

# Nuclear Free Local Authorities

# briefing



Date: 15<sup>th</sup> November 2017

No.168

**Subject: Revised requirements for radiological protection – emergency preparedness and response**

**i. Overview of report**

This report has been prepared by the NFLA Secretariat to provide an overview and model response to a UK Government consultation on how the references to nuclear emergency planning within the Euratom Basic Safety Standards Directive will be transposed into UK law. The Directive was agreed in 2013, and member states have until February 2018 to explain how they will implement the Directive into national law. The consultation document notes that this will require likely legislative change to the Radiation (Emergency Planning and Public Information) Regulations 2001, often known as REPIR, which govern offsite emergency plans at nuclear sites. There will also be some minor changes made to the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009. This can be enabled through powers under the Energy Act 2013.

**1. Introduction**

The parts of the Euratom Basic Safety Standards Directive 2013 (BSSD 2013) which relate to emergency preparedness and response reflect lessons learned from the Fukushima Daiichi accident and radiation release of 2011. (1) They also incorporate recent standards agreed by the International Atomic Energy Authority (IAEA) and the International Commission on Radiological Protection (ICRP).

In its consultation document, the UK Government note that the decision to leave the European Union will not impact on its implementation of the Directive into UK law, as “it is committed to the highest standards in defence and civil nuclear and radiological safety – including standards for emergency preparedness and response”. (2)

The consultation document has been put together by the Business Energy and Industrial Strategy (BEIS) Department in conjunction with the Ministry of Defence and the Health and Safety Executive.

To download a copy of the consultation go to:

[https://beisgovuk.citizenspace.com/civil-nuclear-resilience/epandr/supporting\\_documents/BSSD%20Emergency%20Preparedness%20and%20Response%20Consultation%20Final%20Document.pdf](https://beisgovuk.citizenspace.com/civil-nuclear-resilience/epandr/supporting_documents/BSSD%20Emergency%20Preparedness%20and%20Response%20Consultation%20Final%20Document.pdf)

and:

[https://beisgovuk.citizenspace.com/civil-nuclear-resilience/bssd-public-exposures/supporting\\_documents/Consultation%20on%20BSSD%20Public%20Exposures%20and%20Justification.pdf](https://beisgovuk.citizenspace.com/civil-nuclear-resilience/bssd-public-exposures/supporting_documents/Consultation%20on%20BSSD%20Public%20Exposures%20and%20Justification.pdf)

This briefing concentrates on the emergency preparedness and response consultation.

**THE LOCAL GOVERNMENT VOICE ON NUCLEAR ISSUES:  
WORKING FOR A NUCLEAR FREE, LOW CARBON WORLD**

Both consultations close on the **15<sup>th</sup> November 2017**.

To respond, email comments to: [ep@rconsultation@beis.gov.uk](mailto:ep@rconsultation@beis.gov.uk)

Or by post to: Nuclear Resilience Team, Department for Business, Energy & Industrial Strategy, 1 Victoria Street, London, SW1H 1ET.

Respondents in Scotland should also send their response to: [Ewan.Young@gov.scot](mailto:Ewan.Young@gov.scot)

Or by post to: Ewan Young, Environmental Quality Division, Scottish Government, Area 3H South Victoria Quay, Edinburgh, EH6 6QQ.

Respondents in Wales should also send their response to: [EQR@gov.wales](mailto:EQR@gov.wales)

Or by post to: Environment and Quality Regulation, Welsh Government, Crown Buildings, Cathays Park, Cardiff, CF10 3NQ.

While defence nuclear sites are not bound to the Euratom Treaty, the Ministry of Defence has taken a policy decision to apply BSSD to all relevant defence activities. Responses can make reference therefore to both civil and defence nuclear emergency planning.

## **2. Confusion over the Directives being consulted upon**

Before responding to this substantive consultation, NFLA is aware of a detailed discussion that has taken place between the pressure group Together Against Sizewell C (TASC), and the Government and the Office of Nuclear Regulation over which Euratom Directives are actually being consulted upon. EU2014/87 is the overriding directive agreed across Europe by all governments and nuclear regulators. Yet, the Government responded to TASC that:

“Directive 2014/87/Euratom made minor amendments to Directive 2009/71/Euratom, which established a Community Framework for the safety of nuclear installations. No consultation took place prior to the UK's implementation of Directive 2014/87/Euratom as it required only minimal changes to the UK's current regulatory framework. No further consultation will take place as implementation is now complete.” (Response provided to TASC and passed on to NFLA)

What is being consulted upon in this consultation document is a part of the Euratom Directive 2014/87 which relates to severe accident planning. TASC are concerned that this Directive, 2013/59, is being taken out of context and being referred to as emergency planning. TASC have asked the following questions in their consultation submission to the Government:

- Is it reasonable to assume that the overall directive 2014/87 which strengthens and requires an independent regulator, includes severe accident planning, potentially changes plant layout and siting should, in the interest of openness and transparency, have been consulted on in the first instance?
- Should the Government be asked to answer each condition of the directive and show what steps it has taken to allow it to conclude that changes are only minimal?
- Should government be asked to explain why it can consult on one directive which is a part of an overriding directive, yet not consult on the substantive directive?

NFLA shares this concern and wishes to seek clarification from the Government over the questions put to them by TASC in their consultation submission. Furthermore, NFLA has been disappointed with the limited way in which this consultation was publicised, and a consultation period of just 5 weeks, when average nuclear policy consultations are usually 8 – 12 weeks. NFLA would like to seek clarification from the Government on the relatively short time to respond to what is a very detailed and dense consultation. It expects as such therefore a more limited response from key stakeholders to the consultation.

## **3. Key principles of a new nuclear emergency planning**

The Government argue the risk of a radiological emergency in the UK is extremely low. However, duty holders are required by law to plan for potential nuclear emergencies, with the Office for Nuclear Regulation (ONR) and the Health and Safety Executive (HSE) responsible for

compliance with nuclear emergency plans. The Government notes they have consulted in depth prior to this exercise with what it calls expert stakeholders, the European Commission and the IAEA. In the Government's view, transposing the Euratom BSSD into UK law will build on a robust and well-established regulatory regime by strengthening it further by "making it more responsive to local communities, more proportionate and more transparent". (3)

In order to achieve this, a number of key principles are to be strengthened, including:

**Outcome-focused planning:** The Government wants to move away from 'prescriptive, one-size-fits-all requirements' – which lay at the heart of REPPIR – to a more flexible approach focusing planning efforts on where the impacts of an emergency are more likely to be felt, with the most severe impact, or where the potential benefit is greatest. This would mean looking to target planning for places where emergency plans are harder to implement due to the presence of a number of more vulnerable members of the community, such as in schools, hospitals or day care centres. As such, emergency preparedness and response would become more 'outcome-focused' with duty holders given the power to demonstrate to the ONR / HSE how they intend to meet the requirements of the regulations in light of local conditions. The Government argue this will align the emergency preparedness and response framework more closely with how nuclear safety and security is regulated, as well as with wider health and safety regulation. NFLA broadly welcomes this, but it is concerned it may create inconsistencies between different nuclear sites, compared to present, which need to be carefully considered within the emergency planning process. Training, more live emergency exercises and increased connectivity with the local public will be a key part of such a radical change in planning.

**Commensurate planning:** BSSD 2013 calls for 'proportionate and flexible' emergency plans that can deal with a wide range of emergency scenarios. The Directive therefore calls for civil, defence and radiological sectors to plan proportionately for a full range of emergencies and go into more detail in their planning processes for scenarios which are either more severe in nature or more likely to occur. As such, some emergency planning should be undertaken for events that may have a very low probability but would have a severe impact – such as in a Fukushima type incident. A potential result of this approach is likely to involve planning over larger distances than at present, and introducing new plans for sites which currently do not have specific emergency preparedness arrangements. NFLA welcome this part of the Directive and hopes it can be implemented in full by the responding agencies and the nuclear sites.

**A graded approach:** Whilst the Government will maintain a regulatory framework to all nuclear and radiological activities, including transport, it plans to introduce a 'graded' approach so that the most comprehensive emergency planning arrangements are focused towards the most hazardous activities. With respect to sites that have current off-site plans under the REPPIR regime, the Government expect such plans to be continued and maintained under this new process. NFLA agree that emergency planning should be focused around the most hazardous activities, but care is required to ensure that new plans do not discount completely more lower-risk activity that could still create emergency response issues.

**Transparency and consistency:** The Government argues that the use of complex threshold calculations to decide on what type of planning should be undertaken has "meant that our emergency management system can sometimes appear arbitrary and technical to stakeholders". The Government wishes to move away from this system to develop a regime where planning decisions are based on proportionate planning. They also seek to standardise key elements of the methodology informing planning distances and countermeasures after an emergency incident. This is justified they argue in that local authorities will receive better and consistent information on the consequences of an emergency and become "empowered" by owning the off-site plan. This will increase transparency to the public on how the details of off-site planning are determined. NFLA would welcome a move away from the current secretive planning process under REPPIR, by which the ONR determines the level of the emergency planning zones without any public consultation of the local community. NFLA would wish to see more clarity in the consultation on how local authorities can become "empowered" in a new role where they take will take over responsibility for now determining evacuation areas and other key details of the offsite plan. NFLA has some concerns that local authority emergency planning officers potentially do not have the same level of technical knowledge as ONR staff, and seeks clarification from

the government that such a change will not dilute the quality of the emergency plans. NFLA would also wish to know how the local community will be brought more fully into the discussion over the emergency plan in a way that can be useful, practical, informative, effective, open and transparent. NFLA remain somewhat concerned at how consistency can be achieved across the range of REPPIR plans if each site will undertake planning to local concerns and risks.

**Flexibility:** The Government also wants to see greater 'flexibility' in planning for and responding to a nuclear or radiological emergency. This will allow local emergency planners to make effective and pragmatic decisions. An example given is that the Government wishes to see stocks of stable iodine tablets – which can be an important countermeasure when there has been a radiation release in certain emergencies – being readily distributed in a timely manner to affected communities by removing regulatory obstacles. NFLA sees some benefit to such an approach, but again is concerned that this may create inconsistency between nuclear sites. NFLA has some clear views on the pre-distribution of stable iodine tablets noted below.

**Continuous improvement:** A key part of the new regulations will be a Code of Practice offering practical guidance on how duty holders can meet the requirements of the regulations. Such guidance will be regularly updated when appropriate. NFLA is pleased there is a commitment to continuous improvement. It would have liked to have seen a final edition of the Code of Practice be included with the consultation document, given its importance to understanding how continuous improvement will take place. Whilst the Annex reads well, it does not follow it will be the final agreed Code of Practice. NFLA would like to see some form of public consultation on the final edition of the Code of Practice.

#### 4. **The UK's existing nuclear emergency planning regime, and post-Fukushima planning**

The UK has a number of pieces of legislation governing different aspects of nuclear emergency planning. NFLA has been critical of this previously because it makes nuclear emergency planning too disparate. While it is right and proper to focus detailed work on emergency planning around fixed nuclear sites, NFLA have been concerned those Councils without nuclear sites are not sufficiently aware or fully trained to deal with an accident involving a transport of nuclear materials.

The main emergency planning regulations around fixed nuclear sites is the REPPIR Regulations. These put a duty on local authorities to work with the site operator and all relevant Category 1 and Category 2 responders (the emergency and public health services) to develop an offsite emergency plan for all main civil and defence nuclear sites. (4) In addition, the Ionising Radiation Regulations 1999 provide guidance to all workplaces where radiation substances and electrical equipment emitting ionising radiation are used. (5) For more generic emergency planning and the publication of a county risk assessment by Local and Regional Resilience Forums there is the Civil Contingencies Act 2004. In the area of the transportation of radioactive materials, they are regulated by the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (known as CDGs).

These regulations relate to England, Scotland and Wales. Northern Ireland has its own version of REPPIR and CDGs and so NFLA notes this consultation does not apply to it. NFLA wishes to clarify when Northern Ireland regulations will be consulted upon. The protection of the public around radiation issues is also a reserved matter, which means that Public Health England is the agency dealing with the health effects of radiation for all of the UK. The ONR are the responsible body for REPPIR and the CDGs across the UK.

The Euratom Basic Safety Standards Directive 2013 lays down minimum radiation safety standards for medical patients, workers and members of the public. The Directive also covers arrangements for responding to radiation and nuclear emergency incidents from small-scale incidents up to major nuclear emergencies, like at Fukushima, from which this Directive seeks to implement lessons learned.

In the UK, following the Fukushima disaster in 2011, the then Chief Nuclear Inspector Mike Weightman conducted an inquiry into the lessons that could be learned to enhance the UK's nuclear emergency response arrangements. While he argued arrangements were fit for purpose,

he recommended that the Government should instigate reviews – or extendibility assessments – of the arrangements for extending countermeasures beyond the Detailed Emergency Planning Zone (DEPZ) of core nuclear site offsite emergency plans. NFLA submitted detailed views to this review and argued, amongst other things, for increasing the size of the DEPZ inner and outer zones to international norms. (6) Following Weightman's recommendations, the Government trialled a voluntary approach to extendibility and also sought to refresh national guidance – the Nuclear Emergency Planning and Response Guidance 2015 – to provide practical support and guidance for local planners to take account of developing such extendibility assessments.

In the Government's view, the BSSD 2013 gives the opportunity to improve the existing REPIR regulations more generally. NFLA welcomes much of this change, as it, and several NGOs (non-governmental organisations) have previously outlined a number of detailed concerns with the existing REPIR regulations. These concerns are outlined in Annexe 1 of this briefing, and they have been provided to the Government several times in meetings of what was then the DECC (now BEIS) NGO Forum Nuclear Emergency Planning Sub-group. Despite this, a formal response to them from Government to these concerns has never been provided, despite repeated requests to do so. These concerns remain relevant for any new REPIR regime. NFLA also notes that, due to 'staff shortage' the subgroup has now been disbanded by the Government, a sign that strikes a negative light on seeking greater openness and transparency in this area of policy.

When it comes to the learning points from the Fukushima disaster, which the Directive is directly derived from, NFLA has also been in close contact with local Fukushima community groups, who produced a booklet of the critical issues and mistakes that took place after the accident. A summary of those points is attached as Annexe 2 and they remain relevant for a new REPIR and nuclear emergency planning regime. (7) NFLA urges the Government to consider them in detail when making the final changes to the nuclear emergency planning regime.

## **5. Definitions of an emergency and of emergency workers**

The BSSD Directive has a broader definition of what should be called as a nuclear emergency than current UK regulations allow for. It defines an emergency in this area as "a non-routine situation or event involving a radiation source that necessitates prompt action to mitigate serious adverse consequences for human health and safety, quality of life, property or the environment, or a hazard that could give rise to such serious adverse consequences". Under REPIR, the Government concede that its present definition of an emergency is limited to the exposure of a member of the public to ionising radiation. It does not expressly include serious adverse consequences to quality of life, property or the environment, all of which were badly affected in the area around the Fukushima site in north east Japan. NFLA have remained concerned about this narrow definition for some time, so are pleased the Government has conceded this point.

NFLA agrees with the Government that REPIR in its current guise is too narrow. Indeed it has been saying so for a number of years, but it has taken this new Directive to force important and necessary change. The Government counters that Schedule 8, Part 2 of the REPIR regulations already provides a duty to emergency planners to consider how to reduce the transfer of radioactive substances to individuals from the environment. However it agrees that it would provide greater clarity if a new definition of emergency is widened to explicitly consider direct and indirect impacts to the environment, as recommended in the Directive.

NFLA agrees with the government on the development of a more holistic approach in considering both medical and other protective measures is important, and NFLA sees it as a key learning point from the Fukushima disaster. It does again imply that the existing nuclear emergency planning regime was perhaps not holistic enough. NFLA does not wish to see such changes in nuclear emergency planning to be narrowed down to a budgetary issue, as the Government often appears to within this entire consultation document (as it mentions in accepting this widening definition), as public health and safety and the protection of the environment are essential whatever the cost.

In addition, the BSSD Directive differs from REPIR in that it does not define a specific 'trigger' dose of radiation exposure that has to be reached before there can be a radiation emergency.

The Directive rather concentrates on the potential consequences of a release. Furthermore the IAEA also does not specify trigger doses of radiation exposure in its definition of nuclear or radiological emergency, which is: “An emergency in which there is, or is perceived to be, a hazard due to, (a) the energy resulting from a nuclear chain reaction or from the decay of the products of a chain reaction; (b) radiation exposure.”

As such the Government has decided the new definition of emergency will not include a trigger dose, to align it with the Directive and the IAEA definitions. This is a key justification for moving to a graded approach and the government acknowledges it is a significant change for the nuclear emergency planning regime. NFLA agree that this is the case but believes such a major change has to be considered carefully, seeking official and independent scientific advice. While it may make future planning ‘easier’ to deal with, there has to be care to consider the health impacts of low as well as moderate radiation doses that can emerge from a nuclear or radiological emergency. NFLA has consistently remained concerned that even very low levels of radiation exposure could have an impact on health. (8)

The Directive also defines for the first time an ‘emergency worker’ in a way that REPIR never has. Its definition states: “Emergency worker means any person having a defined role in an emergency who might be exposed to radiation while taking action in response to an emergency. Member States shall ensure that emergency workers who are identified in an emergency response plan or management system are given adequate and regularly updated information on the health risks their intervention might involve and on the precautionary measures to be taken in such an event. This information shall take into account the range of potential emergencies and the type of intervention.”

NFLA find it noteworthy that there has never been such a definition for an emergency worker in any UK nuclear emergency planning law, whether it be REPIR, the Civil Contingencies Act or nuclear transport plans. It is a clear deficiency within such legislation, and important as a wider range of people could be asked to get involved in a major nuclear emergency incident than usual – as was seen in Chernobyl and Fukushima. NFLA is pleased the Government will transpose this definition into UK regulations and all such staff will be trained accordingly. The Government states that stakeholders have confirmed that such staff have been trained adequately through exercises that could be replicated during a real emergency. NFLA is not as confident this is the case, and it would like to see the evidence of a consistent and relatively intense form of adequate training across the country. NFLA would question whether there have been enough ‘live’ exercises to confirm this assertion from the Government, when often exercises are done at a ‘table top’ level. The related issue is how many ‘live exercises’ have looked at the more extreme type of scenario where radiation exposure has taken place? (9)

Furthermore, while much of the current UK nuclear emergency planning regime has been focussed around offsite planning to fixed sites, the NFLA remains concerned about an accident or malicious incident occurring with a nuclear transport. In such cases, local authorities and other Category 1 responders are unlikely to have undertaken such an intensive level of training of appropriate staff. Any new regime should expand generic training to occur across all parts of the country where radioactive materials are transported, whatever the financial cost of such training, which should be covered by a combination of the industry and the government.

## **6. Outcome-focused regulation, graded emergency planning**

A core part of the Directive, and a focal part of the consultation, is the move from prescriptive planning to a more ‘flexible’ form of emergency planning based on hazard assessment and graded to the potential level of radiation dose release that is possible from an accident at a nuclear or radiological site. This is a primary learning point from the Fukushima disaster that there needs to be a wider approach that allows for ‘extendibility’ of an emergency response, potentially taking in much larger areas and an increased number of people. This could also bring in a larger number of sites where currently there are no detailed offsite nuclear emergency plans, though the consultation does not define which these sites will be.

NFLA welcome this move, as it believes any radiation or nuclear emergency at a civil or defence nuclear site could quickly require consideration of extendibility. Any knowledge or rumour of a

radiation release is likely to create inevitable public concerns and alarm and lead to self-evacuation when it may be safer to shelter. The plan has to become more flexible to deal with such a scenario. It should also be noted that most nuclear sites are in geographically remote areas, with limited access and egress points and transport hubs, likely to become gridlocked very quickly. As a case study, the Fukushima disaster emphasised that much self-evacuation took place over a much wider area than most present offsite REPPIR plans are predicated on. While it remains a low risk, there are scenarios at most of the larger nuclear sites where an extended emergency response could take place, and now is the time for recent extendibility assessments at such sites to be formally incorporated into existing offsite plans.

The Government notes that local authorities will need to make the decision on introducing proportionate and graded approaches to offsite emergency plans, with the ONR and HSE playing an advisory role. This is in comparison to the present REPPIR approach, where it has been ONR who determine the size of the detailed emergency planning zone (DEPZ). Local authorities will be assisted by improved and standardised communication of all risks and consequences by site operators and suggested approaches to setting planning zones articulated in the Code of Practice. NFLA has concerns this is adding a more onerous and sensitive role to Council Emergency Planning Units (EPUs), at a time when many have gone through significant staffing and budget cuts following seven years of austerity in local government. NFLA would like to see additional resources and funds given to undertake these wider duties. A core weakness of the Civil Contingencies Act and the nuclear emergency planning regime it created was that it did not come with any dedicated and protected resource (in contrast with the previous Civil Defence Act regime). As such therefore, local authority emergency planning was subject to similar deep cuts as others parts of Council budgets. There is not a local government emergency planning unit in the country that has not been affected by such issues, and while this potential new regime encouraged by the Directive is logical, if it is not funded properly it risks stretching already limited local resources even further. In addition, other Category 1 responders like the Police, the Fire and Rescue Services and the Ambulance Service have all been subject to deep cuts, and NFLA remains unconvinced that this will not have an effect in the event of a major nuclear emergency.

The Government has noted a couple of examples where emergency planning areas have been significantly extended. The Sizewell site has a detailed emergency planning area set by ONR of 3 – 4 kms, but the new outline emergency planning area would now extend to 15kms according to the Suffolk Resilience Forum. NFLA welcomes this from the point of view of being a more common sense approach to emergency planning, but it also has to be linked with a greater level of workload in informing a significantly larger number of people of what to do in such an emergency, along with increased numbers of vulnerable members of the community. NFLA would like to see clarification from Government on how such an increased workload is undertaken and whether additional resources are brought to bear for it, and who will provide that resource. Looking at the outcomes of such emergencies, while again to be welcomed, is likely to increase the need for wider and more extensive training across all Category 1 and 2 responders as well.

NFLA is disappointed that the associated and final edition of a Code of Practice is not with the consultation in order to be able to compare and contrast how this new regime would change from the existing regime. While the Annex, 'How this could work in practice', looks to be the embryonic draft code of practice, it would still appear that they are only initial ideas and they could be changed by the outcome of the consultation. NFLA would like to see a follow-up consultation before the Code of Practice is finally implemented, to ensure that it has been thoroughly tested and found fit for purpose. NFLA would also welcome discussion within all Local Resilience Forums, but also with the local community, when testing the adequacy of the draft Code of Practice.

## **7. Reference levels**

The Directive establishes 'reference levels' for emergency and existing radiation exposure situations. It defines such does levels as follows: "Without prejudice to reference levels set for equivalent doses, reference levels expressive in effective doses shall be set out in the range of 1 to 20 mSv per year for existing exposure situations and 20 to 100 mSv (acute or annual) for emergency exposure situations".

Reference levels are an international concept and, as the definition suggests, relate to both short-term and long-term exposures received during the emergency and over the remainder of the first year after the emergency. Again, such a concept is new for the UK nuclear emergency planning regime. Rather, the UK uses dose criteria such as the Emergency Reference Levels (ERLs) set by Public Health England. NFLA note that ERLs are designed to deal with short-term exposure pathways, and not the full residual dose over the remainder of the first year. Independent scientists have made this point to government previously, and the NFLA notes that the Government has had to respond to this part of the Directive by planning to introduce secondary legislation to establish a 'National Reference Level' and ensure the new regulations replacing REPPiR take account of the National Level. As such, the Government plans to transpose a new National Reference Level of 100mSv effective dose in the first year, as consistent with some other EU countries. NFLA notes that advice from PHE will also follow. Such a level appears quite high to the NFLA, so it is keen to see the justification for this from PHE.

However, the Government goes on to note that it will allow some 'flexibility' for individual nuclear sites and / or local authorities who may wish to establish a reference level lower to this proposed National Level. The Government also notes it may want to permit lower levels to be set in response to an emergency, if appropriate. While NFLA would want to see the intention of keeping exposures to radiation as low as reasonably practicable, it believes the Government needs to provide much more technical and scientific detail on how it could allow flexibility from European norms and how it would see the regulators as defining and accepting such flexibility. With such a duty never being in UK law, which in itself is of concern to the NFLA, there has to be clearer definitions around 'flexibility' or it could imply a dilution of international standards that is not justified.

## **8. Public information around nuclear emergencies**

NFLA has been concerned for many years with the amount, level and quality of public information that is being provided in the area of nuclear emergency planning. (10) It has often appeared to the NFLA that the primary concern has been to minimise alarm to a very small amount of the population – the small area of the detailed emergency planning zone – and not talk about genuine scenarios with a variety of potential wide-area nuclear emergencies.

NFLA has previously noted how public information provided by the operators has been narrow, dominated by reducing public concern and is given out to a relatively small number of people in close proximity to a nuclear site. NFLA has always believed a nuclear emergency incident would impact on a much wider area and public information should be provided considerably further than these very small areas. In contrast as well, little to no pre-incident public information is given out in reference to the transport of nuclear materials, whether that be civil nuclear or the likes of defence nuclear weapon convoys.

The Government congratulates itself that the list of basic areas of public information within the Directive is near identical to what is currently found in REPPiR. The Government does though concede that, with the concept of taking a graded approach to planning, information could be provided to an area a significantly longer distance away. It suggests this will "require careful handling".

In terms of the information provided, current regulations note the providing of advice on information around the type of emergency and specific advice on the health protection measures that have been taken, and how this impacts on the public. The Government note that REPPiR focuses on public information coming via radio or television. It plans to widen this definition to "relevant communication channels" to take account of the increased use of the internet and social media. Again, this may require providing public information to persons who currently would not receive it under the REPPiR regulations. 'Careful handling' is again recommended.

In repeated discussions with the Government, NFLA has felt there has been a half-hearted and overly narrow strategy towards delivering public information on nuclear emergency planning, focusing almost completely on fixed nuclear sites. NFLA feel much improvement is required here and refer the Government to the recommendations made by the group Nuclear Transparency



Watch to a more expansive, informed and considered public information strategy that would create consistency across Europe. (11)

As an example, many city centre evacuation plans for a terrorist or chemical incident include a mobile text messaging emergency information service, which provides the opportunity to get a message out quickly to a large amount of people, who can forward it even further. NFLA is aware the Government has considered this for some nuclear sites, but remains unaware if this is to be actioned across all such sites. NFLA recommend a national plan of action to implement such a scheme.

There are also many ways to use social media – the main way younger generations receive information these days – that could and should be considered within an improvement to the nuclear emergency planning management system. ‘Go In, Tune In, Stay In’ is a nice slogan but could be irrelevant to an alarmed public at the time of an accident or emergency – the Fukushima disaster provides copious evidence that people often ignore public information. As such, a more expansive educative approach should be encouraged, rather than the timid approach that currently exists. The Directive gives a real opportunity for solid and important improvement that could assist Category 1 responders if such an educative approach is taken. The Government does not appear to want to change from the current norm or consider the real challenges of dealing with radiation emergencies – it seems more to hope that such emergencies will not happen rather than taking on board the benefits of a more expansive public information strategy which could actually save essential resources in the long-term and reassure the public at the same time.

NFLA also remains concerned about the lack of extensive public information around what to do in the event of an emergency involving a radioactive material transport. Such transports are presently increasing due to both NDA and Government policy, and could well impact on many local authorities who do not have fixed nuclear sites in their area. NFLA recommends here again a more pro-active expansive public information strategy to educate public awareness of the risks and responsibilities around such transports. Accordingly, there should be changes to the CDG regulations to take such measures into account.

## **9. Other planned changes to REPPIR**

The Directive recommends a number of other elements to be included in an emergency response plan. While the Government argues REPPIR contains within it much of the detail required for the plan, it notes that more explicit reference is required in the new regulations so that the emergency plans provide for reliable communications and efficient and effective arrangements for cooperation and coordination. There is also a regulatory requirement to ensure the current arrangements align with the Civil Contingencies Act in exercising and testing information-sharing and ensuring the interoperability of communications. NFLA welcome this change as an acknowledgement that REPPIR should be improved in these areas, and it will monitor this change in the final regulations and accompanying Code of Practice.

Another change required of REPPIR is to Regulation 4. This expressly requires emergency planners preparing detailed off-site nuclear emergency plans to plan for “reasonably foreseeable” scenarios that could lead to a radiation emergency. In transposing the Directive, the Government does not see the “reasonably foreseeable” as sufficiently fulfilling its requirements as it is only a measure of likelihood and does not consider the severity of harm caused by an emergency. The Directive also expects the new regulation to plan for events of a lower probability than the current REPPIR regulations are based upon; and to consider a wider range of radiation emergencies caused by unforeseen events.

Following on from this, the Government notes that in the civil nuclear sector, the industry and the ONR are seeking to address such issues. An example given is that the ONR have required “cliff edge” testing to consider that, if there are more severe emergency scenarios close to this likelihood, then they should drive new planning determinations. As such therefore, the Government proposes that, in the same way as occurs with regulations on the transport of nuclear materials, emergency plans are required for the site based on a proportionate response to the risks identified in a hazard identification and risk evaluation (HIRE) process.

The Government therefore plans a 'graded' approach focused on three areas:

- On site planning postulated for a dose under 1 mSv (requiring risk assessments and on-site planning is undertaken);
- Intermediate planning for a dose of 1 – 5 mSv (more detailed HIREs are undertaken and shared with the local authority, with on-site planning and some outline planning);
- Detailed and Outline planning for doses over 5mSv (this would require more detailed HIREs shared with the local authority, on site planning, detailed planning around the site for more likely emergencies and Outline planning around the site for less likely emergencies).

NFLA welcomes this planned new approach that arises and is encouraged by the Directive. It will bring forward an important widening of emergency planning to prepare nuclear sites for a broader level of potential emergencies. It should improve nuclear emergency plans if undertaken thoroughly and with care. NFLA argues such change needs to be carefully considered and national and international regulatory advice should be sought and provided within the Code of Practice, which will be very important for giving local authority emergency planning officers the requisite tools to improve plans.

The Government acknowledges there are challenges in increasing the scale of public protection actions, and this could also mean a number of new sites have to develop off-site plans as well. Yet the Government suggests such a level of detailed planning will be comparable to current planning at nuclear sites as under the current detailed emergency planning zone (DEPZ) process. NFLA feels there is a sense of incongruity with such a state of affairs, and would expect considerably expanded emergency planning processes to be implemented, particularly in regards to new safety and security measures.

NFLA is interested in the example of best practice noted in the consultation document around the voluntary offsite plan covering a number of nuclear sites in Oxfordshire. In this example, Oxfordshire County Council and the Harwell Oxford Campus have sought to consider scenarios such as extreme weather, serious fire or a power cut on one site that could affect others, and have outlined mutual support arrangements. This may well be a good example, but NFLA notes it has been 'voluntary' in nature. It is likely to have taken some considerable time and effort to put together. NFLA would want to see the graded approach and more detailed outline planning to be used across all nuclear sites as it will improve nuclear emergency planning culture on these sites, educate the Category 1 responders who would be involved in an emergency response and lead to consistent best practice across the board. Without it, the potential for an inconsistent approach could develop, and with the ONR moving towards a more advisory role rather than formally outlining detailed procedures, that inconsistency could create real issues.

#### **10. Stable iodine – pre-distribution or not?**

The consultation document discusses in some detail the timely administration of stable iodine tablets as a countermeasure for certain type of radiation. Having quick access to such tablets is potentially critical for some types of incident where there has been a radiation release. The Government note that the Directive requires it to reconsider the arrangements for distribution of such tablets. It recommends that local responders should be provided with 'autonomy' to choose a preferred distribution method in relation to local circumstances. The Government will also ensure any legislative or regulatory changes are put in place to allow for that and, with the regulator, provide guidance and advice to local responders on fulfilling their responsibilities to procure, store and distribute stable iodine. This more outcome based approach will assist local responders, but it can only take place by satisfying the regulator that the agreed arrangements are adequate and proportionate in protecting the public. The Government sees the preferred response as to having a local hub for distribution, and not to seek pre-distribution of tablets to the local, potentially affected community.

As a pharmacy medicine, stable iodine currently can only be sold or supplied from a registered pharmacy supervised by a pharmacist. This is a real issue in the extreme time pressure of a nuclear emergency. The Government therefore proposes to create an exception to the Human

Medicine Regulations 2012 to allow those acting under the local authorities' emergency plans to issue stable iodine to the public in the event of a nuclear emergency. As such this will allow such tablets to be stored at appropriate local sites such as schools, hospitals, town halls etc. These would be then distributed by accredited staff, or members of the public could collect from local sites if it does not compromise other measures, such as sheltering. The Annex gives practical information on getting a licence for attaining such tablets, how to claim costs back and procurement issues, which the NFLA broadly welcomes.

The NFLA has been involved for some time in the debate over whether it is better to pre-distribute stable iodine or not. NFLA notes a number of European states such as Belgium and the Netherlands do pre-distribute among others. NFLA supported a response by independent radiation consultant Dr Ian Fairlie to the House of Commons Science and Technology inquiry into radiation emergencies. Dr Fairlie recommended pre-distribution to an area of 30kms around a nuclear site. NFLA re-submit Dr Fairlie's detailed comments in Annex 3. (12) The NFLA Secretariat has previously discussed this matter with BEIS officials. While it would argue the potential new arrangements are a step in the right direction it still encourages a further consideration of the comments made by Dr Fairlie and the recent actions taken by other European states towards pre-distribution.

NFLA also notes the concern Dr Fairlie makes around increasing risks from terrorists incidents. Existing nuclear emergency plans appear to be predicated on accident scenarios in which first responder emergency services remain intact: There needs to be additional planning put in place for alternative Police, Ambulance, Air Ambulance and Fire and Rescue Service support if terrorist groups deliberately take out the local HQs of these agencies as part of an attack on a nuclear facility or transport. NFLA recommends the Government refers to its detailed briefing developed by independent nuclear security specialist Dr David Lowry, which outlines a range of nuclear security issues. (13)

#### **11. Transport of radioactive materials**

The Carriage of Dangerous Goods (CDGs) regulations relate to the transport of civil nuclear materials. Regrettably for the NFLA, defence nuclear materials are not included under the regulations. In reference to civil materials, they are also defined as a practice under the Ionising Radiation Regulations (IRRs). Regulation 17 of REPIR applies to all local authorities by requiring them to prepare and supply information and advice relating to radiation emergencies, which would include transport emergencies. The ONR regulates all civil transport of radioactive materials, and works with the Defence Nuclear Safety Regulator (DNSR) in a process of joint regulation of 'relevant' areas of defence activities.

In reference to the definition of an emergency or emergency workers the Government does not anticipate major changes to the CDG's as ONR guidance includes concern for the environment and the need for appropriate training of transport staff. The National Reference Level will be incorporated in updated guidance to support duty holders in creating transport emergency plans.

In terms of emergency response, the CDGs already require the driver to notify the carrier of an emergency, and that the carrier must then inform the ONR. The arrangements also include guidance on how emergency arrangements are initiated and how examination of the load is carried out to examine if contamination has taken place. The Government also argues the generic levels of risk assessment and response adequately cover transport radiation emergencies. As part of responding to CBRN (Chemical, Biological, Radiological and Nuclear) incidents, the Fire and Rescue Service is obliged to maintain specific resources to respond to nuclear or radiological transport emergencies, which ensure that the necessary people, services and equipment are readily available for such emergencies. The Ambulance Service also has pre-determined roles and responsibilities in the event of a transport emergency. As such the Government therefore also believes such arrangements meet the detail of the Directive. NFLA broadly agrees that good measures are in place to deal with such emergencies, but it remains sceptical that the population would acquiesce to for example, decontamination procedures, without a considerable public information programme.

NFLA is less convinced that pro-active public information for transport radiation emergencies is in place. Much of the CDGs guidance refers to reactive information that would be given to the public after a transport radiation emergency. Such information is of a detail that should comply with the Directive. However, NFLA would like to see more pro-active information on such transports being developed generically by Government and locally by Local Authorities. Many of the changes in emergency planning over the past decade or more have been about pro-active, generic information for a wide range of emergencies. NFLA would like to see more generic information of this type go out so that the public can understand the risks and consequences of the transport of radiological materials by road, rail, sea and even air. Such transports are regrettably increasing at present due to NDA policy to place radioactive materials at Sellafield, as well as the increasing needs to maintain the Trident nuclear weapons programme. A greater quality of information should be provided by Government and Local Resilience Forums to the public about such transports. Whilst this does not directly impact on implementation of the Directive, NFLA recommend improvements should still be made as a matter of best practice.

NFLA does welcome the planned amendment to the CDGs requiring carriers to make provision for the transition from an emergency exposure situation to an existing exposure situation. Whilst Category 1 responders lead the transition to recovery, the NFLA welcomes the Government's recommendation to support this transition.

## **12. Defence nuclear emergency planning concerns**

Whilst the consultation document is a joint approach by the BEIS department, the Ministry of Defence and the Health and Safety Executive, NFLA are disappointed that defence nuclear emergency planning is not more expressly mentioned within the changes required from the Euratom Directive.

This is expressly around concerns over a lack of openness and transparency around REPIR planning, and concern over the secrecy around nuclear weapon convoys that regularly travel from Berkshire to Faslane and Coulport on the west coast of Scotland. It is all very well for the Ministry of Defence (MOD) to say its plans will be amended accordingly to take account of the changes required, but if it will not substantially engage with stakeholders on the detail it makes it almost impossible to assess if the changes are effectively made. Just this week, over seeming concerns around the sensitivity of Trident replacement, the MOD has stopped the Defence Nuclear Safety Regulator from publishing much of the detail of its annual reports. These have previously raised alarms over core staffing shortages in the defence nuclear sector. (14)

NFLA asks BEIS to particularly encourage the MOD to cooperate with local government in the area of nuclear weapon road convoys. At present, Local Authorities receive generic guidance (Local Authority Emergency Service Information or LAESI) on the potential routes, make-up and generic information should an emergency occur with such a convoy. However, only the Police are notified when such a convoy goes through a Local Authority area, and neither the Local Authority or the Fire and Ambulance Services are made aware of them. Therefore, in the event of a radiation emergency with such a convoy, such Category 1 responders would be dealing very much reactively with the incident while only having undertaken, at best, generic training of specialist staff.

As all Category 1 responders can be, and should be, security cleared and emergency planning is undertaken on the whole in a highly integrated manner (as REPIR is, for example) this is one type of emergency that would greatly benefit from such an integrated response. While a small number of emergency exercises have assisted such responders, this remains very much a piecemeal response from the MOD. The NFLA encourages the MOD to take this into account with the new Euratom Directive and act accordingly to develop measures which enhance public protection in this important area of nuclear emergency planning. The NFLA also encourages the MOD to positively engage with independent assessments and critiques of the risk of such transports, as outlined in recent documents by ICAN (15) and the Nuclear Information Service. (16)

### 13. Conclusions

The Euratom Basic Safety Standards Directive 2013 is a welcome initiative to improve generic nuclear emergency planning across Europe. NFLA is disappointed that the UK Government has implemented various parts of the Directive and not consulted on it in its entirety. It has also given just a relatively short amount of time to receive responses from stakeholders. NFLA does not think this consultation has been publicised adequately, and is aware that a number of local authority emergency planning units have not been pro-actively made aware of the consultation document. To only hold this consultation just four months before measures are supposed to be put in place is also very disappointing, and a much wider level of consultation should have taken place, for example through the BEIS NGO Forum or through local government forums like the Nuclear Legacy Advisory Forum or the Scottish Councils Committee on Radioactive Substances, both of whom are interested in such matters.

The considerable changes required to the existing REPIR regulations arising from the Directive gives NFLA a sense of concern that existing regulation is not completely fit for purpose.

The suggested improvements that come out of the Directive and its transposition into UK law are largely to be welcomed, though NFLA is concerned that in some areas policy is being diluted over concerns around cost and burden on the industry and Category 1 responders.

NFLA is somewhat concerned that the changes will increase the burden on local authorities at a time when emergency planning units around the country have been contracting. Moving the ONR from prescribing the likes of the detailed emergency planning zones to become more of an advisor and auditor needs to be considered very carefully. It seems to the NFLA that this change moves consideration of planning zones away from the experts in the ONR to other agencies who have more generic and less specialist knowledge.

A wider concern remains around the consistency of plans around nuclear sites. REPIR was by no means perfect, but it did create some level of standardisation and generic planning. Whilst there are distinct advantages to outcome planning, proportional planning and graded planning, they are significant and considerable changes to the current norm. Flexible planning solutions sounds good on paper but NFLA can foresee a situation where there could be well-written and exercised plans around some nuclear sites, and more average or even inadequate planning in other areas. NFLA sees the Code of Practice as being vital for guaranteeing consistency and it is dismayed that this is not being directly consulted upon in this consultation. At present the consultation offers initial ideas which may become the Code of Practice. While these generally read well, they may not be the final definitive and agreed code of practice. Given that the new arrangements should be in place in 2018, NFLA would like to see some guarantees for a follow-up consultation on the final edition of the Code of Practice. NFLA would also like to see a clear set of nuclear emergency planning training guidelines for emergency planning officers, a more open and transparent nuclear emergency planning culture and a greater readiness to genuinely talk to the wider public and other important stakeholders when putting together new and updated plans under this process.

In terms of nuclear material transportation, NFLA would like to see a more pro-active educational planning process for all local authority emergency planning units to be added to the reactive manner of the current guidelines. With civil and defence nuclear transports rapidly increasing in recent years, NFLA remain concerned that at some point a significant accident could occur and want to be assured that a consistent approach from all local authorities can be provided.

Finally, NFLA would like to see the Ministry of Defence not just fully implement new regulations in the same manner as for civil sites and transports, but to be much more open and transparent about it. This is particularly the case around nuclear weapon transports and the involvement of Local Authorities in the planning process for them.

NFLA sees some genuine and positive developments in this area, which it actually notes comes out of a European Directive rather than an internal government policy process at a time when we are in the process of leaving the European Union. The decision of the UK Government to leave the Euratom Treaty in 2019 needs to also be considered carefully within this policy process

and through the separate Nuclear Safeguards Bill. NFLA is very concerned that there is not enough time to put adequate safety measures in place across all the areas currently governed by Euratom. NFLA is also concerned what may happen after Euratom, in ensuring UK nuclear emergency planning stays consistent with the rest of the European Union, and it needs more assurance from the UK Government in this area.

#### 14. References

- (1) European Commission, Basic Safety Standards Directive 2013, <https://ec.europa.eu/sites/ener/files/documents/CELEX-32013L0059-EN-TXT.pdf>
- (2) BEIS, 'Revised requirements for radiological protection: emergency preparedness and response', October 2017, page 8, <https://www.gov.uk/government/consultations/revised-requirements-for-radiological-protection-emergency-preparedness-and-response>
- (3) ibid, page 8
- (4) REPIIR regulations [http://www.legislation.gov.uk/uksi/2001/2975/pdfs/uksi\\_20012975\\_en.pdf](http://www.legislation.gov.uk/uksi/2001/2975/pdfs/uksi_20012975_en.pdf)
- (5) IRR regulations [http://www.legislation.gov.uk/uksi/1999/3232/pdfs/uksi\\_19993232\\_en.pdf](http://www.legislation.gov.uk/uksi/1999/3232/pdfs/uksi_19993232_en.pdf)
- (6) NFLA submission to the Weightman Fukushima incident review, 31<sup>st</sup> August 2011 [http://www.nuclearpolicy.info/docs/briefings/NFLA\\_Weightman\\_final\\_submission.pdf](http://www.nuclearpolicy.info/docs/briefings/NFLA_Weightman_final_submission.pdf)
- (7) Fukushima Booklet Committee, '10 Lessons from Fukushima-reducing risks and protecting communities from nuclear disasters', 11<sup>th</sup> March 2015 <http://fukushimalessons.jp/en-booklet.html>
- (8) See for example Fairlie and Korblein, Review of epidemiological studies of childhood leukaemia near nuclear facilities, February 2010 <https://www.ncbi.nlm.nih.gov/pubmed/19942628>
- (9) NFLA Policy Briefing 133, Fukushima update and its impact on UK and European nuclear emergency planning, 29<sup>th</sup> June 2015 [http://www.nuclearpolicy.info/docs/briefings/A247\\_\(NB133\)\\_Fukushima\\_Nuclear\\_EP\\_update.pdf](http://www.nuclearpolicy.info/docs/briefings/A247_(NB133)_Fukushima_Nuclear_EP_update.pdf)
- (10) ibid
- (11) Nuclear Transparency Watch, Position Paper on Emergency Preparedness and Response situation in Europe, February 2015 <http://www.nuclear-transparency-watch.eu/wp-content/uploads/2015/04/NTW-Report.pdf>
- (12) NFLA Policy Briefing 146, Science and emergencies – report to the House of Commons Science and Technology Committee, 26<sup>th</sup> May 2016 [http://www.nuclearpolicy.info/wp/wp-content/uploads/2016/05/A259\\_NB146\\_HoC\\_emergencies\\_submission.pdf](http://www.nuclearpolicy.info/wp/wp-content/uploads/2016/05/A259_NB146_HoC_emergencies_submission.pdf)
- (13) NFLA Policy Briefing 145, Nuclear Security concerns, 21<sup>st</sup> May 2016 [http://www.nuclearpolicy.info/wp/wp-content/uploads/2016/05/A258\\_NB145\\_Nuclear\\_Security\\_concerns.pdf](http://www.nuclearpolicy.info/wp/wp-content/uploads/2016/05/A258_NB145_Nuclear_Security_concerns.pdf)
- (14) Sunday Herald, 12<sup>th</sup> November 2017 [http://www.heraldscotland.com/news/15656024.Black\\_out\\_MoD\\_suddenly\\_censors\\_all\\_Trident\\_safety\\_reports/?ref=ar](http://www.heraldscotland.com/news/15656024.Black_out_MoD_suddenly_censors_all_Trident_safety_reports/?ref=ar)

## Concerns of the NFLA / NGO community over the REPIR regulations – first passed to the UK Government in 2013

- Site operators and ONR are not adequately complying with the three-year REPIR review timetable.
- At present there are inadequate numbers of personnel within responding agencies registered under section 14 of the REPIR regulations to deal meaningfully with any radiation emergency.
- Experience from the Fukushima incident indicates that emergency planning zones around nuclear sites need to be substantially larger – a minimum of 20 km appears necessary.
- Fukushima has shown that circular zones, while easier to administer, do not match the reality of how wind and weather spreads radiation, in many cases well beyond 20km. “Hot spots” of radiation have been found more than 100km away.
- The Fukushima incident also suggests that emergency public information should be made available within a larger 20km zone.
- The rationale on which zones are sized is opaque and appears arbitrary.
- Arrangements to control development and population numbers within the zone are difficult to enforce and poorly understood among the populace
- Current public information provided around nuclear sites is inadequate and does not give the sort of background advice or practical instructions that ordinary people need.
- The source of the information originates solely from site operators and should be drawn from a wider base of experts and inputs.
- Sufficiently detailed information and instructions are not passed on to those who need it, e.g. schools, holiday makers, second-homers, business premises, or supermarkets within the current emergency zone and those who use such premises.
- Emergency plans are not tested enough through real-life rehearsals which would highlight practical areas for improvement, and do not cover the timescales and evolving scenarios that a real-life emergency would present.
- ‘Live’ evacuations and road closure arrangements, rather than just notional table-top scenarios, have not been rehearsed in practice.
- The evident conclusion is that off-site emergency plans for nuclear sites are probably unworkable as they currently stand.
- It is unclear exactly how ‘extendibility’ arrangements would work in practice and what such an arrangement would mean for information provision in respect of preparedness for evacuation, basic radiation facts, and other related important information the public should be told.
- Do exercises at licensed sites rehearse an extendibility scenario?
- Potassium iodine tablets are generally not available at short notice, arrangements for distributing them are inconsistent and unproven, and it is not clear over what area they would be distributed in the event of an emergency.
- The uncertainties around the dose/risk methodology on which emergency planning is based are contested and do not address fundamental concerns expressed by the European Committee on Radiation Risk, which consider inhalation and ingestion as important pathways, rendering the ICRP dose/risk method redundant.
- The basis upon which the operator calculates the maximum credible accident upon which, in turn, the ONR sets its requirements for the DEPZ area, is not known.
- The basis upon which the ONR makes its decision about the size of the DEPZ, based on operator information is not known.
- Greater transparency will be needed in future arrangements if NGOs are to be convinced that they are adequately robust.

**Learning points from ‘10 Lessons from Fukushima – Reducing risks and protecting communities from nuclear disasters’ by Fukushima Booklet Publication Committee, 11<sup>th</sup> March 2015 <http://fukushimalessons.jp/en-booklet.html>**

*Evacuation planning -*

- Prior to the Fukushima disaster, Japanese nuclear off-site emergency plans were predicated on evacuation plans for residents within 10 kilometres from the plant. In the end, a 30kms evacuation was required, but the report notes areas much further than that where no evacuation orders were issued. This included Fukushima City (60kms from Fukushima Daiichi), which received, via rainclouds, a radioactive dose of 23.88 microsieverts per hour four days after the disaster; and again in Koriyama, 45kms south of Fukushima Daiichi.
- There was huge traffic congestion on all roads away from the Fukushima disaster, putting large numbers of people in direct danger of radiation exposure.
- Hardly any municipalities received direct evacuation orders from central government during the early days of the incident, and the majority of residents in the Fukushima prefecture could not obtain detailed information of what they should do.
- After the disaster struck, some people could not evacuate due to a severe shortage of petrol.
- Many people had to re-evacuate over and over again, some becoming ill due to this exhausting process.
- The conditions in evacuation and rest centres were extremely difficult for mothers with children, elderly people and people with disabilities.
- Despite having SPEEDI (System for Prediction of Environmental Emergency Dose Information) to predict the spread of radioactive particles, it was not until 12 days after the disaster that information was released, making it a redundant tool for evacuation.

*Sheltering issues -*

- For those who were told to stay indoors and shelter they had difficulty blocking out the external outflow, as Japanese houses are mainly made from wood and not airtight concrete buildings.
- In Minamisoma City, 30 kms to the north of the nuclear plant, residents told to stay indoors ran out of supplies, with the Mayor of the City having to resort to a You Tube plea on the internet seeking help and volunteers to transport supplies ‘at their own risk’. **Many local Councils in the vicinity of the disaster were woefully unprepared to deal with the after-effects of the disaster.**
- Thousands of people voluntarily self-evacuated from cities outside evacuation zones, often families without children. Such voluntary evacuations have led to receiving no compensation to cover the moving away from the area. There are also many ‘mother and child evacuees’ from families where the father has stayed behind to work, putting a real financial and emotional strain on them.
- Many evacuees have had their family units split up, with many elderly people moved from their children and grandchildren. Ill health in such people is high.

*Community recovery issues -*

- The number of ‘disaster related deaths’ of evacuees continues to rise. The report calculates 441 people in Iwate Prefecture, 889 in Miyagi Prefecture and 1,704 in Fukushima Prefecture.
- Unlike in Chernobyl, there is great pressure from the Central Government and local authorities to rush citizens back home in areas which still have considerable levels of radioactive contamination. This is putting many people who have been evacuated from such areas under great uncertainty about their future living and work arrangements.
- It is essential for communities living around nuclear sites to receive extensive information on how emergency orders will be issued and the systems for receiving such alerts. They must know where to go when evacuating to receive facemasks, raincoats, long boots and prescription medication.

*Public health emergency planning issues -*

- Households and schools in affected areas should also be given a prior stock of iodine pills. Local schools and community organisations should also be given stocks of radiation Geiger counters.
- Local residents around nuclear sites should build a network of independent experts whom they can go to during an emergency to verify public information messages, or to provide a second opinion.
- It is critical to immediately obtain and make public weather and contamination prediction maps based on weather modelling to enable institutions and the public to make evidence-based decisions.



- The Fukushima accident showed the need for a fundamental re-think of the entire emergency radiation exposure medical treatment framework.
- During an emergency, it is extremely important for individuals to keep records of their movements and local weather and feeding information.
- Despite having adequate stocks of iodine, many residents did not receive it due to confusion in communication between central government and local municipalities.
- The reopening of some schools in April 2011 with a much higher annual radiation exposure limit (increased from 1 mSv to 20 mSv) created a huge public outcry.
- Many citizens in areas where no evacuation directive was issued did not have any information of safe behaviour, and had to seek information from non-government sources to assist them.

#### *Post-event offsite issues -*

- Many citizens were filled with a sense of mistrust towards central and local government following the incident. Many community groups independently bought Becquerel radiation hand-held monitor counters and even whole-body counters to determine the radiation risk to them. It was only a year after the incident that local Councils bought such equipment.
- Over 4 years since the disaster, community groups from around Japan are inviting children and their families for holidays for evacuated communities, amidst fears they are not able to exercise adequately and to give them time in a 'clean' part of the country. Such 'recuperative holidays' have been a feature of the Chernobyl disaster, but there are to date no plans by central or local government in Japan to provide such schemes.
- There has been a lack of a comprehensive health study, despite the fact that radiation contamination crossed prefectural boundaries. Those studies that are taking place are too localised and limited in scope. The report argues that this is aimed at reducing the amount of people who will eventually receive compensation from the disaster.
- Concerns over the safety of food, fish and agricultural livestock still remain four years after the disaster. There is a real need for full and transparent information on exposure and local community groups should participate in measuring radiation in the area. Without this it is difficult to restore trust in the food distribution system.
- Tsunami debris contaminated with radiation is being transported around Japan to be incinerated. This is often against the wishes of communities in tsunami-hit areas, and residents near incinerators are also concerned about a release of radiation from them.

#### *Post-event onsite issues -*

- There is a huge radioactive waste legacy in the region which will take several decades to resolve. Local NGOs believe complete decontamination is impossible.
- There is real concern over decontamination being sub-contracted to companies without the required level of expertise, leading to the potential dispersal of radioactive materials to a wider area. Central government has also put too much pressure on local councils to deal with this very difficult issue.
- Most workers on the Fukushima site are receiving inadequate treatment for their toil, meagre wages and insufficient healthcare. Many workers have received radiation doses greater than the annual safe maximum dose – the report calculates at least 174 workers in this category, with the highest contamination a TEPCO employee exposure to over 678 millisieverts. Such workers should be guaranteed medical expenses in the long-term and be issued with a personal health record. At present many are not.

#### *Post-event financial and community cohesion issues -*

- There has been increased division and discord between the local communities affected by the disaster due to the psychological stress of being so close to radiation sources. Increased levels of prejudice to such communities are growing. There is also great tension between evacuees and host communities who have had to rapidly expand in a short period of time.
- The Nuclear Disaster Victims Act that was established by the Japanese Government in June 2012 has been significantly watered down by the successor government. Similar to the 'Chernobyl laws', people in Japan expected that the government would establish a series of resettlement zones and a fair system to resettle. There has also been a lack of public participation for evacuated communities. It has become increasingly complicated to claim compensation from the disaster.
- Many community ties that had existed for generations have collapsed.
- In the end, those who will ultimately bear the financial cost of the disaster will not be the nuclear industry that created it, but the taxpayer.

## Executive Summary of May 2016 submission to the House of Commons Science and Technology Committee by Dr Ian Fairlie in reference to distribution of stable iodine tablets

### Executive Summary of submission:

Because of the risk of possible terrorist attacks at 15 UK nuclear reactors and over 20 nuclear reactors in nearby countries; and because of the increasing age of nuclear reactors, there is a need for greater preparedness to deal with nuclear accidents and incidents.

In the event of a nuclear accident or incident, the three main responses are shelter, evacuation, and iodine prophylaxis. This evidence deals with the latter.

The prior ingestion of stable iodine is an effective means of protecting the thyroid gland from thyroid cancer and other thyroid effects, especially among children. It is necessary to consume stable iodine immediately after a nuclear incident: the best way to provide this is the advance distribution of stable iodine prior to any accident or incident.

After the 1986 Chernobyl nuclear disaster, where stable iodine supplies for most people either did not exist or were not distributed, epidemics of thyroid cancer occurred in Belarus, Russia and Ukraine. These did not occur in neighbouring Poland where KI supplies had been rapidly distributed to all people throughout the country.

After the 2011 Fukushima nuclear disaster, although central supplies of stable iodine existed, inadequate planning, faulty communications, disorganisation and the inability to deliver supplies, resulted in stable iodine tablets largely not being distributed or being distributed too late.

In the UK, the Government has refrained from pre-distributing stable iodine tablets to the public. The decision not to pre-distribute KI may have been influenced by considerations other than public safety. Information on the locations of KI supplies, KI stocks held, and arrangements for their distribution in the event of a nuclear incident or accident is generally unavailable.

After the warning of a nuclear accident or incident, it appears that the Government may intend to distribute KI to "schools, hospitals and evacuation reception centres" and "collection centres" for collection by the public. It is likely that such KI distribution would take one to two days or longer, depending on the sizes of the affected areas. During this time, plumes could continue to cross such areas depending on the nature of the accident, wind direction and velocity.

Although it is unclear, it seems that the Government assumes that most thyroid doses will arise via the food pathway, mainly from the ingestion of milk and leafy green vegetables. This pathway could take a few days and could give time for KI distribution to take place. However recent scientific evidence indicates that inhalation is more important than ingestion for radio-iodine doses. This means advance KI distribution is necessary.

Several EU countries have already pre-distributed KI to all families. KI supplies and dose information are available on line from non-UK sources.

### Recommendations:

1. Stable iodine tablets, with clear dose instructions and the reasons for their advance distribution, should be distributed to all families within at least 30 km of nuclear facilities in the UK without waiting for an incident or accident to occur.
2. Since radioactive plumes could reach large urban populations (e.g. >500,000 people) located beyond 30 km, KI pre-distribution should be carried out here as well. This is because rapid evacuations from such large cities would be impractical, but their inhabitants should still be afforded some protection.

3. For this reason, and to deal with the possibility of plumes from nuclear reactors on the Continent, consideration should be given to KI pre-distribution to all families throughout the UK, as occurs in several other countries.

Further comments on stable iodine within the submission:

### Stable Iodine Prophylaxis

15. After a nuclear accident or incident, stable (i.e. non-radioactive) iodine tablets<sup>1</sup> are widely recognised as an effective way of protecting the thyroid gland from thyroid cancer, especially among neonates, babies, infants, children and adolescents.  
<https://ec.europa.eu/energy/sites/ener/files/documents/165.pdf>.  
Also see: <http://www.nap.edu/catalog/10868/distribution-and-administration-of-potassium-iodide-in-the-event-of-a-nuclear-incident>
16. This is because taking stable iodine effectively blocks the uptake of yet more iodine – this time radioactive iodine - from nuclear accidents and incidents. Such prophylaxis only prevents the uptake of iodine nuclides. Many other hazardous nuclides would be released from nuclear incidents or accidents, including caesium-134, caesium-137, strontium-90, hydrogen-3 (tritium), carbon 14, various radioactive noble gases, and uranium and plutonium isotopes. Stable iodine tablets would not provide protection against these nuclides.
17. The most important iodine isotope is Iodine-131 with a half-life of 8.02 days. Other short-lived isotopes include Iodine-133 with a half-life of 20.8 hours, and Tellurium-132 with a half-life of 3.2 days whose decay product is Iodine-132 with a half-life of 2.3 hours. This means that about 3 months after the accident almost all radioactive iodine will have decayed away.<sup>2</sup> The other radionuclides listed in the previous paragraph will persist – some for centuries.
18. In the UK, stable iodine is not currently pre-distributed to families: it appears that Government may intend to distribute KI to “schools, hospitals and evacuation reception centres” and “collection centres” (see Annex A) after the warning of a nuclear accident or incident. The areas to be covered by KI distribution would depend on the kind of accident/incident and size and velocity of the plume, but it is likely that such KI distribution would take a minimum of one to two days, probably longer. During this time, plumes could continue through these areas.
19. Although it is not apparently stated in Government literature, it seems that the Government assumes that most thyroid doses will be via the food pathway, mainly by the ingestion of milk and leafy green vegetables. For example, UNSCEAR (2008) reported that the main <sup>131</sup>I uptake was ingestion via the grass pasture-cow-milk pathway. This pathway would take a few days and would give time for KI distribution to take place.
20. However recent scientific evidence indicates that inhalation is likely to be more important than ingestion for radio-iodine doses. Inhalation would occur immediately as the plume passes, and it means that KI distribution a day or two later would be largely ineffective or certainly not as effective as advance KI distribution.

### Lessons from Chernobyl

21. During April/May 1986, the Chernobyl nuclear disaster in the USSR released radioactive plumes which resulted in >40% of the land surface of Europe being contaminated, several thyroid cancer epidemics, and in tens of thousands of predicted future cancers. See the TORCH-2016 report. [https://www.global2000.at/sites/global/files/GLOBAL\\_TORCH%202016\\_rzWEB\\_KORR.pdf](https://www.global2000.at/sites/global/files/GLOBAL_TORCH%202016_rzWEB_KORR.pdf)
22. Despite Chernobyl being >2,000 km away, its plumes contaminated large areas of the UK. Food restriction orders on Cs-137 contaminated sheep farms in Cumbria and Wales lasted until 2012.

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<sup>1</sup> either potassium iodide (KI) or potassium iodate (KIO<sub>4</sub>)

<sup>2</sup> except for <sup>129</sup>I which has a long half-life of 16 million years, but <sup>129</sup>I doses are estimated to be very low  
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23. It is notable that although thyroid cancer epidemics occurred as a result in Belarus, Russia and Ukraine, they did not occur in neighbouring Poland where KI supplies were rapidly distributed among hospitals, police stations, doctor surgeries, health clinics, schools, libraries, local government offices, and chemist shops. This is discussed in more detail in Annex C.
24. One of the lessons from Poland's experience of Chernobyl is that its Government had fortuitously manufactured and stored 90 million doses of 100 mg KI (i.e. 9 tonnes of KI) for a population of about 35 million people prior to the Chernobyl accident. For the UK, it can be estimated that, in a worst-case scenario covering all of the UK, the 25 million families should each be given a bubble pack of 10 x 65mg tablets of KI, i.e. requiring a total of 16 tonnes of KI.
25. It could be legitimately asked whether the Government has such stocks of KI to protect the public in the event of a worst-case accident or incident.

### Lessons from Fukushima

26. The major Japanese earthquake and tsunami of March 11, 2011 initiated a severe nuclear accident at the Fukushima Daiichi nuclear plant. Over the following week, three reactor buildings exploded releasing plumes which deposited radioactivity especially over Fukushima Prefecture and adjacent prefectures. The accident prompted widespread evacuations of local populations, large economic losses, and the eventual shutdowns of all nuclear power plants in Japan.
27. In 2012, an independent investigation panel, established by the Rebuild Japan Initiative Foundation, reviewed how the Japanese Government, the Tokyo Electric Power Company (Tepco), and other agencies had responded. A review<sup>3</sup> of the panel's findings by its Project Director stated that all agencies were *"thoroughly unprepared on almost every level for the cascading nuclear disaster.... This lack of preparation was caused, in part, by the public myth of absolute safety that nuclear power proponents had nurtured over decades. The lack of preparation was aggravated by dysfunction within and between government agencies and Tepco, particularly in regard to political leadership and crisis management..... The investigation found that the tsunami that began the nuclear disaster could and should have been anticipated [by the Government and Tepco]"*.
28. The precise details of KI distribution after the accident at Fukushima are unclear: none was distributed prior to the accident. On March 15, three days after the start of the radioactive releases, the nearby towns of Futaba, Tomioka, Iwaki and Miharu distributed in-stock KI pills to local residents without waiting for instructions from Tokyo (Hamada et al, 2012)<sup>4</sup>. Futaba and Tomioka directly instructed their residents to take the pills (Hayashi, 2011)<sup>5</sup> again without waiting for Tokyo orders. On March 16, four days after the start of the accident (when about half of the radioactive iodine releases had occurred<sup>3</sup>), the Government issued instructions to make KI available. However, there was little take-up in many areas because, by then, most evacuations had already taken place (Hamada et al, 2012)<sup>2</sup>.
29. In 2014, the US National Academy of Sciences published a major report on the lessons learned from Fukushima - <http://www.nap.edu/catalog/18294/lessons-learned-from-the-fukushima-nuclear-accident-for-improving-safety-of-us-nuclear-plants>  
This recommended the pre-distribution of stable iodine supplies to the public. It concluded, inter alia:
  - *"Emergency management plans in Japan at the time of the Fukushima Daiichi accident were inadequate to deal with the magnitude of the accident, requiring emergency responders to improvise.*

<sup>3</sup> Funabashi Y, Kitazawa K. Fukushima in Review: A Complex Disaster, a Disastrous Response. *Bulletin of the Atomic Scientists* 2012; **14**: 917-937.

<sup>4</sup> Hamada N et al (2012) Safety regulations of food and water implemented in the first year following the Fukushima nuclear accident. *Journal of Radiation Research*, 2012, 00, 1–31

<sup>5</sup> Hayashi Y (2011) Japan Officials Failed to Hand Out Radiation Pills in Quake's Aftermath. *The Wall Street Journal*, September 29.

- *Decision-making processes by government and industry officials were challenged by the lack of reliable, real-time information on the status of the plant, offsite releases, accident progression, and projected doses to nearby populations.*
- *Coordination among the central and local governments was hampered by limited and poor communications.*
- *Protective actions were improvised and uncoordinated, particularly when evacuating vulnerable populations (e.g., the elderly and sick) and providing potassium iodide.*
- *Different and revised radiation standards and changes in decontamination criteria and policies added to the public's confusion and distrust of the Japanese government.*
- *Clean-up of contaminated areas and possible resettlement of populations are ongoing efforts three years after the accident with uncertain completion timelines and outcomes.*
- *Failure to prepare and implement an effective strategy for communication during the emergency contributed to the erosion of trust among the public for Japan's government, regulatory agencies, and the nuclear industry.*

## Lessons for the UK

30. There are several lessons for the UK in these reports. First, if a nuclear accident or incident were to occur, its plume could distribute radioactivity over parts or indeed all of the UK relatively quickly, depending on wind direction, wind velocity and rainfall. All areas of the UK were affected by the contamination from the Chernobyl accident in 1986. This means that advance planning and preparedness are vital, in particular that stable iodine should be distributed before any accident or incident were to occur rather than waiting for them.
31. The speed and invisibility of radioactive plumes from nuclear accidents and incidents are matters of concern. For this reason, since the Chernobyl accident in 1986, the Government has operated a 24 hour, 365 day monitoring system, RIMNET (phase 2), to detect radioactive plumes see <https://www.gov.uk/government/collections/radioactive-incident-monitoring>. This system monitors gamma dose rates hourly at 96 UK sites and checks them for abnormal increases. Should these be detected, it is presumed that the Government's radiological response would be activated. The details here are not disclosed, but it is assumed that warnings and information would be issued via radio, TV and the internet to those living in affected areas to seek shelter if outside, or to stay indoors and close windows and doors if inside. At the same time, people would be advised to take stable iodine tablets. This would apply especially to pregnant women, nursing women, infants, children and adolescents.
32. However an inconsistency may arise if members of the public are required to collect iodine tablets from whichever centres the Government has decided to store them and/or make them available. People could then be faced with conflicting advice to stay inside and to go outdoors. In addition, it is possible that car owners may decide to leave affected areas despite any official advice to the contrary. Possible traffic jams could hamper or prevent the Government from evacuating citizens and from distributing iodine supplies. According to several anecdotal reports, this actually occurred at Fukushima.
33. The above considerations mean that practical steps need to be implemented to ensure quicker responses and better preparedness, especially KI prophylaxis. For example, the independent TORCH-2016 report on Chernobyl concluded as follows - [https://www.global2000.at/sites/global/files/GLOBAL\\_TORCH%202016\\_rz\\_WEB\\_KORR.pdf](https://www.global2000.at/sites/global/files/GLOBAL_TORCH%202016_rz_WEB_KORR.pdf)

*"In addition to providing timely and accurate information, government health authorities and disaster planners need to improve their preparedness for future accidents by:*

  - *providing stable iodine in advance to all citizens within at least 30 km of all nuclear reactors*
  - *stocking emergency levels of radioactivity-free water supplies, long-life milk and dried food supplies*
  - *pre-distributing information leaflets to the public explaining what to do in the event of an emergency and explaining why precautionary measures are necessary*
  - *planning evacuations*
  - *constructing and staffing permanent emergency evacuation centres*
  - *carrying out emergency evacuation drills*

- *planning subsequent support of evacuated populations*
- *planning how to help those who choose to remain in contaminated areas*
- *increasing the mental health training of primary physicians and nurses*
- *moving the site of care to primary care settings, and*
- *informing citizens that these measures have been taken.*

*It may be argued that these measures are unnecessary and/or too expensive. However this report shows that they are indeed necessary. Governments which choose to promote potentially dangerous energy policies should also fund the necessary precautions in case of accidents. “*

### **Advance Distribution of Stable Iodine**

34. Stable iodine tablets (KI) is not pre-distributed to members of the public in the UK. It is understood that “adequate” KI stocks are kept in “regional centres” and some “large hospitals” for utilisation by health authorities and emergency services should an incident/accident occur. KI stocks and the locations of regional centres are not disclosed. For example, in 2013, when queries were made by local councillors in Scotland about stocks of stable iodine, the reported result was “confusion, secrecy and buck-passing”: the Scottish Government refused to answer queries - <http://www.robedwards.com/2013/06/where-are-the-anti-radiation-pills-meant-to-prevent-cancers-no-one-will-say.html>

It is understood that the reason given for this secrecy is that such information could be advantageous to groups mounting a malicious attack.

35. It is therefore impossible for the public to know whether there are sufficient tablets to cater for a large-scale nuclear incident, whether these can be distributed quickly within the required time to be of medical use, and how they will be able to obtain KI tablets during a nuclear incident or accident.
36. The Government’s guidance on KI distribution (set out in Annex C) is considered unsatisfactory. The main failure is on promptness of taking KI tablets. Although the official guidance recognises this is vital, it then states  
*“...plans should consider the most appropriate way to provide tablets to those who require them in as timely manner as possible”.*

*“The Director of Public Health local to a licensed nuclear site is responsible for ensuring that there are appropriate arrangements for the prompt distribution of potassium iodate tablets and for authorising their administration.”*

37. It is submitted that “*the most appropriate way*” and “*appropriate arrangements*” are unhelpful to members of the public: actual pre-distribution is required. This is actually suggested in para 5.3.9 of Annex C but only as a possibility.
38. The problem is that, even with the emergency requisitioning of hundreds of private and public vehicles, the prompt distribution of iodine tablets to schools, hospitals, emergency centres and collection centres etc. could be difficult and limited perhaps to a radius of a dozen kilometres. The question arises as to what would happen if large traffic jams occurred due to evacuations?<sup>6</sup>
39. It is noted that arrangements are to be made re KI tablets for “authorising their administration”. However, one of the lessons from Fukushima is that such central authorisations (from Tokyo) simply did not occur until too late: indeed, as noted above, several local townships went ahead and distributed at-hand stocks to the public without central permission. How can we ensure that such poor communications do not recur in the UK, in the event of an accident/incident?

### **Public Safety to be Paramount**

40. The paramount issues here are public safety and protection. As KI distribution is a public health matter, key decisions (e.g. dose intervention levels, KI distributions, zone sizes etc.) should be made by the Department of Health and their Directors of Public Health. Obviously, close liaison with

<sup>6</sup> London is already considered a traffic nightmare by many, even without a major emergency.  
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other agencies is necessary, but in cases of differing views, the KI technical recommendations of the Department of Health should normally prevail, unless amended by the Civil Contingencies Committee (i.e. COBRA).

41. The prevalence of other considerations has led to unfortunate situations. For example, in 2015, EDF (Energy) stated it intended to pre-distribute stable iodine tablets near its Sizewell reactor in Sussex but that it would reduce the previous suggested catchment area from a 2.4 km radius around the reactor to a 1 km one.  
<http://www.itv.com/news/anglia/2013-01-08/sizewell-locals-to-get-anti-radiation-pills/>  
This decision was apparently objected to by local people -  
<http://tasizewellc.org.uk/index.php/news/28-emergency-plans-for-nuclear-power-plants-at-sizewell>.

### Advance KI Distribution in Other Countries

42. The reluctance to pre-distribute KI and the prevailing of other considerations contrast with other European countries which have pre-distributed, or will shortly pre-distribute, stable iodine to many or all of their citizens<sup>7</sup>. For example,
- Austria is known to have done so already to all families,
  - Ireland (<http://news.bbc.co.uk/1/hi/england/2053301.stm>)
  - Luxembourg (<http://www.independent.co.uk/news/world/europe/luxembourg-hands-out-iodine-pills-over-fears-of-french-nuclear-mishap-9802668.html>)
  - France (<http://www.english.rfi.fr/environment/20151226-france-distribute-iodine-tablets-near-nuclear-power-stations>)
  - Switzerland (<http://zug4you.ch/iodine-tablets-to-be-distributed-to-every-household.html>)
  - Part of the City of Toronto in Canada.  
(<http://www.thestar.com/news/gta/2015/11/10/east-end-given-iodine-pills-as-nuclear-disaster-precaution.html>)
43. In addition, other countries have recently stated they intend to pre-distribute stable iodine, including:
- Belgium (<http://www.independent.co.uk/news/world/europe/belgium-to-give-iodine-pills-to-entire-country-in-case-of-nuclear-fallout-radiation-terrorist-attack-a7006651.html>) and
  - The Netherlands  
(<http://www.politico.eu/article/dutch-follow-belgian-lead-and-stock-up-on-iodine-pills-nuclear-power-plants-accident-protection/>)
44. Stable iodine supplies are readily on sale on-line and dosage advice is available from the UN's World Health Organisation.  
[http://www.who.int/ionizing\\_radiation/pub\\_meet/Iodine\\_Prophylaxis\\_guide.pdf](http://www.who.int/ionizing_radiation/pub_meet/Iodine_Prophylaxis_guide.pdf)

### Conclusions and Recommendations

45. It is concluded that, to ensure preparedness, quicker responses and better public protection, practical steps need to be implemented before any nuclear accident or incident occurs. In particular, the pre-distribution of stable iodine (either as potassium iodide or iodate) is an effective way of protecting the thyroid gland, especially for infants and children. However stable iodine should be swallowed immediately after it is known that there has been a nuclear incident/accident. Unfortunately, information on the whereabouts of KI supplies, their stocks and their planned distribution is withheld.
46. Several other countries and areas have already pre-distributed KI – apparently without difficulty. It is therefore recommended that stable iodine, along with precise dose instructions and the reasons for pre-distribution, should now be distributed to families within at least 30 km of UK nuclear reactors.

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<sup>7</sup> From experience in other countries, one minor problem re: KI pre-distribution to homes is that KI pills can get lost. A possible solution is the recommendation to attach the child-resistant KI bubble packs to indoor electricity meters, out of the reach of young children.

47. Where it is anticipated that plumes from nuclear incidents and accidents could reach large urban populations (e.g. >500,000 people) located beyond 30 km, then pre-distribution should cover these areas as well, as quick evacuations from such cities would not be feasible and their inhabitants would still need to be afforded some protection.
  48. For this reason, and because of the possibility of reactor accidents/incidents abroad, it is recommended that consideration be given to advance KI distribution to all families throughout the UK, as occurs in other countries.
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