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US ARMY MATERIEL COMMAND

MEMORANDUM REPORT BRL-MR-3527

U.S. ARMY RADCON/ALPHA TEAM FIELD TRAINING EXERCISE, 1985

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July 1986

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER MEMORANDUM REPORT BRL-MR-3527	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) U.S. ARMY RADCON/ALPHA TEAM FIELD TRAINING EXERCISE, 1985		5. TYPE OF REPORT & PERIOD COVERED FINAL 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) David N. Neades John E. Kammerer Lisa K. Roach		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Ballistic Research Laboratory ATTN: SLCBR-VL Aberdeen Proving Ground, MD 21005-5066		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS N/A
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Ballistic Research Laboratory ATTN: SLCBR-DD-T Aberdeen Proving Ground, MD 21005-5066		12. REPORT DATE JULY 1986 13. NUMBER OF PAGES 39
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

This report reflects the combined efforts of the members of the U.S. Army RADCON Team.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Radiation Contamination
Radiation Control
RADCON Team
Radiation Hazard
Nuclear Emergency Team
Alpha Radiation
FIDLER

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Details of the combined RADCON/ALPHA Team field training exercise conducted at Nevada Test Site between 15-20 September 1985 are presented. The exercise consisted of a combination of classroom instruction on various subjects related to radiation measurement and management techniques, and actual field entries into radiation contaminated areas to gain practical experience. Included is an exercise critique compiled from post-exercise discussions.

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ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the efforts of numerous Department of Energy (DOE) personnel who provided timely assistance in making the necessary arrangements to conduct the training exercise on Nevada Test Site (NTS). In addition, the professional support provided by Reynolds Electrical and Engineering Company (REECo) personnel in supplying monitors and equipment as needed to meet our changing requirements resulted in a successful training exercise.

CONTENTS

I. INTRODUCTION

The objectives of the RADCON team exercise described in this report are as follows:

a. To satisfy the training requirement specified in FM 3-15,[1]

b. To provide initial training and field experience for new team members, and refresher training for veteran team members,

c. To maintain operational readiness between the RADCON team, Sierra Army Depot Alpha team, and Seneca Army Depot Alpha team,

d. To satisfy such technical requirements as implementing standardized instrument calibration and check-out procedures and evaluating advanced state-of-the-art instrumentation under realistic field conditions.

II. BACKGROUND

The Army Radiological Control (RADCON) team mission is to advise the On-Scene Commander, a general officer, or the Nuclear Accident and Incident Control officer on all radiological aspects associated with a nuclear accident or incident. In addition, RADCON teams perform detailed radiological surveys for alpha and beta-gamma radiation contamination, supervise radiation contamination control, disposal of radiological waste, and decontamination, and provide health physics and radiological safety services. Over the past two decades RADCON team assistance has been requested in connection with several accidents or incidents involving nuclear materials. In 1985 alone, the RADCON team responded on five separate occasions to nuclear related accidents or incidents. In each case RADCON team action was largely responsible for the timely and successful resolution of the incident. Two of these incidents were training exercises, one of which is described in detail in this report. A previous RADCON team report[2] contains a section on RADCON team significant events

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1. FM 3-15, "Nuclear Accident Contamination Control," November 1975, Department of the Army.

2. Rigotti, D.L. (editor), "The US Army RADCON Team: Organization, Capabilities, and Resources," ARBRL-MR-02954, September 1979, US Army Armament Research and Development Command, Ballistic Research Laboratory, Aberdeen Proving Ground, MD (AD A076168).

as well as a detailed description of the team's capabilities and resources.

By remaining abreast of developments in the field of radiation detection and measurement, and by maintaining a high degree of operational readiness, the RADCON team's capabilities have grown considerably since its formation in 1958. RADCON team readiness is partly a result of the annual field exercises which provide team members the opportunity to gain experience in the areas of instrumentation, survey techniques, and sample analysis methods, in an actual radiation contaminated environment. Usually, these exercises are conducted at the Department of Energy (DOE) Nevada Test Site (NTS) facilities in southern Nevada. (A listing of DOE and ALPHA team points of contact are presented as Appendix A). The residual radiation contamination present at many of the experimental sites on NTS adds realism to the training exercises since genuine readings can be achieved when using various instruments to measure radiation. The presence of real (as opposed to simulated) contamination also requires the use of protective clothing and respirators while in the contaminated areas, another aspect of RADCON operations which requires periodic practice.

In the event of a major nuclear accident or incident involving US Army materiel or facilities it is likely that the ALPHA teams from the Sierra Army Depot (SIAD), Herlong, CA and Seneca Army Depot (SEAD), Romulus, NY would be asked to respond along with (and in most cases, in advance of) the RADCON team. For this reason, both ALPHA teams have participated in the RADCON sponsored field training exercises for the past several years. Their involvement has benefited all concerned and resulted in the establishment of standardized instrument set-up and check-out procedures for instruments common to all of the teams. In addition, effective working relationships have developed between ALPHA and RADCON team members which have proven to be invaluable when coordinating team interactions.

III. APPROACH

1. Operation Plan

The combined RADCON-ALPHA team field training exercise occurred at Nevada Test Site over the period 15 to 20 September 1985. The exercise consisted of a combination of classroom instruction on various subjects related to radiation measurement and management techniques and actual field entries into radiation contaminated areas to gain practical experience. The instructional portion of the exercise was divided into a classroom phase and a field training phase. Classroom instruction occurred in the Mercury theater on the first full day of operations, 16 September. Field training took place on 17 September in the "cold" (non-contaminated) area of Area 8 adjacent to the contaminated

alpha RADEX (RADiation EXclusion) field where field entries were scheduled to occur that afternoon and the following two days.* Details of the field entries made at the alpha RADEX area are described in section III.

The exercise personnel roster consisted of 27 RADCON team members, 10 SEAD ALPHA team members and 10 SIAD ALPHA team members. Table 1 is a listing of individuals from each of the three teams.

TABLE 1. Exercise Personnel Roster

RADCON TEAM PERSONNEL		
D. Rigotti	J. Schall	J. Maloney
J. Jacobson	S. Juarascio	C. Taylor
T. Purnell	L. Roach	M. Ralston
M. Vogel	John Anderson	C. Wick
G. Davis	M. Schmoke	J. Morrisey
K. Hess	J. Kammerer	C. Crisco
D. Neades	B. Rickter	J. Saccenti
M. Coon	R. Markland	L. Kokinakis
W. Kokinakis	Joe Anderson	H. Caton
SEAD ALPHA TEAM PERSONNEL		
D. Foster	F. Fisher	E. Mitchell
C. Simon	W. Dilley	C. Rance
K. Tackett	R. Wright	R. Forde
W. Van Duesen		
SIAD ALPHA TEAM PERSONNEL		
D. Clemen	R.Dunquez	R. Eaton
N. Smith	M. Bennett	J. Crutcher
D. Galbreath	J. Adams	P. Hampton
P. Locke		

All exercise participants arrived in Las Vegas on the afternoon of 15 September. Upon arrival in Las Vegas, RADCON instrument cases were assembled, loaded into a cargo van, and driven to the Las Vegas DOE compound for overnight safe storage. (A listing of the instrument packages and related equipment is included as

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* Some exercise events did not occur at their originally scheduled times. A copy of the Operational Plan filed with the DOE's Nevada Operations Office is presented as Appendix B.

Appendix C.) After checking in at the local lodging, exercise leaders, Mr. Jacobson and Mr. Morrissey; exercise coordinator, Mr. Neades; Alpha team leaders Mr. Foster (SEAD) and Mr. Cleman (SIAD) met with Mr. Rigotti, the exercise director, to review the operational plan and coordinate the following days activities. All personnel departed Las Vegas the following morning to arrive at Visitor Control, Mercury, Nevada by 0900 for badging and administrative processing.

2. Classroom Instruction

The first day of the exercise was devoted to formal briefings given by veteran RADCON team members on several standard subjects and a few non-standard needs which were identified during last year's exercise. In addition to oral presentations, the "Air Sampling" and "Hot Line Procedures-Dress Out Instruction" modules included demonstrations which were particularly informative. Classroom instruction began promptly at 0930 hours in the theater and consisted of briefings according to the schedule shown in Table 2.

3. **Practical Instruction**

The practical instructional phase of the training exercise followed the formal classroom session and was designed to give individuals the opportunity to receive intensive hands-on instruction on selected subjects outside of the contaminated area without the added encumbrance of respirator and anti-contamination (Anti-C) clothing. The subjects selected, based on experiences at last year's exercise, were: compass and map use, and instrumentation familiarization. Two consecutive sessions were held wherein each of the two subjects were addressed simultaneously with roughly one-half of the group in each class.

Upon arrival at the field training area all participants were issued Anti-C clothing and a respirator from the REECo equipment van for use as required during the course of the exercise. Respirators were adjusted and smoke tested to assure a proper fit to each individual. Instructors and Advisors not scheduled to enter the contaminated area prepared their lesson plans by laying out the compass course or setting up the instrument stations.

a. Use of Lensatic Compass. Material for this subject was presented in two phases. Phase one consisted of a 30-minute instructional phase. Phase two consisted of a 90-minute practical exercise.

The 30-minute instructional period included discussion of the compass and its uses; identification and description of parts of the compass; day and night use of the compass; precautions regarding the care and use of the compass; safe distance requirements from masses of iron and electrical circuits; the two

TABLE 2. Classroom Schedule - Mercury Theater

TIME	SUBJECT-RESPONSIBLE INDIVIDUAL	
0930 - 0940	Introductory Remarks	Mr. Rigotti
0940 - 0950	Exercise Overview	Mr. Jacobson
0950 - 1020	Air Sampling	Mr. Crisco
1020 - 1030	********** Break **********	
1030 - 1130	Hc . Procedures-Dress Out Instr	Mr. Schmoke
1130 - 1200	Hea Physics-Radiation Principles	Mr. Markland
1200 - 1300	***** Lunch & Check-In *******	
1300 - 1330	Field Survey Techniques	Mr. Jacobson
1330 - 1345	IR Rangefinder/Transit Applications	Mr. Maloney
1345 - 1415	Use of Lensatic Compass	Mr. Schall
1415 - 1430	********** Break **********	
1430 - 1500	Sampling Techniques-Analysis	Mr. Saccenti
1500 - 1600	Instrumentation	Mr. Taylor
1600 - 1630	Collective Anecdotes	Mr. Morrissey Mr. Crisco Mr. Maloney

methods of holding and sighting the lensatic compass; and compass triangulation including triangulation and resection.

The 90-minute practical exercise included: a brief review of discussion items; determining azimuth and direction on a three-legged course; determining azimuth and direction to three man-made features and one natural feature; use of a transit (aiming circle) to determine azimuth; use of distance measuring equipment; and a demonstration of the effects of masses of iron on compass readings. Each participant was given the following assignment:

- Task: Determine a magnetic azimuth using a compass.
- Conditions: Given a compass that has been checked against an aiming circle and has no noticeable deviation and a designated point on the ground, in the field, in daylight.

- Standards: Determine the correct magnetic azimuth to the designated points, within three degrees, using the center-hold method or the compass-to-cheek method.

Headings and distances between course points were:

	Azimuth	Distance
Start point to point one:	053°	532 ft.
Point one to point two:	207°	754 ft.
Point two to point three:	330°	337 ft.
-OR-		
Start point to point three:	150°	337 ft.
Point three to point two:	027°	754 ft.
Point two to start point:	233°	632 ft.

Additionally, azimuths to other landmarks were as follows:

1. Start point to airplane - 274°
2. Start point to APC's - 309°
3. Start point to mountain peak - 311°
4. Start point to crater - 085°

b. **Instrument Familiarization.** Personnel attending the instrument familiarization class were divided into teams of two. Where possible, putting two inexperienced people on the same team was avoided. In most cases enough instruments were available to allow each team of two to have an electronic package of each type described in the following section. Each instrument package was thoroughly described, explained and demonstrated in turn with emphasis on reading the meter and recognizing the appropriate scale to use.

Following the instrument instruction period, each team was required to demonstrate a working understanding of each instrument by first initializing the instrument and then taking a series of measurements at various stations setup for this purpose. Separate stations had previously been setup with low-level radioactive check sources for each of four instrument electronic-detector packages, namely, the FIDLER with Ludlum 2220 electronics, PAC-1SAGA, micro-R meter (Ludlum Model 19), and pancake probe with Ludlum Mod 3 electronics. On the first pass through the instrumentation familiarization course, one member of the team acted as instrument handler and reader and the other was the data recorder. Roles were reversed for the second trip through. At each position where data were required, the instrument handler reported instrument readings to the recorder who in turn recorded it on the data sheet. A sample exercise data sheet is shown in Figure 1. Help of partners was encouraged but individual proficiency was stressed. Written instructions for negotiating the instrument familiarization course included the

following:

A. FIDLER With Ludlum 2220 Electronics

There are two stations with radioactive sources. The first datum to be recorded is the background before leaving the instrument pick-up area. At the first station with a source, the count rate is to be recorded and also the integrated counts for 0.1 minute. (The Ludlum 2220 is set to count for 0.1 minute). After these readings have been taken, the team will proceed to the next station and record the same data, the count rate and an integrated count. When these data have been recorded, the FIDLER is to be returned to the start position.

B. PAC-1SAGA

There are three data entries. The instrument operator proceeds to the three alpha sources and the counts are recorded for the three positions. At the completion of the data recording, the instrument is to be returned to the pick-up station.

C. Micro-R Meter (Ludlum Mod-19)

The micro-R meter determines three data points, one background and two radioactive source stations. The background is recorded before leaving the instrument pick-up position. At both source stations, the Mod-19 instrument is placed on the stand provided and the readings recorded. At the completion of the data recording, the instrument is to be returned to the pick-up station.

D. Pancake Probe With Ludlum Mod-3 Electronics

This section requires four data entries. First, the background is recorded before leaving the instrument pick-up area. Then, the instrument is used to survey two beta sources which are positioned at two stations. Finally, the instrument is used to find an unseen gamma source. The instrument operator is to walk with the probe approximately 1.5 feet above the ground and, using the instrument readings, zero in on the source. Once the source has been found, the radiation level at approximately one foot above the source is to be recorded. At the completion, the instrument is to be returned to the pick-up station.

4. Field Surveys

a. In-and-Out Survey. On 18 September, the third day of the exercise, all personnel assembled at the alpha RADEX training area, Area 8 at 0830 hours. Due to extra time being devoted to practical instruction, the In-and-Out survey scheduled for the afternoon of day two was rescheduled at this time under the direction of Mr. Jacobson. Personnel were assigned to one of six

Instrumentation Familiarization Data Sheet

	Name	Organization
Instrument Handler/Reader		
Instrument Recorder		

**** FIDLER w/LUDLUM 2220 Electronics Data ****

	Reading (cpm)	Integ. Counts/0.1 min
Background		
Station #1		
Station #2		

**** PAC-1SA Data ****

	Reading (cpm)
Station #1	
Station #2	
Station #3	

**** Micro-R Meter (LUDLUM MOD-19) Data ****

	Reading (μR/hr)
Background	
Station #1	
Station #2	

**** Pancake Probe w/LUDLUM MOD-3 Data ****

	Reading (mR/hr)
Background	
Station #1	
Station #2	
Unseen Gamma Source	

Figure 1. Sample Instrumentation Familiarization Data Sheet

teams to conduct simultaneous In-and-Out surveys of the three adjacent contaminated areas, 1, 2 or 3. Figure 2 shows the approximate dimensions of the contaminated sites as well as the general lay-out of the training area.

Those individuals not assigned to one of the survey teams were assigned to one of the two hot line facilities or one of the two air sampling stations which had been set up near each of the hotlines. Several individuals were awarded "Advisor" status and excluded from the general roster. These individuals and their respective areas of responsibility were as follows:

Mr. Rigotti - Exercise Leader
Mr. Maloney - Field Operations
Mr. Jacobson - Exercise Coordinator
Mr. Morrissey - Exercise Coordinator
Mr. Taylor - Instrumentation
Mr. Crisco - Air Sampling

Team assignments for the remaining personnel are shown in Table 3.

After "dressing-out", team members were issued appropriate instrumentation from Mr. Taylor in preparation for entry into the hot area. The FIDLER probes with associated Ludlum electronic packages were standardized at the instrumentation van just prior to field entry. Instruments were standardized using the method outlined in Reference 3.[3] All FIDLER instruments were checked for proper functioning and adjusted for the 60 kev energy gamma-ray peak associated with ^{241}Am. Micro-R (Ludlum 19) meters were checked with a ^{137}Cs source.

In all cases, teams were configured to include:

1. Team Leader: overall responsibility for team safety and actions. Usually radio operator and data recorder.

2. Pathfinder: Distance and azimuth measurements

3. Alpha Monitor: FIDLER measurements

4. Gamma Monitor: Micro-R measurements

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3. Kammerer, J.E. (editor), "USA RADCON-ALPHA Teams: Field Exercise, 1982". ARBRL-MR-03320, November 1983, US Army Armament Research and Development Command, Ballistic Research Laboratory, Aberdeen Proving Ground, MD (AD A136516).

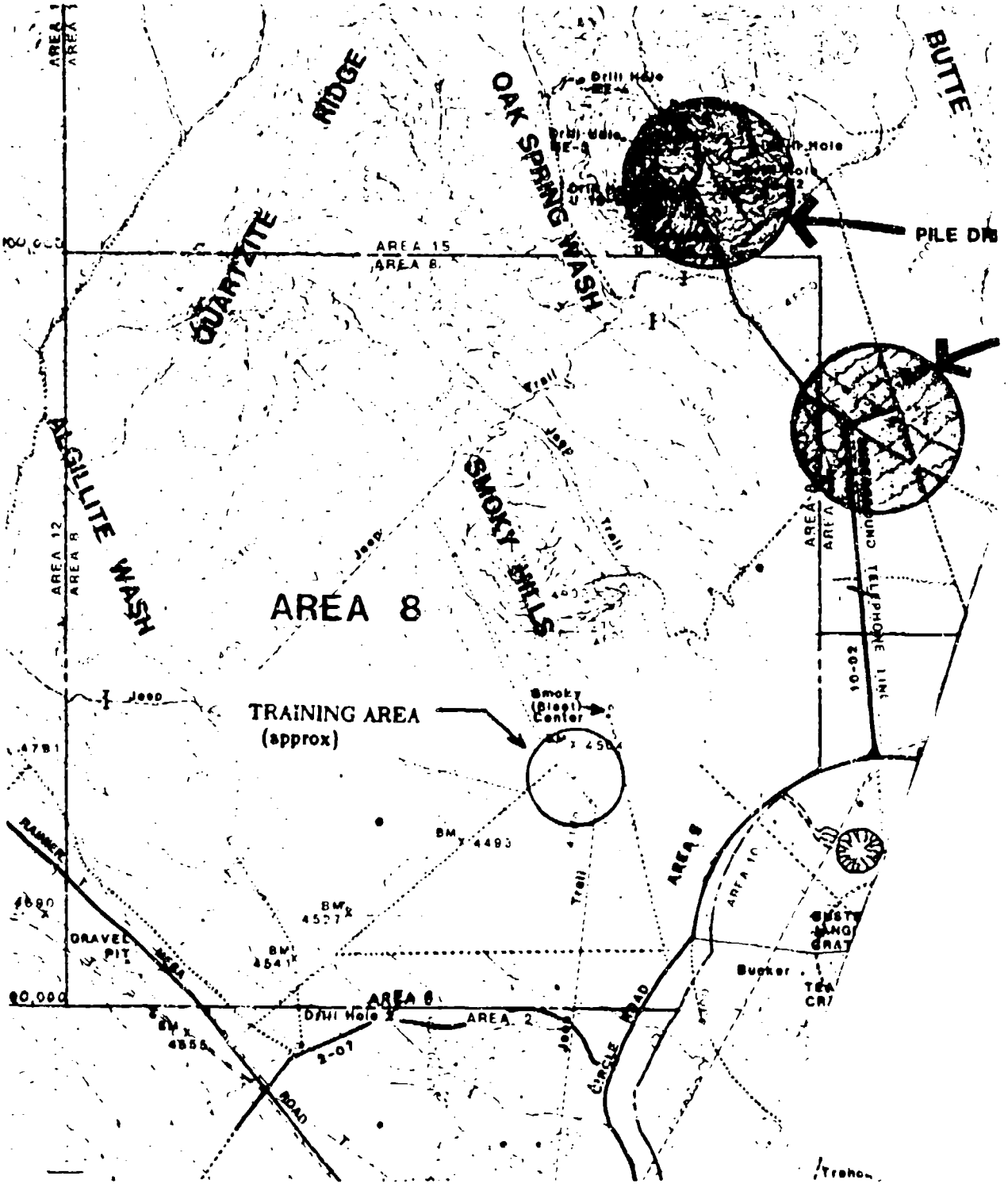

Figure 2. Alpha RADEX Training Area - Area 8, NTS

TABLE 3. Personnel Roster - In-and-Out Survey

Field No.1		Field No.2		Field No.3	
Team#1:	M.Ralston	Team#1:	J.Saccenti	Team#1:	R.Markland
	J.Kammerer		C.Rance		B.Rickter
	J.Adams		E.Mitchell		Joe Anderson
	M.Bennett		N.Smith		P.Hampton
Team#2:	R.Forde	Team#2:	D.Cleman	Team#2:	J.Cruthcher
	L.Roach		G.Davis		D.Galbreath
	T.Purnell		R.Eaton		M.Coon
	H.Caton		L.Kokinakis		J.Schall

Hotline#1		Hotline#2	
Leader:	John Anderson	Leader:	P.Locke
Crew:	R.Dunquez	Crew:	D.Foster
	R.Wright		F.Fisher
	K.Tackett		S.Juarascio
	L.Kokinakis		C.Simon

Air Samplers

Team#1	Team#2
W.Kokinakis	M.Vogel
W.Dilley	D.Neades

Instrument Person : C.Rance
Assistant for Administration : M.Vogel

The objective of this particular field exercise was to establish the three-times background and ten-times background contours for each of the three sites, 1, 2, and 3. These levels were determined to be 15,000 cpm (counts per minute) and 50,000 cpm respectively using the FIDLER instrument package. The two survey teams dispatched to site 3 entered the contaminated area via Hotline #1 at the southern end of the access road. The remaining four teams passed through Hotline #2 which had been set up roughly equidistant from sites 1 and 2. Each team was responsible for surveying one-half of its assigned site. Due to the relatively small size of the contaminated areas, all teams completed their surveys in less than the allotted two hours. Upon completion of operations in the hot area teams were processed back through the hotline facility where individuals and equipment were certified free of

contamination.

b. **Contour Survey.** The afternoon session consisted of a contour survey under the direction of Mr. Morrissey. Hotline facilities and air sampling stations were left in place from the morning session. Team assignments were as shown in the Table 4.

TABLE 4. Personnel Roster - Contour Survey

Field No.1		Field No.2		Field No.3	
Team#1:	M.Vogel	Team#1:	D.Neades	Team#1:	S.Juarascio
	M.Coon		W.Kokinakis		J. Anderson
	W.Dilley		C.Simon		M.Bennett
	R.Eaton		J.Cruthcher		C.Rance
Team#2:	D.Foster	Team#2:	F.Fisher	Team#2:	D.Galbreath
	Joe Anderson		M.Ralston		H.Caton
	L.Kokinakis		K.Tackett		R.Wright
	B.Rickter		P.Locke		R.Dunquez

Hotline#1		Hotline#2	
Leader:	J.Kammerer	Leader:	E.Mitchell
Crew:	G.Davis	Crew:	J.Schall
	R.Forde		D.Cleman
	J.Adams		N.Smith
	T.Purnell		L.Roach

Air Samplers

Team#1	Team#2
J.Saccenti	R.Markland
P.Hampton	Joe Anderson

Instrument Person : M.Bennett

Assistant for Administration : J.Schall

Following a briefing of the team leaders by Mr. Morrissey on the specific requirements of the survey, team members, not already dressed-out, donned Anti-C clothing. The objective of this survey was to establish the three-times background contour for each of the three contaminated areas. From the morning exercise it had already been determined that the corresponding FIDLER reading was 15,000 cpm. Since sites 1 and 2 overlapped

considerably, they were regarded as a single area. Accordingly, each of the four teams dispatched to this area were charged with surveying approximately one-fourth of the combined area. This procedure involved locating the three-times background line at a predetermined starting point for each team, and then, in approximately 15 degree increments, defining its contour in the quadrant of interest. This was accomplished by taking compass headings to locate landmarks at each point on the contour. In addition to FIDLER readings, which were by definition, the same at each point, beta-gamma measurements were also taken. The two teams dispatched to site 3 were instructed to proceed along similar lines except that each was to survey one-half of the effected area. Again, all personnel negotiated the closest hotline facility, before entering the contaminated area, where they were checked for proper attire and again before exiting to check for possible contamination.

IV. RESULTS

Results of the In-and-Out survey conducted in the morning session and the contour survey from the afternoon session have been combined to provide an aggregate picture of the contamination present. Figure 3 is a composite plot of the three times background (3x) and ten-times background (10x) readings taken at each of the three sites. Background readings were established in the vicinity of the hotline prior to field entry. These values were recorded on the data sheets along with the serial number of the instrument used. In general, background readings were in the neighborhood of 5,000 CPM for the FIDLER; background beta-gamma readings were on the order of 30 μR in the vicinity of the hotline.

V. DISCUSSION

1. Critique and Observations

a. Operations. Comments, criticisms, and suggestions relative to this year's operations were solicited from all participants at the close of the exercise. For the most part, comments received have been positive. Everyone agreed that the new training site provided new challenges and learning opportunities for all. Most RADCON and ALPHA team members are now quite familiar with the Plutonium Valley area, site of the last several training exercises. The exercise as a whole was considered to be a success in spite of the sudden unexpected thunderstorms which resulted in major schedule changes.

The recent acquisition of Ludlum 2220 electronic packages by SEAD permitted all survey teams to be equipped with the same type of instruments, all calibrated and standardized according to the same procedure. RADCON and ALPHA team combined capabilities will

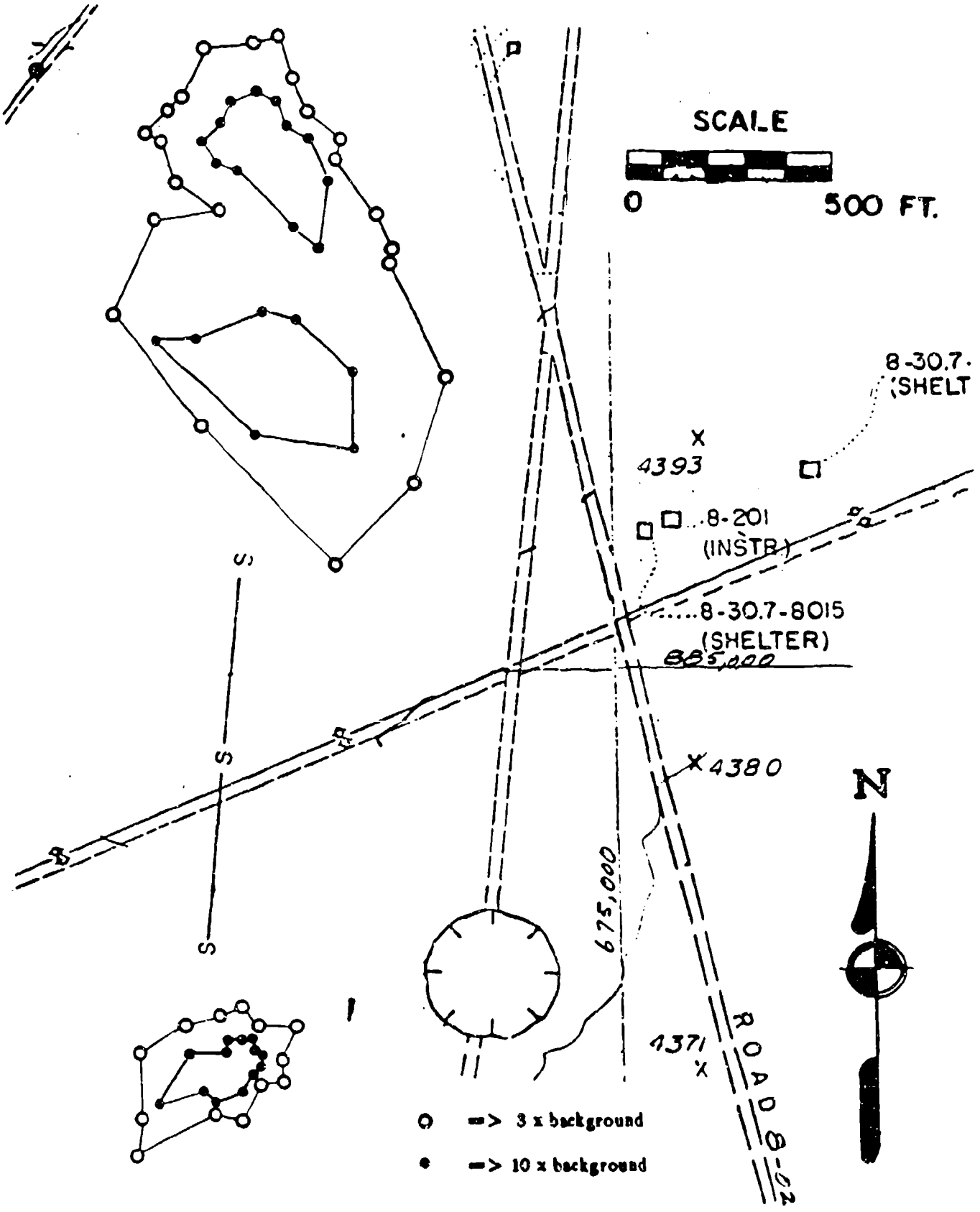

Figure 3. Combined Results of In-Out and Contour Surveys

be similarly increased when SIAD completes the upgrading of its survey equipment to include the Ludlum instruments.

In addition to providing the periodic proficiency training required by regulation for all team members, the exercise served as a basic familiarization course for new RADCON and ALPHA team members. The inclusion of a hands-on training session in the cold area in addition to the formal classroom instruction was a benefit to all. The use of standards as sources of radiation in a simulated contaminated environment was particularly helpful in teaching instrument operation to first time users. Most participants felt that this part of the exercise helped prepare them for the field surveys which occurred on the following day. Other comments and suggestions made relative to the exercise in general were as follows:

Some felt that while the field training was valuable, it would be better if the course were set up in the contaminated area with predetermined check-points established for the taking of readings. This would presumably allow for a wider range of readings and realistic meter fluctuations, but would also require the use of Anti-C clothing and possibly respirators.

Team procedures and team member responsibilities need re-emphasizing. While each individual usually understands his particular job, i.e. FIDLER monitor, data recorder, etc., it is important to understand all responsibilities with respect to the operation and safety of the team as a unit. For example, the beta-gamma monitor, or person carrying the µR meter, should precede the group by a *few* paces, constantly monitoring for the "turn-back" value. The remainder of the team should stay relatively close together to ensure that no one unknowingly receives a hazardous dose. For training purposes, it was further suggested that when the team stops to take instrument readings and/or compass headings, the team leader explain each step, at least initially, as it is being performed so that everyone understands the whole process and not simply his or her own function.

There is a tendency to view all RADCON and ALPHA team members as potential team leaders and attempt to train personnel accordingly. It has been suggested that a more practical approach would be to designate only certain individuals as team leaders and cross train the others to perform the remainder of the team functions. This presumably would eliminate the problems which arise when new, inexperienced individuals are cast in the team leader role before they have become proficient in the other team member skills.

The importance of having accurate up-to-date maps was realized repeatedly during the course of the exercise. Landmarks which have been added or removed from the landscape and not reflected in the current maps clearly can result in confusion and wasted time at best and possibly erroneous data and an inaccurate

characterization of the situation. In the event of a real accident or incident involving nuclear materials, aerial photographs could and probably would be generated to provide a current picture of the area of interest. However, it is doubtful if these would be available as quickly as they would be needed and even if they were, additional maps (e.g. topological) would also be required.

All RADCON forms should be reviewed for accuracy and completeness. The current package was designed and compiled in 1979 and reflects instrumentation and procedures in effect at that time. In particular, the Air Sample Record (RC-10) should be modified to clarify the procedure for calculating the estimated alpha concentration from the field sample. In general, the Air Sample Record should be simplified to minimize confusion with respect to how the data should be recorded.

b. **Training Subjects.** The general consensus of the exercise participants was that some basic curriculum changes are in order for future training exercises. It was generally agreed by all that classroom training on the subject of instrumentation should focus more on theory and principles of radiation detection and less on description and operation of the particular devices on hand. With the exception of new team members, all personnel should now be sufficiently familiar with RADCON-ALPHA team equipment that detailed descriptions and in depth reviews of operating instructions for each instrument should not be required. The hands-on experience acquired during the course of the field exercise should be sufficient to re-familiarize team members with each detector. New members could receive separate, intensive instruction as required to establish a minimum level of expertise. Future classroom training sessions should therefore include discussions on subjects such as radiation physics, scintillation, ion chambers, photomultiplier tubes, Geiger-Mueller tubes, etc., the principles of which are applicable to radiation detection and measurement in general. Additional topics suggested for consideration included, swipe (smear) taking and counting, decontamination procedures, and dosimetry.

ALPHA team members should be encouraged to play a larger role in the design and planning of the annual joint exercises. ALPHA team leaders are most familiar with the training requirements of their team members and should make their needs known to the exercise planners early in the planning process. In addition, since it's likely that an ALPHA team would be the first response group to arrive at the scene of an Army nuclear incident or accident, they are more directly involved in the setting up and management of hotline operations and instruction in that area should probably be given by ALPHA team members. Although FM 3-15 specifies the raquirements for establishing a hotline operation, or more correctly, a contamination control station (CCS), of which the hotline is one element, ALPHA team interpretation of the regulation will affect hotline operational procedure and

should be reflected in training exercises as well.

2. ALPHA Team Comments

Specific comments received on behalf of Sierra and Seneca Army Depot personnel generally concerned minor differences between ALPHA and RADCON team procedures. These differences apparently are a result of different interpretations of the guidelines set forth in FM 3-15, especially with respect to hot-line design and operation. Presumably, when the new, revised version of that manual is published, these ambiguities will be self-correcting. A written critique of the joint exercise received from Seneca Army Depot is included as Appendix D.

VI. CONCLUSIONS

The 1985 Combined RADCON-ALPHA Team Exercise was a success and provided valuable experience to all involved. The exposure of new team members to actual radiation contamination and the opportunity to practice radiation measurement and detection in a controlled environment was indispensable in maintaining the required number of qualified team personnel.

All exercise objectives were met. Joint participation of RADCON and ALPHA teams on an annual basis helps to maintain the excellent working relationships that are required for successful team interactions when actual emergencies occur. Future exercises, similar to this one are encouraged to continue these relationships and identify and resolve the issues discussed in the previous section.

REFERENCES

1. FM 3-15, "Nuclear Accident Contamination Control", November 1975, Department of the Army.

2. Rigotti, D.L. (editor), "The US Army RADCON Team: Organization, Capabilities, and Resources", ARBRL-MR-02954, September 1979, US Army Armament Research and Development Command, Ballistic Research Laboratory, Aberdeen Proving Ground, MD (AD A076168)

3. Kammerer, J.E. (editor), "USA RADCON-ALPHA Teams: Field Exercise, 1982". ARBRL-MR-03320, November 1983, US Army Armament Research and Development Command, Ballistic Research Laboratory, Aberdeen Proving Ground, MD (AD A136516).

APPENDIX A

DOE and ALPHA Team Points of Contact

DOE and ALPHA Team Points of Contact

* NTS Housing: (702) 295-6921

REECO
P.O. Box 14400
Housing Office (ATTN: Mr. Mel Kistler)
Las Vegas, Nevada 89114

* Reynolds Electrical and Engineering Co. (REECo)
(702) 295-3515

Mr. Earl Forry
REECO
P.O.Box 14400
MS 235
Las Vegas, Nevada 89114

* Property Passes: (702) 295-1068

Mr Alfred T. Neumann
NV Contracts and Property Division
Department of Energy
P.O. Box 14100
Las Vegas, Nevada 89114

* CP-1: (Operations Pass) (702) 295-4015

Mr. Stephen Ronshaugen
Chief, Operations Control Center
CP-1
Nevada Test Site
Mercury, Nevada 89023

* Seneca Alpha Team: AV 489-8207

Commander
Seneca Army Depot
ATTN: SDSSE-NX (Mr. Phil Louvier)
Romulus, New York 14541

* Sierra Alpha Team: AV 830-9404

Commander
Sierra Army Depot
ATTN: SDSSI-DSW (Mr. Don Lane)
Herlong, CA 96113

* Security/Badging: (702) 295-3191

US Department of Energy
Nevada Operations Office
Visitor Control (ATTN: Ms Hilda Sprinkle)
P.O. Box 14100
Las Vegas, Nevada 89114-4100

* Camera Passes: (702) 295-4030

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Chief, Safeguards and Securities Branch
Mail Stop 701
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Mercury, Nevada 89023

* Mercury Theater: (702) 295-4001 (Charles McWilliam)

* Nevada Operations Office: (702) 295-0996

Mr. Layton T. O'Neill
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Las Vegas, Nevada 89114-4100

Mr. Robert M. Nelson, Jr.
Asst Manager for Operations
Nevada Operations Office
P.O. Box 14100
Las Vegas, Nevada 89114-4100

APPENDIX B

Operational Plan

COMBINED RADCON/ALPHA TEAM EXERCISE OPERATIONAL PLAN - 1985

Introduction.

The US Army RADCON Team field training exercise is planned for the period 15-20 September 1985. The exercise will consist of a combination of classroom instruction on various subjects related to radiation measurement and management techniques and actual field entries into radiation contaminated areas to gain practical experience. Field entries will be made at the alpha RADEX area of Area 8 of the Nevada Test Site (NTS) as described in the following paragraphs. Procedures relative to the conduct of field surveys will conform to the operational and safety requirements as outlined in the Army RADCON Team Standard Operating Procedures and Field Manual 3-15, both of which are on file with the Health Physics Division, Nevada Operations Office.

RADCON Team personnel will be joined by Alpha team representatives from Seneca Army Depot and Sierra Army Depot.

15 September 1985:

RADCON Team personnel will depart APG to arrive as a group at Las Vegas the afternoon of 15 September 1985. RADCON instrument cases will be assembled in the baggage claim area of the Las Vegas airport, counted, checked and loaded into the rental van driven by Mr. Markland. The van will be driven to the NV compound for overnight storage. Other team members will claim their personal luggage and rendezvous at the El Morocco Motel, downtown Las Vegas. Exercise leaders, Mr. Jacobson and Mr. Morrissey; exercise coordinators, Mr. Neades and Mr Cullum; Alpha team leaders Mr. Foster (SEAD) and Mr. Cleman (SIAD) will meet with Mr. Rigotti to review this operational plan, and coordinate the following day's activities.

The schedule of events for the next four days follows:

16 September 1985:

TIME	EVENT/RESPONSIBLE INDIVIDUAL	
0700	• Personnel depart Las Vegas to arrive at Visitor Control, Mercury Office by 0900	
0900	• Arrive Visitor Control, Mercury, Nevada	
0900 - 0930	• Badging of personnel	ALL
	• Pick up property passes	Mr. Morrissey Mr. Taylor
	• Pick up camera pass	Mr. Maloney
0930	• Assemble at theater for classroom instruction	ALL
0930 - 0940	• Introductory Remarks	Mr. Rigotti
0940 - 0950	• Exercise Overview	Mr. Jacobson
0950 - 1020	• Air Sampling	Mr. Crisco

1020 - 1030	• ********** Break **********	
1030 - 1130	• Hot Line Procedures/Dress Out Instruction	Mr. Schmoke/et al
1130 - 1200	• Health Physics/Radiation Principles	Mr. Markland
1200 - 1300	• **********Lunch & Check-In**********	
1300 - 1330	• Field Survey Techniques	Mr. Jacobsou
1330 - 1345	• IR Rangefinder/Transit Applications	Mr. Maloney
1345 - 1415	• Lensatic Compassing	Mr. Schall
1415 - 1430	• ********** Break **********	
1430 - 1500	• Sampling Techniques/Analysis	Mr. Saccenti
1500 - 1600	• Instrumentation	Mr. Taylor
1600 - 1630	• Collective Anecdotes	Mr. Morrissey Mr. Crisco Mr. Maloney

17 September 1985

TIME	EVENT/RESPONSIBLE INDIVIDUAL	
0715	• Leave Mercury to arrive at Area 8 0845	
0845	• Pick up Operation Permit at CP-1	Mr. Rigotti
0845	• Arrive at alpha RADEX area, Area 8	
0845 - 0930	Rendezvous with REECO escort at access control gate and receive guidance on how far to proceed with vehicles. • Field Training Site Preparation and Set up	
0930 - 1050	• Practical Instruction, Compass Use - Group A	Mr. Schall Maj. Davis
	• Practical Instruction, Instruments - Group B o Familiarization	Mr. Morrissey Mr. Jacobson
	• Operation	Mr. Taylor Mr. Vogel
	• Standardization	Mr. Taylor
1050 - 1100	• ********** Break **********	

1100 - 1230	• Practical Instruction, Compass Use - Group B	Mr Schall Maj. Davis
	• Practical Instruction, Instruments - Group A o Familiarization	Mr. Morrissey Mr. Jacobson
	• Operation	Mr. Taylor Mr. Vogel
	• Standardization	Mr. Taylor
1230 - 1300	• ********** Lunch **********	
1300 - 1600	• In-Out Survey; Exercise Coordinator:	Mr. Jacobson

• All exercise participants will obtain Anti-C clothing, and masks from the REECO RADSAFE truck in preparation for entry into the hot area. All personnel proceed to a point designated by REECO technician where control operations will be set up. Two hotline facilities will be set up to control entry into and exit from the three contaminated areas. Mr. Schmoke will oversee the hotline operations and ensure that all personnel follow approved procedures.

• Three air samplers will be set up at appropriate locations to monitor airborne contamination levels. Mr. Crisco will supervise the placement and operation of all air sampling equipment.

• Total of six (6) teams conduct simultaneous In-Out surveys of the three adjacent alpha RADEX areas in Area 8. Teams will have been previously constructed from the combined rosters of RADCON, SEAD, and SIAD personnel excluding those individuals designated as "Advisors". Advisors and the respective areas of responsibility are as follows:

Mr. Rigotti - Exercise Leader
Mr. Maloney - Field Operations
Mr. Jacobson - Exercise Coordinator
Mr. Morrissey- Exercise Coordinator
Mr. Taylor - Instrumentation
Mr. Crisco - Air Sampling

• After "Dressing-out", team members will be issued appropriate instruments from Mr. Taylor in preparation for entry of the hot area. Background readings will be taken and recorded prior to entering the contaminated area. Under the direction of Mr. Jacobson, teams will proceed through one of the two hotlines and on to their assigned area. Two "4-man" teams will conduct an "In-Out" survey at each of the three areas. Each team will be responsible for determining the three-times background contour for their respective area which will correspond to approximately one-half of one of the contaminated sites.It is expected that each team will be in the field for no more than 2 hours. Teams will pass back through the hot-line upon completion of operations in the hot area. Upon exiting the hot area, teams will finalize their notes and transfer their notes and data onto maps which they will provide to the exercise coordinator for consolidation and eventual inclusion in the final report.

18 September 1985

TIME	EVENT/RESPONSIBLE INDIVIDUAL	
0715	• Leave Mercury to arrive at Area 8 0845	
0845 - 1145	• Contour Survey; Exercise Coordinator:	Mr. Morrissey

• Exercise participants will conduct a contour survey under the direction of Mr. Morrissey. Surveys will be conducted according to the same general procedures and guidelines for the previous day's operations. Teams will be constructed from the personnel roster excluding those individuals, previously designated as advisors. Following a briefing of the team leaders by Mr. Morrissey, teams will "dress-out" and be issued instruments from Mr. Taylor. After taking the required background readings, teams will negotiate one of the two hot lines and proceed to their assigned area where they will establish the three-times background and ten-times background contours. Again, each "4-man" team will be responsible for one half of one contaminated site and is expected to be in the hot area for a maximum of two hours. Upon completion of operations in the hot area teams will return to the hot line to be checked for contamination and if necessary, decontaminated.

• After passing through the hot line and after an appropriate rest period, teams will finalize their notes and data sheets and transcribe pertinent information onto maps which they will provide to the exercise coordinator, Mr. Morrissey.

1145 - 1315	• Return to Mercury	
1315 - 1345	• ********** Lunch **********	
1345	• Assemble at Mercury theater	ALL
1345 - 1600	• Mid-exercise critique and requisite training	Mr. Rigotti Mr. Jacobson Mr. Morrissey
	• Planning of following days activities	
	• Drafting of exercise report	Saccenti Roach Maloney Kammerer

19 September 1985

TIME	EVENT/RESPONSIBLE INDIVIDUAL	
0715	• Depart Mercury to arrive at Area 8 0845	
0845 - 1145	• In-Out Survey; Exercise Coordinators:	Mr. Jacobson Mr Morrissey
	• Details of this survey will be formulated at the critique session on the afternoon of 18 September and will be based on deficiencies or problem areas noted at that time. Team will be made up from the same participant pool but with newer, less experienced personnel acting as team leaders.	
1145	• Final critique and debrief	Mr. Jacobson Mr. Morrissey
1215	• Return to Mercury	ALL
1345	• Pack, Check-out and Departure for Las Vegas	ALL

APPENDIX C

Exercise Equipment List

RADCON/ALPHA TEAM INSTRUMENTATION PACKAGES

CASE NO.	INSTRUMENT	SERIAL NO.
1	BARK-FIDLER	21754
2	BARK-FIDLER	21756
3	BARK-FIDLER	21757
4	BARK-FIDLER	21759
5	BARK-FIDLER	21761
6	BARK-FIDLER	21763
7	BARK-FIDLER	21765
8	BARK-FIDLER	21768
9	Ludlum Model 3 Kit	20170
10	Ludlum Model 3 Kit	20174
11	Ludlum Model 3 Kit	20193
12	Ludlum Model 3 Kit	20197
13	Ludlum Model 3 Kit	20250
14	Ludlum Model 3 Kit	20243
15	Ludlum Model 3 Kit	19398
16	Ludlum Model 3 Kit	20240
17	Ludlum Model 19 (micro-R) 3ea.	37377,37380,37423
17	Eberline PRM-7 (micro-R)	261
18	Ludlum Model 19 (micro-R) 4ea.	16922,16921,16936,37449
19	Eberline PAC-1SAGA (AN/PDR-60)	1648
20	Eberline PAC-1SAGA (AN/PDR-60)	150
21	Eberline PAC-1SAGA (AN/PDR-60)	738
22	Eberline PAC-1SAGA (AN/PDR-60)	727
23	Eberline PAC-1SAGA (AN/PDR-60)	735
24	Eberline PAC-1SAGA (AN/PDR-60)	741
25	Eberline PAC-1SAGA (AN/PDR-60)	739
26	Eberline PAC-1SAGA (AN/PDR-60)	710
31	Huge Rod	No Serial No.
32	Tiny Rod	No Serial No.
33	Administrative Supplies (misc)	No Serial No.
35	Administrative Supplies (Masks)	No Serial No.
38	Theodolite, Eagle 60	532383
39	Transit, Engineer, Paragon, Model 74-0006	521851
40	Range Finder, Auto Ranger II	06C2702
41	Tripod-Theodolite	No Serial No.
42	Tripod-Transit	No Serial No.
60	Footlocker, Air Samplers	No Serial No.
61	Footlocker, Administrative	No Serial No.
62	Footlocker, Markland (HPO)	No Serial No.
SEAD Case	Ludlum Model 3 Kit	34704
SEAD Case	Ludlum Model 3 Kit	34743
SEAD Case	Ludlum Model 3 Kit	34668
SEAD Case	Ludlum Model 3 Kit	34700
SEAD Case	Ludlum Model 2220	34782
SEAD Case	Ludlum Model 2220	31961

APPENDIX D

Exercise Critique - SEAD

DEPARTMENT OF THE ARMY
SENECA ARMY DEPOT
ROMULUS, NEW YORK 14541-5001

REPLY TO ATTENTION OF

SDSSE-N

15 OCT 1985

SUBJECT: Critique of Combined RADCON/Alpha Team Exercise
Sep 16-29 1985 - Nevada Test Site

Commander
U.S. Army Ballistic Research Laboratory
ATTN: AMSMC-BLV-R(A) Mr. Rigotti
Aberdeen Proving Ground, MD 21005

1. All personnel who have attended the joint exercises have expressed positive comments about the use of the Nevada Test Site. The use of this site has allowed each individual to experience first hand the readings normally obtained after a true accident.

2. Many minor comments were received in regard to the use of FM3-15. We understand that a revised FM will soon be available along with an AMC directive for this type operation. The departure from FM3-15 standards experienced during this particular exercise should be incorporated in the new revision.

3. Each exercise should use standard equipment currently on hand with each depot Alpha Team. Variations of instrument calibration and subsequent use should mirror that of the depots for initial monitoring and plotting. If the RADCON Team prefers to obtain readings with a particular instrument and probe, maybe each depot should obtain the initial reading using the same instrument set-up. This will assure an even greater understanding when passing readings to the arriving RADCON Team after an incident.

4. Team leaders during each field entry should be the most qualified. Generally the depot personnel have the greatest level of experience in this area due to the large number of inspections and quarterly exercises experienced each year. The use of this group of personnel both in the joint exercises and possible use during an accident will assure the best qualified individual accomplishes this task. Of course, a RADCON Team member will be necessary to evaluate any readings obtained.

SDSSE-N
SUBJECT: Critique of Combined RADCON/Alpha Team Exercise
Sep 16-19 1985 - Nevada Test Site

5. Working together each year has greatly heightened the understanding and working relationship of all teams involved. Continuation of this type of joint exercise will continue to enhance this working relationship.

FOR THE COMMANDER:

JOHN F. OWEN
LTC, OD
Director of Special Weapons

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