LES

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# SAFETY ANALYSIS REPORT

# Revision 16f

LES building and operating the National Enrichment Facility providing energy independence for America

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The Facilities Manager reports to the Technical Services Director and is responsible for adequately controlling documents at the facility. LBDCR-08-0046

### 2.2.2 Shift Crew Composition

The minimum operating shift crew consists of a Shift Manager (or Deputy Shift Manager in the absence of the Shift Manager), one Control Room operator, one Radiation Protection technician, one operator for each ~~Cascade Hall and associated $UF_6$ handling systems~~, and security personnel. When only one ~~Cascade Hall~~ SBM is in operation, a minimum of two operators is required. LBDCR-07-0042

At least one criticality safety engineer or the criticality safety officer will be available, with appropriate ability to be contacted by the Shift Manager, to respond to any routine request or emergency condition. This availability may be offsite if adequate communication ability is provided to allow response as needed.

### 2.2.3 Safety Review Committee

The facility maintains a Safety Review Committee (SRC) to assist with the safe operation of the facility. The SRC reports to the Plant Manager and provides technical and administrative review and audit of operations that could impact plant worker, public safety and environmental impacts. The scope of activities reviewed and audited by the SRC shall, as a minimum, include the following:

- Radiation protection
- Nuclear criticality safety
- Hazardous chemical safety
- Industrial safety including fire protection
- Environmental protection
- ALARA policy implementation
- Changes in facility design or operations.

The SRC shall conduct at least one facility audit per year for the above areas.

The Safety Review Committee shall be composed of at least five members, including the Chairman. Members of the SRC may be from the LES corporate office or technical staff. The five members shall include experts on operations and all safety disciplines (criticality, radiological, chemical, industrial). The Chairman, members and alternate members of the Safety Review Committee shall be formally appointed by the Plant Manager, shall have an academic degree in an engineering or physical science field; and, in addition, shall have a minimum of five years of technical experience, of which a minimum of three years shall relate directly to one or more of the safety disciplines (criticality, radiological, chemical, industrial).

The Safety Review Committee shall meet at least once per calendar quarter.

Review meetings shall be held within 30 days of any incident that is reportable to the NRC. These meetings may be combined with regular meetings. Following a reportable incident, the

completed a training program, applicable to the scope of operations, in chemistry and in associated safety practices.

Q. Shift Managers

Shift Managers shall have High School Diplomas (or equivalent) and a minimum of five years of appropriate~~, responsible~~ operating experience ~~in implementing and supervising~~ at a nuclear ~~operations program~~ or chemical process facility. LBDCR-08-0028

R. ~~Projects Manager~~Logistics Services Manager

~~The Projects Manager shall have, as a minimum, a bachelor's degree (or equivalent) in an engineering or scientific field and have a minimum of five years of appropriate, responsible nuclear experience.~~The Logistics Services Manager shall have, as a minimum, a bachelor's degree (or equivalent) and have a minimum of three years of appropriate, responsible experience in implementing and supervising a logistics program. LBDCR-08-0046

S. Safeguards Manager

The Safeguards Manager shall have as a minimum a bachelor's degree in an engineering or scientific field, and five years of experience in the management of a safeguards program for Special Nuclear Material, including responsibilities for material control and accounting. No credit for academic training may be taken toward fulfilling this experience requirement.

T. Chemistry ~~and Analysis~~Services Manager

The Chemistry Services~~and Analysis~~ Manager shall have, as a minimum, a bachelor's degree (or equivalent) in an engineering or a scientific field and three years of appropriate, responsible nuclear experience associated with implementation of a facility chemistry program. LBDCR-08-0046

U. Engineering Manager

The Engineering Manager shall have, as a minimum, a bachelor's degree (or equivalent) in an engineering or scientific field and have a minimum of five years of appropriate, responsible experience in implementing and supervising a nuclear engineering program.

V. Maintenance Manager

The Maintenance Manager shall have, as a minimum, a bachelor's degree (or equivalent) in an engineering or scientific field and four years of responsible nuclear experience.

W. Security Manager

The Security Manager shall have ~~as a minimum,~~ a bachelor's degree (or equivalent) ~~in an engineering or scientific field,~~ and five years of experiences or an associates degree (or equivalent) and ten years off experience. Experience must be in the ~~responsible~~ management of physical security at a facility requiring security capabilitiesy similar to that required for the facility. ~~No credit for academic training may be taken toward fulfilling this experience requirement.~~ LDCR-08-0046 LBDCR-07-0042

These maintenance categories are discussed in detail in Chapter 11, Management Measures.

### 2.3.3 Training and Qualifications

~~Formal planned~~Prescribed training programs shall be established for ~~facility~~ NEF employees. ~~Indoctrination~~ General Employee tTraining shall be provided to employees ~~within 30 days of reporting to work,~~ prior to receiving unescorted access, and shall address safety preparedness for all safety disciplines (criticality, radiological, chemical, industrial), ALARA practices, and emergency procedures. In-depth training programs shall be provided to individuals depending on job requirements in the areas of radiological safety (for all personnel with access to the Restricted Area) and in criticality safety control. Nuclear criticality safety training shall satisfy the recommendations of ANSI/ANS-8.20, Nuclear Criticality Safety Training. ~~Retraining~~ Continuing of personnel previously trained shall be performed for radiological and criticality safety at least annually, and shall include updating and changes in required skills. The training program shall include methods for verifying training effectiveness, such as written tests, actual demonstration of skills, and where required by regulation, maintaining a current and valid license demonstrating qualification. Changes to training shall be implemented if indicated due to incidents potentially compromising safety, or if changes are made to facilities or processes. LBDCR-08-0015 LBDCR-08-0015

The training programs and maintenance of the training program records at the facility are the responsibility of the Training Manager. Accurate records are maintained on each employee's qualifications, experience, and training ~~and retraining~~. The employee training file shall include records of all general employee training, technical training, and employee development training conducted at the facility. The employee training file shall also contain records of special company sponsored training conducted by others. The training records for each individual are maintained so that they are accurate and retrievable. Training records are retained in accordance with the records management system. LBDCR-08-0015

Additional details on the facility training program are provided in Chapter 11, Management Measures.

### 2.3.4 Procedures

Activities involving licensed materials will be conducted through the use of approved, written procedures. Applicable procedure and training requirements will be satisfied before use of the procedure. Procedures will be used to control activities in order to ensure the activities are carried out in a safe manner.

Generally, four types of plant procedures are used to control activities: operating procedures, administrative procedures, maintenance procedures, and emergency procedures. Operating procedures, developed for workstation and control room operators, are used to directly control process operations. Administrative procedures are written by each department as necessary to control activities that support process operations, including management measures (e.g. configuration management, training and record-keeping). Maintenance procedures address preventive and corrective maintenance, surveillance (includes calibration, inspection, and other surveillance testing), functional testing following maintenance, and requirements for pre-maintenance activity involving reviews of the work to be performed and reviews of procedures. Emergency procedures address the preplanned actions of operators and other plant personnel in the event of an emergency.

Planned preventative maintenance (PM) includes periodic refurbishment, partial or complete overhaul, or replacement of IROFS, as necessary, to ensure the continued availability and reliability of the safety function assumed in the ISA documentation. In determining the frequency of any PM, consideration is given to appropriately balancing the objective of preventing failures through maintenance, against the objective of minimizing unavailability of IROFS because of PM. In addition, feedback from PM and corrective maintenance and the results of incident investigations and identified root causes are used, as appropriate, to modify the frequency or scope of PM.

Planned maintenance on IROFS, or any items that may affect the function of IROFS, that do not have redundant functions available, will provide for compensatory measures to be put into place to ensure that the IROFS function is performed until it is put back into service.

Corrective maintenance involves repair or replacement of equipment that has unexpectedly degraded or failed. Corrective maintenance restores the equipment to acceptable performance through a planned, systematic, controlled, and documented approach for the repair and replacement activities.

Following any maintenance on IROFS, and before returning an IROFS to operational status, functional testing of the IROFS, as necessary, is performed to ensure the IROFS is capable of performing its intended safety function.

Training and Qualifications

IROFS, and any items that may affect the function of IROFS, require that personnel involved at each level (from design through and including any assumed process implementation steps or actions) have and maintain the appropriate training and qualifications. Employees are provided with ~~formal~~ training to establish the knowledge foundation and on-the-job training to develop work performance skills. For process implemented steps or actions, a needs/job analysis is performed and tasks are identified to ensure that appropriate training is provided to personnel working on tasks related to IROFS. Minimum training requirements are developed for those positions whose activities are related to IROFS ~~relied on for safety~~. Initial identification of job-specific training requirements is based on experience. Entry-level criteria (e.g., education, technical background, and/or experience) for these positions are contained in position descriptions. | LBCDR 08-0015 | LBCDR 08-0015

Qualification is indicated by successful completion of prescribed training, demonstration of the ability to perform assigned tasks, and where required by regulation, maintaining a current and valid license or certification.

Continuing training is provided, as required, to maintain proficiency in specific knowledge and skill related activities. For all IROFS, and any items that may affect the function of IROFS, involving process implemented steps or actions, annual refresher training or requalification is generally required as identified in the needs/job analysis referenced in the previous paragraph. (any exceptions credited within the ISA are discussed in the National Enrichment Facility Integrated Safety Analysis Summary). | LBCDR 08-0058

a. Wind loadings for structures are in accordance with provisions of the International Building Code and Section 6.5 of ASCE 7.

b. For reinforced concrete targets, the formulas used to establish the missile depth of penetration (x) and scabbing thickness (ts) are based on the Modified National Defense Research Committee Formula (NDRC) (ASCE, 58) and the Army Corps of Engineers Formula (ACE) (ASCE, 58) respectively.

c. Per Section C.7.2.1 of ACI 349, the concrete thickness required to resist hard missiles shall be at least 1.2 times the scabbing thickness, ts. Punching shear is calculated and checked against the requirements of ACI 349, Section C.7.2.3.

d. For steel targets, the formula used to establish the perforation thickness is the Ballistic Research Laboratory (BRL) Formula (ASCE, 58).

e. All buildings and structures, including such items as equipment supports, are designed to withstand the earthquake loads defined in Sections 1615 through 1617 of the International Building Code.

f. Extreme snow loadings on roofs of safety significant structures are based on a ground snow load of 32 lb/ft^2. The snow load for safety significant structures is enveloped by the general 40 psf roof live load with the exception of drift areas. Drift areas (where load can exceed 40 psf) are evaluated when required for each structure.

   Quality Level 3 structures will as a minimum, meet the IBC requirements for snow loading.

g. Load combinations for concrete structures and components for the safety significant structures are based on ACI 349. Load combinations for other concrete structures are based on (ACI 318). All concrete structures are designed using the ACI Strength Design Method (ACI, 318).

h. Load combinations for steel structures and components for all buildings are provided in ISAS Section 3.3.2.2.8. All structural steel is designed using the AISC Allowable Stress Method (AISC, Manual of Steel Construction).

i. Design live loads, including impact loads, used are in accordance with Section 4.0 and Table 4-1 of ASCE 7.

j. During detailed design of specific buildings and areas, pressure loads due to postulated truck and pipeline explosions will be considered. The pressure loads will be developed in accordance with the underlying assumptions used in the explosion hazard assessments described in Sections 3.2.1.2.1 and 3.2.2.4 of the ISA Summary. These buildings and areas include: Separations Building Modules ($UF_6$ Handling Area, Process Services Area and Cascade Halls), Blending and Liquid Sampling Area, Cylinder Receipt and Dispatch Building, and the Technical Services Building ~~and the Centrifuge Test Facility~~. These buildings and areas are constructed of concrete. LBDCR-08-0052

## 4.5 TRAINING COMMITMENTS

The design and implementation of the radiation protection training program complies with the requirements of 10 CFR 19.12 (CFR, 2003i). Records are maintained in accordance with 10 CFR 20.2110 (CFR, 2003j).

The development and implementation of the radiation protection training program is consistent with the training development guidance provided in the following regulatory guidance documents: LBCDR 08-0015

- Regulatory Guide 8.10-Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable
- Regulatory Guide 8.13-Instructions Concerning Prenatal Radiation Exposure
- Regulatory Guide 8.29-Instructions Concerning Risks From Occupational Radiation Exposure

~~•ASTM C986-Developing Training Programs in the Nuclear Fuel Cycle~~ LBCDR 08-0015

- ASTM E1168-Radiological Protection Training for Nuclear Facility Workers.

All personnel and visitors entering Restricted Areas or Controlled Areas, as defined below, receive training that is commensurate with the radiological hazard to which they may be exposed. Alternatively, visitors will be provided with trained escorts who have received radiation protection training.

The level of radiation protection training is based on the potential radiological health risks associated with an employee's work responsibilities and incorporates the provisions of 10 CFR 19.12 (CFR, 2003i). In accordance with 10 CFR 19.12 (CFR, 2003i), any individual working at the facility who is likely to receive in a year a dose in excess of 1 mSv (100 mrem) is:

A. Kept informed of the storage, transfer, or use of radioactive material

B. Instructed in the health protection problems associated with exposure to radiation and radioactive material, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed

C. Required to observe, to the extent within the worker's control, the applicable provisions of the NRC regulations and licenses for the protection of personnel from exposure to radiation and radioactive material

D. Instructed of their responsibility to report promptly to the facility management, any condition which may cause a violation of NRC regulations and licenses or unnecessary exposure to radiation and radioactive material

E. Instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation and radioactive material

F. Advised of the various notifications and reports to individuals that a worker may request in accordance with 10 CFR 19.13 (CFR, 2003k).

The radiation protection training program takes into consideration a worker's normally assigned work activities. Abnormal situations involving exposure to radiation and radioactive material, which can reasonably be expected to occur during the life of the facility, are also evaluated and factored into the training. The extent of these instructions is commensurate with the potential radiological health protection problems present in the work place.

~~Retraining~~ Continuing Training of personnel previously trained is performed for radiological, chemical, industrial, and criticality safety at least annually. The ~~retraining~~ continuing training program also provides information on position specific/related ~~includes~~ procedure changes as appropriate~~,~~ and updating and changes in required skills. Changes to training are implemented, when required, due to incidents potentially compromising safety or if changes are made to the facility or processes. Records of training are maintained in accordance with LES records management system. Training programs are established in accordance with Section 11.3, Training and Qualifications. The radiation protection sections of the training program are evaluated at least annually. The program content is reviewed to ensure it remains current and adequate to assure worker safety. LBCDR 08-0015

The specifics of the Radiation Protection Training are described in the following section.

### 4.5.1 Radiation Protection Training

Radiation protection training is highlighted to emphasize the high level of importance placed on the radiological safety of plant personnel and the public. In-depth radiation protection training is provided for the various types of job functions (e.g., ~~production~~ operator, maintenance radiation protection technician, contractor personnel) commensurate with the radiation safety responsibilities associated with each such position. Visitors to a Restricted Area are trained in the formal training program or are escorted by trained personnel while in the Restricted Area. LBCDR 08-0015

Personnel access procedures ensure the completion of ~~formal~~ nuclear safety training prior to permitting unescorted access into the Restricted Areas. Training sessions covering criticality safety, radiation protection and emergency procedures are conducted on a regular basis to accommodate new employees or those requiring ~~retraining.~~ continuing training. ~~Retraining~~ Continuing training is conducted when necessary to address changes in policies, procedures, requirements and the ISA. LBCDR 08-0015

Specific topics covered in the training program are listed in Chapter 11, Management Measures, Section 11.3.3.1.1. The training provided includes the requirements of 10 CFR 19 (CFR, 2003a).

Individuals attending these sessions must pass an initial examination covering the training contents to assure the understanding and effectiveness of the training. ~~The effectiveness and adequacy of the training program curriculum and instructors are also evaluated by audits performed by operational area personnel responsible for criticality safety and radiation protection.~~ The effectiveness of the training programs is also evaluated by audits and assessments of operations and maintenance personnel responsible for following the requirements related to the topics listed above. LBCDR 08-0015

Since contractor employees may perform diverse tasks in the Restricted Areas or Controlled Areas of the facility, ~~formal~~ training for these employees is designed to address the type of work they perform. In addition to applicable radiation safety topics, training contents may include RWPs, special bioassay sampling, and special precautions for welding, cutting, and grinding.

~~Instructors certified by the Radiation Protection Manager conduct the radiation protection training programs.~~ LBCDR 08-0015

The Radiation Protection Manager is responsible for establishing and maintaining the radiation protection training for all personnel, including contractor personnel who may be working at the facility. Records are maintained for each employee documenting the training date, scope of the training, identity of the trainer(s), any test results and other associated information by the Training Manager.

Individuals requiring unescorted access to a Restricted Area receive annual continuing ~~re~~training. ~~Contents of the formal radiation protection training program are reviewed and updated as required at least every two years~~Contents of the radiation protection program is reviewed and updated through curriculum meetings at least every two years by the Programs Manager or Radiation Protection Manager to ensure that the programs are current and adequate. LBCDR 08-0015

modify operating and maintenance procedures in ways that could reduce the likelihood of occurrence of an inadvertent nuclear criticality.

- The NCS program will be used to establish and maintain NCS safety limits and NCS operating limits for IROFS in nuclear processes and a commitment to maintain adequate management measures to ensure the availability and reliability of the IROFS.
- NCS postings will be provided and maintained current.
- NCS emergency procedure training will be provided.
- The NCS baseline design criteria requirements in 10 CFR 70.64(a) (CFR, 2003c) will be adhered to.
- The NCS program will be used to evaluate modifications to operations, to recommend process parameter changes necessary to maintain the safe operation of the facility, and to select appropriate IROFS and management measures.
- The NCS program will be used to promptly detect NCS deficiencies by means of operational inspections, audits, and investigations. Deficiencies will be entered into the corrective action program so as to prevent recurrence of unacceptable performance deficiencies in IROFS, NCS function or management measures.
- NCS program records will be retained as described in Section 11.7, Records Management.

Training will be provided to individuals who handle nuclear material at the facility in criticality safety. The training is based upon the training program described in ANSI/ANS-8.20, Nuclear Criticality Safety Training. The training program is developed and implemented with input from the criticality safety staff, training staff, and management. The training focuses on the following:

- Appreciation of the physics of nuclear criticality safety.
- Information obtained from the analysis ~~Analysis~~ of jobs and tasks in accordance with Section 11.3. ~~to determine what a worker must know to perform tasks efficiently.~~

LBCDR 08-0015

~~•Design and development of learning objectives based upon the analysis of jobs and tasks that reflect the knowledge, skills, and abilities needed by the worker.~~

~~•Implementation of revised or temporary operating procedures.~~

Additional discussion of management measures is provided in Chapter 11, Management Measures.

### 5.1.2 Control Methods for Prevention of Criticality

The major controlling parameters used in the facility are enrichment control, geometry control, moderation control, and/or limitations on the mass as a function of enrichment. In addition, reflection, interaction, and heterogeneous effects are important parameters considered and applied where appropriate in nuclear criticality safety analyses. Nuclear Criticality Safety Evaluations and Analyses are used to identify the significant parameters affected within a particular system. All assumptions relating to process, equipment, material function, and operation, including credible abnormal conditions, are justified, documented, and independently reviewed. Where possible, passive engineered controls are used to ensure NCS. The determination of the safe values of the major controlling parameters used to control criticality in the facility is described below.

Maintenance activities generally fall into the following categories:

A. Surveillance/monitoring

B. Corrective maintenance

C. Preventive maintenance

D. Functional testing.

A more detailed description of the maintenance program and maintenance management system can be found in Section 11.2, Maintenance.

### 6.4.5 Training

Training in chemical process safety is provided to individuals who handle licensed materials and other chemicals at the facility. The training program is developed and implemented with input from the chemical safety staff, training staff, and management. The program includes the following:

A. Development of chemical safety awareness throughout the facility so that individuals know their roles and responsibilities in coordinating chemical release mitigation activities – in support of the Emergency Plan – in the event of a severe chemical release.

B. Information obtained from the analysis ~~Analysis~~ of jobs and tasks in accordance with Section 11.3 ~~to determine what a worker must know to perform tasks efficiently~~

~~B. Design and development of learning objectives based upon the analysis of jobs and tasks that reflect the knowledge, skills, and abilities needed by the worker~~

~~C. Design and development of qualification requirements for positions where a level of technical capability must be achieved and demonstrated for safe and reliable performance of the job function~~ LBCDR 08-0015

~~D. Development and implementation of standard and temporary operating procedures~~

~~E. Development and implementation of proper inspection, test, and maintenance programs and procedures~~

~~F. Development of chemical safety awareness throughout the facility so that all individuals know what their roles and responsibilities are in coordinating chemical release mitigation activities - in support of the Emergency Plan - in the event of a severe chemical release~~

~~G. Coordination of chemical process safety training curriculum with that of other areas including, radiological safety, criticality safety, facility operations, emergency response, and related areas.~~

~~A more detailed description of the training program can be found in Section 11.3, Training and Qualifications.~~

### 6.4.6 Procedures

A key element of chemical process safety is the development and implementation of procedures that help ensure reliable and safe operation of chemical process systems.

Emergency procedures address the preplanned actions of operators and other plant personnel in the event of an emergency.

A more detailed description of the procedural development and management program can be found in Section 11.4, Procedures Development and Implementation.

### 6.4.7 Chemical Safety Audits

Audits are conducted to determine that plant operations are performed in compliance with regulatory requirements, license conditions, and written procedures. As a minimum, they assess activities related to radiation protection, criticality safety control, hazardous chemical safety, fire protection, and environmental protection.

Audits are performed in accordance with a written plan, which identifies and schedules audits to be performed. Audit team members shall not have direct responsibility for the function and area being audited. Team members have technical expertise or experience in the area being audited and are indoctrinated in audit techniques. Audits are conducted on an annual basis on select functions and areas as defined above. The chemical process safety functions and areas will be audited at least triennially.

Qualified staff personnel that are not directly responsible for production activities are utilized to perform routine surveillances/assessments. Deficiencies noted during the inspection requiring corrective action are forwarded to the manager of the applicable area or function for action. Future surveillances/assessments include a review to evaluate if corrective actions have been effective.

A more detailed description of the audit program can be found in Section 11.5, Audits and Assessments.

### 6.4.8 Emergency Planning

The NEF has a facility emergency plan and program which includes response to mitigate the potential impact of any process chemical release including requirements for notification and reporting of accidental chemical releases.

~~The LES fire brigade/emergency response team is outfitted, equipped, and trained to provide hazardous material response and mitigation commensurate with the requirements of 29 CFR 1910.120, Hazardous waste operations and emergency response (CFR, 2004). This includes a technician level qualified entry and backup team with supporting emergency medical function, incident command, and a safety officer. The safety officer has the additional responsibility to monitor response activities to ensure that criticality safety is maintained.~~ LBDCR-07-0042

The City of Hobbs, NM Fire Department is the nearest offsite response agency who can supplement LES with additional Hazardous Waste Operations and Emergency Response (HAZWOPER) response teams. As a result of a baseline needs assessment conducted on offsite response, LES has committed to assist the local offsite fire agency, Eunice Fire and Rescue, in obtaining the equipment and training to also provide a HAZWOPER compliant response team.

Additional information on emergency response can be found in SAR Section 7.5.2, Fire Emergency Response, and in the NEF Emergency Plan.

## Table 6.1-1 Chemicals – Hazardous Properties

| Form | Chemical | Class | Chemical Formula | Corrosive | Flammable | Combustible | Oxidizer | Reactive | Toxic | Radioactive | Hazard | Irritant | Remarks | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Refrigerant R410a | | | | | | | | | | | | | LBDCR-08-0083 |
| | Refrigerant R407c | | | | | | | | | | | | | |
| | R23 trifluoromethane | 2 | $CHF_3$ | | | | | | | | | | Note 3 | |
| | R404A fluoroethane blend | 2 | $C_2HF_5$ / $C_2H_3F_3$ / $C_2H_2F_4$ | | | | | | | | | | Note 3 | |
| | R507 penta/tri fluoroethane | 2 | $C_2HF_5$ / $C_2H_3F_3$ | | | | | | | | | | Note 3 | |
| | detergent | 3 | | | | | | | | | | | Note 3 | |
| | laundry effluent water | 3 | | | | | | | | | | | Note 1 | |
| | PFPE (Fomblin) oil | 2 | | | | | | | | | | | Note 3 | |
| | floor wash water | 3 | | | | | | | | | | | Note 1 | |
| | citric acid, 5-10% | 2 | | | | | | | | | | | Note 3 | |
| | degreaser water | 3 | | | | | | | | | | | Note 1 | |
| | degreaser sludge | 3 | | | | | | | | | | | Note 1 | |
| | standard solutions | 3 | | | | | | | | | | | Note 2 | |
| | urine | 3 | | | | | | | | | | | Note 3 | |
| | nitrogen | 2 | $N_2$ | | | | | | | | | | Note 3 | |
| | miscellaneous chemicals (utilities) | 3 | | | | | | | | | | | Note 2 | |
| | potassium or sodium hydroxide | 3 | KOH/NaOH | ✓ | | | | | | | | | | |
| | hydrocarbon sludge | 3 | | | | ✓ | | | | | | | | |
| | hydrogen fluoride | | HF | ✓ | | | | | ✓ | | | | Byproduct – no NEF class | LBDCR-08-0037 |

## Table 6.1-3 Chemicals – Centrifuge Assembly Building

| CHEMICAL/PRODUCT | | | INVENTORY BY LOCATION | | | REMARKS |
|---|---|---|---|---|---|---|
| NAME | FORMULA | PHYSICAL STATE | CENTRIFUGE ASSEMBLY AREA | CENTRIFUGE TEST FACILITY | CENTRIFUGE POST MORTEM FACILITY | |
| ethanol | $C_2H_6O$ | liquid | 40 L (10.6 gal) | | | Note 1 |
| methylene chloride | $CH_2Cl_2$ | liquid | 40 L (10.6 gal) | | | Note 1 |
| uranium hexafluoride | $UF_6$ | gas/solid | | 50kg (110 lb) | Residual | Notes 2 & 3 |
| helium | He | gas | 440 $m^3$ (15536 $ft^3$) | | | Gas volume is at Std. Conditions. |
| argon | Ar | gas | 190 $m^3$ (6709 $ft^3$) | | | Gas volume is at Std. Conditions. |
| activated carbon | C | granules | | 10 kg (22.1 lb) | | |
| aluminum oxide | $Al_2O_3$ | granules | | 20 kg (44.1 lb) | | |
| Refrigerant R410a | | | | | | |
| Refrigerant R407c | | | | | | |

LBDCR-08-0083

NOTES:

1. In the Centrifuge Assembly Area, ethanol and methylene chloride are used as cleaning agents. Total quantity of both solvents used in one year is 80 L (21.2 gal).

2. Centrifuges in the Centrifuge Post Mortem Facility are considered contaminated based on previous operation with $UF_6$. Once in the Centrifuge Post Mortem Facility they will not contain significant amounts of $UF_6$.

3. In the Centrifuge Test Facility 50 kg (110 lb) of $UF_6$ is contained in a feed vessel, test centrifuges, and a take-off vessel. Physical state will vary depending on testing in progress.

## 7.3 FACILITY DESIGN

The design of the facility incorporates the following:

- Limits on areas and equipment subject to contamination
- Design of facilities, equipment, and utilities to facilitate decontamination.

### 7.3.1 Building Construction

The facility consists of several different buildings or functional areas:

- Visitor Center (within the Security Building)
- Security Building and Gatehouses
- Administration Building
- Technical Services Building (TSB)
- Central Utilities Building (CUB).
- Separations Building (consisting of three Separations Building Modules), which include:
  - $UF_6$ Handling Area
  - Cascade Halls
  - Process Services Area.
- Cylinder Receipt and Dispatch Building (CRDB)
- Blending and Liquid Sampling Area
- Centrifuge Assembly Building (CAB)
- Centrifuge Test and Centrifuge Post Mortem Facilities (within the CAB)
- UBC Storage Pad
- Fire Water Pump Building.

The Security Buildings, Administration Building, Fire Water Pump Building and Tanks and CUB are independent of the rest of the plant main buildings. The CAB, Security Building, Administration Building, Fire Water Pump Building and the CUB are provided with automatic sprinkler protection. The remaining buildings/areas have no automatic sprinkler protection. LBDCR-08-0076

The TSB, Separations Building, CRDB, Blending and Liquid Sampling Area, are pre-cast concrete frame and concrete panel construction with an upside down ballasted roof system over pre-cast concrete tees. This construction is classified as Type I-B Construction by the New Mexico Commercial Building Code (NMCBC) and as a Type II (222) Construction by NFPA 220. The CAB, Administration Building, and Fire Water Pump Building are unprotected steel frame buildings with insulated metal panel exterior walls and with built-up roofing on metal deck roof. This construction is classified as Type II-B Construction by the NMCBC and as a Type II (000) Construction by NFPA 220. The Site Security Buildings are steel frame buildings with insulated metal panel exterior walls and with built-up roofing on metal deck roof. This construction is classified as Type II-B Construction by the NMCBC and as a Type II (000) Construction by NFPA 220. LBDCR-08-0076

# 7.5 FIRE PROTECTION AND EMERGENCY RESPONSE

This section documents the fire protection systems and fire emergency response organizations provided for the facility.

## 7.5.1 Fire Protection System

The facility fire protection systems consist of a dedicated fire water supply and distribution system, automatic suppression systems (sprinklers and alternate systems), standpipe and hose systems, portable fire extinguishers, fire detection and alarm systems, fire pump control systems, valve position supervision, system maintenance and testing, fire prevention program, fire department/fire brigade response and pre-fire plans.

### 7.5.1.1 Fire Water Supply and Distribution System

A single Fire Protection Water Supply System provides storage and distribution of water to the Fire Protection System that protects the entire facility as shown in Figure 7.5-1, Exterior Fire Protection System Overall Site Plan, and Figure 7.5-2, Sprinkler System Coverage.

7.5.1.1.1 System Description

A reliable fire protection water supply and distribution system of adequate flow, pressure, and duration is provided based on the characteristics of the site and the FHA. The fire protection water supply and distribution system is based on the largest fixed fire suppression system demand, including a hose stream allowance, in accordance with NFPA 13. The fire protection water supply consists of two 946,354-lL (250,000-gal) (minimum) water storage tanks designed and constructed in accordance with NFPA 22. The tanks are used for both fire protection water supply and process water supply. A reserve quantity of 681,000 L (180,000 gal) is maintained in the bottom of each tank for fire protection purposes. The elevation of the suction line for the process water pump is above the level of the required fire protection water supply in each tank. Thus the process water pump cannot pump water required for fire protection purposes. The fire protection water supply in each tank is sized for the maximum anticipated water supply needed to control and extinguish the design basis fire at the facility. Two, 3785 l/min at ~~10.35~~11.03 bar ( 1500 gpm at ~~150~~ 160 psi) horizontal, centrifugal, fire pumps designed and installed in accordance with NFPA 20 are provided. For redundancy the capacity of the fire protection water supply is designed to ensure that 100% of the required flow rate and pressure are available in the event of failure of one of the water storage tanks or fire pumps. The maximum demand anticipated based on a design basis fire is 3785 l/min (1000 gpm) based on 1982 l/min (500 gpm) flowing from a building sprinkler system plus 1982 l/min (500 gpm) for hose streams for a duration of two hours. The tanks are arranged so that one will be available for suction at all times. LBDCR-08-0077

Fill and make up water for the storage tanks are from the city water supply to the site which is capable of filling the firewater reserve portion of either storage tank in an 8-hour period.

The fire water service main for the plant is designed and installed in accordance with NFPA 24. The distribution system, including piping associated with the fire pumps is looped and arranged so that a single pipe break or valve failure will not totally impair the system per the Fire Hazard Analysis and NFPA 801. Through appropriate valve alignment, either fire pump can take suction from either storage tank and discharge through either leg of the underground piping loop. The system piping is sized so that the largest sprinkler system demand (including hose

stream allowance) is met with the hydraulically shortest flow path assumed to be out of service. Sectional control valves are arranged to provide adequate sectional control of the fire main loop to minimize protection impairments. All fire protection water system control valves are monitored under a periodic inspection program and their proper positioning is supervised in accordance with NFPA 801. Exterior fire hydrants, equipped with separate shut-off valves on the branch connection, are provided at intervals to ensure complete coverage of all facility structures, including the UBC Storage Pad.

The fire pumps are separated from each other by fire-rated barrier construction. Both pumps are diesel engine-driven. Each pump is equipped with a dedicated listed controller. The pumps are arranged for automatic start functions upon a drop in the system water pressure as detected by pressure switches contained within the pump controllers. ~~Use of start delay timers~~The start pressure logic prevents simultaneous start of both pumps. Each fire pump controller interfaces with the site-wide protective signaling system for all alarm and trouble conditions recommended by NFPA 20, which are monitored and annunciated at the central alarm panel in the Control Room. Once activated, the fire pumps can only be shut-off at the pump controller location. Pumps, suction and discharge piping and valves are all provided and arranged in accordance with the recommendations of NFPA 20. Dedicated diesel fuel tanks are provided for each pump. These tanks are located in the Fire Water Pump Building and are sized to provide a minimum eight hour supply of fuel in accordance with the recommendations of NFPA 20. The Fire Water Pump Building is provided with automatic sprinkler protection. LBDCR-08-0077

A jockey pump is provided in the Fire Water Pump Building to maintain pressure in the fire protection system during normal operation.

7.5.1.1.2 System Interfaces

The Fire Protection Water Supply System interfaces with the city water supply that supplies fill and make up water to the fire water supply storage tanks.

7.5.1.1.3 Safety Considerations

Failure of the Fire Water Supply and Distribution System will not endanger public health and safety. The system is designed to assure water supply to automatic fire protection systems, standpipe systems and to fire hydrants located around the facility. This is accomplished by providing redundant water storage tanks and redundant fire pumps which are not subject to a common failure, electrical or mechanical.

### 7.5.1.2 Standpipe and Hose Systems

As required by the FHA, standpipe systems and interior fire hose stations are provided and installed in accordance with NFPA 14 in the following locations:

- Class I or Class II standpipe systems for are provided in the CUB, CAB, CRDB, TSB, and the Separations Building Modules.

The systems are designed in accordance with NFPA 14. The systems are separated from the building sprinkler system. The separation ensures that a single impairment will not disable both the sprinklers and the hose systems.

In addition to fixed standpipes and fire hose stations, the NEF will be provided with fire hose on mobile apparatus and/or at strategic locations throughout the facility. The amount of hose provided will be sufficient to ensure that all points within the facility will be able to be reached by at least two ~~38 mm (1½-in) diameter attack hose lines and one~~ 64 mm (2½-in) diameter backup hose lines consistent with NFPA 1410. These lines are intended for use by the ~~offsite fire response agencies~~fire brigade in the event of a structural fire. Hydraulic margin for these hose lines will be sufficient to ensure minimum nozzle pressures of 4.5 bar (65 psia) for attack hose line(s) and 6.9 bar (100 psia) for the backup hose line. LBDCR-08-0079

### 7.5.1.3 Portable Extinguishers

Portable fire extinguishers are installed throughout all buildings in accordance with NFPA 10. Multi-purpose extinguishers are provided generally for Class A, B, or C fires.

The portable fire extinguishers are spaced within the travel distance limitation and provide the area coverage specified in NFPA 10. Specialized extinguishers are located in areas requiring protection of particular hazards. Wheeled extinguishers are provided for use in water exclusion areas.

In areas with moderator control issues, the chemical fill for the extinguishers is carbon dioxide and dry chemical and has been selected so as not to create an uncontrolled moderator source.

### 7.5.1.4 Automatic Suppression Systems

Wet pipe sprinkler systems are engineered to protect specific hazards in accordance with parameters established by the FHA. Water flow detectors are provided to alarm and annunciate sprinkler system actuation. Sprinkler system control valves are monitored under a periodic inspection program and their proper positioning is supervised in accordance with NFPA 801 to ensure the systems remain operable. The areas of sprinkler system coverage are shown in Figure 7.5-2, Sprinkler System Coverage.

Automatic wet pipe sprinkler systems, designed and tested in accordance with NFPA 13, are provided in the following buildings:

- Administration Building
- Central Utilities Building (CUB)
- Centrifuge Assembly Building (CAB) LBDCR-08-0076
- Fire Pump House.

Fire rated enclosures are provided for several chemical traps located on the second floor of the Process Services Area in each Separations Building Module. These enclosures will be protected with a gaseous suppression system. The particular type of suppression system utilized will be determined in the final design and will be designed and installed in accordance with the applicable NFPA standard, NFPA 12 for carbon dioxide systems or NFPA 2001 for clean agent suppression systems.

with the applicable NFPA standard, NFPA 12 for carbon dioxide systems or NFPA 2001 for clean agent suppression systems.

### 7.5.1.5 Fire Detection Systems

All facility structures are provided with automatic fire detectors in accordance with NFPA 72 and as required by the FHA. Automatic fire detectors are installed in accordance with NFPA 72, International Fire Code and as required by the FHA.

### 7.5.1.6 Manual Alarm Systems

All facility structures are provided with manual fire alarm pull stations in accordance with NFPA 72, International Fire Code and as required by the FHA.

### 7.5.1.7 Fire Alarm System

Each building of the facility is equipped with a listed, ~~modular, multi-zone~~ fire alarm control panel installed in accordance with NFPA 72. Each panel has a dual power supply, consisting of normal building power and backup power by either 24-hour battery or the facility UPS. The method of backup power will be determined in final design. ~~Sprinkler system and hose station water flow detection devices are connected to separate control panel zone modules. Fire detector and manual pull station alarm circuits are also connected to dedicated control panel zone modules. Fire detector zone modules include detector confirmation features to reduce the potential for false alarms. Each zone module has individual disable switches so individual zones can be removed from service for maintenance and trouble shooting without disabling the entire control panel.~~ The panel and system use individually-addressable devices. Sprinkler system and hose station water flow devices are installed. Smoke and/or heat detectors, as well as manual pull stations are also employed. Each device can be removed from service for maintenance or trouble shooting without disabling the entire system. Features to avoid detector false alarms are also incorporated into the design. ~~–~~Each zone module has separate alarm and trouble contacts for connection to the central alarm panel in the Control Room. Activation of a fire detector, manual pull station or water flow detector results in an audible and visual alarm at the building control panel and the central alarm panel. LBDCR-08-0080

The central alarm panel, located in the Control Room, is a listed, microprocessor-based addressable console. The central alarm panel has dual power supplies, consisting of normal building power and backup power by either 24-hour battery or the facility UPS. The method of backup power will be determined in final design. The central alarm panel monitors all functions associated with the individual building alarm panels and the fire pump controllers. All alarm and trouble functions are audibly and visually annunciated by the central alarm panel and automatically recorded via printout. Failure of the central alarm panel will not result in failure of any building fire alarm control panel functions.

The following conditions are monitored by the central alarm console through the fire pump controllers:

- Pump running
- Pump failure to start
- Pump controller in "off" or "manual" position

- Battery failure
- Diesel overspeed
- Diesel high engine jacket coolant temperature
- Diesel low oil pressure
- Battery charger failure.

Both pumps are maintained in the automatic start condition at all times, except during periods of maintenance and testing. Remote manual start switches are provided in the Control Room adjacent to the alarm console. Pumps are arranged for manual shut-off at the controllers only.

All fire protection water system control valves are monitored under a periodic inspection program and their proper positioning is supervised in accordance with NFPA 801.

### 7.5.2 Fire Emergency Response

#### 7.5.2.1 Fire Brigade

The facility maintains a fire brigade made up of employees trained in fire prevention, fire fighting techniques, first aid procedures, emergency response, and criticality safety. The criticality safety training addresses water moderation, water reflection, product cylinder safety by moderation control, and water flooding. The fire brigade is organized, operated, trained and equipped in accordance with NFPA 600. The fire brigade is considered an incipient fire brigade as classified under NFPA 600, e.g., not required to wear thermal protective clothing nor self-contained breathing apparatus during firefighting. The intent of the facility fire brigade is to be able to handle all minor fires and to be a first response effort designed to supplement the local fire department for major fires at the plant. The fire brigade members are trained and equipped to respond to fire emergencies and contain fire damage until offsite help from a neighboring fire department arrives. This will include the use of hand portable and wheeled fire extinguishers as well as hoselines to fight interior/exterior incipient fires and to fight larger exterior fires in a defensive mode (e.g., vehicle fires). When the local fire department arrives onsite, the local fire department assumes control and is responsible for all fire fighting activities. The plant fire brigade, working with the plant's Emergency Operations Center, will coordinate offsite fire department activities to ensure moderator control and criticality safety. ~~The fire brigade is staffed so that there are a minimum of five fire brigade members available per shift. The fire brigade includes a safety officer who is responsible to ensure that moderator concerns for criticality safety are considered during firefighting activities.~~

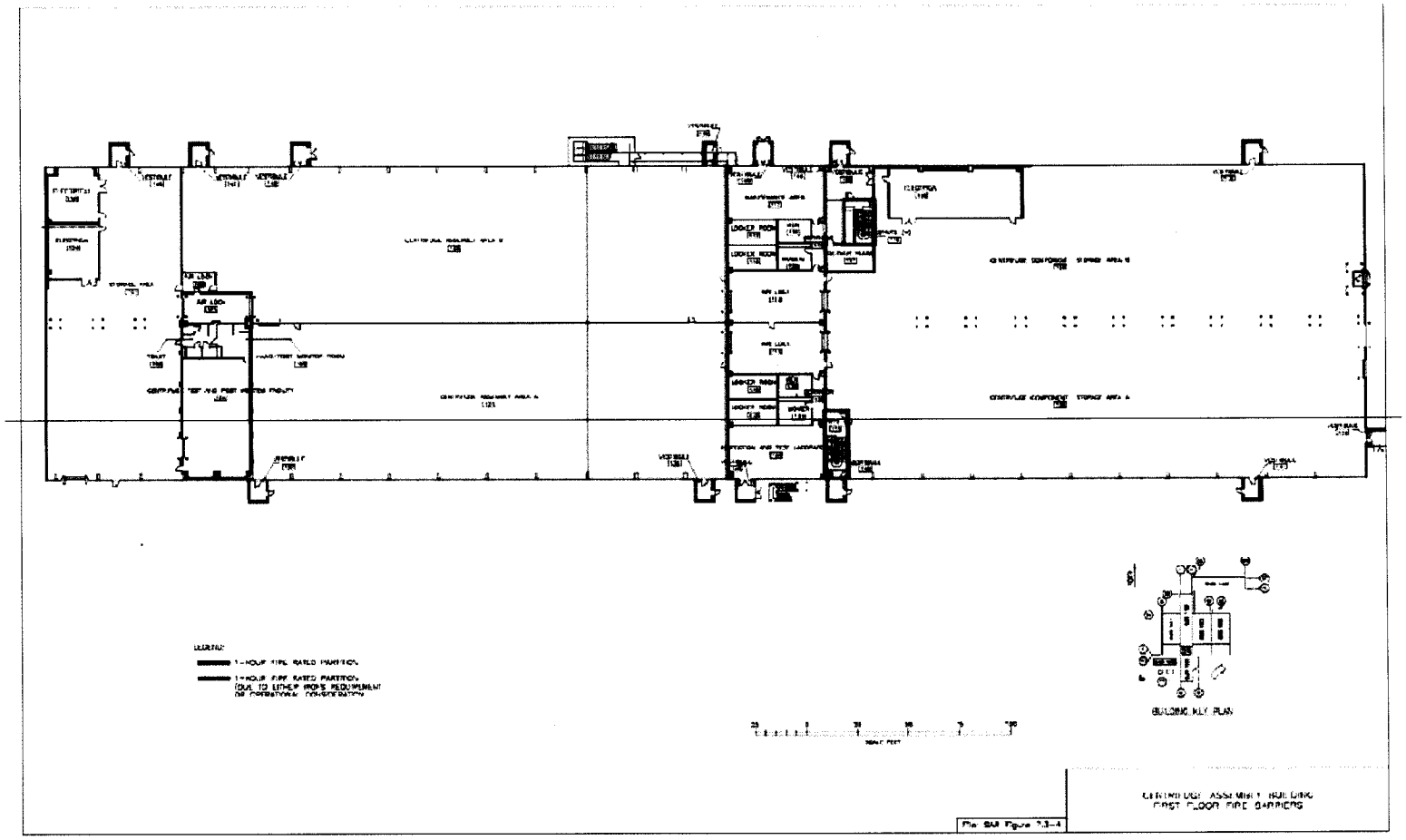
LBDCR-07-0042

Periodic training is provided to offsite assistance organization personnel in the facility emergency planning procedures. Facility emergency response personnel meet at least annually with each offsite assistance group to accomplish training and review items of mutual interest including relevant changes to the program. This training includes facility tours, information concerning facility access control (normal and emergency), potential accident scenarios, emergency action levels, notification procedures, exposure guidelines, personnel monitoring devices, communications, contamination control, moderator control issues, and the offsite assistance organization role in responding to an emergency at the facility, as appropriate.

responders are needed in more than one facility location, the criticality safety role of the NEF fire brigade safety officer is fulfilled by appropriately trained NEF personnel (typically fire brigade members). These NEF personnel are trained in criticality safety and trained and equipped to don structural firefighting gear to accompany the offsite responders to required facility locations.

~~In order to respond to airborne release emergencies or other chemical incidents, NEF will maintain full hazardous material response capability.~~ This is further described in SAR Section 6.4.8, Emergency Planning. LBDCR-07-0042

Through a combination of onsite capability, offsite responders, or through contract arrangements, LES will ensure that capabilities are in place to respond to other events such as confined space rescue, trench rescue, high angle rescue, and other technical emergencies as required. The NEF fire brigade/emergency response team equipment will also be inventoried, inspected and tested in accordance with recognized standards. Final needs for these response areas and response equipment will be reassessed after detailed facility design to ensure adequate response capabilities are in place and training completed prior to any construction activities.



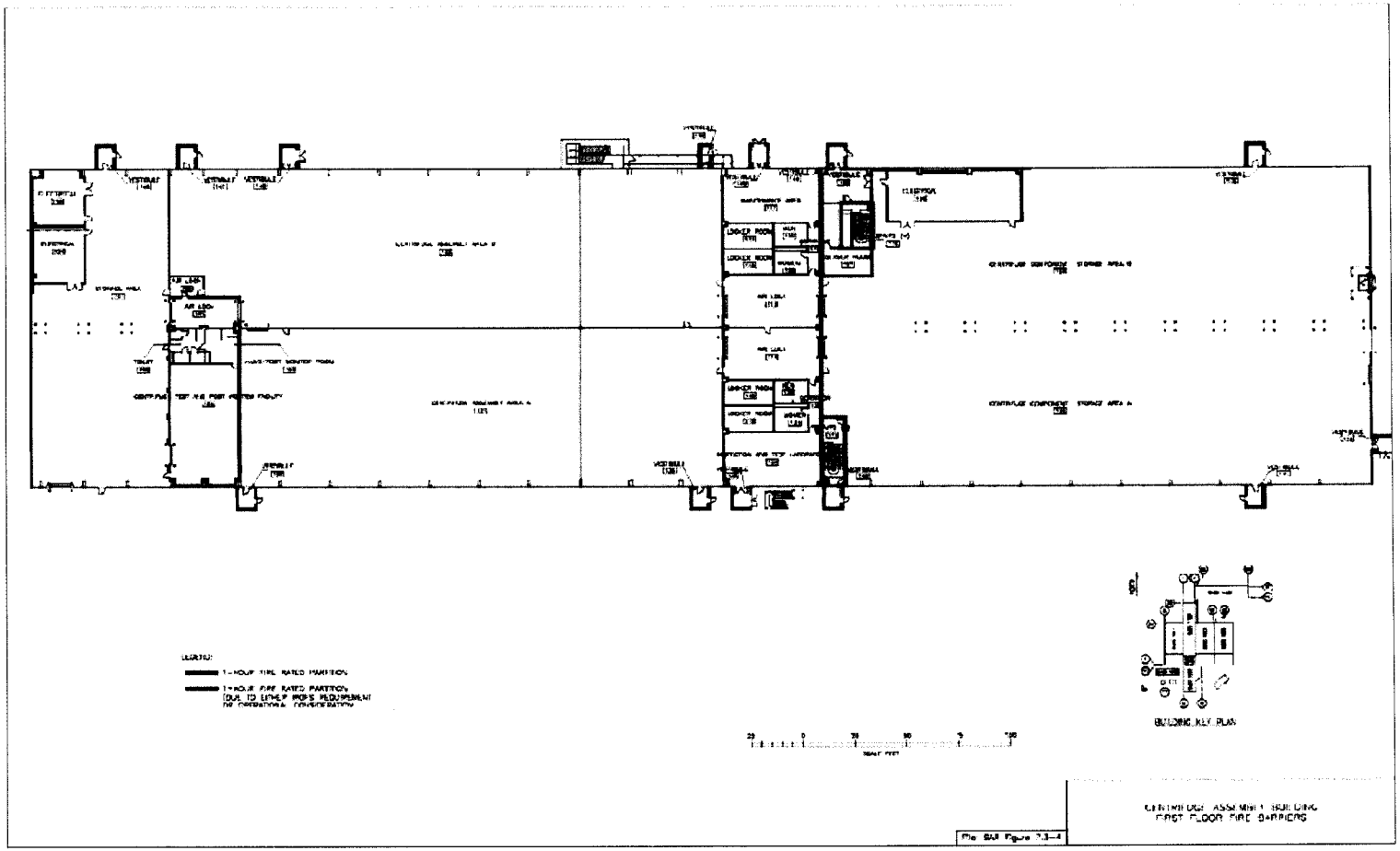
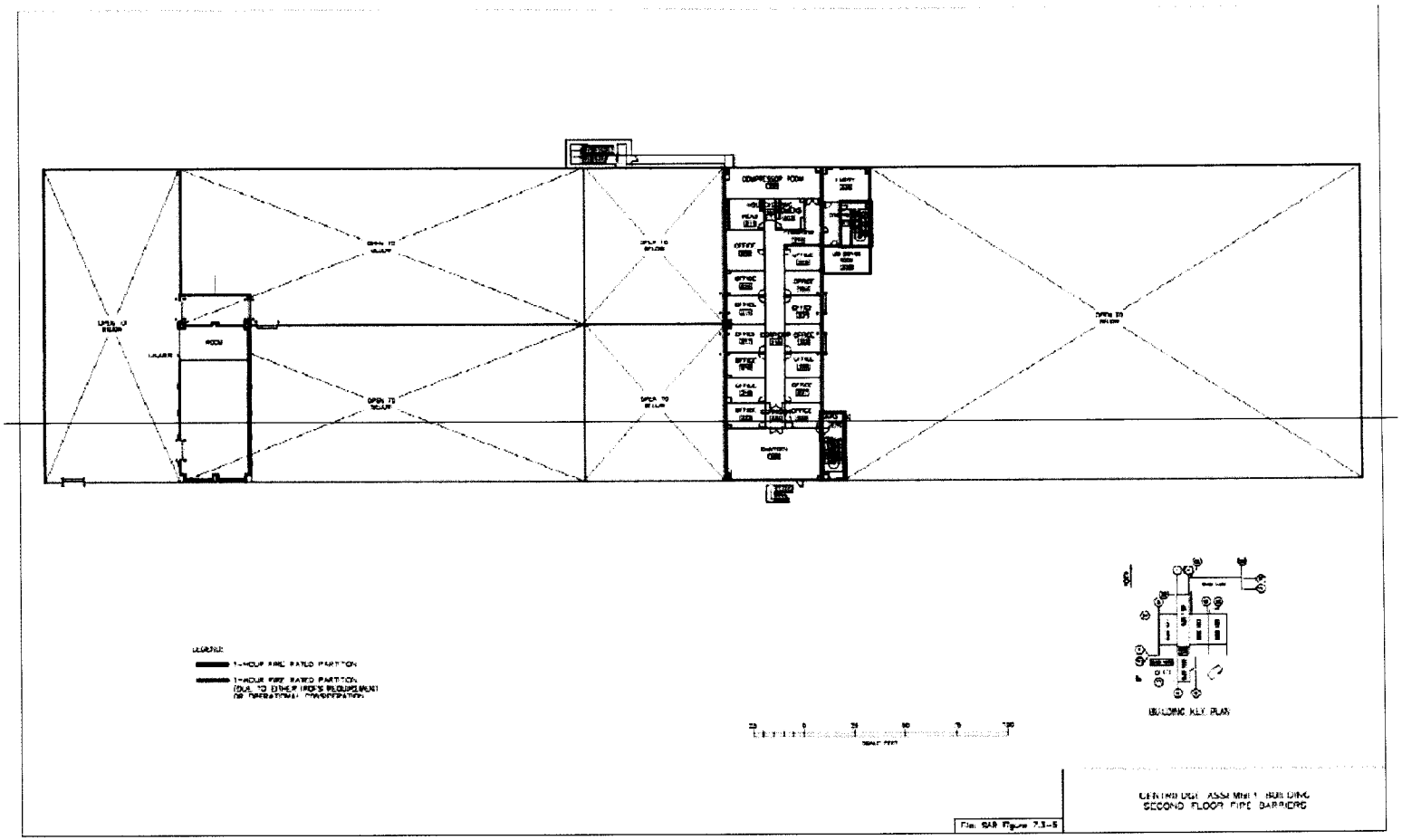


**Figure 7.3-4 Centrifuge Assembly Building First Floor Fire Barriers**



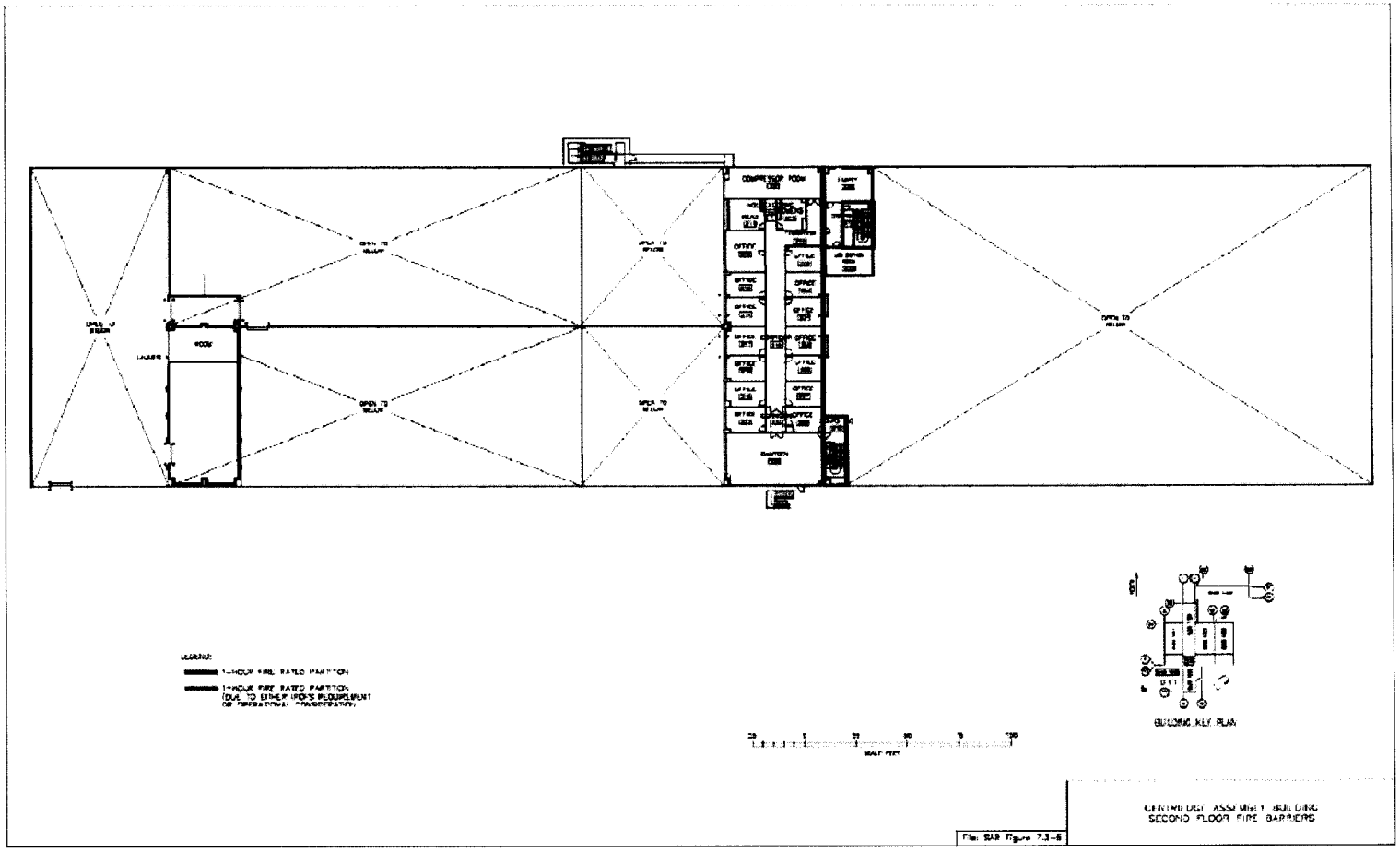


**Figure 7.3-5 Centrifuge Assembly Building Second Floor Fire Barriers**

## 11.3 TRAINING AND QUALIFICATIONS

This section describes the training program for the operations phase of the facility, including preoperational functional testing and initial startup testing. The operations phase is defined as the commercial production of enriched material. The training program requirements apply to those plant personnel who perform activities ~~relied on for safety~~that affect IROFS, or items that may affect the function of IROFS. LBCDR 08-0015

The QA Program provides training and qualification requirements, during the design, construction, and operations phases, for QA training of personnel performing QA levels 1 and 2 work activities; for nondestructive examination, inspection, and test personnel; and for QA auditors.

The principle objective of the LES training program system is to ensure job proficiency of ~~all~~ facility personnel ~~involved in work~~ through effective training and qualification. The training program system is designed to accommodate future growth and meet commitments to comply with applicable established regulations and standards. Employees are provided with training to establish the knowledge foundation and on-the-job training to develop work performance skills. Continuing training is provided, as required, to maintain proficiency in these knowledge and skill components, and to provide further employee development. LBCDR 08-0015

Qualification is indicated by successful completion of prescribed training, demonstration of the ability to perform assigned tasks and ~~where required by~~the maintenance of requirements established by regulation~~;. maintaining a current and valid license issued by the agency establishing the requirements.~~ Training is designed, developed and implemented according to a systematic approach. A systematic approach may be a graded approach that applies the level of detail needed relative to safety. A graded approach incorporates other acceptable methods to accomplish the analysis, design, development, implementation, and evaluation of training. ~~Employees are provided with formal training to establish the knowledge foundation and on-the-job training to develop work performance skills. Continuing training is provided, as required, to maintain proficiency in these knowledge and skill components, and to provide further employee development.~~ LBCDR 08-0015

~~11.3.1~~Organization and Management of the Training Function

Line managers have ~~are responsible~~ responsibility for and authority to develop and effectively conduct training for their personnel. ~~for the content and effective conduct of training for their personnel.~~ Training responsibilities for line managers are included in position descriptions, ~~and line managers are given the authority to implement training for their personnel.~~ The training organization provides support to line managers by facilitating the planning, directing, analyzing, developing, conducting, evaluating, and controlling of a systematic performance-based training process. Performance-based training is used as the primary management tool for analyzing, designing, developing, conducting, and evaluating training.

Facility ~~administrative~~ procedures establish the requirements for ~~indoctrination and~~the training of personnel performing activities related to IROFS ~~relied on for safety and to~~Additionally they ensure ~~that~~ the training program is conducted in a reliable and consistent manner ~~throughout all training areas~~. Procedures also allow for ~~E~~exceptions from training ~~requirements may be granted~~ when justified and properly documented ~~in accordance with procedures~~ and approved by appropriate management. LBCDR 08-0015

Lesson plans or other approved process controlling documents are used for classroom and on-the-job training to provide consistent presentation of subject matter. When design changes or facility modifications are implemented, updates of applicable lesson plans are included in the change control process of the configuration management program. During the design and construction phase of this project, initial lesson plans are developed as the material is finalized. LBCDR 08-0015

~~Training records are maintained to support management information needs associated with personnel training, job performance, and qualifications.~~ LBCDR 08-0015

~~The t~~Training programs and training records at the facility are the responsibility of the Training Manager. Training records are maintained to support management information needs associated with personnel training, job performance, and qualification. Records are maintained on each employee's qualifications, experience, training and retraining. The employee training file shall include records of all general employee training, technical training, and employee development training conducted at the facility. The employee training file shall also contain records of special company sponsored training conducted by others. The training records for each individual are maintained so that they are accurate and retrievable. Training records are retained in accordance with the records management procedures.

### ~~11.3.2~~11.3.1 Analysis and Identification of Functional Areas Requiring Training

A needs/job analysis is performed and tasks are identified to ensure that appropriate training is provided to personnel working on tasks related to IROFS. Identification of job hazards are referred to as precautions and limitations in the procedure related to that task. These limits and precautions will be part of the needs/job analysis performed for that task.

The training organization consults with ~~relevant technical and~~ management personnel ~~as necessary~~ to develop a list of tasks for which personnel training for specific jobs is required ~~appropriate~~. The list of tasks selected for training is reviewed and compared to the training materials as part of the systematic evaluation of training effectiveness. The task list is also updated periodically as necessitated by changes in procedures, processes, plant systems, equipment, or job scope. LBCDR 08-0015

### ~~11.3.3~~11.3.2 Position Training Requirements

Minimum training requirements are developed for those positions whose activities are ~~relied on for safety.~~related to IROFS. ~~Initial identification of job-specific training requirements is based on experience. Entry-level criteria (e.g., education, technical background, and/or experience) for these positions are contained in position descriptions.~~Entry-level criteria (e.g., education, technical background, and/or experience) for these positions are contained in position descriptions. LBCDR 08-0015

The training program is designed to prepare initial and replacement personnel for safe, reliable and efficient operation of the facility. Appropriate training for personnel of various abilities and experience backgrounds is provided. The level at which an employee initially enters the training program is determined by an evaluation of the employee's past experience, level of ability, and qualifications.

Facility personnel may be trained through participation in prescribed parts of the training program that consists of the following:

- General Employee Training
- Technical Training
- Employee Development/Management-Supervisory Training.

Training is made available to facility personnel to initially develop and maintain minimum qualifications outlined in Chapter 2, Organization and Administration, as described in 2.24, Personnel Qualification Requirments.. The objective of the training shall be to ensure safe and efficient operation of the facility and compliance with applicable established regulations and requirements. Training requirements shall be applicable to, but not necessarily restricted to, those personnel within the plant organization who have a direct relationship to the operation, maintenance, testing or other technical aspect of the facility IROFS. Training courses are updated prior to use ~~kept up-to-date~~ to reflect plant modifications and changes to procedures when applicable. LBCDR 08-0015

Continuing ~~or periodic re~~training courses shall be established when applicable to ensure that personnel remain proficient. ~~Periodic retraining generally is conducted to ensure retention of knowledge and skills important to facility operations.~~ The training may consist of periodic retraining exercises, instruction, and review of subjects as appropriate to maintain proficiency of all personnel assigned to the facility. Section 7, Maintenance of Radiological Contingency Preparedness Capability, of the Emergency Plan provides additional information on personnel training for emergency response tasks. LBCDR 08-0015

### ~~11.3.3.1~~11.3.2.1 General Employee Training

General Employee Training encompasses those Quality Assurance, radiation protection, safety, emergency and administrative procedures established by facility management and applicable regulations. The safety training for the NEF complies with the applicable sections of Occupational Safety and Health Administration (OSHA) regulations such as 29 CFR 1910 (Occupational Safety and Health Standards), 1910.1200 (Hazard Communication), and with NRC regulations such as 10 CFR 20 (Standards for Protection Against Radiation) and

10 CFR 19 (Notices, Instructions and Reports to Workers: Inspection and Investigations). Continuing training in these areas is conducted ~~in these areas~~ as necessary to maintain employee proficiency. All persons under the supervision of facility management (including contractors) must participate in General Employee Training; however, certain facility support personnel, depending on their normal work assignment, may not participate in all topics of this training. Temporary maintenance and service personnel receive General Employee Training to the extent necessary to assure safe execution of their duties. ~~Certain portions of General Employee Training may be included in a New Employee Orientation Program.~~ LBCDR 08-0015 LBCDR 08-0015

General Employee Training topics are listed below:

- General administrative controls and procedure use
- Quality Assurance policies and procedures
- Facility systems and equipment
- Nuclear safety (See Section 11.3.3.1.1 - includes the use of dosimetry, protective clothing and equipment)
- Industrial safety, health and first aid

- Emergency Plan and implementing procedures
- Facility Security Programs (includes the protection of classified matter)
- Chemical Safety
- Fire Protection and Fire Brigade (see Section 11.3.3.1.2)

~~•New Employee Orientation.~~ LBCDR 08-0015

~~11.3.3.1.1~~11.3.2.1.1 Nuclear Safety Training

Training programs are established for the various types of job functions (e.g., ~~production~~ operations~~or~~, maintenance, radiation protection technician, contractor personnel) commensurate with criticality safety and/or radiation safety responsibilities associated with each such position. Visitors to the Controlled Access Area ~~are trained in the formal training program or~~ are escorted by trained personnel while in the Controlled Access Area. LBCDR 08-0015

~~This~~ Nuclear Safety training is highlighted to stress the high level of importance placed on the radiological, criticality and chemical safety of plant personnel and the public. This training is structured as follows:

A. Personnel access procedures ensure the completion of ~~formal~~ nuclear safety training prior to permitting unescorted access into the Controlled Access Area.

B. Training sessions covering criticality safety, radiation protection and emergency procedures are conducted on a regular basis to accommodate new employees or those ~~requiring retraining~~attending continuing training. Topics covered in these sessions depend upon the job responsibilities and ~~the training program~~ include the following – when applicable to the job responsibility: LBCDR 08-0015

   - Notices, reports and instructions to workers
   - Practices designed to keep radiation exposures ALARA
   - Methods of controlling radiation exposures
   - Contamination control methods (including decontamination)
   - Use of monitoring equipment
   - Emergency procedures and actions
   - Nature and sources of radiation
   - Safe use of chemicals
   - Biological effects of radiation
   - Use of personnel monitoring devices
   - Principles of nuclear criticality safety
   - Risk to pregnant females
   - Radiation protection practices
   - Protective clothing
   - Respiratory protection

- Personnel surveys.

Criticality safety training shall be in accordance with ANSI/ANS-8.19 and ANSI/ANS-8.20.

Individuals attending these sessions must pass an initial examination covering the training contents to assure the understanding and effectiveness of the training. The effectiveness of the training programs is also evaluated by audits and assessments of operations and maintenance personnel responsible for following the requirements related to the topics listed above.

Newly hired or transferred employees reporting for work prior to the next regularly scheduled training session must complete nuclear safety training prior to unescorted access into the Controlled Access Area.

Since contractor employees perform diverse tasks in the Controlled Access Area, ~~formal~~ training for these employees is designed to address the type of work they perform. In addition to applicable radiation safety topics, training contents may include Radiation Work Permits, special bioassay sampling, and special precautions for welding, cutting, and grinding in the Controlled Access Area.

These training programs are conducted by instructors assigned by the Training Manager as having the necessary knowledge to address criticality safety and radiation protection. Records of the training programs are maintained as described in Section 11.7, "Records Management."

C. Individuals requiring unescorted access to the Controlled Access Area receive annual ~~retraining~~continuing training. ~~Retraining for individuals is scheduled and reported by means of a computerized tracking system.~~

D. Contents of the formal nuclear safety training programs and the radiation protection programs are reviewed and updated through curriculum meetings at least every two years. These curriculum meetings are chaired by the Programs Manager, or designee, ~~to ensure that the programs are current and adequate. In addition, at least annually, the contents of the radiation protection sections of the nuclear safety training program are reviewed and updated, as required, by the Programs Manager or his designee.~~ LBCDR 08-0015

E. Operational personnel are further instructed in the specific safety requirements of their work assignments by qualified personnel ~~their immediate supervisor or delegate~~ during on-the-job training. Employees must demonstrate understanding of work assignment requirements based on observations by qualified personnel ~~their immediate supervisor or delegate~~ before working without direct supervision. Changes to work procedures including safety requirements are reviewed with operational personnel by their immediate supervisor or delegate. LBCDR 08-0015

F. ~~Radiation safety topics are also discussed and reviewed at least annually in roundtable safety meetings held by supervisors or delegates with their workers, and at other meetings held by managers with their employees.~~ LBCDR 08-0015

~~11.3.3.1.2~~Fire Brigade Training

The primary purpose of the Fire Brigade Training Program is to develop a group of facility employees skilled in fire prevention, fire fighting techniques, first aid procedures, and emergency response. They are trained and equipped to function as a team for the fighting of fires. The intent of the facility fire brigade is to be a first response effort designed to supplement

the local fire department for fires at the plant. The facility fire brigade is ~~and~~ not intended to replace local fire fighters. LBCDR 08-0015

The Fire Brigade Training program provides for initial training of all new fire brigade members, semi-annual classroom training and drills, annual practical training, and leadership training for fire brigade leaders.

### ~~11.3.3.2~~11.3.2.2 Technical Training

Technical training is designed, developed and implemented to assist facility employees in gaining an understanding of applicable fundamentals, procedures, and practices related to IROFS ~~common to a gas centrifuge uranium enrichment facility~~. Also, technical training is used to develop manipulative skills necessary to perform assigned work related to IROFS ~~in a competent manner~~. Technical training consists of four segments: LBCDR 08-0015

- Initial Training
- On-the-Job Training and Qualifications
- Continuing Training
- Special Training.

#### ~~11.3.3.2.1~~11.3.2.2.1 Initial Training

Initial job training is designed to provide an understanding of the fundamentals, basic principles, and procedures involved in work related to IROFS that ~~to which~~ an employee is assigned. This training may consist of, but is not limited to, live lectures, taped and filmed lectures, self-guided study, demonstrations, laboratories and workshops and on-the-job training. LBCDR 08-0015

Certain new employees or employees transferred from other sections within the facility may be partially or wholly qualified by reason of previous applicable training or experience. The extent of further training for these employees is determined by applicable regulations, performance in review sessions, comprehensive examinations, or other techniques designed to identify the employee's present level of ability.

Initial job training and qualification programs are developed for operations, maintenance and technical services classifications. Training for each program is grouped into logical blocks or modules and presented in such a manner that specific behavioral objectives are accomplished. Trainee progress is evaluated using written examinations, oral or practical tests. Depending upon the regulatory requirements or individual's needs and plant operating conditions, allowances are made to suit specific situations. Brief descriptions of modules that may be contained in the initial training programs are as follows:

Operator ~~ions~~ Initial Training LBCDR 08-0015

A. Fundamentals ~~General Systems~~

This training module provides the trainee with basic concepts and fundamentals. ~~in mathematics, physics, chemistry, heat transfer and electrical theory. Systems and components are taught in detail along with elementary process instrumentation and control. On-the-job orientation may be provided at an enrichment facility.~~

B. Plant Familiarization ~~Specific Systems~~

~~This training module provides basic instruction in system and component identification and basic system operating characteristics. It provides a general overview of enrichment plant equipment and acquaints the trainees with enrichment plant terminology and nomenclature and provides instruction describing basic system operations.~~The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the facility.

C. ~~Nuclear Preparatory~~Specific Systems

~~This training module develops the necessary concepts in basic nuclear physics, plant chemistry, basic thermodynamics, radiation protection, and enrichment theory. Experience in enrichment control and radiation protection is also provided. It is normally presented to operations personnel following the Systems Specific training module.~~This training module provided instruction in system and component identification and system operating characteristics. It provides specific instruction on enrichment plant equipment and acquaints the trainees with enrichment plant terminology and nomenclature. LBCDR 08-0015

D. ~~Plant Familiarization~~On the Job Training

~~The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the facility.~~This training provides the student with hands-on training to safely operate enrichment systems.

Mechanical Maintenance Initial Training

A. General Maintenance Fundamentals ~~Systems~~

~~This training module provides the trainee with basic concepts and fundamentals in mathematics, physics, chemistry, heat transfer and electrical theory. Systems and components are taught in detail along with elementary process instrumentation and control. On-the-job orientation may be provided at an enrichment facility~~This training module provides the trainee with basis maintenance concepts and fundamentals as well as an introduction to plant systems..

B. ~~Fundamental~~ Shop Basic Skills

~~This training module provides instruction in fundamentals of mechanical maintenance performance. It combines academic instruction with hands-on training to familiarize trainees with design operational and physical characteristics of enrichment facility components, and basic skills and procedures used to perform mechanical repairs and/or equipment replacement. Task training lists are integrated into this module to assure that each trainee attains a minimum level of performance. Tasks are assigned and trainees use work procedures to guide them through a task. Both radiological and industrial safety is stressed in all phases of this training module.~~This training module provides instruction in fundamentals of mechanical maintenance performance. It combines academic instruction with hands-on training to familiarize trainees with design, operational, and physical characteristics of enrichment facility components, and basic skills and procedures used to perform mechanical repairs and/or equipment replacement. LBCDR 08-0015

C. ~~Plant Familiarization~~Advanced Skills

~~The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the facility.~~ This training module provides plant specific component related training for designated mechanics.

~~Instrumentation and Electrical and Maintenance Initial Training~~Plant Control and Energy Systems

LBCDR 0 0015

A. General ~~Systems~~Maintenance Fundamentals

~~This training module provides the trainee with basic concepts and fundamentals in mathematics, physics, chemistry, heat transfer and electrical theory. Systems and components are taught in detail along with elementary process instrumentation and control. On-the-job orientation may be provided at an enrichment facility.~~ This training module provides the trainee with basis maintenance concepts and fundamentals as well as an introduction to the plant systems.

B. Basic Instrument and Electrical Skills

This training module provides the trainee with refresher training in Electrical and Electronic Fundamentals, Digital Techniques and Application, Instrumentation and Control Theory and Application, and an introduction to the types and proper use of measuring and test equipment commonly used in enrichment facilities, including the hazards of calibration errors and calibration during plant operation.~~.~~

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~~The module also provides the student a working knowledge of nuclear and non-nuclear instrumentation systems, overall integrated plant operation and control, and, in particular, the hazards of calibration errors and calibration during plant operation.~~

C. ~~Basic Performance~~Advanced Skills

~~The Fundamental Performance module familiarizes the trainee with plant test procedures, test equipment, and testing as well as plant records, reports, and data collection. It provides a basic understanding of thermodynamics used in testing plant heat transfer.~~ This training module provides plant specific component related training for designed Technicians.

D. ~~Plant Familiarization~~

~~The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the plant.~~

Health Physics and Chemistry Initial Training

~~A. General Systems~~

~~This training module provides the trainee with basic concepts and fundamentals in mathematics, physics, chemistry, heat transfer and electrical theory. Systems and components are taught in detail along with elementary process instrumentation and control. On-the-job orientation may be provided at an enrichment facility.~~

~~B~~A. Fundamental Health Physics

The Fundamental Health Physics Module presents to the trainees a more comprehensive and theoretical understanding of the nuclear processes with which they are involved. This module also provides for the orientation of employees to plant

systems and basic Radiation Protection topics. ~~In addition, the techniques for applying theory are presented in this module. Use is made of various non-automated counting and spectrographic equipment and portable survey instruments~~.

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B. Health Physics Specific

This training includes the use of plant specific equipment including portable instruments, lab equipment, and plant equipment. Administrative material is also presented in a more detailed manner.

C. Fundamental Chemistry

The Fundamental Chemistry module provides familiarization with chemistry theory, techniques, and procedures. This module also provides for the orientation of employees to plant systems and basic Chemistry topics. The overall goal of this module is familiarization necessary for chemistry technicians to be able to work safely and competently in the enrichment facility.

D. ~~Plant Familiarization~~ Chemistry Specific

~~The Plant Familiarization module provides for the orientation of employees to plant layout, plant systems, and practical laboratory and equipment work at the plant.~~ This training includes the use of plant specific equipment including portable instruments, lab equipment, and plant installed equipment.

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Engineer/~~Professional~~ Initial Training

This training is part of the technical staff and managers training program.

A. ~~Facility~~ Orientation

This training module covers administrative procedures, systems and components , and fundamental information related to enrichment plant operations including a basic understanding of how uranium is enriched. ~~provides an orientation to each section within the NEF. An on-the-job task list provides the trainee with training objectives that must be accomplished while working in the section.~~

B. ~~Basic Engineer/Professional Training~~Position Specific Training

~~The Basic Engineer/Professional Training provides a basic understanding of how uranium is enriched, the systems and components required for producing the final product, and the interrelationship of the various facility organizations in achieving the overall objective.~~ Provides training on job responsibilities and processes that prepare and qualify individuals to independently perform selected activities safely and effectively. The qualification guide identifies job performance requirements that must be accomplished while working in this section.

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C. ~~Enrichment/Chemical Engineer/Professional Training~~

~~The Enrichment/Chemical Engineer/Professional Training provides specific theoretical information related to enrichment plant operations. Topics (e.g., Thermal Science, Nuclear Physics) address applications in an enrichment facility.~~

~~D. Engineer/Professional Systems Training~~

~~The Engineer/Professional Systems Training provides an overview of plant systems, components and procedures necessary to operate an enrichment plant safely and efficiently.~~

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~~11.3.3.2.2~~11.3.2.2.2 On-the-Job Training and Qualifications

On-the-job training (OJT) is a systematic method of providing the required job related skills and knowledge for a position. This training is conducted in ~~the~~ an environment as closed to the work environment as feasible. Applicable tasks and related procedures make up the OJT/qualifications program for each technical area. ~~which~~Training is designed to supplement and complement training received through ~~formal~~ classroom, laboratory, and/or ~~simulator training.~~ The part-task trainer (PCS Trainer). ~~The objective of the program is to assure the trainee's ability to perform job tasks as described in the task descriptions and the Training and Qualification Guides.~~

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~~11.3.3.2.3~~Continuing Training

Continuing training is any training not provided as initial qualification ~~and~~ or basic training ~~which~~ that maintains and improves job-related knowledge and skills such as the following:

- Facility systems and component changes
- ~~OJT/Qualifications program retraining~~
- Policy and procedure changes
- Operating experience program documents review to include Industry and in-house operating experiences
- Continuing training required by regulation (e.g., emergency plan training)
- General employee, special, administrative, vendor, and/or advanced training topics supporting tasks that are elective in nature
- Training identified to resolve deficiencies (task-based) or to reinforce seldom used knowledge skills
- Refresher training on initial training topics
- Structured pre-job instruction, mock-up training, and walk throughs
- Quality awareness.
- Requalification Training
- Training designed to maintain proficiency

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~~Continuing Training and Retraining may overlap to some degree in definition; however, Retraining refers to specific training designed for proficiency maintenance.~~

Continuing Training consists of ~~formal~~ classroom and ~~and informal~~ components performed on a frequency needed to maintain proficiency on the job. Each Section's Continuing Training Program is developed from a systematic approach. ~~, using information from job performance and safe operation as a basis for determining the content of continuing training. Continuing training may be offered, as needed, on any of the topics listed above.~~

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Once the objectives for Continuing Training have been established, the methods for conducting the training may vary. The method selected must provide clear evidence of objective accomplishment and consistency in delivery.

~~11.3.3.2.~~411.3.2.2.3 Special Training

Special training involves those subjects of a unique nature required for a particular area of work. ~~Special training is usually given to selected personnel based on specific needs not directly related to disciplinary lines.~~ LBCDR 08-0015

### ~~11.3.~~411.3.3 Basis and Objectives for Training

Learning objectives identify the training content, as established by needs/job analyses and position-specific requirements. The task list from the needs/job analysis is used to develop action statements that describe the desired post-training performance. Objectives include the knowledge, skills, and abilities the trainee should demonstrate; the conditions under which required actions will take place; and the standards of performance the trainee should achieve upon completion of the training activity.

### ~~11.3.5~~11.3.4 Organization of Instruction, Using Lesson Plans and Other Training Guides

Lesson plans are developed from the learning objectives that are based on job performance requirements. Lesson plans and other training guides are developed under the guidance of the training function. Lesson plans are reviewed by the training function and, generally, by the organization cognizant of the subject matter. Lesson plans or other approved process controlling documents are approved prior to issue or use. Lesson plans are used for classroom training and on-the-job training as required and include Standards for evaluating acceptable trainee performance. LBCDR 08-0015

### ~~11.3.6~~11.3.5 Evaluation of Trainee Learning

Trainee understanding and command of learning objectives is evaluated through observation/demonstration or oral or written tests as appropriate. Such evaluations measure the trainee's skills and knowledge of job performance requirements.

Evaluations are performed by individuals qualified in the training subject matter.

### ~~11.3.7~~11.3.6 Conduct of On-the-Job Training

On-the-Job Training is an element of the technical training program (see Section 11.3.3.2.2, On-the-Job Training and Qualifications). On-the-job training is used in combination with classroom training for activities that are IROFS. Designated personnel who are competent in the program standards and methods of conducting the training conduct on-the-job training using current performance-based training materials. Completion of on-the-job training is demonstrated by actual task performance or performance of a simulation of the task with the trainee explaining task actions using the conditions encountered during the performance of the task, including references, tools, and equipment reflecting the actual task to the extent practical.

### ~~11.3.8~~11.3.7 Evaluation of Training Effectiveness

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Periodically the training program is systematically evaluated to measure the program's effectiveness in producing competent employees. The trainees are encouraged to provide feedback after completion of classroom training sessions to provide data for this evaluation for program improvements. These evaluations identify program strengths and weaknesses, determine whether the program content matches current job needs, and determine if corrective actions are needed to improve the program's effectiveness. The training function is responsible for leading the training program evaluations and for implementing any corrective actions. Program evaluations may consist of an overall periodic evaluation or a series of topical evaluations over a given period.

Evaluation objectives that are applicable to the training program or topical area being reviewed are developed and may address the following elements of training:

- Management and administration of training and qualification programs
- Development and qualification of the training staff
- Position training requirements
- Determination of training program content, including its facility change control interface with the configuration management system
- Design and development of training programs feedback, including lesson plans

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- Conduct of training
- Trainee examinations and evaluations
- Training program assessments and evaluations.

Evaluation results are documented, with program strengths and weaknesses being highlighted. Identified weaknesses are reviewed, improvements are recommended, and changes are made to procedures, practices, or training materials as necessary.

Periodically, training and qualifications activities are monitored by designated facility and/or contracted training personnel. The Quality Assurance Department audits the facility training and qualification system. In addition, trainees and vendors may provide input concerning training program effectiveness. Methods utilized to obtain this information include, among other things surveys, questionnaires, performance appraisals, staff evaluation, and overall training program effectiveness evaluation instruments. Frequently conducted classes are not evaluated each time. However, they are routinely evaluated at a frequency sufficient to determine program effectiveness. Evaluation information may be collected through:

- Verification of program objectives as related to job duties for which intended
- Periodic working group program evaluations
- Testing to determine trainee accomplishment of objectives
- Trainee evaluation of the instruction
- Supervisor's evaluation of the trainee's performance after training on-the-job
- Supervisor's evaluation of the instruction.

Unacceptable individual performance is transmitted to the appropriate Line Manager.

### ~~11.3.9~~11.3.8 Personnel Qualification

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The qualification requirements for key management positions are described in Chapter 2, Organization and Administration. Training and qualification requirements associated with QA personnel are provided in Appendix A to this chapter. In addition, qualification and training requirements for operators shall be established and implemented in plant procedures.

### ~~11.3.10~~11.3.9 Periodic Personnel Evaluations

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Personnel performing activities related to IROFS ~~relied on for safety~~ are evaluated at least biennially to determine whether they are capable of continuing their activities that are ~~relied on for safety~~ related to IROFS The evaluation may be by written test, oral test, or on-the-job performance ~~evaluation~~ observation by the supervisor. The results of the evaluation are documented. When the results of the evaluation dictate, retraining or other appropriate action is provided. Continuing training ~~Retraining~~ is also required due to plant modifications, procedure changes, and QA program changes that result in new or revised information.

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