

*Louisiana Energy Services*

**Safety Analysis Report  
Push-Pull Instructions  
Revision 18, December 17, 1993**

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Notes:

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- 2) The "List of Effective Pages" contains the latest revision and date of the revision affecting the page.
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## Louisiana Energy Services

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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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p 6.3-iv	14, 07/30/93
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\*NOTE: p=page  
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\*NOTE: p=page  
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P 6.3-68	14, 07/30/93
P 6.3-69	14, 07/30/93
P 6.3-70	14, 07/30/93
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T 6.3-4 (1 of 6)	original, 1/31/91
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\*NOTE: p=page  
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T 6.3-7 (4 of 4)	original, 1/31/91
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T 6.3-16 (2 of 34)	original, 1/31/91
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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\*NOTE: p=page  
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## 8.1 RADIATION PROTECTION OBJECTIVES

### 8.1.1 PHILOSOPHY

LES management is firmly committed to the "As Low As Reasonably Achievable" "ALARA" philosophy for all operations involving source, byproduct and special nuclear material. This commitment will be reflected in written procedures and instructions for operation involving potential exposures of personnel to radiation (both internal and external hazards) and is reflected in the facility design. The basic objective of the Radiation Protection Program is protection of the health and safety of public and Claiborne Enrichment Center personnel.

Two general categories of radioactive material will be utilized in the facility: 1) calibration and radiochemistry standards for laboratory work and 2) UF<sub>6</sub>. The calibration and radiochemistry standards will be alpha, beta, and gamma emitters of very low activity and will not result in any non-trivial external exposures. Written laboratory protocols will provide safeguards against internal exposures when using these standards.

The second category, UF<sub>6</sub>, consists of depleted, unenriched, and enriched uranium. The UF<sub>6</sub> is delivered to the plant with an unaltered natural composition of uranium isotopes. All of the natural uranium isotopes are alpha, beta, and gamma emitters. Alpha and beta radiations are not a significant external hazard. The gamma energies can be limited by the time-distance-shielding concept. These quantities are so small that they are not significant radiation sources. A summary of the radiological characteristics of the uranium isotopes present in the facility is presented in Table 6.2-10 and the potential for external exposure is discussed in Section 6.2.6.3. The enrichment process only changes the isotopic concentrations - it does not create any new isotopes. Therefore, because the existing isotopes are primarily an internal hazard, the primary goal of the CEC Radiation Protection Program is to prevent inhalation and ingestion of radioactive materials. The secondary goal is to minimize external exposures.

#### 8.1.1.1 Public Safety

Protection of the public requires surveillance of and control over all facility operations and conditions that may affect the radiological health and safety of the public. This includes such activities as handling of radioactive materials, the disposal of radioactive wastes, conducting an environmental radioactivity monitoring program and maintaining an effective emergency plan. All of these activities will be performed in such a way as to ensure that all radioactive releases are below the limits specified in 10 CFR Part 20 and "as low as practicable" in

- e. modifying the program based upon experience and facility history, and
- f. adequately staffing the Health Physics group to implement the Health Physics Program.

The Radiation Protection program shall include the following responsibilities:

- a. establishing and maintaining an ALARA program,
- b. establishing and maintaining a respirator usage program,
- c. monitoring worker doses, both internal and external,
- d. complying with the radioactive materials license for the facility,
- e. handling of radioactive wastes when disposal is needed,
- f. calibration and quality assurance of all radiological instrumentation, including verification of required Lower Limits of Detection or alarm levels,
- g. establishing and maintaining a radiation safety training program for personnel working in radiation control areas or zones,
- h. performing audits of the radiation program on an annual basis,
- i. establishing and maintaining the radiological environmental monitoring programs,
- j. posting RCA and RCZ's, as appropriate, and
- k. developing occupancy guidelines, if needed.

The Health Physics program may be performed by groups outside the facility, but the responsibility for ensuring that the program is performed properly is the duty of the Health Physics Manager.

#### 8.1.2.3 Operations Superintendent

The Operations Superintendent is responsible for operating the facility safely and in accordance with procedures so that all effluents released to the environment and all exposures to the public and CEC personnel meet the limits specified in applicable regulations, procedures and guidance.

## 8.2 ONSITE CONTAMINATION CONTROL

### 8.2.1 RADIOLOGICAL ACCESS ZONES

Radiological access zones within the facility have been established to 1) control the spread of contamination, 2) control access to radiation areas to avoid unnecessary exposure to personnel to radiation, and 3) to control access to radioactive sources present in the facility. Table 8.2-1 lists general dose rate estimates for the facility. These dose estimates were prepared based upon historical data from the operating Urenco centrifuge enrichment facilities. Areas associated with higher dose rates may be restricted from public access, as determined by facility management. Areas where CEC personnel spend substantial amounts of time will be designed to minimize the exposure received when routine tasks are performed - this design will use the ALARA principle.

#### 8.2.1.1 Description of Zones

The projected radiological access zones are shown on Figure 8.2-1. Facility management may elect to make each zone more restrictive as to the radiation levels specified herein. A description of each type of zone is listed below.

Unrestricted area: (Zone I) Designation for areas adjacent to the facility site where LES does not normally exercise access control. This area could be accessed by members of the public, indigenous wildlife, or by facility personnel. In accordance with 10 CFR 20.1003, this is considered to be an unrestricted area which is governed by the limits in 10 CFR 20.1301. These limits for an unrestricted area are 0.1 rem (1 mSv) per year and 2 mrem/hour (0.02 mSv/hour).

Restricted area: (Zone II) Designation for areas that are controlled by the licensee but do not meet the radiation area, high radiation area, or airborne radioactivity area criteria. These are areas within the facility where the CEC staff is expected to work continuously and where potential radiation hazards (radiation and contamination) do not require access control. Examples of this include the office areas, rest rooms, and conference rooms. This area could also be accessed by visiting members of the public.

Radiation area: (Zone III) Designation for restricted areas that are defined by 10 CFR 20.1003 as Airborne Radioactivity Areas or Radiation Areas, or where surface contamination levels exceed 150 dpm/100 cm<sup>2</sup>, or where the intake of soluble uranium in one week is likely to reach 1 milligram. These areas, if accessible to individuals, are designated as the Radiation Control Area (RCA) of the facility. Examples of this include storage areas for the UF<sub>6</sub> Handling Area of the Separations Building and the Blending Area.

Radiation Control Zone (RCZ): An area within the RCA that may be temporary or permanent. RCZ's are established at locations where any of the following conditions exist:

- Area where airborne concentrations of radionuclides (corrected for background) are sufficient to have the area designated as an "Airborne Radioactivity Area" as defined in 10 CFR 20.1003 and will result in a Committed Effective Dose Equivalent (CEDE) that is greater than 25% of the annual organ dose or total body 10 CFR 20 limit if respiratory protection is not utilized.
- Area where the radiation levels (corrected for background) are sufficient to have the area designated as a "High Radiation Area" as defined in 10 CFR 20.1003. Small areas within an RCA that meet the definition of an RCZ may be posted without having the entire area designated as an RCZ.
- Area where the removable contamination levels (corrected for background) exceed 1000 dpm/100 cm<sup>2</sup> alpha or 1000 dpm/100 cm<sup>2</sup> beta/gamma. This applies only to areas that are accessible to workers when no work intrusive to facility components is being performed. Small areas not accessed by workers and areas not accessible to workers may be posted without having the entire area designated as an RCZ.
- Area where the intake of soluble uranium in one week is likely to exceed 1 milligram, if respiratory protection is not utilized.

The purposes of the RCZ are to inform workers of the hazard and prevent the spread of the contamination. Examples of RCZ's could be the contaminated equipment workshop and roped-off areas for facility maintenance.

High radiation area: Designation for restricted areas that are defined by 10 CFR 20.1003 as High Radiation Areas - an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.1 rem (1 mSv) in 1 hour at 30 cm from the radiation source or from any surface that the radiation penetrates. No examples of this are expected during routine operation of the facility. This designation is provided here for the purposes of emergency situations (drills and actual).

Airborne radioactivity area: Designation for areas that are defined by 10 CFR 20.1003 as Airborne Radioactivity Areas - a room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations that 1) exceed the Derived Air Concentrations (DAC's) listed in Appendix B of 10 CFR 20 or 2) to such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual

the continuous air monitors in the airborne radioactivity areas may be used to provide an indication that internal exposures may be approaching the action limit.

If the annual action limit is exceeded as determined from bioassay results, then an investigation shall be performed and documented to determine what types of activities may have contributed to the worker's internal exposure. The action limit already reflects ALARA principles, so this action level is appropriate. This investigation may include, but not be limited to procedural reviews, efficiency studies of the air handling system, and work practices.

#### 8.2.2.4.3 Evaluation of Doses

Dose evaluations may be performed at more frequent intervals and should be performed when reasonable suspicion exists regarding an abnormal exposure. The internal and external exposure values will be summed in accordance with 10 CFR 20.1202.

#### 8.2.2.5 Monitor Stations

Monitor stations are the entry and exit points for the RCA. Monitors are provided to detect radioactive contamination on personnel and their personal items, including hard hats. All personnel are required to monitor themselves, any hand-carried personal items, and hard hats prior to exiting the RCA. Radiation protection management is responsible for monitor station provision and maintenance. Projected monitor station locations are shown on Figure 8.2-1 (sheet 2 of 3). These locations shall be evaluated and changed accordingly to reflect changes in the RCA locations in the facility.

#### 8.2.2.6 Locker Rooms

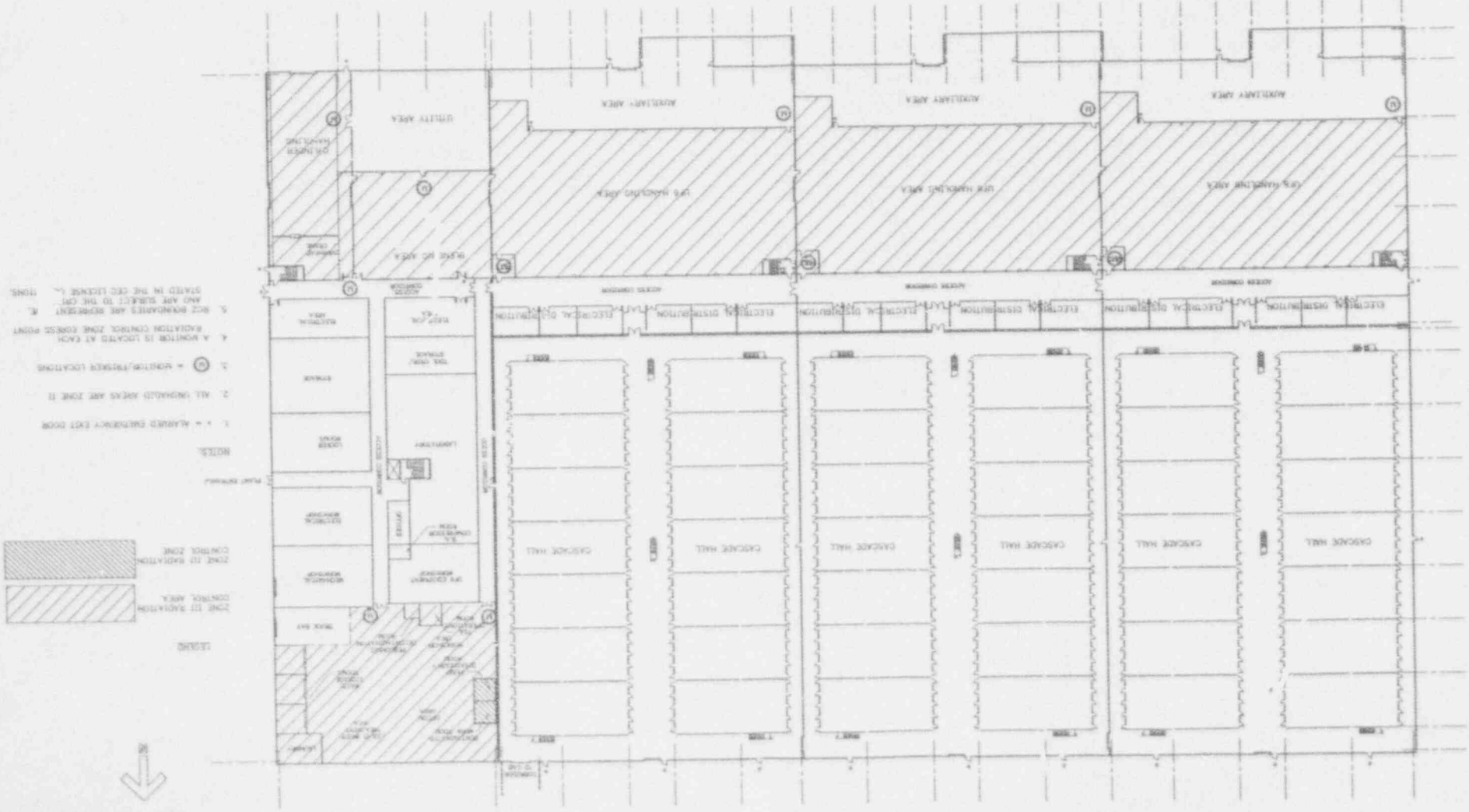
Men's and women's locker rooms are provided for personnel to change into appropriate work clothing and store personal belongings. The following facilities and activities are provided for in the locker room area:

Shower Rooms - men's and women's shower rooms are provided as a place for personnel to wash/clean up after work. These shower rooms are not intended for personnel decontamination.

Restrooms - men's and women's restrooms are provided. These rooms are not for personnel decontamination.

First Aid Station - a first aid station is provided to treat injured personnel.

CLABORN ENRICHMENT CENTER  
 Radiological Access Zones  
 Sheet 2 of 3  
 Figure B-2-1  
 DECEMBER 17, 1983



1. \* - ALARMED EMERGENCY EXIT DOOR
2. ALL Hatched AREAS ARE ZONE II
3. (C) = MONITOR/SENSOR LOCATION
4. A MONITOR IS LOCATED AT EACH RADIATION CONTROL ZONE CONTROL POINT
5. NOT RECORDED ARE MONITOR \* AND ARE SUBJECT TO THE CRF TONS STATED IN THE DEC LICENSE L. TONS

LEGEND

ZONE II RADIATION CONTROL AREA

ZONE III RADIATION CONTROL AREA





TABLE 8.4-1 (sheet 1 of 4)

MONITOR DESCRIPTIONS

MONITOR NUMBER	TYPE	ALARM	INTEGRATING	LOCATION
1	$\alpha$ -in-air	No	Yes	Radioactive Waste Storage area ventilation return
2	HF	Yes	No	Pump Disassembly Room Vestibule
3	$\alpha$ -in-air	Yes	No	Pump Disassembly Room Vestibule
4	$\alpha$ -in-air	Note 1	No	Contaminated Equipment Workroom ventilation return
5	$\alpha$ -in-air	Note 1	No	Pump Disassembly Room ventilation return
6	$\alpha$ -in-air	Note 1	No	Pump Disassembly Room ventilation return
7	$\alpha$ -in-air	Note 1	No	Pump Disassembly Room ventilation return
8	$\alpha$ -in-air	No	Yes	Contaminated Equipment Workshop ventilation return
9	$\alpha$ -in-air	No	Yes	Technical Services Area Corridor
10	$\alpha$ -in-air	Yes	No	Decontamination Bath Monorail A
11	$\alpha$ -in-air	Yes	No	Decontamination Bath Monorail B
12	$\alpha$ -in-air	No	Yes	Decontamination Workshop ventilation return

Note 1: Monitor has indicating display in place of an alarm.

TABLE 8.4-1 (sheet 2 of 4)

MONITOR DESCRIPTIONS (CONTINUED)

MONITOR NUMBER	TYPE	ALARM	INTEGRATING	LOCATION
13	$\alpha$ -in-air	No	Yes	Truck Bay ventilation return
14	$\alpha$ -in-air	Yes	No	Tank Room sample sink
15	$\alpha$ -in-air	No	Yes	Effluent Collection Pit/Tank Room ventilation return
16	$\alpha$ -in-air	No	Yes	Laundry Room ventilation return
17	HF	Yes	No	UF6 Sample Room ventilation return
18	HF	Yes	No	Sample Storage Room ventilation return
19	$\alpha$ -in-air	No	Yes	Health Physics Laboratory ventilation return
20	$\alpha$ -in-air	No	Yes	Chemical Laboratory ventilation return
21	$\alpha$ -in-air	No	Yes	Plant Entrance Corridor (used as a "control")
22	$\alpha$ -in-air	No	Yes	Unit 1 UF6 Handling Area
23	$\alpha$ -in-air	No	Yes	Unit 1 UF6 Handling Area ventilation return
24	$\alpha$ -in-air	No	Yes	Unit 2 UF6 Handling Area
25	$\alpha$ -in-air	No	Yes	Unit 2 UF6 Handling Area ventilation return
26	$\alpha$ -in-air	No	Yes	Unit 3 UF6 Handling Area

December 17, 1993

TABLE 8.4-1 (sheet 3 of 4)

MONITOR DESCRIPTIONS (CONTINUED)

MONITOR NUMBER	TYPE	ALARM	INTEGRATING	LOCATION
27	$\alpha$ -in-air	No	Yes	Unit 3 UF6 Handling Area ventilation return
28	$\alpha$ -in-air	No	Yes	Blending Area
29	$\alpha$ -in-air	No	Yes	Utility Area ventilation return (used as a "control")
30	$\alpha$ -in-air	Yes	No	Portable (Technical Services Area)
31	$\alpha$ -in-air	Yes	No	Portable (Technical Services Area)
32	$\alpha$ -in-air	Yes	No	Portable (Technical Services Area)
33	$\alpha$ -in-air	Yes	No	Portable (Technical Services Area)
34	$\alpha$ -in-air	Yes	No	Portable (Technical Services Area)
35	$\alpha$ -in-air	Yes	No	Portable (Technical Services Area)
36	$\alpha$ -in-air	Yes	No	Portable (Unit 1)
37	$\alpha$ -in-air	Yes	No	Portable (Unit 1)
38	$\alpha$ -in-air	Yes	No	Portable (Unit 1)
39	$\alpha$ -in-air	Yes	No	Portable (Unit 2)
40	$\alpha$ -in-air	Yes	No	Portable (Unit 2)

TABLE 8.4-1 (sheet 4 of 4)

MONITOR DESCRIPTIONS (CONTINUED)

MONITOR NUMBER	TYPE	ALARM	INTEGRATING	LOCATION
41	$\alpha$ -in-air	Yes	No	Portable (Unit 2)
42	$\alpha$ -in-air	Yes	No	Portable (Unit 3)
43	$\alpha$ -in-air	Yes	No	Portable (Unit 3)
44	$\alpha$ -in-air	Yes	No	Portable (Unit 3)