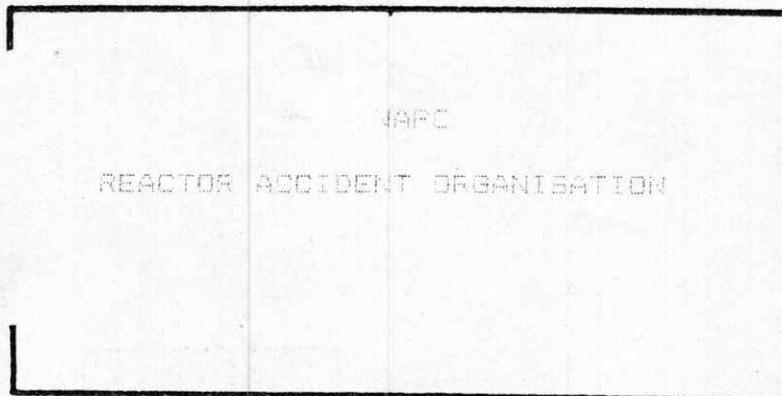


ROYAL NAVAL COLLEGE  
GREENWICH



DEPARTMENT  
OF  
NUCLEAR SCIENCE AND TECHNOLOGY

UK RESTRICTED

NAPC

REACTOR ACCIDENT ORGANISATION

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1. NUCLEAR REACTOR SAFETY ORGANISATION

1.1 Because of the complexity and interdependence of nuclear submarine systems and the serious consequences of any accident, much emphasis has been put on the nuclear safety of all aspects of manufacture, repair and operation.

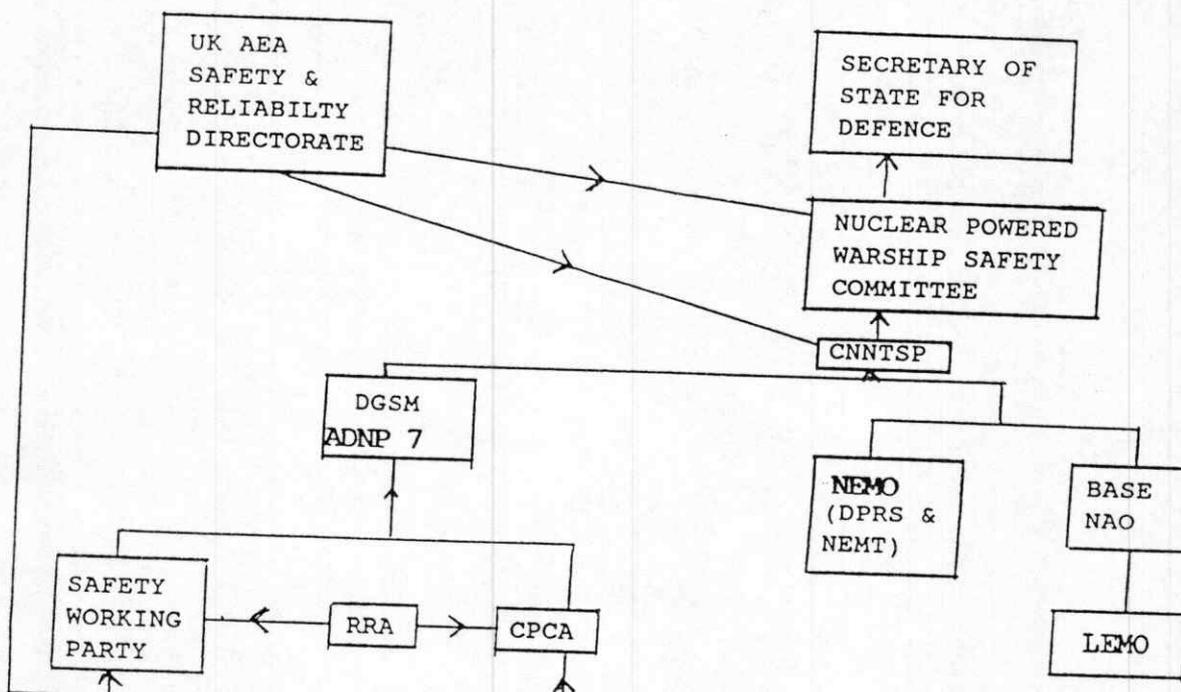


FIG 1.1: ORGANISATION FOR THE SAFE OPERATION OF NUCLEAR POWER PLANTS

1.2 Secretary of State for Defence

The Secretary of State for Defence authorises the operation of naval nuclear propulsion plants. In granting such authorisations he requires that the plants will be operated with at least as high a regard for safety standards as any other nuclear facility in the United Kingdom.

1.3 Nuclear Powered Warships Safety Committee (NPWSC)

NPWSC is an independent, high level committee composed of senior representatives from MOD, UKAEA, Department of Trade, DHSS, Medical Research Council, MAFF etc which reports directly to the Secretary of State for Defence on any aspects of nuclear warship safety which they feel to be important. There are certain issues on which they must be consulted, one of which is the licencing of X and Z berths.

1.4 Chairman Naval Nuclear Technical Safety Panel (CNNTSP)

The focal point of the safety organisation, CNNTSP is responsible for ensuring that all nuclear propulsion technical matters are fully considered by all the appropriate authorities.

The Panel consists of the Chairman, his Deputy and his Assistant together with representatives from other authorities, divisions or establishments as required, depending on the particular expertise or experience required at that particular time. CNNTSP is concerned with:

- a. Advice to the Admiralty Board.
- b. The setting and promulgation of standards in nuclear safety and radiological protection.
- c. The regular auditing of nuclear establishments and bases.
- d. Advising MOD Departments on:

Radiological protection, the transport and stowage of radioactive material, radioactive material, berth clearance, emergency and accident organisation.

1.5 Director General Submarines (DGSM) is responsible to the Controller of the Navy for the safe design, procurement and support of the naval nuclear propulsion programme. His nuclear safety responsibilities are delegated to the Director of Nuclear Propulsion (DNP).

Central Plant Control Authority (CPCA) is tasked with issuing clear and unequivocal instructions to all those concerned with the operation, maintenance, refuelling and repair of nuclear powered submarines and the Shore Prototype. CPCA is headed by the Director Nuclear Propulsion and its principal spokesman is the Assistant Director Nuclear Propulsion (ADNP 7).

Rolls Royce and Associates (RR&A) are the Delegated Design Authority co-ordinating design and safety reports which include hazard surveys covering both risks and consequence.

1.6 Safety and Reliability Directorate of UKAEA (SRD)

SRD are employed by MOD to act as independent assessors of the safety of the naval nuclear plant. SRD performs this task by critically examining the Safety Justification. (This is an analytical demonstration that the risks associated with the operation are tolerable.

A Site Liaison Officer is provided at each Nuclear Dockyard; his task is to both monitor and advise the refitting authority on all aspects of nuclear safety which might arise during refit and commissioning of naval reactor plants.

It should be noted that SRD can, if they feel their advice is not being heeded, represent their views at a very high level.

1.7 Safety Working Party

Advises MOD(N) on nuclear safety aspects of all submarine nuclear propulsion plants. It is made up of representatives from DNP, RR&A, SRD and Vickers, is chaired by ADNP 7 and meets at frequent intervals.

This working party therefore provides a means of bringing together all the interested parties to resolve by discussion on any difference of opinion on nuclear safety matters.

## 2. LOCAL NUCLEAR ACCIDENT RESPONSE ORGANISATION

### 2.1 Introduction:

The Nuclear Accident Response Organisation (NARO) set up to deal with the consequences of a nuclear reactor accident is large and complex and comprises Naval and Local Authority elements. The Organisation is of vital importance because, if successful it can reduce the effects of such an accident by a very large factor but an unsuccessful organisation can sow uncertainty and doubt which may well magnify consequences out of all proportion.

### 2.2 Categories of Submarine Berths

Before a berth can be used by nuclear submarines approval has to be given by the Nuclear Powered Warships Safety Committee (NPWSC). They are categorised X or Z depending on whether they will be used for building, refitting, repairing or for operational, rest and recreational purposes.

#### 2.2.1 X Berths

Submarine berths where there is a local, resident Naval Command and full nuclear facilities are, with the approval of NPWSC designated X Berths eg certain berths at Devonport, Rosyth, Faslane and Barrow. Note that it is only specific berths that are designated, not the Base as a whole. The organisation described in the following sections is appropriate to an X Berth.

#### 2.2.2 Z Berths

Certain berths where there are no nuclear facilities, though there may or may not be a resident Naval Command are, with the approval of the NPWSC designated Z Berths and nuclear powered submarines are allowed to use them for limited periods eg Portsmouth, Portland, Barry, Liverpool.

## 2.3 SAFETY ORDERS

At an X Berths, and at Z Berths where there is a resident Naval Command, full details of the Nuclear Accident Organisation and the plans to deal with a submarine reactor accident emergency are dealt with in two sets of Orders.

### 2.3.1 Nuclear Safety Orders (NUSAFE)

Drawn up for each individual base by the local Naval Command, they lay down in considerable detail actions to be taken within the base area. The orders give not only actions but names and telephone numbers.

### 2.3.2 Public Safety Scheme (PUBSAFE)

The local Naval Command and the Local Authority form a Local Liaison Committee which prepares a Public Safety Scheme (Pubsafe) laying down contingency plans for the protection of the public outside the base area. The Scheme deals with such items as evacuation, and the distribution of potassium iodate tablets, it also gives names and telephone numbers.

3. NUCLEAR ACCIDENT ORGANISATION STRUCTURE

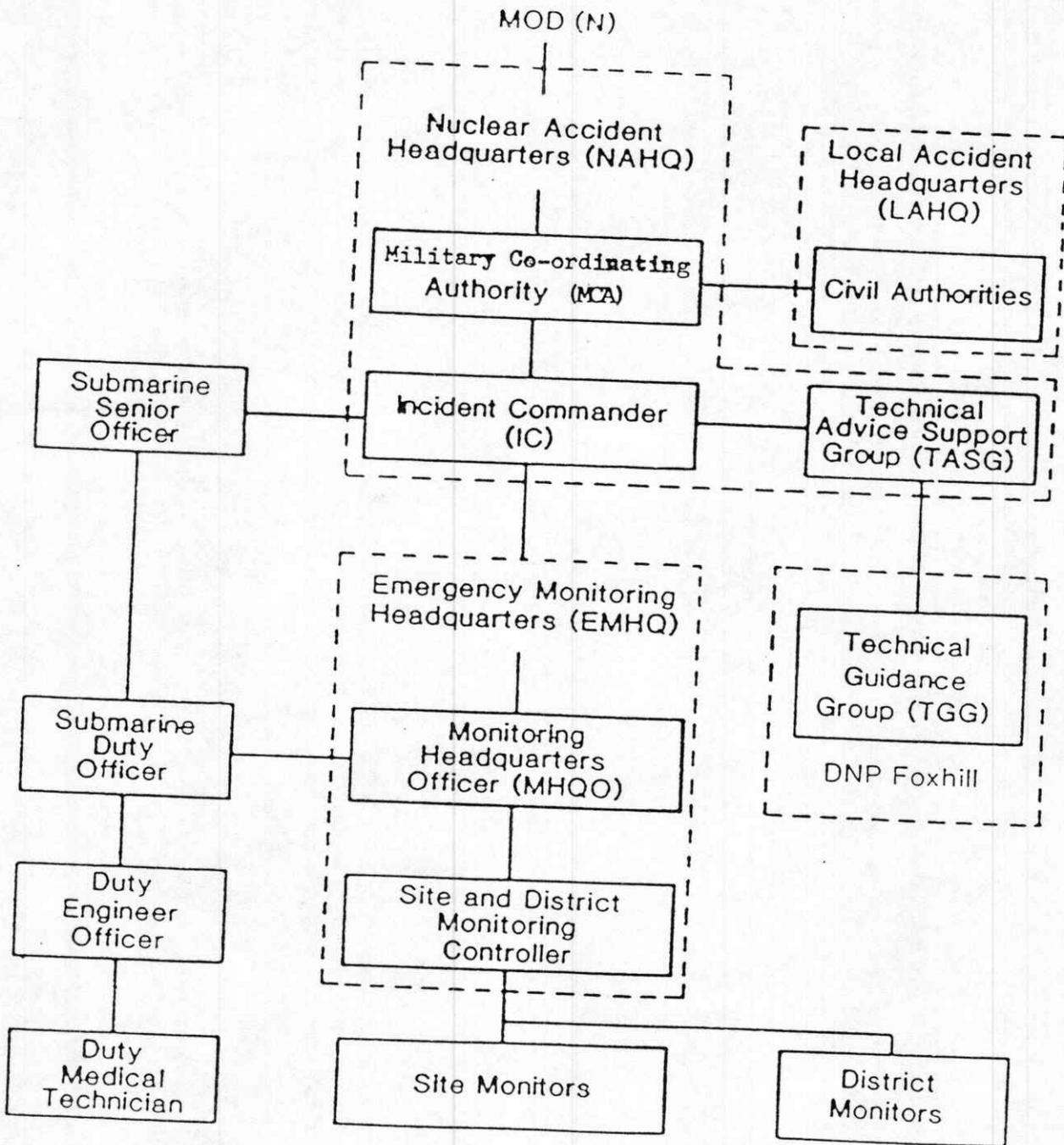


FIG 3.1: NUCLEAR ACCIDENT ORGANISATION WHERE A FULL SCALE NAVAL COMMAND EXISTS

4. FUNCTIONS OF KEY ELEMENTS OF ORGANISATION4.1 INCIDENT COMMANDER (IC)

The incident Commander (IC) is responsible for putting NUSAFE Orders into effect. The Captain of the Port is usually nominated for this duty though to cope with a long drawn out emergency, others are nominated to relieve him. The incident Commander in an X berth is closely advised by the Chief Staff Officer (Nuclear) (CSO(N)) and Senior Health Physicist (SHP), and assisted by a number of others.

Information comes to the IC from a wide range of sources including the Emergency Monitoring Headquarters, the submarine and the MOD Police. It is in the IC's Operations Room (Base Ops Room) that the overall picture is built up, decisions taken and instructions sent out to all parts of the Base.

4.2 Military Co-ordinating Authority (MCA)

The second element in the organisation is the Area Flag Officer and his staff, who act as Military Co-ordinating authority. He is in administrative control of all post accident procedures. The MCA acts as a channel between the Base and the outside world, leaving the Incident Commander free to concentrate on the Base area alone. The MCA liaises with:

4.2.1 Ministry of Defence with whom his first link is the Duty Commander DNOT. He is then required to maintain close contact with the Nuclear Accident Response Operations (NAROps) issuing Situation Report signals to keep MOD informed of the situation.

4.2.2 Local Civil Authority - it is the MCA's responsibility to keep the Local Authority briefed. In the event of a reactor accident the Local Authority will activate its own Local Accident HQ (LAHQ) in order to put the Public Safety Scheme into effect. A liaison officer from MCA normally moves into LAHQ to ensure that it is getting the information it requires.

4.2.3 Regional Civil Authorities - Ministry of Agriculture and Fisheries (MAFF), the Department of the Environment and in particular its Radio-Chemical Inspectorate who takes a close interest in the disposal of radioactive waste and the regional Water Authority.

4.2.4 News Media - this must represent a very large proportion of MCA's responsibility, particularly in the first few hours following an accident since the MCA must do all he can to relieve the anxiety and fears of the local population. It is almost certain that intense public interest will be aroused and very many representatives of the media will foregather at the scene. A press cell forms part of the Area Flag Officers' organisation and plans normally provide for extra PROs to be moved in.

4.2.5 Others - other authorities such as the RAF and AWE (for monitoring assistance), the National Radiological Protection Board (NRPB).

5. EMERGENCY MONITORING ORGANISATION

This is a pre-planned organisation in an X berth, based on the Health Physics Department, which moves into action as soon as an accident situation is declared. Its task is to gather radiological information, process it and present it to the Command in a form on which decisions can be made eg, the desirability of evacuation, areas over which potassium iodate tablets should be distributed, stay times for re-entry and so on. The monitoring organisation consists of two elements:

5.1 Monitoring Teams - a number of mobile monitoring teams (1, 2 or 3) each consisting of a driver and a health physics monitor based on a specially adapted Monitoring Land Rover (MLR).

The local Emergency Monitoring Organisation would not be adequate to deal with the situation and back-up support will be required as quickly as possible. Back-up support will come from the Naval Emergency Monitoring Team, based at the Institute of Naval Medicine at Alverstoke.

5.2 Emergency Monitoring Headquarters (EMHQ) - sited as far as possible from berths in an upwind sector, EMHQ directs MLR's by radio to a number of pre-selected monitoring points where data is gathered and sent back to EMHQ. EMHQ processes the information, and produces a picture of the hazard which is passed up to the incident Commander.

A further source of information available to EMHQ is the Dockside Installed Radiac Monitoring System (DIRAMS). It consists of a number of detectors, permanently installed at each berth, a few feet from the reactor compartment of each submarine and giving a remote reading in EMQH.

6. LOCAL ACCIDENT HEADQUARTERS (LAHQ)

The Accident HQ set up and manned by the Local Civil Authority which puts the Public Safety Scheme into effect. It may be sited at a local Town Hall and manned by the Chief Executive the Emergency Planning Officer, Community Physician, Education Office representative, Social Services representative, the Police etc. It is essential for the LAHQ and the MCA to maintain close liaison.

7. STATES OF READINESS OF NARO

State of Readiness	Plant State A	Plant States B or C	Manning
Alert	Always	Less than 24 hours after reducing to Plant State B	EMHQ manned continuously, Monitoring Controller immediately available Remainder < 1 hour
Relaxed	Never	More than 24 hours after reducing to Plant State B and Grace time < 8 hours	NARO at 1 hours notice
Stood Down	Never	More than 24 hours after reducing to Plant State B and Grace time > 8 hours	NARO at 8 hours notice

NOTES:

1. In the "Closed-Up" and "Relaxed" states the duties of IC may be undertaken by the Duty Commanding Officer or his equivalent.
2. In the "Closed-Up" and "Relaxed" states the duties of Monitoring Headquarters Officer may also be undertaken by a Duty Officer, pending the arrival of the nominated EMHQ Officer.

Central Government/MoD Nuclear Accident Command and Control for military reactor or weapons accidents:

### NUCLEAR ACCIDENT RESPONSE ORGANISATION - NARO

