January 28, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF REBUTTAL TESTIMONY OF ALAN TOBLIN CONCERNING NUCLEAR INFORMATION AND RESOURCE SERVICE AND PUBLIC CITIZEN ENVIRONMENTAL CONTENTION 1 ("NIRS/PC EC-1") (IMPACTS UPON GROUND AND SURFACE WATER)

Q1. Please state your name, occupation, and by whom you are employed.

A1. My name is Alan Toblin. I am employed as a consultant with Advanced Technologies and Laboratories International, Inc. I am providing this testimony under a technical assistance contract with the Nuclear Regulatory Commission ("NRC").

Q2. Have you previously submitted testimony in this proceeding?

A2. Yes. I provided testimony in this proceeding on January 7, 2005, on behalf of the NRC. In that testimony, I described my current responsibilities. I also attached a copy of my professional qualifications.

Q3. What was the purpose of your previous testimony?

A3. I provided my views concerning Nuclear Information and Resource Service and Public Citizen ("NIRS/PC") Environmental Contention 1 ("EC-1").

Q4. What is the purpose of this testimony?

A4. To provide my views on NIRS/PC's pre-filed testimony of Mr. George Rice regarding contention NIRS/PC EC-1.

Q5. What have you done to prepare this testimony?

A5. I have reviewed all of the pre-filed testimony, including supporting documentation and related NEPA analysis.

Q6. George Rice states that groundwater is known to exist in the alluvium at three places near the proposed NEF site: (1) about one-half mile north at the Wallach sand and gravel quarry, (2) about one-half mile northeast at Baker Spring, and (3) about two-thirds mile east at the Waste Control Specialists ("WCS") site. Does this indicate that groundwater exists beneath the proposed NEF site?

A6. No. The existence of alluvial groundwater at the three locations noted is the result of conditions specific to those locations which are not found at the proposed NEF. The specific site conditions which explain the existence of groundwater at those locations are as follows. Groundwater is present at the base of an excavation wall at the Wallach sand and gravel quarry (a photo of which is shown in the *National Enrichment Facility Environmental Report*, Revision 2, Louisiana Energy Services, July 2004 ("LES ER") at Figure 3.4-4, attached as Staff Exhibit 36). This groundwater is due to a seep, an area in which groundwater slowly discharges to the surface, in this case a shallow surface depression. The groundwater is a result of rainfall rapidly infiltrating through surface and near-surface fractured caliche caprock, a cemented carbonate layer capping the alluvial soil at the Wallach site. Water that penetrates the caliche caprock through cracks becomes trapped and remains underneath the caprock because it will not evapotranspire. In contrast, when water enters silty sand soils, evapotranspiration prevents it from remaining trapped in the soil. Rainfall infiltrating through fractured caliche caprock does not occur at the proposed NEF site because the caprock, present at the Wallach site, is not present at the proposed NEF site. (LES ER, at p. 3.4-2, Staff Exhibit 36). Furthermore, the Wallach site surface soil is sand and gravel; the surface soil at the proposed NEF site is a finer

grained silty sand, which tends to inhibit infiltration more-so than the soil at the Wallach site.

Groundwater is also intermittently present at a depression known as Baker Spring. Baker Spring, which is man-made, is a result of the excavation of gravel and caprock above the redbed clay. Due to this excavation, Baker Spring is lower than the surrounding area. This lower surrounding area and the low permeability of the underlying clay produce ponding on the excavation during rainfall events. Shading caused by the 20 to 30 foot high excavation walls, and by trees along these walls, retard the natural evaporation rates. During periods of ponding, standing pond water infiltrates into the sands at the base of the excavation wall, and is retained as bank storage. (LES ER Figure 3.4-5 contains a photo of Baker Spring, Staff Exhibit 36). As the surface water declines to levels below the water stored in the base of the excavation, this bank storage is discharged back to the excavation floor. These conditions do not exist at the proposed NEF site.

At the WCS site, groundwater is found, to a limited extent, in discontinuous perched water bodies on the surface of the Chinle Formation. These areas of perched water are likely a result of playas (buffalo wallows). Playas are surface depressions that collect runoff, which can then infiltrate into the alluvium due to this ponding of water. There is no evidence that playas are present at the proposed NEF site.

Q7. Mr. Rice has drawn a schematic (Figure 1) to show a cross section of the geology in the vicinity of the proposed NEF site. In your opinion, does that schematic reflect conditions at the proposed NEF site?

A7. No, I believe that Figure 1 is misleading. Because he notes vertical dimensions but not horizontal ones, Mr. Rice's depiction implies that playas (buffalo wallows) and groundwater from seepage beneath the playas are located on the proposed NEF site. No playas, nor any saturated alluvial groundwater, have been identified at the proposed NEF site. Furthermore, although possible locations for fractures which could result in fast vertical flow

through the Chinle Formation are indicated in Figure 1, there is no evidence to support the presence of such fractures at the proposed NEF site. In fact, the existing evidence supports the conclusion that no such fractures are present at the proposed NEF site. More than 40 permeability measurements taken of the Chinle Formation in the site vicinity and a detailed evaluation of the fracture characteristics in the Chinle weigh against the theory that fractures are present beneath the proposed NEF site which could act as fast flow paths. (*Section VI Geology Report for Waste Control Specialists LLC, Andrews, Texas,* Cook-Joyce, Inc. & Intera, Inc., August 2004 ("Cook-Joyce Geology Report"), Staff Exhibit 11, at p. 4-11; NRC Staff Testimony of Alan Toblin Testimony, January 7, 2004 ("Toblin Testimony"), at Q&A 45-52).

Q8. Mr. Rice states that groundwater in the Dockum Group (including the Chinle Formation and the Santa Rosa Aquifer) has been used in the vicinity of the site. Can one reasonably infer from this that groundwater in the Chinle beneath the proposed NEF site may be used sometime in the future?

A8. No. Discussing the Chinle and Santa Rosa formations together when discussing water use is misleading because they are two distinct geologic formations. The Chinle forms a very thick impermeable barrier between the soils at the top of the proposed site and the deeper Santa Rosa Formation, where an aquifer is located. Water from the Santa Rosa Aquifer is used in the vicinity of the site; however, as I discuss in my direct testimony, groundwater is not likely to travel through the Chinle and reach the Santa Rosa Aquifer. According to page 6-12 of the *Lea County Regional Water Plan* (LES Exhibit 26), referenced to support Mr. Rice's testimony, "[t]he development that has occurred [in the Dockum Group] is limited specifically to the Santa Rosa sandstone unit."

Q9. What is your response to Mr. Rice's testimony regarding the town of Oil Center, located about 12 miles northwest of the proposed NEF site, which obtains water from the Dockum Group?

A9. The town of Oil Center gets its water from a specific part of the Dockum Group that contains an aquifer; the Santa Rosa Formation. This is the only local community that currently pumps even part of its water from the Santa Rosa. (*Lea County Regional Water Plan,* December 2000, at p. 6-12, LES Exhibit 26).

Q10. Mr. Rice states that the site has not been adequately characterized in order to predict how the proposed facility will affect groundwater. He cites a number of reasons for this conclusion, the first of which is that the hydraulic properties of the shallow materials underlying the site have not been measured. Did you in fact determine appropriate values for the hydraulic properties of those materials?

A10. Yes. In doing so, I relied on well-established literature values (e.g., *Groundwater* by Freeze and Cherry) of hydraulic properties (hydraulic conductivity, porosity) to describe the range of conditions encountered at the site. These literature values are based on numerous measurements of materials similar to those at the proposed site and therefore constitute a reliable indicator of these properties.

Q11. In addition, Mr. Rice claims that the site has not been properly characterized because the presence of moisture found in the shallow alluvium underlying the site has not been explained. He then concludes that the moisture is probably an indication of recent recharge. Do you agree?

A11. No. In my professional opinion, the moisture that was found was not due to recent recharge. Of 14 borings and multiple layers logged, only one shallow alluvium layer at one boring indicated "slight moisture" from a depth of 6 to 14 feet below ground. (*Hydrogeologic Investigation, Section 32; Township 21 Range 38, Eunice, New Mexico*,

Cook-Joyce, Inc., November 2003, "Cook-Joyce Hydrogeologic Investigation," Staff Exhibit 7, at Appendix A). In the alluvium both above and below this layer, the soils are noted as very dry. The lack of any indication that this moisture is seeping further downward is consistent with the conclusion that precipitation does not seep deeply into the ground beneath the proposed NEF site. Were there recent recharge, one would expect to see moisture in the borings that were taken throughout the proposed NEF site. (Toblin Testimony, at Q&A 34-36).

Q12. Mr. Rice continues to state that NEF site characterization was not sufficient because of the failure to investigate the possibility that fractures may exist at the proposed site since fractures may act as preferential pathways. Has there been any such investigation near the proposed NEF site?

A12. Yes. The possibility that fractures may act as preferential pathways has been investigated at the WCS site, located approximately one mile to the east of the proposed NEF site. The geological investigation of faults and fractures in the Chinle Formation beneath the WCS site did not detect any evidence of fast flow paths. (Cook-Joyce Geology Report, at pp. 4-9 to 4-11).

Q13. Mr. Rice notes that moist clay has been found in most of the borings at the WCS site. Does this indicate that the same phenomenon occurs at the proposed NEF site?

A13. No. I would expect to find moist clay at the WCS site. There are known lenses (discontinuous limited extent perched water) sitting on the Chinle Formation at the WCS site. These lenses are known and of limited extent, as witnessed by those borings not indicating clay moisture. In contrast, there is no evidence that such lenses exist at the proposed NEF site as indicated by boring logs taken throughout the site. (Cook-Joyce Hydrogeologic Investigation, Staff Exhibit 7).

Q14. Mr. Rice states that the question of whether recent recharge has occurred could be answered by using radioisotopes to date the moisture in the vadose zone. Do you believe such an investigation is called for?

A14. No. To begin, the vadose zone (the unsaturated zone) is the subsurface zone in which the pore spaces are partially filled with water and partially filled with air. At the proposed NEF site, this zone would include the alluvium and the Chinle. Presumably, Mr. Rice is concluding that a radioisotope investigation is necessary because moist clay was found at the bottom of one of the site borings. However, as I have discussed, I do not believe that the presence of moisture in this one boring casts any doubt on my conclusion that no recent recharge is present. Furthermore, as Mr. Rice concedes, radioisotope testing would not definitively determine the age of the water, nor would such tests indicate the water's flow path from the surface (i.e., its surface origin).

Q15. In discussing the measurements of permeability of the Chinle Formation, Mr. Rice concludes that laboratory measurements often underestimate bulk permeability. In support of this conclusion he refers to data shown in his Figure 2, which is based on a 1981 publication by Olson and Daniel. Do the data in Figure 2 apply to the laboratory measurements of the Chinle?

A15. No. Olson and Daniel's 1981 paper describes the relationship between laboratory and field measurements of fine-grained soils, as stated in the note to Figure 2. Field-measured conductivities are often greater than those measured in the laboratory for such material because the soil which is brought to the laboratory has been subject to compaction during drilling and handling. However, consolidated (rock like) formations, such as the Chinle, show different behavior, in that such material is subject to fracturing (caused by drilling and handling), rather than compaction. (Toblin Testimony, at A42; Schmelling, S. & Ross, R., *Contaminant Transport in Fractured Media: Models for Decision Makers*,

EPA/540/4-89-004, U.S. Environmental Protection Agency, April 1989, Staff Exhibit 9, at p. 3). Accordingly, permeabilities of material taken from the Chinle Formation and measured in the lab tend to be greater than those obtained in the field. I note that the Davis and DeWiest reference cited in footnote 54 of Mr. Rice's testimony talks of lab samples being disturbed but does not conclude whether such samples would result in greater or lesser measurements of permeability than would field measurements.

Q16. Mr. Rice states that stormwater runoff from the proposed NEF site (other than from the UBC storage pad) would be directed to an unlined basin which will be able to hold approximately 23,350 m^3 of runoff. Is this number correct?

A16. No. This number was a typographical error in the LES ER and was corrected in the DEIS at p. 2-10. The correct basin volume is 123,350 m^3 (100 acre-feet).

Q17. Included with Mr. Rice's testimony is a schematic cross-section depicting subsurface discharge from the Site Stormwater Detention Basin and septic field, designated as Figure 3. Does this figure accurately depict flow of water at the proposed NEF?

A17. No. Figure 3 indicates the presence of "fracture flow" under the proposed NEF site, which is not supported by site investigations. Instead, investigations of faults and fractures in the Chinle Formation at the WCS site and more than 40 permeability measurements indicate that there are no fast flow paths along fractures at the proposed NEF site. (A7, above).

Q18. With regard to leakage from the Site Stormwater Detention Basin, Mr. Rice states that the NRC did not perform an adequate estimate because it was assumed that all the water entering the basin would infiltrate underlying materials. Is it true that you assumed that all of the water entering the basin would infiltrate?

A18. Yes. I did not perform a calculation of the fraction of water that would discharge to the vadose zone from the basin because I made the most conservative assumption that all of the water entering the basin would infiltrate beneath it.

Q19. Mr. Rice notes that although you observed that transport of water which infiltrates the soil underlying the Stormwater Detention Basin and the septic leach field would be limited by the storage capacity of the soils and the upward flux to the root zone, you did not quantify either of those limiting factors. Is that correct?

A19. Yes. These factors were not quantified because I did not rely on them in performing the calculations. I conservatively assumed that all of the water which infiltrates from the basins would be transported downgradient. For each of these factors that was not quantified, additional conservatism was added to my calculation.

Q20. Mr. Rice notes that your evaluation of potential discharge areas is based on a review of the literature rather than field investigation. Is reliance on literature for this purpose appropriate?

A20. Yes. The use of literature is appropriate. Information was available to determine the downgradient direction (the slope of the Chine surface as determined from a local map of the same). (LES ER, at Figure 3.4-6, Staff Exhibit 36). A nearby downgradient surface feature (Monument Draw), in which alluvial groundwater could discharge, was also clearly referenced (LES ER, at p. 3.4-4 and Figure 3.4-2, Staff Exhibit 36).

Q21. Mr. Rice states that the DEIS does not explain why water will discharge at the locations given, and why potential discharge areas (e.g., Monument Draw) closer to the proposed NEF site were not considered. Can you explain this?

A21. Yes. I considered whether there were any groundwater discharges (e.g., springs) identified downgradient from the proposed NEF site (south-southwest as determined from the slope of the Chinle surface) and upgradient of any surface water body; none were found. I then identified the closest water body which would cut through the alluvium as the nearest discharge point. Following this method, I identified Monument Draw, approximately 3 miles south-southwest of the site, as the likely discharge location should any perched water be

transported there. This was incorrectly identified as “Custer Mountain or in the excavation 3.2 kilometers (2 miles) southeast of Monument Draw where the Chinle Formation is exposed” in the DEIS at p. 4-13. The statement beginning on line 43 of page 4-13 of the DEIS should be corrected to read, “Portions of the plume not evapotranspired and traveling downgradient could result in a minor seep at Monument Draw, approximately 3 miles south-southwest of the site.” Another correction to the DEIS should be made in line 34 of page 3-35: it should state “the town of Monument” instead of “Monument Draw.”

Q22. Does this conclude your rebuttal testimony?

A22. Yes.