

In setting out the approach to protection of the public within the pre-planned zone, the Clyde Plan sets out the ERL triggering countermeasures actions (setting aside these are inappropriate for a nuclear weapons accident).

The Clyde Plan seems to be totally dependent upon MoD personnel (Royal Navy) carrying out an assessment of the severity of the accident, undertaking monitoring and, from these, determining (projecting) the radiological impact of the accident. For this the Clyde Plan (Section 2.2.5) states that it "*is imperative that there is some form of predetermined plan to protect those who may be at risk in the period before definitive monitoring information becomes available*", but it gives no clue to just what this is in detail and how the local authority is to initiate and implement the appropriate level of countermeasures.

This means that for the pre-planned countermeasure zone (2 km) the Clyde Plan does not relate to the actual radiation exposure dose of individual members of the public (actual or projected) at the time that the countermeasure is initiated, but somehow extrapolates this from the accident *Category* assessment of the condition of the reactor fuel. Since the definition of accident *Category* is vague and, moreover, it is unlikely that the Royal Navy would wish to share sensitive information about the condition of a submarine propulsion reactor with a local authority, members of the public in the 2 km zone are entirely dependent upon the uncorroborated assessment of the condition of the reactor fuel by naval personnel for their well-being.

Nothing at all is set out in the Clyde Plan relating to the means and criteria by which this assessment is undertaken, how much cognisance is given to critical groups within the public population, its hierarchy of reporting within the MoD organisation at HM Naval Base Clyde and beyond, and its eventual communication to the local authorities. In terms of management processes and the detail of how the countermeasures are to be implemented and administered, the Clyde Plan is particularly lacking.

The Clyde Plan (Section 2 Annex) states that the MoD Naval Emergency Monitoring Team (NEMT) will undertake the radiation monitoring but it is not clear whether NEMT is sufficiently resourced to extend its monitoring capability into the public sector. Obviously, in the short time scales afforded by both the submarine *Category 3* accident and the nuclear weapon dispersion scenario, additional or '*back up*' from nuclear power stations in the region will not be available. NEMT's orders were originally defined by the classified MOD document BR 3025²¹ to include for "*Revised Emergency Reference Levels*" by selective sampling over which there is doubt relating to the accuracy and reliability of the techniques employed.

According to BR 3025, the MoD segregates its post accident monitoring into three stages:-

Stage I: Measures the direct gamma shine from the submarine hull at a number of preselected monitoring points. Providing that the submarine is berthed this is likely to be undertaken automatically by the Dockside Installed Radiac System (DIRS). Some delays may occur if the submarine is not berthed and, particularly, where the hull shine is obstructed by another vessel or building.

Stage II: Establishes whether a fission product release has occurred, to determine the direction of the release plume, local deposition of radioactive particles and if the release is continuing. Some part of this release monitoring is likely to be undertaken

²¹ BR 3025 (c1976) may now have been superseded and it refers specifically to NEMO (Naval Emergency Monitoring Organisation) – the BR documents are generally not available to organisations outside the MoD because permission for their release follows through a vetting system in which the sanction of a '*Sponsor*' is required but to determine if the documents are available, first, the documents have to be ordered so that the Sponsor may consider the request.

automatically by the Perimeter Monitoring System (PMS) but the ground contamination dose rates and smear samples will require NEMT health physics personnel involvement. In the immediate aftermath of the release, the Local Emergency Monitoring Team (LEMT) could undertake Stage II monitoring during the period of up to one hour that the mobile NEMT team has prepared and arrived on site.

Stage III: Determines the extent and magnitude of ground contamination in the public areas surrounding the Dockyard. Under Stage III checkpoints are located radially about the dockyard in 60° sectors, although in practice these follow the roads radiating from the Dockyard out to a distance of 20 to 30km.

The Clyde Plan provides no information whatsoever on how NEMT undertakes off-site monitoring, how it arrives at the dose exposures necessary to trigger the ERL countermeasures and, importantly, on how and in what form this information is to be passed to the civilian authorities. Unless the monitoring and dose assessment practices of BR 3025 have been substantially revised, then the monitoring must be confined to ground contamination so, it follows, gamma shine dose from the overhead release plume and thyroid dose for inhalation of the iodine content of the release must be extrapolated from the PMS, which may or may not have gamma spectrometry capability.²²

In fact, monitoring activities immediately around the submarine or weapons accident site are likely to dominate the initial stages of the emergency response to any accident. This approach is set out in a Royal Navy training course on submarine reactor accidents:-²³

“... ”

Stage III monitoring is started as soon as emergency monitoring teams (LEMO or NEMT) can be spared from Stage I or Stage II monitoring, or on the arrival of “back up” monitoring teams from CEGB, UKAEA etc. This should be some six hours or so after the initial report and may take several days to complete, depending on the number of teams that can be deployed for this task.

...”

It is not at clear from the Clyde Plan how the appropriate countermeasures are to be implemented in the absence (“six hours or so”) of reliable radiological information being available.

THE CLYDE PLAN - CONCLUSION

This Review identifies and assesses the potential severity of i) a loss of coolant accident on board a Royal Navy nuclear-powered submarine when in the approaches to, manoeuvring within or berthed at any one of the Clyde berths; and ii) of a nuclear warhead accident occurring at the Coulport storage and explosives handling facility, or when in the silo of a Vanguard class of nuclear powered submarine.

The *Radiation Emergency Preparedness and Public Information Regulations* (REPPIR) require that the operator (here the MoD) identify *hazards* and evaluate the *risks* (Reg 4) and that there is to be *co-operation between the parties* (Reg 8) relating to the preparation and maintenance of emergency plans in which *the emergency plan shall be designed to secure the restriction of exposure to ionising radiation and the health and safety of all persons identified by the assessment* (Reg 8).

The local authority (here Argyll and Bute) shall *prepare an adequate off-site emergency plan (Reg 10.1) which shall address each reasonably foreseeable emergency identified by the operator (Reg 10.2) and which shall be provided to the local authority by the operator (Reg 10.4).*

Put simply, there is a duty placed upon the MoD to provide the local authority with sufficient information for that local authority to put in place adequate arrangements should a radiation emergency arise. The Clyde Plan is the local authorities response to *Regulation 10.1* that fails on the following key requirements:-

All Reasonably Foreseeable Emergencies

The types and severities of accidents reviewed here are considered to be reasonably foreseeable. Since both the *Category 3* submarine reactor plant accident and the nuclear weapons atmospheric radioactive release of plutonium are modelled and planned for by the MoD, it is surprising that these are not specifically cited in the Clyde Plan.

Because these two accident scenarios are not cited in the Clyde Plan the Plan, its organisational competency and identification of the human and equipment resources to be set aside would be unlikely to be effective in countering such an accident.

In this respect the Clyde Plan does not address each reasonably foreseeable emergency.

Adequacy of Off-Site Plans and Resources

In providing the radiological monitoring role, particularly as to where and how the initial monitoring is to be undertaken, the Royal Navy adheres to the pre-planned priorities of the MoD Book of Reference (BR) 3019. Yet, BR 3019 is not publicly available so it is not at all clear when and how, and to what effect, the public areas of the pre-planned countermeasure would be monitored.

Another publicly restricted BR document, BR3025, assigns least priority to monitoring of public areas since Royal Navy personnel are instructed to delay Stage III monitoring, viz "*Stage III monitoring is started as soon as emergency monitoring teams (LEMO or NEMT) can be spared from Stage I or Stage II monitoring, or on the arrival of "back up" monitoring teams.*"

In other words, the Clyde Plan is overly dependent upon MoD personnel and resources monitoring the off-site sector and reporting and advising the local authority on when and what countermeasure to implement. If the accident is severe then MoD personnel are likely to be prioritised to the immediate locality of the accident, but a severe accident that requires early monitoring in the public areas if the consequences to the much larger public group are to be mitigated

The failure of the Clyde Plan to define the resources in terms of specific demands and the secrecy over how the resources available are to be prioritised raises a number of concerns over the readiness and effectiveness of the Clyde Plan.

Reliance of the Local Authority on the MoD

For the implementation of evacuation and all other countermeasures, the local authority seems to be overly dependent upon the MoD for radiological information and advice. This is particularly so for the pre-planned countermeasure zone where the countermeasures are triggered by the Royal Navy's assessment of the condition of the reactor fuel or nuclear weapon.

Reliable projection of the assessment of the condition of the fuel or the nuclear weapon to the radiological hazard that this represents to members of the public is absolutely critical in safeguarding public health and property. The procedures employed for this assessment,²⁴ and the means of communicating it through the MoD organisational structure to the local authority are not included within the Clyde Plan documentation and, in the main, are not publicly available.

This almost blind reliance of the local authority upon unpublished MoD procedures, criteria and judgements disqualifies the commanding role of the local authority in implementing its off-site emergency plan. Moreover, since there is no provision to check and corroborate the Royal Navy's decision-making until the involvement of the NRPB or Government representative, which will be several hours or more into the accident aftermath.

In effect, the Clyde Plan simply states that Argyll and Bute will implement emergency procedures and, other the most generalised statements of evacuation, sheltering and issue of PITs (which would not apply in a nuclear weapons accident), it remains totally reliant upon the MoD as to when and how it is to put in place actions that would mitigate the consequences to members of the public. This means that the Clyde Plan is totally tied to the MoD's plan for dealing with incidents and accidents within the boundaries of MoD establishments.

The problem here is threefold: First, the MoD is unlikely to publish its own emergency plans so the identification of the hazards and assessment of the risks remains concealed from the public. Second, the MoD plans will concentrate resources within the immediate area of the incident and will not extend, since it has no formal responsibility, far into the public domain, and it may not have assessed the manpower and equipment resources required to cover larger areas of population. And, third, the methods and criteria deployed by the MoD to assess and project forward radiation doses in the public sector are not publicly available and may, indeed, assume means of health and risk assessment and valued judgements that would be unacceptable in the public domain.

In these important respects the draft Clyde Plan does not satisfy *Regulation 10* of the *Radiation Emergency Preparedness and Public Information Regulations* and, accordingly, the off-site emergency plans associated with nuclear powered submarines and nuclear weapons in Scotland should be subject to review to ensure that there is adequate protection for the local populations and the environment.

JOHN H LARGE
9 April 2001

²⁴

The procedures are set out in a series of MOD documents (BR 3030 – Radiological Controls, BR 3020 Radiological Protection, BR 3019 Nuclear Reactor Accidents, BR3025 – Naval Emergency Monitoring Organisational Orders) none of which seem to be available in the public domain.

**REVIEW OF THE EMERGENCY PLANNING MEASURES RELATING TO
THE BERTHING AND MAINTENANCE OF ROYAL NAVY NUCLEAR
POWERED SUBMARINES AT FASLANE, COULPORT, LOCHGOIL,
ROTHESAY AND LOCH STRIVEN**

MAPS

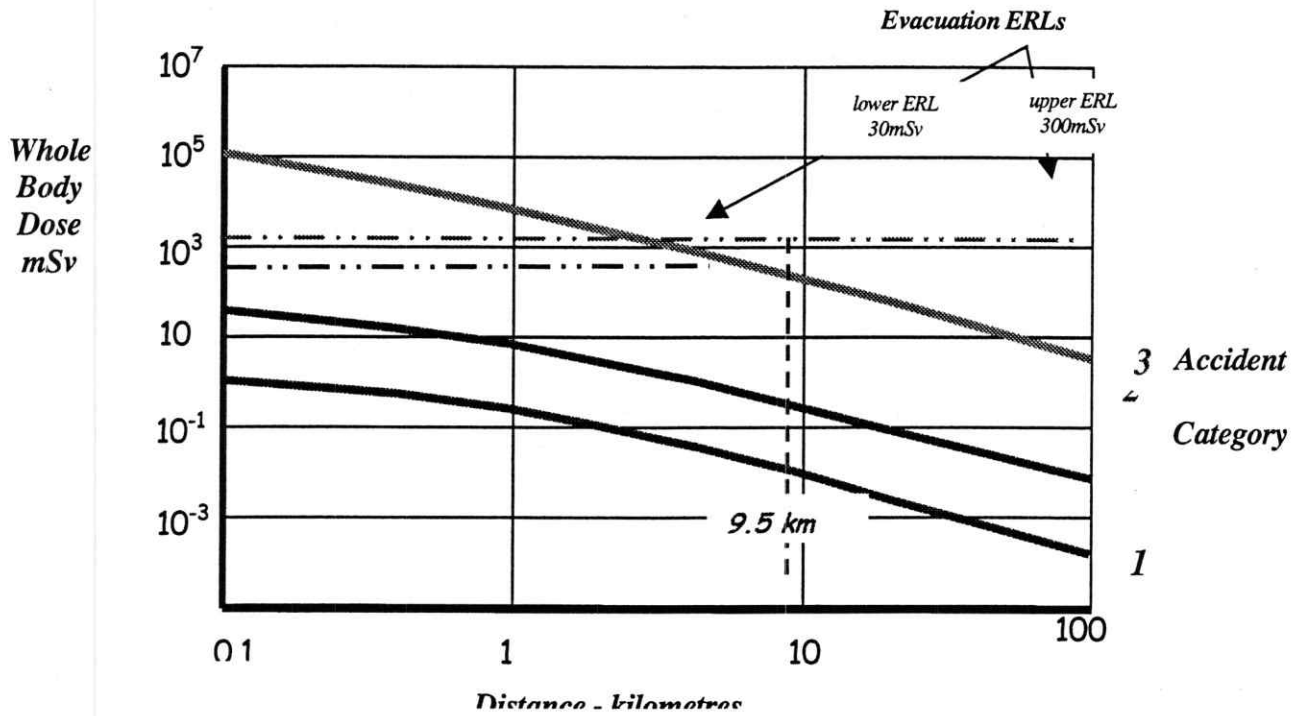
**PAPER FOR THE
PUBLIC PETITIONS COMMITTEE
OF THE
SCOTTISH PARLIAMENT**

CLIENT: SCOTTISH NUCLEAR FREE LOCAL AUTHORITIES

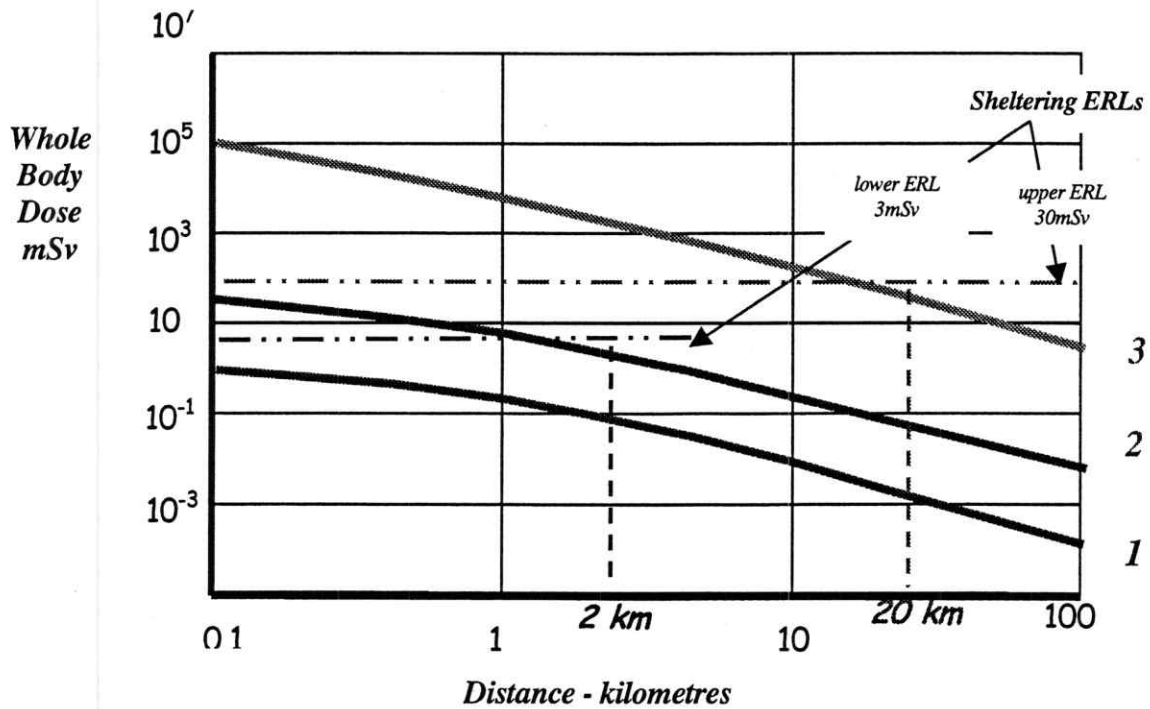
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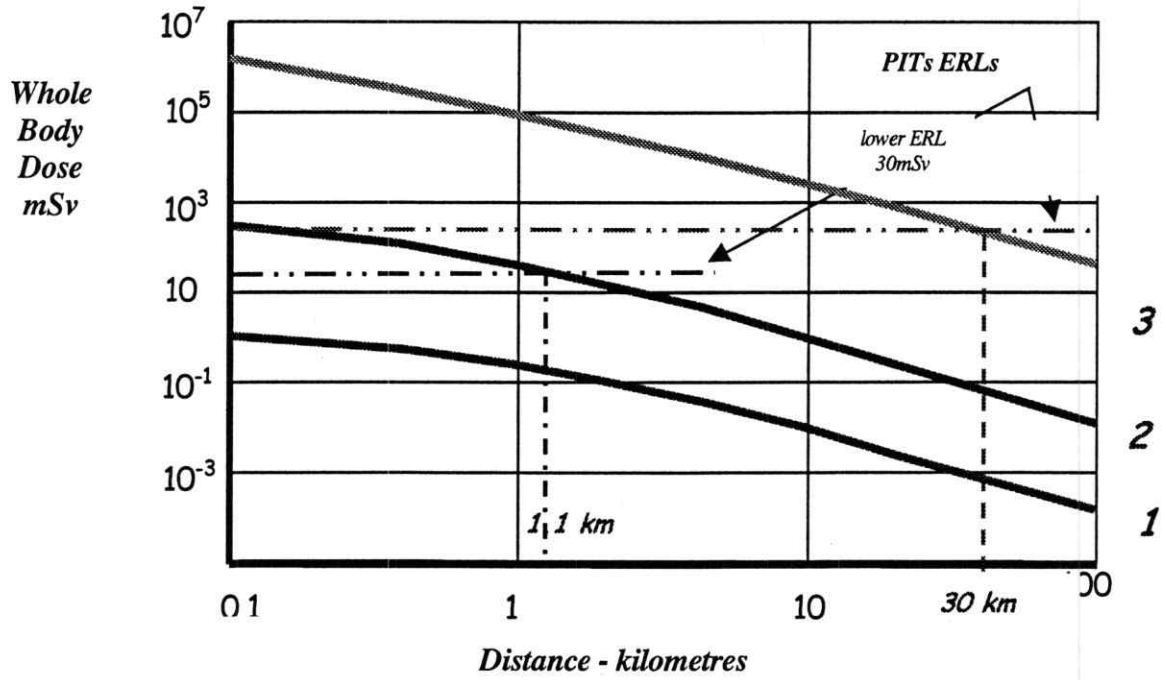


GRAPH 1 SUBMARINE ACCIDENT - PROJECTED EVACUATION DISTANCES



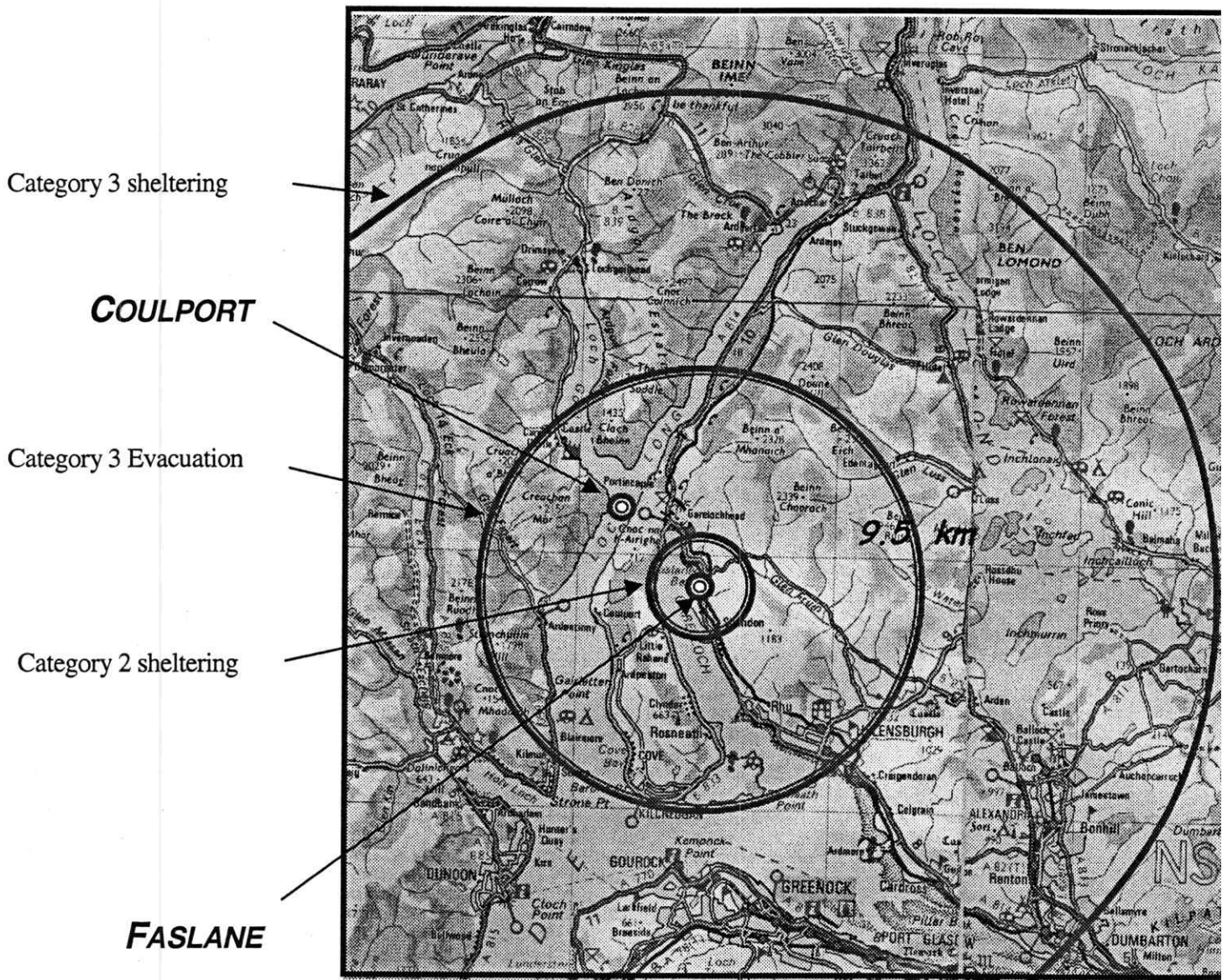
GRAPH 2 SUBMARINE ACCIDENT - PROJECTED SHELTERING DISTANCES

WHOLE BODY - THYROID DOSE



GRAPH 3 SUBMARINE ACCIDENT - PROJECTED PITs ISSUE DISTANCES

MAP I CONTINGENCY MEASURES TO AVERT UPPER ERLS FOR WHOLE BODY DOSE



**MAP 2 PROJECTED RELEASE FROM A NUCLEAR WEAPONS ACCIDENT
(ASSUMED WIND DIRECTION)**

**Public Annual Whole
Body Dose exceeded**

**Respirator protection
and sheltering**

**Respirator protection
and evacuation**

COULPORT

FASLANE

