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DEFENSE NUCLEAR AGENCY
Radiation Safety Audit and Inspection Team
Armed Forces Radiobiology Research Institute
Bethesda, Maryland 20014

8 August 1978

SUBJECT: 5th Radiation Safety Audit and Inspection Team (RSAIT) Visit
to Enewetak Atoll

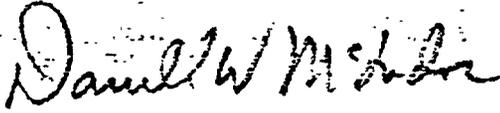
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1. The enclosed materials constitute the report of the Radiation Safety Audit and Inspection Team (RSAIT). No further report will be generated for this visit. Three (3) copies will be reproduced by the originators on Enewetak. Copies for the team members will be reproduced and sent to them after the team returns home. One copy will be given to the Commander, Joint Task Group (JTG), before departure. The second and third copies will be given to the Commander, Field Command, Defense Nuclear Agency and the Director, Defense Nuclear Agency at their briefing on 11 August 1978.
2. Disagreements with the contents, conclusions and/or recommendations made in this report should be forwarded to this office before the next anticipated RSAIT visit.
3. The RSAIT size has been reduced from ten members to seven. Full representation by each of the uniformed services has been maintained. Occupational safety and health review is still considered an integral function of this team. A short overall summary with the most important findings and recommendations by the Officer in Charge is followed by short summaries and recommendations covered in each of the annexes. The recommendations brought forward to the summary section are done so only after thorough discussions by the team. Ideas brought up for consideration, but not thought to be substantive remain in the body of the annex.
4. The next anticipated visit of the team will be from 5-13 December 1978.

RSAIT

SUBJECT: 5th Radiation Safety Audit and Inspection Team Visit
to Enewetak Atoll

5. The point of contact for all future inquiries remains the same.



Encl
as

DARRELL W. McINDOE
Colonel, USAF, MC
Officer in Charge
DNA Radiation Safety Audit and
Inspection Team

DISTRIBUTION:
Director, Defense Nuclear Agency
Commander, FCDNA
Commander, JTG
Inspection Team Members (7)

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SUMMARY

The fifth visit by the Radiation Safety Audit and Inspection Team (RSAIT) was accomplished from 1-8 August 1978. The size of the team was reduced from ten to seven. The areas of interest were divided into three major portions: training and indoctrination, operational safety, and records keeping.

The mobilization phase has been completed and the operational cleanup phase is now at full effort. Previous Audit and Inspection activities were divided into six or seven general areas. Planned during this visit was to look at the operation as a whole entity and observe and comment on those aspects of environmental, radiological and occupational safety as they apply to all phases of the operation. Particular emphasis was paid to the chain of events from debris or earth removal through dumping, stockpiling or crater containment.

Considerable activity has taken place over the last four months in the areas of safety programs. The current Commander, Joint Task Group (JTG) and the element commanders are safety conscious. No significant changes have occurred in the environmental protection program. Indoctrination and training in this area still needs improvement. Radiological and occupational hazards were reviewed during the debris and ground removal operations. Radiation hazards appeared to be minimal as previously noted on all our RSAIT visits. Resuspension does not even appear to be significant at the area of maximum dirt agitation and potential for

resuspension, i.e., batch plant operation. Occupational hazards abound and have been mentioned in the appropriate annex.

CONCLUSIONS

The RSAIT arrived at three conclusions of note. First, resuspension of plutonium has not been a problem and does not now appear to be a problem even at the batch plant operation. Second, the bulk haul of contaminated soil is efficient and safe, and does not require any extraordinary degree of radiation protection. Third, occupational hazards still are the predominant problem during this cleanup operation.

RECOMMENDATIONS

1. There is no need for personnel to wear surgical face masks at Enjebi.
2. Respiratory protection against plutonium is only logical at the time earth is physically being moved about, but not during water transit.
3. Continued command emphasis on occupational safety and health is essential for the completion of this operational program.

SUMMARY - ANNEX A: TRAINING & INDOCTRINATION

Arrival orientation and indoctrination still leaves much to be desired. This has been mentioned on each of the previous visits and the basic format is essentially the same. The audience is fatigued and retains little of the presented material.

Recommendation:

Audio-visual aids should be used to the maximum possible. A more dynamic approach at a more favorable time in a more favorable location are essential for lasting impact of this most important aspect of the new arrivals' education and training.

Field Radiation Support Team Training: This program appears to be quite satisfactory. The new change in format is felt to be beneficial and no recommendations are made.

SUMMARY - ANNEX B-1: ENVIRONMENTAL SAFETY

Environmental safety continues to be a significant problem on the Atoll and should be included for review by the Atoll Safety Committee at the time of their deliberations each month.

SUMMARY - ANNEX B-2: RADIATION SAFETY

All aspects of the health physics operation here have been reviewed by this team. Field operations are going well due to the competence of the FRST team and the RADCON staff. The requirement that all personnel wear surgical masks on Enjebi is excessive since an inhalation hazard cannot be demonstrated there. However, respiratory protection should continue to be worn on all islands during earth moving operations until it has been demonstrated at a particular site that no hazard exists. It should then be removed at that site. The bulk haul operation is progressing smoothly with no significant problems.

Analysis of air sample data indicates that the average air concentration of ²³⁹Pu on the bulk haul operation is approximately 1/5000 MPC and approximately 1/500 of the action level.

SUMMARY - ANNEX B-3: OCCUPATIONAL SAFETY

Overall, the occupational safety and health program is satisfactory.

Notable is the large improvement in the physical condition of the working areas. Safety deficiencies noted and recommended areas of improvement are noted in the annex. The major recommendation relates to the somewhat dramatic increase in accidents leading to work-related injuries (not necessarily just "lost-time" injuries). Most of these are related to the manner in which the individuals do their work. This indicates a need for a more intensive training program, more safety conscious supervision, and an effective inspection program. Most notable was the need for better and more timely use of injury reports. These do not appear to be reviewed on a timely basis nor are they being coordinated through all elements on the Atoll.

SUMMARY - ANNEX C: RADIATION RECORDS

The recordkeeping function of RADCON is being handled adequately. There was no difficulty in locating or retrieving any of the records. SP6 Ruyter has done an outstanding job in organizing the file system.

Recommendations:

The two microwave ovens that are present on the Atoll must be registered with RADCON so periodic safety checks can be done. In order for RADCON to do the required safety check on the microwave ovens, it will be necessary for them to get the proper instrumentation.

INTRODUCTION

One full year has passed since the first RSAIT visit. Mobilization has been completed and all aspects of the cleanup operation are in full swing. Lagoon dumping of appropriate materials and crater entombment of radiological contaminated materials are ongoing procedures. A cohesiveness to the operation is now apparent.

There has been a change of command in the JTG and multiple changes of command in the supportive elements. These new faces appear to have brought a high degree of enthusiasm and dedication with them that manifests itself at the lowest echelons. A "can-do" attitude pervades this operation.

The JTG is well aware of the present concern by the Congress and public at large of the safety and welfare of personnel associated with this operation and are cognizant of the special concern about radiation hazards. The RSAIT visits and recommendations have been well received and executed to the fullest extent possible. EAI's, SOPs, documentation and records are a dynamic process and have been accomplished with clarity and relevance. The RCC has fulfilled its function as intended and has become an extremely important managerial tool. The JTG Occupational Safety and Health Committee should gain the same status and utilization. Command emphasis on safety education and compliance with all safety regulations is essential for an effective safety program in all areas of concern.

The Director, DNA has requested the RSAIT address several aspects of the radiation safety program, especially the command decision to wear surgical masks on Enjebi and the radiological safety of the bulk haul contaminated earth and debris. The unanimous concensus of the RSAIT is that there is no need for surgical masks on Enjebi and the respiratory protection be guided by EAI 5707. The bulk haul operation was evaluated by the RSAIT in July and again this month. Again, the unanimous opinion is that the procedure is radiologically safe and respiratory protection only be used during loading and unloading with continuous air monitoring during all phases of the operation.

Accidents, both occupational and recreational, continue to be the major source of manhours lost from the job. Improvements in the overall safety program are apparent everywhere, but still there is a need for strong endorsement and support by the JTG Commander and element commanders for all safety programs. A rise in the number of accidents which have occurred over the last three months attests to the need for continued surveillance.

ANNEX A: TRAINING & INDOCTRINATION

I. ORIENTATION TRAINING

A. Discussion. The orientation briefing given to all personnel arriving on Enewetak provides general information and safety precautions peculiar to the Atoll. Since the first visit of the Radiation Safety Audit and Inspection Team in August 1977, continuing recommendations have been made to include audio/visual aids to improve the impact of the inbriefing and use of the Pau Hana Club when arriving numbers can be accommodated.

B. Findings. The indoctrination briefing has not changed substantially. The important information in the briefing still does not come across. Moreover, the first impression created in the minds of the new arrivals detracts from the professionalism of the personnel associated with the cleanup project.

C. Recommendation.

Incorporate slides, filmstrips, charts, videotapes and/or films into the indoctrination briefing.

II. FRST TRAINING

A. Discussion. The Program of Instruction for arriving FRST personnel combines a forty hour didactic training phase and two weeks of on-the-job training (OJT). During the last visit of the Radiation Safety Audit and Inspection Team visit, a need to improve the attitude of some of the members of the departing team, and presumably the effectiveness of the OJT experience, was highlighted. In addition,

all FRST members interviewed felt that a review and critique after the OJT would be highly beneficial.

B. Findings. Replacement FRST training and overlap schedule for the August/September period are scheduled for three groups of approximately equal size at two week intervals. This scheduling pattern is preferred over the previous FRST turnover with frequent arrivals of a few members at a time. The scheduling of larger groups has allowed the flexibility to plan for periodic RADCON Division Officer supervision of the OJT phase of the training. In addition, a full day, formal end-of-course review and critique session has been scheduled with the RADCON Division Staff.

The lesson plans for the didactic phase of the training are nearly completed. CPT Myers and SP6 Ruyter deserve special mention for the excellent quality of the lesson plans they have written.

C. Recommendation.

No recommendations are offered.



JOHN W. DULEY
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ANNEX B-1: ENVIRONMENTAL SAFETY

There has been no change in the environmental hazards during the past year. Orientation and inbriefings continue to emphasize the hazard from heat, humidity, the need for particular care to cuts and abrasions, the problems of heat stable toxins in the lagoon algae that are passed up the food chain to edible fish, the need for water safety are all adequately emphasized. A handout on the signs, symptoms and prevention of heat exhaustion and heat stroke are made available to all incoming personnel. Considerable improvement could be made in the indoctrination lecture about poisonous fish by utilizing visual aids.

Environmental monitoring is an active, ongoing program handled with diligence and dedication by the veterinary technician assigned to the dispensary. Water samples, food and kitchen utensil culturing is an integral part of this program. Both the camp at Lojwa and the main base island, Enewetak, are covered on a routine basis and no major problem areas have been elucidated, other than the rodent infestation on Lojwa which is an ongoing problem but appears to be under reasonable control.

Environmental monitoring appears to be adequately handled and no recommendations are made. Environmental safety continues to be a significant problem on the Atoll and should be included for review by the Atoll Safety Committee at the time of their deliberations each month.

DARRELL W. MCINDOE
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Director, AFRI

ANNEX B-2: RADIATION SAFETY

I. GENERAL

This area of interest represents the combination of various specific annexes in previous reports. Since the operation is now fully functional, the time has passed for considering individual aspects and the entire operation must be considered as a whole.

II. CONCEPT OF OPERATIONS

The method used to evaluate the Radiation Safety Program was to interview personnel responsible for the program at all levels to determine their interpretation of instructions and methods of operation. Visits were made to Runit, Lojwa, Aomon and Enjebi to observe operation of hot lines and field radiological protection procedures. In addition, a trip was made on each bulk haul vessel to observe loading, unloading, and transport procedures. Discussions were held concerning procedures with JTG RADCON personnel, FRST senior NCOs, and with the monitors working the hot lines and bulk haul boats.

III. OBSERVATIONS

A. It is felt that the requirement for surgical masks on Enjebi in areas other than soil moving operations is an unnecessary burden on the workers and detracts from the credibility of the remainder of the program. All areas, except the plow experiment,

are now down to levels of 50 pCi/gm for ^{239}Pu and there is absolutely no health physics basis for requiring surgical masks. We agree that respiratory protection should be provided when a soil moving operation is started, but the requirement for all personnel to wear masks is excessive. In addition, the requirement for standard masks should be at the discretion of the FRST member present based on an evaluation of air sample measurements and the condition of the soil. However, as long as this command decision remains in effect, all personnel should wear masks. Several engineers were observed to don masks as the inspection team approached and individuals in the soil moving operation were seen to wear surgical masks instead of full face respirators as required. Personnel in the field must learn to comply with command decisions whether they agree or not.

B. In general, the FRST operation is excellent. The morale of individual members seems high and their attitude toward their jobs is excellent. The probable cause of this is the stabilization of missions which has occurred since the operation has gone into full swing. In general, FRST personnel are assigned to a job on a continuing basis now and have a chance to learn the peculiarities of their individual mission and to build a rapport with the personnel they are supporting. The availability of SOPs, EAIs and specific instructions for the job being done at the job site is a vast improvement over what has been observed in the past. The general and specific job knowledge of FRST members in the field is excellent.

C. The bulk haul operation has been monitored during all phases as follows:

1. Initial soil removal
2. Loading on both the LCM-8 and LCU
3. Transport to Runit
4. Removal and transport to the shaker operation
5. Operation of the batch plant
6. Final crater deposition

We have been impressed with the smoothness of the operation and with both the engineering and radiation protection aspects of the entire procedure. The bulk haul operation is well administered and we have observed no problems with it. However, we recommend that the soil be covered during transport and that personnel not be required to wear positive pressure half face or full face respiratory protection except during loading and unloading operations or when an air sample is noted to be positive. If the air sample count is positive, or a hazard is perceived to exist by the FRST member present, then everyone should acquire respiratory protection immediately.

Our recommendation not to require respiratory protection during the actual hauling operation is based on analyses of 89 air samples collected between 26 March and 28 July 1978. The results of these analyses allow us to conclude that there has not been a radiological inhalation hazard due to ^{239}Pu during this period. The average air concentration determined from these samples is $6.9 \times 10^{-15} \mu\text{Ci/cc}$, whereas the maximum permissible concentration (MPC) for insoluble

plutonium for occupational radiation workers is $4 \times 10^{-11} \mu\text{Ci/cc}$.

This indicates that the average air concentration on the bulk haul to date has been less than 1/5000 of the MPC and five hundred times lower than the action level.

D. The current bioassay program has been reviewed and still appears to be adequate for all field conditions observed during our inspection. A review of all returned analyses on urine samples show no reason to suspect significant internal exposure to date.

E. The Field Radiological Survey Team Operation Data Reports for various islands have also been reviewed for the period January-July 1978. These reports generally give a complete picture of operations and followup actions are typically noted. Laboratory results are generally not noted if they are negative although positive results are noted. This policy is probably adequate although the casual reviewer might think that the case is still pending, whereas, in fact, negative results have been obtained.

F. When the team visited the Enjebi soil excision operation it was noted that the air sampler was non-operational, although the operation was still ongoing. FCRR SOP 608-01 requires at least one air sampler at an earth moving operation. Although the operation should have been halted by SOP, it is felt that the masks being worn by all personnel provided sufficient protection so that the operation could be continued. Investigation indicates that of the 85 air samplers provided, only 27 are operational, two (2) down for maintenance, 14 requiring parts, 24 requiring engines, and 18 salvaged. It is

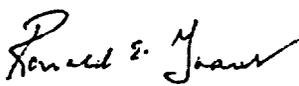
clear that the problem is not the maintenance effort of the personnel involved, but the poor condition of the equipment and lack of parts support. An effort should be made to expedite the supply of parts so that this condition can be corrected.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. It is felt that surgical masks are not necessary on Enjebi and that this requirement is excessive and should be dropped immediately.

B. The FRST support in the field is excellent and the assignment of FRST personnel to a job on a continuing basis has had a stabilizing effect on the operation.

C. Respiratory protection standards on the bulk haul should be relaxed unless there is a positive indication of a hazard. A reasonable standard of radiation protection can be achieved by using a disposable plastic sheet for covering the dirt during transit and requiring respiratory protection only while loading or unloading.



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ANNEX 3-C: OCCUPATIONAL SAFETY AND HEALTH

I. The following elements of the OSH program were reviewed:

program description, standards and instructions, accident reports, inspection activities, safety related training activities, hazards review, and Safety Committee activities. During this review, discussions were held with the following individuals: MAJ Lloyd Colio (JTG Safety Officer), A.J. Bennett (H&N Safety Officer), Maj Thrash (USAF Element Commanding Officer), Sgt Smith (USAF Element Safety Officer), CDR Coulapides (USN Element Commander), Chief Waller (USN Element), LCDR Rhamey (USN Element Deputy Commander), MAJ Birchfield (Acting Commander, USA Element and Safety Officer), 1LT MacVeigh (USA Element Operations Officer), and Dick Powell (Eberline contractor).

II. Overall, the safety program appears to be satisfactory. A number of Department of Defense (DOD), Defense Nuclear Agency (DNA) and Service administrative requirements do not appear to be met. These are discussed in detail below. However, the basic elements of a safety program are actively being pursued within the staffing limitations existing on the Atoll. Of paramount importance is the concern and priority given to safety by the Atoll and Service element commanders. This was reflected both in the knowledge evidenced by the Service element commanders of the safety program requirements and applicable safety standards and instructions and in the large improvement in the safety conditions of the work environment on the Atoll. Also to be commended is the thoroughness of the medical

detachment in documenting all instances of medical treatment. This serves as the primary source of information on accidents, particularly minor accidents and injuries which do not result in lost time but serve as important indicators of areas of activity possibly needing additional attention. The major recommendation here is that better and more timely use be made of these reports than is presently being done. It is recommended that a daily review of this report be made by the Atoll Safety Officer to assure that work-related reports are brought to the attention of supervisors of related operations in a timely manner. It is also recommended these accident or injuries which are not lost-time accidents but which are "non-trivial"* be investigated and reviewed by the Atoll Safety Committee.

It must be recognized that a number of serious accidents have been occurring on the Atoll. These can only be reduced by alert supervisory personnel, knowledgeable workers, and an aggressive safety program. This is especially true because of the hazardous environment, long working hours, and old equipment in use on this project.

III. PROGRAM DESCRIPTION

A. The description of the Enewetak Safety Program is contained in EAI 5601 (Program for Construction Safety), EAI 5602 (Heat Injuries), EAI 5603 (Occupational Safety and Health), EAI 5604 (Report of Unsafe and Unhealthful Working Conditions) and EAI 5605 (Water Safety).

* "Non-trivial" in the sense that they were not simply due to minor lapse of attention and those that appear to have factors involved which could easily have caused a more serious accident.

B. OPLAN 600-77 calls for "...detailed procedures for coordinating the safety programs of the various services." These procedures generally meet the requirements of the OPLAN and of the various DOD instructions and directives. The primary concern regarding this set of instructions is the lack of a clear description and delineation of safety responsibilities of the Service elements with regard to various operations and various areas of the Atoll. Although this delineation seems to be clear in the minds of the Service element commanders, this should nevertheless be defined in the appropriate EAI, particularly because of the regular turnover in supervisory personnel.

IV. INSPECTION PROGRAM

EAI 5603 appears to require monthly safety inspections of all Atoll activities together with reports of each to the Atoll Safety Officer. This is being done on Enewetak and Lojwa by H&N for fire protection and for H&N activities. Infrequent inspections are being performed by other activities, but it does not appear that this requirement is being met. The Service elements in general emphasize their use of the normal chain-of-command and supervisory responsibilities to meet this end. However, the usefulness of an inspection program, particularly of ongoing activities and not just physical facilities, is well established as well as required by DOD. It is recommended that this program be reviewed, particularly with regard to the frequency requirement, and that a program appropriate to the Atoll activities be instituted.

V. SAFETY TRAINING

EAI 5601 requires weekly training for engineer and demolition personnel and reports of such to the Safety Officer. This is being done although the reports were not available at the time of this inspection. Special training classes are required by EAI 5603. The Atoll Safety Coordinator (i.e., the H&N Safety Officer) has offered his services for these but, to date, has presented only one or two such sessions to non-H&N personnel. It is recommended that more such programs be held.

VI. ACCIDENT REPORTS AND INVESTIGATIONS

The reports from the medical detachment appear to be the key to a comprehensive overview of all incidents with some injury involved. In most cases the preliminary information collected by the medical personnel provides a sound basis for followup by the appropriate safety officer. However, the reports are not being received by the Atoll Safety Officer soon enough for a timely followup (e.g., they are received monthly). Further, reports are not being received by the Service safety officers so that a matchup with the reports forwarded up the chain-of-command is not possible. Also, to be noted, the Atoll Safety Officer is not receiving all the safety investigations conducted by the Service elements. It is recommended that:

A. The routing of the injury reports from the medical detachment be clarified so that the appropriate personnel receive them on a timely basis.

B. Accidents and injuries which do not meet reporting criteria but are "non-trivial" be investigated, be reviewed by the Safety Committee, and significant findings be routed to all activities as part of the education program. It must be noted that these are not incidents requiring formal documentation. But some of these have great educational value because they serve as object lessons and indicators of more serious incidents that could have happened.

C. Accident and injury investigation findings be more widely distributed so that all Atoll personnel can benefit from these results.

VII. ATOLL SAFETY COMMITTEE

The Committee is being effectively used as an adjunct to normal operations. The Commanding Officer's daily standup briefing is being used to address immediate items of concern while the Committee appropriately serves more of a review and problem solving function. It is suggested that Committee periodically perform a comprehensive review of the safety program of all Service elements. Also, a review of the recent accident and injury experience and inspection findings should be a part of every meeting.

VIII. ATOLL SAFETY OFFICER AND ATOLL SAFETY COORDINATOR

The Atoll Safety Officer function is essentially a collateral duty of the Atoll Assistant Operations Officer. EAI 5603 indicates that the Base Support Safety Officer will act as the Assistant Atoll Safety Officer (this interpretation is supported by MAJ Toch's

end-of-tour report) but, in fact, he has not been utilized for any safety activities beyond those related to fire protection or H&N activities. The need for a recognized full-time safety officer is very apparent. It is recommended that a full-time military staff officer (as identified in the OPLAN) be designated or that the Atoll Safety Coordinator be utilized more fully (and formally) to meet this need.

IX. SAFETY STANDARDS

The question was raised of the applicability of the exemption for "military unique" activities to the Atoll operations. This exemption has been interpreted to apply only to wartime activities. It is obvious that the many items of equipment at Enewetak will not be retrofitted to meet OSHA standards, thus, the use of that equipment must be suitably modified to counteract those deficiencies. For instance, spotters must be used during backing movements of equipment without backup signals and front-end loaders and bulldozers without overhead protection should be restricted to operations where overhead hazards are not present. Compliance with those standards of safe practice applicable to operations (e.g., personal protective equipment, noise, dust, electrical, materiel handling, etc.) is mandatory.

X. SAFETY OBSERVATIONS

In general, the condition of the Atoll with regard to the safety of the operation is greatly improved since the last inspection. Only especially significant observations are presented here.

A. The arrangement for transit from the dock at Lojwa to land continues to be a problem. Because the ramp is not totally compatible with the movements of the docking platform on some occasions it is stored in the raised position. This results in the necessity to jump across a several foot gap to sloping and sometimes wet rocks.

B. The table and radial arm saws cited in the last inspection for lack of guards have been moved to Lojwa and are still without guards. These saws should be removed from service until such guards are installed.

C. Many deficiencies relating to electrical standards were noted. Examples are a power cord stretched as tight as a bowstring; uncovered junction boxes; covers missing from plugs; wiring fed through unprotected penetrations; etc. The humid environment further accentuates electrical problems on the Atoll. Several recent accidents have been electrically related. This problem was particularly evident on Lojwa. It is recommended that a vigorous program of electrical safety be instituted and made a continuing part of all operations.

D. The fire extinguisher program suffers from many deficiencies. The command is having difficulties with unauthorized use (e.g., water battles) of extinguishers, principally on Lojwa. Many extinguishers are not mounted, are in relatively inaccessible locations, or are in improper locations (e.g., too close to the fuel storage area). Most extinguishers had not been checked in the last month and many had been sporadically checked, if at all. Given the general lack

of fire fighting resources, the great abundance of fire extinguishers is a necessity. But they must be available (i.e., at convenient and recognized locations) and operational. It is recommended that this program be thoroughly reviewed.

E. A number of leg injuries have been related to shallow water debris removal. Protective leggings have been ordered. Given the increasing work requirements of this nature, it is recommended that this order be expedited.

F. At the time of the inspection, the DOE contractor (Eberline) could not ascertain what the current face velocities were for the hoods. Apparently they had been measured recently and found satisfactory. It is recommended that the face velocities be checked regularly and the results posted by each hood.

G. It was reported that the k-loader for air transport loading and unloading had hydraulic problems which created difficulties with vertical positioning. This apparently has been reported up the Air Force chain-of-command and a one-for-one replacement is being considered. Given the potential consequences of an accident during aircraft unloading, it is recommended that the condition of this loader be reviewed.

H. Due to a lack of proper facilities, the Naval detachment must do a lot of open air welding. The frequent rainstorms create very wet conditions which make such welding very hazardous. It is recommended that proper facilities be provided for this activity.

I. The Naval detachment reported that the beach-and-haul technique for hull work on the large vessels is hazardous. It was suggested that an underwater railway be constructed or regular visits by Naval units capable of facilitating such repairs be planned. It is suggested that these requirements be reviewed and support be requested for FCDNA, as required.

J. Personnel were observed chipping cement off the mixers on Runit without goggles. It is strongly recommended that goggles be worn for this activity.

K. Improper footwear (e.g., sandals/flip-flops) were observed on several persons involved in activities requiring better protection (e.g., beach debris cleanup, warehousing activities, forklift driving). Although safety shoes are not apparently very available through Army supply channels, it is strongly recommended that an active program to enforce the wearing of military boots be instituted.

L. Personnel were observed during the soil screening operation on Runit working from a rather precarious footing. It is recommended that this be rectified.

M. A storage cabinet for gasoline is located immediately adjacent to an oxygen cylinder storage area at the Navy scuba shop. One of these must be relocated to maintain the proper separation distance.

N. A transfer of a small engine head from the water taxi to an LCU was observed. This was accomplished in a very hazardous fashion by having four men manhandle it from one boat to the other

in somewhat choppy seas, and with a several foot deck differential.

A small winch would have accomplished the job in a much safer and easier fashion. It is recommended that such transfer procedures be reviewed and that an appropriate training program be instituted.

O. Noise levels around the air samplers on the soil transports and in the engine compartments of the LCMs appear to be sufficiently high as to require hearing protection. In both cases, personnel were observed working without such protection (on the LCM one individual was observed wearing protection). It is recommended that such protection be required until such time that a quantitative evaluation can be done. Even if the measurements indicate otherwise, it is strongly suggested that hearing protectors be made available for voluntary use.



LESTER A. SLABACK, JR.
Head, Radiological Safety Department
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ANNEX C: RADIATION RECORDS

I. INTRODUCTION

A. Discussions were held with LTC Dodd, CPT Myers and SP6 Ruyter concerning administrative procedures and RADCON records. The RADCON Division is in compliance with guidance and requirements specified in FCDNA OPLAN 600-77, relevant SOPs, EAI's, ARs and directive messages. No major areas of discrepancies were noted.

II. SPECIFIC COMMENTS

A. Central Enewetak Island Files. All 1977 RADCON records are located at the Central Island Files maintained by the Administrative Branch. The FRST monitoring notes and logs are the only 1978 records maintained at the Central Island Files.

B. SOPs. RADCON has published the following fourteen SOPs:

1. 608-01, 21 Jul 77: Air Particulate Sampling Procedures
2. 608-02.1, 3 Dec 77: Debris Survey Procedures
3. 608-03.1, 12 Dec 77: Decontamination of Facilities and Equipment
4. 608-04, 5 Jul 77: Hot Line Procedures
5. 608-05, 5 Jul 77: Respiratory Protection
6. 608-06, 12 Oct 77: Radioactive Source Test Procedures
7. 608-07, 12 Oct 77: Source Accountability and Control Procedures
8. 608-08, 9 Nov 77: Radiological Guidelines for Ground Zero Operations
9. 608-09, 2 Jun 78: Runit Contamination Control Area Procedures
10. 608-10, 2 Jul 78: Decontamination Laundry Procedures
11. 608-11, 17 Jul 78: Disposal of Laboratory Generated Radioactive Waste
12. 609-01, 17 Jul 78: Sample Data Records
13. 609-03, 17 Jul 78: Radiation Control Sample Identification Procedures
14. 609-04.1, 4 May 78: Bioassay Procedures

COMMENT: These SOPs are clearly written and interviews with several NCOs of the FRST team indicate that the personnel in the field have no difficulty in understanding and applying them. SOPs are maintained at RADCON and each FRST team chief maintains up-to-date SOPs on the job for quick reference.

B. EAI's (Enewetak Administrative Instructions). RADCON has published the following nine EAI's:

1. 5701, 15 Aug 77: Radiological Briefing for Arriving Persons, Enewetak
2. 5702, 15 Aug 77: Access to Radiologically Controlled Islands
3. 5703, 18 Aug 77: Radiation Monitoring of Blast Operations
4. 5704, 29 Oct 77: Radioactive Source Test Procedures
5. 5705, 1 Feb 78: FRST Training
6. 5706, 29 Mar 78: Administration of Personnel Dosimetry Program
7. 5707, 3 Apr 78: Personnel Protection Levels
8. 5708, 15 Jul 78: Bulk Soil Haul Monitoring Procedures
9. 5709, 5 Jun 78: Island Debris Removal Completion Procedures

COMMENT: EAI 5705 - FRST Training has been expanded to include audiovisual material. The mixture of the AV aids with the didactic portion of the presentation is excellent.

C. Records. The records are maintained and filed in accordance with the Army Functional File System. Field Command has sent a team to set up and organize a Central Island File at Enewetak. Records included and maintained by RADCON are:

1. Dosimetry Records and Logs. The official personnel dosimetry record is DD Form 1141, accomplished in accordance with AR 40-14. On 4 August 1978, RADCON received a directive from the Office of the Surgeon General of the Army assigning an administrative radiation whole body dose to those personnel assigned to Enewetak during the period of 20 June - 20 November 1977.

2. Inventory of Radioactive Sources. All radioactive sources listed on the RADCON inventory sheet were found to be correct. Quarterly inventory records are maintained and include type of source, radionuclide, source strength, location and date of calibration.

3. Listing of radioactive debris and radioactive soil for contaminated islands. These records consist of maps of each island on which annotations have been documented as to debris, level of contamination, etc.

4. Registry of Ionizing Radiation Producing Devices: Two x-ray units are located at Enewetak; one Westinghouse diagnostic x-ray unit and one S.S. White dental x-ray unit. Both units were surveyed in February 1978 by a health physicist from Tripler Army Hospital.

5. Inventory of Non-Ionizing Producing Devices. Two microwave ovens are now present on the Atoll. Neither were listed on the registry for non-ionizing producing devices and have not been leak-tested. RADCON does not have proper instrumentation to do safety checks on microwave ovens.

6. Radiological Survey Reports. Copies of the radiological safety survey reports provided by DOE are filed by island.

7. Monitoring Notes/Logs and Island Visitation Records. Each FRST operation maintains a daily monitoring log and visitation record. These are submitted on a daily basis to RADCON where a typed version of the hand written log is done, returned to the FRST team leader for signature and then returned to RADCON where it is filed. A review of the reports from Runit, Aomon and Enjebi was

done and a random sample of reports for this period revealed that the information contained is fairly detailed and constitutes a valuable record of each day's activities.

8. Minutes of RCC Meetings and Documents. Copies of the minutes of RCC meetings were on file and current.

9. SOPs and EAI's. SOPs and EAI's were current and on file.

10. Training Materials. Course outlines and lesson plans for the training given to the FRST personnel were reviewed. Records are maintained indicating the type of training an individual receives before going to work in a controlled area. LCDR John Duley, MSC, USN has covered this section in more detail.

11. Radiation Accident or Incident Files. Records of radiation accidents and/or incidents are on file. The latest incident occurred on 10 July 1978 which involved a decontamination of an individual's boots. After decontamination, no observable or removable activity was noted.

12. Instrument Calibration Files. These files are maintained by the contractor on Enewetak and by the FRST team on Lojwa. Records indicate the survey instruments are calibrated every six months.

13. Radiation Analysis Files. These files consist of three bound journals in which the results of all radiological analyses are recorded. Examples of entries include: decon swipes, soil samples, air samples, etc. Entries are chronological with entry codes specifying type of sample, location, and date taken.

14. Inspection Files. Copies of previous inspection reports
were on file.



DAVID HUNTER
Capt, USAF, BSC
Health Physicist
USAF Representative

ENEWETAK INSPECTION TEAM

OIC	D.W. McINDOE, Colonel, USAF, MC	Armed Forces Radiobiology Research Institute Defense Nuclear Agency Bethesda, MD 20014 AV 295-1210
Staff	L.A. SLABACK, JR., Civilian R.E. SCHAFFER, CPT, CE, USA P.A. RYAN, Civilian	
USN	J.W. DULEY, LCDR, MSC, USN	Naval Nuclear Power Unit Port Hueneme, CA 93041 AV 360-4151
USAF	D. HUNTER, Capt, USAF, BSC	School of Aerospace Medicine Brooks AFB, Texas 78235 AV 536-3416
DOE	R.E. GOANS, Ph.D.	Oak Ridge National Laboratory Oak Ridge, TN 37830 (615) 483-8611 ext. 36786

ATTACHMENT 1

Refer to 1st report of the DNA Radiation Safety Audit and Inspection Team for background information on Colonel McIndoe, LCDR Duley and CPT Schaffer. Refer to 2d report, same subject, for background information on Dr. Goans.

Background information on Mr. Slaback and Capt Hunter attached.

ATTACHMENT 2

LESTER A. SLABACK, JR., C.H.P.

EMPLOYMENT

Head, Safety Department, AFRRI	1977-present
Head, Radiological Safety Department AFRRI	1971-1977
Head, Special Projects Division, RADSAFE, AFRRI	1969-1971
Health Physicist, RADSAFE, AFRRI	1965-1969
Physical Science Assistant, S&E Program, US Army	1963-1965

EDUCATION

BS (Physics) BS Math	San Jose State College, 1962
Graduate work	Iowa State University, 1962-1963 American University, 1964-1966

PROFESSIONAL SOCIETIES

Member, Health Physics Society
Member, American Association of Physicists in Medicine
Member, American Industrial Hygiene Association
Diplomate, American Board of Health Physics
Chairman, Continuing Education Panel, American Board of Health Physics
President, Baltimore-Washington Chapter, Health Physics Society (1974)

DAVID HUNTER, Captain, USAF, BSC

PRIVACY ACT MATERIAL REMOVED

DPOB:

EDUCATION

BS The Medical College of Georgia; Radiology, 1972

MS Emory University; radiological Physics/Nuclear Medicine Physics, 1974

EMPLOYMENT

Instructor, Department of Radiology/Nuclear Medicine, Bowman Gray
School of Medicine, 1974-1977

Consultant, Nuclear Medicine, VA Hospital, Sailsbury North Carolina,
1974-1977

Consultant, Canberra Industries, Meridan, Connecticut, 1975-1977

Health Physicist, USAF Brooks AFB, Texas, 1977-Present

RESEARCH AREAS

Radiation physics, instrumentation, internal dosimetry, computer
applications in nuclear medicine.

PUBLICATIONS

Six publications and one book.

PROFESSIONAL ASSOCIATIONS

Society of Nuclear Medicine
AAPM

REPOSITORY PNNL
COLLECTION Marshall Islands
BOX No. 5686
FOLDER Enwetak Oct-Sept 1978

DOCUMENT DOES NOT CONTAIN ECI

Reviewed by J. Schuette Date 4/30/97