[redacted]

HEADQUARTERS
JOINT TASK FORCE SEVEN
WASHINGTON 25, D.C.

26779

J-3/729.3

Dr. John C. Bugher
Director, Division of Biology and Medicine
Atomic Energy Commission
1901 Constitution Avenue
Washington 25, D. C.

Dear Sir:

Reference is made to letter this headquarters, file AG 729.3, subject as above, dated 27 July 1953.

The above reference transmitted a copy of the Radiological Safety Annex to Joint Task Force Operation Order 1-53. This annex was designed to delineate the necessary planning by all participants in the operation preparatory to the overseas phase. Attached hereto is a draft of Annex N to Joint Task Force Operation Plan 3-53 which will be published approximately 1 November 1953. At a future date Operation Plan 3-53 will be designated an order, superseding Operation Order 1-53, and will become the primary task force directive upon which the on-site phase of operations will be based.

Due to the special nature of field tests such as Operation CASTLE, it is the opinion of this headquarters that a policy of strict adherence to the radiological standards prescribed for routine work is not realistic. The intent in the attached annex is to strive for a reasonable and safe compromise considering conservation of personnel exposures, the international import of the tests and the cost aspects of delays chargeable to excessive radiological precautions.

It is requested that you review the attached Annex N and provide this headquarters with your comments, suggestions and/or approval in order that the on-site operations order may reflect a set of rules mutually acceptable to all concerned.

A similar letter has been forwarded to the Surgeons General of the three Services.

1 Incl:
Annex N to JTF SEVEN
Operation Plan 3-53

E. McGinley
E. McGINLEY
Brigadier General, U.S. Army
Chief of Staff

CLASSIFICATION CANCELLED *
BY AUTHORITY OF DOE/OC
J. Diaz 1/25/88
REVIEWED BY DATE
* Ltr. DNA Verotto To
DOE, OC dated 10/22/87
Carl Walker 1/26/88

0 9051

S[redacted]

8708064A 6

[redacted] 1

Headquarters, Joint Task Force SEVEN
Washington 25, D. C.

Annex N to CJTF SEVEN Operation Plan No. 3-53

RADIOLOGICAL SAFETY

1. Radiological safety of all task force military and civilian personnel is a command responsibility and radiological safety activities will be performed through normal command channels.

2. General ~~Terminology~~ Radiological Defense (RadDefense) operations, or Radiological Safety (RadSafe) operations, short term RADOPS, are general terms. They are used to denote the means by which a unit can control and confine the damage and radiological effects of an atomic explosion, or of radioactive material spread by other means, thereby preventing and avoiding health hazards to personnel. They are interpreted to include measures such as (a) training, organization, ~~and~~ distribution of radiological personnel, (b) development of techniques and procedures, ~~including~~ use of detecting equipment, protection or removal of exposed personnel, and decontamination of personnel, structures and equipment.

Following each detonation there will be areas of surface radiological contamination and areas of air radiological contamination. These areas are designated as Radiological Exclusion Areas (R/DEX). Prior to shot times, the forecast air and surface R/DEX will be disseminated by CJTF SEVEN in the target area. ~~While CTG 7.1 disseminates the forecast air R/DEX.~~ These R/DEXES will represent a forecast from HOW Hour (H-Hour) until dissemination of a later surface and air R/DEX at about H plus 4 hours. The later RADEXES will be based upon the master radiological "situation map" maintained in the R/DSAFE OFFICE of CJTF SEVEN. Since the air R/DEX after shot time will be based on monitored ~~air~~ tracking by ~~recon~~ aircraft over significant large ocean areas, information promulgated from the forecast air R/DEX may have to be extended beyond the originally anticipated 4-hour period.

[redacted] SECURITY INFORMATION

The surface RADEX will be determined by actual survey with Radiation Detection, Indication and Computation (RADIAC) equipment after shot time. The most rapid method of accomplishing surface survey in the early stages will be by helicopter flight in and around the surface of contaminated areas. From the radiation intensities measured at a known altitude, it is possible to obtain an estimate of the radiation dosage rates which would be encountered on the surface of the ground or water. Actual water samples from the lagoon will also be utilized. Ground survey will follow these guides to determine definitely the contaminated regions and objects. Formal ground survey of the shot atoll, as feasible, will be accomplished on M plus 1 Day.

3. The Commander, Joint Task Force SEVEN will:

a. Specify the measures necessary to insure the radiological safety of task force personnel and furnish technical advisory assistance to task group radiological safety officers.

b. Inform CINCPAC of radiological hazards which may exist in areas outside the task force responsibility.

c. Maintain an information center (RADSAFE OFFICE) with displays of current air and surface radexes, radiological situation maps of atolls and peripheral aerial and surface areas and such other allied data as may be appropriate.

d. Arrange for the designation of monitors and couriers to accompany radioactive and special cargo shipments on sample return aircraft, and to monitor loading and unloading of such cargo.

4. Task Group Commanders will:

a. Provide radiological safety units within their task groups and insure that these units are in the required condition of readiness to carry out the radiological safety missions of their respective task groups.

b. Provide complete allowances of RADIAC equipment and special clothing. The requirements of CTG 7.5 will be included in the allowances of CTG 7.1 for necessary issue to TG 7.5 personnel during the operational phase and for subsequent loan or sale to CTG 7.5 for post-operational use at the Pacific Proving Ground.

c. Prior to the first shot minus 10 days, forward to CTG 7.1 (for use of the RADSAFE CENTER in conjunction with film badge/dosage control) a listing of TG personnel/~~participating in~~ radiation to whom film badges will be issued during the overseas phase of the operation. Within five days following each shot, provide CTG 7.1 with additions ~~or deletions~~ to previous lists. Lists will indicate full name, rank or rate, serial or service number if applicable, and home station or laboratory as appropriate.

5. The Commander, TG 7.1, having the major technical radiological safety unit, will:

a. Perform all ground monitoring services associated with scientific missions except those in conjunction with aircraft and airborne collection of scientific data.

b. Provide laboratory services and technical assistance to all task groups, to include:

(1) Provision of standard type film badges and specified supplementary items of personnel radiological safety equipment.

(2) Laboratory services to develop and interpret film badges.

(3) Records of exposures from film badges. (Duplicates will be furnished task group commanders).

(4) Laboratory services for the radio-chemical analysis of water samples.

(5) Provision of primary facilities at PARRY ISLAND radiological safety building for calibration, repair and maintenance of instruments

and storage of spare parts of RADIAC equipment. Similar limited facilities will be maintained at BIKINI during the operational phase at that atoll.

(6) Monitoring the removal and packaging of radioactive sources and samples except as indicated in paragraph 5a above, removal operations fro craft will remain the Radsafe responsibility of the task group to which t aircraft are assigned.

c. Provide radiological safety surface situation maps after shot times to the task force and the task group commanders.

d. Provide and issue special high density goggles to specified personnel of the task force.

e. Provide and maintain RADIAC equipment and protective clothing as necessary for TG 7.1, TG 7.5 and specified recovery personnel.

f. Provide technical personnel to assist task group commanders in the inspection of radiologically contaminated items and the certification of destruction, disposal or unserviceability of such items as required.

g. Maintain a radiological safety center (RADSAFE CENTER) for the control of TG 7.1 RadSafe Operations.

h. Provide personnel and equipment decontamination facilities for RadSafe survey and recovery operations.

i. Perform limited fall-out studies within the Pacific Proving Ground for radiological safety documentation only.

j. Assume radiological safety responsibilities of TG 7.5 during the overseas phase of the operation.

k. Integrate within TG 7.1 key radiological safety personnel made available by CTG 7.5. Such personnel will assist CTG 7.1 during the operational phase and will be assigned duties amenable to training in the fundamental radiological safety services to be assumed by CTG 7.5 upon completion of the overseas phase of the operation.

l. Assist CTG 7.3 to the extent of providing equipment, personnel and supervision for rough operational decontamination of aircraft ashore at BIKINI ATOLL. Decontamination will be limited to washdown of exterior and vacuum cleaning of interiors. No detailed decontamination will be

attempted by TG 7.1 personnel. Aircraft crews will assist in this operati

6. The Commander, TG 7.2 will:

a. Perform all ground monitoring services associated with ENIWETOK ISLAND except in those areas or activities assigned to other task groups.

b. Provide own radiological safety monitors, 50 of which will be "Q" cleared for emergency monitor support of TG 7.1 if required.

c. Provide own decontamination personnel, 10 of which will be designated for emergency decontamination support of TG 7.1 if required.

d. Provide own RADIAC equipment and protective clothing.

e. Provide own repair, spare parts and calibration facilities for RADIAC equipment.

f. Provide contaminated clothing laundry facilities for TG 7.4.

g. Provide contaminated equipment storage area with the necessary securit

7. The Commander, TG 7.3 will:

a. Provide own radiological safety monitors, including one airborne monitor for each multi-engine aircraft crew assigned to TG 7.3.

b. Provide own RADIAC equipment and protective clothing.

c. Provide own repair, spare parts and calibration facilities for RADIAC equipment.

d. Provide monitors and decontamination crews aboard each ship within the task group.

e. Provide facilities for personnel decontamination on the CVE.

f. While the task force is embarked, provide space for use of the radiological safety (RADSAFE CENTER) unit of TG 7.1.

g. Provide decontamination crews and facilities for all aircraft at BIKINI ATOLL. Limited assistance ashore will be furnished by CTG 7.1 in accordance with paragraph 5 l above as required.

h. Provide decontamination crews and facilities for own aircraft aboard the CVE at ENIWETOK ATOLL. Limited assistance ashore will be furnished by CTG 7.4 as required.

i. Provide necessary helicopter air service for radiological surveys and post-shot recovery operations (monitors furnished by TG 7.1).

j. Collect lagoon water samples.

k. Provide water spray equipment aboard all vessels likely to be in the fall-out area.

l. During the BIKINI phase provide for air-to-ground reporting of approximate air radiation intensities encountered by all aircraft operating between ENIWETOK and BIKINI from H hour to H plus 24 hours. It is not contemplated that aircraft should be scheduled for this specific requirement alone. Reports will be routed to the RADSAFE OFFICE at the Task Force Command Post by the most expeditious means. Reports will be prepared and coded in accordance with paragraph 81 below.

8. The Commander, TG 7.4 will:

a. Provide own radiological safety monitors, including one airborne monitor for each multi-engine aircraft crew assigned to TG 7.4.

b. Provide own RADIAC equipment and protective clothing.

c. Provide own repair, spare parts and calibration facilities for RADIAC equipment.

d. Provide facilities for personnel decontamination on ENIWETOK ISLAND.

e. Provide decontamination crews and facilities for own aircraft at ENIWETOK ATOLL.

f. At ENIWETOK ATOLL assist TG 7.3 in aircraft decontamination with TG 7.4 equipment, as required.

g. Provide necessary helicopter and liaison air service for radiological surveys and post-shot recovery operations (monitors furnished by TG 7.1).

h. Provide monitoring services for the removal (by TG 7.1 personnel) of radioactive samples or data collected by aircraft.

i. Provide cloud tracking aircraft for post-shot radiological safety "situation data" up to radius of 500 miles in the significant quadrant for a period of 48 hours, starting at approximately H plus 6 hours.

Reports will be prepared and coded in accordance with para 8 l below.

During the BIKINI phase,

j./ Provide for air-to-ground reporting of approximate air radiation intensities encountered by all aircraft operating between ENIWETOK and BIKINI from H hour to H plus 24 hours. It is not contemplated that aircraft should be scheduled for this specific requirement alone. Reports will be routed to the RADSAFE OFFICE at the Task Force Command Post by the most expeditious means. Reports will be prepared and coded in accordance with para 8 l below.

Develop

k./ ~~Promulgate~~ the air radex for each shot.

Employ

l. /Simple codes, (to be furnished separately by CJTF SEVEN) ~~will be used~~ in conjunction with the periodic weather reconnaissance reports to report approximate air radiation intensities encountered on regularly established weather reconnaissance or cloud tracking flights and for reports required from aircraft operating during the BIKINI phase between ENIWETOK and BIKINI from H hour to H plus 24 hours. Reports will indicate the approximate position, altitude and order of magnitude of radiation encountered.

9. The Commander, TG 7.5 will:

a. Develop a schedule of requirements for radiological safety services required from CTG 7.1, and assist CTG 7.1 in decontamination of AEC facilities and equipment as necessary.

b. Provide key radiological personnel for integration into and training with the radiological safety organization of TG 7.1 during the overseas phase of the operation. The total number and qualifications of such personnel will be as determined necessary by CTG 7.5 commensurate with the assumption of responsibilities indicated in 9c, below.

c. Assume residual task force radiological safety functions at the Pacific Proving Ground upon completion of the overseas phase of the operation. Required equipment and supplies will be made available at that time to CTG 7.5 on a loan or sale basis from stocks provided by CTG 7.1.

10. ~~For the purpose of~~ radiation dosage control ~~only to the overseas operations period~~ will start on first shot minus fifteen (15) days and terminate upon departure of ~~xx~~ individuals from the forward area or on the last shot plus fifteen (15) days, whichever occurs first. All personnel will be considered to have arrived at the Pacific Proving Ground by first shot minus fifteen (15) days. Prior and subsequent to this period, radiation dosage control will be as prescribed by CTG 7.5.

11. Training: The inclusion of radiological safety organizations throughout the task force will require two general levels of training; basic indoctrination and technical training. The scope of instruction within each of these levels will vary in accordance with the requirements of different operational and staff levels. Basic indoctrination will include primary, non-technical instruction in radiological safety measures and techniques. This must be imparted to all personnel of the task force to enable them to perform their assigned duties efficiently within the allowable low exposures, regardless of the presence of radioactive contaminants. Technical training will include the training of the majority of the personnel who will be required to staff the task force radiological safety organizations and perform the technical operations involved. This will be accomplished through the utilization of existing Service courses and establishment of suitable courses at task group level. This instruction will be designed to train radiological defense monitors, decontamination personnel and radiological instrument repairmen.

[redacted]

Radiological Safety
CJTF SEVEN No. 3-53

P. W. CLARKSON
Major General, U.S. Army
Commander

Appendix:

I - Radiological Safety Regulations
II - Radiological Safety Office and Center
III - Hazards Resulting from Atomic Bomb Explosions

OFFICIAL:

WILLIAM S. COWART, JR.
Colonel, U.S. Air Force
Assistant Chief of Staff, J-3

[redacted]

[redacted]

Headquarters, Joint Task Force SEVEN
Washington 25, D. C.

Appendix I to Annex N
Radiological Safety, CJTF SEVEN Operation Plan No. 3-53

RADIOLOGICAL SAFETY REGULATIONS

1. The Maximum Permissible Exposures (MPEs) and Maximum Permissible Limits (MPLs) as stated herein are applicable to a field experimental test of nuclear devices in peacetime wherein numbers of personnel engaged in these tests have been previously exposed or will be continuously exposed to potential radiation hazards. It may become necessary from a study of personnel records to reduce the MPE for certain individuals who have recently been over-exposed to radiation. Further, the MPEs and MPLs are subject to revision by waiver from the task force commander in individually designated cases when circumstances indicate the need and justification therefor.

2. Due to the special nature of field tests it is considered that a policy of strict adherence to the radiological standards prescribed for routine work is not realistic. The regulations set forth herein have been designed as a reasonable and safe compromise considering conservation of personnel exposures, the international import of the test and the cost aspects of operational delays chargeable to excessive radiological precautions. In all cases other than emergencies or tactical situations, the ultimate criteria will be limited by the MPEs for personnel. Specia instances may arise such as in the case of an air-sea rescue within the RADEX, or in the case of a tactical situation, in which operations will be carried out without regard to the MPEs and MPLs prescribed herein. For such emergency or tactical operations the criteria prescribed below for tactical situations will be used as a guide. Wherever possible, however, film badges will be carried and RadSafe monitors will accompany such operations to determine the extent of the actual radiation hazard experienced in order that appropriate medical action may be initiated.

[redacted] SECURITY INFORMATION

3. a. The MPE for personnel involved in this operation, as defined by para 10 of Annex N, is 3.9 roentgens (gamma only). This exposure may be acquired at any time during a thirteen (13) week period of the operation. Provided no previous over-exposure remains for compensation, 3.9 roentgens may be acquired without regard to the individual's past radiation history. This MPE will be considered further augmented (without separate action) by 0.3 roentgens/week for each week in excess of thirteen (13) weeks required during the operational period defined by para 10 of Annex N.

b. A special MPE of 20 roentgens (gamma only) is authorized for the operational period as defined by para 10, Annex N, for crew members of air sampling aircraft.

c. All exposure to external gamma radiation will be regarded as total body irradiation.

4. Those individuals exposed to ionizing radiation in excess of the value computed by paragraph 3a above will be informed that appropriate remarks will be included in their medical records. Military personnel in this category will be advised that they should not be exposed to further radiation until sufficient time has elapsed in order to bring their average radiation dose down to 0.3 roentgens/week. Civilian personnel in this category will be informed that limitations on further radiation exposure will be as determined by the laboratory or agency having administrative jurisdiction over such personnel.

5. All atoll land and lagoon areas in or near which a detonation takes place will be considered contaminated until cleared for operations by the task force commander. Entry to and exit from contaminated areas will be via RadSafe check points only.

6. Contaminated land and water areas will be delineated as such. Personnel entering these areas will be subject to clearances by the RadSafe Officer,

TG 7.1, and will normally be accompanied by a Radsafe monitor. Radsafe clothing and equipment will be issued to the personnel.

7. Contaminated land areas of intensities less than 10 mr/hr (gamma only) will be considered unrestricted from a Radsafe viewpoint. Areas coming within this limitation will be designated specifically by CJTF SEVEN prior to unrestricted entry.

8. Radsafe monitors assigned to individuals or groups working in contaminated areas or with contaminated equipment during recovery operations will act in an advisory capacity to keep the recovery party leader informed of radiation intensities at all times. The recovery party leader is expected to accept this advice and act accordingly. It is the responsibility of both the leader and the members of the recovery party to adhere to the limits established in these regulations. The Radsafe monitor will limit his activities to monitoring and will not engage in actual recovery operations.

9. Film badges, dosimeters and protective clothing (coveralls, booties, caps, gloves, dust respirators, etc.) as deemed necessary will be issued to personnel entering contaminated areas by appropriate task group RadSafe supply sections. All personnel dosage film badges will be procured from and returned to the laboratory of TU 7, TG 7.1 where all processing and recording will be accomplished.

10. All personnel within viewing distance of an atomic detonation who are not supplied with protective goggles will turn away from the detonation point and close their eyes during the time of burst. At least 10 seconds should be allowed before looking directly at the burst.

11. The arrival and proposed use of radioactive sources at the Pacific Proving Ground will be reported to the Radiological Safety Officer of TG 7.1.

12. Transportation of radioactive material to and from the forward area shall be in accordance with AEC regulations for escorted shipment of such material. The assignment of couriers and Radsafe monitors will be the subject of separate instructions. No radioactive material shall be removed from the test site except as authorized in experimental projects.

13. All samples of radioactive material which are couriered in aircraft will be packaged and loaded so as to reduce radiation to a minimum. Prior to departure of such aircraft the Rad-Safe Officer of TG 7.4 will have a survey made of the aircraft cargo to determine if adequate precautions have been taken. The following criteria will determine space and packaging requirements:

a. Prior exposure of aircraft crew, courier and passengers.

b. Anticipated future exposures on trip, considering length of trip, compartmental loading requirements and capability to isolate personnel from radioactive material.

14. All air and surface vehicles or craft used in contaminated areas will be checked through the appropriate task group decontamination section upon return from such areas.

15. The Maximum Permissible Limits (MPLs) listed herein are to be regarded as advisory limits for control under average conditions. All readings of surface contamination are to be made with Geiger counters, with tube walls not substantially in excess of 30 mg/cm^2 with shield open unless otherwise specified. The surface of the probe should be held one (1) inch to two (2) inches from the surface that is under observation unless otherwise specified. For operational purposes the contamination MPLs presented below will not be considered applicable to spotty contamination provided such

areas can be effectively isolated from personnel.

a. Personnel and clothing MPLs are as follows:

(1) Skin readings should not be more than 1.0 mr/hr. Complete decontamination by bathing will be utilized for readings in excess of this level. If the body is generally contaminated and especially if contamination is on the eyes or gonads, special efforts should be made to reduce the contamination level. In general, however, it is not considered profitable to abrade the skin or epilate the scalp in an attempt to reduce stubborn contamination below 1 mr/hr (about 1000 cpm). Beta radiation exposur to the hands should not exceed 30.0 rep for the overseas operational period as defined in paragraph 10 of Annex E.

(2) Underclothing and body equipment such as the internal surfaces of respirators should be reduced to 2 mr/hr.

(3) Outer clothing should be reduced to 7 mr/hr.

b. Vehicle MPLs: The interior surfaces of occupied sections of vehicles should be reduced to 7 mr/hr. The outside surfaces of vehicles should be reduced to less than 7 mr/hr (gamma only) at five (5) or six (6) inches from the surface.

c. Ship and Boat MPLs:

(1) It is desired to point out that the employment of the ships and units in TG 7.3, insofar as radiological safety is concerned, is not considered routine usage within the purview of NavMed P-1325, "Radiological Safety Regulations." Current revision of NavMed P-1325 indicates that its provisions do not apply for special operations such as field tests and that for such operations naval personnel will operate under regulations set forth by the task force commander as approved by the Chief of Naval Operations.

(2) In general, ships and boats operating in waters near shot sites after shot times may become contaminated. Monitors shall be aboard all such craft operating after shot time, either as passengers or members of the crew, until such time as radiological restrictions are lifted.

(3) Task Group Commanders will take necessary action to ensure that

personnel of ships and boats are not over-exposed to radiation and that ships and boats are not contaminated excessively. The criterion in both cases is that no personnel will be over-exposed as defined by paragraph 3a above, except in emergencies or tactical operations, and that after the operational period no personnel will receive more than 0.3 roentgen per week from contaminated equipment.

(4) For ships and boats operating in contaminated waters, reasonable allowances will be made to differentiate between the relative contribution to the total flux from fixed contamination and that due to "Shine" from contaminated waters. Fixed alpha contamination should not exceed 2500 ~~cpm~~ dpm disintegrations (counts per minute) per 150 cm^2 of area for enclosed areas (cabins, etc.) and 5000 ~~cpm~~ dpm per 150 cm^2 area for open surfaces where ventilation is good.

(5) At the conclusion of the operation, final clearances will be granted by Task Group Commanders, or by Commanding Officers if so ordered, to those ships and boats showing no point of contamination greater than 15 mr/day (beta and gamma) and no detectable alpha. Other ships and boats will be granted operational clearances by Task Group Commanders, or by Commanding Officers if so ordered. An operational clearance implies that contamination exists and that special procedures as necessary are instituted aboard ship.

(6) Individuals on board ships of the task force shall be protected collectively from hazards of blast, heat and radioactivity by movement and positioning of the ships.

(7) No ships with personnel shall be permitted inside the 1.5 p.s.i. line unless specifically directed otherwise. Bearings of danger from immediate radioactive fall-out for ship operations will be established by CJTF SEVEN on the basis of forecast wind directions at the intended time of detonation. This danger section will be designated as surface radex. All ships of the task force shall be required to remain outside the

radex - danger bearing, radial limitation and time restriction unless specifically directed otherwise. However, if ships are directed tactical into the surface radex, movement of ships shall be governed by tactical exposure guides.

d. Aircraft MPLs:

(1) The interior surfaces of occupied sections of aircraft should be reduced to 7 mr/hr.

(2) No aircraft in the air at H Hour will be at slant ranges from ground zero less than as determined by the following effects unless specifically directed otherwise. (Based on maximum predicted yield and 20 mile visibility.):

Blast (at predicted shock arrival): 0.5 p.s.i.

Thermal (H Hour): Fabric control surfaces: 1.0 cal/cm^2

Metal control surfaces: 6.0 cal/cm^2

(3) After detonation no aircraft shall operate inside the air radex or closer than 10 nautical miles from the rising or visible cloud unless specifically directed otherwise. Non-excepted aircraft involved in routine operations encountering unexpected regions of aerial contamination will, immediately upon detecting such contamination, execute a turn-out. Cloud tracking aircraft will execute turn-out from contaminated areas at a level of not more than ~~10.0~~ 3.0 r/hr. If a tactical or emergency situation arises where aircraft must enter the air radex or visible cloud, tactical exposure allowances shall apply.

(4) All multi-engine task force aircraft in the air at H Hour within 100 miles of the detonation point shall carry a person designated as radiological safety monitor equipped with suitable RADIAC equipment and a radex plot. This monitor shall be capable of calculating allowable exposures under both tactical and operational conditions.

(5) All persons in aircraft at shot time, or at subsequent times when engaged in operations in or near the cloud or radex track, shall wear

film badges.

(6) Crew members of aircraft in the air at zero hour will take special precautions to avoid (for at least 10 seconds) the direct and reflected light resulting from the burst. At the discretion of the airplane commander this could be done with protective high density goggles, by turning away from the burst with eyes closed, or by covering the eyes with the forearm, by turning cockpit lights up to highest intensity or by any combination of the above.

e. In air and water the following continuous levels of radioactivity are considered safe from the viewpoint of personnel drinking and breathing (uc = microcurie):

	Beta-Gamma Emitter
Water	5×10^{-3} uc/cc (calculated to H + 3 days)

Air (24-hour average)
Particles less than 5 micron diameter 10^{-6} uc/cc
Particles greater " 5 micron diameter 10^{-4} uc/cc

16. In tactical situations the military commander must make the decision regarding allowable exposures. As military personnel are normally subject to only randum exposure, health hazards are at a minimum. Current Department of Defense information on exposure to gamma radiation in tactical situations is indicated below:

a. Uniform acute (immediate) exposure of 50 roentgens to a group of Armed Forces personnel will not appreciably affect their efficiency as a fighting unit.

b. Uniform acute exposure of 100 roentgens will produce in occasional individuals nausea and vomiting, but not to an extent that will render Armed Forces personnel ineffective as fighting units. Personnel receiving an acute radiation exposure of 100 or more roentgens should be given a period of rest and individual evaluation as soon as possible.

c. Uniform acute exposure of approximately 150 roentgens or greater can

be expected to render Armed Forces personnel ineffective as troops within a few hours through a substantial incidence of nausea, voriting, weakness and prostration. Mortality produced by an acute exposure of 150 roentgens will be very low and eventual recovery of physical fitness may be expected.

d. Field commanders should, therefore, assume that if substantial number of their men receive acute radiation exposures substantially above 100 roentgens there is a grave risk that their commands will rapidly become ineffective as fighting units.

e. Internal radiation hazards caused by entry of radioactive substances through the mouth, through the lungs or through cuts or wounds do not exist after an air burst. Internal hazards following a contaminating surface explosion may be avoided if ordinary precautions are taken. Only under unusual circumstances will there be internal hazard from residual contamination. This eliminates the necessity for masking and consequent reduction of tactical efficiency.

17. The Radiological Safety Officer, Task Group 7.1 will maintain standard type film badge records of radiation exposures for all Task Force personnel. Records will indicate full name, rank or rate, serial or service number, if applicable, organization, home station or laboratory, date of approximate exposure, duration of overexposure in hours and minutes (for Army personnel only) and remarks such as limitations on assignment because of overexposure. Upon completion of the operation, disposition of these records will be as follows:

a. A consolidated list of exposures listing military personnel, and civilian personnel under military control, by full name, rank or rate, serial or service number (if applicable), organization, home station or laboratory and exposure in milliroentgens together with exposed film badges and control film badges will be forwarded to the Chief, AFSWP.

b. A consolidated list of personnel and exposures as indicated in ~~13a~~ 17a above (including all controlled and administered civilian AEC/personnel) will be forwarded to the Director, Division of Biology and Medicine, AEC.

c. Individual records of Navy and Air Force military and civilian personnel will be forwarded to their unit of permanent assignment for inclusion in the individual's health record (Medical History Sheets, NavMed H-8 and the Individual Health Record for Navy and Air Force personnel, respectively). For those military personnel exposed to ionizing radiation in excess of that defined by paragraph 3a above, a statement will be included to the effect that the individual is not to be subjected to ionizing radiation before a specific date, the date to be computed by the Radiological Safety Officer, Task Group 7.1 to allow sufficient time to elapse in order to bring the average radiation dose down to 0.3 roentgens per week. Limitations on Navy and Air Force civilian personnel reference over-exposures will be as determined by the laboratory or agency having administrative jurisdiction over such personnel.

d. Individual records of Army military and civilian personnel will be forwarded in accordance with SR 40-1025-66 dated 21 April 1953 to their unit of permanent assignment for inclusion in the individual's field military 201 file or the civilian personnel 201 file (whichever is applicable). These records will indicate date of exposure, amount of exposure in milliroentgens, approximate duration of over-exposure in hours and minutes, and a space for remarks such as limitations on assignment (as indicated in 17c above) because of over-exposures.

e. Individual records of controlled and administered AEC/civilian personnel will be processed in accordance with special instructions prescribed by the laboratory or agency having administrative jursidiction over such personnel.

f. Upon completion of 17a, b, c, d, and e, above, letter reports will be submitted through channels to the Surgeon General, USA, the Chief, Bureau of Medicine and Surgery, USN, the Surgeon General, USAF, and the Director

Division of Biology and Medicine, AEC, indicating, in general, the action taken to dispose of individual dose records, comments on over-exposures if applicable, and any pertinent remarks considered of interest to the above offices.

18. These regulations have the concurrence of the Surgeon General, USA, the Chief of Naval Operations, the Surgeon General, USAF and the Director, Division of Biology and Medicine, AEC.

19. This appendix has been designed for reduced security classification in order to facilitate wide dissemination and may be downgraded to RESTRICTED SECURITY INFORMATION provided all references to Joint Task Force SEVEN and its subordinate units are deleted.

P. W. CLARKSON
Major General, U.S. Army
Commander

OFFICIAL:

WILLIAM S. COWART, JR.
Colonel, U.S. Air Force
Assistant Chief of Staff, J-3

[redacted]

HEADQUARTERS, Joint Task Force SEVEN
Washington 25, D.C.

Appendix II to Annex N
Radiological Safety, CJTF SEVEN Operation Plan No. 3-53

RADIOLOGICAL SAFETY OFFICE AND CENTER

1. A JTF SEVEN Radiological Safety Office (RADSAFE OFFICE) and a TG 7.1 Radiological Safety Center (RADSAFE CENTER) will be established for each shot. The RADSAFE OFFICE manned by personnel of the Technical Branch of the Task Force J-3 Operations Division, will operate as the task force staff agency responsible for the dissemination of task force radiological directives, the presentation of radiological shot briefing material and the maintenance of displays of radiological information having an impact on the over-all task force mission. The RADSAFE CENTER will be established by CTG 7.1 and will serve as operations headquarters for the radiological safety activities of TG 7.1. Pertinent data collected at the RADSAFE CENTER will be forwarded to the RADSAFE OFFICE at the task force command post.

2. Detailed Duties:

a. RADSAFE OFFICE:

(1) The RADSAFE OFFICE, in coordination with CTG 7.4 who will develop the AIR RADEX plot, will assemble the overall RADEX situation and disseminate the air and surface RADEX prior to shot time (forecast), and will originate messages from time to time after shot time, announcing R HOUR (Re-entry Hour), radiological clearances of previously closed areas, radiological directives to task groups, advisories to commands external to the task force, and revisions of the air and surface RADEX as required.

(2) The RADSAFE OFFICE will be responsible for the preparation of RADSAFE forecast information for the shot briefings.

(3) The RADSAFE OFFICE will maintain displays of radiological information pertinent to the test area and having an impact outside this area to include radiation levels on atoll islands and lagoon, RADEX

information, cloud trajectories and their relation to occupied atolls and air/surface routes contiguous to the Danger Area, ship movements in the Danger Area, results of water sampling, and such other items of special radiological consideration as may be required by the operation or the scientific projects.

(4) Physical locations of RADSAFE OFFICE:

(a) For BIKINI ATOLL shots: Command Ship.

(b) For ENIWETOK ATOLL shots: J-3 Operations Division wing of JTF SEVEN Headquarters building, PARRY ISLAND.

b. RADSAFE CENTER:

(1) The RADSAFE CENTER will maintain radiological situation data on lagoon waters and islands of the shot atoll, based on air and ground survey information, supplemented by monitor reports. This information will be the basis of periodic situation reports or maps and briefing information furnished to the task force and task group commanders.

(2) The RADSAFE CENTER will provide information for the planning of TG 7.1 radiological safety operations, and for the disposition of all working parties, within the contaminated area. It will establish radiological safety check points. It will maintain an operations table giving details for all groups who plan to enter contaminated areas each day, including name of monitor, destination, general type of mission (program or project number), and time of departure and return.

(3) The RADSAFE CENTER will provide special clothing to previously designated recovery personnel, have cognizance over working schedules of the radiochemical laboratory, photo-dosimetry developing facilities, contaminated laundry, personnel decontamination facilities, RADLAC repair, etc., of TG 7.1. Personnel decontamination facilities afloat will be coordinated with existing ship facilities.

(4) Physical location of RADSAFE CENTER:

(a) For BIKINI ATOLL shots: The RADSAFE CENTER will initially operate from the CVE facilities. At a later time, radiological contitions

[redacted]

permitting, the CENTER will provide a detachment at pre-prepared positions ashore to operate all its activities except radiochemistry and photo dosimetry.

(b) For ENIWETOK ATOLL shots: The RADSAFE CENTER will operate all of its facilities from the radiological safety building (Bldg 57, PARRY ISLAND).

P. W. CLARKSON
Major General, USA
Commander

OFFICIAL:

Wm. S. COWART, JR.
Colonel, USAF
Assistant Chief of Staff, J-3

[redacted] SECURITY INFORMATION

[redacted]

HEADQUARTERS, Joint Task Force SEVEN
Washington 25, D.C.

Appendix III to Annex N
Radiological Safety, CJTF SEVEN Operation Plan No. 3-53

HAZARDS RESULTING FROM ATOMIC BOMB EXPLOSIONS

1. Nature of Hazards

a. When an atomic bomb explosion occurs, tremendous quantities of energy in a variety of forms are released. This energy is propagated outwards in all directions.

b. The immediate reaction is intense emission of ultraviolet, visible and infrared (heat) radiation, gamma rays and neutrons. This is accompanied by the formation of a large ball of fire. A large part of the energy from the explosion is emitted as a shock wave. The ball of fire produces a mushroom-shapped mass of hot gases, the top of which rises rapidily. In the trail below the mushroom cap, a thin column is left. The cloud and column are then carried downwind, the direction and speed being determined by the direction and speed of the wind at the various levels of air from the surface to base of mushroom cap. Part of the energy from the explosion results in an ocean surface wave which is considered of minor nature directly to the Task Force.

c. All personnel of the Task Force will be well outside of the range of all hazard at the time of detonation, except for the light from the fire ball. The light of explosion is so intense that permanent injury to the eye may result from viewing the ball of fire at close range with the naked eye or through binoculars. Ordinary dark glasses will not suffice and all personnel who do not have the special protective glasses, which will be issued in limited numbers by CTG 7.1, must be facing 180 degrees from the detonation with the eyes closed.

d. The emission of dangerous nuclear radiation can be separated into two time periods. The primary radiation which occurs at the time of the flash is composed of gamma rays and neutrons. Casualties may result from this primary radiation if the exposure occurs within a certain range of

ground zero. Secondary radiation is due to activation of the soil around ground zero and to fall-out.

e. Following the detonation, personnel entering shot areas will be exposed to beta particles and gamma rays coming from induced neutron activity in the soil and any fission products which might have been deposited on the ground. There may also be a potential alpha particle hazard rom the unfissioned fissionable materials which may be deposited on the ground.

2. Protection

a. Against the primary radiological effects, distance will provide protection.

b. Against the secondary radioactivity hazards from radioactive fission products, induced radioactivity and unfissioned residue, detection and avoidance provide the best protection. Suitable instruments indicate both the presence and intensity of radioactivity at a given place. Area reconnaissance, the maintenance of contamination situation maps, the posting of areas of hazard, and minimizing the spread of contaminate material into uncontaminated areas constitute the active measures for reducing the radiological hazard.

c. Personnel within an operational radius of ground zero who are to be facing in the direction of the flash will be required to wear special goggles to protect their eyes against excessive light. Personnel within the above operational radius who are not provided goggles will face, wit eyes closed, in the opposite direction from the flash. After ten (10) seconds, such personnel may turn about and observe the phenomena.

3. Anticipated Hazard Areas

a. Immediately under the bomb burst there will be an area of intense radioactivity extending downwind and to some extent crosswind and upwind with gradually decreasing intensity.

b. Extending downwind, (and to some extent crosswind and upwind) an airborne radioactive hazard will exist. Its characteristics will depe on the meterological influences such as wind speed and direction at va ious altitudes up to the maximum height reached by the cloud.

c. Contaminated water in the lagoon adjacent to the shot site may be of consequence, and will be analyzed by the radiological safety unit o TG 7.1 immediately after shot time and at other intervals.

d. Unless care is exercised, individuals or objects entering contami areas may transfer radioactivity to clean areas.

e. By means of instruments, such as Geiger-Mueller counters and ion chambers, it is possible to detect the area of contamination and to me sure the intensity of the radioactivity. Radiation intensity will nor· mally be measured and reported in roentgens per hour. Besides those instruments, dosimeters and film badges will be used as indicators of the accumulated exposure to radioactivity. Only personnel involved in work near, or in, radioactive areas will wear film badges to provide a permanent record of exposure, except that film badges will be issued to 10% of ship crews to aid in estimating crew dosage in the event of heavy fall-out.

f. The intensity of the radioactive hazard tends to decrease with time due to decay of radioactive materials, and dispersion and dilution, depending upon climatic conditions. As an approximation, the intensity of the surface contamination from the fission products decreases by radioactive decay inversely with the time after the detonation. As a further approximation, the intensity of water contamination decreases by radioactive decay and diffusion inversely with the square of the time after the detonation.

4. This appendix has been designed for reduced security classification in order to permit wide dissemination to all personnel of the command, and may be downgraded to RESTRICTED - SECURITY INFORMATION provided all references to Joint Task Force SEVEN and its subordinate units are deleted.

P. W. CLARKSON
Major General, USA
Commander

OFFICIAL:

WILLIAM S. COWART, JR.
Colonel, USAF
Assistant Chief of Staff, J-3