

▶ The Pilaster Deployment Mururoa 1973 A Radiological Review



New Zealand

**VETERANS'
AFFAIRS**

Te Tira Ahu Ika A Whiro

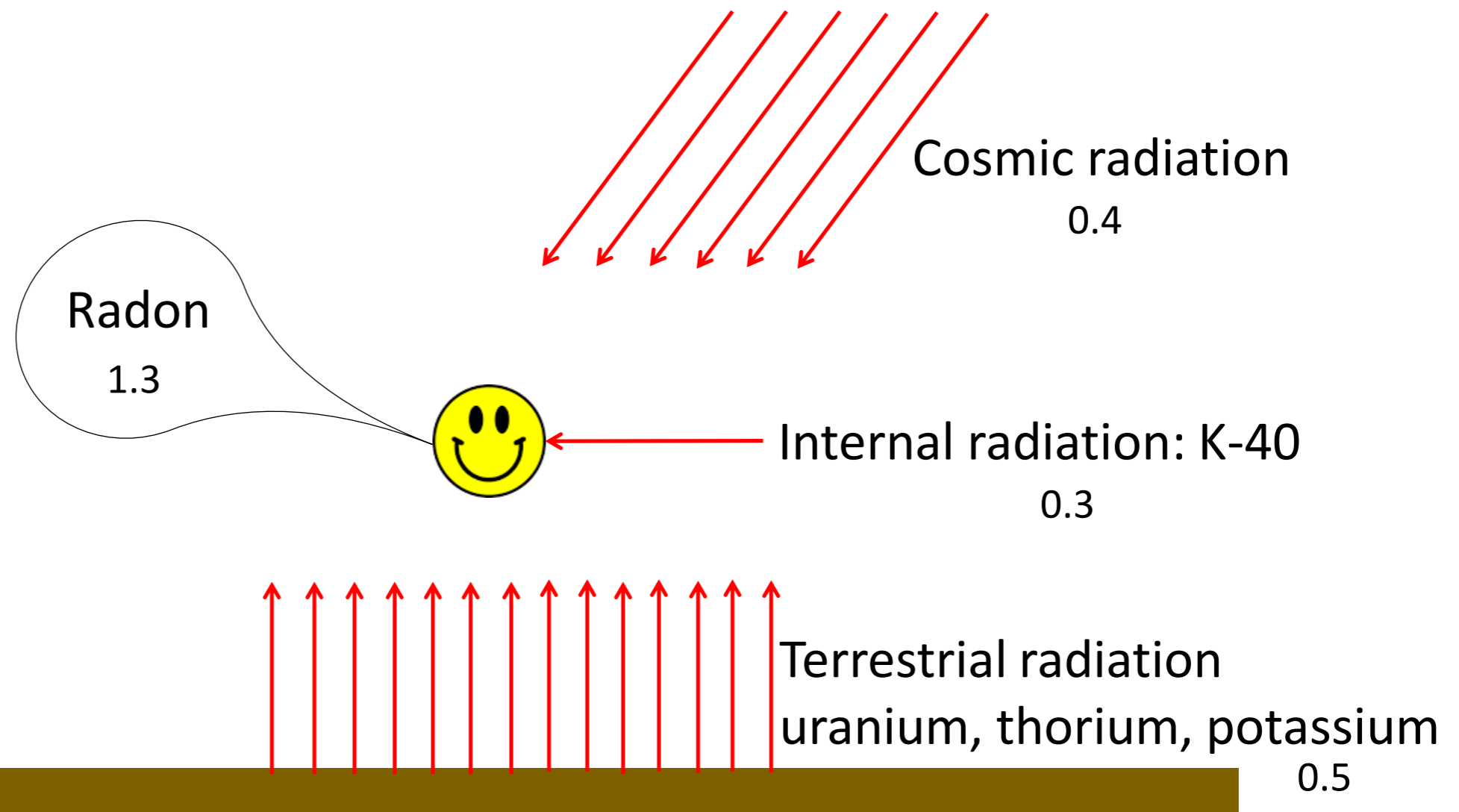
Scope and purpose

ESR was tasked with documenting the current state of knowledge about the radiological impact on crew and passengers of the 1973 Mururoa voyages of HMNZS OTAGO and HMNZS CANTERBURY, in order to be able to re-evaluate any possible radiation exposure of the ships' crews and passengers.

Setting the scene: natural radiation

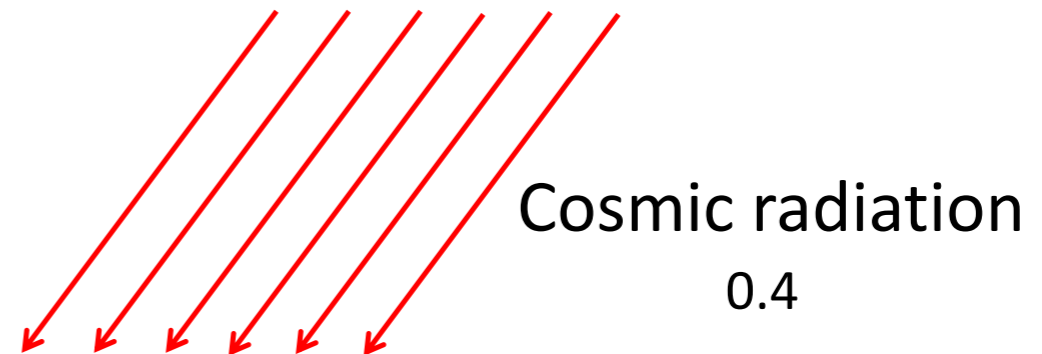
exposure

Total natural
dose (mean):
2.5 mSv/y



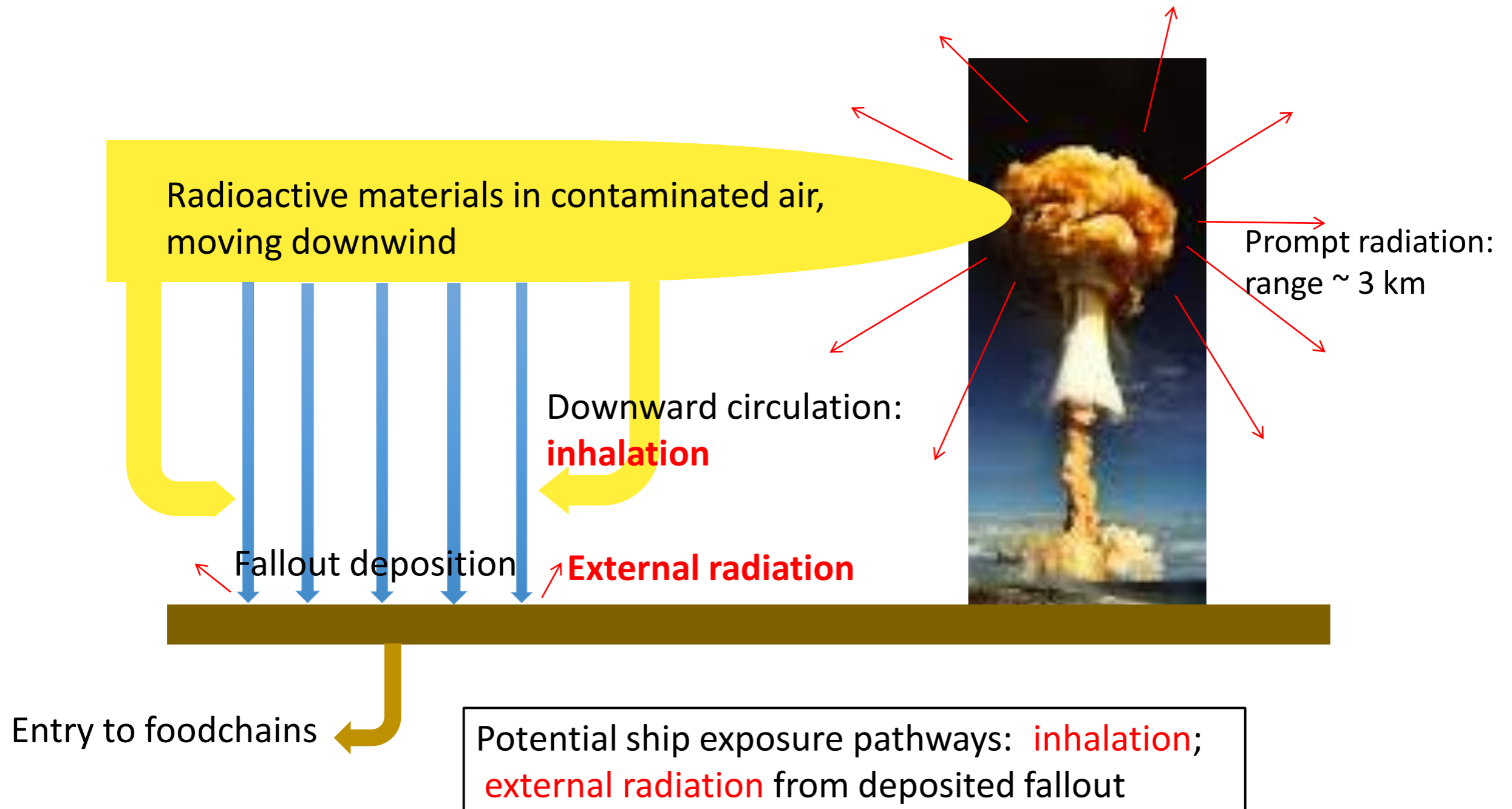
Setting the scene: at sea

Total natural
dose:
0.7 mSv/y



Natural exposure at sea 30% of level on land

Setting the scene: Radiation from weapons



Information sources

McCahon Report – by J.F.McCahon, NRL Radiation Officer

Ship logbooks

Declassified orders

Ship signals

National Radiation Laboratory reports

Scientific publications

Published books

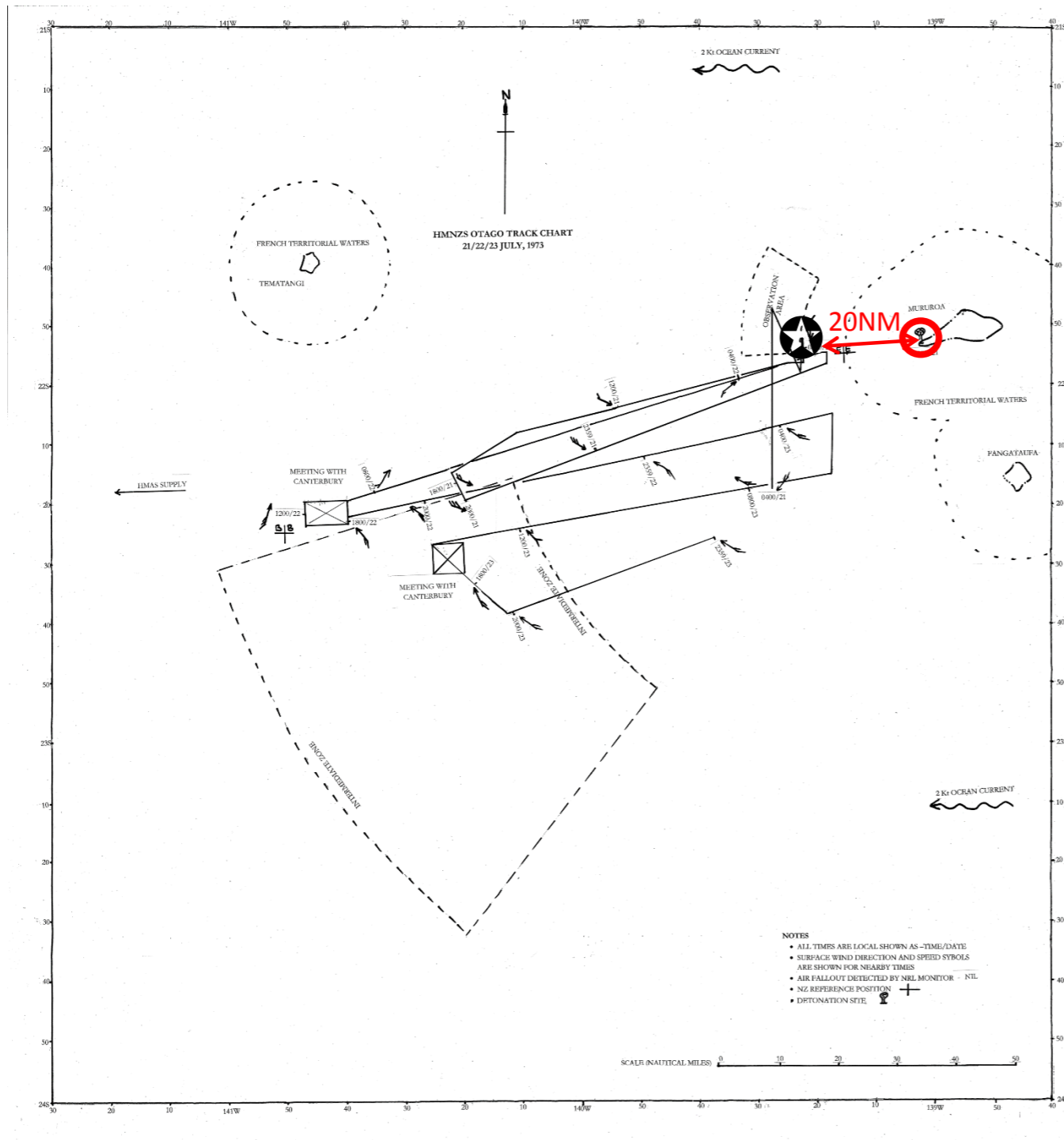
Anecdotal accounts

Defence Library

Navy Museum and Archives

National Archives

HMNZS OTAGO deployment

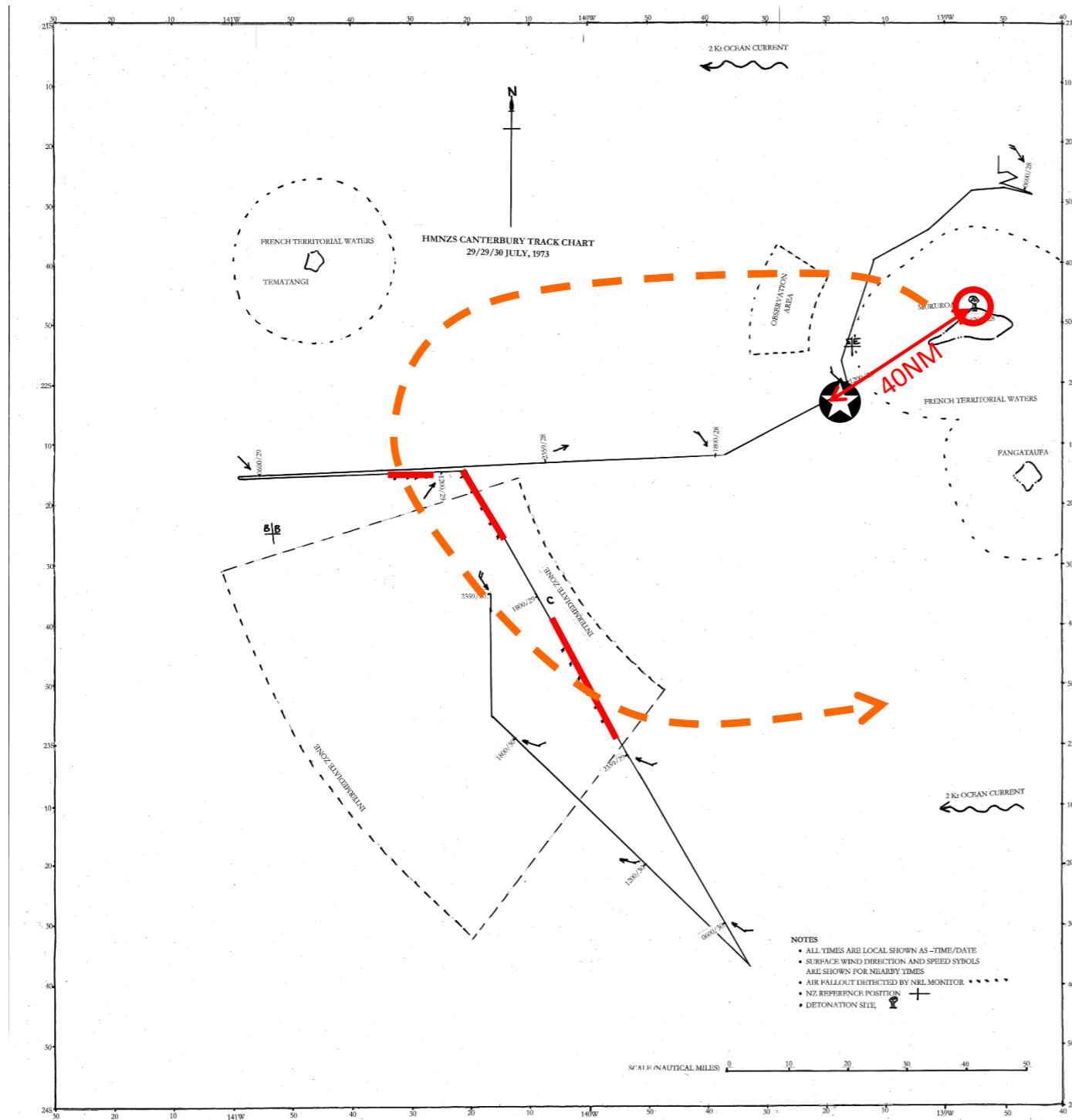


5 kiloton test at
08.00 on 21 July

Distance 20 NM

★ Ship's location at
detonation




HMNZS CANTERBURY deployment



0.05 kiloton test at 13.00 on 28 July

Distance 40 NM

Possibly a missile warhead detonator

-  Ship's location at detonation
-  Contaminated air detected
-  Apparent surface wind eddy

Radiological monitoring during voyage

Radiological preparations were of a high standard. Monitoring equipment was fit for purpose, and included:

- External gamma radiation monitoring (detection limit 0.001 mSv/h)
- Airborne radioactivity: pump/filter system (detection limit 2 Bq/m³)
- Surface contamination monitoring
- Food and water monitoring – equipment carried, but not needed
- Personal monitoring: Badge system (detection limit 0.12 mSv)
- Pocket dosimeters
- Thyroid monitoring available, but not needed

Monitoring results

- No external gamma radiation detected
- Trace of airborne radioactivity detected by HMNZS
CANTERBURY only: average of 22 Bq/m³ for 34h period:
0.06% of Action Level
- No fallout deposition (surface contamination) detected
- Personal monitoring: No dose recorded above detection limit

Summary of doses

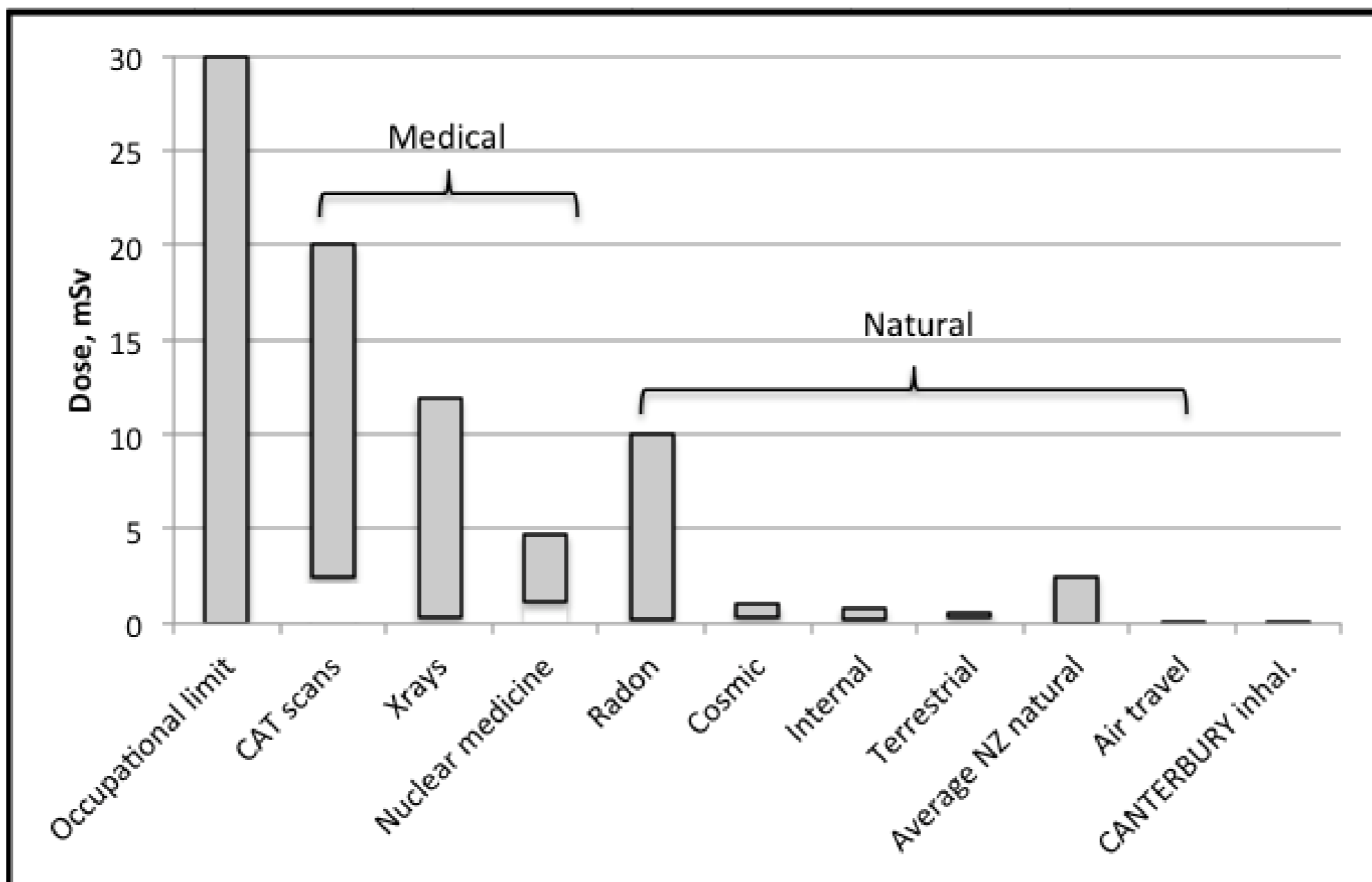
- ▶ External gamma radiation: less than 0.001 mSv/h (<0.5% of Action Level)
- ▶ Airborne radioactivity: HMNZS OTAGO: none detected
HMNZS CANTERBURY: 0.005 mSv (with maximum credible 0.05 mSv)
- ▶ External radiation from deposited radioactivity: none
- ▶ Food and water exposure: none
- ▶ Personal monitoring: Below detection limit of 0.12 mSv; with provisional average of 0.04 mSv, similar to cosmic background.

Doses in perspective

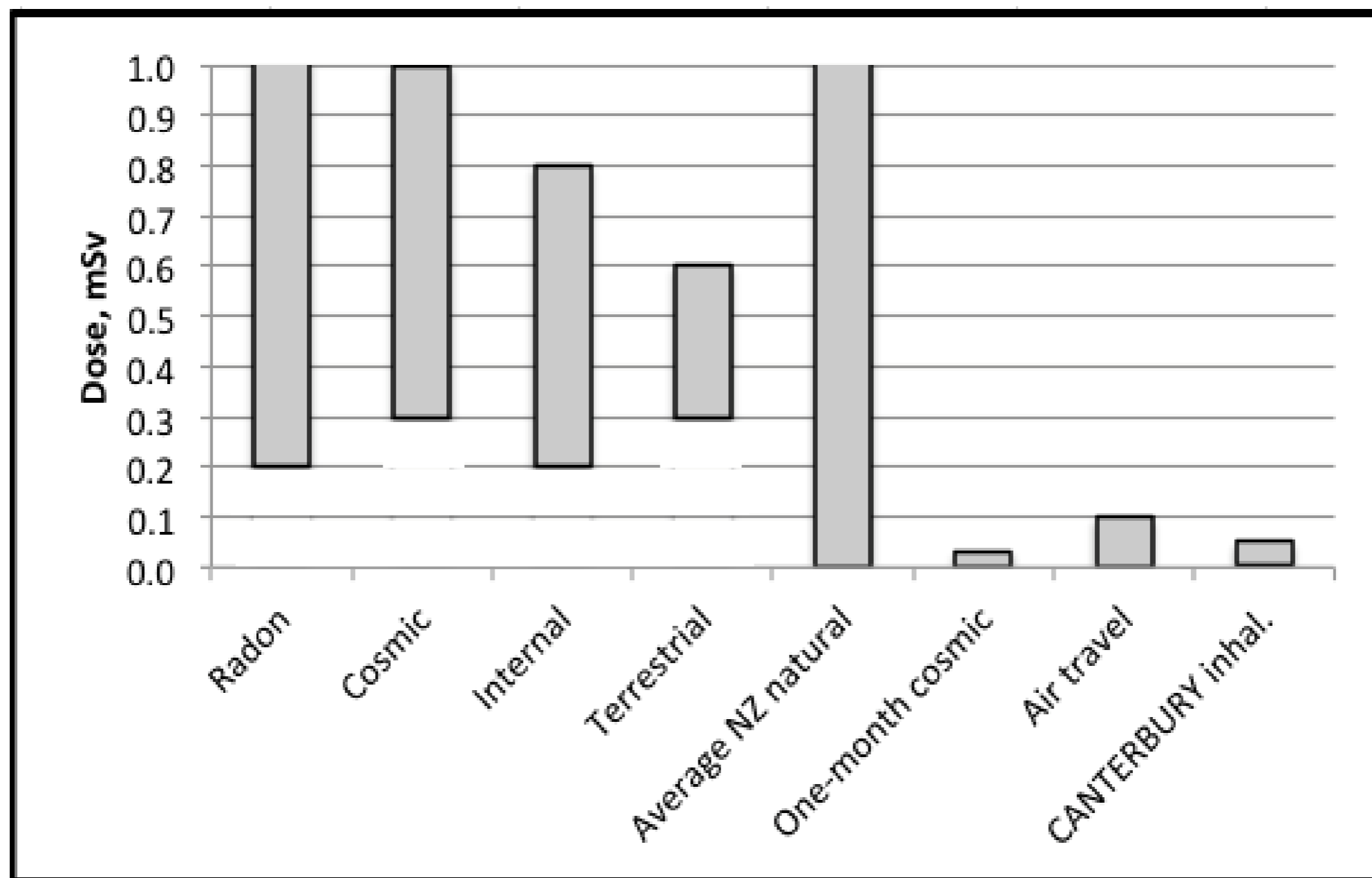
For a perspective on doses, it is necessary to compare results with the following:

- Natural background radiation, on land and at sea
- Occupational permissible doses
- Doses incurred in medical procedures
- Enhanced natural background, as incurred in air travel

Dose comparisons



Dose comparisons (expanded)



The drinking water issue

- No fallout was detected on either ship. There was therefore no local fallout into the sea around the ships at any time, and therefore no water contamination.
- Oceanic contamination levels in Mururoa vicinity were typical of all oceans, and due to global fallout from earlier tests.
- Any radioactive contamination is present in seawater as salts which are removed in the desalination process.
- Exposure via drinking water is therefore not a credible concern.

Doses summary

- ▶ HMNZS OTAGO: total dose received approximates the expected natural cosmic background radiation dose: ~ 0.04 mSv
- ▶ HMNZS CANTERBURY: natural cosmic background, plus a dose from airborne radioactivity: $0.04 + 0.005 = \sim 0.05$ mSv

Conclusions

- Radiological protection for the voyages was thorough and well prepared
- No measurable external radiation was received by either ship's crew, with total dose for the deployment approximating natural background
- A very small dose was received on HMNZS CANTERBURY due to airborne radioactivity, but the total dose was still within the normal background range.
- Doses received were less than, or comparable with, average onshore natural exposure in New Zealand.

Institute of Environmental Science and Research
Centre for Radiation Science

E: NCRS.environmental@esr.cri.nz