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OPERATION "HURRICANE"-TRIAL ORDERS
ORDER NO. 266 - TRAINING

For use with Documents with Protective Markings up to and including

W. 0048.

14 Sept 52

Note. Dates of orders.

Some reissued with alterations at a later date.

CONFIDENTIAL

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 266 - Training

APPENDIX A

Group I

1. The following lectures will be given to all personnel:-

(a) Principles and description of an atomic explosion

To include a general pictorial description of the structure of matter and the fission process and the division of available energy into blast and the various types of radiation.

(b) The Physical effects of an atomic explosion

To include the effects of air blast, ground and underwater shock, and heat.

(c) Radiological Hazards from an atomic weapon

To deal in some detail with the various hazards, the general effects of radiation and the means of protection.

(d) Radiological Hazards - Operation Hurricane

To deal in some detail with the specific radiation safety arrangements for the operation.

Note. This lecture is for personnel who have special duties in Phase III of the operation and is not to be attended by other personnel.

(e) The detection and measurement of nuclear radiations

To cover the principles of measurement and their application in the various measuring devices - particularly those being used for "Hurricane": no electronic detail.

(f) The effect of atomic weapons on warship design

2. Suitable films for showing with each lecture are available in CAMPANIA. These films will be shown in other ships if circumstances permit.

18th June, 1952.



[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 270 - Phase III Outline Plan

Introduction

1. At H-hour, when Phase III commences, all ships will be in positions at least ten miles south of the Target Vessel. Immediately after the explosion the Health Control vessel, ~~followed by the other H.C.V.s.~~, will close in to a position from which contamination surveys can be launched where the party from H1 can be recovered and control of entry and exit, for the purpose of recovery of records and for salvage, can be exercised.

Control of Re-entry

2. From H-hour onwards entry to and exit from the area of the islands will be completely controlled by the Health Control vessel until such time as a clear division can be made between clean and dirty areas. The Health Control Vessel will then control entry into dirty areas only and entry into clean areas will be unrestricted.

Contamination Survey

3. The object of contamination survey will be to determine the degree and extent of contamination and its variations due to movement of air or water and the decay of radioactivity. A contamination plot will be built up and maintained in the H.C.V.

4. Telemetred Survey. The readings of a number of radiation dose-rate meters at selected sites ashore will be telemetred to the Health Control Vessel. These readings will give the first indication of the extent of contamination.

5. Water Survey. Water survey will locate and track the limits of contaminated water and establish the cleanest routes to recovery areas.

6. Helicopter Survey. Helicopters will be employed with two main purposes:-

(a) To make an initial survey of the general limits of contamination.

(b) To survey those areas which because of their distance from the Health Control Vessel cannot be surveyed by boats.

7. Land Survey. A land survey will be carried out as soon as possible to confirm the telemetred information, to locate the positions of certain isodose lines onshore and to establish boundaries between clean and dirty areas.

Recovery of Records

8. Time of Recovery. The time at which any individual record will be recovered depends on:-

(a) The scientific importance of the record.

(b) Any time limit within which the record should be recovered.

(c) The dose rate on the route to and at the site of the record.

9. Priority for Recovery. A general priority for recovery of records will be laid down in advance but it will not be possible to determine the precise order of recovery until the degree and extent of contamination is known.
10. Daily Programme of Recovery. From the contamination plot it will be possible to forecast at what time the various recovery sites may be visited within the limits of radiation dosage permitted for the record concerned. These forecasts which will be made daily, will be the basis on which the next day's recovery programme will be planned.
11. Recovery Teams. The Teams employed to recover records will be organised by the naval, or scientific group concerned. The Technical Director will co-ordinate the work of recovery teams in order to avoid duplication of effort.
12. Health Escorts. All recovery teams entering a contaminated area will be accompanied by a radiological surveyor who will have complete and overriding authority over the movements and activities of the team as far as radiological safety is concerned.

Salvage

13. As much equipment as possible will be salvaged in the time available. As a matter of principle, no equipment which, in itself, constitutes a scientific record will be left at the site. The detailed application of this policy will depend on conditions at the time, and equipment which cannot be removed will be demolished.
14. Salvage will not commence until boats can be spared from the more important task of recovery of records.
15. Equipment in dirty areas will be salvaged only if radiological conditions permit and if there is reasonable hope of successful decontamination. As in the case of recovery teams, all salvage teams entering a contaminated area will be accompanied by a radiological surveyor.

[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 271. - Control of Re-Entry

1. From H-Hour onwards entry into and exit from the area of the islands must be controlled. To achieve this control all personnel proceeding into the area and all personnel returning from the area are to pass through the Health Control Vessel.
2. The duties and responsibilities of the Health Control Vessel are divided between the Commanding Officer, H.M.S. TRACKER, (referred to hereafter as TRACKER) and the Officer-in-Charge of the Radiological Health Group (referred to hereafter as Health Control).
3. Health Control. Health Control is responsible for:-
 - (a) Briefing radiological surveyors and Health escorts in their duties and all re-entry parties and boats crews in radiological conditions at and en route to the sites they are visiting.
 - (b) Providing Health Escorts for all re-entry teams.
 - (c) Providing protective clothing and personal monitoring devices to all personnel.
 - (d) Providing radiological instruments to surveyors and escorts.
 - (e) Decontaminating all personnel, records and equipment on return.
4. TRACKER. TRACKER is responsible for:-
 - (a) Briefing boats crews in navigational hazards.
 - (b) Controlling all boats allocated to the Health Control Vessel.
 - (c) Supervision of the Dirty Boat Trot and securing dirty boats.
 - (d) Maintenance of boats allocated to the Health Control Vessel.
 - (e) Decontamination of boats.
5. Entry into clean areas, when established and promulgated, will be unrestricted and will not be subject to the orders above.

30th April, 1952.

[REDACTED]

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OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 272 - Contamination Survey

1. A complete contamination survey of the islands and the surrounding water is to be carried out by Health Control as soon as possible after H-Hour with a view to establishing the degree and extent of contamination.

Permissible Dosage

2. Personnel employed on the various forms of contamination survey will be employed continuously and are therefore not to be exposed to radiation intensities in excess of the "Normal working rate".

Water Survey

3. The task of water survey is:-

- (a) to establish the limits of contaminated water and to follow their subsequent movements due to tide and diffusion.
- (b) to establish and follow the tolerance line. This is defined as that line outside which the radiation intensity does not exceed the "Normal Working Rate".

4. Water survey is to be launched as soon as possible after arrival of the Health Control Vessel at its pre-arranged position East of H.1.

5. Three boats are to be allocated to Health Control for this task on the basis of:-

- (a) Two to survey the central channel.
- (b) One to survey waters to the east of Trimouille.

6. Initially, three further boats are to stand by as rescue craft and reliefs for the first flight until conditions are such as to warrant their release.

7. Each boat employed on water survey is to be in the charge of a naval executive officer who is to be responsible for the navigational safety of the boat. The technical conduct of the survey is to be the responsibility of the senior radiological surveyor in the boat, who will be responsible that the "Normal Working Rate" is not exceeded.

8. If available, helicopters are to be allocated for the initial coverage of areas to the North which will be beyond the range of boats.

Land Survey

9. The first indication of the extent of contamination will be obtained from Fixed Monitoring Instruments ashore, the readings of these instruments being telemetered to the Health Control Vessel.

Order No. 272 (contd.)

10. The task of land survey is:-

- (a) To confirm the telemetred information
- (b) To establish the absolute limits of contamination ashore i.e. to establish the precise boundaries between clean and dirty areas.
- (c) To establish the tolerance line. This line is defined as that outside which the radiation intensity does not exceed the "Normal Working Rate".

11. Land Survey parties are to be put ashore as early as possible subject to radiological conditions.

12. On D-Day, two boats are to be allocated for the use of land survey parties. Subsequently allocation is to be on a day to day basis and requirements are to be co-ordinated as far as possible with those of recovery parties.

13. If available, helicopters are to be allocated for a general survey of Trimouille at an early stage.

Contamination Plot

14. A plot of the information obtained from the above surveys is to be built up and maintained by Health Control.

15. Health Control is to pass the following reports, based on this plot, to the Naval Commander:-

- (a) At 1200 and 1800 daily a situation report together with an up-to-date radiation intensity trace.
- (b) At 1800 daily (at Force Commander's conference):-
 - (i) A forecast of the position of the tolerance line at 0800 hours the next day.
 - (ii) A forecast of the integrated dose likely to be received by parties visiting sites for the recovery of category A and B records (H.T.O. No. 273).

30th April, 1952.

[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

PHASE III - RE-ENTRY

Order No. 273 - Recovery of Records

Introduction

The recovery of scientific records is the primary object of re-entry and, Radiological conditions permitting, is to be completed by D + 14 days.

General Priorities

2. For purposes of recovery all records are to be classified as follows:-
- A Those in which a time factor, such as decay of radioactivity or deterioration of film, is involved and whose value justifies the Higher Integrated Dose (H.T.O.160) to personnel.
 - B Those in which a time factor is involved but whose value does not justify a dosage in excess of the Lower Integrated Dose (H.T.O.160).
 - C Those in which no time factor is involved and which can be left until the dosage likely to be received does not exceed the Normal Working Rate. (H.T.O. 160).

This classification will provide the basis of priorities on which the detailed recovery programme is to be worked out, once radiological conditions are known.

Detailed Programme

3. Recovery of records, with the exception of those described at para. 7 below, is to commence on the morning of D + 1.
4. A conference will be held in CAMPANIA at 1800 daily commencing on D-Day, to decide the programme for the following day. The programme will be based on the detailed forecasts of radiological conditions submitted by Health Control (See H.T.O. 272 para. 15).

Recovery Teams

5. The teams employed to recover records are to be organised and provided by the Scientific Group concerned. The daily recovery programme will be co-ordinated by the Technical Director to ensure that the number of people visiting one site is kept to a minimum.

Collection of Special Samples

6. The only exception to the order at para. 4 above will be the collection of special samples for radiochemical analysis, which are to be collected as soon as possible on D day.
7. Recovery parties (two boats, one helicopter) for these samples are to stand by at immediate notice from H + 1 hr.
8. Orders to proceed will be given by the Force Commander as soon as the telemetered information as reported by Health Control shows a reasonable chance of success. In the event of failure of the telemetry system, parties are to proceed under escort by boats of Water Survey. (See H.T.O. 272).

/Control

[REDACTED]

Control of Re-entry

9. All recovery parties will be subject to the general regulations for entry to and exit from contaminated areas laid down in H.T.O. 271.

10. Routes

- (a) The routes to be taken are those which involve the least radiation exposure to personnel, subject to navigational feasibility. They are to be laid down by Health Control in consultation with TRACKER.
- (b) Wherever possible parties are to be landed at the piers and will then proceed overland to sites. In many cases radiological conditions will not permit this and landing will be carried out at the nearest suitable beach.

11. Health Escorts

- (a) As laid down in H.T.O. No. 271, Health Escorts are to be provided by Health Control on a scale of one per independent party.
- (b) They will have complete and overriding authority over their parties in all matters of radiological safety.
- (c) They are to be responsible:-
 - (i) that parties do not exceed the dosage level laid down for them,
 - (ii) that the route followed is the safest possible within the limits laid down by Health Control,
 - (iii) that all radiological safety rules are obeyed (See H.T.O.276).
 - (iv) for maintaining wireless communication with Health Control, (See H.T.O. 1041).
- (d) In the event of any delay in the recovery of a record such that, in order to complete their task, the party would receive a radiation dosage in excess of that laid down, the Health Escort will ask for instructions from Health Control. Health Control is authorised to sanction increased dosages up to the Lower Integrated Dose: authority for dosages in excess of this figure can only be given by the Force Commander.

12. Contaminated records

- (a) All records brought out of a contaminated area are to be decontaminated by Health Control.
- (b) Records which cannot be decontaminated are as far as possible to be analysed on the spot and then destroyed. If they are required for further study they are to be sealed in a suitable container by Health Control and certified safe for return to laboratories in the U.K.

13. Recovery from clean areas

See H.T.O. 278.

[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 274. - Salvage of Equipment

General

As much equipment as possible is to be salvaged subject to

- (a) Time and effort available.
- (b) Radiological conditions.

2. No equipment in contaminated areas is to be salvaged unless there is a reasonable hope of successful decontamination.

3. As far as possible no equipment is to be abandoned on site which might reveal classified information in the event of its falling into the hands of an unauthorised person. If it cannot be moved it is to be demolished.

Radiation Exposure

4. In general, no equipment is to be salvaged until the radiation dose-rate in the area concerned has fallen below the Normal Working Rate.

5. Authority to salvage equipment from areas of higher dose rate can be given by Health Control provided that the total integrated dose to personnel in any one day does not exceed a full day's dose at the Normal Working Rate.

6. In exceptional cases and in order to conform to the requirements of para. 3 above, the Force Commander may grant permission for higher exposures, each case being considered on its merits.

Programme

7. Salvage of equipment is to begin as soon as boats can be spared from the more important task of recovery of records (at approx, D + 14 days) and will end at D + 28 days unless otherwise ordered by the Force Commander.

8. Priorities will be decided by the Technical Director.

9. The detailed programme cannot be planned in advance. A conference will be held at 1800 daily to decide the programme for the following day, based on Health Control forecasts of radiological conditions (See H.T.O. No. 271).

Control of Re-entry

10. Salvage parties will be subject to the regulations for entry to and exit from contaminated areas laid down in H.T.O. No. 272 (Control of Re-entry) and in paras. 10, 11 and 12 of H.T.O. No. 273 (Recovery of Records).

Decontamination

11. All salvaged equipment is to be handed over for decontamination to Health Control.

[REDACTED]

Order No. 274 (contd.)

12. Decontamination is to be carried out as far as possible on the H.C.V. Health Control is to be prepared to establish a decontamination centre ashore to deal with equipment which cannot be handled on the H.C.V. The material requirements of this centre are to be provided by C.R.E.
13. Additional labour as required by Health Control is to be provided by the scientific teams concerned.
14. The final decision whether a particular item has been successfully decontaminated is to rest with Health Control.

Disposal

15. Equipment which has been successfully decontaminated is to be held by Health Control pending instructions from the Technical Director.
16. Equipment which cannot be successfully decontaminated will be disposed of by sea dumping at sites to be ordered by the Force Commander. Health Control is to ensure that such equipment:-
- (a) is safe to handle.
 - (b) will sink.

16. Particularly valuable equipment which cannot be successfully decontaminated with the facilities and time available but which, in the opinion of Health Control, could be dealt with successfully under laboratory conditions, is to be placed in sealed containers and returned to the U.K. under special arrangements.

Recovery from clean areas

17. Sec.H.T.O. No. 278.

Abandoned equipment

18. A full record is to be made of all equipment finally abandoned on site and the necessary write-off action will be taken by the Technical Director.

30th April, 1952.

[REDACTED]

[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 281 - Employment of Helicopters

TASKS

1. The following tasks are to be carried out by Helicopters:
 - (a) Collection of a special water sample for radio chemical analysis.
 - (b) Radiation surveys at places and distances which cannot be covered by other methods of survey.

RADIATION DOSAGE

2. The task given in (a) above is a Category A task as defined in H.T.O. 273 para 2, i.e. personnel involved are permitted to receive up to the Higher Integrated Dose.
3. Task (b) is to be carried out under the same conditions as other surveys i.e. the normal working rate is not to be exceeded. In addition, no crew which has received an integrated dose of 5R or more during task (a) is to be employed on task (b) except that such a crew may be employed on air sea rescue duties.

COLLECTION OF SPECIAL SAMPLE

4. Two helicopters are to be at immediate notice for this task from H + 1 hour. Both helicopters are to be fitted to collect this special sample and to carry out air sea rescue duties.
5. The order to proceed will be given by the Naval Commander.
6. One Helicopter is to proceed to a position five miles up wind of the burst, keeping well clear of the contaminated area, and then proceed directly towards ground zero until the measured radiation dose rate at an altitude of 30 feet is ¹⁴Roentgen/hour. At this point the sample is to be collected and the helicopter is to rise until the measured dose rate is negligible (at least 1000 feet). The helicopter is to withdraw along the original route of entry.
7. If a reading of ¹⁴Roentgen/hour has not been obtained by the time ground zero is reached, a sample is to be collected in the position where the highest dose rate was obtained during the fly-in.
8. The Helicopter is NOT to fly down wind of ground zero.
9. The Second Helicopter is to fly in along the same route as the first helicopter but is to maintain a height such that the dose rate does not exceed 0.1 Roentgen/day. It is to keep in the vicinity of the first helicopter and be prepared at all times to carry out air sea rescue duties.

26th May, 1952. [REDACTED]

[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 281 - Employment of Helicopters

16. Height Survey. contd.

(whichever distance is the greater) until the measured Dose Rate is 0.1 Roentgen/day. Height is then to be adjusted to maintain a Dose Rate of 0.1 Roentgen/day until Ground Zero is reached. The procedure may be reversed moving out from G.Z.

- (c) A record is to be kept of heights at various ranges from G.Z. on each bearing. This record is to be despatched to Health Control as soon as the Helicopter has landed.

17. Dunking Survey. Helicopters are required to hover in a series of nominated positions and lower the probe of Dose-Rate meter into the water to obtain radiation intensities. The length of cable on the probe is 20 feet. The positions or areas to be covered by dunking survey will be stated at the time the survey is required.

18. Times of Surveys. The first height survey is to be carried out P.M. on "D" Day. The order to proceed will be issued by the Naval Commander. Subsequent surveys, as required by Health Control, will be arranged at the Force Commander's evening conference. It is probable that for three or four days after "D" Day height Surveys will be required and subsequently, dunking surveys.

19. Protection of Personnel. Crews are to carry personal monitoring devices and wear protective clothing as laid down in H.T.O. 276.

20. Instruments. Helicopters are to carry the following instruments which are to be supplied by Health Control:-

Monitor 1092 C
Monitor 1193 A
Monitor 1155 A

[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 283 - Shore Camps Required in Phase III.

1. Two camps will be required on Hermite during Phase III, one for Ministry of Supply personnel and one for Service personnel.

Ministry of Supply Camp.

2. Up to 45 Ministry of Supply personnel will require to be accommodated. The camp established at H.1 for Ministry of Supply personnel during Phase II is to be re-established during Phase III as soon as the area is declared clean.

3. The camp staff, including a camp commandant who will be accommodated at H.2, is to be provided by H.M.S. CAMPANIA and should be of the same order as that provided for H.1 camp during the Stand-by Period.

Service Camp.

4. This camp is to be developed from the Army camp at H.2 as soon as the area is declared clean. It is required to accommodate a maximum of about 145 officers and men made up as follows:-

Royal Engineers

1 Major	In command.
2 officers	Troop and Plant duties.
1 W.O.2	Camp duties.
10	Pool working party.
4	T.C. working party.
4	O.P. working party.
2	Storemen.
20	Equipment and Transport drivers.
3	Communications.
9	Generators.
6	Galley staff (1 Cook and 5 galley hands).
1	Batman.

Royal Marines

1 officer	} In charge
1 N.C.O.	
44	landing craft.
	Landing craft crews.

Royal Navy

1 C.P.O.	Naval Regulating duties at both camps.
2 P.O.s or L.S. }	Pool working party from CAMPANIA.
24	
1 Ldg Cook (S)	From CAMPANIA (Ex PLYM).
1 Ldg Cook (O)	From CAMPANIA (Ex PLYM).
1 Cook (O)	From CAMPANIA.
1 Cook (S)	From TRACKER (Ex PLYM).
1 Steward	From CAMPANIA.
1 L.S.A.(V)	From ZEEBRUGGE.
2 N.A.A.F.I. staff	See paragraph 13.

Note. The above numbers include about 8 Chief or Petty Officers or equivalent other ranks.

11th September, 1952

5./.....

[REDACTED]

[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 1101 - Medical Arrangements for Dealing with Radiological Hazards.

Blood Counts.

1. Everyone who may be exposed to radiation in excess of the normal working rate is to have a total and differential white count done between the beginning of September 1952 and the time of possible exposure.
2. Anyone whose records show that he has been exposed to radiation to the extent of more than 10 roentgens in all, or more than 5 roentgens in any one week, is to have the counts repeated.

Exposure Records.

3. These are to be worked out by Health Control and copies of the figures obtained are to be sent daily to the Naval Commander, Technical Director, Safety Advisor and Staff Medical Officer.
4. At the end of the Operation the total exposure is to be recorded in each person's medical history document, and for Naval and Army personnel, in his pay book as well.
5. In the case of Naval and Army personnel the Naval Commander will forward exposure records to Commanding Officers as appropriate. Commanding Officers are responsible for the action in paragraph 4 above and for ensuring that individuals have access to their exposure record should they wish to see it.
6. The Technical Director will make arrangements for recording radiation exposure of Ministry of Supply personnel.

Disposal of Potentially Contaminated Casualties.

7. If an injury is trivial the patient is to be sent to the Health Ship in the ordinary way for decontamination. The Health Ship is to deal with minor surgery in such cases.
8. If the injury is more serious the Health Escort with the party is to communicate with the Health Ship by voice wave and ask for instructions. If necessary a Medical Officer will be sent to see the patient and advise about his disposal. An extra Medical Officer is borne in the Health Ship for this purpose.
9. If the injury is such that the patient will need to be kept in bed he is to be sent straight to CAMPANIA for treatment. His clothing will be disposed of as contaminated and any residual contamination on his body is likely to be of little importance compared with his surgical condition. Decontamination will be postponed but any danger to those treating him can safely be ignored.

Transport of Medical Officer and Patient.

10. This will be decided for each case according to circumstances. The normal method will be by land rover and boat but helicopters may be used in an emergency if the situation is suitable.

14th September, 1952.

11./.....

[REDACTED]

[REDACTED]

OPERATION "HURRICANE" - TRIAL ORDERS

Order No. 1101 - Medical Arrangements for Dealing with Radiological Hazards. (Contd.).

Responsibilities of the Health Ship Medical Officer.

11. The Senior Medical Officer in the Health Ship is responsible for the medical supervision of all who pass through the special compartments on their way to or from contaminated areas.
12. He (or his deputy) is to arrange to inspect all such persons for minor abrasions before they go ashore and when they return.
13. When a casualty is reported by a shore party, the Senior Medical Officer will decide, in consultation with Health Control, whether to send a Medical Officer to take charge, or whether to direct that simple first aid should be given and the patient sent back to the Health Ship for treatment.
14. He is to examine daily the records of the radiation dose received by all personnel, and advise Health Control on Medical aspects.

14th September, 1952.

[REDACTED]