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ATOMIC ENERGY COMMISSION
Albuquerque Operations
Office of Test Operations

RADIOLOGICAL SAFETY PROCEDURES FOR ENIWETOK PROVING GROUNDS

1. PURPOSE

The purpose of the Standard Operating Procedure is to define responsibilities and to establish criteria and procedures for the conduct of radiological safety at the Eniwetok Proving Ground during test and non-test periods. Additional operational instructions relating to radiological safety during test periods will be issued by Commander, Task Unit 6, Task Group 7.1, Joint Task Force SEVEN.

2. DEFINITIONS

a. Radiological safety is defined as protection of personnel from the hazards of radiation through control of radioactivity of contaminated areas, materials, vehicles, and other equipment.

b. The term "Director" as used in the following, refers to the Director, Pacific Operations Division (Joe B. Sanders).

c. The term "Rad-Safe Advisor" as used, refers to Rad-Safe Advisor to the Assistant Manager, Office of Test Operations, ALOO. (Roscoe H. Goeke)

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d. The term "AEC Radiological Safety Officer" as used in the following, refers to the Atomic Energy Commission Radiological Safety Officer, ALOO. (Charles L. Weaver)

e. The term "AEC Rad-Safety Assistant" as used, refers to AEC Radiological Safety representative stationed at EPG. (Henry P. Schlacks)

f. The term "contractor" as used in the following, refers to employees of Holmes & Narver, Inc., the architect-engineer-construction-management services contractor at the EPG.

g. Radex. Radiological Exclusion Area.

(1) Full Radex. An area in which the radiation contamination is greater than 100 mr/hr gamma.

(2) Limited Radex. A radiation contaminated area with an intensity of between 10 and 100 mr/hr gamma.

h. Task Group Rad-Safety Officer. A representative of each Task Group specifically concerned with radiation safety for that Task Group.

3. RESPONSIBILITIES

a. During the non-test period the Director of Pacific Operations is responsible for the radiological safety at EPG.

b. During the operational period the Commander, JTF SEVEN, assumes responsibility for the radiological safety of EPG. However, the Commander, TG 7.5 (Assistant Manager, Office of Test Operations) will retain radiological safety responsibility for TG 7.5 personnel and will issue the necessary implementing instructions to comply with JTF SEVEN directives.

c. During the test period, TG 7.1 is responsible for providing the services normally provided by H&N rad-safety organization during non-test periods, together with the increased service occasioned by the operation.

d. For non-test periods the CTG 7.5's Rad-Safety Advisor will be responsible for staff direction on all rad-safety policies for EPG.

e. During non-test periods the Director, Pacific Operations Division is responsible for the rad-safety support services for EPG with the AEC Rad-Safety Officer coordinating these services.

f. During non-test periods, the AEC Radiological Safety Officer is responsible to the Director for the operation of the Radiological Safety Program as outlined herein.

g. During a test period, the AEC Rad-Safety Officer is responsible to the Deputy CTG 7.5 for:

(1) Liaison with CTG 7.1, CTU-6, on radiological safety matters prior to and during Pacific Operations.

(2) Recommendations to the Deputy CTG 7.5 on procedures in the event of fallout from a nuclear detonation and decontamination methods when determined necessary to protect health and safety of TG 7.5 personnel. (To be coordinated with CTG 7.1)

(3) Recommendation to the Deputy CTG 7.5 for evacuation of TG 7.5 personnel in the event of fallout.

h. Rad-Safety Assistant is responsible to the AEC Radiological Safety Officer for:

(1) Periodic check of the contractor's operation to insure compliance with rad-safety procedures.

(2) Aid in training of contractor's employees on radiological safety activities and procedures.

(3) Act as an advisor to the Eniwetok Branch Chief on radiological safety during interim period.

(4) Observing, reporting, and recommending changes as required on operation of the rad-safety organization.

(5) During the test period the AEC Rad-Safety Assistant will continue to supervise the contractor and assist in coordinating the rad-safety support.

(6) Keeping the Office of Test Operations, ALOO advised of all rad-safety activities.

i. During the non-test periods the contractor is responsible to the Director for:

(1) Making periodic radiological surveys and proper marking and mapping of contaminated areas.

(2) Operating a H&N dosimetry and records section, and issuing of monthly and quarterly radiation exposure reports.

(3) Holding exposure of employees engaged in construction, support, recovery, salvage, or removal of contaminated materials to the lowest possible dose. In all cases the dose must be less than the allowable 3.0 r (gamma only) for any consecutive 13-week period and less than 5.0 r per calendar year.

(4) Furnishing monitors as required.

(5) Repairing, maintaining, and calibrating of radiation detection equipment.

(6) Requisitioning repair parts and supplies as required and/or directed by the AEC Rad-Safety Officer.

(7) Procuring, issuing, and decontaminating radiological safety clothing and supplies as required.

j. During test periods the contractor is responsible to the CTG 7.5 for:

(1) Conducting a monitor training course at either NTS or EPG prior to each Pacific Operation to qualify rad-safety monitors for a TG 7.5 monitor's pool.

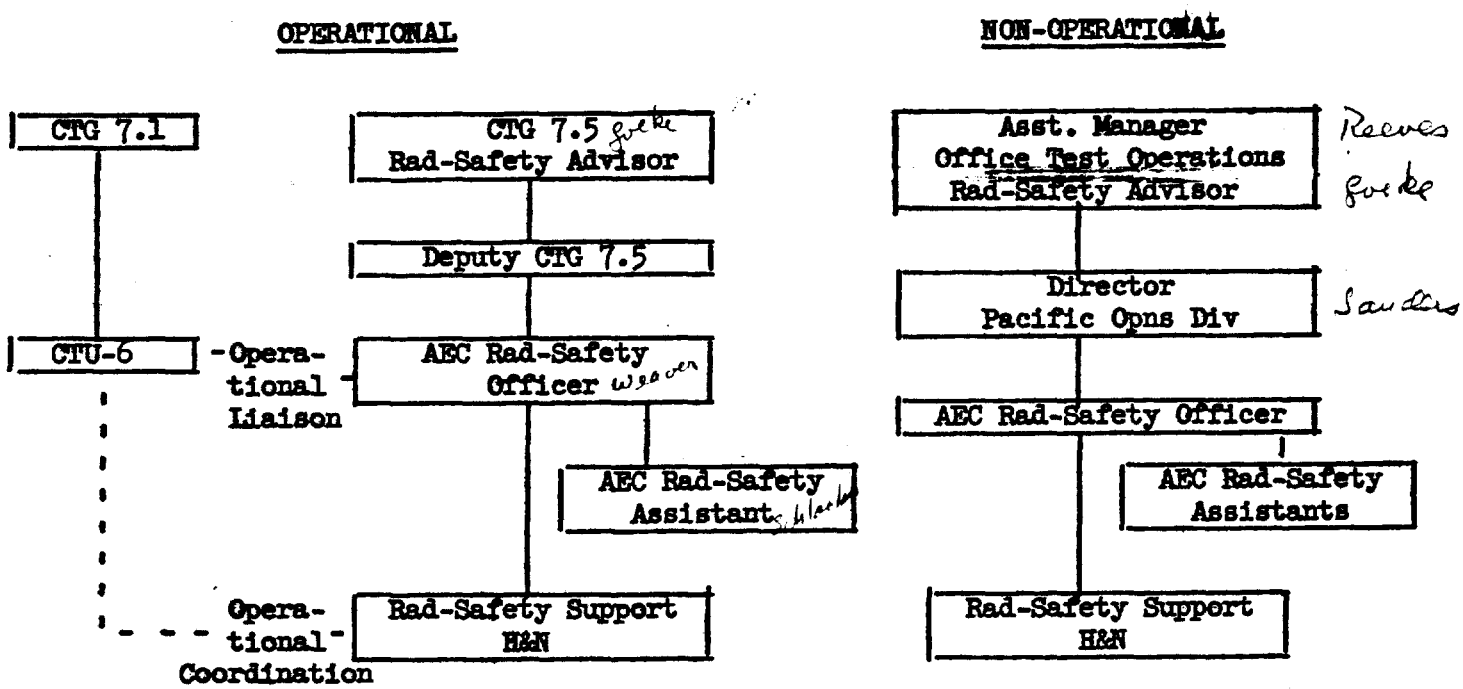
(2) Providing a monitor's pool for support of contractor's operation.

(3) Turning over responsibility of rad-safety services to CTU-6 for duration of the Operation. However, H&N rad-safety personnel will continue to work with TU-6 in performing these services.

(4) Providing laundry facilities for decontaminating protective clothing except the laundry facilities which are provided by TG 7.2 at Site Fred.

4. ORGANIZATION

a. The operational chart showing the organization of the rad-safety activities is as follows:



b. During an operational period the AEC and contractor rad-safety personnel will function separately as the rad-safety organization of TG 7.5 and will be designated TU-E7. Work on common problems such as dosimetry, decontamination, and instrument repair will be accomplished by agreement between the AEC Rad-Safety Officer, H&N Rad-Safety Officer, and CTU-6 per letter file TM:CLW, Reeves to Felt, subject "Radiological Safety at EPG for TG 7.5 dated 15 August 1957.

5. TEST PERIOD OPERATIONAL GUIDES

a. Radiation Exposure

The maximum permissible exposures have been defined by the Division of Biology and Medicine, AEC, Washington, D.C. The dosage of any individual shall not be allowed to exceed this maximum level. The total cumulative exposure to TG 7.5 personnel authorized by current JTF-7 directives is as follows:

(1) Gamma -- a maximum of 3.0 roentgens per any 13 consecutive week period, with a maximum of 5.0 r within a period of one calendar year.

(2) Alpha -- 10,000 units per any consecutive 13-week period, computed by multiplying the average air concentration in the area of exposure in $d/m/M^3$ by the hours of exposure, when no protective equipment is worn. This excludes natural background.

b. Radiation Exposure Control

(1) Persons in charge of work or construction parties are responsible for controlling the radiation exposures of their personnel.

(2) Any exception to these guides must be approved by CTG 7.5 and CJTF SEVEN.

(3) Wearing of film badges will be as prescribed by directives from JTF SEVEN and TG 7.1, TU-6.

(4) Personnel engaged in operations in full radex areas will have their badges processed immediately after each mission.

(5) Daily dosage reports will be provided by CTG 7.1, TU-6.

(6) The CTG 7.5 will be notified immediately of an integrated exposure in excess of two roentgens.

c. Radiation Contamination

(1) Vehicle contamination must not exceed:

Outside	Inside
7 mr/hr (gamma + beta)	7 mr/hr (beta + gamma)
500 c/m/55 cm^2 (fixed alpha)	500 c/m/55 m^2 (fixed alpha).

By "fixed" alpha is meant that no change in the alpha contamination level can be observed by swiping a 100 centimeter square area.

(2) Personnel contamination should be maintained as low as possible and decontamination exercised when levels are greater than 7 mr/hr (gamma beta) or 500 c/m/55 cm^2 (alpha) for outer clothing or greater than 1 mr/hr (gamma) or 100 c/m/55 cm^2 (alpha) on skin or under clothing.

(3) Equipment contamination must not exceed 7 mr/hr (gamma) and 500 c/m/55 cm^2 (fixed alpha).

(4) Respiratory protective devices will be maintained at a contamination level less than 1 mr/hr (beta/gamma) or 100 c/m/55 cm^2 (alpha).

NOTE: Equipment or vehicles, alpha contaminated to levels in excess of 5,000 c/m/55 cm^2, will be decontaminated by mobile equipment in the field.

d. Entry into contaminated areas during the Operational Period.

(1) Entry of all TG 7.5 personnel into contaminated areas will be controlled by CTG 7.5 through CTU-6 Rad-Safety Organization.

(2) H&N personnel will be allowed to return to work in shot areas according to the radiological situation. The TU-6 Rad-Safety organization will set up check points at the Helicopter Pad, M-boat Landing, and Personnel Pier to control traffic into the contaminated areas.

(3) No person will be permitted beyond the check station without a proper access pass, stating the purpose of the entry and precise location to which the entry will be made.

(4) Entry into a contaminated area will require an access permit which will be issued by the Plotting and Briefing Officer TU-6.

(5) TG 7.5 Rad-Safety Organization will operate additional rad-safe check points when it is determined necessary for control of TG 7.5 personnel only.

(6) Construction activities in radex areas will be accomplished at the discretion of the CTG 7.5 and the AEC Rad-Safety Officer.

(7) All parties entering a full radex area will be required to have a certified monitor accompany them. These monitors are responsible to the party leader. ?

(8) Work parties will provide their own monitors. If they are unable to do so, TG 7.5 monitors pool or TU-6 Rad-Safety Organization will provide the monitors.

(9) TG 7.5 Rad-Safety Organization will have training courses for monitors as required.

(10) It is required that the rad-safety monitors, and any others as directed by the party leader, shall be briefed at the Rad-Safety Building, Site Elmer, and/or Site Nan, prior to receipt of an access permit. A situation map showing the results of a radex survey will be used.

e. Rad-Safety Equipment and Clothing

(1) In general, entrance into full radex areas will require full rad-safety clothing. Clothing worn in limited radex areas will be determined by the TG 7.5 Rad-Safety Organization and TU-6 as a particular mission demands. Clothing

will also be worn when working with contaminated material.

(2) All necessary rad-safety equipment, including instruments, clothing, respirators, film badges, and dosimeters may be obtained at the Rad-Safety Building at Site Elmer and Site Nan. This equipment will be issued to individuals on receipts.

(3) Individuals losing rad-safety equipment, such as dosimeters or survey instruments, will sign a statement to that effect and the original organization will be notified.

f. Decontamination

(1) All persons leaving a full radex or limited radex area will be monitored for contamination on the person and on the equipment. Persons leaving such areas will clear through the Rad-Safety Building at Site Elmer and/or Site Nan.

(2) All aircraft landing on the airstrip at Site Elmer and/or Site Nan will be monitored and decontaminated by decontamination personnel from the TU-6 when contamination levels exceed those values listed in Section 5c.

g. Radioactive Material

All radioactive material brought into EPG, exclusive of Sources and Special Nuclear Material, will be registered with CTG 7.1, TU-6.

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h. Removal of Radioactive Material

During test periods no radioactive material, except material shipped by fly-a-way aircraft, will be removed from EPG without prior written approval of CTU-6. All other radioactive materials which are removed from EPG will be packaged, monitored, labeled, and loaded so as to satisfy the Interstate Commerce Commission and MATS regulations for transporting radioactive material.

i. Emergency Plan

An emergency plan will be prepared by the Support Contractor Rad-Safety Officer that will set forth in detail those procedures dealing with situations that require TG 7.5 personnel to remain indoors and those which require people to be evacuated. Emergency programs will be coordinated with CTG 7.1, TU-6.

6. DOCUMENTING DECONTAMINATION

The Support Contractor will, at any time that it becomes necessary to decontaminate an island or area that has become contaminated as a result of radioactive fallout, submit a full report in quadruplicate to the CTG 7.5. This report will include such data as: map of area showing radiation intensities, radiation levels at specific locations prior to decontamination, radiation levels upon completion, effect of character of terrain on radiation intensities, type of equipment used

on the job, dosages equipment operators received, effectiveness of the decontamination, time required to complete the decontamination, photographs, and any other pertinent facts relating to the problem. Upon completion of this report, a copy will be submitted by the Assistant Manager, Office of Test Operations to the Division of Biology and Medicine, DMA, Washington, D.C. Work performed on all decontamination projects will be coordinated with CTG 7.1, CTU-6.

7. NON-TEST PERIOD OPERATIONAL GUIDE

a. Radiation Exposure

The cumulative exposure to TG 7.5 personnel during non-test periods will be the same as currently authorized for the operational period. Every effort should be made to keep personnel exposure to a minimum.

b. Radiation Contamination

The contamination limits as prescribed in paragraph 5b also apply during non-test periods.

c. Entry into Contaminated Areas

(1) Entry of all personnel into contaminated areas will be controlled by the H&N Rad-Safety Organization.

(2) All parties entering a contaminated area shall be briefed at the Rad-Safety Building, Site Elmer, and/or Site Nan, prior to being cleared for access to a specific area. A situation map showing the results of a radex survey will be used.

(3) All parties entering a full radex area (greater than 100 mr/hr) will be required to have a certified monitor accompany them.

(4) Construction and support activities in contaminated areas will be accomplished at the discretion of the AEC Branch Chief. The AEC Rad-Safety Assistant will act as an advisor when required.

d. Rad-Safety Clothing and Equipment

The procedures outlined in paragraph 5e also apply during the non-test period.

e. Decontamination

All persons leaving a contaminated area will be monitored for contamination. Persons found contaminated will be processed through the personnel decontamination station Site Elmer and/or Site Nan. Equipment found to be contaminated will be decontaminated when the radiation levels are greater than those values

listed in Section 5c. Vehicles that cannot be decontaminated will be disposed of or parked in hot parks. The hot park areas will be fenced and marked with appropriate signs.

f. Radioactive Material

All radioactive material brought into EPG, exclusive of Source and Special Material, will be registered with the AEC Branch Chief or H&N Rad-Safety Superintendent.

g. Contaminated Areas

The support contractor will survey all contaminated areas periodically to establish radiation levels. Contaminated areas will be marked with appropriate warning signs indicating gamma radiation levels. Signs will be placed to indicate alpha contamination when prevalent. Maps of contaminated areas will be prepared to reflect the general radiological siguation as required.

h. Removal Radioactive Material

No radioactive material will be removed from EPG without the prior approval of the AEC Branch Chief or the AEC Rad-Safety Assistant. All radioactive materials which are removed from EPG will be packaged, monitored, labeled, and loaded so as to satisfy the procedures of the AEC Rad-Safety Officer and the Interstate Commerce Commission regulations for transporting

radioactive material. The AEC Rad-Safety Officer or Assistant will, by signature, release all such shipments by completing in duplicate the form "Release of Radioactive Materials for Shipment."

8. DOSIMETRY AND RECORDS FOR NON-TEST PERIODS

a. The H&N Rad-Safety Organization will provide complete dosimetry and record service for H&N personnel.

b. The contractor will set up a system of dosage reporting to provide current information on exposure of all personnel. Consolicated Monthly Reports on exposed individuals will be furnished for distribution to contractors. The contractor is responsible for the safety of his own employees by obtaining from the H&N Rad-Safety Department the dosage each received prior to making the work assignments. When records indicate that an employee of a scientific agency or a contractor is approaching 2.0 r, the employer will be so notified. The Rad-Safety Department of Holmes & Narver, Inc., will maintain complete continuous records in the individual's personnel jacket to include accumulated, periodic, and lifetime radiation dosages, and any pertinent remarks of extraordinary circumstances regarding unusual situations.

c. The policy and procedures regarding information to be given AEC contractor and sub-contractor employees concerning their radiation exposure is soon to be published in AEC Manual Chapter 0525, "Radiation Exposure Information for Employees." Section 04 of this chapter sets forth uniform practices which are as follows:

(1) Radiation status of an employee shall be made available to him at his request.

(2) Each employee shall be informed each year of his total recorded whole body radiation exposure dose from external radiation accumulated during the prior twelve month period if it exceeds the permissible cumulative exposure recommended by the NCRP.

(3) Special notification shall be given following a reasonable period of time to permit verification, to an employee who receives any of the following:

(a) A total recorded whole body external radiation exposure dose during any consecutive 13-week period greater than the quarterly permissible exposure recommended by NCRP.

(b) A body burden estimated by the best technique available to be equal to or greater than one-half the

maximum permissible body burden for any radioisotope as recommended by the NCRP.

(4) Any employee terminating his employment shall at his request be provided with a written, certified, summary of his cumulative occupational radiation exposure during the period of his employment.

d. Quarterly Consolidated Exposure Reports, in quadruplicate, will be furnished to the AEC Branch Chief. Two copies of this report will be forwarded to the Director, Safety and Fire Protection Division, ALOO, who will in turn forward one copy to the Division of Biology and Medicine, AEC, Washington, D.C. Limited additional copies may be required for distribution to scientific agencies should personnel of other agencies or contractors other than Holmes & Narver, Inc., be included in subject report.

e. The provisions of AEC Appendix 0230-091-11, Sections 5 and 6, "Medical, Health, and Safety, AEC Manual," set forth the records disposition policies and regulations pertaining to all rad-safety matters. Under those provisions every film badge, written records, reports, water, soil and air sampling data, etc., are to be retained indefinitely. Thorough check with these regulations and clearance from the AEC will be obtained prior to any disposition of rad-safety records, film badges, survey data, etc.

9. WEEKLY RAD-SAFETY REPORT

A weekly rad-safety activities report in quadruplicate, as required by letter ETE:RWT H-4991, will be forwarded to AEC Branch Chief covering the following activities:

a. Missions into areas requiring rad-safety protection, with number of personnel involved. If special equipment (i.e., protective clothing) and special handling (i.e., monitoring, air sampling, shielding) are necessary, this shall be included.

b. Number of film badges issued, processed, and lost each week.

c. List of all biological samples processed with pertinent data, (i.e., fish, plants, and urine). Four copies only.

d. Equipment failures, modifications, and reports of survey.

e. Shipment of radioactive materials, and how handled.

f. Any additional information as required by the AEC Rad-Safe Officer.

g. Any incidents deemed of sufficient importance to merit wider record distribution (i.e., unusually high dosage, "hot" spill, etc.).

h. Decontamination project underway.

This report should be in the AEC Eniwetok Branch Office not later than the close of business the first working day of each week.

FOR: Thyrl J. Smith

Joe B. Sanders, Director
Pacific Operations Division
Office of Test Operations