

**Virginia Defense Force
Regulation 385–10-4**

Safety
Virginia Defense Force
Safety Program
Radiation Safety Management

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Richmond, VA
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Safety

VDF Safety Program

Summary. This document is an adaptation of the Army Regulation 385-10, Army Safety Program, for use by the units of the Virginia Defense Force (VDF). This regulation provides guidance to commanders and other personnel in regards to the safety program in the Virginia Defense Force.

Applicability. This regulation applies to units of the VDF. During mobilization for state active duty, procedures in this publication can be modified to support policy changes as necessary.

Suggested Improvements. Users are invited to send comments and suggested improvements directly to Headquarters, Virginia Defense Force, George Washington Division, Division Safety Office, 5001 Waller Road, Richmond, Virginia 23230-2915.

Distribution. Distribution is intended for all VDF units down to, and including, company-level.

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Chapter 1 Radiation Safety Management

1-1. Introduction

- a. This chapter prescribes VDF safety policy and processes for the VDF radiation safety function. This chapter applies to all sources of radiation, both ionizing (i.e. radioactive) and nonionizing (i.e., radio frequency and/or lasers).
- b. DA Pamphlet 385-24 contains technical guidance for developing management and control processes for operations involving sources of radiation.

1-2. Policy

- a. VDF organizations shall develop management and quality control processes to identify, mitigate, and control hazardous radiation fields and other radiation hazards associated with VDF activities and equipment by engineering design, administrative controls, or protective equipment (in that order). Organizations will also exposure to radiation is kept as low as reasonable achievable (ALARA).
- b. Equipment containing ionizing radiation sources, including lensatic compasses, are not authorized in the VDF, unless specifically authorized by the VDF Commander.
- c. All radiation sources or radiation producing devices shall comply with all Federal and Commonwealth of Virginia regulations and requirements.
- d. Organizations will adopt no practice and conduct no operation involving planned exposure of personnel to radiation (ionizing or nonionizing) in excess of the applicable exposure standards.
- e. Although a commander may assign the radiation safety functions of the RSO anywhere in their organization (that is, safety office, logistics, commander's staff, etc.), the RSO shall have direct access to the commander for radiation safety purposes.
- f. Disposal of radioactive material on VDF property is prohibited.

1-3. Applicability

This chapter applies to VDF activities and organizations with a mission involving ionizing and nonionizing sources.

1-4. Application of composite risk management

The requirements of Appendix B are mandatory and shall be applied to the requirements of this chapter. DA Pamphlet 385-24 is applicable for guidance.

1-5. Radiation safety key components

As part of the VDF Safety Program, a radiation safety function will consist of management and control processes addressing all aspects of the following key components as applicable:

- a. License (NRC and/or Commonwealth of Virginia) and associated recordkeeping for any ionizing radiation sources.
- b. Personal monitoring to address external dosimetry and recordkeeping for any ionizing radiation sources.
- c. Personal protective equipment and engineering controls for any ionizing and/or nonionizing radiation sources.

- d. Training.
- e. Inventory and accountability.
- f. Shipping and receiving.
- g. Life cycle management
- h. Use and storage:
 - (1) Posting.
 - (2) Security.
- i. Radiation surveys for any ionizing and/or nonionizing radiation sources.

1-6. VDF radiation authorization

- a. Unless directed by higher authority, VDF **WILL NOT** procure, store, and/or use any ionizing radioactive sources / equipment. If so,
- b. A VDF radiation authorization is required for all sources not regulated by the NRC except:
 - (1) By-product, source, or special material that the NRC has declared to be license-exempt (10 CFR 30.14 through 10 CFR 30.20, 10 CFR 40.13 through 10 CFR 40.14, and 10 CFR 70.13) or generally licensed (10 CFR 31, 10 CFR 40-20 through 10 CFR 40-28, and 10 CFR 70.19 through 10 CFR 70.20b).
 - (2) Less than 0.1 microCurie (37 kiloBecquerels (kBq)) of any naturally occurring / accelerator produced radioactive material (NARM) other than radium.
- c. Radio frequency emitters with a power output of greater than 5 watts (e.g., larger than a handheld transceiver) will have antennas either positioned so that individual cannot contact or enter into the hazard area / zone for that emitter while transmitting. Where antennas are located where individual can enter into a hazardous area, warning signs and/or hazard warning tape will be used to warn individuals of the hazard.
- d. Lasers with a power rating and/or ANSI classification greater that what is normally associated with a laser light pointer, are not authorized in the VDF, unless directed by higher authority.

Appendix A
References

Section 1.
Publications

Code of Federal Regulations (CFR) (<http://www.gogpoaccess.gov/cfr/index.html>)

10 CFR, Energy

29 CFR 1910, Subpart I, Personal Protective Equipment

42 CFR, Public Health

49 CFR, Transportation

DA Pam 385-1, Small Unit Safety Officer / NCO Guide

DA Pam 385-10, Army Safety Program

DA Pam 385-24, The Army Radiation Safety Program

FM 5-19, Composite Risk Management (CRM)

NFPA (National Fire Prevention Association) 101, Life Safety Code.

Section 2.
Forms

VDF Accident Investigation Report Form

Appendix B**Determining if a Radiation Safety Function is Required.****B-1. Requirements**

If any of the conditions in B2, below, pertain to a VDF unit, the VDF is required to execute the requirements of a radiation safety function, which includes designating, in writing, an RSO who will establish, maintain and manage a written Radiation Program in accordance with this regulation, Federal, and Commonwealth of Virginia regulations.

B-2. Conditions requiring a radiation safety element

- a. A unit possessing radioactive commodities or radiation emitting equipment that requires the implementation of a radiation safety program (e.g., leak testing, posting, shipping requirements, etc.)
- b. When required under regulations issued and/or managed by the Commonwealth of Virginia Department of Health, Radiological Health Program.
- c. A unit possessing / operating a radio transceiver with a power output of greater than 5 watts of radio frequency energy (e.g., a high frequency radio transceiver or VHF / UHF mobile and/or base stations).
- d. If directed by higher authority to possess and/or operate laser emitters (regardless of optical frequency) stronger than a commercially available laser pointer or bar code scanner.

Glossary

Section 1

Abbreviations

ADSC – Additional Duty Safety Course

ADSO – Additional Duty Safety Officer (or NCO)

ANSI – American National Standards Institute

AR – Army Regulation

ARNG – Army National Guard

CFR – Code of Federal Regulations

CG – Commanding General

DA – Department of the Army

DA Pam – Department of the Army Pamphlet

DoD – Department of Defense

DoDD – Department of Defense Directive

DoDI – Department of Defense Instruction

DoLI – Virginia Department of Labor and Industry (i.e., State OSHA)

ECP – Exposure control plan

EO – Executive Order

JHA – Job hazard analysis

MIL-STD – Military Standard

NARM – Naturally occurring / accelerator produced radioactive material.

NCO – Noncommissioned Officer

NRC – Nuclear Regulatory Commission

OSH – Occupational Safety and Health

OSHA – Occupational Safety and Health Administration

OSH Act – Occupational Safety and Health Act

RAC – Risk Assessment Code

RSO – Radiation Safety Officer

SME – Subject matter expert

SOH – Safety and occupational health

SOP – Standing Operating Procedure or Standard Operating Procedure

SSMP – Safety System Management Plan

VDF – Virginia Defense Force

Section 2

Terms

Accident – Any unplanned event or series of events that result in death, injury, or illness to personnel, or damage to or loss of equipment or property. (Within the context of this regulation, accident is synonymous with mishap.)

Accident-based risk management – A component of CRM used to identify, evaluate, manage and prevent accidents to personnel, equipment, and the environment during peacetime and contingency operations due to safety and occupational health factors and other accident-based factors.

Barrier – A permanent or temporary impediment to foot and/or vehicular traffic that personnel are prohibited to pass without approval from range control or other appropriate authority. A barrier may be a sentinel, wire fencing, gate, sign, or other access-limiting device.

Command responsibility – Commanders down the entire chain of command are responsible for the safety of their personnel.

Commander – An individual that lawfully exercises over subordinates by virtue of rank or assignment. This includes the authority and responsibility for effectively using available resources for planning the employment or, organizing, directing, coordinating and controlling forces for the accomplishment of assigned missions. This also includes responsibility for health, welfare, morale and discipline of assigned personnel in his or her “command.”

Competent authority – An individual designated in command, responsible for the direction, coordination and control of personnel. The commander alone is responsible for everything his or her unit does or fails to do. They cannot delegate their responsibility or any part of it, although they may delegate portions of their authority to competent individuals. An individual designated by the commander to address areas of primary interest within that individual’s technical expertise.

Composite risk – Blends threat-based risks with accidental, hazard-based risks.

Control – Action taken to eliminate hazards or reduce their risk.

Emergency – An event for which an individual perceives that a response is essential to prevent or reduce injury or property damage.

Engineering controls – Regulation of facility operations using prudent engineering principles, such as facility design, operation sequencing, equipment selection, and process limitations.

Establishment – A single physical location where business is conducted or where services or operations are performed. Where distinctly separate activities are performed at a single physical location, each activity shall be treated as a separate establishment. Typically, an establishment refers to a field activity, regional office, area office, installation, or facility.

Evaluation – A specialized inspection designed to determine the effectiveness of a unit’s safety and health program.

Exposure – The frequency and length of time personnel and equipment are subjected to a hazard.

Facility – An area within a building that provides appropriate protective barriers for persons working in the facility and the environment external to the facility and outside of the building.

Federal OSHA official – Investigator or compliance officer employed by, assigned to, or under contract to OSHA.

Field operations – Operations conducted outdoors or outside of man-made enclosures or structures. Short-term operations in storage structures are also considered as field operations.

Ground accident – Any accident exclusive of aviation (flight / flight-related / aircraft-ground).

Hazard – Any actual or potential condition that can cause injury, illness, or death of personnel or damage to or loss of equipment, property, or mission degradation or a condition or activity with potential to cause damage, loss, or mission degradation.

Hazard analysis – A hazard analysis is a clear, systemic, concise, well defined, orderly, consistent, closed-loop, quantitative or qualitative and objective methodology used to identify possible hazards within a mission, system, equipment, or process that can cause losses to the mission, equipment, process, personnel, or damage to the environment. Examples of hazard analyses are: What-If, Preliminary Hazard Analysis, Sneak Circuit Analysis, Hazard and Operability Study, Fault Tree Analysis, Failure Mode and Effects Analysis, and Fault Hazard Analysis.

Hazardous Substances – Two form of definitions:

- a. The EPA uses the term hazardous substance for the chemicals that, if released into the environment above a certain amount, must be reported and depending on the threat to the environment, Federal involvement in handling the incident can be authorized. A list of the hazardous substances is published in 40 CFR 302, Table 302.4.
- b. OSHA uses the term hazardous substance in 29 CFR 1910.120, which resulted from Title I of SARA and covers emergency response. OSHA uses the term differently than the EPA. Hazardous substances, as used by OSHA, cover every chemical regulated by both DOT and EPA.

Health hazard – An existing or likely condition, inherent to the operation, maintenance, storage or disposal or materiel or a facility, that can cause death, injury, acute or chronic illness, disability, or reduced job performance.

Health hazard assessment – The application of biomedical and psychological knowledge and principles to identify, evaluate, and control the risk to the health and effectiveness of personnel.

Human error – Human performance that deviated from that required by the operational standards or situation. Human error in accidents can be attributed to a system inadequacy / root cause in training, standard, leader, individual, or support failure.

Human factors – Human interactions (man, machine, and/or environment) in a sequence of events that were influenced by, or the lack of human activity, which resulted or could result in an accident.

Imminent danger – Conditions or practices in any workplace that pose a danger that reasonably could be expected to cause death or severe physical hardship before the imminence of such danger could be eliminated through normal procedures.

Individual risk – Risk to a single exposed person.

Inherent hazard – An existing or permanent hazard (i.e., high voltage).

Injury – A traumatic wound or other condition of the body caused by external force, including stress or strain. The injury is identifiable as to time and place of occurrence and member or function of the body affected, and is caused by a specific event, incident, or series of events within a single day or work shift.

Laser – A device capable of producing a narrow beam of intense light (LASER = light amplification by stimulated emission of radiation).

Mishap risk management – A component of CRM used to identify, evaluate, and prevent accidents to personnel, equipment, and the environment during peacetime and contingency operations due to safety and occupational health factors, design and construction of equipment, and other mishap factors.

Near miss – A potentially serious accident or incident that could have resulted in personnel injury, death, or property damage, damage to the environment and/or illness, but did not occur due to one or more factors.

Non-DoD component – Any entity (government, private, or corporate) that is not a part of DoD.

Note – Additional information provided to expand understanding of the subject and to call attention to areas of interest.

Occupational hazard – Conditions, procedures, and practices directly related to the work environment that creates a potential for producing occupational injuries or illnesses.

Occupational injury – A wound or other condition of the body caused by external force, including stress or strain. The injury is identifiable as to time and place of the occurrence and a member or function of the body affected, and is caused by a specific event, incident, or series of events or incidents within a single day or work shift.

Operational control – Operational control is the authority to perform those functions of command over subordinate forces involving organizing and employing command and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direction over all aspects of military operations and Joint training necessary to accomplish missions assigned to the command. It does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training.

Permanent partial disability – Any injury or occupational illness that does not result in death or permanent total disability, but in the opinion of competent medical authority, results in the loss or permanent impairment of any part of the body, with the following exceptions:

- a. Loss of teeth.
- b. Loss of fingernails or toenails.
- c. Loss of tip of fingers or toes without bone involvement.
- d. Inguinal hernia, if it is repaired.
- e. Disfigurement or sprains or strains that do not cause permanent limitation of motion.

Permanent total disability – Any nonfatal injury or occupational illness that, in the opinion of competent medical authority, permanently and totally incapacitates a person to the extent that he or she cannot follow any gainful employment. (The loss of, or the loss of use of, both hands, feet, eyes, or any combination thereof as a result of a single accident will be considered as permanent total disability.)

Probability – Probability is the qualitative or quantitative likelihood of a particular event or sequence of actions initiated by a hazard-related Cause resulting in a Maximum Credible Loss. The Probability can be expressed as the product of the Incident Rate and Mishap Set Likelihood.

Qualified safety and health personnel – Includes personnel who have been primarily engaged in safety and occupational health specialties in the military or civilian occupations, have documented training within these areas (i.e., associates, bachelors, and/or masters degrees), and/or are qualified under the civil service classifications for safety, medical, occupational health, or industrial hygiene.

Recommendations – Those actions advocated to the command to correct system inadequacies that caused, contributed, could cause or contribute to a VDF accident. Also referred to in this regulation as corrective action, remedial measures and/or countermeasures.

Recordable accident – Reportable accident that meets the minimum criteria stated in the regulation for aviation and ground Class A-D accidents.

Reportable accident – All occurrences that cause injury, occupational illness, or property damage of any kind must be reported to the local safety office and to the VDF, G.W. Division Safety Office.

Residual hazards – Hazards that are not eliminated by design.

Residual significant risk – Any risk remaining in a system after corrective actions have been executed.

Residual risk – The levels of risk remaining after controls have been identified and countermeasures selected for hazards that may result in the loss of effectiveness. Risks remaining after hazard mitigation measures have been applied.

Risk – Risk is directly related to the ignorance or uncertainty of the consequences of any proposed action. Risk is an expression of possible loss in terms of hazard severity and hazard probability. Risk is the expected value of loss associated with a loss caused by a hazard expressed in dollars. The risk associated with this loss is mathematically derived by multiplying the probability of the loss's likelihood by the probable dollar loss associated with the loss's severity. Note that risk has two dimensions – likelihood and magnitude, while a hazard has only one – varied magnitude.

Risk acceptability – Risk acceptability is that level of risk which has been determined as tolerable in order to fulfill mission requirements. It represents a level of risk where either the output of resources to rectify safety deficiencies does not result in a proportional increase in the level of safety to be provided; or so restricts the performance that the assigned mission cannot be executed.

Risk acceptance – Risk acceptance is a formal and documented process indicating that leadership understands the hazard, its associated cause, and the probable consequences to mission, personnel, equipment, public and/or the environment and that they have determined that the total risk is acceptable because of mission execution.

Risk acceptance level – Used to denote the level of risk a particular level of leadership may accept. These levels are based on the magnitude of the risk involved and the duration of the risk acceptance.

Risk assessment – An evaluation of a risk in terms of loss should a hazard result in an accident and against the benefits to be gained from accepting the risk.

Risk decision – The decision to accept or not accept the risk(s) associated with an action; made by the commander, leader, or individual responsible for performing the action and having the appropriate resources to control or eliminate the risk's associated hazard.

Safety – Freedom from those conditions that can cause death, injury, occupational illness, or damage to, or loss of, equipment or property.

Safety objectives – Criteria for comparing and judging measures for adequacy. Safety objectives incorporate the safest measures consistent with operational requirements.

Severity – A qualitative or quantitative assessment of the degree of injury, occupational illness, property, facility, or environmental damage associated with a maximum credible loss. Severity is

dependent only on the Maximum Credible Loss. Once established for a Maximum Credible Loss, it does not change. Only the probability of a Maximum Credible Loss can be reduced.

Significant Risk – A risk associated with a particular hazard where the hazard likelihood of occurrence and its potential impact on the mission, person, equipment, or facility is such that it can be reasonably expected to cause bodily harm, damage to equipment, or the facility, or delay in the execution of the mission unless corrected. Normally, they are assigned a RAC of 1, 2, or 3.

Single-hazard risk – Risk associated with a single hazard of the system.

Special hazards areas – Areas identified containing hazards which due to their nature could not be eliminated through design selection and therefore depend upon training, procedures, and PPE for control of the hazards to tolerable levels. Examples: Kitchens, machine shops, areas around conveyor belts, hazardous chemical storage areas, etc.

Standards failure – Standards / procedures not clear or practical, or do not exist.

State OSHA official – Investigator or compliance officer employed by, assigned to, or under contract to state OSHA / Commonwealth of Virginia Department of Labor and Industry.

Supervisory – Activities associated with the management of personnel.

Support failure – Inadequate equipment / facilities / services in type, design, availability, or condition, or insufficient number / type of personnel, which influenced human error, resulting in a VDF accident.

System – A composite, at any level of complexity, of trained personnel, procedures, materials, tools, equipment, facilities, and software. The elements of this composite entity are used together in the intended operational or support environment to perform a given task or achieve a specific production, support, or mission requirement.

System inadequacy – A tangible or intangible element that did not operate to standards, resulting in human error or materiel failure. Also referred to as causes, readiness shortcomings, and/or root causes.

System safety – The application of engineering and management principles, criteria, and techniques to optimize safety within the constraints of operational effectiveness, time, and cost throughout all phases of systems', equipment's, or facilities' life cycle.

System safety lesson learned – A collection of real or potential safety or health-related problems based on data analysis or experience that can be applied to future and current systems to prevent similar recurrences.

System safety management – An element of management that defines the system safety program requirements and ensures the planning, implementation, and accomplishment of system safety tasks and activities consistent with the overall program requirements.

Tolerable risk – The level of risk associated with a specific hazard below which a hazard does not warrant any expenditure or resources to mitigate. From a legal standpoint it would be considered as a “de minimus” risk, from the Latin phrase “de minimus noncurat lex,” meaning “the law does not concern itself with trifles.”

VDF accident – A VDF accident is defined as an unplanned event, or series of events, which results in one or more of the following:

- a. Occupational illness to VDF personnel.
- b. Injury to on-duty VDF personnel.
- c. Damage to VDF property.
- d. Damage to public or private property, and/or injury or accident to non-VDF personnel caused by VDF operations (i.e., the VDF had a causal or contributing role in the accident).

VDF property – Any item of VDF property, or property leased by the VDF for which the VDF has assumed risk of loss, such as aircraft, vehicle, building, structure, system, etc.

Workplace – A place (whether or not within or forming a part of a building, structure, or vehicle) where any person is to work, is working, for the time being works, or customarily works, for gain or reward; and in relation to an employee, includes a place, or part of a place, under the control of the employer.

Work-related injuries – Injuries or occupational illnesses incurred while performing duties in an on-duty status.

