

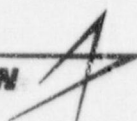
LOCKHEED MARTIN



Technical Safety Requirements

**Paducah Gaseous Diffusion Plant
Department of Energy Nonleased Facilities
Paducah, Kentucky**

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Approvals

Jonny A. Angelelli
GDP SAR Upgrade Program Manager

9/24/96
Date

Lincoln D. Keith
Manager, GDP SAR Upgrade Program

9/24/96
Date

William A. Wall
Manager, GDP SAR Upgrade Program

9/24/96
Date

John P. Payne
PGDP EM & EF Installation Facility Safety Manager

9/27/96
Date

Jim C. Roney
PGDP EM & EF Site Manager

9/27/96
Date

TECHNICAL SAFETY REQUIREMENTS

**PADUCAH GASEOUS DIFFUSION PLANT,
DEPARTMENT OF ENERGY NONLEASED FACILITIES**

Date Approved: _____

Prepared by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
managing the
Environmental Management Activities
at Paducah Gaseous Diffusion Plant
and
Portsmouth Gaseous Diffusion Plant
under contract DE-AC05-84OR21400
and managing
Oak Ridge K-25 Site
and
Oak Ridge Y-12 Plant
for the
U.S. DEPARTMENT OF ENERGY

KY/EM/175

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

ALARA	as low as reasonably achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
CAAS	criticality accident alarm system
DOE	U.S. Department of Energy
EM&EF	Environmental Management and Enrichment Facilities
IFSM	Installation Facility Safety Manager
LCO	limiting condition for operation
LCS	limiting control setting
LMES	Lockheed Martin Energy Systems, Inc.
NCS	nuclear criticality safety
PGDP	Paducah Gaseous Diffusion Plant
PSS	Plant Shift Superintendent
SAR	safety analysis report
SL	safety limit
SR	surveillance requirement
TSR	technical safety requirement

Section 1 — Use and Application

1.0 USE AND APPLICATION

The Paducah Gaseous Diffusion Plant (PGDP) is owned by the U.S. Department of Energy (DOE). The production-related facilities are leased to the United States Enrichment Corporation for producing enriched uranium. The remaining facilities are retained by DOE as nonleased facilities and are managed by Lockheed Martin Energy Systems, Inc. (LMES). These facilities currently house various Environmental Management and Enrichment Facilities (EM&EF) activities. The requirements covered by this technical safety requirement (TSR) document are generic in nature and are applicable to all facilities that exceed the Category 3 threshold values identified in DOE-STD-1027-92.¹ Any deviations from the generic requirements will be described in specific limiting conditions for operations (LCOs) as applicable.

1.1 DEFINITIONS

<u>Term</u>	<u>Definition</u>
OPERABLE/OPERABILITY	A system or component is OPERABLE when it and its support systems and components are capable of performing their intended safety function(s) or intended support function, respectively. A system or component is considered OPERABLE when the required SURVEILLANCE has been accomplished in accordance with the required frequency and there is no indication of inoperability. When a system or component is determined to be incapable of performing its intended safety function(s), the declaration of inoperability shall be immediate
SAFETY LIMIT (SL)	A limit on process variables associated with those physical barriers, generally passive, that are necessary for the intended facility function and that are required to guard against the uncontrolled release of radioactivity and other hazardous materials. Process variables subject to SLs are measurable parameters that, individually or in combination, reflect the basic hazard for which controls or limits are specified
SURVEILLANCE REQUIREMENT (SR)	A requirement relating to testing, calibration, or INSPECTION to ensure that the necessary OPERABILITY of systems and components is maintained or that operations are within the specified SLs, LCSs, and LCOs

1.2 OPERATIONAL MODES

The MODES for the PGDP DOE nonleased facilities are as follows:

Cylinder handling/storage	This mode of operation includes receipt/shipping/storage, handling, and on-site transport of all UF ₆ cylinders. This mode will address all aspects of cylinder movement, including storage, shipping, overpacking, and cylinder handling. Also included in this mode are any operations associated with the cylinders (e.g., valve changeouts, gas-over solid sampling, patching, stacking, cleaning, painting, and testing). In addition, this mode of operation also includes any pigtail connections/disconnections
Waste handling/storage	This mode of operation addresses the handling of radioactive and hazardous wastes that exceed Category 3 threshold values, identified in DOE-STD-1027-92, and it includes activities supporting the characterization, certification, packaging, on-site transport, and storage of these wastes. This mode does not include material in UF ₆ cylinders
Out of operation	The facility is not performing any normal operation in this mode, and the hazardous materials that exceed the Category 3 threshold values, identified in DOE-STD-1027-92, have been removed from the facility

1.3 LIMITING CONDITIONS FOR OPERATION

entered permit operation in the MODE or other specified condition for only a limited time.

- 1.3.5 Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to Sect. 1.3.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.
- 1.3.6 When a support system is inoperable and an LCO for that support system is specified in the TSRs, the supported system is not required to be declared inoperable due solely to support system inoperability. Only the support system's ACTIONS are required to be entered. This is a clarification of the definition of OPERABILITY. Sect. 1.3.2 is still applicable to the supported system.

1.5 SURVEILLANCE REQUIREMENTS

SRs are requirements relating to test, calibration, or inspection to ensure that the necessary quality of safety-related structures, systems, and components is maintained and that the LCO will be met. Sects. 1.5.1 through 1.5.4 establish the general requirements applicable to all SRs and apply at all times, unless otherwise stated.

1.5.1 SRs shall be met during the MODES or other specified conditions in the applicability for individual LCOs unless otherwise stated in the SR. Failure to meet a surveillance shall constitute failure to meet the LCO (see Sect. 1.3.2). Failure to perform a surveillance within the specified frequency shall constitute failure to meet the LCO, except as provided in Sect. 1.5.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.

1.5.2 The specified frequency for each SR is met if the surveillance is performed within 1.25 times the interval specified in the frequency, as measured from the previous performance or as measured from the time a specified condition of the frequency is met.

For frequencies specified as "once," the above interval extension does not apply.

If a completion time requires periodic performance of "once every...", the above frequency extension applies to each performance after the initial performance.

Exceptions to this section are stated in the intervals described in Sect. 1.4.

1.5.3 If it is discovered that a surveillance was not performed within its specified frequency, compliance with the requirement to declare the LCO not met may be delayed from the time of discovery up to 24 hours or up to the limit of the specified frequency, whichever is less. This delay period is permitted to allow performance of the surveillance.

If the surveillance is not performed within the delay period, the LCO shall IMMEDIATELY be declared not met, and the applicable ACTIONS shall be entered. The completion times of the ACTIONS begin IMMEDIATELY on expiration of the delay period. When the surveillance is performed within the delay period and the surveillance is not met, the LCO shall IMMEDIATELY be declared not met, and the applicable ACTIONS shall be entered. The completion times of the ACTIONS begin IMMEDIATELY on failure to meet the surveillance.

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Section 2 — Safety Limits

2.0 SAFETY LIMITS

There are no SLs for the PGDP DOE nonleased facilities.

Section 3/4 — Operational Limits and Surveillance Requirements

3/4.0 OPERATIONAL LIMITS AND SURVEILLANCE REQUIREMENTS

3/4.1 CRITICALITY ACCIDENT ALARM SYSTEMS

LCO 3.1.1: Nonleased processes that contain greater than 700 g of FISSIONABLE MATERIAL shall have operable criticality accident detection/alarm coverage capability, except where approved exemptions have been identified.

APPLICABILITY: MODES: Waste handling/storage

ACTIONS

Condition	Required action	Completion time
A. Areas, equipment, or processes not covered by criticality accident detection/alarm capability	1.a Discontinue movement of containers containing any FISSIONABLE MATERIAL. <u>AND</u> Waste containing any FISSIONABLE MATERIAL shall not be transported.	IMMEDIATELY
	<u>OR</u> 1.b Evacuate area in which a criticality accident occurring within the area not covered by detection capability could result in a maximum foreseeable dose exceeding 12 rad. <u>AND</u> Restrict access to the evacuated area.	IMMEDIATELY
	<u>OR</u> 1.c Provide personnel in the area who would be restricted under ACTION A.1.b with an alternate means of criticality alarm notification: a device that will alarm on sensing a 20-mrad/h dose rate.	IMMEDIATELY
	<u>AND</u>	
	2.a Restore at least one fixed cluster/alarm providing detection capability and alarm capability for those areas, equipment, or processes applicable to this LCO.	24 h
	<u>OR</u> 2.b Install portable criticality accident alarm system (CAAS) unit providing required detection capability and local alarm capabilities.	24 h
B. ACTION condition A not satisfactorily completed	1. Continue required ACTIONS for condition A. <u>AND</u> 2. Restore criticality accident detection and alarm capability to operable status.	IMMEDIATELY 30 days

Section 5 — Administrative Controls

5.0 ADMINISTRATIVE CONTROLS

5.1 CONTRACTOR RESPONSIBILITY

- 5.1.1** The EM&EF Site Manager shall have corporate responsibility for overall safety within DOE nonleased facilities and shall have authority to take any measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support to the plant to secure nuclear safety.
- 5.1.2** The Installation Facility Safety Manager (IFSM) serves as the site subject matter expert for the technical areas associated with facility safety and coordinates and oversees implementation of the Facility Safety Program for the site. The IFSM or his/her designee shall approve, prior to implementation, each proposed test, experiment, or modification to systems or equipment that affect nuclear safety. The IFSM shall delegate in writing the succession to this responsibility when absent from the plant site.
- 5.1.3** The Plant Shift Superintendent (PSS) shall be responsible for emergency response at the plant and for the central control room command function. This function is a shared site responsibility for leased and nonleased facilities.² During any absence of the PSS from the central control room while the plant is operational, an authorized designee shall be named and be present in the central control room. The term "designee" means a person who has been trained to execute plant emergency procedures. The designee shall have the capability to be in contact with the PSS by using the plant communication systems when the PSS is absent from the central control facility.
- 5.1.4** The Facility Manager/Owner shall be responsible for the operations conducted within the facilities affected by this TSR for which he/she is responsible.

5.2 ORGANIZATION

5.2.1 On-Site

On-site organizations shall be established for facility operation. The on-site organizations shall include the positions for activities affecting the nuclear safety of the EM&EF activities and are described in Sect. 17.3 of the SAR.

5.4 PROGRAMS

- CAAS coverage,
- procedure requirements,
- posting and labeling requirements,
- change control,
- operation surveillance and assessment, and
- technical aspects.

- 5.4.1.1 All operations involving uranium enriched to ≥ 1.0 wt % ^{235}U and ≥ 700 g of ^{235}U shall be based upon a documented nuclear criticality safety evaluation and shall be performed in accordance with a documented nuclear criticality safety approval.
- 5.4.1.2 NCS calculations shall be performed in accordance with the requirements of ANSI/ANS-8.1-1983. The system and codes used for these calculations shall be validated for the appropriate range of applicability and these validations shall be documented.
- 5.4.1.3 The double-contingency principle, as described in the SAR, shall be used as the basis for the design and operation of processes using fissionable materials. In each instance wherein double contingency is not met, in addition to those cases already described in Chap. 6 of the SAR, technically evaluated and documented exceptions must be provided to and approved by DOE.
- 5.4.1.4 The CAAS is a leased system that provides coverage for nonleased areas as well as nonleased operations within leased facilities. For nonleased operations within leased areas, the requirements for the CAAS will be in accordance with the leased facility TSRs.²

5.4.2 Radiation Protection Program

A radiation protection program shall be established, implemented, and maintained as described in the SAR Sect. 7.3 and shall address the following elements:

- health physics technician training and qualifications,
- personnel exposure control and measurement,
- contamination control,
- radioactive material control,

5.4 PROGRAMS

program shall ensure that the following objectives are met for any equipment designated as safety-class:

- vendor testing of ordered equipment meets requirements,
- proper equipment is received and installed, and
- installed equipment satisfies specifications and demonstrates satisfactory performance.

The surveillance program shall meet the following objectives for any equipment designated as safety-class or that requires an operating limit in Sects. 2, 3, and 4:

- identify the activities to be monitored,
- identify the frequency of the surveillance,
- identify the individual or organization responsible for conducting the surveillance,
- generate and update surveillance schedules and plans,
- assess compliance,
- document surveillances, and
- document nonconformances and initiate corrective actions.

5.4.6 Maintenance Program

A maintenance program shall be established, implemented, and maintained as described in the SAR Sect. 10.5 and shall address the following program elements for any equipment designated as safety-class or safety-significant:

- training,
- maintenance procedures,
- maintenance programs,
- work control,
- postmaintenance testing,
- procurement, receipt inspection, control, and issuance of safety-class and safety-significant items, repair parts, materials and services,
- control of measuring and test equipment, and
- maintenance history.

5.4 PROGRAMS

- systematic analysis of jobs to be performed,
- learning objectives derived from the analysis that describe desired performance after training,
- training design and implementation based on the learning objectives,
- evaluation of trainee mastery of the objectives during training, and
- evaluation and revision of the training based on the performance of trained personnel in the job setting.

5.4.10 Quality Assurance Program

A quality assurance program shall be established, implemented, and maintained as described in the SAR Sect. 14.2. The quality assurance program is applicable to all facilities that exceed the Category 3 threshold values identified in DOE-STD-1027-92 and shall ensure that the following objectives are met:

- ensure that personnel are trained and qualified to perform their assigned work and are provided continuing training to ensure that job proficiency is maintained,
- establish and implement processes to detect and prevent quality problems and to ensure quality improvement,
- prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design,
- perform work to established technical standards and ADMINISTRATIVE CONTROLS,
- design items and processes using sound engineering/scientific principles and appropriate standards,
- ensure that procured items and services meet established requirements and perform as specified,
- inspect and acceptance-test specified items and processes using established acceptance and performance criteria,
- assess, at all levels, the integrated quality assurance program and its performance, and
- perform planned and periodic independent assessments to measure item quality and process effectiveness and to promote improvement.

3/4.0 BASES - OPERATIONAL LIMITS AND SURVEILLANCES

3/4.1 CRITICALITY ACCIDENT ALARM SYSTEMS (CAAS)**3/4.1.1 CAAS****BASES**

BACKGROUND	The CAAS is used to warn plant personnel of a criticality or radiation accident. This system is designed to detect radiation and provide a distinctive, audible signal that will alert personnel to move from those work areas which are potentially affected. The design of the system, three detector modules per cluster, provides protection for criticality events even with partial losses of required equipment. The CAAS also provides detection coverage in most areas by using an overlapping pattern of individual cluster units.
APPLICABLE SAFETY ANALYSIS	The ability of the CAAS to provide detection/alarm coverage of areas covered by the CAAS is required to minimize the potential on-site exposure of personnel to radiation from an accidental criticality (see applicable SAR subsections 4.4). The only nonleased process presently requiring coverage is C-746-Q.
LCO	The alarming of a criticality accident is necessary for the prompt evacuation of personnel from the affected area to a designated assembly point a safe distance from the incident. The intent of these requirements is to ensure that adequate detection and alarm capability are provided by the CAAS to detect criticality events in any EM&EF area that could have an accidental criticality.
APPLICABILITY	CAAS coverage is required in areas that have more than 700 g of FISSIONABLE MATERIAL, provided no justification for excluding alarm coverage is provided.

3/4.1 CRITICALITY ACCIDENT ALARM SYSTEMS (CAAS)

BASES (cont'd)

REFERENCES

1. "Criticality Accident Alarm System," ANSI/ANS-8.3, 1986.
2. "Request for Exemption to the Paducah Gaseous Diffusion Plant's Criticality Accident Alarm System," letter from D. J. Bostock to D. R. Allen, November 29, 1990.

5.6 TECHNICAL SAFETY REQUIREMENTS BASIS CONTROL

- a change to the way that OPERABILITY or the TSR could be met, applied, or interpreted.

Proposed changes meeting any of the above criteria shall be reviewed and approved by the DOE prior to implementation. Changes to the TSR bases that may be implemented without prior DOE approval will be provided to the DOE at least ANNUALLY.

5.7 REVIEWS AND AUDITS

A system of audits and assessments is implemented at PGDP to ensure that the health, safety, safeguards, security, and environmental programs, as described in the SAR and the accompanying programs, plans, and other documents, are adequate and are effectively implemented.

This TSR shall be reviewed ANNUALLY and a report of this review forwarded to the Contracting Office Representative. All changes to operating practices that require changes to this TSR shall be approved by DOE.

5.8 FACILITY OPERATING RECORDS

In addition to the requirements of applicable regulation, records and logs shall be prepared for at least the following items and retained for at least the period indicated in parenthesis:

- normal and emergency conditions of facility operation (5 years),
- maintenance activities relative to safety-related equipment (5 years),
- equipment and component SURVEILLANCE activities required by the TSRs (life of facility),
- record of reviews and audits (5 years),

Appendix A —
Technical Safety Requirement Bases