

December 22, 2004

NEF#04-057

ATTN: Document Control Desk  
Director  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Louisiana Energy Services, L. P.  
National Enrichment Facility  
NRC Docket No. 70-3103

Subject: License Application and Integrated Safety Analysis Summary Update Related to  
Chemical Exposure Limits

- References:
1. Letter NEF#03-003 dated December 12, 2003, from E. J. Ferland (Louisiana Energy Services, L. P.) to Directors, Office of Nuclear Material Safety and Safeguards and the Division of Facilities and Security (NRC) regarding "Applications for a Material License Under 10 CFR 70, Domestic licensing of special nuclear material, 10 CFR 40, Domestic licensing of source material, and 10 CFR 30, Rules of general applicability to domestic licensing of byproduct material, and for a Facility Clearance Under 10 CFR 95, Facility security clearance and safeguarding of national security information and restricted data"
  2. Letter NEF#04-002 dated February 27, 2004, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision 1 to Applications for a Material License Under 10 CFR 70, "Domestic licensing of special nuclear material," 10 CFR 40, "Domestic licensing of source material," and 10 CFR 30, "Rules of general applicability to domestic licensing of byproduct material"
  3. Letter NEF#04-029 dated July 30, 2004, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision to Applications for a Material License Under 10 CFR 70, "Domestic licensing of special nuclear material," 10 CFR 40, "Domestic licensing of source material," and 10 CFR 30, "Rules of general applicability to domestic licensing of byproduct material"

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4. Letter NEF#04-037 dated September 30, 2004, from R. M. Krich (Louisiana Energy Services, L. P.) to Director, Office of Nuclear Material Safety and Safeguards (NRC) regarding "Revision to Applications for a Material License Under 10 CFR 70, "Domestic licensing of special nuclear material," 10 CFR 40, "Domestic licensing of source material," and 10 CFR 30, "Rules of general applicability to domestic licensing of byproduct material"

By letter dated December 12, 2003 (Reference 1), E. J. Ferland of Louisiana Energy Services (LES), L. P., submitted to the NRC applications for the licenses necessary to authorize construction and operation of a gas centrifuge uranium enrichment facility. Revision 1 to these applications was submitted to the NRC by letter dated February 27, 2004 (Reference 2). Subsequent revisions (i.e., revision 2 and revision 3) to these applications were submitted to the NRC by letters dated July 30, 2004 (Reference 3) and September 30, 2004 (Reference 4), respectively.

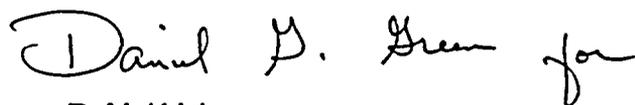
In a November 4, 2004, telephone call between LES and NRC representatives, a revised approach for chemical safety consequence determination was presented. During this telephone call, LES representatives agreed to document the revised approach in a submittal to the NRC. This revised approach is provided in the form of updated License Application and Integrated Safety Analysis (ISA) Summary pages. Some of these updated pages contain information that LES considers proprietary in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," paragraph (d)(1). Accordingly, we request that the updated pages that contain proprietary information be withheld from public disclosure.

Enclosure 1 provides the proprietary version of the updated License Application and ISA Summary pages. The proprietary information is located in Sections 3.7 and 3.8 of the ISA Summary. Enclosure 2 provides the non-proprietary version of the updated License Application and ISA Summary pages. In the proprietary version, i.e., Enclosure 1, the pages that contain proprietary information include the marking "Proprietary Information" consistent with 10 CFR 2.390 (d)(1). In the non-proprietary version, i.e., Enclosure 2, the pages containing proprietary information are withheld.

The updated pages will be formally incorporated into the License Application and ISA Summary, as applicable, in a future revision.

If you have any questions or need additional information, please contact me at 630-657-2813.

Respectfully,



R. M. Krich  
Vice President – Licensing, Safety, and Nuclear Engineering

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Enclosures:

1. Updated License Application and Integrated Safety Analysis Summary Pages Related to Chemical Exposure Limits (Proprietary Version)
2. Updated License Application and Integrated Safety Analysis Summary Pages Related to Chemical Exposure Limits (Non-Proprietary Version)

cc: T.C. Johnson, NRC Project Manager

**ENCLOSURE 2**

**Updated License Application and Integrated Safety Analysis Summary Pages  
Related to Chemical Exposure Limits  
(Non-Proprietary Version)**

**National Enrichment Facility  
Safety Analysis Report  
Updated Pages**

To quantify criteria of 10 CFR 70.61 (CFR, 2003b) for chemical exposure, standards for each applicable hazardous chemical must be applied to determine exposure that could: (a) endanger the life of a worker; (b) lead to irreversible or other serious long-lasting health effects to an individual; and (c) cause mild transient health effects to an individual. Per NUREG-1520 (NRC 2002), acceptable exposure standards include the Emergency Response Planning Guidelines (ERPG) established by the American Industrial Hygiene Association and the Acute Exposure Guideline Levels (AEGL) established by the National Advisory Committee for Acute Guideline Levels for Hazardous Substances. The definitions of various ERPG and AEGL levels are contained in Table 6.3-1, ERPG and AEGL Level Definitions.

The consequence severity limits of 10 CFR 70.61 (CFR, 2003b) have been summarized and presented in Table 6.3-2, Licensed Material Chemical Consequence Categories. The severity limits defined in this table are developed against set criteria.

The toxicity of  $UF_6$  is due to its two hydrolysis products, HF and  $UO_2F_2$ . The toxicological effects of  $UF_6$  as well as these byproducts were previously described in Section 6.1.2. AEGL and NUREG-1391 (NRC, 1991) values for HF and  $UF_6$  were utilized for evaluation of chemotoxic exposure. Additionally, since the byproduct uranyl fluoride is a soluble uranium compound, the AEGL values were derived for evaluating soluble uranium (U) exposure in terms of both chemical toxicity and radiological dose. In general, the chemotoxicity of uranium inhalation/ingestions is of more significance than radiation dose resulting from internal U exposure. The ERPG and AEGL values for HF are presented in Table 6.3-3, ERPG and AEGL values for Hydrogen Fluoride. The ERPG and AEGL values for  $UF_6$  (as soluble U) are presented in Table 6.3-4, ERPG and AEGL values for Uranium Hexafluoride (as soluble U).

~~The values from NUREG-1391 (NRC, 1991) for soluble uranium are presented in Table 6.3-6, Health Effects from Intake of Soluble Uranium.~~

Table 6.3-5, Definition of Consequence Severity Categories, presents values for HF and  $UF_6$  (as soluble U) from the AEGL and NUREG-1391 (NRC, 1991).

#### 6.3.2.1.1 Worker Exposure Assumptions

Any release from  $UF_6$  systems/cylinders at the facility would predominantly consist of HF with some potential entrainment of uranic particulate. An HF release would cause a visible cloud and a pungent odor. The odor threshold for HF is less than 1 ppm and the irritating effects of HF are intolerable at concentrations well below those that could cause permanent injury or which produce escape-impairing symptoms. Employees are trained in proper actions to take in response to a release and it can be confidently predicted that workers will take immediate self-protective action to escape a release area upon detecting any significant HF odor.

For the purposes of evaluating worker exposure in cases where a local worker would be expected to be in the immediate proximity of a release (e.g., connect/disconnect, maintenance, etc.), the ~~10-minute AEGL~~ values have been ~~used for HF and NUREG-1391 (NRC, 1991) values have been used for U~~. In these cases, it has been presumed that the operator will fail to recognize the in-rush of air into the vacuum system and will not begin to back away from the source of the leak until HF is present. ~~Sufficient time is available for the worker to reliably detect and evacuate the area of concern.~~

For the purposes of evaluating worker exposures for workers who may be present elsewhere in the room of release, the values in Table 6.3-5, Definition of Consequence Severity Categories,

which are the 10-minute AEGL values have been used. Once a release is detected the worker is assumed to evacuate the area of concern. Sufficient time is available for the worker to reliably detect and evacuate the area of concern.

Another assumption made in conducting consequence severity analysis is that for releases precipitated by a fire event, only public exposure was considered in determining consequence severity; worker exposures were not considered. The worker is assumed to evacuate the area of concern once the fire is detected by the worker. Fires of sufficient magnitude to generate chemical/radiological release must either have caused failure of a mechanical system/component or involve substantive combustibles containing uranic content. In either case, the space would be untenable for unprotected workers. Sufficient time is available for the worker to reliably detect and evacuate the area of concern prior to any release. Fire brigade/fire department members responding to emergencies are required by emergency response procedure (and regulation) to have suitable respiratory and personal protective equipment.

#### 6.3.2.1.2 Public Exposure Assumptions

Potential exposures to members of the public were also evaluated assuming conservative assumptions for both exposure concentrations and durations. Exposure was evaluated for consequence severity against chemotoxic, radiotoxic, and radiological dose.

Public exposures were estimated to last for a duration of 30 minutes. This is consistent with self-protective criteria for UF<sub>6</sub>/HF plumes listed in NUREG-1140 (NRC, 1988).

#### 6.3.2.2 Chemical Release Scenarios

The evaluation level chemical release scenarios based on the criteria applied in the Integrated Safety Analysis are presented in the NEF Integrated Safety Analysis Summary. Information on the criteria for the development of these scenarios is also provided in the NEF Integrated Safety Analysis Summary.

#### 6.3.2.3 Source Term

The methodologies used to determine source term are those prescribed in NUREG/CR-6410 (NRC, 1998) and supporting documents.

Table 6.3-2 Licensed Material Chemical Consequence Categories

	Workers	Offsite Public	Environment
Category 3 High Consequence	<p>Radiation Dose (RD) &gt; 1 Sievert (Sv) (100 rem)</p> <p>For the worker (elsewhere in room), except the worker (local)</p> <p>Chemical Dose (CD) &gt; AEGL-3</p> <p>For worker (local)</p> <p>CD &gt; AEGL-3 for HF</p> <p>CD &gt; 2 for U</p>	<p>RD &gt; 0.25 Sv (25 rem)</p> <p>30 mg sol U intake</p> <p>CD &gt; AEGL-2</p>	-
Category 2 Intermediate Consequence	<p>0.25 Sv (25 rem) &lt; RD ≤ 1 Sv (100 rem)</p> <p>For the worker (elsewhere in room), except the worker (local)</p> <p>AEGL-2 &lt; CD ≤ AEGL-3</p> <p>For the worker (local)</p> <p>AEGL-2 &lt; CD ≤ AEGL-3 for HF</p> <p>2 &lt; CD ≤ 3 for U</p>	<p>0.05 Sv (5 rem) &lt; RD ≤ 0.25 Sv (25 rem)</p> <p>AEGL-1 &lt; CD ≤ AEGL-2</p>	<p>Radioactive release &gt; 5000 x Table 2 Appendix B of 10 CFR Part 20</p>
Category 1 Low Consequence	<p>Accidents of lower radiological and chemical exposures than those above in this column</p>	<p>Accidents of lower radiological and chemical exposures than those above in this column</p>	<p>Radioactive releases with lower effects than those referenced above in this column</p>

Notes:

~~NUREG-1891 threshold value for intake of soluble U resulting in permanent renal failure~~

~~NUREG-1891 threshold value for intake of soluble U resulting in no significant acute effects to an exposed individual~~

Table 6.3-4 ERPG and AEGL values for Uranium Hexafluoride (as soluble U)  
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ERPG and AEGL Values For  $UF_6$  (values in mg soluble U/m<sup>3</sup>)

ERPG		AEGL					
	1-hr		10-min	30-min	1-hr	4-hr	8-hr
ERPG-1	3.4	AEGL-1	2.4	2.4	2.4	NR	NR
ERPG-2	10	AEGL-2	19	13	6.5	1.6	0.8
ERPG-3	20	AEGL-3	145	49	24	6.1	3.1

Table 6.3-5 Definition of Consequence Severity Categories

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		High Consequence (Category 3)	Intermediate Consequence (Category 2)
Acute Radiological Doses	Worker	>100 rem TEDE	>25 rem TEDE
	Outside Controlled Area	>25 rem TEDE	>5 rem TEDE
Acute Radiological Exposure	Worker	not applicable	not applicable
	Outside Controlled Area	>30 mg U intake	>5.4 mg U/m <sup>3</sup> (24-hr average)
Acute Chemical Exposure	Worker (local)	>40 mg U intake; > 139 mg HF/m <sup>3</sup>	>10 mg U intake; >78 mg HF/m <sup>3</sup>
	Worker (elsewhere in room)	>146 mg U/m <sup>3</sup> ; > 139 mg HF/m <sup>3</sup>	>19 mg U/m <sup>3</sup> ; >78 mg HF/m <sup>3</sup>
	Outside Controlled Area (30-min exposure)	>13 mg U/m <sup>3</sup> ; >28 mg HF/m <sup>3</sup>	>2.4 mg U/m <sup>3</sup> ; >0.8 mg HF/m <sup>3</sup>

Table 6.3-6 Health Effects from Intake of Soluble Uranium  
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Health Effects	Uranium Intake (mg) by 70 kg Person
50% Lethality	230
Threshold for Intake Resulting in Permanent Renal Damage	40
Threshold for Intake Resulting in No Significant Acute Effects	10
No Effect	4.3

**National Enrichment Facility  
Environmental Report  
Updated Page**

Table 4.12-15 Accident Criteria Chemical Exposure Limits by Category

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	High Consequence (Category 3)	Intermediate Consequence (Category 2)
Worker (local)	> 40 mg U intake > 139 mg HF/m <sup>3</sup>	> 10 mg U intake > 78 mg HF/m <sup>3</sup>
Worker (elsewhere in room)	> 146 mg U/m <sup>3</sup> > 189 mg HF/m <sup>3</sup>	> 19 mg U/m <sup>3</sup> > 78 mg HF/m <sup>3</sup>
Outside Controlled Area (30-min exposure)	> 13 mg U/m <sup>3</sup> > 28 mg HF/m <sup>3</sup>	> 2.4 mg U/m <sup>3</sup> > 0.8 mg HF/m <sup>3</sup>

**National Enrichment Facility  
Integrated Safety Analysis Summary  
Updated Pages**

**(Pages Containing Proprietary Information Have Been Withheld)**

Table 3.1-3 Consequence Severity Categories Based on 10 CFR 70.61  
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	Workers	Offsite Public	Environment
Category 3 High Consequence	<p>Radiation Dose (RD) &gt; 1 Sievert (Sv) (100 rem)</p> <p>For the worker (elsewhere in room), except the worker (local)</p> <p>Chemical Dose (CD) &gt; AEGL-3</p> <p>For worker (local), CD &gt; AEGL-3 for HF CD &gt; * for U</p>	<p>RD &gt; 0.25 Sv (25 rem) 30 mg sol U intake</p> <p>CD &gt; AEGL-2</p>	—
Category 2 Intermediate Consequence	<p>0.25 Sv (25 rem) &lt; RD ≤ 1 Sv (100 rem)</p> <p>For the worker (elsewhere in room), except the worker (local)</p> <p>AEGL-2 &lt; CD ≤ AEGL-3</p> <p>For the worker (local)</p> <p>AEGL-2 &lt; CD ≤ AEGL-3 for HF * &lt; CD ≤ * for U</p>	<p>0.05 Sv (5 rem) &lt; RD ≤ 0.25 Sv (25 rem)</p> <p>AEGL-1 &lt; CD ≤ AEGL-2</p>	Radioactive release > 5000 x Table 2 Appendix B of 10 CFR Part 20
Category 1 Low Consequence	Accidents of lower radiological and chemical exposures than those above in this column	Accidents of lower radiological and chemical exposures than those above in this column	Radioactive releases with lower effects than those referenced above in this column

Note 5:

~~NUREG-1391 threshold value for intake of soluble U resulting in permanent renal failure~~

~~NUREG-1391 threshold value for intake of soluble U resulting in no significant acute effects to an exposed individual~~

Table 3.1-4 Chemical Dose Information  
Page 1 of 1

	High Consequence (Category 3)	Intermediate Consequence (Category 2)
Worker (local)	> 40 mg U intake > 139 mg HF/m <sup>3</sup>	> 10 mg U intake > 78 mg HF/m <sup>3</sup>
Worker (elsewhere in room)	> 146 mg U/m <sup>3</sup> > 139 mg HF/m <sup>3</sup>	> 19 mg U/m <sup>3</sup> > 78 mg HF/m <sup>3</sup>
Outside Controlled Area (30-min exposure)	> 13 mg U/m <sup>3</sup> > 28 mg HF/m <sup>3</sup>	> 2.4 mg U/m <sup>3</sup> > 0.8 mg HF/m <sup>3</sup>

The following pages, in their entirety, contain proprietary information in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," paragraph (d) (1) and have been withheld.

<u>NEF ISA Summary – Revision 4</u>	<u>Page Number</u>
Table 3.7-1 Accident Sequence and Risk Index	1 of 12 2 of 12 4 of 12 5 of 12 9 of 12 11 of 12 12 of 12
Table 3.7-2 Accident Sequence Descriptions	2 of 69 5 of 69 13 of 69 26 of 69 32 of 69 33 of 69 47 of 69 50 of 69 56 of 69 57 of 69 58 of 69 59 of 69 60 of 69 61 of 69 62 of 69 63 of 69 66 of 69 68 of 69 69 of 69
Table 3.7-3 External Events And Fire Accident Sequences And Risk Index	3 of 9 9 of 9
Table 3.7-4 External Events and Fire Accident Descriptions	15 of 37 37 of 37
Sections 3.8.3.39a through 3.9.3.39c	3.8-6 through 3.8-8
Table 3.8-1 Items Relied On For Safety (IROFS)	2 of 34 17 of 34 18 of 34 25 of 34 26 of 34 29 of 34 33 of 34
Table 3.8-2 Sole Items Relied On For Safety (IROFS)	1 of 3 2 of 3 3 of 3