. (Tr. 1077-78) (LES ex. 75 at 44657-58; LES Ex. 74 at 44652-53). NRC has licensed the Framatome fuel fabrication facility to release HF containing 6.4 ppm of uranium, and the European limit for release of HF from the Cogema deconversion plant is 5 ppm. (LES Ex. 17 at E-13; NIRS/PC Ex. 56 at 50-51). In the United States there is public concern about uranium contaminants, and if the fluorine chemical is to be sold in North America, it may be subjected to higher purity standards due to the source material. (NIRS/PC Ex. 56 at 50-51). The implied uranium concentrations in HF referred to above assume that no uranium oxide was removed by the scrubber; thus, the contamination of the HF is likely to be higher. The DEIS should assume that HF resulting from deconversion cannot be resold on the open market. (Tr. 1078).

95. Similarly, disposal of $CaF_2$ as LLW must be assumed, because it is expected to be contaminated by the uranium in the HF. (Tr. 1079) (LES Ex. 17 at E-5). If the $CaF_2$ otherwise were non-hazardous waste, it would qualify as Class A low-level waste, suitable for disposal in a 10 CFR 61.55(a) facility. Impacts of the treatment and disposal of this waste stream should be considered in the ER and DEIS. (Tr. 1079).

**d. Proposed Findings of Fact concerning NIRS/PC Contention EC-7.**

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.

FINDINGS OF FACT:

96. Discussion of the asserted need for the proposed NEF in the ER appears at sections 1.1.1 through 1.1.3 (LES Ex. 30). In that material LES lays out an analysis of the supply and demand for enrichment services in the period 2002 through 2020. Table 1.1-5 contains Mr. Schwartz's tabulation of the suppliers of enrichment in the years 2003 and 2016. (LES Ex. 30, Table 1.1-5).

97. The DEIS discussion of Purpose and Need for the Proposed Action (NRC Staff Ex. 1A sec. 1.3) refers to national energy security policy and mentions, without supporting information, possible supply disruptions in production by the Paducah gaseous diffusion plant and the supply of downblended uranium from Russia. (DEIS at 1-3). The DEIS does not calculate the capacity of various enrichment suppliers and does not estimate the size of the unmet need to be fulfilled by the proposed NEF. It states only that the plant would "supplement the domestic sources of enrichment services provided by the USEC's Paducah Gaseous Diffusion Plant and the proposed American Centrifuge Plant" (at 1-5), implying that both such USEC facilities would continue in operation.

98. Intervenors Nuclear Information and Resource Service and Public Citizen offered expert testimony by Dr. Michael Sheehan. Dr. Sheehan has M.A. and PhD. degrees in economics from the University of California at Riverside and is also a graduate of the University of Iowa College of Law. He has testified numerous times concerning matters of utility economics and has written extensively in the area. (Tr. 1589-1626).

99. Based on his supply and demand projections, Mr. Schwartz concluded that

"absent construction of the NEF and USEC's and Eurodif's proposed centrifuge facilities for that matter, there is likely to be a shortage of enrichment capacity after 2010." (Tr. 1459).

100. Mr. Schwartz confirmed that it is a basic assumption of his supply-demand analysis that the existing gaseous diffusion plants (i.e., Paducah in the United States and Eurodif in Europe) will soon be shut down, removing them as sources of supply. (Tr. 1513-15). Mr. Schwartz based his projections of the shutdown of gaseous diffusion plants upon public statements by the plant operators. (Tr. 1514; see also Tr. 1527-29).

101. In his analysis Mr. Schwartz chose to include only those producers who are "considered to be competitive." (Tr. 1451). Thus, he provides only his conclusion as to "competitiveness" and not the supporting analysis. His definition of "economically competitive and physically usable" capacity "refers to that portion * * * of the physical capability that * * * can be competitively sold." (Tr. 1452). Yet the analysis supporting what is and what is not competitive capacity is not presented. (Tr. 1652).

102. Moreover, Mr. Schwartz's choices favor the supposed "need" for the Urenco facility. For example, he does not include the Portsmouth, Ohio gaseous diffusion plant, which is currently maintained in a cold ready status, as available, because he said it would be "uneconomical" to start and operate the plant. (Tr. 1452). Similarly, Mr. Schwartz counts the planned Georges Besse centrifuge plant into production between 2007 and 2013 but insists on "closing" the existing Georges Besse gaseous diffusion plant at the end of the same period. (Tr. 1453; 1653).

103. Mr. Schwartz's analysis was initially referred to by Urenco personnel as a "no need analysis." (NIRS/PC Ex. 81; Tr. 1500). Mr. Schwartz subsequently revised his analysis to enhance demand for enrichment services. (NIRS/PC Ex. 83, 84). He increased his estimate of installed capacity and reduced the tails assay attributed to Eastern Europe and the former Soviet Union. (Tr. 1500-02, 1504). In addition, he discounted the availability of certain prospective sources of supply, such as increases in capacity of Russian enrichment plants and highly enriched uranium held by the United States defense establishment and possible increases in the capacity of the USEC centrifuge plant. (Tr. 1505-07).

104. In his deposition Mr. Schwartz testified that, for purchasers of enrichment services, "economics are always a consideration." He added: "It can be reduced to price." (NIRS/PC Ex. 80, at 61). He stated that in 2002 "at that time there was certainly—and still is—a competitive market. And the suppliers do compete for business. And, you know, one of the issues or factors that goes into that is always the cost factor." (NIRS/PC Ex. 80, at 107-08).

105. Mr. Schwartz acknowledged that "obviously there's a cost basis" (Tr. 1528) for shutting down the gaseous diffusion plants, but he did not use such cost data in projecting closure of the gaseous diffusion plants. (Tr. 1527). He prepared Table 1.1-5 without making an economic analysis of costs of production or maintenance. (Tr. 1527).

106. Mr. Schwartz acknowledged that uranium prices have increased by about 70% since late 2003. (Tr. 1518). In this market, he said, customers prefer to use more enrichment in producing fabricated fuel. (id.). He said that enrichment requirements will therefore increase, and with increased demand prices will go

up. (Tr. 1518-19). When asked whether some of the gaseous diffusion capacity may be kept on line with rising prices, he disagreed, but did not explain his conclusion. (Tr. 1519-20).

107. Notably, in the Claiborne case, Mr. Schwartz had estimated which suppliers would participate in the market at different price levels, to determine whether the proposed facility could compete from an economic perspective. (Tr. 1522). But in the case of the NEF, Mr. Krich explained, the study of need for the facility "was separate from the business case effort. So, there was a separate business case that was developed." (Tr. 1524). The Board rejects Mr. Schwartz's attempt to measure supply and demand without reference to price.

108. Mr. Nevin, witness for NRC Staff, reviewed the supply-demand forecast prepared by LES and agreed with it. (Tr. 1565-66). He agreed with Mr. Schwartz's approach in dealing with prospective increases in Russian enrichment capacity. (Tr. 1566-67). He agreed with Mr. Schwartz's approach in omitting the 490 metric tons of U.S. highly enriched uranium from market analyses. (Tr. 1567-68). Mr. Nevin stated that there is nothing in the analysis that Mr. Schwartz prepared for the ER that he has any difference about. (Tr. 1568).

109. Mr. Nevin took the view that price might have a short term effect on a particular facility, but in evaluating the need for a facility over 2010 to 2020, he did not think that price is a factor. (Tr. 1568-69). He did no analysis or price or cost. (Tr. 1570). He has not considered the effect of recent increases in the price of uranium. (Tr. 1569). He did no analysis of the cost of operating gaseous diffusion plants or how much it costs to replace one with a centrifuge plant. (Tr. 1570). He did no analysis of costs, prices, or the competitive outcome of the

entry of the NEF and the USEC centrifuge plant into the enrichment market. (Tr. 1570). The Board rejects Mr. Nevin's analysis as inadequately based.

110. Mr. Nevin had no part in preparing the DEIS and did not work with anyone on NRC Staff who had prepared the DEIS. (Tr. 1572). He did review the ER and the DEIS and materials cited in both. (id.). He did not consult with anyone in the NRC Staff who was involved in preparation of the part of the DEIS that concerns need. (Tr. 1572-73).

111. LES is not willing to disclose the price at which it has contracted to sell enrichment services. (Schnoebelen, Tr. 1411).

(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.

112. NIRS/PC offered evidence that a principal motivation to establish an enrichment plant in the United States would be the prospect of avoiding liability for violations of anti-dumping laws. (Sheehan direct testimony, at 29-30 (Jan. 7, 2005)). Such evidence was excluded by the Board. (Memorandum and Order at 12-13 (Jan. 21, 2005).

(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.

113. Dr. Sheehan, witness for NIRS/PC, pointed out that, assuming the USEC centrifuge plant is built, it will constitute a United States enrichment plant using centrifuge technology. (Tr. 1649). In addition, from the standpoint of energy security, the NEF plant is not necessary, since USEC's Paducah plant is now in operation, and the USEC centrifuge plant is in the works. (id.). Moreover, both USEC plants will be operated by a genuine United States "domestic" producer.

Urenco is hardly a United States domestic producer; but instead an aggressive foreign conglomerate owned by foreign governments and utilities. (id. ).

114. Dr. Sheehan explained that U.S. supply is composed of the following elements: The Paducah plant has been producing at between 5.0 to 6.5 mSWU per year. (NIRS/PC Ex. 68 at 3; LES Ex. 30, Table 1.1-5). Russian HEU imports are at or below 5.5 mSWU. (NIRS/PC Ex. 68 at 4). Foreign imports, primarily from Western Europe, have been in the range of 3.0 mSWU. (NIRS/PC Ex. 68 at 3). USEC sells about 3.0 mSWU of its capacity to customers outside the United States, primarily in Asia. (NIRS/PC Ex. 68 at 6). Thus, of the total of about 11.6 mSWU demand, about 8.6 mSWU equivalent is supplied by USEC; this is roughly 74 percent of the total United States demand. (Tr. 1587-88).

115. From a review of the list of global market participants (LES Ex. 30, Table 1.1-5), it is evident that the world market for uranium enrichment is dominated by several large producers. The main producers are: Urenco, Eurodif, Russia, and USEC.

116. European producers are rapidly expanding their capacity: Urenco and Areva are expanding enrichment capacity sharply, along with the manufacturing capacity to produce centrifuges. For the last several years Urenco has been sharply increasing both the capacity of its three European enrichment plants and its market share. Enrichment capacity has increased from 4.8 mSWUs in 2000 to 6.5 m in 2003, an increase of 35 percent. Market share has increased from 13 percent in 2000 to 18 percent in 2003, an increase of 38 percent in three years. Moreover, in 2003 the Urenco/Areva Enrichment Technology Company (ETC) reported, “commissioning of new capacity increased by 55% in 2003. The

manufacturing rate for production of centrifuges increased by 25% in 2003." (NIRS/PC Ex. 69 at 17). Finally, Urenco reported that it had invested over $310 million in capacity expansion in 2003 alone and intended that its European enrichment capacity will have expanded to 7.5 mSWU by the end of 2005. This will mean an increase of 56% in enrichment capacity between 2001 and 2005. This does not count the LES proposal. (Sheehan, Tr. 1647-48). Note as well that the Russians are major producers, and Mr. Schwartz assumes that sales of Russian SWU to Europe and the U.S. will probably increase by about 30% over the next five years. (Tr. 1455-56, 1654).

117. As Dr. Sheehan pointed out, the contracts that LES has entered into include transactions with entities that are participants on the LES venture itself, i.e., they may be motivated by an incentive to establish the partnership in business. (Tr. 1650). Other purchases may have made such agreements based upon the expectation that USEC will not long survive and that today's prices are the most favorable prices; such conduct would not reflect a public benefit. (Tr. 1650, 1680-81).

118. The contacts entered into by LES for supply by the NEF could be supplied from another source, such as Urenco production in Europe, should Urenco so elect. Thus, with the NEF, Urenco would gain virtually unrestricted access to United States customers. (Schnoebelen, Tr. 1409-10).

119. With the expected demise of gaseous diffusion production and its prospective replacement with centrifuge plants, the market for enrichment is in an unstable condition. (Sheehan; Tr. 1676, 1680). LES has stated that U.S. utility purchasers of enrichment have several concerns and

> "view themselves as being largely dependent on a single enricher, USEC, whose only operating enrichment plant is the Paducah GDP, which has very high operating costs that impact the financial situation of USEC itself. These purchasers are concerned that the primary source of enrichment services that USEC delivers for use in their nuclear power plants is obtained from Russia and could be vulnerable to either internal or international political unrest in the future. . . . Also, there is concern that neither the performance nor economics of the updated version of the DOE centrifuge technology that USEC is planning to use have been successfully demonstrated. This is not to say that the technology would not be successful, but there is still much to be done, while the schedule announced by USEC is very aggressive and the economics remain unproven." (LES Ex. 30, at 1.1-18).

Therefore, the situation is unstable both because there is a transition from gaseous diffusion technology to centrifuge technology, and because the transition is expensive and risky, creating the possibility that one or more competitors may not survive. As Dr. Sheehan testified, customers may foresee the prospect that USEC may not survive this period of instability. (Tr. 1680-81).

120. The optimal scenario, according to Mr. Schwartz, would be construction of both the NEF plant and the USEC centrifuge plant. (Tr. 1511). Mr. Schwartz explained that "optimal" in his terms meant that it addressed national security needs as well as giving plant operators an alternative source of supply. (Tr. 1512). He also stated that it was his best estimate of what is likely to happen. (Tr. 1512). The Board finds that this opinion has no basis in any economic analysis.

121. In stating that the optimal case would be the entry of both the NEF and the USEC centrifuge plant into the market for enrichment, Mr. Schwartz assumed that each plant could participate in the market. (Tr. 1530). He made no assumptions about the prices that would prevail in the market. (Tr. 1530). He testified on deposition that he "took their word for it, LES, that they could offer product at a

competitive price." (NIRS/PC Ex. 80 at 54).

122. A key assumption underlying the testimony of Mr. Schwartz and Mr. Krich is that USEC would constitute a viable producer in a competitive market if the NEF were built. (Tr. 1651-54). These witnesses, and Mr. Nevin, refuse to consider or acknowledge the impact of the NEF on the USEC centrifuge plant. Mr. Schwartz tells us that, without the construction of the USEC plant, there will probably be a shortage of enrichment capacity. (Tr. 1459). Mr. Schwartz assumes that the construction of the NEF is not inconsistent with the construction of the new USEC plant. He states no basis for such an assumption. (Tr. 1654).

123. Analysis of cost and price, including the relative cost of capital, are important factors in the determination of whether the placement of the NEF in the United States will substantially reduce the likelihood that the USEC American Centrifuge plant will be constructed and be economically viable. If it will not, then the applicant's assertion that the construction of the NEF will result in a second U.S. producer and a competitive U.S. market is not supported, and the identified need will not be met by the construction of the NEF. (Tr. 1654).

124. The onset of oligopoly, or foreign monopoly, conditions is not in the public interest nor should it be considered a benefit. (Sheehan, Tr. 1667).

125. Based on these circumstances, the Board acknowledges that there is a need for enrichment services to supply U.S. utilities. However, the Board cannot on this showing agree that there is a demonstrated need for the NEF, as proposed by LES. Given that LES (a subsidiary of Urenco, the dominant western European enricher and producer of centrifuges) and USEC would be constructing new centrifuge facilities almost simultaneously, and that such facilities would clearly

compete with one another, the Board cannot anticipate that both such facilities would survive nor that the outcome would be beneficial for U.S. utilities and their customers. The most likely outcome would be that the NEF would compete effectively and that USEC, and the USEC centrifuge plant, would not survive in the market. The result would be a reduction in competition and diversity of supply, enhancing the control of Urenco over the price paid by utilities. The Board cannot agree that there is a need for such an outcome.

**e. Conclusions of Law**

1. In issuing a license to construct and operate a uranium enrichment facility the Commission is required to prepare an Environmental Impact Statement in conformity with the National Environmental Policy Act (NEPA), 42 USC 4332, and regulations of the Council on Environmental Quality, 40 CFR Part 1500, and of the Commission itself, 10 CFR Part 51. The policy goals of NEPA are realized through a set of 'action-forcing' procedures that require agencies take a 'hard look' at environmental consequences. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989), quoting *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n. 21 (1976); *Baltimore Gas & Electric Co. v. Natural Resources Defense Council*, 462 U.S. 87, 97 (1983); *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), 58 NRC 454, 463, LBP-03-30 (Dec. 31, 2003); *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), 47 NRC 77, CLI-98-3 (April 3, 1998). NEPA thus "ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

2. The “hard look” standard requires that an agency address substantive questions raised by intervenors and other agencies and reach a judgment more considered than a conclusory decision to proceed. *Hughes River Watershed Conservancy v. Glickman,* 81 F.3d 437, 445-46 (4th Cir. 1996).
3. NEPA compels an analysis of “every reasonable alternative” to the proposed licensing action. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), 58 NRC 454, 463, LBP-03-30 (Dec. 31, 2003). It is the Board’s charge to determine whether appropriate information has been gathered, considered, and disclosed, and a legitimate choice made based on that information. (id.).
4. NEPA is generally regarded as calling for some sort of a weighing of the environmental costs against the economic, technical, or other public benefits of a proposal. 10 CFR 51.71(d); *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), 47 NRC 77, 88, CLI-98-3 (April 3, 1998).
5. Misleading economic assumptions can defeat the first function of an EIS by impairing the agency’s consideration of the adverse environmental effects of a proposed project. *Hughes River Watershed Conservancy v. Glickman,* 81 F.3d 437, 446 (4th Cir. 1996).
6. In the face of unavailable information concerning a reasonably foreseeable significant environmental consequence, an agency is required to prepare a summary of existing credible scientific evidence which is relevant to evaluating the adverse impacts and prepare an evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. 40 CFR 1502.22(b); *Robertson v. Methow Valley Citizens Council,*

490 U.S. 332, 354 (1989).

7. The record in this proceeding shall remain open pending the issuance of a Final Environmental Impact Statement, as required by 42 USC 2243(a)(2), which requires that an environmental impact statement shall be prepared before the hearing on the issuance of a license for the construction and operation of a uranium enrichment facility is completed.

8. Contention EC-1: In this case, there has been a failure to gather, consider, and disclose appropriate information concerning the potential impact of the NEF upon ground water resources and to make a legitimate decision based upon such information. Investigation and disclosure have been inadequate in the following respects:

    a. Failure to calculate the probability of leakage of lined basins and the extent of such leakage.

    b. Failure to support estimates of the retardation of uranium contaminants by liners of the TEEB or the UBCSPSRB.

    c. Failure to disclose limitations upon monitoring systems proposed by LES as regard location of monitoring and specific constituents monitored.

    d. Failure to investigate and disclose the likelihood that water escaping from the NEF will penetrate into the alluvium at least to the depth of the top of the Chinle Formation.

    e. Failure to calculate the size and speed of a ground water plume in the alluvium, using values appropriate for the gravel beds that are present under the NEF site.

    f. Failure to investigate and disclose the likelihood that water released from

the NEF may penetrate through the alluvium and into the Chinle Formation and flow through fractures therein to aquifers present in the Dockum Group.

9. Contention EC-2: There has also been a failure to gather, consider, and disclose appropriate information concerning the potential impact of the NEF upon available ground water supplies and to make a legitimate decision based upon such information. Investigation and disclosure have been inadequate in the following respects:
    a. Failure to disclose the geographic area within which usage by the NEF can be expected to have an impact on the Ogallala Aquifer.
    b. Failure to state the ratio of the peak usage of the NEF to the average usage of the Hobbs and Eunice water systems.
    c. Failure to estimate, with calculations for high, medium, and low usage, given the uncertainties, the impact of pumping upon the Lea County Underground Water Basin over the operating life of the NEF (i.e., through 2036), showing the remaining saturated thickness at locations from which water would be extracted to serve the Hobbs and Eunice municipal systems.
    d. Failure to estimate the total demand on municipal systems and the impact of the usage of the NEF throughout the operating life of the NEF, i.e., through 2036, with high, medium and low cases to account for uncertainties.
10. Contention EC-4: Under 10 CFR 51.60(b)(1)(vii) an applicant for a license to construct and operate a uranium enrichment facility is required to prepare and

submit an ER in accordance with 10 CFR 51.45. Under 10 CFR 51.45 the ER is required to discuss the "impact of the proposed action on the environment" and "[a]lternatives to the proposed action." (10 CFR 51.45(b) (1). Moreover, "[t]he environmental report should contain sufficient data to aid the Commission in its development of an independent analysis." (10 CFR 51.45(c)). To refer, as LES has done, to previous EISs for the Claiborne, Portsmouth, and Paducah sites, without supplying the underlying data or an explanation of their analyses, fails to satisfy NEPA requirements as contained in 10 CFR Part 51.

11. Although the applicable rules require the ER to contain a description of the proposed action; a statement of its purposes; a description of the environment affected; a discussion of the impact of the proposed action on the environment; a discussion of any adverse environmental effects which cannot be avoided; discussion of alternatives to the proposed action; analysis that considers and balances the environmental effects of the proposed action, the environmental effects of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse environmental effects; and consideration of the economic, technical, and other benefits and costs of the proposed action and of alternatives—no discussion of such matters with regard to deconversion of depleted uranium is contained in the ER. (10 CFR 51.45).
12. Commission regulations require that "[t]he Commission will independently evaluate and be responsible for the reliability of any information which it uses." (10 CFT 51.41). In addition, the rules specifically state that "[t]he NRC Staff will independently evaluate and be responsible for the reliability of all information used in the draft environmental impact statement." (10 CFR 51.70(b)). The

testimony establishes that NRC Staff has not evaluated the information contained in the EISs upon which NRC Staff relies, and does not take responsibility for such information. In such situation the Board can lend no credence to NRC Staff's testimony on the environmental impacts of deconversion.

13. Rules of the Council on Environmental Quality ("CEQ") also require that federal agencies take responsibility for the analyses upon which they rely:

> "Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement." 40 CFR 1502.24

The NRC Staff has not undertaken to insure the professional integrity, including scientific integrity, of the discussions and analyses in the DEIS, to the extent the DEIS makes reference to FEISs previously produced by DOE. Therefore, the Board can lend no credence to NRC Staff's testimony on the environmental impacts of deconversion.

14. Under applicable CEQ rules, 40 CFR 1506.3, a federal agency may adopt an EIS prepared by another agency, but unless the action covered by the original EIS is the same as the proposed action, the adopting agency must recirculate the original EIS as a draft—an action that NRC Staff has not undertaken with regard to the DOE FEISs upon which it relies. Therefore, NRC Staff cannot claim to have adopted the DOE FEISs.

15. Under applicable CEQ rules, a federal agency may use data submitted by an applicant but "shall independently evaluate the information submitted and shall be responsible for its accuracy. . . .It is the intent of this paragraph that acceptable work not be redone, but that it be verified by the agency." 40 CFR 1506.5(a).

Moreover, CEQ rules require that any environmental impact statement "shall be prepared directly by or by a contractor selected by the lead agency . . . . If the document is prepared by contract, the responsible Federal official shall furnish guidance and participate in the preparation and shall independently evaluate the statement prior to its approval and take responsibility for its scope and contents." 40 CFR 1506.5(c). It is apparent from the testimony that NRC Staff have not independently evaluated the information contained in the DOE FEISs upon which they rely and are not taking responsibility for its accuracy. NRC Staff have done nothing to verify the accuracy of such information. Consequently, the Board can give no credence to NRC Staff's testimony on the environmental impacts of deconversion.

16. There has also been a failure to gather, consider, and disclose appropriate information concerning the potential impact of deconversion of depleted $UF_6$ from the NEF and to make a legitimate decision based upon such information. Investigation and disclosure have been inadequate in the following respects:

    a. Failure to consider the potential impact of deconversion to the form $UO_2$, which is a reasonable alternative that has different environmental impacts from deconversion to $U_3O_8$, the product assumed by LES and NRC Staff.

    b. Failure to consider the potential impact of deconversion using a process that generates anhydrous hydrofluoric acid ("AHF"), which is a reasonable alternative that has different environmental impacts from a deconversion process that generates aqueous hydrofluoric acid or calcium fluoride ($CaF_2$), the process assumed by LES and NRC Staff.

c. Reliance by LES upon analyses contained in the Claiborne FEIS is unjustified, because it contains only analyses of routine operations of a facility that generates $U_3O_8$ and $CaF_2$. Accident impacts and generation of other products are not considered.

d. The DOE PEIS does not satisfy NEPA requirements for the NEF, because neither the ER nor the DEIS refers to substantive analyses contained in the DOE PEIS. Moreover, no witness appeared at the hearing to explain or defend the analyses contained in the DOE PEIS. The analyses in the DOE PEIS are in numerous respects obsolete and inadequate.

e. Reliance by LES and NRC Staff upon analyses contained in the Portsmouth and Paducah EISs is unjustified, because those documents only contain analyses of a facility that generates $U_3O_8$ and $CaF_2$.

f. NRC Staff have not taken a hard look at the environmental impacts of deconversion of depleted $UF_6$. NRC Staff have simply compared the projected throughput of the Portsmouth and Paducah plants with the throughput of the proposed NEF and have assumed that the impacts of deconversion for the NEF would be bounded by the impacts of the Portsmouth and Paducah plants. Such reasoning does not satisfy NEPA.

g. The DOE EISs do not consider the air emissions that would issue from a plant that generates HF in large amounts.

h. The DOE EISs fail to consider the environmental impacts of specific transportation routes applicable to a deconversion plant to serve the proposed NEF and all of the process chemicals to be transported in

connection with such a facility.

i. The DOE EISs fail to consider the implication of the present lack of standards for free release of large quantities of contaminated HF and $CaF_2$.

j. The DOE EISs fail to consider the impacts of disposal of large quantities of contaminated $CaF_2$.

17. Contention EC-7: The applicant has failed to establish that there is a "need" for the NEF based on the criteria of need set forth in the ER. These criteria included the "need" for a second domestic producer in order to increase the both the reliability of domestic supply, and also to provide a competitive domestic supply market for enrichment. The applicant also claimed that the construction of the NEF would provide a needed enhancement to both United States energy security and national security by diminishing reliance on foreign dominated supply. The evidence presented to support the claim that the creation of the NEF will produce these results has been inadequate in the following respects:

a. Failure to consider the likely impact of the construction of the NEF by Urenco on the viability of the existing and proposed enrichment facilities operated or planned by USEC.

b. Failure to consider the likely impact of the construction of the NEF on the continued viability of the USEC in the acquisition and conversion of Russian HEU.

c. Failure to consider the likely impact of the construction of the NEF on the resulting domestic supply market if USEC is eliminated as a domestic enrichment producer and the ramifications for U.S. energy and

national security in this event.

d. Failure to consider the likely impact on U.S. energy and national security if the only resulting "domestic" producer is owned and dominated by a cartel of European producers such that competition no longer exists between the Urenco's U.S. plant and the dominant foreign producers, i.e., the Urenco/Areva plants in Europe.

e. Failure to consider the asserted need for the NEF at different possible price levels for enrichment services.

f. Failure to consider the asserted need for the NEF under conditions such that the existing gaseous diffusion plants continue in operation for a substantial time.

g. Failure to consider the likelihood that the NEF would compete in such a way that the planned USEC centrifuge facility would not be built and USEC might cease operations, leaving U.S. utilities with an undesirably limited range of choices for enrichment services.

h. Failure to consider that the contracts entered into by LES to date are in part made with entities that are participants in the LES venture itself.

i. Failure to consider that the contracts entered into by LES to date can be fulfilled by supplying enrichment services from Urenco's European plants, thereby equipping Urenco with virtually unrestricted access to U.S. customers.

Respectfully submitted,

Lindsay A. Lovejoy, Jr.

618 Paseo de Peralta, Unit B
Santa Fe, NM 87501
(505) 983-1800
(505) 983-0036 (facsimile)
E-mail: lindsay@lindsaylovejoy.com

Counsel for Petitioners
Nuclear Information and Resource Service
1424 16th St., N.W. Suite 404
Washington, D.C. 20036
(202) 328-0002

and

Public Citizen
1600 20th St., N.W.
Washington, D.C. 20009
(202) 588-1000

March 14, 2005

## CERTIFICATE OF SERVICE

Pursuant to 10 CFR § 2.305 the undersigned attorney of record certifies that on March 14, 2005, the foregoing Proposed Findings of Fact and Conclusions of Law based upon Evidentiary Hearing held on February 7 through 10, 2005 Submitted on behalf of Intervenors Nuclear Information and Resource Service and Public Citizen was served by electronic mail and by first class mail upon the following:

G. Paul Bollwerk, III
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
e-mail: gpb@nrc.gov

Dr. Paul B. Abramson
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
e-mail: pba@nrc.gov

Dr. Charles N. Kelber
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
e-mail: cnk@nrc.gov

James Curtiss, Esq.
David A. Repka, Esq.
Winston & Strawn
1400 L St.
Washington, D.C. 20005-3502
e-mail: jcurtiss@winston.com
drepka@winston.com
moneill@winston.com

John W. Lawrence, Esq.
National Enrichment Facility
100 Sun Avenue, N.E.
Albuquerque, NM 87109
e-mail: jlawrence@nefnm.com

Office of the General Counsel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attention: Associate General Counsel for Hearings, Enforcement, and Administration
e-mail: OGCMailCenter@nrc.gov
lbc@nrc.gov
abc1@nrc.gov
jth@nrc.gov
dmr1@nrc.gov
dac3@nrc.gov

Office of Commission Appellate Adjudication
Mail Stop O-16C1
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Tannis L. Fox, Esq., Deputy General Counsel
New Mexico Environment Department
1190 St. Francis Drive
Santa Fe, NM 87502-1031
e-mail: tannis_fox@nmenv.state.nm.us

Glenn R. Smith, Esq.
Christopher D. Coppin, Esq.
Stephen R. Farris, Esq.
David M. Pato, Esq.
Assistant Attorneys General
P.O. Drawer 1508
Santa Fe, NM 87504-1508
e-mail: ccoppin@ago.state.nm.us
dpato@ago.state.nm.us
gsmith@ago.state.nm.us
sfarris@ago.state.nm.us

Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attention: Rulemakings and Adjudications Staff (original and two copies)
e-mail: hearingdocket@nrc.gov

---

Lindsay A. Lovejoy, Jr.
618 Paseo de Peralta, Unit B
Santa Fe, NM 87501
(505) 983-1800
(505) 983-0036 (facsimile)
e-mail: lindsay@lindsaylovejoy.com