PUBLIC INFORMATION ABOUT NUCLEAR EMERGENCIES: BACKGROUND BRIEFING

November 1991

BACKGROUND BRIEFING

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A. INFORMING THE PUBLIC ABOUT RADIOLOGICAL EMERGENCIES AND PUBLIC PROTECTION MEASURES

A1. INTRODUCTION TO THE DIRECTIVE

After the Chernobyl disaster the European Commission reviewed the measures it had taken to protect health and safety under the Euratom Treaty. As a result, EC Governments, including the UK, agreed to the issue of a Directive on "Informing the General Public about Health Protection Measures to be Applied and Steps to be taken in the Event of a Radiological Emergency" (Directive 89/816/Euratom).

This Directive requires that the public be provided with ***advance information*** to anticipate radiological emergencies. The information must cover:

* basic facts about radioactivity and its effects on human beings and on the environment;

* the various types of radiological emergency covered by relevant emergency plans and their consequences for the general public and the environment;

* emergency measures envisaged to alert, protect and assist the general public in the event of a radiological emergency; and

* appropriate information on action to be taken by the general public in the event of a radiological emergency.

The Directive is ***comprehensive in scope*** and applies to civil and military nuclear accidents in peacetime, and to the use of nuclear weapons in war. According to the Directive, the population that must be given prior information is that for which Member States have drawn up intervention plans for a radiological emergency. A large number of intervention plans have been drawn up in the UK, including local, regional and national plans. ***The existence of national intervention plans means that the entire population of the UK should be given prior information.***

Prior information should be given both for accidents that might arise at fixed sites, and for those that arise from the transport of radioactive materials.

The method of communication and the organisation to be responsible for communication are matters that the UK Government has the power to decide.

The Directive also contains requirements about information to be given ***in the event*** of a radiological emergency, but this is beyond the scope of this briefing.

A2. THE COMPLEXITIES OF THE TASK

There are a number of complexities involved in the advance provision of public information about radiological emergencies:

* The ***perception of the aims of the task*** are potentially many and varied - to educate, to inform, to reassure, to protect, to placate, or to persuade - depending upon the interests and concerns of the different organisations involved;

* The topics to be communicated are ***inherently difficult to explain***, raising particular problems when simplified or summarised;

* The ***controversial nature*** of the subject matter means that one person's information or truth, may be another's distortion or oversimplification;

* ***Not all emergency measures are in place*** - various improvements are being discussed or planned, often in response to pressure from local government; and

* The implementation of the Directive raises ***practical difficulties*** - for example, what information and in what form?

These complexities should not be ignored, nor used as an excuse for inaction. Instead, it is important to draw on experience of how people react to nuclear accidents, and on analysis of the provision of information to the public about other major hazards. A stronger position will then be established from which to tackle the complexities and identify the key steps that will enable the Directive to be properly implemented.

A3. NUCLEAR ACCIDENTS: HOW PEOPLE REACT

During the emergency at ***Three Mile Island in the US in 1979***, a growing public awareness that information about the seriousness of the situation was being withheld, led to a loss of public confidence in the official public information system, and a panic response. This manifested itself in the overload of the telephone system and mass self-evacuation. Although official advice was that only pregnant women and children should evacuate, 144 000 people evacuated from an area 15 miles around the site.

During the ***Chernobyl disaster in 1986***, self-evacuation was limited by ignorance about the accident and its possible consequences, and a lack of transport. Official evacuation was delayed, and then organised in a way which angered evacuees. For example, the 50 000 people of Pripyat were bundled into buses and told they would be away for three days. They have still not returned.

In Britain, the nuclear industry believes the public have an exaggerated fear of radioactivity. Environmentalists disagree - they argue that the attitude of the public to radioactivity is based upon legitimate concerns over the practices of the nuclear industry and the Government's poor record in response to radiological emergencies. After Chernobyl, for example, there was ***a widespread lack of public confidence in official statements***, partly because of the emphasis placed on reassurance.

Experience suggests that in the event of a major radiological emergency, there could be a widespread, panic response from the British public. Indeed, in a survey of the local population around the Berkeley nuclear power station in Gloucestershire, 75% said they would not follow official advice to shelter in the event of an accident, but would evacuate immediately using their own transport (1).

The survey also found that ***basic facts about the nature of radioactivity and its health effects were not well understood.*** In particular, less than 50% knew what stable iodine tablets were for, leading to the conclusion that a considerable public education effort was needed about the use of such tablets.

Reference

1. *'Nuclear Accidents: How People React', D Pheby and P Robinson, Health Visitor, Vol 63 No 4, April 1990, p119-121.*

A4. HOW TO INFORM PEOPLE ABOUT MAJOR HAZARDS

A number of studies have been carried out on the implementation of the requirement in the 1984 Control of Industrial Major Accident Hazards (CIMAH) regulations for certain sites to provide hazard information to the local public. These contain findings of considerable relevance to the implementation of the Directive on radiological emergencies.

In an assessment of a survey of 201 industrial sites it was concluded that the key components of ***'best practice'*** in the provision of prior information are as follows:

* ***Multiple Routes of Information Dissemination*** - Various communication channels, such as newspaper adverts and media announcements, should be used to reinforce the information contained in leaflets, which were considered to be the core method of communication. Updated leaflets should be distributed on a regular basis.

* ***Flexibility in Criteria*** - In identifying hazards and defining populations at risk it is not desirable to follow hard and fast rules.

* ***Explanation*** - If the public is to remember and act upon the advice, then it is desirable to explain why particular actions are advised and not others.

* ***Differentiation*** - Material should be adapted to the sociological characteristics of the population at risk, for example leaflets should be available in ethnic minority languages.

* ***Emphasis on Major Hazard Information*** - Priority must be given to information on the nature of the potential hazard and health protection measures. Promotion of the company should be avoided, and reassurance must not be overly dominant. (1)

More detailed assessments at particular sites support these conclusions. A doorstep survey around a major industrial site in Greater Manchester, 18 months after the distribution of a leaflet explaining the activity on site and providing advice on action in the event of an emergency, found that only 52.5% could remember the leaflet. Notably, over 25% said that they would evacuate immediately, in contrast to advice in the leaflet to remain in doors. It was concluded that more concerted and sustained efforts are required, including the ***repetition of mailings and the use of complementary methods*** (2).

Finally, after two issues of information (in October 1988 and December 1990) and three surveys (in February 1989, October

1989 and April 1991), the Cumbria County Council emergency planning team concluded that ***repeated information provision does lead to an increased level of public retention, that re-issues are vital, and that their frequency may be critical.*** The Cumbrian team recommend a three part information package consisting of a letter, leaflet and action card, accompanied by announcements in newspapers and on television. They highlight the importance of simple and unequivocal guidance (3).

References

1. *'Major Hazard Communication in the UK: Past Achievements and Future Prospects', G Walker, in 'Communicating with the Public about Major Accident Hazards', Ed. HBF Gow and H Otway, Commission of the European Communities.*

2. *'Emergency Response and the Provision of Public Information under CIMAH - a Community Case Study', A Jupp and A Irwin, Disaster Management, Vol 1 No 4, 1989.*

3. *'CIMAH Information to the Public: Presentation and Evaluation of Effect', GK Mossman, RA Follows, RW Fisher, and D Humphreys, paper presented to 'Emergency Planning '91', an International Conference, Lancaster University,September 8-11, 1991.*

A5. WHAT NEEDS TO BE DONE

Taking account of existing experience of major hazard communication, and the European Commission's own advice (1), the following is proposed:

Aims - The fundamental aims in implementing the Directive must be to take the steps necessary to ensure that the public is aware of the nature of the risks to which they might be exposed, and knows what to do in the event of a radiological emergency.

Approach - The approach should be based on the following key principles:

* The content and style of the information must help to build ***trust and confidence***. The emphasis must therefore be on the nature of the hazard and health protection measures. Advice should be simply and unequivocally stated. Clear and succinct explanations for taking or avoiding certain measures should be given.

* The information should ***not*** be provided as a ***'one-off'***. The provision of information should be ***repeated at regular intervals***. A range of methods should be used, including material delivered to ***every household in the country***, and media announcements.

* It is necessary to produce specific material, ***aimed at certain groups***, for example, information in different languages, or written for emergency services personnel, or for particularly vulnerable people such as pregnant women.

* There should be a ***consistent national programme***, organised and financed by the Government, to ensure the principles above are acted upon. This national programme should complement the distribution of more detailed ***local information*** around the licensed nuclear sites where an off-site emergency plan is considered necessary.

Form - The ***central components*** of the ***national programme*** should consist of:

- A durable, plastic coated ***action card***, delivered to every household and workplace in the country, setting out on one side basic instructions for the first actions that should be taken or avoided in the event of a radiological emergency, and with a brief explanation on the reverse side.

- A supplementary ***leaflet***, delivered with the action card, explaining in a clear and straightforward way what the consequences of a radiological emergency could be, what the public might need to do, and how this should be done.

- A ***covering letter***, introducing the action card and leaflet, and having a tear-off portion for people to use to send for a free copy of a booklet.

- A ***booklet***, providing more detail about radioactivity and its effects on people, the various types of radiological emergency and their consequences, and emergency measures to alert, protect and assist the public. The booklet should be open and honest about the scale of the accidents that could occur, and about the emergency arrangements that are being improved or changed. The booklet should also be distributed to libraries, doctors' surgeries, community centres and other public places.

The distribution of the materials forming the central core of the national programme should be publicised by national newspaper adverts and through media announcements. ***Local authorities should cooperate in the organisation of the national programme.*** The information materials should be updated whenever major changes are made to emergency arrangements which have a practical impact on the public.

The ***additional local information*** around licensed nuclear sites should consist of a pamphlet distributed to all households within the area of the site's off-site emergency plan. This pamphlet should contain information about the nature of the site and local intervention plans. Such pamphlets are already distributed in areas around a number of licensed nuclear sites.

The next section of this briefing sets out the case for the proposals above, and provides some basic information about the nature of radiological emergencies and public protection measures.

Reference

1. *Commission Communication on the Implementation of Council Directive 89/618/Euratom, Official Journal of the European Communities, No C 103/12-16, 19 April 1991.*

B. THE NATURE OF RADIOLOGICAL EMERGENCIES AND PUBLIC PROTECTION MEASURES

B1. TYPES OF RADIOLOGICAL EMERGENCY AND THEIR CONSEQUENCES

This section explains why, when it comes to exposure to radiation, the entire population of Britain lives in the vicinity of a potential radiological emergency.

Nuclear Reactions

The main potential types of radiological emergency arise from the use of ***nuclear reactions*** in nuclear power reactors or the planned use in nuclear weapons, and from the various ***technological stages*** that have to be gone through to prepare the nuclear fuel for reactors or weapons.

There are two basic kinds of nuclear reactions: ***fission***, in which atoms are split, and ***fusion***, in which atoms are fused together.

Nuclear fission occurs when the nuclei of certain atoms are bombarded by neutrons. When the atom splits, part of the atom's mass is converted into energy and neutrons are released. If conditions are right, these neutrons go on to split other atoms and establish a ***chain reaction***. This process is fundamental to both power reactors and weapons. In a power reactor, the energy is released in a controlled fashion by regulating the amounts of neutrons present. In a fission weapon, the energy is released in a very short time, creating an uncontrolled chain reaction and a massive explosion.

A fusion weapon has a fission bomb at its core, the heat from which is enough to cause the fusion of the deuterium and/or tritium packed around it. Fusion power reactors would attempt to control this reaction, but since extremely high temperatures are involved, they are a distant prospect.

Materials that readily undergo fission are called *fissile*. The fissile material used to provide the explosive force for weapons has either been the isotope uranium 235 or plutonium 239.

The Civil and Military Nuclear Cycle

Uranium mining - Uranium is the raw material for both weapons and power. It is mined mainly in Africa, America, Australia and Canada, converted into uranium oxide ('yellowcake') and shipped to the country of use.

Enrichment - Only 0.7% of uranium ore is fissile uranium 235. Most reactors and all weapons require a higher percentage of uranium 235. This is achieved by a process called enrichment. Slightly enriched uranium for civil reactors is produced at Capenhurst in Cheshire, and highly enriched uranium for submarine reactors and nuclear warheads is imported from the US.

Fuel Fabrication - Before uranium can be used in a power reactor it has to be fabricated into fuel rods. For nuclear power stations this is carried out at Springfields near Preston, and for submarine reactors by Rolls Royce at Derby.

Nuclear Power Stations - The fuel rods are assembled in an array called the core, which contains material called the moderator that slows down the neutrons. Heat is conducted away from the fuel by a coolant, which is generally water or gas. Power reactors designed in the UK use graphite as a moderator and pressurised carbon dioxide gas as the coolant. Most other countries use Pressurised Water Reactors (PWRs), where water acts as both moderator and coolant. The coolants are passed through heat exchangers to make steam to drive the turbine generators which make electricity.

The Fast Breeder Reactor (FBR) - This type of reactor is supposed to 'breed' plutonium in the uranium 'blanket' placed round the core. A prototype FBR programme at Dounreay in Scotland is being run down.

Nuclear Powered Submarines - PWRs are used to power a number of vessels in Britain's submarine fleet.

Reprocessing - During the operation of a power reactor, there is an enormous increase in activity in the fuel, due mainly to the creation of a range of fission products, including isotopes of plutonium. Every so often the fuel in reactors has to be replaced. The 'spent fuel' is stored in cooling ponds and then transported to Sellafield for reprocessing. This involves dissolving the spent fuel in solvents, and separating out the uranium and plutonium for further civil or military use. Spent fuel from companies abroad is also reprocessed at Sellafield and it is intended to return key products, including plutonium, to the country of origin.

Waste Disposal - The nuclear fuel cycle creates radioactive wastes. At present, most waste from civil and military programmes is stored in temporary silos awaiting final disposal. Some low level waste is disposed of in shallow trenches at Drigg in Cumbria.

Nuclear Warhead Manufacture and Refurbishment - Plutonium from reprocessing and uranium from enrichment go to weapons establishments at Aldermaston and Burghfield where they are used for research or fabricated into nuclear warheads. The warheads are transported to nuclear weapons bases and stores.

At certain intervals they [illegible] returned to Burghfield for refurbishment.

Nuclear Weapon Deployment - Nuclear weapons are 'deployed' in Britain by both the RAF and RN, and by the US Air Force and Navy, using a variety of warships, bombers and submarines, and a number of inland and coastal bases.

For a schematic representation of key aspects of the civil and military nuclear cycle see Figure 1.

Sources of Radiological Emergency

Radiological emergencies with harmful consequences for the public and environment could arise at various points in the civil and military nuclear cycle. This includes those:

* at ***fixed civil and/or military sites within the UK***, which include nuclear power stations, research or demonstration reactors, the fuel fabrication plant at Springfields, the enrichment plant at Capenhurst, the reprocessing plant at Sellafield, the nuclear powered submarine facilities at Barrow, Devonport and Rosyth, the ports for the visit of nuclear powered submarines ('z-berths'), the nuclear warhead manufacturing sites at Aldermaston and Burghfield, and UK and US nuclear weapon bases and stores.

* at ***nuclear power stations overseas***, as occurred at the Chernobyl nuclear power station in the Ukraine, or that might occur at one of the PWRs along the French and Belgian coasts.

* involving the ***transport of radioactive materials*** by air, rail, road or sea, including the transport of spent reactor fuel to Sellafield, the transport of plutonium from Sellafield to overseas customers, the movement of nuclear warheads between Burghfield and operational bases and stores, and the flight of nuclear weapon carrying planes over the UK.

* involving the crashing to earth of a ***nuclear-powered satellite***.

* arising from the ***accidental or intentional use of nuclear weapons in war***.

Maps illustrating the way in which Britain is covered by fixed civil and military sites, and by transport routes, accompany this briefing.

Consequences

Emergencies involving the release of radioactivity can vary from the trivial to the catastrophic. Where an accident comes in the spectrum depends on a large number of factors. First and foremost, the consequences would depend upon which radioactive materials were released, in what quantities, and in what form. These in turn depend upon the ***source*** of the release, and the ***nature of the accident or event*** involving that source. Clearly, the detonation of a nuclear weapon can cause far greater damage than a major reactor accident, which in turn is likely to cause more damage than a rail crash involving a spent fuel flask.

The way radioactive materials spread out after an emergency would be affected by the speed, temperature and other physical characteristics of the release, and by local topography and ***weather conditions***. For example, radioactive materials are likely to be dispersed further and spread out more evenly over a smooth, flat terrain, than over a hilly one or in a built up area. Similarly, the influence of atmospheric conditions is of great importance. In general, rain would bring airborne particles to earth more quickly and in higher concentrations, while high winds would carry them further and faster, resulting in lower concentrations.

Exposure to the high doses of radiation which can cause ***early death*** would only occur in the most extreme circumstances, for example, after a nuclear weapon explosion or in the immediate vicinity of a major reactor accident. In statistical terms, late ***cancers and hereditary effects*** are of greater significance.

Normally, the radionuclides of most ***immediate*** concern during a radiological emergency would be the gamma emitters, as penetrating gamma rays can affect all parts of the body. Alpha and beta emitters are of concern when absorbed by inhalation or ingestion. The direct health effects depend largely upon which radionuclides are taken up, and by which parts of the body. Certain radionuclides affect specific organs because they are readily absorbed there, such as iodine 131 into the thyroid gland, or strontium into bone tissue.

The potential for catastrophe clearly exists. The explosion of the atomic bomb at ***Hiroshima*** caused 130 000 deaths within three months. The official figure for the number of deaths cause by the ***Chernobyl disaster*** is 31. However, it has been claimed that the number of deaths could already have reached 10 000 (1). There is also mounting evidence of extremely damaging social and psychological effects. Estimates for the number of fatal cancers that could occur worldwide vary from 30 000 - 100 000.

The Likelihood of Accidents

Those responsible for operating the civil and military nuclear cycle carry out safety analyses so that steps can be taken to try to prevent accidental releases of radioactive material.

These analyses identify potential accidents, or chains of events called 'accident sequences', which might lead to the release of radionuclides. The accident sequences which are used to determine the adequacy of safety systems are called 'design basis accidents' (dba). The dba which leads to the largest release of radionuclides "which can reasonably be foreseen" is called the ***'reference accident'***. Such accidents do not involve the rapid or widespread release of radiation.

Detailed arrangements for dealing with the consequences of radiological emergencies are restricted to the 'reference accidents' for the different stages in the civil and military nuclear cycle. This approach can be criticised because all accidents lie on a spectrum of probabilities, so that the official distinction between 'credible' and 'incredible' accidents is inevitably arbitrary. ***After Chernobyl, the notion of 'incredible' accidents is no longer supportable.***

The official estimated probability of an accident larger than a 'reference accident' is always exceedingly small. But such estimates do not make full allowance for ***human error*** or what has been called ***'institutional failure'***. These can arise in design, construction, operation, maintenance and overhaul, particularly if there is pressure to "get the job done", or to "keep the facility going".

In this context, the nuclear industry's drive to cut costs in the run up to the Government's 1994 review of the prospects for nuclear power raises particular concerns. For example, the industry is planning to extend the lives of its ageing Magnox reactors. This will lead to the worsening of serious technical defects, and an increasing risk of accidents.

Accidents involving the rapid and widespread release of radiation should not be considered 'incredible', and must be properly planned for.

Conclusions

It is widely recognised that the provision of advance information to the public forms an integral part of effective emergency planning. Indeed, the Directive has been described as "a new principle in practical radiation protection for the public" (2).

The existence of national intervention plans for certain types of radiological emergency means that the Directive requires that the entire population of the UK should be given advance information. This requirement is clearly sensible. In Britain, the civil and military nuclear cycle touches practically every part of the land. This fact, and the potentially catastrophic nature of emergencies that could arise at certain points within the cycle, underscore the argument that every household and workplace should receive advance information as part of a consistent national programme.

References

1. *'Chernobyl - after the Fire', M Townsley, The Safe Energy Journal, No. 83, June/July 1991, p12.*

2. *Commission of the European Communities, Explanatory Memo to COM 88 296, para 12.*

B2. EMERGENCY MEASURES TO ALERT, PROTECT AND ASSIST THE PUBLIC

This section explains the measures that could be taken in a peacetime radiological emergency and the difficulties involved, particularly in an accident leading to a rapid and widespread release of radiation.

Countermeasures

In general, countermeasures can be considered to be of two types: emergency and longer term. The emergency countermeasures would only be of real value if implemented quickly, and therefore require rapid mechanisms for decision making and public alert, and ***a well informed public.*** Longer term countermeasures would be implemented after more detailed evaluation of the situation.

If conditions or assessments indicated that the public were at risk, one or more of the following measures could be taken:

* ***Sheltering*** - Staying indoors and closing doors and windows, thereby reducing the risk of exposure to direct radiation and the inhalation of radioactive material.

* ***Taking stable iodine tablets*** - Saturating the thyroid gland in advance of or shortly after the arrival of radioactive iodine in the plume, thereby minimising uptake via inhalation.

* ***Evacuation*** - Removing people from a downwind sector from the source of the emergency to reduce the risk of exposure to radioactivity in the plume or deposited on the ground.

* ***Food and water bans*** - Restricting the supply of contaminated food or water.

* ***Relocation*** - Moving people away from the source of contamination for extensive periods of time because of the cumulative dose received over a length of time.

The main emergency countermeasures are sheltering, taking stable iodine tablets and evacuation.

Deciding When to Implement Countermeasures

In most circumstances the police would have responsibility for taking decisions about the implementation of emergency countermeasures. In the first few hours, they would rely heavily on advice from those responsible for the source of the emergency, for example, a nuclear power station operator. As time went on, advice would become available from relevant national agencies.

Formulating advice on whether to implement countermeasures is far from straightforward. It requires an assessment of the magnitude and nature of the radiation release, its dispersion in the environment and the doses that might arise to the public. The radiological benefit of implementing a countermeasure also has to be balanced against the non-radiological risks and disadvantages involved.

The National Radiological Protection Board (NRPB) has issued advice on the levels of dose at which specific countermeasures would produce some positive overall benefit. These are known as ***Emergency Reference Levels*** or ERLs. For each countermeasure the NRPB recommends a lower and upper ERL. Below a lower ERL, the radiological risk is judged generally to be less than the non-radiological risks or social disruption of introducing a particular countermeasure. If projected doses are greater than a lower ERL, the NRPB recommends that the countermeasure should be taken if possible under the circumstances. At an upper ERL, the NRPB expects that the countermeasure would definately be taken.

The NRPB has also calculated ***Derived Emergency Reference Levels*** for use as an aid to judging whether or not to implement countermeasures. These are activity concentrations in environmental materials (such as grass) and foods that can be related to ERLs. The results of measurements made in the environment can then be compared directly with these derived levels to aid early decisions.

The End of the Emergency?

The duration and extent of the emergency would depend on the scale and nature of the radioactive release. Once the release from the source had stopped, ground contamination would be checked and those who had been evacuated would be advised by the police when they could return home. At about this stage the emergency condition would be ***officially*** terminated, although the return to anything approaching normal conditions might take place over a considerable period of time and require the prior decontamination of land and buildings. Restrictions on milk and foodstuffs might also need to be continued for long periods.

Emergency Plans

A substantial number of local, regional and national emergency plans have been prepared, setting out the arrangements for responding to the range of radiological emergencies outlined in section B2. The main ones are as follows.

Site Specific Plans for Licensed Nuclear Sites - which include all civil nuclear reactors owned by Nuclear Electric and Scottish Nuclear, all British Nuclear Fuel sites, three Amersham International sites, an ICI site, a Rolls Royce site, three University research reacto... ..ces, the nuclear submarine facilities at Barrow, Rosyth and Devonport, and five Atomic Energy Authority sites.

Ministry of Defence Plans - for nuclear weapon accidents at bases and ports, accidents at nuclear weapon plant, and accidents involving the transport of warheads or their components.

Royal Navy Public Safety Schemes - for home ports and those visited on an occassional basis by nuclear powered submarines ('z-berths').

Carriers' and Consignors' Plans to Deal with Transport Accidents - involving the transport of radioactive materials by air, sea, road or rail, for example, the Irradiated Fuel Transport Emergency Plan.

The NAIR Scheme (National Arrangements for dealing with Incidents involving Radioactivity) - which is relied on for those nuclear accidents where specific plans do not exist.

The Department of Environment's National Response Plan - for dealing with the consequences in Britain of overseas nuclear accidents.

Civil Defence Plans - for dealing with the effects of nuclear war.

Improving Emergency Plans

Emergency plans for peacetime radiological emergencies are not currently geared to providing a response to major accidents involving a rapid and widespread release of radioactive materials. The National Steering Committee of Nuclear Free local authorities (NSC) has consistently argued for improved emergency arrangements so that an effective response to such accidents might be forthcoming:

* ***Public Alert Systems*** - it is currently planned that the public in areas affected or likely to be affected by an accident would be warned by police knocking on doors, by police public address systems, and by broadcasts on television and radio. ***The NSC calls for a standard national warning system involving a wider use of sirens to be set up to assist the police.*** This issue is being considered by the Home Office.

* ***Stable Iodine Tablets*** - until recently only limited stocks have been held by the emergency services for use by their personnel, and at nuclear site gatehouses for collection by the police and distribution to the public in a small emergency planning zone. ***The NSC calls for stocks to be more readily available within the community to aid***

distribution in the event of an accident. The Department of Energy has agreed that tablets can be pre-distributed to buildings earmarked as evacuation centres and isolated households near civil nuclear sites. A Department of Health working party has also recommended that regional supplies should be held for accidents other than those for which detailed plans exist.

* ***The Extendability of Plans*** - section B1 explains how detailed planning is restricted to the 'reference accidents' for the different stages in the nuclear fuel cycle. ***The NSC calls for practical steps to be taken to ensure that these detailed arrangements can be extended to deal with larger accidents.*** The Nuclear Installations Inspectorate has recently produced guidance on outline emergency planning to achieve an ***extended response*** to major accidents at nuclear power stations. This is a welcome first step, but more needs to be done.

Civil Defence Plans for Nuclear War: A Special Case

It is important to make plans for radiological emergencies where life saving measures and assistance can be effective. This is not the case for nuclear attack on Britain, which would be a catastrophe of almost unimaginable scale and complexity. Such is the awesome destructiveness of nuclear weapons that civil defence arrangements would not provide any meaningful degree of protection or assistance to the public.

Nonetheless, the Directive applies to the use of nuclear weapons in war, which should therefore be covered in the booklet proposed as part of the national public information programme (see Section A5).

Conclusions

Clearly the response to a radiological emergency is more likely to be effective if the public is aware of the nature of the risks to which they might be exposed, and knows what protective measures to take.

The implementation of the Directive could go along way towards achieving this, as long as the content and style of the information helps to build up ***trust and confidence.*** This means being open and honest about the potential scale of an emergency, and about the emergency arrangements that are being planned and improved.

FIGURE 1: Schematic Civil and Military Nuclear Cycle