Australian Government
Department of Defence

DEPARTMENT OF DEFENCE

DEFENCE OPERATIONS MANUAL (OPSMAN 1)

VISITS TO AUSTRALIA BY NUCLEAR–POWERED WARSHIPS

EDITION 11

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FOREWORD

1. This publication has been prepared for the Australian Department of Defence in consultation with the appropriate Australian Government departments, through the standing interdepartmental committee, the Visiting Ships Panel (Nuclear).

2. Edition 11 supersedes Edition 10 of December 2016, which is to be destroyed.

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CHAPTER 1

NUCLEAR POWERED WARSHIP VISITS POLICY

References:

A. 1989 Senate Report on contingency planning for the accidental release of ionizing radiation
B. RB – NPW - 66/00 2000 *Reference Accident to assess the suitability of Australian Ports for visits by Nuclear Powered Warships*, ARPANSA 2000
C. Radiation Protection Series G-3 *Guide for Radiation Protection in Emergency Exposure Situations,* ARPANSA 2019
D. Environmental Monitoring Handbook for visits by Nuclear Powered Warships; ARPANSA 2006
E. Radiation Monitoring Handbook for Visits by Nuclear Powered Warships, ANSTO 2022
F. *General Safety Requirements for Preparedness and Response for a Nuclear or Radiological Emergency* (GSR Part 7) – International Atomic Energy Agency 2015.

Purpose

1.1 This document prescribes the conditions, procedures and responsibilities for the conduct of port visits to Australia by nuclear-powered vessels, particularly Nuclear-Powered Warships (NPW). Chapters one and two of this document prescribes the Australian Government policy to allow for the safe conduct of visits to Australia by nuclear-powered vessels, particularly NPW.

Policy

1.2 Port visits to Australia by naval vessels of friendly nations, and reciprocal visits by ships of the Royal Australian Navy, are one of the most visible aspects of the defence cooperation between Australia and other countries in peacetime. These naval vessels may be conventionally or nuclear-powered. Ship visits are made with the approval of the Australian Government.

1.3 Australian Government responsibility is generally for international negotiations, prescribing guidelines and approving and arranging visits within those guidelines. State/Territory responsibility is generally for the establishment and conduct of the safety organisation during NPW visits. To ensure adequate time to implement this policy and any associated arrangements, the Australian Government requires a minimum of 42 days' notice for any proposed NPW visit.

1.4 The Australian Government requires contingency arrangements to be in place at all Australian ports visited by NPWs and also requires that there be the capability to undertake radiation monitoring of the port environment. These arrangements are formulated to cover two potential release mechanisms, which are failure or malfunction of radioactive waste control systems within the vessel and an accident involving the reactor plant.

1.5 The design of NPWs propulsion plants require special procedures that have been adopted to ensure that the safety of the general public is maintained during visits by such vessels. The nature of these requirements necessitates that responsibility for the conduct of these procedures is shared between Australian Government and State/Territory Governments and will ensure hazards and risks to the Australian public and environment from visiting NPWs are eliminated or minimised so far as is reasonably practicable.

1.6 These procedures include Conditions of Entry, the arrangements for visits and contingency arrangements in the unlikely event of an accident resulting in the hazardous release of radioactivity to the environment. Visits by NPWs will only be permitted to Australian ports which have been assessed and approved as suitable in terms of practicability, radiological, sociological and economic criteria. Every port deemed suitable will require emergency plans and arrangements for NPW visits to be established at the preparedness stage.

Indemnity

1.7 To cover the unlikely event of a NPW reactor accident in an Australian port the Australian Government requires visiting nations to accept liability and indemnify the Australian Government in respect of damage or loss resulting from such accident. Under US Public Law 93–513 it is United States Government policy to pay for damage or loss proven to have resulted from a nuclear accident involving the reactor of a US warship. The UK and French Governments have provided unilateral assurances to Australia on nuclear reactor liability comparable to the US Government policy. Other nations will be required to provide similar assurances prior to approval being given.

Risk Management

1.8 Risk Management is a systematic process of identifying, analysing, assessing, treating and mitigating risk to people, property and the environment. The process begins with an understanding of the relevant hazards and produces a range of treatment options to minimise the impact or, if possible, eliminate the resulting risk. The arrangements proscribed in this document have been established by the Commonwealth Government and were subsequently reviewed as part of the 1989 Senate Inquiry with the aim to reduce the risk to the Australian public and environment to the lowest acceptable level.

1.9 The main hazard associated with nuclear reactors is the release of fission products from the fuel. In order to prevent this, reactor fuel is encased in strong metal cladding and there are additional barriers designed to contain the fission products should an emergency situation develop. Should the reactor fuel cladding fail, the primary circuit which is a closed loop, is designed to contain the fission products and prevent further spread. Beyond the primary circuit, the Reactor Compartment is designed and constructed to contain fission products in the unlikely event of a reactor accident resulting in the complete failure of the primary circuit. In the event these boundaries were to allow a proportion of fission products to release slowly through the primary containment boundary, they would still largely be contained within the NPW.

1.10 Detailed assessments of potential emergencies and their associated consequences have previously been carried out by the Visiting Ships Panel (Nuclear) (VSP(N)) and supporting agencies in accordance with international and Australian requirements. These assessments are published in the NPW Reference Accident (Reference B) and presume concurrent failures of all of the safety barriers preventing core cooling leading to fuel melt and subsequent leakage through the containment barriers.

NPW Reference Accident

1.11 The NPW Reference Accident, at Reference B, is a loss of coolant accident that results in the melting of the fuel in the reactor core and the release of volatile and gaseous fission products to the reactor containment. These fission products would then be available to leak to the atmosphere and dispersed according to the prevailing weather.

1.12 In the assessment, the dispersion of released fission products in the atmosphere downwind of the accident has been estimated using a standard, conservative meteorological model and the radiation doses to individuals and to the total population exposed have been calculated. The assumptions, methodologies and the radiological consequences are fully described in the Reference Accident.

1.13 The consequences of a reference accident defined in this way forms the basis of the detailed port safety response plans developed and updated by the relevant State/Territory authorities to protect the public who may be affected by a nuclear emergency. Response and recovery to the contamination would be addressed by the State/Territory extant HAZMAT Plans.

CONTROL OF ENTRY AND BERTH ASSESSMENT

DEFINITIONS

Primary port

1.14 A primary port is defined as a validated port that can support an NPW visit of longer than two hours duration and requires all conditions of entry to be met. Primary ports have been classified as either Tier 1 or Tier 2. A Tier 1 Primary Port is a port that receives regular visits, that is a visit at least at a biennial frequency. A Tier 2 Primary Port is a port that receives fewer visits than a Tier 1 Port. The Tier Classifications are used by the Technical Working Group to determine the re-validation program and the effective and efficient use of limited resources and has no impact on the ability of these ports to host NPW visits.

Secondary port

1.15 A secondary port is defined as a port that has been assessed and validated for visits of less than two hours duration. These visits are usually classified as a “Stop and Go” visit, an example being a boat transfer serial or medical evacuation (Medivac). All primary ports can also support Stop and Go visits.

CONDITIONS OF ENTRY

Primary ports

1.16 Visits are only permitted to Australian ports, which have been assessed and approved by the VSP(N) as suitable in terms of strict Australian environmental and safety criteria. Conditions of entry to Australian ports by visiting NPWs have been established by the Australian Government. Approval of visits is subject to satisfaction of these general conditions, which are:

a. visits will be for purposes such as medical emergency, crew rest and recreation, exercise briefings and preparations, embarkation and disembarkation of logistics associated with operations and normal voyage repairs and not for nuclear fuel handling or repairs to reactor plant (necessitating breach of reactor containment);

b. visits will be subject to satisfactory arrangements covering indemnity, and the provision of adequate assurances relating to the operation and safety of the warships while they are in Australian waters;

c. movement of vessels must take place during daylight hours under conditions where visibility is not less than three-quarters of a nautical mile;

d. navigational controls on other shipping will be applied during the time that NPW are entering and leaving port;

e. there must be a capability to remove the vessel, either under its own power or under tow, to a designated safe anchorage or a designated distance to sea as soon as possible within the time frame specified for the particular berth or anchorage, and in any case within 24 hours for submarines and two hours for NIMITZ class, if an incident should occur;

f. an operating safety organisation, competent to conduct a suitable radiation monitoring program and able to initiate actions and provide services necessary to safeguard the public in the event of a release of radioactivity following an accident, must exist for the port being visited; and

g. post visit marine environmental sampling is to be conducted as soon as possible after the visit. The marine samples are to be forwarded to ARPANSA for analysis.

Secondary ports

1.17 Visits classified as “Stop and Go” defined at paragraph 1.15 above are subject to the following conditions of entry:

a. visits will be purposes such as medical emergency, boat transfer of personnel for exercise briefings and preparations, embarkation and disembarkation of logistics;

b. visits will be subject to satisfactory arrangements covering indemnity, and the provision of adequate assurances relating to the operation and safety of warships while they are in Australian waters;

c. movement of vessels must take place in daylight hours under conditions where visibility is not less than three-quarters of a nautical mile;

d. navigational controls on other shipping will be applied during the time that the NPW is entering or leaving port;

e. a radiation monitoring team comprising of one person equipped with a portable radiation detector located on the shoreline in proximity of the transfer position; and

f. post visit marine sampling is to be conducted as soon as possible after the visit. The marine samples are to be forwarded to ARPANSA for analysis.

1.18 Due to the short notice of the visit and short duration of the visit and due to the very low risk of a reactor incident occurring there is no requirement for a full radiation monitoring organisation to be employed for visits to secondary ports.

1.19 Acceptance of visits under the conditions detailed in paragraphs 1.16 - 1.17 are applicable to current classes of NPW. Additional conditions may be applied on a case by case basis.

Berth assessment

1.20 Upon an expression of interest to visit, a rigorous evaluation process shall be undertaken by the VSP(N) to assess whether the identified port is suitable to accommodate a visit by a nuclear-powered vessels. A complete suitability assessment shall consider port-specific practicalities, radiological, sociological and economic impacts, to determine the overall suitability of a request, or expression of interest, for an NPW to visit a particular location in Australia.

1.21 Suitability of particular alongside berths and anchorages, including remote berths or anchorages, is determined by the VSP(N) Technical Working Group (TWG) in consultation with appropriate Commonwealth and State/Territory authorities.

1.22 Specific alongside berths and anchorages in certain Australian ports have been assessed as suitable for use by visiting NPW. These assessments have been made with respect to the radiological consequences on the population of a NPW Reference Accident in the light of the constraints imposed by the Conditions of Entry. As specific port safety arrangements are predicated on the use of these designated locations, in particular radiation monitoring and environmental sampling, no berth or anchorage is to be used by an NPW unless approval is given by the VSP(N), nor are alternative locations to be used without such approval.

Validation of berths and anchorages

1.23 A port validation is the process where Ports are reviewed and assessed to ensure the State/Territory arrangements meet the requirements detailed in this document. When a berth or anchorage has not been used for a period of 12 months it shall be validated by the VSP(N) TWG prior to its use by an NPW.

1.24 Berths and anchorages should be validated on a routine basis as determined by the VSP(N) and no less frequently than every two years irrespective of the number of NPW visits that have occurred since the last validation. The validation process will take into account changing factors such as land use and population.

CHAPTER 2

VISITING SHIPS PANEL (NUCLEAR)

Introduction

2.1 The Australian Government has established an interdepartmental standing committee called the Visiting Ships Panel (Nuclear) (VSP(N)) to control arrangements for visits to Australian ports by nuclear-powered warships (NPW) and other nuclear-powered vessels (NPV).

Visiting Ships Panel (Nuclear) responsibilities

2.2 The responsibilities of the VSP(N) are to:

a. advise the Minister for Defence on proposals for NPW visits;

b. develop and maintain procedures related to NPW visits;

c. generally oversee the implementation of specific arrangements, especially safety requirements, for visits by NPW;

d. maintain and oversee safety arrangements for visits by nuclear weapons capable warships; and,

e. validate/invalidate NPW ports on advice from the Technical Working Group of the Visiting Ships Panel (Nuclear).

2.3 The Technical Working Group is responsible to the VSP(N) for providing advice and support as directed by the VSP(N).

VSP(N) membership

2.4 The VSP(N) is constituted of representatives from:

a. **Department of Defence:**

(1) Head Navy Engineering (Chair);

(2) National Port Services Organisation (Secretary);

(3) Navy Engineering;

(4) Maritime Operations;

(5) International Policy Division;

(6) Joint Health Command; and

(7) Defence Science and Technology Group.

b. Australian Nuclear Science and Technology Organisation;

c. Australian Radiation Protection and Nuclear Safety Agency;

d. Department of Climate Change, Energy, the Environment and Water;

e. Department of Health and Aged Care;

f. Department of Foreign Affairs and Trade; and

g. Department of Home Affairs, National Emergency Management Agency.

Technical Working Group

2.5 The Technical Working Group (TWG) comprises of representatives from:

a. ANSTO,

b. ARPANSA,

c. NEMA (AGNSR), and

d. RAN.

Invited membership

2.6 Representatives from the Department of Prime Minister and Cabinet or other organisations may be invited to attend VSP(N) meetings.

PART 2 – PROCEDURES

CHAPTER 3

PORT SAFETY ARRANGEMENTS

General

3.1 The conditions of entry for NPW require that the port being visited has an operating safety organisation competent to conduct a suitable radiation monitoring program, able to initiate actions and provide services necessary to safeguard the public in the event of a release of radioactivity following a reactor accident.

Responsibility

3.2 As the authority for controlling the required resources is vested in the State/Territory Government and its instrumentalities, the State/Territory Government is responsible for drawing up contingency plans that control the safety organisation for those ports under its control and exercising the safety organisation.

3.3 The Australian Government and its agencies will provide technical expertise, trained manpower and specialised equipment to assist in establishing the organisation and conducting operations during NPW visits. The Royal Australian Navy (RAN) will implement safety plans for those ports under its control while taking due cognisance of State/Territory requirements.

Nuclear propulsion plant

3.4 NPWs use conventional steam turbine machinery in the propulsion system with the energy for steam generation being supplied from the fission of uranium fuel in a nuclear reactor rather than from the combustion of conventional fossil fuels such as oil. NPWs of the United States, United Kingdom and France use pressurised water reactors that employ indirect steam generation involving a primary and a secondary circuit. The nuclear reactor vessel that is part of the primary circuit contains a core of uranium fuel elements within which heat is generated by the fission process. Interspaced with the fuel elements are control rods which provide the means of regulating the fission process and hence the heat generation rate. To achieve criticality, selected control rods are slowly withdrawn from the core until the process of nuclear fission becomes self-sustaining.

3.5 Primary cooling water is circulated through the core, removing heat from the fuel elements and transporting it via a heat exchanger to the secondary circuit where the generated steam drives the propulsion turbine and auxiliary machinery. This indirect system is designed to confine radioactive material to the primary circuit. The entire primary circuit including the reactor vessel is contained within a compartment designed to confine radioactive material which might escape from the primary circuit. Radiation shielding is provided to reduce radiation levels.

3.6 As well as producing heat the fission process generates fission products within the fuel, some of which are highly radioactive and potentially hazardous to health. There is no hazard, provided that the fission products remain contained within the fuel element assemblies. At the end of their useful life the spent fuel elements containing these fission products are discharged ashore at special handling facilities at the NPWs homeport.

3.7 Extensive precautions are taken in the design, construction and operation of all nuclear reactors including marine propulsion units to protect against the release of radioactive material to the environment. The excellent nuclear safety record of NPWs of the United States, United Kingdom and France exemplifies the effectiveness of these precautions.

3.8 Since the inception of the radiation and environmental monitoring program there have not been any releases of radioactive material nor have any radiation measurements been recorded in excess of background levels of ionising radiation either during or subsequent to any visit. This confirms that the procedures and checks used by the US, UK and French Navies in managing the radioactive wastes are effective and that the potential for exposure of members of the Australian public and the environment arising from the discharge of radioactive wastes from a visiting NPW is very low.

Radiation monitoring

3.9 Australian authorities monitor radiation levels during all NPW visits to Australian ports and environmental samples are analysed after visits. Assessment of results is published in the Department of Defence *Annual Report on Radiation Monitoring on Visits by Nuclear Powered Warships to Australian Ports.* These reports are available on the ARPANSA Website (http://www.arpansa.gov.au/ /research/radiation-emergency-preparedness-and-response/visits-by-nuclear-powered-warships).

3.10 The guidelines detail the suitable radiation-monitoring program to address two situations:

a. routine radiation monitoring before, during and post visit, and

b. emergency radiation monitoring related to a reactor accident.

ROUTINE RADIATION MONITORING

Objectives

3.11 The objective of routine radiation monitoring for NPW visits is to:

a. provide a means to confirm that there are no increases in external radiation levels during an NPW visit, and

b. address pathways for internal radiation exposure through environmental monitoring to confirm there are no releases of solid, liquid or gaseous radioactive waste to the environment.

Radiation protection standards

3.12 The Australian radiation protection standards that are relevant to radiation exposure of radiation workers and members of the public during a routine NPW visit are detailed in the following ARPANSA publications:

a. Radiation Protection Series F-1 Fundamentals for Protection Against ionising Radiation (2014)

b. Radiation Protection Series C-1 (Rev. 1) Code for Radiation Protection in Planned Exposure Situations (2020), and

c. Radiation Protection Series G-3 Guide for Radiation Protection in Emergency Exposure Situations (2019).

The emergency reference levels to be used as the basis for the implementation of protective measures following a reactor accident are those recommended by ARPANSA.

External radiation exposure

3.13 The potential for the external radiation exposure of personnel in the vicinity of a NPW at an alongside berth is checked at regular intervals by radiation surveys of areas designated as free for public access.

3.14 A radiation monitoring system is to be in place during each NPW visit to provide early detection of a reactor accident of sufficient severity to possibly cause a major release of fission products to the environment. This Early Warning System (EWS) is complemented by arrangements for notification by the NPW should an accident occur. NPW Commanding Officers (CO), or their delegated representatives, will advise a nominated official of the Port Safety Organisation immediately a release of radioactivity or a reactor accident occurs The NPW is to be kept under surveillance for direct emission of gamma radiation that could provide indication of such an accident. The detection of gamma radiation significantly above background levels will enable the prompt initiation of protective countermeasures.

Internal radiation exposure

3.15 The potential for exposure to the public and the environment from releases of radioactive material is checked by a program of environmental monitoring. Analysis for radionuclides known to characterise radioactive discharges likely to arise from a NPW is conducted by the water analysis as determined by ARPANSA.

3.16 The arrangements and procedures for radiation monitoring are detailed in paragraphs 3.57 – 3.93 to this chapter.

EMERGENCY RADIATION MONITORING

Objectives

3.17 The objectives for emergency radiation monitoring in the event of an NPW accident are to:

a. determine the nature and extent of any release,

b. assess levels of radiation and radioactive contamination in the environment around the vessel,

c. assess the magnitude and nature of the hazard arising from an accident,

d. determine when a release has terminated,

e. assess the need and extent of required protective measures, and

f. determine the requirements for recovery of affected areas and return to normal.

Immediate Post-Accident monitoring

3.18 Radiation monitoring surveys are to be initiated immediately on confirmation of detection of a high gamma radiation level or on notification by the vessel that a reactor accident has occurred.

Longer term monitoring

3.19 More extensive monitoring of affected areas is conducted following the immediate post-accident monitoring. This could continue for several days, weeks or months depending on the extent of the release. Additional personnel and equipment including laboratory facilities are likely to be required and have been planned for. The arrangements and procedures for radiation monitoring following an accident are in paragraph 3.87 to this chapter.

PLANS

Requirement

3.20 Each port likely to be visited will require a Port Safety Plan (PSP) specifically for NPW visits, as well as a Visit Operations Order (VOO) for each specific visit. Guidelines for the preparation and maintenance of these plans and instructions are contained in this document. Port Safety Plans are issued separately by State/Territory Governments or the RAN for visits to Naval

Ports. States/Territories during the routine review of their Port Safety Plans (PSP) should identify capability gaps and develop planning strategies for any shortfalls and advise the VSP(N) TWG as part of the routine port validation activity.

Content

3.21 The PSP is to address those measures designed to ensure the maintenance of public safety in the event of a reactor accident. Specifically the organisation detailed in the PSP should address routine and emergency operations management, removal times, radiation monitoring, security, supporting personnel and services, links to other Emergency Plans and public information.

Port Safety Plan

3.22 Because of differing State/Territory legislation, a standard format for such plans is not feasible. However, a guide to the preparation and maintenance of the Port Safety Plan and Visit Operation Order is at Annex B to this chapter.

Visit Operations Order

3.23 In addition to the general PSP, a Visits Operations Order (VOO) that provides detail on operational requirements should be issued for each individual NPW visit containing details specific to that visit.

Exercise

3.24 State and Territory authorities are to exercise their Port Safety Organisation before the visit of a NPW. However, no exercise is required if an exercise has been held at the port during the previous 12 months and there has been no change in key personnel since that exercise. Every two years a deployment exercise should be conducted that includes the deployment of agencies/equipment involved in NPW accident response. Where possible this exercise should coincide with the routine port revalidation conducted by the VSP(N) TWG.

Emergency action

3.25 The broad, initial responses that the specified organisations are required to complete upon indication of a reactor accident are outlined in paragraph 4.7 - 4.29. Follow-up action will depend on the extent of the accident and should be in accordance with the State/Territory Emergency Management legislation. The PSP should articulate the links between the various plans and responsible agencies.

Maintenance of plans

3.26 NPW Port Safety Plans are to be kept under regular review (no longer than 3 years) in order to maintain their currency. The Secretary of the VSP(N) should hold copies of all State/Territory plans and any amendments that have national application or considered to be in the interests of better planning for all affected Australian organisations should be submitted to NEMA for consideration by the VSP(N).

NAVAL NUCLEAR SHIPS SAFETY ORGANISATION

Responsibility

3.27 At the port visited by a NPW, the CO of the local naval establishment or the local Defence Representative (where no naval establishment is located in the area) will be responsible for implementing an organisation known as the Naval Nuclear Ships Safety Organisation (NNSSO).

Role

3.28 The role of the NNSSO is to effectively coordinate those functions relevant to NPW safety arrangements that are allocated to the RAN.

Functions

3.29 The scope of these functions will vary depending on the port visited (whether under RAN control) or by its location but should include:

a. coordinating the issue of secure communications equipment to enable 24 hours communications capability between the NPW and the State/Territory Port Safety Organisation headquarters;

b. provision of suitable assistance for radiation-monitoring operations (see Annex B to this chapter);

c. at a naval berth, provision of the Officer in Charge of Precautionary Action Zone (OIC PAZ);

d. provision of craft, equipment and personnel for emergency towing;

e. alerting the Port Safety Organisation and relevant Defence authorities upon receiving notice of a reactor accident: and

f. in the event of an emergency, providing assistance to the State/Territory and local authorities.

TOWING ARRANGEMENTS

Requirement

3.30 The Conditions of Entry for NPW to Australian primary ports require a capability to remove the NPW either under its own power or under tow to a designated safe anchorage or a designated distance to sea. One standby tug is required for all single reactor NPW visit and two standby tugs are required to support multi reactor NPW when berthed alongside.

Responsibility

3.31 The RAN has the responsibility for making arrangements for provision of RAN crewed tugs capable of removing single reactor NPWs and multi reactor NPW berthed alongside in the event of a reactor accident. These tugs will also be required to assist NPWs upon arrival and departure in the event of commercial tug services being withdrawn, should the Minister for Defence approve such action. RAN tugs are to remain at one hour's notice during the entire period of the visit.

3.32 The RAN, with ANSTO assistance, has the responsibility for developing and maintaining specific training and procedures for personnel engaged in NPW towing operations. The RAN will also provide appropriate equipment for RAN tug crews from the Department of Defence inventory. The guidelines are designed to minimise the radiation hazard to personnel engaged in the removal of an NPW subject to such an accident.

Towing vessel capability and shore parties

3.33 The towing vessels employed should have sufficient capability to tow to sea, or to, a remote anchorage, nuclear-powered warships of the types usually visiting Australia, taking into account local environmental conditions, in sea conditions up to sea-state 3.

3.34 When placed on stand-by for emergency NPW towing duties, the towing vessels and shore parties are to be equipped with protective clothing, personal dosimeter equipment and potassium iodide tablets for each member of these specialist parties and must carry radiation-monitoring instruments. A simple system for wash down of the decks and superstructure of the tug is also required.

Personnel

3.35 The personnel to whom these guidelines are to apply are the RAN crews of vessels assigned the towing duty, and shore parties required to slip an alongside vessel. Safety of other personnel is to be addressed in the Port Safety Plans.

Removal decision

3.36 The decision on whether or not to request removal of the vessel would be made after consideration of the relative risks posed to members of the public and to personnel engaged in the removal operation. Under certain circumstances it may be advisable for the NPW to remain at the berth or anchorage following a reactor accident. Advice from the CO of the NPW should also be sought regarding the state of the reactor plant and the potential severity of the accident.

3.37 The decision to remove the NPW rests with the State/Territory Government after consultation with the NPW CO. Guidance for decision-makers on the removal of an NPW following an accident is contained in Chapter 4.

Protective measures

3.38 In the event of a reactor accident protection is required against four potential sources of hazard. These are:

a. direct radiation (gamma shine) from the vessel;

b. direct radiation from an airborne release of radioactive material;

c. inhalation and/or ingestion of airborne radioactive material; and

d. radiation from surface deposition of radioactive material.

3.39 All available protective methods are to be employed, including local means of radiation detection, protective clothing, potassium iodide prophylaxis tablets, decontamination and ship-handling procedures and using distance and time factors to minimise exposure.

Assumptions

3.40 In the development of these guidelines, it has been assumed that should it be necessary to move a submarine from an alongside berth, limited assistance may be available from the submarine's crew and that shore parties and the crews of the towing vessels are to be provided by the RAN. For removal of a submarine from an anchorage, it is assumed that the submarine crew will weigh anchor or slip the anchor cable from onboard.

Permissible radiation dose

3.41 In the event of a reactor accident, radiation doses less than 50 millisievert (mSv) are permissible for these towing operations. However, in exceptional circumstances such as actions to save lives or the prevention of a catastrophic situation higher doses may be approved subject to strict conditions (refer to table 10 of ARPANSA publication RPS G-3). Every care should be taken to ensure that these emergency doses to individuals are below the threshold for acute radiation effects of 1 Sv. Doses received in emergency or accidental exposures should be monitored and recorded

Radiation monitoring

3.42 Towing vessels are to be provided with the capability for measuring radiation levels during the approach to the NPW. Portable shore-side monitoring is to be provided to assess the risk to shore parties engaged in slipping berthing lines and/or attaching towing hawsers.

PORT SAFETY ORGANISATION

General

3.43 To affect the requirement for provision of the safety organisation, State/Territory Governments need to establish committees for liaison between relevant Government departments, develop contingency plans, provide means for the control of the response organisations and enact the necessary supporting legislation.

State/Territory Visits Committee

3.44 Each State/Territory should establish a NPW Visits Committee (NPWVC) charged with the responsibility for creating, administering and implementing the State/Territory safety organisation. The NPWVC should consist of senior representatives from local government and instrumentalities likely to be involved in a NPW visit, particularly in the event of an emergency situation. For example, representatives from the Police, Emergency Services, Port Authority, and Health/Environment should be included.

Nuclear-Powered Warship Visits Committee Functions

3.45 The functions of the NPWVC are to:

a. oversee the preparation, approval, exercising and maintenance of Port Safety Plans for NPW visits;

b. coordinate the activities of departments and instrumentalities involved in the preparation for and conduct of NPW visits;

c. develop and promulgate the Visit Operations Order (VOO);

d. establish the specialised units required to carry out the various operations associated with a NPW visit;

e. activate the routine and emergency measures as called for in the contingency plans;

f. inform and advise higher authority on NPW visit matters; and

g. liaise with Australian Government departments as required.

3.46 In setting up the safety organisation, it is an important requirement for the NPWVC to ensure that the senior officials in the organisation are vested with the necessary authority for them to carry out their duties.

Control of operations

3.47 Depending on the scope of the required organisation, the State/Territory may appoint an executive body to coordinate and control operations immediately prior to, during and immediately after a NPW visit. This is normally affected using the resources of the State/Territory Emergency Services.

Naval Nuclear Ships Safety Organisation (NNSSO)

3.48 In accordance with Defence and State/Territory contingency plans, the CO of the local naval establishment/Defence Representative in the port will establish and activate the NNSSO.

Department of Home Affairs, National Emergency Management Agency (NEMA)

3.49 In the event of a reactor accident, the effected State/Territory may request Australian Government Assistance. All requests are coordinated by NEMA, who will:

a. liaise with the relevant Australian Government Departments on the accident;

b. coordinate the provision of Australian Government physical assistance when requested by the effected State/Territory; and

c. coordinate the provision of International assistance when requested by the effected State/Territory

Australian Government liaison

3.50 Administrative liaison is normally effected through the VSP(N) for those matters of an interdepartmental nature, or through normal inter-governmental channels if of a specialised nature. However, for operational matters during a visit, provision of additional Australian Government support to the local area is affected through NEMA.

EMERGENCY PLANNING ZONES

General

3.51 Emergency Planning Zones are designated around NPW berths and anchorages for planning purposes to assist in the identification of areas where hazards might arise and to ensure that appropriate protective actions can be taken promptly and effectively in the event of an accident.

3.52 The Emergency Planning Zones are as follows:

a. **Precautionary Action Zone (PAZ)**—is an area close to the NPW within which protective measures will be implemented automatically upon notification of a reactor accident;

b. **Urgent Protective Action Planning Zone (UPZ)**—represents an area where preparations are made to promptly perform environmental monitoring and implement urgent protective actions based on the results. The UPZ includes PAZ; and

c. **Extended Planning Distance (EPD)**—represents an area within which risks would be due to ingestion hazards from contamination of water, foodstuffs, milk and agricultural produce, and includes PAZ and UPZ.

3.53 The automatic implementation of protective measures within the PAZ is intended to limit radiation exposure of individuals, provide adequate time for assessing the severity of the accident and if necessary to assemble teams and equipment for initiating protective measures outside the PAZ. In practice the areas in which further protective measures would be implemented would vary according to the severity of the accident, prevailing meteorological conditions and would be determined by measurements of radiation and contamination levels.

ZONE BOUNDARIES

3.54 In 2004 ARPANSA reviewed the Urgent Protective Action Planning Zone distances based on a new Australian intervention recommendations. The revised Emergency planning boundaries are detailed at paragraphs 3.55 and 3.56 and supersede the boundaries/distances detailed in the 2000 Reference Accident.

Submarines

3.55 Based upon the NPW Reference Accident and a removal time of 24 hours, the calculated Emergency Planning Zone boundaries for all berths and anchorages in Australian ports when used by nuclear powered submarines are:

a. **Precautionary Action Zone**—a circle of 600 metres radius from the berth or anchorage.

b. **Urgent Protective Action Planning Zone**—a circle of 2.8 km radius from the berth or anchorage for 24 hour removal time or a circle of 2.3 km from the berth or anchorage for 4 hour removal time.

c. **Extended Planning Distance**—a circle of several kilometres radius from the berth or anchorage.

NIMITZ Class aircraft carriers

3.56 A number of anchorages and a berth have been assessed as being suitable for use by NIMITZ class aircraft carriers. Based upon the NPW Reference Accident and a removal time of two hours, the Emergency Planning Zones for anchorages when used by these vessels are:

a. **Precautionary Action Zone**—a circle of 800 metres radius from the anchorage or berth.

b. **Urgent Protective Action Planning Zone**—a circle of 3.7 km radius from the anchorage or berth.

c. **Extended Planning Distance**—an area extending several kilometres from the anchorage or berth.

3.57 The downwind distance specified for the UPZ depends upon the characteristics of the particular anchorage and is sufficient to allow adequate response time to initiate protective measures outside the zone.

PORT RADIATION MONITORING—ARRANGEMENTS AND PROCEDURES

General

3.58 This Section presents a set of basic arrangements and procedures for a program capable of meeting the radiation monitoring requirements at Australian ports visited by NPW.

3.59 The arrangements and procedures provide for the allocation of certain key responsibilities in a suitable monitoring program. They also provide an outline of procedures whereby Australian Government radiation protection officers engaged in routine monitoring at a port are able to activate the Port Safety Organisation in the event of enhanced radiation monitoring readings or notification of a release of radioactive material.

3.60 The techniques, practices and procedures for the conduct and reporting of radiation monitoring for NPW visits, the use of measured radiation levels as operational intervention levels for protective measures, and working guidelines relating to the emergency reference levels recommended for Australia are set out in the following documents;

a. *Guide for Radiation Protection in Emergency Exposure Situations* (RPS G-3) ARPANSA (2019);

b. *Radiation Monitoring Handbook for Visits by Nuclear-powered Warships to Australian Ports* ANSTO (2022); and

c. *Environmental Monitoring Handbook for Visits by Nuclear-powered Warships* (ARPANSA Technical Report TR145, 2006)

Note:

These documents are available as a reference to all Australian Government and State radiation protection officers participating in radiation monitoring of NPW visits.

3.61 The capability to conduct radiation monitoring is to be established in a port before a NPW visit commences. To this end, a Radiation Monitoring Group (RMG) that consists of a number of Field Assessment Teams (FAT) is to be formed for each NPW visit and made responsible for both routine and emergency radiation monitoring. Each field assessment team will be staffed by either two Australian Government officers, State radiation protection officers or a combination of both. The Australian Government, through ANSTO, will ensure that an appropriately qualified officer is available for each NPW visit to act as the Leader of the Radiation Monitoring Group (LRMG).

Pre-Visit preparation and stand-by arrangements

3.62 Arrangements are to be made for the radiation monitoring equipment, required for routine monitoring and for emergency monitoring, to be available at ports immediately before and during NPW visits. It is to be held in the custody of the RMG. Supporting operations and communications facilities are State/Territory responsibilities. Before each NPW visit, the RMG is to be brought to operational readiness and the LRMG is to confirm the readiness of the RMG to the State/Territory Radiation Officer (SRO/TRO).

3.63 The State/Territory members of the RMG may then revert to stand-by for the period of the visit or until called out. Australian Government members of the RMG are to remain on call throughout the visit and implement the routine radiation monitoring requirements as detailed in the *Radiation Monitoring Handbook*.

State/Territory Radiation Officer

3.64 A SRO/TRO is to be nominated by the host State/Territory and made responsible for advice to authorities of the host State/Territory on all public health aspects of radiation safety arising from NPW visits. The SRO/TRO is to be an experienced senior professional health physicist nominated by the host State/Territory.

3.65 In the event of a reactor accident, the SRO/TRO is specifically responsible for advising the Port Safety Organisation:

a. on hazards to the health of members of the public,

b. of the need to implement protective measures, and

c. when normal activities may be resumed in affected areas.

Leader Radiation Monitoring Group

3.66 The LRMG, is an appropriately qualified and experienced Radiation Health Physicist responsible for advising the SRO/TRO on the:

a. the pre-visit exercising/briefing of the RMG;

b. the readiness and functional status of all monitoring equipment;

c. pattern of radiation monitoring conducted by the RMG;

d. specific needs for ongoing radiation monitoring;

e. results of radiation monitoring as they may affect the public; and

f. protective actions that should be taken or considered based on the results of radiological monitoring.

Technician RMG

3.67 The Technician RMG is an appropriately qualified and experienced Radiation Health Physicist or a Senior Health Physics Surveyor responsible for assisting the LRMG in:

a. providing training to the FAT's and relevant personnel in radiological monitoring and safety aspects associated with the task,

b. ensuring in maintaining operability of the deployed radiological monitoring equipment

c. being a lead health physics person in one of the FATs as per state or territory arrangements.

Australian Government Technical Adviser

3.68 Irrespective of the local measures taken on confirmation of an accident the following Australian Government Officers will be deployed:

a. ARPANSA will provide a suitably qualified senior radiation health expert as the Commonwealth Technical Adviser (CTA), to liaise and offer technical advice to the State/Territory authorities in the affected area as appropriate;

b. ARPANSA will coordinate with NEMA on deploying Liaison Officers to AGNSR in Canberra to liaise on provision of technical advice to Australian Government; and

c. ARPANSA and ANSTO will coordinate with the State/Territory authorities on deploying Liaison Officers to the affected State or Territory operations centre to liaise on provision of technical advice.

ROUTINE ENVIRONMENTAL RADIATION MONITORING

External radiation exposure

3.69 The levels of gamma radiation during an NPW visit at an alongside berth is to be checked by radiation surveys on the vessel's arrival at the berth, and approximately once daily thereafter. The surveys are to be confined to those areas in the vicinity of the NPW designated as free for public access. Members of the RMG are to make the surveys in accordance with the instructions set out in the Radiation Monitoring Handbook and the results are assessed to determine any increase in established background radiation levels.

Passive dosimeters

3.70 To provide data on radiation doses which would result from an accidental release of airborne radioactivity, a number of passive dosimeters are to be placed at selected locations in the vicinity of an NPW berth during each NPW visit by the State/territory. The number and location of dosimeters issued for individual berths is to be determined jointly by the Australian Government and State/Territory radiation safety personnel and the location of the dosimeters should be detailed in the Visit Operations Order. The provision and analysis of the doses recorded by the passive dosimeters is the responsibility of ARPANSA.

Support facilities for radiation monitoring

3.71 Arrangements are to be made to provide:

a. adequate radio communications facilities and equipment for radiation protection officers of the RMG,

b. vehicles for use as Field Assessment Teams throughout NPW visits, and

c. secure storage facilities to accommodate equipment for the RMG.

Provision of radiation monitoring equipment

3.72 The Australian Government provides all radiation monitoring equipment. Except for the equipment in Annex C to Chapter 6, it is to be retained by ANSTO and properly maintained and calibrated. Equipment required for a NPW visit will be made available at the port, checked and made operational as part of the preparation and stand-by arrangements. Equipment is itemised in the Radiation Monitoring Handbook.

3.73 Additional backup equipment may be required in the event of an accident and is to be provided in accordance with Annex C to Chapter 3.

Marine environmental sampling program

3.74 The potential for internal radiation exposure of members of the public is to be kept under surveillance by a marine environmental sampling program. The program is a cooperative venture between the Australian Government and the host State/Territory and is to gather environmental samples as determined by ARPANSA from the vicinity of the berths.

3.75 Samples as advised by ARPANSA are to be collected by State/Territory authorities or by the Royal Australian Navy where berths are at naval bases. Samples are to be forwarded to ARPANSA for analysis as soon as possible after the sample has been collected and ARPANSA will immediately advise the relevant jurisdiction to any result indicating an increase in established background levels. All summaries of the results are published annually in the Annual Report on Radiation Monitoring on Visits by Nuclear Powered Warships to Australian Ports. The Annual Report is publically available on the ARPANSA website (Nuclear powered warships visit planning | ARPANSA)

3.76 A reliable baseline of radioactivity in the marine environment will be established at all approved NPW ports. This will involve the collection of a number of samples at different times of year to ensure seasonal variations of radioactivity in the environment is taken into consideration. This baseline will be used to compare samples collected after a visit by a NPW to determine whether a release of radioactivity to the environment has occurred.

3.77 The baseline sampling program at an approved berth may be discontinued provided that:

a. the sampling program has been implemented for a sufficient period to account for seasonal variations; or

b. State/Territory and Australian Government authorities are agreed that a reliable baseline of radioactivity has been established.

3.78 Once a baseline sampling program has been discontinued at a port, less frequent sampling should be conducted to ensure the baseline data has not changed. Routine sampling taken for a scheduled NPW visit that does not indicate a release of radioactivity may be considered for inclusion into the baseline data.

RADIATION MONITORING IN RELATION TO A REACTOR ACCIDENT

Early Warning System

3.79 A facility to provide early warning of a reactor accident is required and is to be based upon detection of gamma radiation emitted from the NPW as a consequence of the accident. The early warning system is to:

a. be capable of continuous operations,

b. employ the principles of redundancy and diversity to ensure reliability of operation and freedom from spurious signals,

c. normally have its detectors located with a clear line of sight to the NPW, and

d. provide an alarm upon detection of a sustained increase in gamma radiation levels.

3.80 Signals from the detectors are to be relayed to a data logging computer in parallel with a pre-set alarm facility which is continually manned throughout NPW visits.

3.81 Selection of a suitable site for the detectors in the early warning system should be made after consultation between State/Territory Radiation Officers and Australian Government officers. The installation of the system is to be undertaken by the Australian Government with State/Territory assistance as required. The location of any portable early warning systems supporting the NPW visit will be at the discretion of the LRMG and the State/Territory radiation officers.

3.82 NPW at anchor will normally be monitored from a vessel stationed within the Precautionary Action Zone (PAZ) of the NPW. A watch keeper will be provided to oversee the continuous monitoring equipment. Should weather conditions deteriorate to the situation whereby it is hazardous or difficult to maintain the designated position, then monitoring may cease; plume dispersal in such conditions would be such that radiation hazards would become negligible and hence monitoring unnecessary. However, in these circumstances the approval of the LRMG is to be sought before ceasing monitoring, and monitoring is to be recommenced immediately after the weather abates. The State/Territory Radiation Officer is to be advised of cessation and recommencement of monitoring.

Operation of the Early Warning System

3.83 The data logging computer in the early warning system will provide an automatic text message on detection of high radiation levels. Guidance on the appropriate alarm level is set out in the Radiation Monitoring Handbook. Australian Government or State/Territory officers are to be in continuous attendance and capable to respond to a text message in accordance with predetermined procedures. Any alarm activation must be capable of being investigated within 20 minutes.

Procedures following an alarm

3.84 The procedures, which are to be implemented in the event of an alarm signal, are to be developed in detail for each port from the following general principles. Personnel in the PAZ should go to shelter stations unless directed otherwise by the SRO/TRO or LRMG. The LRMG and the Duty Officer of the Emergency Control Centre are to be notified immediately of an indication of a high radiation level and are to react as follows:

a. the LRMG is to immediately investigate whether the indication is genuine. If so, they are to advise the Emergency Control Centre of the confirmed alarm, initiation of evacuation and the need to commence radiation surveys. If the alarm is not confirmed the non-confirmation should be recorded and if due to an instrument fault, the fault is to be remedied immediately; and

b. the Duty Officer at the Emergency Control Centre is to immediately contact the NPW through established channels to seek confirmation of an accident. Upon confirmation of an alarm, either from the NPW or from the LRMG, the Duty Officer is to initiate the actions set out in the Port Safety Plan and the activation of the Port Safety Organisation.

Immediate Post-Accident radiation monitoring

3.85 Upon confirmation of an alarm, radiation surveys are to be initiated by the LRMG. The first priorities are:

a. gamma radiation measurements to determine the magnitude and extent of any external radiation hazards due to direct radiation from the NPW,

b. gamma radiation measurements and air sampling to determine if a release of radioactive material has occurred, and

c. air sampling to determine airborne concentrations of critical radionuclides and to estimate inhalation hazards to members of the population.

3.86 The LRMG in conjunction with the SRO/TRO is to direct radiation surveys as outlined above, initially in a direction downwind from the NPW. In conjunction with the SRO/TRO, they are to interpret the results and determine the need for further surveys.

3.87 Arrangements are also to be made by State/Territory authorities for the monitoring and if necessary, the decontamination of persons evacuated from PAZ.

Meteorological data

3.88 Visit arrangements are to include the availability of meteorological data, including local wind speed and direction throughout the visit to assist in estimating the extent and magnitude of the effects of a release of airborne radioactivity.

Longer term radiation monitoring

3.89 Following the immediate post-accident radiation-monitoring period more extensive environmental radiation monitoring is to be undertaken to:

a. determine the extent of any decontamination needed,

b. monitor foodstuffs that may have been affected,

c. monitor the marine environment,

d. provide assurances that evacuated areas can be reoccupied, and

e. provide assurances that normal activities may be resumed in affected areas.

3.90 Substantial resources of staff and equipment may be needed for this purpose but the requirement is less urgent than that of immediate post-accident monitoring. Therefore, these resources can be obtained from other centres, including those remote from the port being visited. Organisations, which are expected to contribute this assistance, are to be informed beforehand.

Countermeasures to protect the public

3.91 Following a release of radioactive fission products to the atmosphere measures, which are available to counteract or minimise effects on the health of members of the public at risk include:

a. sheltering indoors. Guidelines on sheltering are detailed in Chapter 4;

b. evacuation of areas in the path that may be significantly affected by the radioactive plume;

c. prophylaxis by administration of potassium iodide to those in the path of the radioactive plume; and

d. restriction on the use of contaminated foodstuffs, especially milk and vegetables.

3.92 The implementation of protective measures may incur some additional risks to those affected, together with inconvenience and expense. The decision on appropriate protective measures should be made to ensure that any disadvantages accruing from a remedial measure are balanced against the benefits from reduction of the radiation risk. The implementation of protective measures in the UPZ should be based on the radiation monitoring results, compared with the recommended intervention and action levels in ARPANSA Publication *Guide for Radiation Protection in Emergency Exposure Situations RPS G-3*. To assist in the decision making, these levels are expressed as operational quantities (Operational Intervention Levels) such as dose rate and concentrations of marker radionuclides. The information in paragraphs 3.53–3.57 provides an indication of the distances from the berth for which the planning for protective measures may be necessary.

3.93 The only countermeasure that provides effective prophylaxis against the effects of radio iodine's on the thyroid gland is oral potassium iodide therapy. Guidance on potassium iodide prophylaxis is provided in ARPANSA publication RPS G-3, this guidance advises that a history of allergy to iodine is a relative contraindication to the administration of potassium iodide tablets. Consequently, personnel with known iodine allergy, or any of the conditions listed in the appendix to RPS-G3 should not be used in the emergency response teams.

Annexes:
A. Royal Australian Navy assistance to the Radiation Monitoring Group
B. Port Safety Plan and Visits Operation Order guides
C. ANSTO emergency support equipment
D. Interaction with the public and media

ANNEX A TO
CHAPTER 3

ROYAL AUSTRALIAN NAVY ASSISTANCE TO THE RADIATION MONITORING GROUP

General

1. The Royal Australian Navy will provide assistance to the Australian Nuclear Science and Technology Organisation in meeting its responsibility for conducting radiation monitoring operations during the visits to Australian ports by nuclear-powered warships (NPW). The assistance is prescribed by the location, personnel requirements, role, tasks and support requirements detailed below.

Location

2. The prescribed assistance will be provided at ports as follows:

a. visits to Brisbane and Western Australia (HMAS *Stirling* and Fremantle (Gage Roads)),

b. visits to other ports on a case-by-case basis as resources permit, and

c. for NPW at anchor, provision of a vessel for radiation monitoring.

Personnel requirements

3. Personnel provided for radiation-monitoring duties may be of any rank or category and are to have completed the requisite training provided by ANSTO.

Role

4. The role of radiation monitoring personnel will be to assist the Leader Radiation Monitoring Group (LRMG) in the routine and emergency functions of the Radiation Monitoring Group (RMG) during visits by NPW.

Note:

For NPW visit to HMAS *Stirling* a fourth Field Assessment Team, manned by RAN personnel will carry out measurements at HMAS *Stirling*

Tasks

5. The specific tasks will be to:

a. conduct routine radiation monitoring duties in conjunction with the LRMG (1–2 hours approximately daily); and

b. be on continuous (24-hour) call:

(1) as a member of the Field Assessment Team, and

(2) to correct equipment or line faults.

Support requirements

6. The appropriate Commanding Officer (CO) of the local naval establishment/Naval Headquarters/Defence Representative in the port is responsible for:

a. arranging the required radiation monitoring personnel in compliance with the local Port Safety Plan (PSP) (other RAN priorities permitting);

b. ensuring radiation monitoring personnel are immediately contactable at all times (preferably via mobile phone);

c. ensuring transport is readily available to deliver radiation monitoring personnel 'on-scene' within 45 minutes of notification;

d. notifying ANSTO of the name(s) of the nominated radiation monitoring personnel at least seven days prior to the commencement of the NPW visit;

e. arranging other service facilities required by the PSP; and

f. arranging berthing/slipping parties if required, from available Australian Defence Force manpower.

Radiation monitoring vessel requirements

7. Where resources permit, the RAN will be responsible for provision of a vessel for radiation monitoring of NPW at anchor. Radiation monitoring of an NPW at anchor has two components. The first is continuous monitoring of the NPW whilst in port and the second, where appropriate, is mobile monitoring on water following a reactor accident. This responsibility can be achieved by either:

a. provision of a dedicated radiation monitoring vessel which would station itself adjacent to the NPW and which may also become the mobile radiation monitoring vessel following a reactor accident; or

b. arrange for radiation monitoring equipment and a trained operator to be located onboard another vessel, such as a police security vessel, that will be stationed adjacent to the NPW.

8. If the latter option is used and the continuous radiation-monitoring vessel is unable to undertake post reactor accident mobile radiation monitoring, other arrangements to provide a response vessel should be planned. This situation would apply, for example, when a police security vessel is used for continuous radiation monitoring but has specific Precautionary Action Zone (PAZ) security and evacuation tasks following a reactor accident.

9. To satisfy RMG requirements for the early collection of mobile monitoring radiation data the following criteria for provision of a response vessel are desirable:

a. the vessel is to be on stand-by with the mobile radiation monitoring equipment located onboard for the duration of the NPW visit;

b. the vessel is to be equipped with radio/telephone communications, preferably fitted with Global Positioning System and radar; and

c. the vessel is to be of sufficient size, performance and seagoing capability to fulfil its response role.

ANNEX B TO
CHAPTER 3

PORT SAFETY PLAN AND VISIT OPERATIONS ORDER GUIDE

General

1. This guide should be used when developing Port Safety Plans (PSP) and Visit Operation Orders/Instructions. These plans are developed by, and are the responsibility of, State/Territory Governments. The PSP details the responsibilities of State/Territory authorities during all phases of nuclear-powered warships (NPW) visits. The Visit Operation Order/Instruction specifies detailed arrangements for the visit of each particular vessel. The content of these documents will vary depending on each particular State/Territory organisation and legislation. However, there are common requirements which should be addressed in these plans and they are described in this annex.

PORT SAFETY PLAN

Structure

2. The structure of the plan should address the following topics:

a. background information;

b. introduction;

c. facilities;

d. State/Territory organisation,

e. relationship to other applicable State/Territory plans, including links where appropriate;

f. identification of important infrastructure such as health facilities, schools, day care centres, agriculture within 10 km of the NPW berth(s);

f. procedures; and

g. radiation monitoring.

Background information

3. This section should include information related to the nature of the problem to allow planning personnel sufficient background to understand the need for the procedures that are adopted, particularly those to be followed in an emergency.

Introduction

4. This section should identify:

a. the authority for the plan (legislation and authorisation/ratification by the appropriate authority);

b. related documents, including sub plans and other applicable plans);

c. the format of the plan; and

d. the relationship between the plan and its associated visit operation order/instruction.

Facilities

5. The port's approved berths and anchorages should broadly be identified in this section. Supporting services such as marine authorities, wharf services, security, communications, depths of water, fendering, sullage etc. should also to be included or a link to the relevant Port Guide.

Organisation

6. All relevant Commonwealth, State/Territory authorities, committees and operations staffs should be identified in this section, together with contact details (normal and out of hours). Functions and responsibilities and liaison channels between supporting organisations should be clearly identified.

Relationship to other State/Territory Plans

7. Links or other references to applicable State/Territory plans should be included.

Infrastructure

8. Details on critical infrastructure such as ports, airports, health facilities, schools (primary and secondary), childcare centres and agriculture (including aquaculture) within 10 kilometres of the berth should be detailed in this section.

Procedures

9. This section should describe the details of those procedures that are to be used during normal and emergency situations. The stages of activation of the Plan should be clearly identified and for ease of reference it is recommended action tables are included. Action tables should clearly articulate the duties of each authority, responsible officers and the actions to be completed. The required safety zones should be clearly set out along with their responsible personnel.

10. Relevant Annexes to this section could include:

a. evacuation plan,

b. communication plan,

c. meteorological report format,

d. pre-planned media announcements, and

e. supply and issue of potassium iodide tablets, or reference to the jurisdictions Potassium Iodide Supply and Distribution Plan

Security

11 Physical security requirements will vary from visit to visit, based on the assessed threat from anti-nuclear or, less likely, terrorist organisations. In addition to the physical waterborne and land-based patrols, consideration should be given to issuing a Notice to Airmen (NOTAM) to effectively restrict access for overflight within a proscribed radius and to a predetermined height around the berth or anchorage.

Closure of airspace

12. Immediately following a confirmed alarm, a NOTAM should be issued closing airspace within Urgent Protective Action Zone and in the downwind sector of Extended Planning Distance to a height and distance dependent on the prevailing meteorological conditions.

Radiation monitoring

13. While the need for radiation monitoring should be briefly addressed in the background information section, it is preferable to keep all aspects of this task within one section, since monitoring can and should be treated as a separate function in support of the overall response organisation for a NPW visit.

14. The scope of the plan should address the radiation monitoring requirement and the State/Territory's organisation and procedures for the provision of support in addition to that provided by the Australian Government. The authority and responsibilities of the State/Territory Radiation Officer should be clearly identified.

15. Appropriate Annexes should include:

a. a table and chart describing passive dosimeter locations, and

b. radiation-monitoring report format.

VISIT OPERATION ORDER

Introduction

16. A Visit Operation Order (VOO) should be issued for each particular NPW visit. This will support the PSP but will provide specific operational and administrative details specific to that visit.

Content

17. A typical VOO/Instruction would contain:

a. a summary of the NPW's characteristics,

b. the visit timetable,

c. the location of the fixed radiation monitoring post,

d. details of the port emergency communications net,

e. contact directory for members of the port safety organisation ,

f. personnel rosters, and

g. any other pertinent information.

Maintenance of PSP and VOO

18. All NPW safety plans are to be kept under regular review in order to maintain their currency. NEMA and Headquarters Joint Operations Command may also hold copies of all State/Territory plans. Should any PSP amendment have national application or be considered to be in the interests of better planning for all affected Australian organisations, they should be submitted to NEMA, for consideration by the Visiting Ships Panel (Nuclear).

Post-accident recovery

19. Guidance for establishing the extent of contamination and its characteristics, collection of environmental samples and advice on longer term recovery are contained in the VSP(N) *Environmental Monitoring Handbook for Visiting NPW Warships*. Post-accident recovery would be conducted in accordance with State/Territory HAZMAT/CBRN Plans and the Australian Government Crisis Management Framework.

ANNEX C TO
CHAPTER 3

AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION EMERGENCY SUPPORT EQUIPMENT

1. In the event of a reactor accident, the full objectives of the radiation-monitoring requirement may not be achieved solely by the on-scene radiation-monitoring group. Following the immediate period of monitoring, extensive environmental radiation surveys of affected areas may be needed before normal activities could be resumed; this could take several days or weeks.

2. Additional equipment and personnel would therefore be required to support that deployed for a routine visit. The additional resources would be used to:

a. determine the extent of decontamination required,

b. monitor foodstuffs that may be affected,

c. provide assurances that evacuated areas can be reoccupied, and

d. provide assurances that normal activities may be resumed in affected areas.

Royal Australian Air Force support

3. Because of the size and immediacy required of the resources, Air Command will maintain a suitable aircraft (at four hours-notice) to airlift the equipment and personnel to the affected area.

Resources

4. The equipment held by ANSTO consists of 10 Pelican cases and up to 12 personnel may be required to travel with the equipment. Details of the equipment are:

Item/Number	Weight loaded (kg)	Dimensions (m)
10 Pelican cases	42	0.75 x 0.45 x 0.4

Movement

5. During all NPW visits the equipment and personnel are available at Lucas Heights Science and Technology Centre. On notification, the personnel and equipment will deploy within 12 hours to Royal Australian Air Force (RAAF) Base Richmond for loading at the Air Movements Section. The RAAF aircraft will concurrently deploy, load and proceed to the nearest airfield to the affected port.

ANNEX D TO
CHAPTER 3

INTERACTION WITH THE PUBLIC AND MEDIA

1. It is essential that the Port Safety Organisation for nuclear-powered warship visits include arrangements for dealing with inquiries from the public and from the media in the event of a reactor accident in a visiting NPW.

2. Use of the media (television, radio, social media and newspapers) in informing the public of the accident and emergency reactions is essential to planning for NPW visits. However, it is essential that the correct and exact message is passed without the use of emotive or imprecise words or expressions, which may create panic or other difficulties. To this end it is essential to include prepared releases in the Port Safety Plan which will then require only the insertion of the name of the NPW, dates times and other details to suit the situation.

CHAPTER 4

ACTION IN THE EVENT OF A REACTOR ACCIDENT

Reference:

A. RPS G-3 Part 2 *Guide for Radiation Protection in Emergency Exposure Situations—Planning, Preparedness, Response and Transition* ARPANSA 2019

General

4.1 Action in the event of a reactor accident will require joint State and Australian Government action, as well as cooperation with the NPW parent nation / national authorities. Immediate action in the local area will rest with the Port Safety Organisation, with follow-up support coordinated by the Australian Government. This Chapter sets out the broad, initial responses that the specified organisations are required to complete on indication of a reactor accident.

4.2 The scope of emergency action will cover accident notification, protective countermeasures, for example shelter, evacuation, radiation monitoring, decontamination, security and public information, as well as the services required to control, support and maintain these actions.

4.3 The primary objective is to ensure the safety of the general public from the potential hazards of a reactor accident. It is likely that reaction to the accident will need exhaustive examination to establish possible medical consequences, the validity of some aspects of the reaction and compensation aspects. In addition, the accident itself and subsequent response will certainly attract considerable public and political attention. The overall organisation will therefore come under close scrutiny, both during and after the event. Hence, the direction, control and coordination of the response must be unified, timely and effective, as well as being fully documented.

Notification

4.4 The occurrence of a reactor accident will be indicated by:

a. notification from the NPW, and/or

b. detection by the early warning radiation monitoring equipment.

Action

4.5 The immediate action to be undertaken by:

a. the Port Safety Organisation is to initiate emergency arrangements in accordance with the Port Safety Plan.

b. if a State/Territory has requested assistance from the Australian Government, NEMA will:

   (1) liaise with Australian Government Departments; and

   (2) coordinate Australian Government physical assistance (including international assistance).

c. Joint Operations Command is to:

   (1) alert CJOPS**;**

   (2) alert Air Headquarters to the probable requirement for the transport;

   (3) direct the provision of Australian Defence Force (ADF) support; and

   (4) liaise with NEMA on deploying ADF Liaison Officers within NEMA.

Nuclear-powered warship removal

4.6 Under certain circumstances it may be advisable for the NPW to remain at the berth or anchorage following a reactor accident. The decision on whether or not to request removal of the vessel would be made after consideration of the relative risks posed to members of the public and to personnel engaged in the removal operation. Advice from the Commanding Officer of the NPW would also be sought regarding the state of the reactor plant and the potential severity of the accident. The decision to request the removal of a NPW rests with the State/Territory Government. Guidance for decision-makers on removal of an NPW following an accident and actions at specific berths and anchorages are detailed in the following paragraphs.

GUIDANCE FOR DECISION MAKERS ON THE REMOVAL OF A NPW FOLLOWING AN ACCIDENT

Purpose

4.7 An effective measure for protecting the population from exposure to radiation following a reactor accident on a NPW in an Australian port could be the removal of the vessel to a remote anchorage or to sea. These guidelines have been developed to assist decision-makers in determining the circumstances under which vessel removal would be an appropriate protective measure.

Background

4.8 The possible need to move an NPW from its berth following a reactor accident is considered during the berth assessment. Berths are approved only if vessel removal is feasible without the risk of significant exposure to members of the public. Approval for individual visits is granted on the specific condition that in the event of a reactor accident the NPW will be removed on the direction of the competent Australian authority.

4.9 The Conditions of Entry for NPW to Australian ports require that there must be a capability to remove the NPW, either under its own power or under tow, to a designated safe anchorage or a designated distance to sea, as soon as possible within the specified time frame. The specified time frame is normally 24 hours for all berths except for those used by aircraft carriers for which the time frame is two hours, and others where a reduced removal time is specified.

4.10 All multi-reactor NPW have the capability to move under their own power following an accident. In the case of single reactor NPW or nuclear-powered aircraft carriers berthed alongside a wharf, RAN tug(s) will be on stand-by to tow the vessel. Protective measures to be adopted by crews of towing vessels and by shore parties involved in vessel removal are provided in Chapter 5 Annexes A and B respectively.

Objective

4.11 The aims of removing a NPW from its berth following an accident are to:

a. minimise, to the extent practicable, the exposure of individuals and the overall population to radioactive materials;

b. restrict individual and population radiation doses to within the limits stated in the radiological assessment criteria;

c. minimise, to the extent practicable, contamination of the port and surrounding areas due to deposition of radioactive material; and

d. minimise, to the extent practicable, disruption of the normal use of the port and surrounding areas.

Information about the accident

4.12 The following information will assist in making a decision on the appropriateness of vessel removal following a reactor accident:

a. the character, severity of the accident and the type and likely duration of the fission product release. There may be uncertainties associated with this information which can only be clarified by the Commanding Officer (CO) of the NPW;

b. meteorological conditions (wind speed, direction and atmospheric stability measure) prevailing at the time and forecast for the next six to 12 hours;

c. the population distribution around the berth and along the removal route in relation to the meteorological conditions;

d. results of radiation measurements by the RMG;

e. the state of the sea, shipping movements in port and along the removal route and, in the case of submarines, the availability of towing vessels;

f. predictions provided by ARPANSA on the plume direction and product inventory;

g. the CO of the NPW is not essential to the removal of a vessel, as other officers will be qualified to take command during emergency removal; and

h. A list of questions to put to the CO or Duty Officer of a NPW are detailed in paragraph 4.63. The list is not exhaustive but should elicit sufficient information to assist local personnel in the implementation of local response measures.

Removal decision guidelines

4.13 The spectrum of possible accidents varies from those with no, or minimal, release of radioactive material to those with larger releases. The urgency for vessel removal will depend upon the rate of release of radioactive material to the atmosphere, the prevailing and forecast atmospheric dispersion characteristics and the wind direction relative to the surrounding population.

4.14 In general upon confirmation of an accident the aim should be to remove the vessel to the designated remote anchorage or to sea as soon as possible consistent with the objectives outlined above. In some cases a decision to remove the vessel should be able to be taken immediately. However, under some circumstances it may be advisable to delay removing the vessel, such as where the passage of the vessel would have a potential for higher exposure of the population and tug crews than if the vessel were to remain at its berth, or where the likely release would be minimal.

4.15 In deciding when to direct vessel removal consideration should weigh the relative risks:

a. to members of the public,

b. to personnel engaged in the removal operation, and

c. of potential impact on the port and surrounding areas.

4.16 A logic diagram to assist in making the decision to remove a vessel is given in figure 4–1 and specific information on individual ports is provided in paragraphs 4-30 to 4–62.

Responsibilities

4.17 Responsibilities associated with the decision to remove an NPW from port, and the flow of information between various groups is discussed below and summarised in Table 4–1.

State/Territory authority responsible for the removal decision

4.18 The State/Territory authority responsible for deciding to remove an NPW from port should be identified in the Port Safety Plan or Visit Operation Order. The CO NPW should be advised of the directive by the Harbourmaster or representative (paragraph 4–23) and the local naval authorities (paragraph 4–25) are to activate the tugs.

4.19 The decision will be taken on the basis of advice provided by the State/Territory Radiation Officer (SRO/TRO) in liaison with the Leader Radiation Monitoring Group (LRMG), the CO of the NPW, the Harbour Master, the CO of the local naval establishment/Defence Representative and the Bureau of Meteorology (BOM).

State/Territory Radiation Officer and Leader Radiation Monitoring Group

4.20 The SRO/TRO will work in liaison with the LRMG. They should consult the CO NPW to gain information concerning the accident and the expected rate of release of radioactive material to the environment, and to seek views concerning removal of the vessel.

4.21 The results of surveys by the RMG will also provide information on the extent of the accident and may allow inferences about the rates of release of radioactive materials.

4.22 The CO NPW will be the person best positioned to provide technical, information of the nature, severity and the possible cause of the accident. Additionally, the CO NPW will be required to cooperate in the removal of the vessel.

Harbour Master

4.23 The Harbour Master (HM) is the competent Australian authority responsible for directing removal of the NPW and also for controlling shipping movements within the port and its approaches.

4.24 The HM should be consulted concerning the state of the sea and shipping movements within the port and along the removal route. Care should be taken to ensure that shipping will not interfere with removal of the NPW or cause delays where significant exposures could result to the surrounding population.

Local naval establishment/Defence Representative Commanding Officer

4.25 A tug will usually be required for the removal of a submarine. The CO of the local naval establishment or Defence Representative, where there is no local naval establishment in the port, is responsible for activating the RAN Naval Pilot and tug crew. The Naval Pilot should be consulted concerning the practicality of towing the submarine in the prevailing conditions.

4.26 If the sea state was to make towing impractical, it is probable that the prevailing meteorological conditions would provide good dispersion and dilution of airborne radioactivity, so that removal would be less urgent.

Bureau of Meteorology

4.27 Wind speed and direction, and atmospheric stability, are major factors influencing the dilution and dispersion of radioactive material released during an accident and the resulting exposure of the public. In particular, stable atmospheric conditions with low wind speeds have the greatest potential for significant doses from airborne releases.

4.28 Prevailing meteorological conditions, and their forecast pattern in the hours following an accident, may influence the decision on when to remove the vessel. The meteorological pattern differs for each port and Port Safety Schemes make provision for ongoing advice on meteorological conditions.

4.29 Weather information will be available from the NPW and should be sought during the initial reaction to a reactor accident in addition to that provided by the BOM.

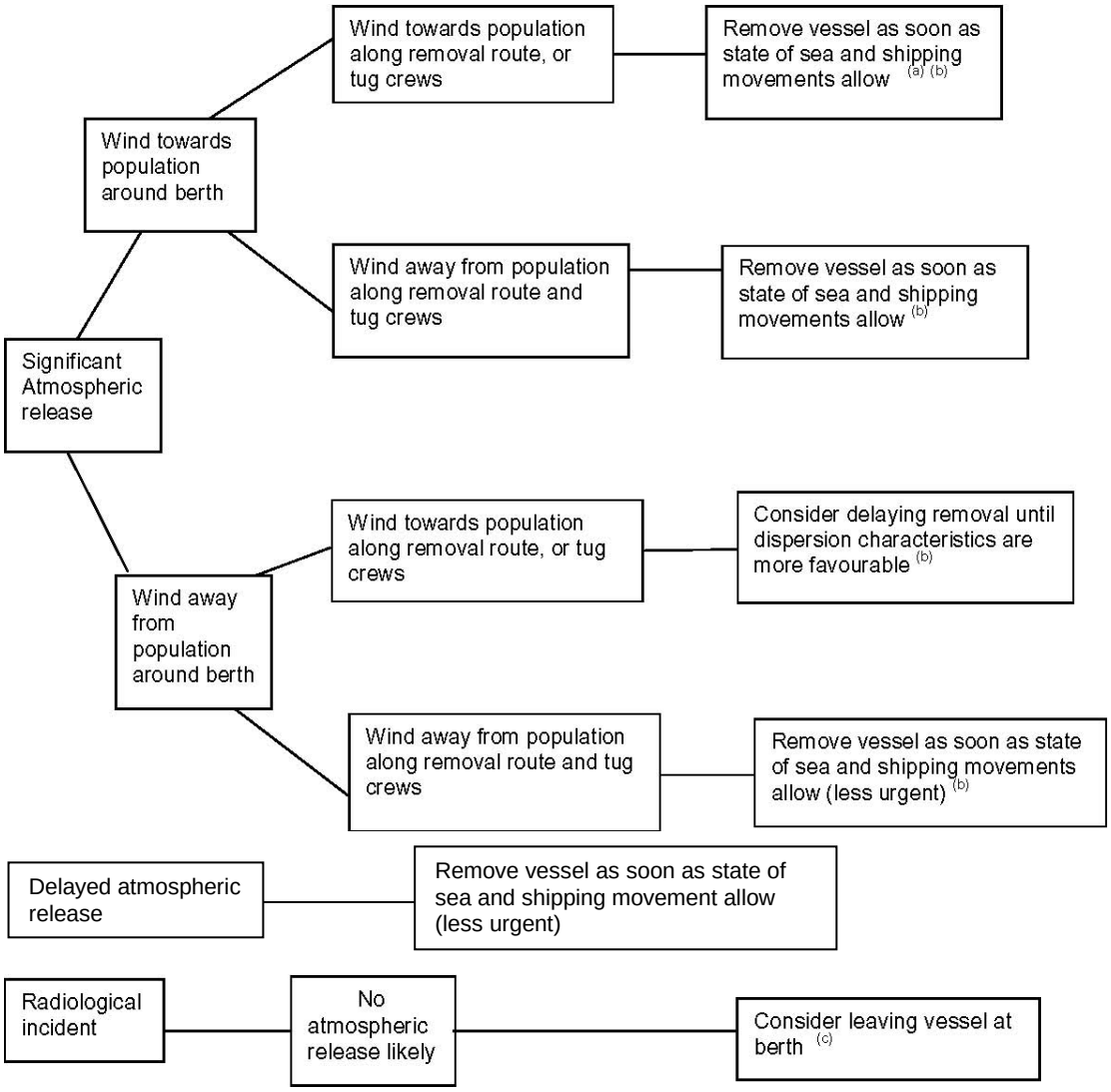

Figure 4–1: Logic diagram for vessel removal

NOTES

a. In general the exposure of the population during the transit of a vessel would be small and considerably less than might result if the vessel were to remain at its berth. This is due to the short time exposure and the diluting effects of the moving vessel.

b. Exposure to tug crews should be minimised to the extent practicable by choosing the removal path and time to avoid putting the tug in the path of the radioactive plume.

c. An incident might occur in which the release of radioactive fission products to the atmosphere is unlikely. Control of the incident might be better managed while the vessel remains at its berth. Such actions would be undertaken in consultation with the CO NPW.

OFFICER	INFORMATION	RESPONSIBILITIES
DSES/DTES	Seek advice from: • SRO/TRO in liaison with LRMG • CO NPW • HM • CO Local Naval Establishment (COLNE)	• Deciding to move NPW • Instructing HM to require NPW removal • Instructing COLNE to implement removal of submarine by tug
SRO/TRO	Seek advice from: • LRMG on RMG survey results • ARPANSA on plume predictions Advise DSES/DTES on: • Desirability of removing NPW • Preferred timing for NPW removal	• Forewarn HM that removal of NPW may be required • Forewarn COLNE through DSES/DTES that tug may be required.
LRMG	Seek information from: • FATs on: – radiation dose rates – field conditions • BOM on: o prevailing atmospheric conditions, o forecast atmospheric conditions. • CO NPW on prognosis of accident Advise SRO/TRO on: • Results of monitoring surveys, • Prognosis of accident, • Preferred timing for NPW removal	• Direct FATs before, during and after removal operation • Interpretation of RMG field monitoring surveys • Advise and assist SRO/TRO. • Oversee monitoring and protection of tug crew and shore party involved in vessel removal
CO NPW	Advise LRMG, DSES/DTES on: • Prognosis of accident • Prevailing atmospheric conditions	• On instruction/direction from HM, remove NPW
HM	Advise DSES/DTES on: • Shipping movements o in port o along removal route • State of sea	• Instruct/direct CO NPW to: o remove NPW • Control shipping movement: o in port o along removal route
COLNE	Advise DSES/DTES on: • Availability of tug • Practicality of towing submarine under prevailing conditions	• Direct tug crew to: o prepare to remove submarine o tow submarine to designated anchorage
TUG CREW SHORE PARTY	Seek information from NPW on mooring and rigging details	• On direction from COLNE o prepare to remove submarine o tow submarine to designated anchorage
BOM	Advise LRMG and SRO/TRO on: • Prevailing atmospheric conditions • Forecast atmospheric conditions	

Table 4–1: Responsibilities, information and actions

INFORMATION FOR SPECIFIC BERTHS AND ANCHORAGES

4.30 Information on population distributions relative to vessel removal routes, and meteorology, is given below for individual ports, for use in conjunction with the logic diagram for decisions on vessel removal.

TASMANIA—HOBART

Population

4.31 The route from the approved anchorages to the remote anchorage passes between populated areas to the east and west of the Derwent River, with the majority of the population on the western shore.

Meteorology

4.32 The main winds are from the north and northwest, induced by the orientation of the Derwent Valley, which acts as a natural channel for the drainage of cold air at night. A high frequency of inversions with the onset of early evenings, particularly in autumn, are associated with these winds. They also give rise to fogs, particularly during winter months, which may persist until midday. The 9.00 AM wind rose shows a strong prevalence of winds from the northwest with velocities generally less than five metres per second.

4.33 Next in importance is the sea breeze from the south to southeast in the afternoons during summer months. These can also be associated with atmospheric inversion conditions, which result from the cooler air from the ocean moving in under the warm air cover of the landmass, in a convection pattern. The 3.00 PM wind rose shows velocities of the sea breezes generally to be greater than 5 metres per second. Afternoon inversions resulting from sea breezes are less frequent, of shorter duration, and less stable than those associated with the night-time katabatic winds.

Comments and removal times

4.34 The approved anchorages in the Derwent River for NIMITZ class aircraft carriers and nuclear submarines are remote from populated areas. The emergency planning UPZ represents the limit to which it may be necessary to implement protective measures to prevent radiation doses from exceeding the individual dose criteria if the vessel is moved within the maximum period permitted. The removal times for aircraft carriers is two hours and four hours for submarines.

WESTERN AUSTRALIA—HMAS STIRLING AND GAGE ROADS

Population

4.35 There are no populated areas in the vicinity of the routes from the approved berths and anchorages to the remote berth and anchorages.

Meteorology

4.36 Studies to the south of Fremantle indicate that stable atmospheric conditions occur less frequently than on the southeast coast of Australia. Once established, however, the period of persistence of stable conditions is similar at around 12 hours.

4.37 The BOM estimate that slightly stable conditions occur for about 13 per cent of the time, and moderately stable conditions for about 3.5 per cent of the time. During conditions of stability, winds tend to be faster than on the southeast coast. Wind speeds of less than 2 m per second occur less than two per cent of the time during stable conditions. These conditions occur almost exclusively at night and are seldom associated with winds, which would carry airborne contamination across the populated areas of the city.

Comments and removal times

4.38 At HMAS *Stirling* exposure of the public should not be significant while the vessel is at its berth or during its removal, since the distance to the mainland is in excess of 5 km. Once the base has been evacuated of personnel the most relevant benefit from removing the vessel would be the protection of the base from radioactive deposition. Removal time is two hours for aircraft carriers and 24 hours for a submarine.

ALBANY

Population

4.39 Populated areas lie to the north of the initial part of the route from the approved anchorage to the remote anchorage.

Meteorology

4.40 Estimates of the likely frequency of atmospheric inversions and associated wind directions are not available. However, inversions would normally be expected to last for a few hours, starting in the early hours of the morning and breaking up at sunrise.

4.41 Seasonal and diurnal wind roses indicate that winds from the south-west are frequent (up to 35 per cent of occasions) throughout the year, and from June to November winds from the north-west are experienced on up to 40 per cent of occasions. Wind speeds in excess of 10 m per second are frequent. Calms are very rarely experienced during the daytime.

Comments and removal times

4.42 Removal time is two hours for submarines.

QUEENSLAND—PORT OF BRISBANE

Population

4.43 There are no populated areas in the vicinity of the route from the approved berths to the remote anchorage.

Meteorology

4.44 The BOM has provided information obtained from observations at Brisbane Airport. The seasonal north-south oscillation of the sub-tropical high-pressure belt produces a generally south-easterly air stream over Brisbane during the warmer months and a mainly south-westerly stream in winter.

4.45 A fairly high frequency of inversion conditions can be expected in association with light winds at night, particularly during the winter months. Night-time winds are predominantly south to south-westerly throughout the year, with a fairly high proportion of calm conditions and light winds prevailing. This is generally a reflection of the basic wind field during the winter months and a land breeze effect during the summer months.

4.46 Winds tend to strengthen during the morning and by mid-afternoon the frequency of calm and very light winds is small. From September through to January north-easterly sea breezes predominate in the afternoons. Wind directions during other times of the year generally reflect the basic south-westerly or south-easterly fields. Higher wind speeds observed during daylight hours are indicative that stable atmospheric dispersion conditions are unlikely to persist past mid-morning.

Comments and removal times

4.47 Removal time is two hours for aircraft carriers and four hours for a submarine.

PORT OF GLADSTONE

Population

4.48 There are no populated areas in the vicinity of the route from the approved berths to the remote anchorage.

Meteorology

4.49 Low level inversions are uncommon in the spring and summer months however, do occur in the late autumn and winter months. Inversions are most common in June and July. Generally the inversion will break up as the temperatures start to rise after sunrise.

4.50 The wind is mainly onshore throughout most of the year, with southeast to northeast winds predominating. During the spring, summer and autumn months morning winds are east to south east becoming east to northeast in the afternoon with the onset of the sea breeze. Overnight winds during these seasons are generally south to southeast. The winter winds are normally southeast to southwest, tending south to southeast in the morning and swinging round east to northeast in the afternoon. The wind strength generally increases in strength as the day progresses reaching a peak around mid to late afternoon. Calm conditions during daylight hours are uncommon.

Comments and removal times

4.51 The remote anchorage is approximately one mile north east of the berth. Removal time is two hours for submarines.

NORTHERN TERRITORY—DARWIN

Population

4.52 There are no populated areas in the vicinity of the route from the approved anchorages to the remote anchorage.

Meteorology

4.53 Surface inversions at Darwin are mainly due to radiative cooling of the atmosphere during the night, starting soon after sunset, being established by 9.00 PM and clearing by 9.00 AM the next day. The highest incidence occurs during the dry season and particularly from May to August with a 50 per cent occurrence during June and July. Winds are persistently south-easterly at this time of year and are usually of low velocity (about 1 to 2 metres per second), but could exceed 5 metres per second. There is little land and sea breeze effect.

4.54 Intense inversions lasting nearly 24 hours may occur two or three times from May to August. They are probably subsidence inversions, which arise when strong anticyclone conditions exist over South Australia and strong south-easterlies reach the Darwin area. Wind speeds may exceed 10 m per second.

4.55 Rainout could be an important dilution mechanism of atmospheric pollutants during the monsoonal wet season.

Comments and removal times

4.56 Removal time is two hours for aircraft carriers and 24 hours for submarines.

VICTORIA—PORT OF MELBOURNE

Population

4.57 The route from the anchorage to the remote anchorage is in a southerly direction away from the population.

Meteorology

4.58 Data collected from at Fisherman's Bend indicates that stable atmospheric conditions, including inversions, exist for some 50 per cent of the time. The estimated duration of the inversions averages about 13 hours and they generally break up early in the mornings. Wind directions during stable night-time conditions are predominantly from the north to the northwest and away from the population. Afternoon immersion conditions may occur infrequently and have winds blowing from the south or southwest towards heavily populated areas.

Comments and removal times

4.59 Removal time is two hours for aircraft carriers and 24 hours for submarines.

NEW SOUTH WALES—JERVIS BAY

Population

4.60 There is no residential population within 1.2 km of the anchorage. HMAS *Creswell* and Australian Government territory is within 1.9 km of the anchorage. The removal route for the vessel is away from populated areas.

Meteorology

4.61 Atmospheric inversions can be expected on about one in three nights during summer and one in two nights at other times of the year. They are associated with calm winds on about one in four nights and with light winds from the northeast quadrant about one in six nights. Winds from all other directions are rarely associated with surface inversions.

Comments and removal times

4.62 Removal time is two hours for submarines

Questions to the NPW Commanding Officer or Duty Officer in the event of a reactor accident

4.63 The following are questions that should be asked of the Commanding Officer, or Duty Officer of a NPW in which a reactor accident is suspected or known:

a. could you provide some information on the character of the accident and its potential for major release of radioactive material?

b. does the accident involve:

   (1) a release of radioactive material outside the reactor cooling circuit,

   (2) a release of radioactive material into the reactor compartment,

   (3) Leakage of radioactive material outside the reactor compartment, and

   (4) Leakage of radioactive material into the environment.

c. could you provide information on the expected development of the accident, and expected release of radioactive material over the:

   (1) next hour,

   (2) next four hours, and

   (3) next 12 hours.

d. are there any immediate or impending off-site emergency actions required to protect the Australian public?

e. is it possible for the vessel to put to sea under its own power or is assistance from the Australian Navy tug required?

f. do you need assistance from any Australian authorities to pick up injured or other ship's personnel?

g. is it safe for Australian vessels to put alongside and are there any restrictions on their approach?

h. how many casualties or crew need to be landed from the vessel, and what is the extent and type of their injuries and contamination?

i. could you advise of any local wind speed and direction information in the vicinity of the vessel?

j. could you advise who will be handling the interfacing of your countries emergency response measures and press releases with Australian authorities?

Guidelines on sheltering beyond Precautionary Action Zone

4.64 For those situations where a large number of people may be exposed to airborne radioactivity, immediate countermeasures following preliminary monitoring would be to advise them, as applicable, to stay indoors in a suitable building or a proper shelter with as much protection between themselves and the outside as possible. All doors and windows should be tightly closed and forced ventilation systems, including air conditioning, turned off. Sheltering is generally one of the simplest countermeasures to implement and may provide considerable protection. It causes little social disruption and involves little risk provided it is imposed for relatively short periods of time (a few hours) and should be considered as the first countermeasure. Sheltering populations should be advised to listen to radio and/or television for further information and should be kept well informed.

4.65 Sheltering provides protection against external radiation from the radioactive contaminants in the air, from ground deposition, and protection from inhalation of contaminants. The effectiveness of sheltering depends on the type of building (wood or brick), including air tightness, and the situation within the building, generally basements provide the most effective shielding.

4.66 As monitoring proceeds, plans can be made for other countermeasures such as the distribution of potassium iodide prophylaxis, decontamination, evacuation, relocation and controls over foodstuffs if these are considered justified on the basis of the monitoring results. When the contaminants in the air have decreased significantly sheltering individuals should open windows and doors and switch on ventilation systems to remove any radioactivity that has accumulated in the building

4.67 Unplanned long-term sheltering (for 12 hours or more) could cause social, medical and psychological problems. Psychological problems may be particularly important if family members are separated or if those sheltering are not kept informed with regular and consistent information, advice and instructions.

CHAPTER 5

REQUESTS AND ROUTINE ARRANGEMENTS FOR VISITS

Visit requests

5.1 To obtain approval for the visit of a nuclear-powered warship (NPW), the relevant diplomatic mission will seek the Australian Government's agreement through a request passed, at least 42 days before a proposed visit, to the Department of Defence (Maritime Operations (MAROPS)) for consideration by the Visiting Ship's Panel (Nuclear). A recommendation is made by the VSP(N) for subsequent decision by the Minister for Defence through MAROPS. The Department of Defence conveys the Minister's decision and any conditions or restrictions that may apply during the visit to the diplomatic mission. State/Territory Governments are informed of the visit request and Ministerial decision by Department of Home Affairs, National Emergency Management Agency (NEMA).

5.2 When diplomatic clearance for a particular ship visit is passed to the requesting nation's diplomatic mission, details of the position of the specific berth/anchorage and the remote anchorage to be used during the visit and any special removal requirements for that berth/anchorage are to be included if known.

Port Safety Organisation

5.3 During all visits by NPW to ports under the jurisdiction of State/Territory authorities, the State/Territory will activate and control the operation of a Port Safety Organisation to initiate the actions and provide the services necessary to safeguard the public in the event of a reactor accident. Relevant Australian Government departments will be available to provide assistance if required. The Royal Australian Navy (RAN) will implement and control safety plans for those ports under its control.

Radiation monitoring

5.4 During all visits by NPW, the Australian Government, with State assistance where available, will provide radiation-monitoring services to detect any accidental discharge of radioactivity into the environment. Radiation monitoring is to be conducted in accordance with the guidelines stated in Chapter 3. Where possible the RAN is to provide assistance as detailed in Annex A to Chapter 3.

Security

5.5 Security will be provided by:

a. Defence Security Authority (DSA) will liaise with Australian Security Intelligence Organisation for an initial threat assessment to be issued to HQJOC and NEMA (AGNSR) at least three weeks before the arrival of each NPW. Assessment updates will be issued as necessary.

b. In the event that a security threat is identified which requires a nationally coordinated response, NEMA (AGNSR) will take carriage of the response. For lesser threats, DSA will be responsible for coordinating advisory action to the DSA Regional Security Office and the Provost Marshall—Navy (PM–N) who will liaise with State/Territory police regarding the appropriate security response.

c. The control of public movement and maintenance of public order outside military establishments will be conducted by State/Territory Police.

5.6 Advice of an NPW visit is usually classified until the Diplomatic Clearance has been granted. Declassification details for each particular visit will be advised by the Department of Defence.

Open days and visitors

5.7 Traditional ‘open days’, where the general public is allowed onboard, are not permitted for NPW or vessels berthed alongside a NPW. This does not exclude visits by organised groups and private guests.

5.8 The responsibility for evacuation of visitors rests with the State or Territory authority responsible for all aspects of the Port Safety Plan (PSP). In order to provide full accounting for visitors in the case of an evacuation a register should be maintained and be available to the responsible State/Territory agency.

Reporting

5.9 The Department of Defence and NEMA are to be kept informed of the progress of each NPW visit by the Commanding Officer (CO) of the local naval establishment/Defence Representative in the port or State/Territory jurisdiction as appropriate. In particular they are to report any incident of note occurring prior to or during a visit involving:

a. public reaction or media comment,

b. security, and

c. provision of supporting services.

Visit clearance action

5.10 When notified of a visit request, the VSP(N) will consider the necessary practical arrangements; in particular, the VSP(N) will:

a. Through the National Port Services Organisation:

   (1) confirm the availability of the appropriate berth/anchorage;

   (2) confirm the availability of Naval Pilot(s);

   (3) confirm the provision of emergency towing arrangements for single reactor vessels and multi reactor vessels (when berthed alongside);

   (4) confirm the provision of a radiation monitoring vessel for NPW at anchor; and

   (5) consider the detailed visit program to determine of any proposed activities that are incompatible with radiological safety requirements.

b. Confirm the availability of:

   (1) the Port Safety Organisation (through NEMA);

   (2) the mobile monitoring units (through ANSTO); and

   (3) the Early Warning System (through ARPANSA).

c. through MAROPS inform NEMA

d. through NEMA, advise the Premier’s/Chief Minister’s office and the Director of the Emergency Service of the State/Territory concerned;

e. conducting the consultations required to obtain approval for the visits and generally overseeing arrangements made by the various authorities to ensure that all the appropriate safety arrangements are in place;

f. through Defence inform Defence Security; and

g. forward a recommendation on visit approval to MAROPS.

ORGANISATIONAL RESPONSIBILITIES

5.11 The responsibilities for the conduct of routine arrangements prior to, during and after the visits of NPW are shared between Australian Government and State/Territory authorities.

Department of Defence

5.12 Defence is responsible for:

a. Arranging the preparation of a threat assessment for each visit in accordance with paragraph 4.5.

b. Liaising with NEMA and, through DSA Regional Security Offices and PM–N State/Territory authorities as appropriate to the level of threat.

c. **Royal Australian Navy:** Through MAROPS, the National Port Services Organisation, CO of the local naval establishment or Defence Representative in the port for:

(1) arranging port and berthing facilities;

(2) arranging the Naval Pilots;

(3) coordinating arrangements for visits as may be required by VIPs, in consultation with Federal and State/Territory police as appropriate;

(4) providing appropriate and adequate ship-to-shore transport and other auxiliary support;

(5) preparing the PSP for ports under RAN control and ensuring the implementation of the Naval Nuclear Ships Safety Organisation and pending the agreed level of assistance at civilian ports to State/Territory Governments required in their PSP;

(6) arranging tugs to provide the emergency towing capability for visiting single reactor vessels and multi reactor vessels (when berthed alongside);

(7) providing a vessel for radiation monitoring of NPW at anchorages; and

(8) For visits to HMAS *Stirling*, provision of an additional field assessment team.

d. **Royal Australian Air Force:**

(1) Providing air support for the transportation of emergency support equipment (in accordance with Annex D to Chapter 3); and

(2) Providing air transport of early warning radiation monitoring equipment and other equipment to NPW visit ports using scheduled flights if requested by ANSTO and ARPANSA.

e. **Local Defence Representative:**

(1) media releases, in consultation with the appropriate local Senior Naval Officer; and

(2) in ports not served by a conveniently situated naval establishment, undertaking the responsibilities listed in subparagraph f. below.

f. **Local Naval establishment or Naval Headquarters:**

(1) liaising with State/Territory authorities as required by Port Safety Organisations;

(2) arranging assistance to radiation monitoring teams (in accordance with Annex A to chapter 3);

(3) coordinating appropriate visit support; and

(4) arranging service berthing parties if required, from locally based personnel.

g. **Joint Heath Command:**

(1) providing potassium iodide tablets for defence personnel in naval ports, navy crewed emergency tugs, naval pilot(s) and shore parties; and

(2) be prepared to provide medical support.

Australian Nuclear Science and Technology Organisation

5.13 ANSTO is responsible for:

a. provision of advice related to all aspects of radiation monitoring;

b. conducting radiation-monitoring operations, in cooperation with State authorities, ARPANSA and the area Naval Commanding Officer;

c. developing, maintaining and, as required, providing and installing, appropriate and adequate equipment for routine and emergency radiation monitoring;

d. providing leadership and training of radiation monitoring teams, and pre-visit exercises of the emergency response plan; and

e. providing emergency radiation monitoring equipment and appropriate personnel as required in the event of a reactor accident.

Department of Health and Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)

5.14 Through ARPANSA, the Department of Health is responsible for:

a. providing technical advice on all aspects of nuclear reactor safety matters;

b. providing technical advice on nuclear reactor accident modelling;

c. assessment of the suitability of specific ports for visits by NPW against radiological criteria;

d. providing advice on radiation protection and monitoring requirements;

e. providing the Early Warning System (EWS) for monitoring of the NPW;

f. participating in the environmental radiation monitoring operations and performing analyses of samples as required;

g. providing passive dosimeters to State authorities and RAN tug crews;

h. providing regularly updated plume modelling data;

i. participation with ANSTO and State/Territory in the analysis and assessment of post-accident radiation monitoring data; and

j. providing Australian Government Technical Advisers as required.

5.15 In the event of a reactor accident ARPANSA is responsible for the availability of back-up emergency monitoring equipment and personnel to support the State/Territory with longer term post-accident monitoring and recovery.

Department of the Prime Minister and Cabinet

5.16 The Department of the Prime Minister and Cabinet is responsible for providing the contact between Australian Government and State authorities on matters of policy, which may arise in relation to NPW visits.

Department of Foreign Affairs and Trade

5.17 The Department of Foreign Affairs and Trade is responsible for conducting formal exchanges with the representatives of diplomatic missions requesting and conducting NPW visits. The Department may also provide advice on foreign policy considerations relevant to a proposed visit.

Department of Home Affairs, National Emergency Management Agency

5.18 The National Emergency Management Agency is responsible for:

a. the coordination of Australian Government security arrangements when a threat is identified which requires a nationally coordinated response;

b. assisting with the development and maintenance of State/Territory Plans through the VSP(N) Technical Working Group (TWG);

c. liaising with the appropriate jurisdiction on port validation issues;

d. assist in the compilation of post exercise reports, through the TWG, for the Chairman of the VSP(N);

e. advising the Premier/Chief Minister's office via the Director of the State/Territory Emergency Service of forthcoming NPW visits. Initially by a sanitised message (port and visit dates) requesting that the PSP be activated. Advising full details when the visit is declassified;

f. Through the appropriate State/Territory instrumentality, confirming the availability of the Port Safety Organisation for each NPW visit; and

g. Coordinating Australian Government physical assistance to State authorities in the event of a reactor accident.

State/Territory Governments

5.19 State/Territory Governments are responsible for:

a. the preparation of PSP for the visits of NPW for those ports under their control;

b. issuing instruction for, and operation of, a competent Port Safety Organisation during the visit of a NPW;

c. if required, conducting a pre visit exercise;

d. advising the Chair VSP(N) of changing local factors, such as land use and population changes, which may affect the currency of NPW berths and anchorages, or approaches thereto; and

e. through the Australian Maritime Safety Authority issuing an appropriate Danger to Navigation message, giving details of intended NPW movements in the port approaches.

Public information

5.20 The local authorities will issue the visit press release on the day before arrival of an NPW. Appropriate local naval and civilian authorities should be consulted on the matter of timing and content. The Department of Defence is to be consulted if it is considered that an earlier release is appropriate.

CHAPTER 6

PORT ASSESSMENT PROCEDURES

Basis of berth suitability

6.1 The assessment of suitability for a berth is based on consideration of radiation safety factors for each berth and anchorage, including estimates of the individual and collective radiation doses to the public in the event of a Reference NPW Accident, these dose estimates are used to determine:

a. On the basis of the affected population, if it is feasible to plan to protect individuals at the intervention levels specified in ARPANSA publication Radiation Protection Series G-3— *Guide for Radiation Protection in Emergency Exposure Situations (2019)*, and

b. whether the assessed effective doses are acceptable.

6.2 The specific sized planning zones for protective measures applies for all berths and anchorages, based on the particular class of NPWs and for the applicable removal times. However, the assessment of the collective radiation dose to the population surrounding a berth or anchorage depends on the particular berth or anchorage being considered.

NPW Reference Accident

6.3 The NPW Reference Accident is a loss of coolant accident that results in the melting of the fuel in the reactor core and the release of volatile and gaseous fission products to the reactor containment or to the atmosphere and dispersed according to the prevailing weather. For the purposes of emergency planning it is considered that the NPW Reference Accident represents a conservative upper limit of potential radiological risk to the public. From information available it has been estimated that the probability that such an accident would occur during a four or five-day visit to port would be less than one in a million per reactor per year.

6.4 Little technical information is available to Australian authorities on the reactors and associated plant of an NPW. In particular, no information is available on fission product inventory or engineered safety features such as emergency core cooling, fission product containment or clean up systems. The assumptions, models and parameters used in the NPW Reference Accident have been selected to ensure conservatively high estimates of individual and population doses.

Towing vessel crew protection

6.5 Specific safety measures to be adopted by towing vessel crews are detailed in Annex A to this chapter. The importance of the specific protective measures listed could vary according to on-the-spot circumstances. However, in the absence of actual radiation protection measurements, these protective measures should be observed.

Shore party protection

6.6 The hazard from direct radiation from the vessel, particularly close to the reactor compartment, could be extreme and the actual radiation levels are to be measured before any approach to the vessel is undertaken. Radiation protection personnel should be available to undertake radiation measurements and to advise on permissible exposure times. Unless specific instructions to the contrary are given, the protective measures detailed in Annex B to this chapter are to be observed.

Time to remove vessel

6.7 An effective measure to reduce the radiation exposure to the public and emergency personnel from the radioactive plume downwind of the release is the rapid removal of the vessel. In accordance with Condition (e) in the Conditions of Entry detailed in Chapter 1, the time available to achieve this is dependent upon the population distribution around the particular berth since this determines the extent of the UPZ boundary. Characteristics of the berth and surrounding waterways must facilitate rapid removal of the vessel.

6.8 In discussions with US naval representatives, the Department of Defence has confirmed that US NPW having more than one reactor can rely on either reactor for manoeuvring the ships regardless of the condition of the other reactor plant, and that these vessels are maintained in a high state of readiness to go to sea. The Department of Defence has determined that there would be no requirement to provide tugs to assist in the removal of multi-reactor vessels with a damaged reactor, at anchor. However, there would be a requirement to provide tugs to assist in the removal of multi-reactor vessel berthed at an alongside berth and for all single reactor vessels with a damaged reactor.

Approved primary and secondary berths and anchorages

6.9 Berths and anchorages (including remote anchorages) which have been assessed as suitable, subject to adequate arrangements being made for the visit of each particular unit, are detailed at paragraph 6.14. The only Ports cleared for use by NIMITZ Class NPW are Brisbane, Darwin, Fremantle, Hobart and Melbourne.

VALIDATION

Procedure

6.10 A port validation is a process of review and assessment against the arrangements detailed in this document. The aim of the validation is to ensure that the State/Territory NPW visit arrangements meet the Commonwealth's requirements. The validation process includes:

a. Compliance evaluation of the Port Safety Plan (PSP) and arrangements by the TWG against this document;

b. Completion of the Port Safety Plan Proforma and the Socio-Economic Assessment by the jurisdiction for evaluation by TWG;

c. Meeting with the local NPW committee and the conduct of a deployment exercise;

d. Confirmation of testing of port safety plans (drills and exercises); and

d. Preparation and tabling of the validation report to the VSP(N).

6.11 Each year the TWG will develop a rolling plan that will enable all NPW ports to be validated every two years for Tier 1 Primary Ports and as determined by the TWG for all other ports. The TWG is also responsible for advising the ports and state/territory emergency services of the proposed validation visit schedule and when compiling the plan it is imperative that the relevant state/territory personnel are available. As a minimum the following personnel should be available for the duration of the validation visit;

a. State/Territory Radiation Health Officer;

b. Emergency Services Director (or nominated representative);

c. functional area responsible for the Emergency Plan; and

d. other state/territory officials with knowledge of NPW visits.

6.12 The Port Validation Assessment Proforma at Annex D provides guidance on the areas within the State/Territory PSP that should be addressed. The TWG will circulate the proforma to the lead jurisdiction six weeks before the visit to the port to be validated. The validation is a robust process that checks all parts of the emergency plans and in particular will pay attention to those areas within the Port that have changed since the previous validation to ensure the PSP meets the requirements and directives laid down by the Australian Government. These procedures are considered essential to safeguard the safety of the Australian public.

Conditions of Entry and validation requirements

6.13 The following table summarises Condition of Entry requirements for Primary and Secondary NPW ports and the routine requirements for port validation.

Conditions of Entry	**PRIMARY PORT TIER ONE**	**PRIMARY PORT TIERTWO**	**SECONDARY PORT TIER THREE**
Six week visit notification period	Yes	Yes	Not required.
Radiation monitoring with ANSTO LRMG	Yes	Yes	Not Required
Environmental sampling	Yes	Yes	Post visit only
Indemnity	Yes	Yes	Yes
Movement of vessels during daylight only	Yes	Yes	Yes See Note 1
Navigational controls on shipping	Yes	Yes	Yes
Standby tugs available during the visit	Yes	Yes	Not Required
Operating Port Safety Plan	Yes	Yes	Placed on standby
PORT VALIDATION REQUIREMENTS			
Port Safety Plan	Yes	Yes	Yes
Validation team visit biennially	Yes	No	No
Validation team to review PSP and conduct an exercise before visit	Not Required	Yes	No
Monitoring Group eExercise before a visit	Yes See Note 2	Yes	Not required
Biennial desktop review of Port Safety Plan	Not Required	Yes	Yes

Notes:
1. Unless conducting medical emergency transfer
2. eExercise — An exercise that does not require field deployment of the Radiation Monitoring Group

Table 6-1:—Conditions of entry and validation requirements

NPW Berth Availability

6.14 Table 6- 2 below describes berth availability for Classes of NPWs:

SHIP CLASS	FREMANTLE			HMAS STIRLING			ALBANY	MELBOURNE	HOBART	JERVIS BAY	BRISBANE	GLADSTONE	DARWIN		
	North	South	Outer	Berth	Anchor	Buoys	Anchor	Anchor	Anchor	Anchor	Berth	Berth	Berth	Anchor	Buoy
NIMITZ	Y4	N	N	N	N	N	N	Y4	Y4	N	Y	N	Y1/6	Y4	N
SUBMARINE	Y2/4	Y2/4	Y2/4	Y	Y4	Y	Y2/4	Y2/4	Y2/4	Y4	Y3	Y3	Y3	Y2/4	Y
PORT CLASSIFICATION	P	P	P	P	P	P	S	P	P	S	P	S	P	P	P
VALIDATION TIER	ONE			ONE			THREE	TWO	TWO	THREE	ONE	THREE	ONE		

Notes:

All port visits are to comply with long standing Conditions of Entry described in OPSMAN 1

1. Subject to navigational constraints (Limited draught)
2. Exposed anchorages not suitable for this class of vessel under certain weather conditions
3. Unsuitable for submarines without additional fendering
4. NPW are to anchor within one cable (200 yards) of the designated anchorage positions.
5. P = primary / S = secondary, All primary ports can also be secondary ports.
6. The berth may only be used if the minimum under keel clearance of 2.0 metres can be maintained during the visit.

Table 6-2: Availability of Berths for Classes of NPWs

ANNEX A TO
CHAPTER 6

PROTECTIVE MEASURES—TUG CREWS AND NAVAL PILOTS

1. Specific safety measures are to be adopted by tug crews and the Naval Pilot to minimise radiation hazard when engaged in NPW towing operations following a reactor accident.

2. The importance of the specific protective measures listed below could vary according to on-the-spot circumstances. However, the following protective measures should be observed:

a. The NPW is only to be approached from within a 30° angle of the bow or stern;

b. No approach is to be made within 200 metres of the beam of the NPW;

c. The downwind area of the NPW is to be avoided;

d. The time spent in the vicinity of the NPW is to be limited;

e. Prophylactic potassium iodide tablets are to be taken by all personnel before approaching the NPW;

f. Protective clothing is to be worn by all personnel prior to the tug entering the PAZ;

g. Respirators are to be worn by all personnel prior to the tug entering then PAZ;

h. Personnel are to remain under cover as far as possible;

i. Eating, and smoking is to be prohibited. Personnel may consume water by following RAN CBRN procedures; and

j. Individual dosimeters are to be worn by all personnel. For personnel required to be in the vicinity of the NPW and the dosimeters must be the digital alarm type. The alarm level will be determined by the Leader Radiation Monitoring Group (LRMG) as per the Radiation Monitoring Handbook. If the alarm level is reached, the personnel are to retreat from the radiation area and consult the LRMG, who will advise on further action. Additional exposure of personnel may be required to complete emergency actions as outlined in ARPANSA Document RPS G-3.

ANNEX B TO
CHAPTER 6

PROTECTIVE MEASURES—SHORE PARTIES

1. Specific safety measures are to be adopted by shore parties in order to minimise the radiation hazard from a NPW following a reactor accident when engaged in slipping to effect removal by a tug.

2. The hazard from direct radiation from the vessel, particularly close to the reactor compartment, could be extreme and the actual radiation levels should be measured as any approach to the vessel is being undertaken. Radiation protection personnel should be available to undertake radiation measurements and to advise on the following protective measures to be observed:

a. the downwind area of the NPW be avoided;

b. prophylactic potassium iodide tablets be taken by all personnel before approaching the NPW;

c. no approach within 200 metres of the beam of the NPW is to be undertaken unless under control of radiation protection personnel;

d. protective clothing and respirators are to be available and worn upon advice from radiation protection personnel; and

e. Individual dosimeters are to be worn by all personnel. For personnel required to be in the vicinity of the NPW and the dosimeters must be the digital alarm type. The alarm level will be determined by the Leader Radiation Monitoring Group (LRMG) as per the Radiation Monitoring Handbook. If the alarm level is reached, the personnel are to retreat from the radiation area and consult the LRMG, who will advise on further action. Additional exposure of personnel may be required to complete emergency actions as outlined in ARPANSA Document RPS G-3.

3. Personal protection packs for shore parties who may be engaged in casting off an NPW are also to be prepared and provided to the port visited on request of the area Naval Commanding Officer. Each pack is to contain:

a. 6 x Electronic Personal Dosimeters;

b. 6 x MK4 CBRN clothing outfit or equivalent;

c. 3 pair each size Gloves Protective Outer CBRN and 3 pair each size Gloves Cotton inner CBRN, Size 8–8½; and 3 pair each size Gloves Protective Outer CBRN and 3 pair each size Gloves Cotton inner CBRN Size 9–9½;

d. 3 pr Overboot CBRN Size 10/11, and 3 pair Overboot CBRN Size 12/14; and

e. 6 x Full face CBRN respirators (3 Medium and 3 Large).

4. Personal protection packs for shore parties are to be located with, but marked to distinguish them from, those prepared for towing vessel crews.

ANNEX C TO
CHAPTER 6

TOWING VESSEL EQUIPMENT

1. When placed on stand-by for emergency nuclear-powered warships (NPW) towing duties, tugs are to be equipped to provide protective clothing, personal dosimeter equipment and stable iodine tablets for each member of the crew and Naval Pilot(s), as well as carrying radiation monitoring instruments. A simple system for wash down of the decks and superstructure is also required. The tug is to be provided with an Early Warning System provided by ARPANSA and sufficient stable iodine tablets and personal protection packs for all embarked personnel.

2. Sufficient personal protection packs for tug crews and Naval Pilot are to be prepared and are to contain the following items or equivalent:

a. SOR/T (personal device), XOM/T (reader);

b. 1 x Mk4 CBRN clothing Outfit;

c. 1 pair Gloves Rubber, available sizes are 8 small, 9 medium or 10 large, 2 pair Gloves Cotton, available sizes are 8-8 ½ small, 9-9 ½ medium and 10-11 large; (Note 2)

d. 1 pair Boots Knee Rubber (Note 3); and

e. Full face CBRN respirator and filters (Note 4).

Notes:

1. Radiac Computer for passive dosimeter to be retained ashore by Royal Australian Navy (RAN) Radiation Monitor.
2. Glove quantities are per person.
3. Items come in three sizes—small, medium and large.
4. Unless a more suitable item is available and recommended by the Australian Nuclear Science and Technology Organisation.

3. Packs are to be made up in varying sizes to fit individual crew members. Where towing vessel crews are drawn from a ‘pool’ of sailors, equal numbers of medium and large sizes should be made up. The packs should be held in an easily accessible stowage area for issue to the crews.

4. Collective protection packs containing equipment to support two vessels and 20 personnel are required. The Commanding Officer of the local naval establishment/Defence Representative will draw these packs when a NPW visit is confirmed.

5. Specifically each collective protection pack is to contain:

a. 1 x Dose Rate Meter;

b. 1 x Radiac Computer;

c. 1 x Dosimeter Charger;

d. 1 x Digital Alarm Dosimeter (or similar); and

e. 200 (adult doses) potassium iodide tablets.

6. Personal protection packs also must contain the equipment listed in paragraph 2. These packs should be made up with equal proportions of medium and large size boots.

ANNEX D TO
CHAPTER 6

PORT VALIDATION ASSESSMENT PROFORMA

1. The Port Validation Assessment Proforma will be used by the VSP(N) Technical Working Group to conduct the validation and port assessment for existing or new NPW ports. When using this proforma care should be taken to account for variation in State/Territory emergency management arrangements and the geographical conditions of the site.

PART A—NUCLEAR POWERED WARSHIP PORT SAFETY PLAN

2. Port Plan …….. Port Classification: ……

3. Date of Review …….

4. Evaluation Team …….
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5. Date of Last Review ……

6. Related ARPANSA Radiological Assessment ……..……..…..

7. Date of Last Visit and Vessel Details ……..……

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8. Plan Manager: ……..……
Telephone No:..……. Mobile No: …….……...
Email: ……..…….

9. Persons Consulted:

Name ……. Organisation ……...
Name ……. Organisation ……...
Name ……. Organisation ……...
Name ……. Organisation ……...
Name ……. Organisation ……...
Name ……. Organisation ……...

Serial	Plan Contents	Yes / No	Remarks
1	**Introduction**		
a	Does the plan have: • Title, • Date of Issue, • Appropriate Distribution, • Amendment List, • Table of Contents, • Glossary, and • Date Last Reviewed (indicate date).		
b	Does the plan provide a background section on the nature of the hazard?		
c	Does the plan provide locations of key population centres and farming within 10km of the berth/anchorage such as schools, age care facilities, hospitals, dairy and egg production facilities?		
d	Does the plan provide details of the authority/legislation for the plan?		
e	Does the plan refer to associated plans and sub-plans?		
f	Does the plan make reference to the requirement for the issue of a Visit Operation Order?		
2	**Berth / anchorage facilities**		
a	Does the plan define the locations of the berths and/or anchorages (safe/remote)?		
b	Does the plan include clear charts/maps showing the berths/anchorages and surrounding areas?		
c	Does the plan provide details of berths regarding lengths, depth of water, sullage and other wharf services?		
3	**Organisation**		

a	Does the plan identify the State and Local authorities involved in the Port Safety Plan, including:
	• Organisational Structure (line diagram/organisational chart);
	• State Visits Committee Organisations (role and responsibilities);
	• Key personnel appointments and responsibilities (usually shown in Annex) including:
	  • Incident Controller/Manager,
	  • Radiation Protection Officer,
	  • Contact points for EWS alarms,
	  • Leader Radiation Monitoring Group, and
	  • Radiation Monitoring Personnel.		

b	Does the plan identify supporting organisations and locations e.g. NNSSO?		

Serial	Plan Contents	Yes / No	Remarks
4	**Plan procedures**		
a	Does the plan include a concept of operations, including: • Designation of EPZs, and • Procedures for evacuation or shelter in place		
b	Does the plan have a series of phases and the actions to be carried out in each phase/stage? • Actions on sounding of Alarm in the PAZ.		
c	Ship removal procedures including: • Towing arrangements, • Shore party arrangements, and • Protective equipment.		
d	Evacuation plan, including: • Decision criteria to evacuate; • Evacuation/Shelter in Place population in UPZ; • Special requirements – aged care facilities, schools, hospitals; • Transportation; • Evacuation shelters/facilities; • Routes and traffic control; and • Advising the public.		
e	Medical. Does the plan include: • Procedures for the decontamination of contaminated personnel, • Arrangements for the transport of contaminated personnel, • Arrangements for the treatment of radiological casualties at pre-designated hospitals, and • Potassium Iodide prophylaxis supply and distribution procedures.		
5	**Command, Control and Co-ordination arrangements**		
a	Does the plan include command, control and co-ordination arrangements, including: • Location of an EOC and alternate, • Staffing of the EOC, • SOPs for the EOC, including ✓ Standardised maps/charts and plotting procedures, ✓ Callout/alerting procedures, ✓ Liaison Officers, ✓ Information processing/Logs/Status Boards, ✓ Briefings, ✓ Hazard modelling, ✓ Shifts to allow 24 hour operations, and ✓ EOC equipment – telephones/computers.		

Serial	Plan Contents	Yes / No	Remarks
b	Communication plan, including: • Communications with the NPW, • Communications with Radiation Monitoring Team, • Communications with decontamination facilities, • Communications with other supporting agencies, • NPW visit points of contact.		
c	Procedures for obtaining meteorological information		
d	Contact details (Annex) – Local, State and Commonwealth		
e	Liaison channels with other departments		
f	Media arrangements and announcements, including • Nominated spokesperson and method of dissemination • Initial public announcement • Advice on evacuation • Advice on shelter in place		
6	**Radiation monitoring**		
a	Does the plan include: • Organisation and equipment of radiation monitoring teams • Call out procedures • Monitoring procedures in accordance with the Radiation Monitoring Handbook • Reporting procedures (for example MONREPS)		
b	Monitoring at decontamination facilities		
c	Radiological dose control		
d	Long term health measures, including: • Determination extent of radiological hazard in PAZ, UPZ and EPD • Protection of the public from ingestion of contaminated food • Monitoring and mapping of hazard areas • Procedures for declaring an area safe		
7	**Visit Operation Order**		
a	Does the VOO provide a summary of the vessels characteristics and include: • Visit timetable • Details on berth/anchorage • Location of monitoring teams / posts • Emergency communications nets • Frequencies • Contact procedures with the NPW • Personnel rosters • Telephone numbers		

Serial	Plan Contents	Yes / No	Remarks
8	**Maintenance of plans**		
a	Does the plan indicate a review process including: • When it is to be reviewed • By whom it is to be reviewed – planning committee • Where changes are to be forwarded		
9	**Training and exercises**		
a	Does the plan include: • What training is required by key appointments • How is the training obtained • What exercises are to be conducted • When exercises are to be conducted		

Plan Review Summary

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Plan Manager Comments

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Evaluator Date

PART B—ASSESSMENT AND VALIDATION OF PORT BERTHS AND/OR ANCHORAGES FOR VISITS BY NUCLEAR POWERED WARSHIPS

Date: ……

1. Port: ……

2. Number of approved berths and anchorages

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3. Number and location of remote anchorages

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4. Port description and significant changes since last validation

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5. Features of services for individual berths, anchorages and moorings, including firefighting facilities, access to water and electricity, fendering arrangements, crane services

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6. Features of remote anchorages

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7. Industry developments in the vicinity of berths, anchorages and moorings

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8. Potential hazards to NPW from industrial installations (hazardous cargo handling berths, use of adjacent berths).

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9. Potential hazards to industrial installations from an NPW accident

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10. Public infrastructure development within 10km (schools – number of pupils, hospitals – number of beds, major public buildings, airfields, milk and egg production facilities).

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11. Significant navigation features (including hazards, berthing difficulties, tidal and current information, proximity to other shipping).

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12. Features of area within the PAZ (population, boundaries – shoreline, fences, gates, provision of physical control and method of warning).

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13. Features of area within the UPZ (population density and distribution, ease of evacuation and control, food crops production and distribution, use of waterways).

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14. Provision for Remote radiation monitoring in the PAZ.

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15. Provision for decontamination of evacuees from the PAZ.

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16. Site specific meteorological information (including prevailing wind direction day and night, incidence of inversion conditions, average rainfall).

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17. Location of Emergency Operations Centres.

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18. Systems, radio networks, road network).

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19. State of readiness of the Port Safety Plan.

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20. Date of last emergency exercise.

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21. Availability of RAN assistance.

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22. Security arrangements for NPW visit.

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ANNEX E TO
CHAPTER 6

PORT/BERTH SOCIO—ECONOMIC ASSESSMENT OF <PORT> FOR USE BY NUCLEAR POWERED < NPW CLASSES>

References:
A. NPW 2014 Functional Model version 1.1
B. OPSMAN1 NPW Policy
C. <Applicable ARPANSA Radiological Assessment>

Background

1. Background information on the port.

Basis of assessment

2. This assessment has been conducted by the Jurisdiction in accordance with the methodology for berth assessments detailed at Reference A. ARPANSA has conducted the radiological assessment based on estimates of exposures to the public in the event of a hypothetical Reference NPW Accident.

3. The Reference NPW Accident uses conservative assumptions as defined in the ARPANSA Technical Report, *The 2000 Reference Accident used to Assess the Suitability of Australian Ports for visits by Nuclear Powered Warships*. ARPANSA has used the Reference Accident to determine whether collective doses would be less than the 200 person Sievert level established by the Australian Government, if offsite emergency intervention would be feasible and if contamination of the environment would restrict the long term use of land around the berth. The ARPANSA Report is at Enclosure 1.

4. References B and C require a x hour removal time for CVNs following an accident or x hours for submarines.

Port description

5. Include a detailed description of the port, navigation specifics and berth details.

6. Specifics on trade (import and export) to the port through the previous full FY when the assessment was made.

Anchorage

7. Details on any approved anchorages including any remote anchorages.

Socio-economic assessment

8. Potential Hazards to NPW from Industrial Installations (hazardous cargo handling berths, use of adjacent berths):

a. Identify and list the hazards

9. Potential Hazards to Industrial Installations essential infrastructure from an NPW Accident:

a. Identify and list the hazards

10. Potential hazards and disruptions to local industry, community, and service delivery provisions from a NPW accident:

a. Identify and list the hazards and disruptions

11. Socio economic impact on the port, port environs and State/Territory in the event of a reactor accident:

a. Identify and detail the impact on the port and environs

12. Public Infrastructure development and affected population within 5km (schools – number of pupils, hospitals – number of beds, major public buildings, airports, critical infrastructure, impact on the port, milk and egg production facilities):

a. Total population of the port concerned if the proposed berth is alongside;

b. Total population within a 10km radius if the berth is an anchorage;

c. Total populations of any towns or large villages within 10km radius of the berth

d. Population within circles at the following ranges from the berth:

1. 0-200 metres
2. 200-400 metres
3. 400-600 metres
4. 600-900 metres
5. 900-1500 metres
6. 1.5 – 2.0 kilometres
7. 2-5 kilometres
8. 5-15 kilometres

e. Population within circles at the following ranges from the egress path of the vessel from the port.

1. 0-200 metres
2. 200-400 metres
3. 400-600 metres
4. 600-900 metres
5. 900-1500 metres
6. 1.5 – 2.0 kilometres
7. 2-5 kilometres
8. 5-15 kilometres

Features of the planning zones

13. Essential economic or social features of Area within Zone 1 (population, boundaries of Zone 1 – shoreline, fences, gates, provision of physical control, method of warning, installations, essential activities such as fuel import and distribution).

a.

14. Essential economic or social features of Area within Zone 2 (population density and distribution, ease of evacuation and control, food crops production and distribution, use of waterways essential activities such as fuel import and distribution).

a.

Conclusions

15. Precis of the social-economic impact to the port and environs in the event of a reactor accident

Compiled by:

<DATE>

GLOSSARY

Accident	An accident is any occurrence unintended by the operator, including operating error, equipment failure or other mishap, and deliberate or malicious action on the part of others, the consequences or potential consequences of which are not negligible from the point of view of protection and safety.
Annual radiation monitoring report	A **r**eport on the results of Marine Sampling and Environmental Monitoring conducted before, during and after NPW visits. The report is circulated to Australian Government, State and Territory authorities concerned with NPW visits.
MONREP	Report on radiation measurements conducted in the field and transmitted to the Emergency Operations Centre by radio or other technology
Port Safety Plan	Contingency plan drawn up by State/Territory authorities providing the State/Territory response arrangements for NPW visits in the event of a reactor accident)
Primary port	Is a validated port for NPW visits.
Reference Accident	An accident scenario upon which port radiological assessment and response planning is based.
Removal time	There must be a capability to remove the vessel, either under its own power or under tow, to a designated safe anchorage or a designated distance to sea as soon as possible within the time frame specified for the particular berth or anchorage.
Secondary port	Is a validated port for short duration visits (less than two hours), for example: medical emergencies, stores or personnel transfers.

ACRONYMS

ADF	Australian Defence Force
AGNSR	Australian Government National Situation Room
ANSTO	Australian Nuclear Science and Technology Organisation
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
BOM	Bureau of Meteorology
COLNE	Commanding Officer Local Naval Establishment
CTA	Commonwealth Technical Adviser (a senior radiation protection officer—the CEO ARPANSA or delegate fulfils this role)
CVN	Nuclear powered aircraft carrier
DSA	Defence Security Authority
DSES/DTES	Director of State Emergency Services or Director of Territory Emergency Services
EPD	Extended Planning Distance
FAT	Field Assessment Team Unit (a component of the RMG)
GPS	Global Positioning System
HMAS	His Majesty's Australian Ship (an Australian warship)
HMS	His Majesty's Ship (a warship of the United Kingdom (RN)
HQJOC	Headquarters Joint Operations Command
ICRP	International Commission on Radiological Protection
LRMG	Leader Radiation Monitoring Group
MA	Master Attendant (RAN officer responsible for Port Services nationally)
MAROPS	Maritime Operations
MONREP	Radiation monitoring report
NEMA	National Emergency Management Agency
NNSSO	Naval Nuclear Ships Safety Organisation
NPW	Nuclear Powered Warship
NPWVC	Nuclear Powered Warship Visits Committee
NHQ	Naval Headquarters in Hobart
PAZ	Precautionary Action Planning Zone
PM-N	Provost Marshall-Navy
PSP	Port Safety Plan
RAN	Royal Australian Navy
RMG	Radiation Monitoring Group
RN	Royal Navy
SSN	Nuclear powered attack submarine
SRO	State Radiation Officer
TECHRMG	Technician Radiation Monitoring Group
TRO	Territory Radiation Officer
TWG	Technical Working Group
UPZ	Urgent Protection Action Planning Zone
USN	United States Navy
USS	United States Ship (a warship of the United States of America)
VOO	Visit Operations Order
VSP(N)	Visiting Ships Panel (Nuclear)