Kennedy NASA Procedural Requirements

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Expiration Date: **August 20, 2024**

Responsible Office: **Spaceport Integration and Services**

Kennedy Space Center Nonionizing Radiation Protection Program

National Aeronautics and Space Administration

John F. Kennedy Space Center

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Change Log

Date	Revision	Description
3/26/15	A-1	Expiration date extended due to timing of Medical Environmental Support Contract ending and new contract starting. Subject matter expert is serving on a Source Evaluation Board and resources are limited until after contract change.
11/10/15	A-2	Additional extension granted due to the delay of the new contract and the subject matter expert's support to the Source Evaluation Board being extended.
2/17/16	B	Administrative changes to reflect new organization and updated laser class terminology for fiber optics based on changes in ANSI Standard Z136.2. Also removed a requirement regarding registration of certain nonionizing radiation devices.
8/20/19	C	Revised Section 3.6, Medical Surveillance for Laser Operations to remove the requirement for medical surveillance: "There are no medical surveillance requirements for users or operators of laser or non-laser optical radiation devices." Replaced KEMCON with "KSC medical and environmental contractor" throughout document. Chapter 3 3.3.9.a Added reference to Section 3.4 on exemptions 3.5 Changed Controlled RF to Non-exempt RF Chapter 4 4.5 Added Non-Exempt to RF Chapter 5 Edited layout of Chapter 5 to provide clarity on emergency procedures.
2/17/22	C-1	Chapter 2 Added sections 2.4.4 and 2.4.5 to clarify training frequency.

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PREFACE

P.1 Purpose

This Kennedy National Aeronautics and Space Administration (NASA) Procedural Requirements (KNPR) describes Kennedy Space Center's (KSC) Radiation Protection Program provisions including requirements and controls relating to the procurement, possession, and use of nonionizing radiation-producing devices.

P.2 Applicability

a. These provisions apply to all organizations including internal contractors only to the extent specified or referenced in the appropriate contracts, grants, or agreements and user elements under the jurisdiction or direction of NASA KSC and NASA KSC facilities at the Cape Canaveral Air Force Station (CCAFS), Patrick Air Force Base, Vandenberg Air Force Base, and any other KSC worksites.

b. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended, but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.

c. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 Authority

Kennedy NASA Policy Directive (KNPD) 1860.1, KSC Radiation Protection Program

P.4 Applicable Documents and Forms

a. Title 21 Code of Federal Regulations (CFR) Parts 1000-1040

b. KNPD 1150.24, KSC Councils, Boards, and Committees

c. KNPR 8715.3, KSC Safety Procedural Requirements

d. KSC Form 7-49, Purchase Request (Supplies / Equipment or Property Turn-In)

e. KSC Form 16-353, Modification of Radiation Use Authorization (RUA)

f. KSC Form 16-447, Laser Device Use Request / Authorization

g. KSC Form 16-450, Radiation Training & Experience Summary (Nonionizing Radiation)

h. KSC Form 16-451, Radio Frequency / Microwave Systems Use Request / Authorization

i. KSC Form 28-34, Radiation Use Request/Authorization (Ionizing Machine/Device)

j. KSC Form 28-626, Optical Device Use Request / Authorization

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k. Institute of Electrical and Electronics Engineers Standard C95.1, Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kilohertz (kHz) to 300 Gigahertz (GHz)

l. ANSI Standard Z136.1, Safe Use of Lasers

m. ANSI Standard Z136.2, Safe Use of Optical Fiber Communication Systems (OFCS) Utilizing Laser Diode and Light Emitting Diode (LED) Sources

n. ANSI Standard Z136.6, American National Standard for the Use of Lasers Outdoor

P.5 Measurement/Verification

Triennial audit of the KSC Occupational Health Program by the NASA Headquarters Office of the Chief Health and Medical Officer and interim KSC self-audits.

P.6 Cancellation

This KNPR cancels the provisions and requirements of KNPR 1860.2, Rev. C, KSC Nonionizing Radiation Protection Program.

/original signed by/

Nancy P. Bray
Director, Spaceport Integration and Services

Distribution: TechDoc Library

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CHAPTER 1. GENERAL DESCRIPTION

1.1 Organization

Three major organizational elements make up the KSC Radiation Protection Program: the KSC Radiation Protection Committee (RPC), the KSC Radiation Protection Officer (RPO), and the Kennedy medical and environmental services Health Physics Office (HPO). Functions and responsibilities of these organizational elements are summarized below. Figure 1, Functional Structure of the KSC Radiation Protection Program, describes the functional structure of the KSC Radiation Protection Program.

1.2 Responsibilities

1.2.1 The KSC RPC is responsible for:

a. Ensuring the development and maintenance of KSC Nonionizing Radiation Protection Program policies on behalf of the Center Director

b. Reviewing and approving uses of controlled nonionizing radiation devices

c. Advising the KSC RPO in the execution of duties as designated in KNPD 1860.1

d. Providing oversight of KSC radiological regulatory matters

e. Developing policy requirements to assure adequate facilities, equipment, training, operational, and emergency controls are maintained for all operations utilizing nonionizing radiation-producing devices

f. Approving or disapproving all uses of controlled radiation-producing devices

g. Conducting RPC meetings in accordance with (IAW) the requirements of the NASA KSC Nuclear Regulatory License and KNPD 1150.24

1.2.2 The KSC RPO is responsible for:

a. Functional implementation and administration of the KSC Radiation Protection Program

b. Acting as liaison officer for the KSC Radiation Protection Program to ensure compliance with the applicable regulatory agencies' requirements relative to all nonionizing radiation-related activities and regulatory matters for KSC

c. Acting as liaison officer between KSC and other non-regulatory agencies, parties, and contractors relative to nonionizing radiation matters

d. Providing technical guidance to KSC organizations on nonionizing radiation-related matters and acting as the functional representative of the RPC

e. Auditing the recordkeeping systems of the Nonionizing Radiation Protection Program for KSC pertinent to applicable requirements for licenses, registrations, and reports

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f. Performing contract insight role by participating in contractor environmental health management team and Government contract evaluation and performance meetings

g. Assuming technical control, initiating investigations, and directing corrective actions in nonionizing radiation incidents and emergencies for KSC and coordinating mishap reporting and investigation requirements with the appropriate KSC Safety and Mission Assurance or KSC Protective Services Office personnel

h. Assuring proper disposition of nonionizing radiation records for all employees, both Government and contractor, upon termination of employment or transfer from KSC

i. Representing the RPC, and speaking and acting for KSC, on matters of policy and procedures relating specifically to control of nonionizing radiation sources for KSC

j. Making interim approvals for the RPC subject to subsequent RPC ratification

k. Ensuring that operations involving nonionizing radiation-producing devices are performed in accordance with applicable Federal, state, and local regulations and other pertinent health and safety standards.

l. Serving as the KSC liaison for formal contact and coordination with other agencies regarding radiation protection matters

1.2.3 The KSC medical and environmental contractor HPO supports the Spaceport Integration and Services' Aerospace Medicine and Occupational Health Branch. The KSC medical and environmental contractor HPO shall, to the extent provided by the contract, provide services to include:

a. Conducting technical review and evaluation of radiation sources and their use

b. Acting as the functional representative of the KSC RPO

c. Conducting consultations with users of nonionizing radiation-producing devices

d. Maintaining the nonionizing radiation device inventory

e. Providing general surveillance, monitoring, and implementation of the KSC Nonionizing Radiation Protection Program

f. Implementing operational aspects of the KSC Nonionizing Radiation Protection Program under the direction of the RPO

g. Providing, in the RPO's absence and after formal notification by the RPO, an individual to act on behalf of the RPO

h. Maintaining appropriate licenses and registrations with associated records and reports in compliance with applicable regulatory agencies' requirements

i. Providing general radiation use authorization (UA) functions for the KSC Nonionizing Radiation Protection Program

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j. Providing technical evaluation of proposed uses of nonionizing radiation, making recommendations, and providing other assistance to the RPO concerning nonionizing radiation protection

k. Acting as the field representative of the KSC Nonionizing Radiation Protection Program and as liaison between user organizations and the RPO on radiological matters

l. Performing onsite surveillance, inspections, surveys, or monitoring of nonionizing radiation uses and users

m. Providing radiation protection training for UA approval if needed or if requested through the RPO. Such training shall be provided on a case-by-case basis and tailored to the intended Area Radiation Officer (ARO) and users' activities involving nonionizing radiation sources

1.2.4. Heads of primary organizations are responsible for the following:

a. Ensuring all requests from their organizations for procurement, possession, use, transfer, or other disposition of controlled nonionizing radiation devices are coordinated with and routed through the RPO to the RPC for approval prior to forwarding to the Procurement Officer, Transportation Officer, or other appropriate official

b. Ensuring project leaders, technical representatives, and supervisors do the following:

(1) Familiarize themselves with all policies and procedures governing radiation sources and devices

(2) Ensure those personnel within their respective organizational responsibility are provided appropriate orientation or systems training

(3) Review projects, plans, and procedures involving the use of nonionizing radiation sources and identify all controlled sources to the RPO for applicable UA approval

c. Ensuring procurement requests and Statements of Work (SOW) involving radiation sources do the following:

(1) Stipulating compliance with KSC Nonionizing Radiation Protection Program requirements

(2) Requiring all contractor nonionizing radiation source user personnel who are terminating or transferring employment be identified in accordance with the UA requirements

d. Ensuring the designation of a user organization ARO, who shall have training and experience in radiation protection commensurate with the scope of proposed activities and is satisfactory to the RPO

1.2.5 AROs are responsible for the following:

a. Ensuring the safe use and accountability of the nonionizing radiation device(s) under their control in accordance with the provisions specified and approved by the applicable KSC UA

b. Ensuring all sources of nonionizing radiation under their jurisdiction have been identified and approved by the RPO

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c. Giving prior notification to the KSC medical and environmental contractor HPO of movement of controlled nonionizing radiation devices

d. Ensuring all personnel utilizing sources of nonionizing radiation under their jurisdiction are:

(1) Properly trained in safe practices for the possession and use of such sources and oriented to the applicable regulatory and program requirements

(2) Approved through the KSC Radiation Protection Program

e. Providing immediate notification to the KSC medical and environmental contractor HPO upon determination or suspicion of any accident or incident involving a potential overexposure of personnel

f. Designating a Use Supervisor and Custodian (US/C) under the UA process to act as a designated representative in their absence or whenever they are unable to maintain direct supervision of the sources under their jurisdiction. The US/C shall have training and experience in radiation protection commensurate with the scope of proposed activities.

1.2.6 The US/C is responsible for the following:

a. Ensuring the operational implementation of control provisions and requirements levied by the applicable KSC approved UA

b. Acting on behalf of the ARO in their absence

1.2.7 Each user is responsible for:

a. Ensuring proper personnel access controls at all identified Radiation Controlled Areas (RCA)

b. Complying with applicable provisions of this KNPR and the specific control provisions and requirements as stated in the approved KSC UA

c. Consulting with their ARO and supervision when deviation from approved procedures, equipment, personnel, or planned schedules would necessitate a modification of the approved KSC UA

d. Providing immediate notification to the KSC medical and environmental contractor HPO upon determination or suspicion of any accident or incident involving a potential overexposure of personnel

1.2.8 The Director, Safety and Mission Assurance, is responsible for:

a. Coordinating provisions of the KSC Safety, Reliability, and Quality Assurance Program with KSC Nonionizing Radiation Protection Program provisions or with the KSC RPO

b. Reviewing and monitoring procedures for use, movement, and transportation of nonionizing radiation devices as required by KNPR 8715.3

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c. Providing safety surveillance of all activities involving the use of nonionizing radiation devices

d. Coordinating with the RPO on emergency operations concerning nonionizing radiation devices

e. Supporting enforcement of radiological controls established by the KSC Nonionizing Radiation Protection Program and any applicable approved KSC UA

1.2.9 The Director, Spaceport Integration and Services, is responsible for:

a. Ensuring that fire protection personnel are properly trained in personnel protective practices when fighting fires involving hazards associated with nonionizing radiation sources

b. Reviewing and making final determination of requirements for the physical security of nonionizing radiation sources

c. Collaborating with the RPO or designated representative on the development of emergency plans and procedures relative to major emergency situations involving nonionizing radiation devices which might significantly affect KSC operations or personnel safety

d. Coordinating KSC resources to support implementation of approved emergency plans and procedures as directed by the RPO relative to radiation sources

e. Ensuring identified controlled nonionizing radiation devices are not released from KSC without approval of the RPO or designated representative

f. Ensuring shipments of controlled nonionizing radiation devices off KSC properties comply with applicable regulations and have been released for shipment by the RPO or designated representative

g. Ensuring inbound shipments of controlled nonionizing radiation devices are identified and approvals are received from the RPO or designated representative

h. Ensuring that requests for construction, siting, and modifications of facilities and equipment involving nonionizing radiation hazards have been reviewed and approved by the RPO

1.2.10 The Director, Procurement, is responsible for:

a. Ensuring procurement requests for equipment which incorporates controlled nonionizing radiation devices have been identified to the RPO prior to procurement

b. Incorporating into all requests for proposal (RFP) and invitations for bid (to include KSC Form 7-49) all nonionizing radiation protection requirements identified by the heads of primary organizations in their purchase requests or SOW

c. Ensuring contractor compliance with the requirements of the KSC Nonionizing Radiation Protection Program to the extent delineated in their contract

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d. Including in contracts the requirement that all contractor personnel who have been associated with operations involving nonionizing radiation devices and are terminating or transferring employment are identified in accordance with UA requirements

1.2.11 Contracting Officers are responsible for including in contracts the requirement that all contractor personnel who have been associated with operations involving nonionizing radiation devices and are terminating or transferring employment be identified in accordance with UA requirements.

1.2.12 The Director, Communication and Public Engagement, is responsible for coordinating public affairs activities involving announcements and releases concerning nonionizing radiation hazards under KSC jurisdiction with the RPC or RPO.

1.2.13 Directors of program and project offices are responsible for ensuring all payload organizations coordinate through proper channels with the RPO for compliance with KSC Nonionizing Radiation Protection Program requirements.

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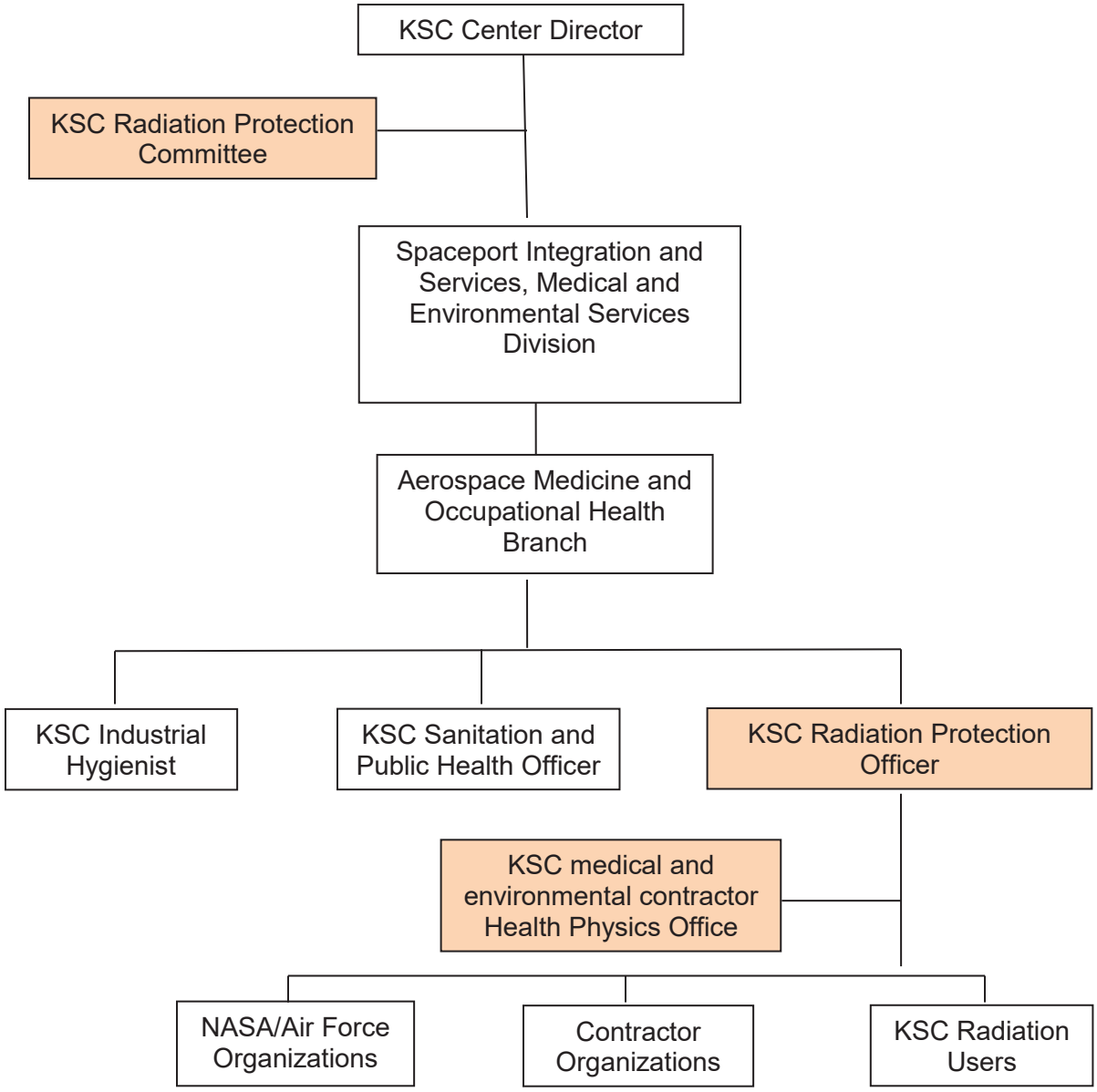


Figure 1-1 Functional Structure of the KSC Radiation Protection Program

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CHAPTER 2. ADMINISTRATIVE PROVISIONS FOR CONTROL OF NONIONIZING RADIATION SOURCES

2.1 General Provisions

2.1.1 The following general provisions are provided to assist users of controlled nonionizing radiation devices under the purview of the KSC Radiation Protection Program. Radiation source(s) may be exempted from some or all of the KSC Radiation Protection Program control requirements if the specific source(s) have been appropriately analyzed and evaluated. If the user cannot otherwise determine a specific source of nonioninizing radiation, those concerns, and any other concerns regarding program applicability, can be addressed by submitting the appropriate form and information described in Chapter 3 and Chapter 4 of this KNPR.

2.1.2 All RFPs for procurement and use of controlled nonionizing radiation devices shall be submitted to the KSC RPC through the KSC RPO or designee for review and approval prior to procurement and use.

2.1.3 Approved KSC Nonionizing Radiation Protection Program forms as described by Chapter 3 and Chapter 4 of this KNPR shall be used in submittals to the KSC RPO through the KSC medical and environmental contractor HPO.

2.1.4 All receipt, internal transfer, and shipment of controlled nonionizing radiation devices shall be coordinated with and approved in advance by the KSC RPO or designee. Responsible individuals designated in the approved UA (e.g., AROs, US/Cs) will review plans and procedures to ensure such coordination and approval.

2.1.5 Constraints imposed upon the use of controlled nonionizing radiation devices shall:

a. Be no less than those required by applicable regulatory authorities

b. Include any additional constraints deemed necessary by the KSC RPC or the KSC RPO

2.1.6 Applicable records pertaining to the KSC Radiation Protection Program shall be maintained by the RPO or designee. Examples of such records include the following:

a. Records of procurement of hazardous radiation sources

b. Receipt of hazardous sources

c. UA

d. Licensing or registration

e. Inventory of all hazardous nonionizing sources or devices

f. Surveys and Investigation reports

2.1.7 Controlled nonionizing radiation devices transferred to, stored, or used on CCAFS by organizations under KSC purview shall also be approved by the 45th Space Wing (45 SW) RPO.

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2.1.7.1 Approval is accomplished by concurrence signature of the 45 SW RPO on the appropriate KSC UA form.

2.1.7.2 Coordination is performed by the KSC RPO or designee and does not require separate submittals to the 45 SW RPO by the user organization.

2.2 Procurement Authorization

All procurement requests for controlled nonionizing radiation-producing devices, except as specifically exempted by the provisions of Chapter 3 and Chapter 4 of this KNPR, shall be accompanied by an explanatory statement and by the signature of approval from the KSC RPO.

2.3 Possession and Use Authorization

2.3.1 Authorization for possession or use of controlled nonionizing radiation devices requires review by and approval of the KSC RPC and the KSC RPO. To begin the authorization process, submittal of a completed use request as outlined in Chapter 3 and Chapter 4 (as applicable) of this KNPR is required. These forms, in conjunction with any necessary supportive data, shall be submitted as soon as practical but in no case later than 45 days prior to the intended arrival of the source(s) at KSC.

2.3.2 A specific UA shall be issued subsequent to evaluation of information or data submitted on the appropriate KSC forms. Enclosures for these forms should include all relevant data and information pertaining to the specified devices and use. Details of the type of information required are delineated in Chapter 3 and Chapter 4 (as applicable) of this KNPR.

2.3.3 A General Use Authorization (GUA) may be issued under certain circumstances subsequent to evaluation of information submitted on appropriate KSC forms. GUAs usually pertain only to devices which represent a minimal hazard potential for personnel. Use of devices under GUAs may be subject to specific controls or restrictions. GUAs will normally be issued for indefinite periods of time.

2.4 User Qualifications

2.4.1 Prior to using controlled nonionizing radiation devices, individuals shall receive KSC Nonionizing Radiation training (radio frequency [RF], laser, or optical) or commercial equivalent, must possess pertinent experience, have an understanding of the limiting provisions of the UA, and have received training or orientation covering at least the following topics:

a. General description of the applicable radiation type and associated biological effects

b. Basic principles of radiation protection

c. Radiation protection procedures relevant to intended use

d. Provisions of this KNPR and appropriate Federal, state, and local regulations

e. Emergency procedures

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2.4.2 Personnel subject to certain nonionizing radiation hazards may be required to obtain additional training and medical certification as deemed necessary by the KSC RPC or the KSC RPO.

2.4.3 The ARO is responsible for ensuring US/C and users identified are properly trained in safe practices for the possession and use of such sources and oriented to the applicable regulatory and program requirements.

2.4.4 This training shall be documented on KSC Form 16-450.

2.4.5 Refresher training shall be required every three years and documentation of such maintained.

2.5 Hazard Analysis and Evaluation

The KSC RPO or designee shall evaluate each use request to assess the potential hazards associated with the possession and use of the nonionizing radiation source. Additional information may be requested and site inspections or surveys may be utilized in the course of analysis and evaluation.

2.6 Radiation Protection Surveys

Surveys may be required to ensure compliance with procedures and controls described by the provisions of this KNPR. Also based on the preliminary assessment of a use request, an initial survey may be required by the KSC RPO or designee either prior to, or in conjunction with, initial use of the controlled nonionizing radiation device(s).

2.7 Assigned Controls

In addition to compliance with applicable Federal, state, and local regulations, an individual UA may stipulate additional controls assigned by the KSC RPO as a result of unique source or operational characteristics.

2.8 Scheduling and Notifications

2.8.1 Organizations responsible for use of such devices may be required to schedule use operations through the KSC scheduling system or to provide other prior notification of operations to the KSC medical and environmental contractor HPO, based upon the potential hazard represented by the use of certain nonionizing radiation devices. Such requirements shall be specified in the UA.

2.8.2 The user organization shall ensure all activities involving hazardous radiation sources are in compliance with the KSC Nonionizing Radiation Protection Program support requirements, as stipulated in the approved KSC UA, and are included in the appropriate KSC scheduling system document sections.

2.9 Waivers, Deviations, and Suspensions

2.9.1 Waivers of or deviations from the requirements described by this KNPR may be issued by the KSC RPO on an individual basis.

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2.9.2 Authorization for possession and use of nonionizing radiation devices may be rescinded at any time as a result of noncompliance with provisions of the applicable UA or other regulatory requirements.

2.10 Loss or Theft of Nonionizing Radiation Devices

Loss or theft of controlled nonionizing radiation devices shall be immediately reported to the KSC RPO or the medical and environmental contractor HPO. Refer to Chapter 5 of this KNPR for emergency notification telephone numbers.

2.11 Unattended Nonionizing Radiation Devices

Unattended controlled nonionizing radiation devices shall be secured to protect against unauthorized access at all times.

2.12 Incidents, Accidents, and Emergencies

Provide immediate notification to the KSC medical and environmental contractor HPO upon determination or suspicion of any accident or incident involving a potential overexposure of personnel. Refer to Chapter 5, Paragraph 5.3 for radiation incident notification requirements and telephone numbers.

2.13 Modification of Use Authorization

2.13.1 Changes to authorized use of nonionizing radiation devices shall be approved in advance and coordinated with the KSC RPO.

2.13.1.1 To initiate the coordination and approval process, submit KSC Form 16-353 to the KSC RPO or designee.

2.13.1.2 Requests for modification shall be submitted as soon as practical but must be submitted 30 days prior to implementation of the planned change.

2.13.2 Examples of changes requiring modification of UA include, but are not limited to, changes in approved procedures, location of storage or use, device operating parameters, personnel, and associated equipment.

2.14 Annual Renewal

2.14.1 Specific UAs shall expire one year from effective date

a. Requests to extend the authorized use period may be sent to the KSC RPO through the KSC medical and environmental contractor HPO by submitting KSC Form 16-353.

b. Submittal of requests for extension of authorized period of use should be made as early as practical, but no earlier than 45 days prior to the expiration of the UA. Requests for extension must be received by the RPO 30 days prior to expiration of the UA.

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CHAPTER 3. CONTROL PROVISIONS FOR THE USE OF LASERS AND OPTICAL RADIATION DEVICES

3.1 General

3.1.1 Procurement, possession, and use of lasers and optical radiation devices under the purview of the KSC Nonionizing Radiation Protection Program require coordination with the KSC RPO and approval by the KSC RPC. Apart from these Radiation Protection Program approvals, the unique nature of certain laser or optical radiation devices may cause regulatory agencies outside NASA KSC to require authorization or registration of the intended use and location of such devices. It must be noted, however, such outside authorization or registration shall be required in addition to, and concurrently with, KSC Nonionizing Radiation Protection Program approval.

3.1.2 The provisions in this chapter are provided to assist users in their effort to comply with NASA KSC requirements as well as those of other regulatory agencies as they apply to all operations, regardless of location. Those other agency regulations include the following:

a. ANSI Standard Z136.1, Safe Use of Lasers

b. ANSI Z136.6, American National Standard for the Use of Lasers Outdoor

c. ANSI Standard Z136.2, Safe Use of Optical Fiber Communication Systems (OFCS) Utilizing Laser Diode and LED Sources

3.2 Registration

On pertinent areas of KSC and CCAFS, certain controlled nonionizing radiation devices may require specific registration by the State of Florida. Copies of all such registrations shall be provided to the KSC RPO as part of the data submittal required for KSC Radiation Protection Program authorization of laser or optical radiation devices.

3.3 KSC Required Authorizations and Provisions

3.3.1 General Provisions

Any organization or individual functioning under KSC jurisdiction proposing to procure, possess, use, store, transfer, or otherwise dispose of laser or optical radiation devices that are not specifically exempted from KSC Nonionizing Radiation Protection Program requirements (refer to Paragraph 3.4, Program Exemptions) shall request and obtain authorization to do so. The KSC RPO is the focal point of the KSC Nonionizing Radiation Protection Program for coordination of such authorizations.

3.3.2 Unless specifically exempted by the provisions of Paragraph 3.4 or by KSC RPO direct action, a KSC UA is required for the following:

a. Lasers and laser systems with ANSI Class 3R or greater

b. Non-laser optical radiation devices operating in the ultraviolet, visible, or infrared wavelength range of the electromagnetic spectrum

c. Laser diodes and laser diode arrays

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d. OFCS using laser diodes and LED with ANSI Hazard Level 3R

3.3.3 KSC Nonionizing Radiation Protection Program written authorization shall be obtained from the KSC RPO or designated representative according to the following:

a. Prior to procuring for use or to transport controlled laser or optical radiation devices on to KSC

b. For responsible individuals and for all documented instructions or procedures (and subsequent revisions) applicable to operations involving such radiation devices. This applies to requests and plans which involve the acquisition, possession, use, storage, transfer, or other disposition of these laser or optical radiation devices.

c. Prior to operation or modification of existing operations

d. For storage and use areas and facilities prior to commencement of initial operations

3.3.4 Overall inventory control and administrative accountability of all authorized laser and optical radiation devices on KSC shall be maintained by the KSC Radiation Protection Program Office. Individual users and use organizations shall ensure accountability for their sources and coordinate this effort with the KSC RPO or designated representative.

3.3.5 RCAs and exclusion areas described by the applicable UA shall be posted and controlled by the user with warning signs and labels IAW this KNPR.

3.3.6 All personnel exposure to laser or optical radiation devices on KSC or a KSC worksite shall be kept as low as reasonably achievable (ALARA).

3.3.7 Any laser or optical radiation device improperly transported onto KSC or a KSC worksite shall be subject to impoundment until either the irregularities are corrected and appropriate KSC authorizations obtained or removal is arranged.

3.3.8 Failure to comply with the KSC Nonionizing Radiation Protection Program requirements for the authorized use of lasers or optical radiation devices shall result in the revocation or suspension of such UA and impoundment of radiation devices.

3.3.9 Data Submittals and Approvals

a. KSC Nonionizing Radiation Protection Program authorization for the possession or use of laser or optical radiation devices (Listed in Section 3.4) requires submittal of the appropriate completed KSC Nonionizing Radiation Protection Program form(s) for the type of device(s) together with any required supporting data.

b. Submittals shall be made as soon as practical but no later than 45 days (unless otherwise specified) prior to the intended arrival of the radiation devices. Appropriate KSC forms required for laser and optical radiation devices and associated data submittal requirements for KSC Nonionizing Radiation Protection Program authorization are described in this chapter.

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c. Lasers and Laser Systems

(1) KSC Form 16-447 shall be submitted for evaluation of all intended uses of lasers and laser systems to include laser diodes, diode arrays, LED not associated with OFCS, and lasers incorporated in equipment, instrumentation, or other devices.

(2) In cases where applicability of program requirements is unclear to the user organization and cannot be determined, KSC Form 16-447 shall be submitted with Sections I and III completed for review and preliminary evaluation by the KSC medical and environmental contractor HPO for the KSC RPO. Based upon this review, additional data and information may be required by the RPO to complete the authorization process.

d. Non-laser Optical Radiation Devices and OFCS

(1) KSC Form 28-626 shall be submitted for evaluation of all intended uses of non-laser optical radiation devices, fiber optic systems, and OFCS, including equipment, instrumentation, or other items incorporating such devices.

(2) In cases where applicability of program requirements is unclear to the user organization and cannot be determined, KSC Form 28-626 shall be submitted with Sections I (IA for optical devices, IB for fiber optic and OFCS) and III completed for review and preliminary evaluation by the KSC medical and environmental contractor HPO for the KSC RPO. Based upon this review, additional data and information may be required by the RPO to complete the authorization process.

e. User Personnel Identification

KSC Form 16-450 shall be submitted with the appropriate UA form for each identified user or operator, the ARO, and the US/C proposed for possession and use of the specified laser or optical radiation device.

f. Modification of Approved UA

KSC Form 16-353 shall be submitted for evaluation of any intended changes to applicable procedures, licenses or registrations, facilities, personnel, equipment, or materials described by the current KSC UA. Submittal of requests for modification of UA must be submitted no later than 30 days prior to the implementation of the intended changes.

3.3.10 Specific Data Submittal Requirements

3.3.10.1 Certain information is required to be submitted in support of a request for use of lasers or optical radiation devices at KSC or at a KSC worksite. All documentation for initial use requests shall include the original submittal package and one copy of the submittal package.

3.3.10.2 Copies of appropriate Use Request/Authorization forms, which are provided prior to arrival of sources, for use of lasers or optical devices related to cargo or payloads shall be included in any safety review documentation associated with the payload or cargo.

RELEASED - Printed documents may be obsolete; validate prior to use.

3.3.10.3 Requests for use of lasers or optical devices at KSC or a KSC worksite shall be submitted to the KSC RPO through the KSC medical and environmental contractor HPO as early as practical, but in no case later than 45 days prior to projected receipt of the device(s) at KSC or at a KSC worksite.

3.3.10.4 Elements of a complete data submittal package for UA include, but may not necessarily be limited to, the following:

a. The appropriate KSC Form 28-34 as described by paragraph 4.3.2.b.

b. Copies of licenses or other appropriate registrations possessed by the user organization to own, maintain, and use the specific radiation device

c. Copies of all applicable operating, maintenance, and emergency procedures relating to possession and use of the radiation device(s) for which authorization is being requested

d. Listing, by full name, of all proposed user or operator personnel accompanied by a completed KSC Form 16-450 for each individual on the list

e. Completed KSC Form 16-450 for the designated ARO and US/C

f. Approximate dates of arrival and departure of the specified radiation device(s) to/ from KSC, or KSC worksite, and mission or payload designation

3.4 Program Exemptions

3.4.1 A variety of commercially available consumer, business, and industrial application laser and optical radiation devices are exempted from the authorization requirements of the KSC Nonionizing Radiation Protection Program because of their common usage and negligible potential for hazardous exposure under conditions of normal use. However, such exemption is valid only when certain conditions are met. The following paragraphs describe currently exempted devices and the conditions necessary for their exemption. Individuals should consult with the KSC RPO or the KSC medical and environmental contractor HPO if there is a question regarding applicability of program exemption for the particular situation or requirement.

3.4.2 Exempted Item Categories

a. Equipment utilizing lasers and LEDs, including the following general categories of Class 1 and 1M and Class 2 and 2M laser devices, products, and systems:

(1) All laser pointers to include Class 3R (not exceeding power of 5 milliwatts)

(2) Laser copiers and printers

(3) Image scanners

(4) Compact disc (CD), digital versatile disc (DVD), and Blue Ray media type read-only memory (ROM) players

(5) Barcode scanner, reader, and verifier units

RELEASED - Printed documents may be obsolete; validate prior to use.

(6) Class 1and 1M and Class 2 and 2M laser devices, except for those that allow access to other classes of laser radiation during servicing operations, provided the laser product is maintained as a Class 1 or 1M or Class 2 or 2M laser product through its useful life

(7) Hazard Level 1 and Hazard Level 2 fiber optic devices and systems

b. Equipment using nonlaser optical devices, including the following general categories:

(1) Photographic strobe units

(2) High-intensity discharge lamps used for facility lighting

(3) Infrared radiation devices with accessible irradiance less than 10 milliwatts per square centimeter (mW/cm^2)

(4) Visible radiation devices with accessible luminance less than 1 candela per square centimeter

(5) Ultraviolet radiation devices with accessible effective irradiance of less than 0.1 mW/cm^2

3.4.3 Exemptions are valid for the general categories of equipment, instruments, and systems identified by paragraph 3.4.2 of the chapter provided that:

a. The individual item is maintained in its original design configuration and utilized for its originally intended use over the useful life of the item

b. The design and manufacture of the item is in accordance with the specifications of the Federal Performance Standard for Light Emitting Products (Title 21, CFR, Part 1040)

c. The item is operated in accordance with the manufacturer's recommended operating procedures

d. Maintenance, service, or repair activities which could expose personnel to accessible levels of radiation equal to or greater than the levels described or implied in paragraph 3.4.2 shall be performed only by appropriately authorized and qualified personnel

3.4.4 General Precautions for Exempted Items

3.4.4.1 Exemption of radiation devices from the authorization requirements of the KSC Nonionizing Radiation Protection Program shall not be construed to exempt the user from other safety requirements relating to potential hazards associated with operation of the item such as electrical hazards, fire hazards, heat, and explosion or fragmentation of glass envelopes

3.4.4.2 Apart from the negligible potential nonionizing radiation hazard characteristically represented by exempted sources, users should avoid:

a. Close or prolonged direct viewing of the devices

b. Intrabeam viewing conditions of any duration

c. Viewing of specular (mirror-like) reflected emissions from exempted devices

RELEASED - Printed documents may be obsolete; validate prior to use.

3.5 Radiation Protection Controls for Laser and Optical Devices.

Non-exempt lasers, OFCS, optical radiation devices, and laser pointers shall be identified in the radiation UA.

3.6 Medical Surveillance for Laser Operators

There are no medical surveillance requirements for users or operators of laser or non-laser optical radiation devices.

RELEASED - Printed documents may be obsolete; validate prior to use.

CHAPTER 4. CONTROL PROVISIONS FOR THE USE OF RADIO FREQUENCY AND MICROWAVE RADIATION DEVICES

4.1 General

4.1.1 Procurement, possession, and use of RF and microwave radiation devices under the purview of the KSC Nonionizing Radiation Protection Program requires coordination with the KSC RPO and approval by the KSC RPC. Apart from these KSC Radiation Protection Program approvals, the unique nature of certain RF and microwave radiation devices may cause regulatory agencies outside NASA KSC to require authorization or registration of the intended use and location of such devices. It must be noted, however, that such outside authorization or registration shall be required in addition to, and concurrently with, KSC Nonionizing Radiation Protection Program approval.

4.1.2 The provisions in this chapter are provided to assist users in their efforts to comply with NASA KSC requirements as well as those of other regulatory agencies as they apply to NASA-directed operations at KSC and at KSC worksites. Those other agency regulations include ANSI and Institute of Electrical and Electronics Engineers Standard C95.1.

4.2 Registration

Certain nonionizing radiation devices on pertinent areas of KSC and KSC worksites may require specific registration by the State of Florida or other Federal agencies such as the Federal Communications Commission. Copies of all such registrations should be provided to the KSC RPO as part of the data submittal required for KSC Radiation Protection Program authorization of RF and microwave radiation devices.

4.3 KSC Required Authorizations and Provisions

4.3.1 General Provisions

4.3.1.1 Any organization or individual functioning under KSC jurisdiction not specifically exempted from KSC Nonionizing Radiation Protection Program requirements (see paragraph 4.4) are required to obtain authorization to procure, possess, use, store, transfer, or otherwise dispose of RF and microwave devices. The KSC RPO is the focal point of the KSC Nonionizing Radiation Protection Program for coordination of such authorizations.

4.3.1.2 Unless specifically exempted by the provisions of paragraph 4.4 of this chapter or by KSC RPO direct action, KSC UA is required for any RF and microwave radiation device operating at frequencies between 3 kHz and 300 GHz, including but not limited to:

a. Radar systems

b. Spacecraft and vehicle telemetry and communications systems

c. Earth stations

d. Microwave diathermy units

e. RF generators

RELEASED - Printed documents may be obsolete; validate prior to use.

4.3.1.3 KSC Nonionizing Radiation Protection Program written authorization is required from the KSC RPO or designated representative:

a. Prior to procuring RF and microwave radiation devices for use or transport on to KSC

b. For responsible individuals and for all documented instructions or procedures (and subsequent revisions) applicable to operations involving such radiation devices. This applies to requests and plans which involve the acquisition, possession, use, storage, and transfer or other disposition of these RF and microwave radiation devices.

c. Prior to initiation of operation or modification to existing operations

d. For storage and use areas prior to commencement of initial operations

4.3.1.4 Overall inventory control and administrative accountability of all authorized RF and microwave radiation devices on KSC shall be maintained by the KSC Radiation Protection Program office. Individual users and use organizations are required to ensure accountability for their sources and coordinate this effort with the KSC RPO or designated representative.

4.3.1.5 RCAs and exclusion areas, as described by the applicable UA, must be posted and controlled by the user. Warning signs and labels described by this KNPR, or their equivalent, are required to be utilized in all area postings.

4.3.1.6 All personnel exposure to RF and microwave radiation devices on KSC or KSC worksites are required to be kept ALARA.

4.3.1.7 Any RF and microwave radiation device improperly transported onto KSC or KSC worksites are subject to impoundment until either the irregularities are corrected and appropriate KSC authorizations are obtained or removal is arranged.

4.3.1.8 Failure to comply with KSC Nonionizing Radiation Protection Program requirements for the authorized use of RF and microwave radiation devices will result in the revocation or suspension of such UA and impoundment of radiation devices.

4.3.2 Data Submittals and Approvals

a. KSC Nonionizing Radiation Protection Program authorization for the possession or use of controlled non-exempt RF and microwave radiation devices requires submittal of the appropriate completed KSC Nonionizing Radiation Protection Program form(s) for the device(s), together with any required supportive data.

b. Submittals shall be made as soon as practical, but in no case later than 45 days (unless otherwise specified) prior to the intended arrival of the radiation devices. Appropriate KSC forms required for RF and microwave radiation devices and associated data submittal requirements for KSC Nonionizing Radiation Protection Program authorization are described in this chapter.

(1) RF and Microwave Systems

(i) KSC Form 16-451 shall be submitted for evaluation of all controlled sources, including radar units, communication systems, satellite earth stations, and RF generators.

RELEASED - Printed documents may be obsolete; validate prior to use.

(ii) In cases where applicability of program requirements is unclear to the user organization and cannot otherwise be determined, KSC Form 16-451 shall be submitted with completed Section I (IA through IE) for review and preliminary evaluation by the KSC medical and environmental contractor HPO for the KSC RPO. Based upon this review, additional data and information may be required by the RPO to complete the authorization process.

(2) User Personnel Identification

(i) KSC Form 16-450 shall be submitted with the appropriate UA form for each identified user or operator, the ARO, and the US/C proposed for possession and use of the specified RF and microwave radiation device.

3) Modification of Approved UA

(i) KSC Form 16-353 shall be submitted for evaluation of any intended changes to applicable procedures, licenses or registrations, facilities, personnel, or equipment or materials described by the current KSC UA. Submittal of requests for modification of UA must be submitted no later than 30 days prior to the implementation of the intended changes.

4.3.3 There are specific data submittal requirements that must be addressed under the following conditions:

a. Certain information must be submitted in support of a request for use of RF and microwave radiation devices at KSC or KSC worksites. All documentation for initial use requests should be submitted as a single complete copy of the submittal package.

b. Copies of appropriate UA forms for use of RF and microwave radiation devices related to cargo or payloads should be included in any safety review documentation associated with the payload or cargo that is provided prior to arrival of sources.

c. Request for use of RF and microwave devices at KSC or KSC worksites shall be submitted to the KSC medical and environmental contractor HPO for the KSC RPO as early as practical but no later than 45 days prior to projected receipt of the device(s) at KSC or at KSC worksites.

d. Elements of a complete data submittal package for UA include, but may not necessarily be limited to, those described below:

(1) The appropriate KSC Form 16-451

(2) Licenses or other appropriate registrations possessed by the user organization to own, maintain, and use the specific radiation device

(3) All applicable operating, maintenance, and emergency procedures relating to possession and use of the radiation device(s) for which authorization is being requested

(4) Listing, by full name, of all proposed user or operator personnel, accompanied by a completed KSC Form 16-450 for each individual identified

(5) A completed KSC Form 16-450 for the designated ARO and US/C

RELEASED - Printed documents may be obsolete; validate prior to use.

(6) Approximate dates of arrival and departure of the specified radiation device(s) to/from KSC or KSC worksites and mission or payload designation

4.4 Program Exemptions

4.4.1 A variety of commercially available consumer, business, and industrial application RF and microwave radiation devices are exempted from the authorization requirements of the KSC Nonionizing Radiation Protection Program because of their common usage and negligible potential for hazardous exposure under conditions of normal use. However, such exemption is valid only when certain conditions are met. The conditions listed below shall be met for exempted sources. Individuals should consult with the KSC RPO or the KSC medical and environmental contractor HPO if there is a question regarding applicability of program exemption for the particular situation or requirement.

4.4.2 The following general categories of RF and microwave radiation devices are exempted:

a. Devices with transmitter power of 7 watts or less and an antenna gain of unity (two-way radios, car phones, cellular phones) at frequencies between 100 kHz and 900 megahertz (MHz)

b. Speed monitoring devices (radar guns)

c. Automotive radar detectors

d. RF and microwave radiation devices designed for and operated in a completely enclosed configuration where no open air transmission is possible

e. RF and microwave radiation devices designed to operate in a hard-lined, closed-loop configuration where no open air transmission is possible

f. Devices or systems which have been shown by documented worst case analysis that they are incapable of emitting radiation levels greater than applicable maximum permissible exposures levels

4.4.3 Exemptions are valid for the general categories of equipment, instruments, and systems identified by Paragraph 4.4.2 of this chapter provided that:

a. The individual item is maintained in its original design configuration and used for its originally intended use over the useful life of the item

b. The design and manufacture of the item is in accordance with the specifications of the Federal Performance Standard for Electronic Products (Title 21, CFR, Part 1010)

c. The item is operated in accordance with the manufacturer's recommended operating procedures

d. Maintenance, service, or repair activities which could expose personnel to accessible levels of radiation equal to or greater than the levels described or implied in paragraph 4.4.b. are performed only by appropriately authorized and qualified personnel

RELEASED - Printed documents may be obsolete; validate prior to use.

4.4.4 General Precautions for Exempted Items

a. Exemption of radiation devices from the authorization requirements of the KSC Nonionizing Radiation Protection Program shall not be construed to exempt the user from other safety requirements relating to potential hazards associated with operation of the item such as electrical hazards.

b. Apart from the negligible potential nonionizing radiation hazard characteristically represented by exempted sources, users should avoid:

(1) Close or prolonged exposure to emissions of devices

(2) Intra-beam exposure conditions of any duration

4.5 Radiation Protection Controls for Radio Frequency and Microwave Systems

Non-exempt RF and microwave systems shall be identified in the user organization's Radiation UA.

4.6 Medical Surveillance for Radio Frequency Operators

There are no medical surveillance requirements for users or operators of RF and microwave systems.

RELEASED - Printed documents may be obsolete; validate prior to use.

CHAPTER 5. RADIATION INCIDENT NOTIFICATIONS

5.1 General

Nonionizing radiation incidents may result in exposure of personnel to nonionizing radiation. The resulting exposure is not assessable except by the use of specialized techniques and detection instrumentation.

5.2 Radiation incidents involving fire, explosion, personnel injury, or facility damage requiring emergency response by medical, fire, or security elements shall be reported by as follows:

a. Calling 911 (KSC)

b. To report from a cell phone while on KSC property, dial 321-867-7911

c. Caller must identify the radiation source and describe their involvement in the emergency

5.3 Basic Emergency Procedures

5.3.1 Eliminate Source of Radiation by removing power source to radiation producing device. If unable to remove power to radiation source, evacuate personnel from radiation area.

5.3.2 Notify appropriate response elements (See Section 5.4 for contact numbers)

a. Notify emergency response elements (fire, medical, security) as determined necessary.

b. Notify KSC RPO

c. Notify KSC Emergency Management Officer as determined necessary

5.3.3 Standby Activities for Affected Area Personnel

a. Control unauthorized access to the area

b. Inform response element(s) of the nature of the radiological hazard (i.e., type of nonionizing device)

c. Detain evacuated personnel in marshaling area until released by the RPO

5.3.4 Personnel Conduct

a. Potentially exposed personnel shall be required to provide a detailed account of conditions or circumstances surrounding the exposure incident

b. The written account shall be provided to the KSC RPO

c. Survey efforts shall, in all cases, be conducted under the supervision of the KSC RPO

RELEASED - Printed documents may be obsolete; validate prior to use.

5.4 The following contact numbers are subject to change without notice or may not be applicable to your area. Consult your local installation telephone directory for current listings and for areas not listed. Current emergency contact information shall be listed in the user organization's Radiation UA.

a.	All Hours Emergency Response	911 (Medical, Fire, Security)
b.	Emergency on KSC property (From a cellular device)	321-867-7911
c.	Normal Duty Hours (0730-1630)	321-861-5050
d.	KSC RPO	321-867-6958
e.	KSC medical and environmental contractor HPO	321-867-2400
f.	KSC Emergency Management Office	321-867-8723
g.	45 SW RPO	321-494-5435
h.	Outside Normal Duty Hours	321-861-5050

RELEASED - Printed documents may be obsolete; validate prior to use.

APPENDIX A. DEFINITIONS

Area Radiation Officer (ARO) - The individual designated by the user organization's management as their representative for matters pertaining to the local control of authorized radiation sources.

Authorized Personnel - Individuals approved by the RPO for activities occurring under the auspices of an approved UA.

Hazard Evaluation - A comprehensive technical review and theoretical analysis of formally submitted data and information related to UA, Modification of Radiation UA, etc., in order to assess radiation hazard potentials and establish necessary controls.

Hazard Survey - An onsite technical inspection or audit of material, systems, personnel, procedures, or devices covered by a UA. Such a survey may involve the physical measurement of radiation and the evaluation of precautionary control measures, as applicable.

Health Physics- The professional discipline dedicated to the protection of humans and their environment from unwarranted radiation exposure.

Laser - A device which produces an intense, coherent, and directional beam of radiation by stimulating electronic or molecular transitions to lower energy states.

Laser Facility - A facility which has one or more Class 3B or 4 lasers. In the case of facilities possessing more than one laser class, the assigned facility classification shall be determined by the most hazardous class of laser contained therein.

Laser System - An assembly of electrical, mechanical, and optical components which includes a laser.

Maintenance - Performance of those adjustments or procedures specified in user information provided by the manufacturer with the nonionizing radiation device or system which are to be performed by the user to ensure the intended performance of the device or system. Does not include “operation” or “service” as defined in this KNPR.

Microwave Radiation - Electromagnetic radiation with frequencies that lie within the range 300 MHz to 300 GHz.

Nonionizing Radiation -

a. Electromagnetic radiation which is not capable of producing ionization when interacting with matter but is capable of producing thermal or other effects resulting in a personnel health hazard.

b. That portion of the electromagnetic spectrum which includes the frequency and wavelength characteristics associated with ultraviolet, visible, and infrared radiation, RF, and microwaves.

Nonionizing Radiation Producing Device, Nonionizing Source - Any device capable of producing nonionizing radiation that has the potential for producing a health hazard to user personnel.

Operation/Use - The performance of a nonionizing radiation device or system over the full range of its intended function (normal operation/use). Does not include “maintenance” or “service” as defined in this KNPR.

RELEASED - Printed documents may be obsolete; validate prior to use.

Optical Fiber Communication System (OFCS) - A system consisting of one or more laser or LED transmitters, each of which is coupled to an individual optical fiber and which is used for the transmission of information, e.g., voice or data.

Optical Radiation - For the purposes of the Nonionizing Radiation Protection Program and this KNPR, optical radiation is used as a general term to describe non-laser electromagnetic radiation including infrared, visible, and ultraviolet wavelengths.

Radiation Controlled Area (RCA) - An area established where access to, occupancy of, and activities within, are controlled for the purpose of radiation protection.

Radiation Exclusion Area - An area established for the purpose of radiation protection to which entry and occupancy of personnel is prohibited.

Radiation Incident - Any unusual occurrence, accident, or emergency involving a radiation source(s).

Radiation Protection Committee (RPC) - At KSC, a committee composed of representatives from various organizations to ensure adequate protection of personnel under KSC jurisdiction from the harmful effects of nonionizing radiation.

Radiation Protection Officer (RPO) - At KSC, the representative from the Spaceport Integration and Services Aerospace Medicine and Occupational Health Branch who is authorized to serve as an executive member of the RPC and act for KSC on all matters related to nonionizing radiation protection.

Radiofrequency (RF) Radiation - Electromagnetic radiation with frequencies that lie within the range 3 kHz to 300 GHz.

Service - The performance of those procedures or adjustments described in the manufacturer's service instructions which may affect any aspect of the performance of the nonionizing radiation device or system. Does not include 'maintenance' or 'operation' as defined in this KNPR.

Shall - The word "shall" is to be understood as mandatory.

Should - The word "should" is to be understood as advisory.

Uncontrolled Area - Any area to which access is not controlled by the user for purposes of protection from radiation hazards.

Use Authorization (UA) - An approval issued by the RPO, following review of the use request submittal, for the use of a specific radiation source by specified personnel, use location, and radiation protection control provisions.

Use Request - A data package composed of appropriate KSC forms and attachments as described by Chapters 3 and 4 of this KNPR. The use request is submitted to the KSC RPO, through the KSC medical and environmental contractor HPO, to obtain a UA for nonionizing radiation devices.

User - Any NASA, contractor, or other personnel involved in the operation or use of nonionizing radiation-producing devices under KSC jurisdiction.

RELEASED - Printed documents may be obsolete; validate prior to use.

User Organization - Any NASA, contractor, or other organization which has direct responsibility for the operational possession and use of nonionizing radiation-producing devices.

Use Supervisor/Custodian (US/C) - Designated onsite user who is authorized to act on behalf of the ARO during ARO absence.

RELEASED - Printed documents may be obsolete; validate prior to use.

APPENDIX B. ACRONYMS

45 SW	45th Space Wing
AFOSH	Air Force Occupational Safety and Health
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
ARO	Area Radiation Officers
CCAFS	Cape Canaveral Air Force Station
CFR	Code of Federal Regulations
GHz	Gigahertz
GUA	General Use Authorization
HPO	Health Physics Office
IAW	In Accordance With
kHz	Kilohertz
KNPD	Kennedy NASA Policy Directives
KNPR	Kennedy NASA Procedural Requirements
KSC	Kennedy Space Center
LED	Light Emitting Diode
MHz	Megahertz
mW/cm^2	Milliwatts Per Square Centimeter
NASA	National Aeronautics and Space Administration
OFCS	Optical Fiber Communication Systems
RCA	Radiation Controlled Areas
RF	Radio Frequency
RFP	Request for Proposal
RPC	Radiation Protection Committee
RPO	Radiation Protection Officer
UA	Use Authorization
US/C	Use Supervisor/Custodian

RELEASED - Printed documents may be obsolete; validate prior to use.

APPENDIX C. REFERENCES

C.1 Title 29 CFR Parts 1926.54 and 1910.97

C.2 Title 47 CFR Parts 15 and 30

C.3 State of Florida Administrative Code Chapter 64E-4, Control of Nonionizing Radiation Hazards

C.4 ANSI Standard C95.3, Techniques and Instrumentation for the Measurement of Potentially Hazardous Electromagnetic Radiation at Microwave Frequencies

C.5 ANSI Standard C95.5, Recommended Practice for the Measurement of Hazardous Electromagnetic Fields – RF and Microwave

C.6 ANSI Standard Z136.3, Safe Use of Lasers in Health Care Facilities

C.7 Air Force Occupational and Health (AFOSH) Standard 48-9, “Exposure to Radio Frequency Radiation”

C.8 AFOSH Standard 48-10, Health Hazards Control for Laser Radiation

C.9 45 SW Instruction 127-1, Range Safety Manual

C.10 American Conference of Governmental Industrial Hygienists, TLV’s, Threshold Limit Values for Chemical Substances and Physical Agents in the Work Room Environment with Intended Changes

RELEASED - Printed documents may be obsolete; validate prior to use.