D3.3: Final Report including the Workshop conclusions prepared by the Task Force

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PREPARE

Innovative integrated tools and platforms for radiological emergency preparedness and post-accident response in Europe
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PREPARE (WP3) – January 2016

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Reminder: PREPARE WP3 Context and objectives

EU and individual countries have developed systems of radiological protection after an accident with radiological consequences, which affect the quality of foodstuff including drinking water, feedstuffs and more generally consumer goods. Recommendations or requirements already exist internationally (Codex Alimentarius, IAEA) and regionally (EURATOM directives). However, after nuclear accidents (Chernobyl, Fukushima) and less serious radiological events, experience shows that the implementation of this system (based on criteria expressed as activity concentration) is not so easy and requires to develop adapted means. For instance, although this system provides general guidance for the management of contaminated products, it does not prevent against stigmatisation and even rejection attitudes from consumers or retailers (anticipating the fears of consumers). Therefore, there is a need to further investigate the role of a quality system for the placement of foodstuffs on the market after a radiological event not only based on activity concentration.

The overall objective of this Work Package is to contribute to the development of strategies, guidance and tools for the management of the contaminated products, taking into account the views of producers, processing and retail industries and consumers. It will help in designing and strengthening the preparedness plans for post-accidental situations at the national and local levels in European countries. It provides the opportunity to launch a common reflection for the establishment of a comprehensive adapted system to cope with the quality of product based on the principles of justification, optimisation and societal acceptance. Such a reflection should take into account the experience of several countries after the accidents of Chernobyl and Fukushima (in EU Member States and other countries) and ensure the involvement of relevant stakeholders.

Work Package 3 is divided into 4 subtasks:

- WP3.1 National panels methodology, programme, coherence and follow-up
- WP3.2 Running national stakeholder panels in 10 countries
- WP3.3 Conclusions of the national panels
- WP3.4 Coordination and synthesis of the WP activities

This report (D3.3) describes the results and the conclusions of the 10 national panels presented during the PREPARE Dissemination Workshop organised in Bratislava on January 20-22, 2016. [WP3.3]

Contents

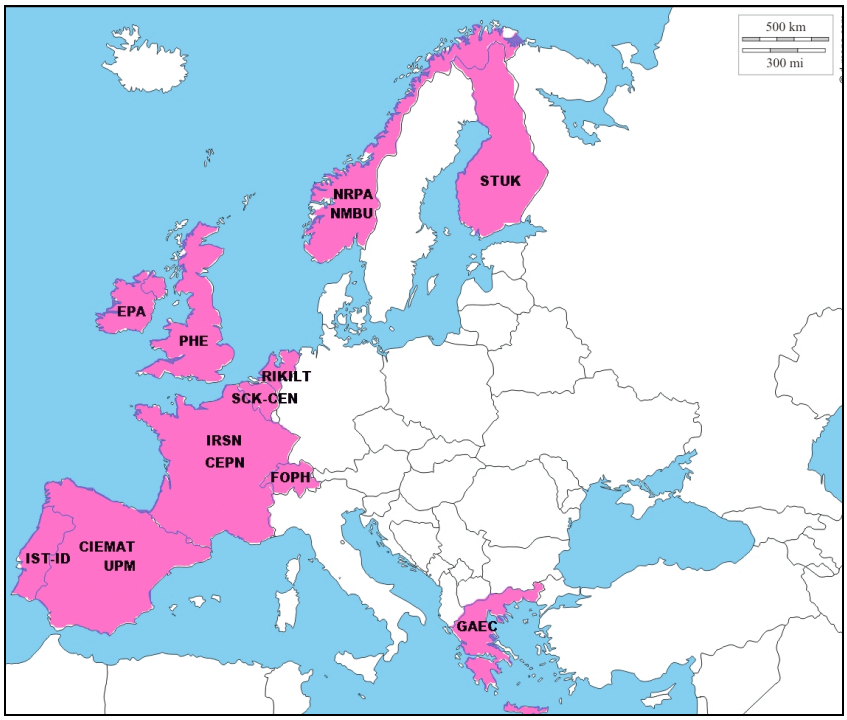
1. Introduction

Recommendations and legal requirements for the management of foodstuffs including drinking water and feedstuffs as well as other goods contaminated after a nuclear accident or a radiological event have been developed by international bodies such as the FAO/WHO (Codex Alimentarius), IAEA (Safety Standards) or the European Union (EURATOM Council Regulations), and have been transposed into national Laws.

Even though such approaches provide sufficient protection for the population, the experience from severe nuclear accidents (Chernobyl, Fukushima) and less serious radiological events, shows that the implementation of such systems - most of the time based on criteria expressed in terms of activity concentration – does not seem to be fully suitable to prevent significant difficulties such as, for instance, stigmatisation of products and communities, rejection attitudes from consumers as well as from sellers and retailers anticipating the fears of their customers.

To further investigate the possible strategies and stakeholders' concerns and expectations, a reflection has been launched through a dedicated Work Package (WP3) within the European research project PREPARE. The overall objective of this work package was to contribute to the development of strategies, guidance and tools for the management of contaminated products, taking into account the views of producers, processing and retail industries and consumers. For this purpose, 10 stakeholder panels from different European countries have been set up. In addition, the feedback experience and lessons learned from the management of contaminated goods after the Fukushima accident have been provided by Japanese stakeholders.

Eleven countries through 14 organisations have been involved in the PREPARE WP3 dedicated to the management of contaminated foodstuffs and other goods, after a nuclear or radiological event.



Before launching the PREPARE WP3, a Working Group on Contaminated Goods ("ConGoo"), was created in May 2012 in the framework of the NERIS Platform activities. This allowed to draw a state-of-the-art of the international experiences in the management of contaminated goods after Chernobyl and Fukushima accidents. Two thematic workshops were organised (the first one in Paris in October 2012, and the second one in Madrid, in May 2013) during which the main challenges related to the management of contaminated foodstuffs and other goods were highlighted and discussed. Most of the participants of the PREPARE WP3 attended these two workshops: it was a good opportunity to exchange information and knowledge with international organisations (e.g. IAEA, EC, FAO, NEA-OECD) and Japanese counterparts who daily face to post-accident management issues.

The First Task Force Meeting of PREPARE-WP3 was organised in Madrid and held by CIEMAT on May 23, 2013 just after the second "ConGoo" Workshop. This meeting allowed discussing a common framework and methodology for the organisation of stakeholder panels. Milestone 1 (MS1) reports the setting up of these national stakeholder panels: one in each country and a common one for France and Switzerland.

The Second Task Force Meeting was organised and held by the Greek Atomic Energy Commission in Athens from 26 to 28 May 2014 in order to exchange the first results or lessons of each national panel. In addition, two Japanese experts were invited to present their involvement on contaminated goods management after the Fukushima accident.

The Third Task Force Meeting was held by the Environmental Protection Agency in Dublin on May 20-22, 2015. The results of the national panels were presented by the Task Force Members; two Japanese experts were invited again to present their experience in the management of contaminated goods after the Fukushima accident. The last day, discussions were conducted to prepare the Final PREPARE WP3 Workshop organised in cooperation with the NERIS Platform on November 12-13, 2015 at OECD-NEA in Paris. This Workshop was an opportunity to discuss and share the PREPARE WP3 results in the presence of national stakeholders (consumers, producers, retailers…), international organisations (EC, FAO, OECD-NEA, IAEA, HERCA, ICRP) and invited Japanese colleagues (CRIEPI, University of Fukushima, producers and consumers NGO's…).

This report (D3.3) describes the results and the conclusions of the 10 national panels presented and discussed during the Final PREPARE WP3 Workshop in November 2015 in Paris and reported during the PREPARE Dissemination Workshop organised in Bratislava on January 20-22, 2016.

2. Global organisation of the panel methodology established in each country

Between the end of 2013 and May 2014, all participants of WP3 managed to define their own methodology for setting up a stakeholder panel in their country. The first panel meetings took place during that period, except for Norway and the Netherlands who organised their meetings in Autumn 2014.

The feedback of experiences presented by each country during the Second Task Force meeting, held in Athens in May 2014, highlighted that the establishment of national panels was successful in each country even though it is a long and intensive process. In particular, it was recognized that involvement of non-institutional stakeholders is generally difficult.

The table below summarizes the methodology adopted by each country and shows that the majority of countries focused their reflection on foodstuffs (and sometimes feedstuffs). The framework of the panel methodology was defined during the First Task Force meeting in Madrid, but each country was encouraged to adapt the flexible method to its national context. In this way, various methodological approaches were used for the composition of the stakeholder panels and the organisation of the panel meetings.

According to their specificities (e.g. nuclear vs. non-nuclear country) and past national experiences in post-accident management, different topical issues were selected and discussed during the meetings (see table below). However, it was observed that a common structure has been adopted for the organisation of each national panel meeting with:
- A PREPARE project presentation;
- Presentations of basic issues on radiological protection, regulation framework and post-accident management through table-top exercises based on NPP accident scenarios, training courses, presentations of feedback experiences of post-accidental situation from Chernobyl and Fukushima;
- Discussion sessions on specific topics.

Belgium	Contaminated foodstuffs and other consumer goods
Finland	Contaminated industrial products
France & Switzerland	Contaminated foodstuffs
Greece	Contaminated ships, trucks and containers, and foodstuffs
Ireland	Contaminated foodstuffs
Netherlands	Contaminated foodstuffs/feedstuff
Norway	Contaminated foodstuffs/feedstuff
Portugal	Contaminated foodstuffs/feedstuff and other consumer goods
Spain	Contaminated foodstuffs/feedstuff and other consumer goods
United Kingdom	Contaminated scrap metal and other consumer goods

3. Results and national panels' lessons

The main points tackled by the different national stakeholders have been synthesized into the five following topics.

1. Market, trade, economic aspects and management strategies
2. Resources and capabilities, monitoring strategies
3. Information strategies and decision-making process
4. Management of other goods than foodstuffs and feedstuffs
5. Preparedness and stakeholder participation process

Results and outcomes from the stakeholder discussions are summarized hereafter. Prior to these findings, it must be pointed out that three key messages were particularly emphasized by stakeholders in all countries:

- Everything must be done to avoid any accident. Indeed according to the panellists, citizens are victims first, and they are not responsible for the situation arising from the accident. In addition, the presence of artificial radioactivity in the environment is always illegitimate, even if the corresponding exposures are low.
- A post-accident situation would be totally new for everyone. This is so unexpected that it will lead to a loss of references and values for all the people. Upstream preparedness - before an accident occurs - is obviously crucial, but nobody will be fully ready if it happens. Only a pre-established distribution of roles of the different stakeholders will allow a quick response.
- The concept of Maximum Permitted Levels (MPLs) is useful but questionable. According to the stakeholders, MPLs are needed but their rationale is complex to understand. The definition and values of MPLs must be flexible and need to be adapted to the actual situation. They should be based on monitoring results as soon as possible, and should follow a graded improvement process.

3.1. Market, trade, economic aspect and management strategies

The PREPARE stakeholder panel results as well as the testimonies from Japan highlighted the complexity of a post-accident situation, which is felt as multi-dimensional: it affects the image and quality of products, it impacts local, regional, national, and international economies, generates real and potential effects on human health and has a lot of societal, cultural and ethical implications. In such a context, the policies developed for managing contaminated goods in emergency and post-accident situations have to take into account the stakeholders' concerns, expectations and values alongside scientific knowledge, as it is pointed out by recent international recommendations (e.g. ICRP-109 2009[1]; ICRP-111 2009[2]; CEC, 2013[3]).

[1] ICRP-109 (2009) Application of the Commission's recommendations for the protection of people in emergency exposure situations. ICRP Publication 109. Ann. ICRP 39 (1)

[2] ICRP-111 (2009) Application of the Commission's recommendations to the protection of people living in long-term contaminated areas after a nuclear accident or a radiation emergency. ICRP Publication 109. Ann. ICRP 39 (3)

[3] CEC (2013). Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom

A key issue underlined in the panels was that responsibility for the situation should not be shifted towards the citizens who are affected (as producers, consumers, etc.) by the accidental environmental contamination or threat of contamination. A post-accident situation would be new and totally unexpected and may lead to a loss of references and values for all the people. Transfer of risks, for instance through the production of wastes or the contamination of the environment should be avoided as far as possible.

Many stakeholders are concerned, from the producer to the consumer, and past experiences show the diversity of their attitudes and reactions. An appropriate management of the situation requires understanding and appropriation of countermeasures by all of them. The market is shared between short (local sale) and long (supermarkets) circuits. The panels pointed out that the consumer is always the final decision-maker for buying goods on the market. Each consumer will react according to individual criteria. As far as food consumption is concerned, the overall quality, the taste (which is not altered by radioactivity) and the price are the most important ones. In post-accident situation, the confidence in the product (and, in the producer and the seller) is affected for a long period of time. Restoring trust (or credibility) is a long lasting and difficult process. An upstream preparedness – i.e. before an accident occurs – notably based on a previous assessment of the vulnerabilities of the potentially affected territories, is of outmost importance. In particular, it has been mentioned that the proposed policies and strategies would not be accepted by the public, if the consumer NGOs are not involved in the upstream discussion process.

According to the panellists, early and visible actions should be taken from the beginning. These actions should be rigorous, i.e. attempt to avoid residual contamination in the food chain as much as possible, but at the same time be reasonable and justified. The optimization principle of radiological protection (ALARA) should be the driving principle, taking into account not only radiological but also economic, societal, cultural and ethical aspects. The protection of the consumer is based on some key tools, such as the zoning - definition and classification of geographical areas according to the levels of contamination - and the application of the concept of Maximum Permissible Levels (MPLs) in foodstuff and feedstuff.

It has also been pointed out that the zoning criteria should be based on real measurements as soon as possible and also that they should consider the specificity of the affected areas taking into account geographical, social, environmental and nutritional background, while avoiding the creation of ineffective and counterproductive 'administrative' borders. However, for practical reasons, geographical or administrative criteria would probably be used alongside radiological criteria.

The concept of MPL provides a useful policy-support instrument. However, there are different understandings of the concept and, according to the panels, its rationale and meaning as well as the different set of levels may be questionable and confusing. The units used to express doses and activities are familiar neither to the general public, nor to the media (Turcanu et al, 2013[4]). The name MPL itself sounds like a "black or white"

[4] Turcanu C., Perko T., Geenen D., Aerts H., Goussarov G., Vermeersch L. (2013). Media reporting on food contamination after the Fukushima accident. Content analysis of four Belgian newspapers. Open Report of the Belgian Nuclear Research Centre BLG-1095, Mol: Belgium.

concept, which does not reflect the reality. While it is a standard, which is mainly established to guarantee a safe international trade market (based on import-export conventions), it seems to be understood by the public as a level below which the consumer products are safe and above which they are surely unsafe (i.e. dangerous for human health). Consequently, MPLs appear to justify the presence of artificial radioactivity, which is however illegitimate and should not be there. Many sets of numbers are already established and their rationales as well as the methods of calculation are not easy-to-understand. Harmonisation of the MPLs would probably be useful, at least at international level (for trade), and could ensure a more consistent, stable and clear system of management of contaminated goods. However, the need to have MPLs adapted to the actual situation and its evolution, in particular at the local level (i.e. in the most affected areas), has been repeatedly flagged by the stakeholders. The situation inside the affected areas (or countries) and outside is not the same. A system associating a standing set of criteria based on risk tolerability with a changing set based on quality criteria has been suggested, provided that it is justified and transparent for the consumer.

The complexity of a post-accident situation and the need to deal with previously unknown concepts can make people in the affected areas feel powerless and unable to find references for assessing the severity of the situation. The measurement of radioactivity as a way of "making it visible", and empowering people by facilitating (self-) measurements are essential elements of post-accident recovery efforts. The presentation of the Japanese experience highlighted the importance of measurements and notably the measurements made by inhabitants themselves in order to build their own reference scale and recover a grip on their daily life. This response strategy seems relevant for the panellists.

There may be some reluctance from consumers towards a residual radioactivity in food products (Turcanu and Perko, 2014[5]). As a consequence, producers ask for a graded approach for the management of contaminated goods based on an improvement process. Such a process, including for example clean animal feeding and agricultural soil treatments (decontamination), may be efficient if it is done on a step-by-step basis. If countermeasures are proactively and transparently undertaken, these will help to regain credibility and trust. The concept of the "dilution of radioactivity" has been also discussed. This is a very sensitive issue. Even if it is totally forbidden "in a period of peace", it might be tolerable "in a period of crisis" (for instance, it has been pointed out that the reprocessing allowed to mitigate the radioactivity content in foodstuff/feedstuff in agricultural regions affected by the Chernobyl accident). However, this implies ethical considerations and could not be implemented without a process of stakeholder-wide consensus building. However, other possibilities should also be explored, such as the diversification of the diet.

A balance between the interests of the producer and consumer should be sought. If the situation is severe, compromises will have to be found between the food quality, the cost, the sustainable development of the affected areas without affecting human health, the image of the product and its production area, as well as the market competition. The waste management strategy may also be a key parameter. The presence of artificial radioactivity may be offset by the improvement of the global quality of the product. How far can one go for supporting a production or a sector? This is a crucial question. A kind of solidarity

[5] Turcanu C., Perko T. (2014). The SCK•CEN Barometer 2013. Perceptions and attitudes towards nuclear technologies in the Belgian population. Open Report of the Belgian Nuclear Research Centre BLG-1097, Mol: Belgium.

should be built, based on health, economic and ethical considerations. Solidarity from the consumers cannot exist without accountability from the producers, based on an improvement process, a rigorous monitoring strategy and transparency. It may be built using pre-existing or new stakeholder networks. Cross-border solidarities are probably more difficult to set up.

Indemnification and compensation of affected stakeholders is a key issue since it is clear that economic consequences will affect whole sectors especially for products with important export shares. It was recognized that any compensation scheme could lead to undesirable effects. In particular, it can provide inequities between individuals, create unfair market situations, and influence or even block decisions. In a long-term post-accident situation, the management of potentially contaminated food should rely on regional and inter-professional organisations, which generally have pre-established response teams and mutual aid funds.

The latter point raises the question of the difficulty to lift countermeasures, and how to justify that they are no longer necessary. As a consequence, the strategies which consist in implementing early countermeasures on a very large perimeter before reducing it according to the improvement of the situation should be prudently considered. This issue should be anticipated and discussed with stakeholders. Especially, protocols for clearing foodstuffs should be established during the preparedness phase.

3.2. Resources and capabilities, monitoring strategies

Regarding resources and capabilities, emergency situations can put an important stress on the economy and even cause a societal disruption. Even though governmental bodies have the knowledge of the operational procedures and the ability to deal with the follow-up operations, there are doubts regarding the national capabilities to respond to such events. There are usually enough resources to handle routine operations, but it can be overwhelming in emergency and recovery situations, since personnel and monitoring equipment are quite often limited: for instance, handling a large number of samples will be very challenging in the short term and difficult to sustain in the long term. According to the stakeholder viewpoints, there is often an unclear visibility of the competent institutions role and a lack of knowledge concerning support networks. It means that there is a need for a clarification of the roles and responsibilities of governmental bodies and for an identification of a potential non-governmental contribution.

Monitoring is a key issue in a post-accident situation. The purpose of measurements should be clear (compliance with regulations or risk estimation) and the establishment of radiation monitoring networks is fundamental to compare measurements and to properly guide protective actions. Monitoring strategies should consider: the standardisation and harmonisation of procedures for the measurement of radioactivity, the prioritization of samples, logistic and samples storage capacity, adequate training of people involved, expert guidance, accreditation and use of dedicated laboratories in industrial partners (control of contaminated goods). In the future, it could be interesting to open a dialogue with the stakeholders on the calculation assumptions and the consistency of the radiological criteria for monitoring.

Stakeholders are very sensitive to issues related to radioactive contamination monitoring and its perception depends on the way the subject is communicated. Many regulations and

standards are available, but guidance on their implementation is required. It was stressed out that there is a general need and a demand for more education and training across all stakeholders, including the media. In addition, it was stressed that plurality of radiation monitoring networks is important to compare measurements and to improve the protective actions.

3.3. Information strategies and decision-making process

From national stakeholder panels discussions it is clear that one of the most important issues in the event of a nuclear emergency is good communications with all stakeholders. Communication paths must be clear to avoid confusion and to ensure the public and professionals are not receiving contradictory messages. The provision of accurate, clear and transparent information is vital for building trust amongst the public and other stakeholders. The speed with which information is provided is crucial and the use of social media would play an important role that must be anticipated.

In the preparedness phase, responsibilities regarding communication should be clarified and decisions should be made about who would deliver the communication. In a nuclear crisis context, the public are more likely to trust independent health and scientific experts rather than government officials or those with vested interests in the electronuclear industry. To ensure that information is quickly provided, generic and easy-to-understand key messages, which could be tailored in the case of emergency, should be prepared in advance. As far as possible all relevant stakeholders must be involved in the communication plans as well as in emergency exercises. This allows them to build inter-relationships and helps to improve communication between them. In that perspective, it is very beneficial to involve journalists in the preparedness phase as the media can influence consumer views and behaviours.

In order to design an effective information strategy, it is important to anticipate, as far as possible, the expectations and concerns of the public regarding radioactive contamination of food and other products. When an accident occurs, many official channels of information may lose their credibility (government, experts, nuclear industry…). Nevertheless, they would be expected to provide information. Intermediate channels may be activated such as medical staff personnel, teachers, NGOs and elected representatives, local agencies of agriculture, trade unions…). The plurality of the information sources and expertise is welcome. Good cooperation is needed between government and industry both in the provision of information and also in the implementation of protective actions. Food and agricultural protective actions should be developed in cooperation with those responsible for implementing them. Emergency plans should avoid as far as possible the spreading of false rumours and prevent over-reaction such as unduly rejection goods, for example only because of their origin. It should also take into account the predictable nuances in the risk perception among people, e.g. the increased concern of young or future parents. In another hand, it is important for the experts to be at the service of the population and progressively restore their credibility. It means that they have to commit themselves working at the local level together with - and not just for - the population.

In order to pass information and improve the understanding of the situation, experience shows that searching for appropriate solutions is preferable than lecturing affected people. When communicating risk, the language used should be straightforward, non-technical and the risks should be explained by comparison with daily life examples and familiar

concepts. A kind of consistency should be sought for these key messages in all Member States. In addition, in case of an accident in Europe, if mixed messages are being sent outside this would have a negative impact on foreign markets. To protect exportations, the EU response would be critical.

For the professionals, guides and handbooks should also be prepared in advance. For instance, the European Handbook for Food Production Systems[6] could be used to prepare a national catalogue of appropriate protective actions. The advantages and disadvantages of the various protective countermeasures in terms of cost, feasibility, acceptance and sustainability should be included.

According to the European Directive 2013/59/EURATOM (CEC, 2013) that has to be implemented before February 2018, each Member State should indicate which aspects are included in the decision-making process and how corrective actions are optimised. Regarding the introduction and cessation of agricultural protective actions, the communications plan must be very clear about who would communicate instructions to producers and where they can seek further information and support. It would be useful to provide them with examples of the potential effectiveness of these protective actions if they have been implemented in the past.

In the decision making process there are many aspects that need to be evaluated in a transparent manner such as health effects (which are not limited to doses), remediation costs, production of waste, technical feasibility, societal and environmental aspects, short- and long-term acceptability of the protective actions by both producers and consumers and also reassurance. The decision making process should be transparent with regard to the choices of parameters as well as the weights assigned to each one. The communication of any decisions made is extremely important for a good understanding of the situation by the public.

3.4. Management of other goods than foodstuffs and feedstuffs

In case of a radiological event involving radioactive releases into the environment, the contamination of feed and foodstuff can be an important contributor to doses received by the public. Therefore, the issue is addressed in emergency plans in many countries, notably on the basis of Maximum Permissible Levels (MPLs) laid down at international level (Codex Alimentarius) and European level (EU regulations). The results of the panels focussed on foodstuff showed however that the situation for such products is complex and remains difficult to deal with in case of a radiological event.

On the other hand, vast amounts of non-food products and raw materials are produced in Europe and around the globe, for which there is no clear regulation in case of a radiological event. Production is often a complex system consisting of production/recycling of raw materials, manufacturing of components, assembly of products and sales. Many stakeholders are involved such as producers, subcontractors, overseas factories, subsidiary companies, retailers and carriers. These products are continuously transported through transport hubs via road, rail, sea, inland waterways and air, within and across borders. They finally fall into the hands of end-user consumers.

[6] EURANOS (2009). Generic Handbook for assisting in the management of contaminated food productions systems in Europe following a radiological emergency, EURANOS (CAT1)-TN(09)-01.

Assessments and past experience (e.g. after the Fukushima accident) show that the contamination of non-food goods is generally not a significant exposure pathway for the population. However, such contamination should be controlled in order to protect the population and in particular workers who may be in contact with contaminated goods during production, handling and transport. If a contamination – even low – is detected at any control point, the production and delivery of the product may seriously be affected or even halted for a long time. Furthermore, goods that are contaminated above regulatory criteria, could be abandoned by their manufacturer, owner or carrier if there is no existing safe disposal to manage them as radioactive waste.

The discussion of the panels about goods other than foodstuff aimed to highlight the current legal and procedural framework relating to the management of such goods and further explore the practical issues in this area in order to establish consensus on what strategies should be developed for their management and identify what future work needs to be done.

Management of complex or extensive contamination cases can only be successful when all actors know their respective roles and responsibilities. According to the panellists, while the organisations or agencies in charge of the monitoring of goods (such as customs…) are rather well identified, those having the responsibility to manage them if they are considered as contaminated, or not. Among the other stakeholders, the manufacturer is normally responsible for the overall safety of the product. Production chains, however, are long and complex and in many cases the origin of any single component of a finished product is not known and the responsibility thus falls to the owner. The shipper may also be designated as responsible. Currently, international trade rules do not include the issue of radiological contamination in the agreements on responsibility. As a consequence, it may be difficult to determine what are the responsibilities of each stakeholder, what are the rules to be applied and who is in charge of their enforcement.

More generally, there is no specific international legislation that applies to goods contaminated after a nuclear accident. In that context, as shown by past-experience after nuclear accidents (Chernobyl and Fukushima) and other crises, the application of regulations issued for non-accident situations is attempted. However, it is not clear whether these regulatory regimes may apply in case of emergency and experience shows that they do not fit well. The panellists stressed that the priority should be to protect personnel staff against the threat for their safety - although the process for that is not clear - rather than to control the radiation levels of goods. The discussions of the panellists focused on the management of contaminated goods which cannot be released without authorization. The owner may refuse to take back the goods and the shipper may refuse to transport them once they have been declared as radioactive; the responsibility for repackaging or disposal of these goods may then fall to the carrier. If there is no provision for the management of rejected goods, and notably no facilities for a safe disposal of them, contaminated goods could be abandoned in an inappropriate location, and thereby becoming “orphan source”.

From the regulator’s point of view the main challenge is, however, to determine practical criteria for the release of goods. But again, in the absence of specific criteria for contaminated goods laid down for post-accident situations, the use of some current reference values established for other purposes may be an option. These could be, for

instance, the exemption and clearance levels that have been set internationally (IAEA, 2004[7]). However, they have been established for planned exposure situations and neither for emergency nor for existing exposure situations. Further, they are based on a reference dose criteria of 10 μSv/y, which is much lower than those used for food (1 mSv/y). Moreover, it is unclear whether the same criterion applies, no matter how, by whom, and for what the goods are used. There will be so many exposure scenarios to take into account that such an approach would probably be misleading. Another option is to use the surface contamination limits and standards established for the transport regulation. However, the corresponding levels are not really appropriate for a post-accident situation. The issue of contaminated goods is so diverse that it would be difficult to determine a set of numbers adapted to all cases.

Because the management of the situation depends to a large extent on the context (severity of the accident, type and number of contaminated goods, location of the control points, monitoring capabilities, etc.) the panellists considered that there was no need for an additional international legislation addressing specifically the issue of "non-food contaminated goods". In particular, they did not advocate the existence of specific criteria for release. However, they highlighted that the elaboration of guidance on how existing regulations could apply in a practical way would be useful. The panellists also agreed that, because goods are transported, both in the EU and worldwide, a global and international approach is needed to develop that guidance. In particular, a common approach to deal with orphan goods would be welcomed, especially as some countries do not have the expertise and infrastructures enabling them to manage the repatriation and storage of contaminated goods.

Monitoring strategy would be a real challenge for industries and manufacturers. During the panel discussions, it was clear that a very few number of companies and industries have included radiological protection in their crisis management plans, with the exception of, however, the steel industry, which is prepared for orphan sources with portal monitoring and management protocols. Capacity for monitoring has raised vivid discussions. Some companies would favour the setting up of a jointly operated laboratory with a high enough capacity for screening. Prospective buyers accept in-house control certificates only if the laboratory has accreditation. The companies must follow instructions given by the authorities. However, protocols and accreditation systems may vary between different countries. This may create confusion in companies, which operate in several countries. This issue should be prepared in advance and included in emergency plans, in particular for industries with overseas factories.

Like for food, the public perception is a crucial point. It is always difficult to demonstrate that very low contamination of goods still fits with heath safety principles. The panellists recommended the development of information and communication tools, preferably in advance. Predetermined points of contact could be identified or created to allow exchange between relevant authorities and potentially affected industries. Leaflets could be prepared in advance and general information should be made available to all stakeholders (agencies, industry and general public). Forwarding companies have huge client registers, which could be used for the circulation of the information in case of crisis.

[7] IAEA. Application of the Concepts of Exclusion, Exemption and Clearance. Safety Guide No. RS-G-17. IAEA, 2004.

Considering the complexity of a post-accident situation, the blur in terms of responsibilities as far as contaminated goods are concerned, the lack of protocols, criteria and guidance in that field, the panellists are aware that much remains to be done, even though it would be difficult to set universal criteria in advance which would be adapted to all situations. The panellists thus recommended continuing to explore the issue with relevant stakeholders in order to help the development of an approach shared in the European context or even beyond.

3.5. Preparedness and stakeholder participation process

All panellists pointed out the importance of preparedness and the need to involve all the relevant stakeholders, even if it is difficult to implement in practice. The issue is addressed in many international recommendations and standards, such as ICRP Publication 111. Some key provisions have been included in the European Directive (CEC, 2013[8]) such as:

- The development of response plans that cover not only the emergency and transition phases but also the recovery and long-term remediation phase,
- The description of the decision-making process,
- The identification and involvement of different stakeholders in the different stages of the management system,
- The implementation of education and training programmes, and,
- The development of communication strategies.

The preparedness is also addressed by OECD/NEA, which recommends that the generic emergency management system (NEA, 2010[9]) should include several stages, such as - the identification of the possible protective actions, - the allocation of resources for their implementation, - the required legal framework at the local/regional and national levels, taking into account feedback from training, exercises, audits, action plans with a reinforced stakeholders participation at each stage of the process.

During the emergency preparedness for contaminated goods, institutional and non-institutional actors should be involved in dialogue. As all the life dimensions would be affected after an accident, there would be a wide range of issues at stake: the determination of the roles and responsibilities and the coordination of potential stakeholders as well as the identification of local/regional/national vulnerabilities in case of an accident should be key elements for designing an effective emergency management system.

It is obvious that among institutional actors (e.g. direct managers and decision-makers) there are organisations, institutions and experts, which have no radiological protection background although they have specific roles and responsibilities in emergency preparedness and response. This is also the case for non-institutional actors, stakeholders affected by a nuclear/radiological accident and those affected by the decisions taken, as well as organizations involved in public information. The stakeholder participation

[8] CEC (2013), Council Directive 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure ionizing radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.

[9] Strategic Aspects of Nuclear and Radiological Emergency Management, NEA nº 6387, 2010.

process is necessary but complex. It is a real challenge to identify, attract, engage, keep active and coordinate all these stakeholders, mainly because:

- Apart from nuclear emergency response agencies and regulatory authorities, other stakeholders lack previous experience and a radiation protection background;
- Nuclear emergencies are very complex situations with important societal, economic, and political implications, involving multiple stakeholders;
- Different approaches are required at each phase after a radiological event;
- Various stakeholders have different needs and interests;
- All stakeholders have different roles and responsibilities but they are not familiar with others' roles and responsabilities.

The panellists raised many specific issues. In order to ensure a good coordination between different stakeholders, it is important to identify roles and responsibilities, the interaction among groups and awareness of each other's action plans. The pre-existence of local and regional inter-disciplinary networks and the balance between consumers versus producers' interests should be addressed. Guidelines and handbooks with procedures about what to do, including strategy criteria and stakeholder networking, should be developed in advance.

In general, there is a need for basic training on radiological protection issues in order to speak the same language, as well as to promote the radiological protection culture. Education and training initiatives for the technical staff in charge of the implementation of the contaminated goods management plans should routinely be established. Special training programs can also be delivered to the stakeholders, who do not have radiological protection skills.

One of the problems for the institutional stakeholders is the limited resources, notably in terms of technical capabilities. In the case of non-institutional actors, there is a lack of trained personnel to deal with radiological emergencies. Globally, the panellists expressed their doubt about the capability of countries to manage large-scale contamination of goods.

In case of a radiation emergency, European initiatives are expected in cooperation with competent international organisations (e.g. the UN Food and Agricultural Organisation, IAEA, International Maritime Organisation). The provision of assistance to countries lacking the required expertise or infrastructure for the management of contaminated goods is also expected.

Experts and media should be trained to communicate radiation-related concepts by using simple language. Communication plans should be prepared in advance, in order to (re-)build public trust. Risk communication and transparency are crucial factors: flow, content, timescales, and credibility of information are basic steps to achieve public confidence.

Finally, the experience gained from the establishment of the different PREPARE National Panels (Deliverable report 3.2, 2015) for preparedness and stakeholder participation processes, shows that there is an added value of stakeholders participation in the management of contaminated goods. This added value can be described as follows:

- It provides an opportunity for the stakeholders to gain new knowledge on the topic of radioactive contamination and the national systems of radiological and nuclear emergency preparedness and response;
- It gives the experts and authorities an insight into the feasibility and acceptability of suggested actions in various sectors;
- It increases the networking opportunities;
- It allows building trust and understanding between actors, which can be crucial during real events.

4. Recommendations and perspectives

The first result is the fruitful participation of various stakeholders in the national panels in Europe and their willingness to continue to be involved into the reflection.

The work performed with the national panels also highlighted some lessons. There is a need to favour their involvement in the reflection but also to ensure the respect of their values. The objective of involving the stakeholders is not to promote the acceptability of the accident: citizens are victims. The objective is to build trust and understanding between stakeholders. This can be crucial for managing emergency and recovery situations. In addition, to engage dialogue with stakeholders on this issue, it is important to rely as much as possible on existing structures. All stakeholders involved in the national panels also indicated that preparedness on the management of contaminated goods is crucial. Nevertheless, it is unrealistic to think that everything could be prepared in advance. The situation will be totally new and will lead to a loss of references. So, it is essential to be ready to react promptly if an accident occurs. It is also essential to develop tools that allow better predictions for emergency situations follow-up behaviours and be able to implement corrective actions to overcome loss of references and mistrust. Long-term perspectives have to be considered while implementing the actions. In addition, the significant contribution in the reflection of the feedback provided by Japanese experts and stakeholders on the follow-up of the Fukushima accident was mentioned.

The results of the national panels allowed to identify some issues needing to be further investigated:

- The responsibilities of the different actors are essential for improving the preparedness but the role of each other should be made clearer;
- Concerning other goods, processes should be streamlined and approaches for other goods should be consistent with food;
- Compensation schemes have to be considered and put into debate as they play a key role (positively and/or negatively) in the management of the contaminated goods;
- In the process of restarting the distribution of goods after an accident, the role of local networks has to be investigated;
- Challenging issues on traceability, brand image and the distribution of the goods on national and international markets;
- The role of social media and the importance of communication strategies;
- The promotion of education and training on this issue and the development of the radiological protection culture among the different stakeholders;
- The opportunity to open a dialogue with the stakeholders on the calculation assumptions and the consistency of the radiological criteria for managing the situation in order to deal with conflicting criteria and favour their understanding and usefulness on one hand and on the other hand to explain the possible evolution of the response strategies and the long term perspective at the beginning, based on the accident in order to derive robust management options.

Some proposals were discussed to continue the reflection. The first one is to promote the diffusion of the results through the report including feedback to national stakeholder panels. In addition, the results could be presented in order to share lessons learned with national and international organisations. The second one is to continue the dialogue by

keeping the contact with the national panels. For that, it is proposed to ensure a coordination within the NERIS “ConGoo” (Contaminated Goods) working group. Likewise, the cooperation with Japanese experts could be reinforced to draw lessons from the follow-up of the management of the post-accident situation in Fukushima.

5. Overview of each national panel

5.1 BELGIUM

I) General

In the framework of the WP3 of the FP7 project PREPARE, stakeholder panels have been organised in Belgium to discuss issues related to the management of contaminated goods. The activities carried out with the Belgian stakeholder panel and the results obtained are described in the following sections.

II) Global organisation of the panel

In order to establish the stakeholder panels, different stakeholder organisations have been contacted in the period of March 2013-September 2013. These organisations have roles or responsibilities in nuclear / radiological emergency management, represent stakeholders affected or have an interest in the decisions taken.

Two meetings were planned for the Belgian panel, in order to address both the management of contaminated food in the aftermath of a nuclear accident, as well as the other consumer goods. To identify important issues to be addressed in the panel discussions and to ensure input from a broad range of stakeholders, a policy Delphi was organised prior to the panel meetings. The Delphi method is a structured communication technique where experts answer questionnaires in two or more rounds. The questions are open questions and the analysis is essentially qualitative. As opposed to the classical Delphi, where generating consensus between experts' opinions through an iterative consultation process is a main aim, the policy Delphi provides an organized method for gathering different opinion on policy issues, allowing the respondents representing such views and information the opportunity to react to and assess differing viewpoints.

For the panel targeting the discussion of contaminated food, we took into account that a number of stakeholder organisations had previously participated in the Belgian panels for the FARMING project , and have thus discussed in the past a number of issues concerning the management of contaminated foodstuff and feedstuff . For this reason, the establishment of the panel on contaminated food strongly relied on this previous experience.

For the panel on other goods, some other organisations, that did not take part in the FARMING panels were contacted, e.g. the harbour of Antwerp.

The following organisations participated in the Delphi survey and one or both panel meetings:

- The Federal Agency for Nuclear Control (FANC-AFCN). Delphi and panel meetings: Food & Other goods.
- The Food Agency (FAVV-AFSCA). Delphi and Food Panel.
- Boerenbond (farming union). Delphi and Food Panel.
- Algemeen Boerensyndicaat (farming union). Delphi and Food Panel.
- Fédération Wallonne de l'Agriculture (farming union). Only the Delphi survey.
- The Belgian Confederation for Dairy Industry (BCZ-CBL). Only the Delphi survey.
- The Environment, Nature and Energy Department (LNE) of the Flemish Government. Delphi and Food Panel.
- The Food Industry Federation – FEVIA. Delphi and Food Panel.
- The Belgian National Agency for Radioactive Waste and Enriched Fissile Material (NIRAS-ONDRAF). Delphi and panel meetings: Food & Other goods.
- Belgoprocess, company focused on the treatment of radioactive waste and the decommissioning of nuclear facilities. Delphi and Panel on Other goods.
- Harbour of Antwerp. Panel: Other goods.
- Public Health. Panel meetings: Food & Other goods.
- BelV, a subsidiary of FANC-AFCN in charge with regulatory controls in nuclear installations. Panel: Other goods.

- CONTROLATOM - certified inspection body of class I. Delphi and Food Panel.
- NITTO-Europe (private company). Only Delphi survey.
- IRE/ IRE-Elit- National Institute for Radioelements. Delphi and panel meetings: Food & Other goods.
- SCK•CEN, Belgian Nuclear Research Centre. Delphi and panel meetings: Food & Other goods.

III) Panel activities

The activities carried out with the Belgian stakeholder panel are as follows (see also Fig. 1):

- On-line Delphi survey, in order to prepare collect information from a broad range of stakeholders and identify issues of importance. Timing: November 2013-January 2014. The survey was concluded with a report[10].
- Panel meeting dedicated to the management of contaminated food: 25/04/2014. The results of this meeting are summarised in a special report[11].
- Panel meeting dedicated to the management of other consumer goods: 02/02/2015. The results of the second meeting are summarised in a special report[12]

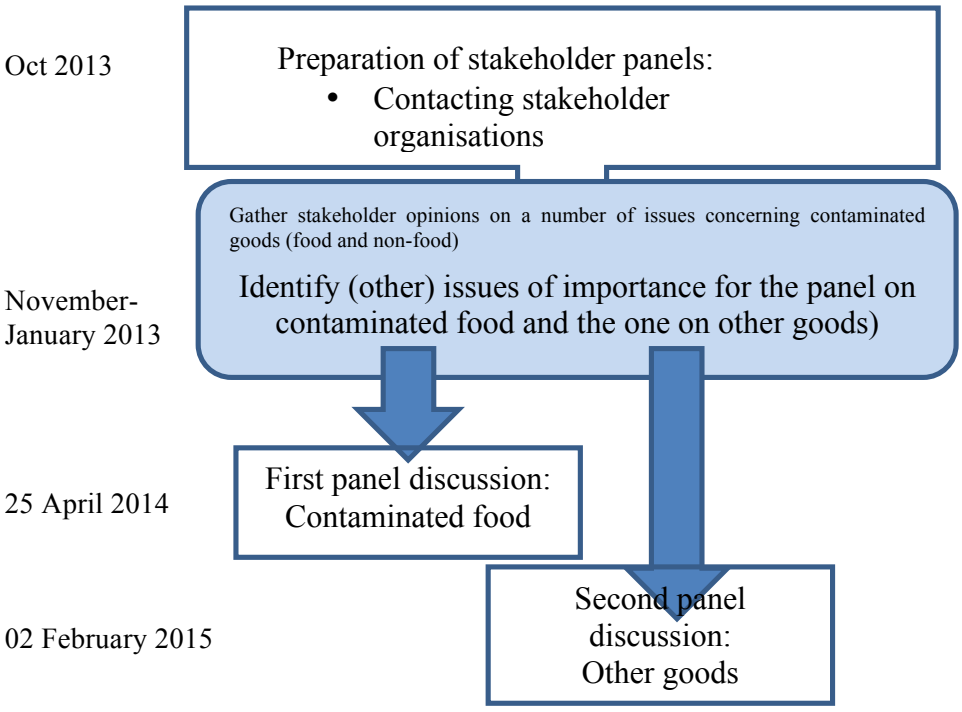


Fig.1. Activities of the Belgian stakeholder panel

[10] Turcanu C., Camps J., Olyslaegers G., Rossignol N. (2015). "Report from a Delphi survey on the management of contaminated goods. FP7 project PREPARE". External Report ER-293 of the Belgian Nuclear Research Centre SCK•CEN, Mol, Belgium.

[11] Turcanu C., Olyslaegers G., Camps J., Rossignol N. (2015). "*Report of the First Meeting of the Belgian Stakeholder Panel within the FP7 project PREPARE*". External Report ER-280 of the Belgian Nuclear Research Centre, SCK•CEN, Mol, Belgium.

[12] Turcanu C., Olyslaegers G., Camps J., Rossignol N. (2015). "*Report of the Second Meeting of the Belgian Stakeholder Panel within the FP7 project PREPARE*". External Report ER-295 of the Belgian Nuclear Research Centre, SCK•CEN, Mol, Belgium.

IV) Results

The Delphi survey highlighted that getting a complete overview of the situation is essential for all stakeholders.

Communication was revealed as a key issue when dealing with contaminated goods. Related difficulties concern the communication flow, its content and its timing. Communication material in the form of checklists, forms or leaflets could be prepared in advance in order to allow timely transmission of relevant information. A list of receivers of specific information should be made and updated regularly. Several participants suggested that responsibilities should be clarified as to who is responsible to communicate which information. Different actors (e.g. governmental agencies) could take this role depending on the type of information that needs to be communicated. Some participants mentioned the need for a central contact point for stakeholders ("helpdesk"), e.g. a call centre and/or website continuously updated. An "information cell" could be established that would operate also after the emergency phase is finished.

Most participants were favourable to **involving other stakeholders in the measurement of radioactivity in goods** (food or non-food). Stakeholders could carry out independent measurements of radioactivity, but it is important to establish: the purpose (in collaboration with stakeholders, e.g. compliance with legal norms or risk estimation); the equipment, the method and the calibration procedure (in collaboration with experts); training programmes; expert feed-back; quality control procedures that stakeholders can apply themselves to check if the equipment functions as required; and standard measurement formularies. However, it is not possible to prepare everything in advance given the unknown nuclide mixture; this means that it is not feasible to do all the technical settings of the equipment in advance. The incorrect use of equipment could create a false feeling of safety (or high risk). Some participants suggested that professional and consumers' organisations should be involved. Others proposed that a central pool of measurement teams exists such that companies can request measurements to members of this pool.

The need for **standardisation and harmonisation** was repeatedly mentioned in different contexts: i) technical (measurement procedures, calibration of equipment, etc.); ii) legal. Norms applicable to contaminated goods should ideally be the same at least in Europe, if not worldwide, to allow free market and to ensure clarity and fairness. This is however recognized as difficult to put this in practice. Most participants favoured the idea that predefined levels should be used for banning consumption/use of contaminated goods, at least during the crisis phase. Some argued that these levels should not be changed at a later time, in order to ensure clarity and consistency of action, as well as the credibility of the experts and authorities toward the general public. Others argued that such levels should be flexible and possibly revised in a later phase, depending on the crisis situation.

Most participants argued that legal norms are in place precisely to ensure the safety of the consumer. This means that a conservative attitude, aiming to ban any products that have contamination residues, even when they are far below the legal norms, is not be advisable. However, in the case of past (non-radiological) contaminations, a conservative attitude has often been adopted in practice.

The **panel on contaminated food** joined a subgroup of the organisations having filled in the Delphi survey. A first issue discussed was whether a conservative attitude aiming at eliminating any product with residual radioactivity would be desirable. Various *arguments opposing* this were put forward, some related to the justification of food norms, the viewpoints of affected stakeholders or the potential for social amplification of the perceived risk. Food safety is now well regulated and controlled; for instance the origin of food products can be traced back to the producer. From the producers' point of view, a graded approach should be used, where countermeasures are decided depending on the level of contamination. If products satisfy legal norms, they should be considered good for consumption. If a conservative attitude is taken in the beginning, this might decrease social acceptance of any products with residues of radioactivity.

At the same time, people nowadays are more concerned about food safety and a **conservative attitude** could be a pragmatic way to manage the situation. Experience shows that consumption of suspicious products had drastically decreased in previous crises, e.g. poultry meat consumption

during the dioxin crisis. Contamination in food products will trigger a cascading effect in the production-distribution-retail-consumption chain where the consumer is the final decision-maker. Ensuring consumer's trust, both internally and externally is essential. Even if both chemical and radiological contaminants are regulated by legal norms, in the case of nuclear, emotional factors and consumers' perception will always play a significant role.

One of the most important issues concerns **capacity** in terms of people and means; this could be critical especially in case of a large scale incident or long term contamination. In terms of measurement and sampling capabilities, this seems to be more a problem of personnel rather than equipment. An overload in the organisations tasked with measurement of radioactivity in the framework of the national emergency plan can be expected if hundreds of samples have to be handled simultaneously. Setting of priorities is important, e.g. food vs. other products, samples from specific emergency organisations vs. spontaneous requests from companies or citizens, and "normal work" vs. specific emergency-related work. The emergency plan addresses fairly well the crisis phase, but more attention should be given to measurement and sampling strategies on the longer term. Such reflection could take place for instance during/after emergency management exercises.

Sampling and measurement are crucial for producers as they have to convince the market that their products are safe to eat. The experience in other domains (e.g. veterinary disease) shows that the lack of measuring capacities and manpower can be a big problem. It would be useful to anticipate how many samples and what measurement capacities are needed; however, this depends very much on the situation. A cost-benefit analysis has to be inherently made concerning capacity building in the preparedness phase.

Communication was mentioned as a key issue in various contexts. In the early phase the difficulties are related to the timing and the accuracy of information, in a later phase to responsibilities. Due to increasing social media use, there is a risk that official communication comes after people have already received information from social media, eventually echoed by local news. It is therefore often not possible to wait until one is very sure about the information communicated. This will be a problem mainly in short-time after an accident (first days); with time it is expected to improve. Another problem in the early phase is that while there is a tendency to centralise the official communication, there will be plenty of unofficial sources coming out.

One issue that deserves more reflection is how to communicate about the **quality of products** with residual radioactivity. This should ideally be coordinated with other countries. In principle, as for chemical contaminants it should be sufficient for the consumer to know the origin of the product and that it satisfies the legal norms. However, following previous food crises, some retail chains made it a point to explicitly say that their products were not coming from affected areas.

Concerning **the** communication with the affected population when field measurements are performed (e.g. in private gardens), citizens should receive fast **feedback on the results**, at least in qualitative terms ("good to eat" or not) in order to restore their confidence. Similar, what should be communicated to companies or private people requiring measurements? **Lay people may have difficulties in** understanding **the** effects of **a radioactive** contamination **and the** countermeasur**es required (or not). For instance,** how to explain that if milk is contaminated, people were not advised to shelter? What is the environmental impact? Can children play outside if cows stay in stables? What about the clothing, the drinking water? Several stakeholders proposed that a communication plan is prepared. Reflection on this topic is needed especially for the post-crisis situation, when responsibilities could be distributed **among different organisations**.

The participants emphasized that different stakeholders have different communication needs. Farmers need to know as soon as possible what countermeasure strategy has been chosen by the authorities, e.g. can they plough the field or not, etc. Even before all measurements are done, they should be informed which practices can limit or increase contamination in food products. Cultural and language differences have to be taken into account to avoid misinterpretations. Processing companies need to know as soon as possible which zones and crops are affected.

The discussion about **compensation** for loss and distribution of costs should start in the preparedness phase. Farmers should know how much they will be compensated for each day when production is not possible. However, recovering the costs would take a long time, which can lead to bankruptcy of affected producers. In addition to the direct loss (products that cannot be sold

because they are contaminated), there would be also an influence on the market. All producers located in (or close to) an area where products are being destroyed would be affected, irrespective of the level of contamination in their products.

Exchange of information and collaboration between different organisations having e.g. production data should be discussed in the preparedness phase. More information is needed by stakeholders regarding the emergency plan and the possible countermeasures for food production systems in case of a radioactive contamination. Data is also needed in terms of people or institutions responsible involved in different aspects of emergency management. A question posed at the level of processing companies is which laboratory they can ask for performing analyses. There is a need for the actors to better know each other.
The federal nuclear and radiological emergency plan focuses on the crisis phase, during which important releases might still be expected, but more reflection is needed on the post-crisis situation. This includes multiple aspects, starting from responsibilities to through to pragmatic ways to deal with the situation. The preparation of the later phases should start early in order to ensure stakeholder acceptance.
Even if there are legal norms for radioactivity in food products and they are calculated in a conservative way, the actual limits used in an accident situation might be changed (this was also seen after the Fukushima accident). Although harmonisation was broadly called for, past experience shows that this might be difficult to achieve[13].
Waste management has to be better analysed. There are solutions for dealing with waste, but this should be analysed in the preparedness phase: what types of waste could be generated and how to handle it. In case of large quantities of low level waste (e.g. contaminated food) capacity problems are likely to appear. Farmers and companies would also face problems with temporary storage on-site, especially for the fresh products that go to the market without processing.

The panel on other consumer goods highlighted that dealing with the protective measures for the population (including decontamination of inhabited areas) and the food chain would likely take priority over other consumer goods. In addition, it appears **difficult to decouple the discussion about other goods from the one on food products**, in the sense that the other goods would be dealt with within the limits of the remaining available resources.
The participants at the meeting recognized the **complexity** of the problem. There was a general agreement that such situations should be thought off, at least on paper. It is necessary to build expertise on the post-accidental management and address several, smaller aspects of the problem according to their priority. Preliminary assessments should be made, for instance in terms of doses for certain scenarios and levels of residual contamination in consumer goods in order to be able to explain, if necessary, that due to practical reasons a certain residual presence of radioactivity is accepted and this will give a certain (trivial) dose. Guidelines should be established for this purpose that provide a framework allowing a fast, concerted and coherent response, but at the same time enough flexibility.
The revision of the national emergency plan should **describe well the objectives and the competencies of the different actors and stakeholders for post-accidental situations**. While it will not go into the details of specifying values, limits or guidelines for contaminated products, it should at least establish a framework for the management of post-accidental situations and consider the type of directives necessary. For instance will transport authorisation be needed for everything that is contaminated?
Concerning **norms for other consumer goods**, it was argued that, on the one hand, it is difficult to have norms that would cover all products. The specific of the situation will have a large influence on the legal norms that will be adopted in case of an accident. These will have to correspond with the reality and the day-to-day life. On the other hand, operational levels are

[13] The latest recommendations from the International Commission on Radiological Protection (ICRP) suggest that in the calculation of radiation doses to the population, all pathways should be taken into account including ingestion and that the level of exposure should be optimised (e.g. between 1 mSv and 20 mSv in an existing exposure situation). This means in principle that the maximal values of radioactivity allowed in food, at least in the affected area, could be adjusted depending on the situation.

needed in the early phase to allow a rapid deliniation of the (non-) affected areas and to have a coherent and accepted value to start from. In time these levels would probably be lowered. However, the changes should not be done very often and should be thoroughly justified.

V) Results

The need for standardisation and harmonisation was expressed both in a technical (procedures equipment, etc.), as well as a legal (maximal levels of radioactivity allowed in consumer goods) context. However, this may be difficult to achieve in practice and needs to match the day to day reality.

The issue of **legal norms** needs to be further clarified. Food norms are needed to delineate the affected areas and to give clearance to products and areas that are not affected, or have residual contamination below the maximal permissible level. However, consumers' acceptance and the scale and characteristics of the contamination would play a key role when deciding in favour of a graded or a conservative approach.

The problem is even more complicated for other consumer goods. **It seems difficult to have the same norms for all types of products**, thus they should be split in categories. Operational levels are needed in the early phase to allow a rapid delimitation of the (non-) affected areas and to have a coherent and accepted value to start from.

Consequently, a priori **fixed limits for contamination in consumer goods** seem desirable at least in the very early phase. In time, these levels would probably be lowered, provided changes are not done very often and are thoroughly justified. Revision of legal norms in a post-accident situation could however have impact on the clarity and consistency of the risk management policy.

Communication is a key point. The need for a "helpdesk" serving as contact point for stakeholders was emphasized during the discussion. Communication material or templates should be prepared in advance and the responsibilities for the post-accidental communication should be clarified. An analysis of stakeholders potentially affected should be done, highlighting the type of information they need in order to ensure fast communication. How to communicate to the consumer that a product containing residual contamination is safe remains an open question.

It was noted that the foreseen revision of the emergency plan should lead towards **establishing protocols** between the federal level (nuclear) and the regions (all other issues concerning environment, agriculture, etc.), greater attention to socio-economic evaluations (including compensations schemes), better knowledge management and transfer among and to various stakeholders (e.g. knowledge on potential countermeasures), cross-feeding mechanisms from other types of crises. The revised plan should also put more attention to the long term phase, e.g. in terms of measurement capabilities and strategies, the responsibility for and flow of communication with and between stakeholders and the public, and the waste management strategies in different scenarios.

Emergency exercises should analyse more in depth the management of the post crisis situation, with all relevant aspects: measurement and sampling, countermeasures, communication, socio-economic aspects, and with larger involvement of potentially affected stakeholders in the discussion of different countermeasure strategies.

Concerning other consumer goods, a reflection framework is needed to establish the processes behind the management of contaminated goods. **Preliminary dose assessments** should be made for certain scenarios and levels of residual radioactivity in consumer goods. Guidelines should be established for this purpose that provide a framework allowing a fast, concerted and coherent response, but at the same time enough flexibility.

Existing legislation and guidance **has limitations**, e.g. differences between normal vs. post-accidental situations, inadequacy of transport legislation to deal with contaminated containers, and the need for a legislation covering non-food goods.

Methodology and conclusions from the Belgian stakeholder panel on contaminated goods

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Introduction

In the framework of the FP7 project PREPARE, **stakeholder panels** have been organised to discuss the management of **contaminated goods** in the aftermath of a nuclear accident.

The Belgian panel included organisations with roles or responsibilities in nuclear / radiological emergency management, representing stakeholders affected or having an interest in decisions. The establishment of the panel relied on previous experience from the European projects FARMING and EURANOS. Activities carried out were: i) **policy Delphi** and ii) **two panel meetings**.

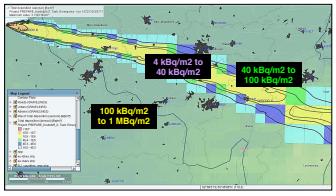
Objectives

Exchanging ideas and views concerning the **development of strategies, guidance and tools** for the management of the contaminated products, taking into account the views of a wide range of stakeholders, and using lessons learned from the Fukushima accident.

Methodology

On-line Delphi survey:
example of question and corresponding cloud tag

Visualisation of roles and challlenges faced by participating organisations in different emergency management phases



Scenario used in the panel on other goods

On-line policy Delphi

- Structured communication technique
- Open questions, qualitative analysis
- Gather different opinions and provide opportunity to react and assess differing viewpoints (2 or more rounds)

Round 1: 15 items: five general questions (e.g. most problematic aspects in previous contaminations), five questions on contaminated food (e.g. flexible vs. adaptable MPL) and five questions on other goods (e.g. stakeholder involvement in measurement of rad. in goods).

Round 2: 3 items (e.g. communication)

Scenario-based panel discussions

First meeting: contaminated food

Topics: i) the experience and conclusions of the FARMING project; ii) the roles and responsibilities of the different organisations; iii) an NPP accident scenario.

Second meeting: other goods

Topics: i) Fukushima experience; ii) new BSS; iii) NPP accident scenario; iv) scenario of malevolent use of rad. in consumer goods.

All discussions were recorded, transcribed and analysed with the ATLAS software for qualitative analysis.

Participants

- Federal Agency for Nuclear Control
- Federal Agency for the Safety of the Food Chain
- Farmer unions: Boerenbond, ABS, FWA
- Belgian Confederation for Dairy Industry
- The Env., Nature and Energy Dept., Flemish Gov.
- Food Industry Federation
- Belgian National Agency for Radioactive Waste
- Belgoprocess, waste management company
- Harbour of Antwerp
- Public Health
- BelV, regulatory control authority
- CONTROLATOM, certified inspection body of class
- NITTO-Europe, private company
- IRE/ IRE-Elit- National Institute for Radioelements.
- SCK•CEN, Belgian Nuclear Research Centre

Conclusions

- Need for **standardisation and harmonisation** (technical and legal). Can this be achieved **in practice?**
- **MPL's** need further clarification; **consumers' acceptance** and scale / characteristics of the contamination play a key role when deciding in favour of a **graded or a conservative approach**;
- Reflection framework needed to establish the **processes for the management of contaminated non-food goods**; preliminary dose assessments; operational levels; legislation and guidance;
- Communication is a key point: **"helpdesk"** serving as contact point for stakeholders; comm. material and templates prepared in advance; clarification of **responsibilities for post-accidental communication**. How to communicate that a product is "safe"?
- Emergency planning should pay more attention to **long-term phase** (measurement capabilities and strategies, responsibility and flow of communication with/between stakeholders and the public, waste management strategies) and **socio-economic aspects** (including compensations schemes) and establish **protocols** between the federal level and the regions;
- Need for better **knowledge management and transfer** among/ to stakeholders;
- Emergency exercises should analyse more in depth the **post-crisis situation** (e.g. measurement and sampling, countermeasures, communication, socio-economic aspects), and have **larger involvement** of potentially affected stakeholders.

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5.2. FINLAND

Background

Food safety is highly regulated by EU legislation and therefore cooperation between different actors working with food safety is necessitated (e.g. 87/3954/Euratom, 89/2218/Euratom, 89/2219/EEC, 2000/473/Euratom, etc.). Radiological accidents are dealt with specified The Ministry of agriculture and forestry (MMM) organizes stakeholder workshops concerning risks on food (latest workshop in Oct 2012). MMM also has a permanent interdisciplinary working group on food and feed contaminants which gives advice to officers of MMM for legislative decision making at national and EU level. Also food industry is represented in the working group. STUK participates in this group that has meetings every 2–4 months. Also, the Finnish Food Safety Authority (Evira) holds annual workshops on risk assessment for food contaminants and coordinates an expert group that is responsible for updating a report on chemical contaminants of foodstuffs and household water. STUK and Evira have regular meetings dealing with in radiological emergency preparedness. STUK participated Farming and Eurados projects in which topical workshops discussed radioactive contamination of food and feed. It was therefore decided that stakeholder panel concerning food safety would be redundant.

Drinking water safety is also regulated by the EU legislation and there are MPL's for radionuclides to be applied both in emergency exposure situation (89/2218/Euratom currently being revised by proposal 5802/2/14 REV 2 ATO 9 AGRI 48 COMER 24) and existing exposure situation (Council Directive 2013/51/Euratom). The Finnish Environment Institute (SYKE) has an official working group on ground water sources protection in which several stakeholders including STUK participates. Finnish Water Utilities Association (FIWA) participates actively in emergency preparedness planning in cooperation with STUK and communicates with the water works and the public. STUK and The National Institute for Health and Welfare (THL) organized a workshop dealing with CBRN threats for water utilities in December 2012. Hence, stakeholder panel concerning drinking water safety was deemed unnecessary this time.

STUK has had contacts with different sectors of industry during suspected cases of radiological contamination, most notably forestry, scrap metal recycling, and customs. No platform, however, exists where different sectors of industry may discuss radioactive contamination with experts and exchange ideas and expectations for emergency preparedness planning. Therefore, STUK decided to focus on these industries and to organize the workshop on the topic of contamination of industrial products.

Setting up the panel

A panel concentrating on contamination cases within industries was obviously the most relevant option for Finland. National Emergency Supply Agency (NESA) aims to ensure security of supply during emergencies. NESA supports this by providing enterprises critical to society with tools for developing their business continuity management. Within NESA framework, these industries have organized as pools with an aim to follow, survey, plan and prepare actions for improving security of supply within their field of operation. The pools are:

- Chemical industry pool
- Forest industries pool
- Plastic and rubber industries pool
- Construction industry pool
- Electronics industry pool
- Technology industry pool
- Military pool (a new pool since 2015, not invited)

In addition to these pools, Finnish Commerce Federation and Customs were considered the most relevant representatives for the panel. The first panel meeting was held 27 February 2014. Two separate official invitations were sent to the pools and the two other organizations. Seven registrations were received but only four attendees came to the panel. The results of the first meeting have been reported previously.

For the second panel, the list of invitees was expanded. Invitations were sent to NESA and Finnish Freight Forwarding and Logistics Association. The panel methodology was also restructured. In order to illustrate the complexity of contamination in industrial products, an extensive radiological contamination scenario was created and the discussions were held based on the effects it may cause within different sectors of trade. Also, a facilitator outside STUK was hired in order to evoke discussions in which all participants can participate on equal basis.

The scenario and questionnaire

The scenario was a severe NPP accident in Qinshan 1, eastern China (Figure 1). Large territories were thought contaminated as well as raw materials, products and facilities.

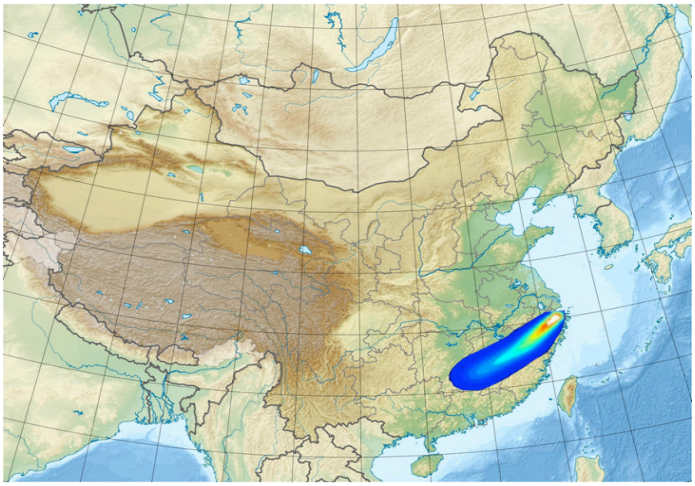

Figure 1. Accident scenario.

The site of the accident was selected so that it will affect most industries globally. In China, a vast variety of raw materials are produced and products manufactured (e.g. iron, steel, aluminium, coal, machinery, armaments, textiles and apparel, petroleum, cement, chemicals, fertilizers, food processing products, automobiles and other transportation equipment, ships, and aircrafts, consumer products, telecommunications and information technology products).

Radiological protection units, such as Bq and mSv, were avoided in the scenario. By this, we aimed at directing the discussions into effects, countermeasures and management and to avoid discussions on how-much-is-too-much.

With the invitations, the scenario was sent along with a questionnaire which was asked to be returned before the panel. The questionnaire was as follows:

- Effects: How would an incident like this affect your industry / enterprise
- Mitigation of effects: Important actions by which negative effects by radiological contamination can be mitigated (e.g. economical, social, health, psychological).
- Impeding factors: Factors that you suppose to complicate business operation in general or import/export
- Measures: Measures that your industry/company will take in a situation like this

- International measures: Does your line of industry have internationally agreed measures for reacting to incidences like this? How should these be elaborated?
- Emergency preparedness plans: Are radiological accidents covered in your emergency plans?
- Role of authorities: What are your expectations from authorities in a situation like this?
- Concerns: What are the greatest concerns in an incident like this?

The second panel meeting

As in the first panel meeting, there were no-shows and only five representatives from the stakeholders participated in the panel (two representatives of steel company SSAB and one from DHL Global Forwarding, Construction industry and Plastic industry). Forest industry sent answers to the questionnaire but could not attend to the meeting. In addition, nine attendees from STUK representing different field of expertise were present.

Table 1. The schedule of the second panel meeting.

8:30	Opening of the panel (Director T.K. Ikäheimonen)
8:30–8:45	PREPARE – European project (Deputy Director R. Mustonen)
8:45–10:00	The panel (Facilitator prof. R.P. Hämäläinen, Aalto university) 1. Objectives 2. Presentation of the scenario 3. Effects at different sectors 4. Critical effect chains
10:00–10:20	Coffee break
10:20– 11:45	The panel 5. Practicalities and preparedness. National and international guidelines and preparedness plans 6. The role of Authorities 7. Concrete ideas for improving preparedness 8. Need for further development 9. Synthesis
11:45–12:00	10. Future plans: concerns, ideas, cooperation

The objectives of the panel were elaborated: To develop strategies, emergency plans, guidance and procedures for dealing with contamination cases and to recognise development targets from the point of view of the stakeholders.

After introduction of the scenario, the answers to the questionnaire were presented. First discussions concerned the effects in different industry sectors (Table 2).

Table 2. The effects discussed during the panel

The panellists' views on effects caused by the accident presented in the scenario
Suspension of production Challenges in starting of production: raw materials, markets, labour force Monitoring of incoming components/raw-materials Alternative sources of raw materials/components Disposal of contaminated materials Rumours, consumers' fears Subcontracting chains are long and monitoring is difficult Buildings are expensive products with a very long life span Alternative transport routes must be ready

People's reactions are strong; the industry must be able to assure the staff that no significant exposure occurs during their work Hoarding of raw materials/components Increase in raw material/component prices

Next, discussions addressed possible countermeasures. The time-span was divided from hours to weeks. Table 3 lists the topics brought into discussion by the panellists. Then, the panellists thought of possible chains of events caused by accidents (Table 4).

Table 3. Countermeasures

Countermeasures addressed by the panellists	
hours	Protection of workers PR (customers, workers) Suspension of production in affected areas There is a risk that communication channels to the affected area are overloaded Emergency plans and the authorities at the affected area, translation work
days	Possible contamination of containers, monitoring, lack of port space Finding monitoring equipment for own use Retrieving correct information (all time scales) PR Disposal/placement of contaminated goods, storage space and capacity
weeks	Alternative transport routes Lack of containers Monitoring raw materials, third-country transport Some facilities can be moved and decontaminated (eg. Plastic moulds and frames) Lack of raw materials, components Risk of illegal dumping of cargo
months/years	New contracts with suppliers Changes in legislation, new statutory certificates/monitoring

Table 4. Chains of events after an accident

Chains of events suggested by the panellists
Communication overload → many difficulties may occur Consumer suspicion: first affected country, then also neighbouring countries, some line of industry may be severely affected Contamination of raw material → no import → alternative raw materials → no work at the affected areas Monitoring capacity too small → raw materials are not accepted before certificate→ no enough storage space Public perception → advantage for certain producers (non affected areas) Authority regulations, statutory monitoring → delays/problems in transport

After the break, the discussions were directed to emergency planning. The questions presented included: Which countermeasures? Roles and responsibilities of actors (industry /national/EU/international)? Are there chains of events which industry/authorities cannot influence? If so, do we need new approaches? The panellists agreed that the authorities must provide companies with guidance on management of the incident including information on safe exposure levels. Timely and open communication about projected effects to customers and members of staff was thought essential. It was also reminded that keeping situation as stable as possible in domestic facilities is important. No internationally agreed countermeasures exist within industries, however communicational channels exist. Enterprises have crises management plans but these plans generally lack plans concerning radiological accidents (steel industry, which has occasional problems with orphan sources, is an exception). Monitoring import/export of side products and waste was also discussed. Main development targets were monitoring and communications (Tables 5 and 6).

Table 5. Ideas for developing monitoring and monitoring strategies

Global environmental on-line monitoring network could be beneficial but cannot replace monitoring of products (dose rate outside cannot be directly translated into contamination of products)
Cooperation in in-house monitoring should be carefully considered (by industry sectors)
• A laboratory with enough capacity to provide monitoring services for the whole industry would be the best option
• STUK/Authorities cannot provide large-scale monitoring services during radiological accidents (protection of people is prioritized)
• The responsibility of monitoring raw materials is on the producer
• Responsibilities of monitoring/certification should be detailed in import contracts
Monitoring strategy should notice that materials are increasingly recycled, transport networks in recycling are complex
Information on monitoring capacities and strategies in different countries are not known. It is important that globally operating enterprises include this information in their crises management plans.
The Commission can stipulate monitoring/certification within EU. Globally the maximum levels may, however, vary and some countries may not set obligatory monitoring.
What types of international cooperation is there with customs (Customs was absent so this issue could not be discussed)
Monitoring technology has improved (e.g. easy-to operate and mobile solutions) and the prices have decreased. More monitoring points could be set up. Steel industry may act as an example for others. Possibility for R&D based on demand.

Table 6. Ideas for developing communications

The authorities are responsible for communications towards the public and the media
Targeted communication to the industry by the authorities is presently missing in the plans
STUK communicates to Finnish citizens abroad using the embassies
Different pools have contacts with each other but no shared communication platform exist
NESA has a portal for communication which could be developed into communication tool during emergencies
Idea: Forwarding companies have huge customer registers. These registers could be used in communication targeted to companies/industry
The companies must give information quicker than the social media where misinformation and rumours spread fast
For this, the facts must be available
Example from steel industry: automatic SMS from portal monitors to the head of public information
The authorities use also social media
Flow-charts on responsibilities and distribution of information should be prepared
Training on detecting and management of radiological contamination would be beneficial for the industries. Steel industry have well-thought processes for this.

The stakeholders were very concerned of the possible exposure to the members of staff. In domestic accidents, STUK and other authorities gives guidance on protection of workers. For facilities in other countries the local authorities should provide guidance. A globally operating enterprise could use harmonized instructions for the staff members but these should be congruent with the instructions provided by local authorities. Protective measures must be thought and personal protective equipment stocked up before an accident takes place.

Carriers and forwarding companies have detailed plans for alternative transport routes in case of emergency. Customer relationships, however, are generally short as there is intensive competition in the field. This brings up challenges in long-term planning of preparedness to accidents. It is very important that possible contamination of freight is covered in the contracts. In emergency planning, Carriers and forwarding companies are not separate from the producers. It would be optimal that crises management plans of producers would integrate carriers and forwarding in the process. If the products are not transported to the buyers, productions will stop since producers do not have large storage capacities for their products.

Summary of the development needs

Communication was an intersecting theme in all aspects of emergency management and relatively easy to improve. More discussions and plans on this theme are obviously needed (who gathers the information, who communicates to whom, which communication channels are preferred, etc).

Radiological emergencies should be included in the crises management plans in all industry sectors. These plans should preferably cover the protection of workers, effects on production, and communication strategy. The sectors should have internal discussions on this topic and distribute information to companies within their industry sector. The stakeholder wished to be included in emergency response exercises after their plans have been updated.

In globally operating enterprises, all emergency plans in the countries of operation and their monitoring strategies should be checked. In-house emergency plans and instruction should be congruent with these.

The PREPARE project should list and review the monitoring strategies in the participating countries. With the exception of steel industry, companies are generally unfamiliar with monitoring of radioactivity. It is important to know in which kind of incidences monitoring may become statutory, where these services can be acquired from, what kind of maximum levels are set and what kind of certification systems are available.

Finland: critical industry

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Background

Several interdisciplinary groups including stakeholders are working on food, feed and drinking water safety. Also, specific workshops on this topic have been organized in recent years.

STUK—Radiation and Nuclear Safety Authority has contacts with different sectors of industry during suspected cases of radiological contamination. No platform, however, existed where different sectors of industry may discuss radioactive contamination with experts and exchange ideas. Therefore, we decided to focus on critical industries and to organize the panels on the topic of *contamination of industrial products*.

Invited Stakeholders

Industry Pools	Other relevant stakeholders
Chemical Industry pool	Finnish Commerce Federation
Forest Industry pool	Customs
Plastic and Rubber Industry pool	NESA—National Emergency Supply Agency
Construction pool	Finnish Freight Forwarding and Logistics
Electronics Industry pool	
Information Technology pool	

First panel

Short introductions were given by experts after which the following topics were discussed:

- Radioactive substances in industrial import and export products
- Regulations regarding radiological emergency
- STUK's strategy on measurements in radiological emergency
- Product quality and measurements of radioactivity in scrap metal plants
- Control of contaminated products at the customs

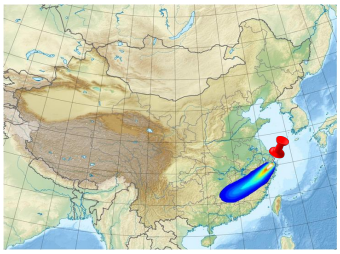
Waste Framework Directive requires efficient recycling. Monitoring of contaminated materials is essential.

In emergency situation, decision on maximum permissible levels must be made promptly, licensing must be fast and straight-forward.

Public communication is very important and should be coordinated by STUK.

Second panel

In this panel, we chose an accident scenario in a NPP outside Europe where many companies have subcontractors/factories. What would be the effects on industries?



Communication is an intersecting theme in all aspects of emergency management. The group agreed to cooperate for improving the present state.

Radiological emergencies should be included in companies' crisis management plans (protection of workers and production, communication)

Emergency plans in overseas facilities should be found out. In-house plans should take these into consideration.

A well-thought monitoring strategy optimizes the use of monitoring capacity. In order to prepare strategies, maximum levels and types of certification systems must be known beforehand.

5.3. FRANCE & SWISS

Global organisation of the French Swiss panels (PREPARE WP3 project)

The reflection of the French-Swiss panels focussed mainly on the contaminated foodstuff management in a post-accidental situation. The main objectives of the panel discussions were to raise issues on the possible strategies, guidance and tools that would help to manage contaminated food taking into account all stakeholders viewpoints (consumers, producers, retailers).

Two panels have been set up: the first one to collect the Consumers' viewpoints, the second those of the Producers & Retailers. Their membership is the following:

Consumers' Panel participants:

Local Information Commissions close to Nuclear Power Plants
Federal Union of Consumers (NGOs):
French People's aid NGO
Environmental and health NGOs
Swiss district ('canton') Superintendent
Chief doctor of Swiss telemedicine ('Medgate')

Producers & Retailers' Panel participants:

Local Producers and farmers (wine, milk)
Agriculture Chambers representatives
Association for International Cooperation for Agricultural Development (FERT)
Inter-professional Centre of the Dairy Economy (CNIEL)
Nestlé group (Switzerland)
National Federation of Farm workers' Unions (FNSEA)
National Association of Food Industries (ANIA)

A 'Mirror panel' involving most of the institutional French organisations and the Swiss Federal Office of Public Health that are in charge of or concerned by the contaminated food management and control, was also constituted.

Each panel met twice in 2014. These meetings started with a general presentation of the PREPARE (WP3) project, and three lectures allowing stakeholders to better understand the context of the project. CEPN presented the European regulatory framework as well as feedback experiences from Belarus, Norway, the United Kingdom and Japan several years after the Chernobyl and Fukushima accidents. IRSN presented the main elements of the French doctrine on post-accident situation management (CODIRPA, 2012) including foodstuff management. Several Swiss experiences on post-accident management issues (especially during and after the Fukushima accident) were also presented: - the Medgate® telemedicine Network for informing the public on health risks, - the foodstuff management and control in Switzerland and, - the Nestlé® group response and organisation after Fukushima accident.

On November 2014, a joined meeting was organised with consumers, producers and retailers who participated to both panels in order to let discussions and exchanges between stakeholders. This meeting allowed to deal with the main topics discussed during the previous meetings in depth (Complexity of the situation and vulnerability of the affected territories, Tools for managing foodstuff contamination, Elaboration of response strategies, Questions of ethics and solidarity, Communication aspects and trust restoration, Stakeholder preparedness).

The results of the panel meetings were presented on February 2015 to the 'Mirror panel' and the National Post Accident Committee.

Results and analysis of the panel meetings

First of all, three main cross-cutting messages were expressed by both consumers and producers:

- Everything must be done to avoid any accident. According to the panellists, citizens are victims first and they are not responsible of the situation. The presence of artificial radioactivity in the environment is illegitimate, even if - dose rates and/or activity - levels are low;
- The post-accident situation will lead to a new and unexpected situation with losses of references and values for all stakeholders. According to the panellists, it is unrealistic to expect everything to be foreseen in advance; however, it is important to be ready to react and respond as quick as possible;
- Regarding the concept of Maximum Permitted Levels (MPLs), it seems useful but rather complex to understand. There is a need to pay attention to the values adopted for MPLs, especially so that their meaning and principles of elaboration are understood.

1. Complexity of the situation and vulnerability of the affected territories

- The panellists pointed out the extreme complexity of a post-accident situation. A radiological or nuclear accident leading to a potential or an actual contamination of foodstuff intended to be placed on the market is such an unexpected and exceptional situation that its management would be totally new for all concerned parties. It will lead to losses of reference in everyone's day-to-day life at home and at work and to the depreciation of intangible values; it is a multidimensional situation, which generates countermeasures that may be disruptive and difficult to understand. They can lead to a large variety of attitudes, individual reactions and behaviours. Thus, there is a need to consider all aspects: scientific, technical as well as social, health, economic, psychological and environmental issues.

  ⇒ Preparedness is crucial but would not be sufficient. From the panellist's point of view, it is unrealistic to consider that the actors will be fully prepared in case of accident. However, it is important to be ready to response promptly. For instance, key and easy-to-understand messages that will be addressed to specific stakeholders can be prepared in advance, as well as the framework for preparing a constructive dialogue and cooperation between stakeholders, having in mind that all of them should be involved.

- The large vulnerability of an agricultural country, like France, has been emphasized:

  - AgriSwiss is of critical importance in France (0.5 ha of cultivated areas per inhabitant, agriculture represents more than 50% of the total surface area of the country, and about 5% of the GDP) and it is also a key activity in some of the Swiss cantons.
  - There are 58 NPPs and other nuclear installations in France spread all over the territory, represented about 30 sites and 5 in North-Eastern Switzerland, which means that all regions and all types of agricultural production are potentially concerned by the consequences of an accident.
  - The local agricultural products will be stigmatised whatever their real contamination. The risk of a permanent loss of image is high, and economic losses for producers and retailers are inevitable in such circumstances. The depreciation of the reputation could also affect the whole national export market (especially famous national products and brands such as wine or cheese). In such a context, the preservation of the image and the reputation of the local agriculture is a key issue.

- Moreover, the national organization of the food consumption market could lead to a long lasting disruption of the economic activity in the agricultural sector:

- In France, about 70% of purchases are made in large (>400m^2) supermarkets: six companies – *Carrefour*®, *Auchan*®, *Casino*®, *Leclerc*®, *Intermarché*®, *Système U*® - share 85% of the food consumption market. It is even more concentrated in Switzerland where only two retailers share the majority of the market: *Coop*® and *Migros*® realise together more than 70% of the foodstuff sales. The short marketing circuits have a minor role (<30%) but it has been pointed out that the consumers who rely on them, are more concerned by – and are ready to pay more for - a better quality of products with guaranteed (often local) origin. There are plenty of existing official quality and/or origin labels in France (ex. AOC, AB, "Label Rouge", etc.) and Europe (ex. AOP, IGP, STG, etc.).

⇒ Large retailers are very important stakeholders. In a post-accidental situation, their trade policies (esp. with regards to prices, labelling, advertisement and ban) would be of major importance and certainly would influence the consumer purchasing behaviours.

- All stakeholders are aware that the management of foodstuffs after a radiological or nuclear event will encompass both protecting the population, which is the first priority, and maintaining economic (agricultural) activities in the affected area. In some cases, compromises would be needed between promoting a sustainable development and seeking the lowest level of contamination. The panellists consider that, if such an event would occur, *'the best option is the least worst'*.

2. Tools for managing foodstuff contamination

- The contaminated area 'zoning' approach of the French doctrine for managing the situations after a nuclear accident (CODIRPA) has been presented and was examined and questioned by the panellists. They agreed on its basic principles, which give the priority to the protection of people taking into consideration the sustainability of the local economy (mixing radiological protection and economic considerations). However, they underlined the need for the zoning approach to be based on objective and transparent criteria, that could then be justified, otherwise any future change in the contaminated areas zoning would not be understood by the population.

- Looking at the balance between the radiological protection (health) and economic (quality) dimensions, it has been pointed out that the criteria for both dimensions are confusing for non-specialists. While it is considered that below 100 mSv/year there is no clear scientific evidence of a risk for health, the dose reference levels used for foodstuff management are well below this value. Moreover, with regard to the Maximum Permissible Levels (MPLs), which are the criteria used for controlling foodstuff import/export after an accident, the fact that many set of numbers co-exist, is also confusing. In particular, the method for calculation is not always clear and easy to understood, and gives an impression of *'scientific opaque cooking'* that might lead to an unexpected use of MPLs by concerned parties. They also noted that MPLs are not a border between safe and unsafe and therefore that the term "maximum" is not appropriate.
  - Consequently, the panellists were of the opinion that MPLs are a useful tool for the management of contaminated food while they also appealed for some adjustments, such as the review of the concept and the wording of MPLs, in order to better fit with what is needed. They called for a simpler and more transparent method of calculation. Further, while they recognized the need for foodstuffs on the market to be in compliance with the fixed MPLs, the panellists also recognized the need for flexibility when setting the MPLs taking into account the actual situation and its evolution. It means that the MPLs set in advance can change when an event occurs and this point should be clearly stated. It was also pointed out the fact that the situation is not the same internationally for people eating contaminated food episodically and locally where ingestion can be the dominant pathway.

- The result could be a combination of a steady envelope level (based on radiological protection considerations and generic for all groups of populations) together with context-based reference levels (reflecting 'food quality' objectives), which can change over time according to the real situation. Other decision-making approaches might be taken into account (e.g. to diversify individual diets; - to implement self-help protection actions; - to perform measurements before consumption; etc.).

- According to the panellists, it is unclear if specific subgroups at risk (children, pregnant women and people with atypical food consumption behaviours) or the cumulative effects of chronic exposures are well considered; it is also unclear if the existing post-accident management doctrines and strategies are still valid and implementable in the case of severe accidents or after malevolent/terrorist acts.

- If drastic countermeasures (such as food bans, food destruction, food restriction, livestock quarantine or slaughtering, etc.) would be implemented, they should be justified and explained taking into account the diverse aspects of the situation. Moreover, from the point of view of professionals, the consequences of such decisions should be fully compensated otherwise there activity would shut down. Thought should also be given to alternative options (e.g. storage before release or clearance, livestock 'clean' feeding or quarantine on 'clean' pasture before slaughtering, decontamination instead of storage as waste, etc.).

  ⇒ Arbitrary – i.e. 'black or white' - approaches must be avoided; the specificities of the affected territory must be considered case-by-case. The decision-system has to be 'quick and strict': the precautionary principle fully applies. In case of doubt or if measurements are unavailable, market prohibitions, food bans and restrictions must be put in place but these have also to be transparent and fair (i.e. based on costs vs. societal benefits considerations). The ALARA (optimisation of radiological protection) principle has been considered by the panellists as the relevant principle to be applied.

3. Elaboration of response strategies

First, the panel participants pointed out that, with regards to the food market evolution, the consumer is always the final decision-maker. Each consumer will react according to individual criteria but, as far as food consumption is concerned, the price, the overall quality and taste (which is not altered by radioactivity) are the most important ones.

In a long-term post-accident situation, the response in terms of management of the potentially contaminated food should rely on regional and inter-professional organisations:

- The main stakeholders (especially producers and retailers) must interact with mutual transparency, and cost-effectiveness. The public health protection must always be ensured and guaranteed but it is clear that compromises (loss of image and quality vs. price) will have to be made. The dialogue between producers and retailers must be established independently of the occurrence of an accident (in a *'period of peace'*) in order to be able to adopt and implement common policies and shared strategies if an accident would occur.

- From the producer point of view, the establishment of strategies in the case of an accident is easier for the 'long circuit' market for several reasons. The dialogue between producers and retailers can be constructive even if their interests do not coincide completely. The behaviours of consumers on this market can be rapidly detected. These behaviours have also been already observed and analysed after former food crises (e.g. Escherichia coli epidemic, avian influenza crisis, bovine spongiform encephalopathy epizootic, etc.).

- It could be more difficult to elaborate strategies and guidance for the 'short circuit' market: it has been mentioned the importance of pre-existing loyalty links between

consumers and producers (e.g. pedagogic farms, certification of origin and quality). Anyway, there will be a huge difference between the directly affected and non-affected territories. Conversion and reorientation of agricultural activities could be envisaged in the affected territories. However, any change or termination of activities should allow for a kind of compensation of local producers.

It has been also mentioned that the proposed policies and strategies wouldn't be accepted by the public, if the consumer NGOs are not involved in the upstream discussion process.

The presentation of the Japanese experience highlighted the importance of measurements and notably the self-measurements by inhabitants. This response strategy seems relevant for the panellists, self-measurement is a way for consumers to have again a grip on their daily life: consumers can build their own reference scale to make their choice.

4. Questions of ethics and solidarity building

Panel discussions raised different topics regarding ethics (e.g. sale of very slightly contaminated products, dilution of radioactivity, risk transfer, etc.) and construction of solidarity (e.g. mutual aid and compensation).

As a preamble, it has been said that the involvement of the population and non-institutional stakeholders in the post-accident management should not result into a transfer of responsibilities (citizens are the victims, the government and operators have to fully assume the societal, health and economic consequences of an accident). In that respect, operator, government and international compensation schemes should exist early enough to allow stakeholders to make their choices. These schemes should also be checked and regularly re-assessed, taking into account different scenarios of accidents with local and cross-border consequences and local economic vulnerabilities.

A better collective response to such an event will be facilitated if solidarity networks are built. They could rely on regional and professional organisations and health safety groups that pre-exist in normal situation. The creation of specific response teams (with a reduced number of stakeholders) and national or intra-professional mutual aid funds should be also considered. It has been mentioned that cross-border solidarity actions could be more difficult to set up, except maybe in case of EU financial compensation.

Risk transfers should also be avoided. The production of wasted foodstuffs should be controlled as far as possible. For example, a systematic ban of the so-called 'grey products' (contaminated below MPLs) should be avoided. For that reason, and also in order to maintain agricultural activities in the affected areas, exportations of foodstuff above levels tolerated locally is questionable but not a priori unacceptable, provided that certain conditions are met such as the compliance with international generic MPLs, the transparency about the origin, the set-up of measurement and control systems as well as transparency on the concentration level of the food. Indeed, knowing that the conditions of exposure are penalising for the local population compared to international consumers, a kind of *'share of the burden'* is not necessarily unethical. Furthermore, some panellists recalled that placing on the market products with lower quality at cheap prices is a current practice. Of course, these considerations can be tolerated only if the quality of products remains significantly below concentration levels which may induced health problems.

In the same way, the dilution process to intentionally reduce the radioactivity in food is forbidden by law in normal situations. However, in a post-accident situation context, it would be appropriate to consider or even encourage countermeasures, even including dilution, that would mitigate exposures and reduce individual internal doses through food consumption for the most affected

population. It is mainly a matter of trust by and negotiation with the consumers (i.e. consumer protection organizations).

5. Communication aspects, trust restoration and confidence building

In normal situations, quality and traceability are both a concern for producers and a requirement by consumers who, in most of the cases have a good confidence in the chain of food control. Should an even arise, the situation will drastically change, generating doubt and mistrust. Measures and countermeasures must be visible and explained to restore confidence.

⇒ The media and social media coverage will affect and influence consumer views and attitudes toward non-contaminated foodstuff or products with level of radioactivity below reference levels. It will be difficult to let journalists understand that in certain situations MPLs can be (or have been) exceeded without seriously endangering public health. During and after food crises, the role of media is often misperceived by the panellists. It shows that involving journalists in the preparedness phase would be useful.

- After food crises, restoring consumer confidence is a difficult and long process. It always takes time for producers, who generally need compensations for saving or redeploy their activity. In addition, the panellists expressed their preference for the term credibility, which is more factual than trust. Furthermore, trust restoration means having it before the accident while it is not always the case.

- A complete and systemic control - by measuring the radioactivity in foodstuff - is necessary but it is difficult to fully achieve. Each time one MPL will be exceeded, the public confidence will collapse.

⇒'Upstream' information (especially toward media and public) is useful but is not enough. On one hand, it is necessary to set up relevant and understandable information during crisis, and on the other hand, to explain all measures which could help in restoring confidence and credibility (integration of criteria on natural/artificial radioactivity content in quality charters, compensation of radioactivity traces by a better overall quality of products, etc.). The plurality of information sources is needed but the development of 'only one voice' and/or 'only one door' systems of information must be encouraged (e.g. Swiss Medgate® portal).

6. Stakeholder preparedness

It was first pointed out that the stakeholder engagement in preparedness does not mean trivialization of risk: everything must be done by the operators and competent authorities to avoid any nuclear accident leading to radiological consequences.

It is the role of competent authorities on one hand, to encourage stakeholders to get involved in joint and independent structures (if possible pre-existing ones, and not necessarily dedicated to the sole radiological situation management) and on the other hand, to promote and coordinate extensive discussions on this topic. It is also their power and responsibility to diffuse the radiological protection culture within society. They have to promote the development of local informed people networks included key representative persons ('persons of trust, credible and available', the panel participants said): this includes notably medical staff personnel, teachers, NGOs and elected representatives, local agencies of agriculture, trade unions, etc. A key role is also dedicated to the local liaison committee (CLI) that exist around French nuclear installations.
Moreover, the involvement of the population and local stakeholders (e.g. producers, retailers, consumer organizations) through emergency exercises could be an issue as well as the development of exercises at the European level (to deal with cross-border aspects).

Conclusion and guidelines

PREPARE WP3 Project was an opportunity to open dialogue and exchange with authorities, experts, industries, producers, retailers, consumers and NGO'S on the management of contaminated food. Discussions conducted during the panel meetings and the presentations of the Japanese experience allow to identify the following main messages and considerations:

- The extreme complexity of a post-accident situation calls for considering all aspects in the management of contaminated goods: scientific, technical as well as societal, health, economic, psychological and environmental issues.

- Health aspect and intake of radionuclide are important in the management of foodstuff, especially for specific subgroup at risk such as children, pregnant woman.

- Ban and restrictions are appropriate as first countermeasures but they should be justified and complemented by compensation schemes.

- Countermeasures should be explained and discussed to be understood and accepted. In addition it is crucial to mention at the beginning that the situation is variable, depending on the severity of the accident and the vulnerability of the areas affected. Response strategies notably MPLs should be adapted to the actual situation, taking into account the differences between affected and non-affected areas.

- Dilution should not be a regular way but may be used under control to reduce individual doses

- Long-term restrictions on the consumption of foodstuffs are difficult to maintain and conflicting to the sustainable development of contaminated areas. However, lifting countermeasures is difficult and compensation regime should be prepared in 'period of peace' taking into account the collateral effects.

- A balance should be found between consumers/producers interests and it is important to rely on pre-existing local, inter-professional networks in order to engage dialogue and exchanges between the different stakeholders.

Furthermore, the panel meetings lead to the following recommendations:

- Establish a framework in advance (strategy, criteria, compensation regime, stakeholders networking…) even if it is unrealistic to predict everything in advance; be aware that the prepared framework may not fit with the prevailing circumstances and may need to be adapted.

- Explain at the beginning the possible evolution of the response strategy and the long-term perspective - MPLs, countermeasures, etc. - according to the accident, the vulnerability of the territories, etc.

- Develop the capacity of measurements and self-help actions, which are key issues.

- Disseminate the radiological protection culture.

- Maintain the synergy and the network developed in the framework of the PREPARE WP3 Project in order on the one hand to share with European countries on the management of contaminated goods and on the other hand to reinforce the cooperation with Japanese colleagues in order to draw the lessons from their experience.

FRANCE / SWITZERLAND PANELS

Stakeholders' point of view on the management of the contaminated food

IRSN INSTITUT DE RADIOPROTECTION ET DE SÛRETÉ NUCLÉAIRE — cepn — Schweizerische Eidgenossenschaft, Confédération suisse, Confederazione Svizzera, Confederaziun svizra — PREPARE

PROCESS & METHODOLOGY

- Reflection on contaminated foodstuff management
- Constitution of two stakeholders' panels:
  - Consumers (Union of Consumers, People's Aid NGOs, Environmental and Health NGOs...)
  - Producers / Retailers (local producers, Nestlé...)
- Integration of feedback experience of countries concerned by this issue, after Chernobyl and Fukushima accidents
- Constitution of a 'Mirror Panel' involving institutional organisations concerned by contaminated food management and control

RESULTS

3 main messages were expressed by the different stakeholders:

- Everything must be done to avoid any accident -> citizens are victims
- Totally new situation for all actors -> loss of references and values; nobody will be fully ready; unrealistic to try to predict everything; be ready to react quickly
- The concept of Maximum Permitted Levels (MPLs) is useful but questionable -> needs of adaptability and accountability based on monitoring and improvement process (solidarity & ethics)

20-22 January 2016	**Dissemination Workshop of the PREPARE Project - Bratislava**
12-13 November 2015	***Final PREPARE WP3 Workshop - Paris***
9 February 2015	Presentation of the results to the 'Mirror' Group & the National Post Accident Committee
1 December 2014	Joined meeting of the two French-Swiss Panels
3 November 2014	2nd Meeting of the 'Mirror' Group
5 June 2014	2nd Meeting of the 'Producers/retailers' Panel
25 April 2014	2nd Meeting of the 'Consumers' Panel
25 March 2014	1st Meeting of the 'Mirror' Group
13 February 2014	1st Meeting of the 'Producers/retailers' Panel
4 February 2014	1st Meeting of the 'Consumers' Panel
February 2013	Kick-off Meeting of the PREPARE Project

CONCLUSION AND PERSPECTIVES

PREPARE WP3 = opportunity to:

- Open dialogue between authorities, experts, industries, producers, retailers, consumers and NGOs
- Engage reflection beyond emergency action plans -> focussed on transition and long term phases
- Develop further cooperation with Japanese partners and with the NERIS Platform

5.4. GREECE

PREPARE WP3 project in Greece: Introduction

Greece is a non-nuclear country; the public is quite concerned about the risks and perceive them to be high. The management of post-accident situations, such as the monitoring of contaminated goods, is based mainly on the provisions included in regulations and guides of the European Commission (EC). The national framework for radiological protection in case of nuclear accidents has been firstly established in the aftermath of the Chernobyl nuclear accident (1986). The recent Fukushima nuclear accident (2011), for a non-affected country such as Greece, acted as an exercise to test the authority's own capabilities in emergency response. The importance of several aspects of emergency plans emerged; the management of contaminated goods, including cooperation and coordination among stakeholders, proved to be crucial in the post-accident period.

The WP3 of the PREPARE project, funded by EC, focuses on the development of strategies, guidelines and tools for the management of the contaminated products. The Greek Atomic Energy Commission (GAEC), as a partner in the PREPARE project (WP3), has the responsibility to organize and coordinate the national panel of stakeholders involved in post-accident management situations, such as the monitoring of contaminated goods.

The main objective is to provide to national stakeholders an opportunity for reflection and dialogue. Taking into consideration the possible consequences and implications that a nuclear accident may trigger in terms of management of goods, the preparedness at national level could be substantially improved. To this purpose, GAEC has chosen to organize plenary and topical panels. In a chronological order, the panels have been planned as following:

- plenary meeting focusing on the PREPARE project, previous goods management-related projects and initial identification of roles and responsibilities among stakeholders
- first topical panel focusing on transportation; the management of contaminated ships, trucks and containers was selected as the discussion topic, since transport-related issues emerged during the Fukushima accident crisis
- second topical panel focusing on milk and dairy products; the topic of milk management was selected due to the prominent position of the milk and its products in the national diet mix.

GAEC as the coordinator of the national panel:

- sets the agenda of the panel discussions, in line with the PREPARE goals
- organizes the meetings, taking care of logistics
- coordinates the discussion within the panel
- drafts the reports summarizing the discussions.

Stakeholders and topics

The invited stakeholders were categorized in the following groups:

- authorities in charge of the control and management of goods at the national level in case of contamination
- laboratories and experts involved in emergency management plans
- relevant associations
- bodies and unions related to specific country-related activities.

The choice of the participating organizations was based on the following criteria:

- relevance with the topics to be discussed
- involvement in national emergency arrangements
- societal role.

Detailed lists of the stakeholders represented in the meetings is given in the following pages.

The topics discussed with the participants of the panels were the following:

- Existing vs. planned exposure situation
- Accident scenario (outside the country)
- Emergency vs. long term issues and management
- Reference levels (status, needs and values) and rationale basis
- Dilution and exemption/clearance
- Zoning strategies (when, where, how long, towards a graded approach in time and space)
- Societal acceptance (definition of the food quality, consumption of contaminated products below the MPL)
- The role of the «market» (customer confidence, product image)
- Communication and public information.

Panels presentation

The following stakeholders panels were organized:

➢ **plenary meeting held on 18 December 2013.**

Wednesday 18 December 2013
Plenary meeting

09:30-10:30	Welcome address by GAEC – Brief presentation about GAEC – "Tour de table" *C. Hourdakis, Licensing and Inspections Department, GAEC*
10:30-11:30	PREPARE project presentation – WP3 presentation *V. Kamenopoulou, Licensing and Inspections Division, GAEC*
11:30 -12:00	The Fukushima nuclear accident experience *C. Potiriadis, Environmental Radioactivity Control Department, GAEC*
12:00-12:45	Break
12:45-13:30	Presentation of the projects FARMING – EURANOS *K. Ioannides, University of Ioannina*
13:30-15:30	Discussion The participants were asked to present: • *The responsibilities of their organizations regarding the management of contaminated goods* • *Previous experience* • *Coordination with other bodies aspects* • *Information dissemination* • *Special issues - problems*

The panel was attended by **32 participants representing 18 organizations:**

- Ministry of Rural Development and Food
- Ministry of Mercantile Marine
- General Secretariat for Civil Protection
- Greek Atomic Energy Commission
- Network of collaborating laboratories "Xenokratis": National Technical University of Athens, NCSR Demokritos, Aristotle University of Thessaloniki, University of Ioannina, University of Crete
- General Chemical State Laboratory of Greece
- General Secretariat for Consumers
- Hellenic Food Authority (EFET)
- Customs
- Hellenic Association of Medical Physicists
- Piraeus Port Authority SA
- Athens International Airport El. Venizelos
- Athens Water Supply and Sewerage Company (EYDAP SA)
- Piraeus Port Authority SA

Aim of this meeting was to discuss aspects of the contaminated goods management in case of a nuclear accident. In this meeting, GAEC outlined also the objectives and structure of the PREPARE project, focusing particularly on work package 3. Furthermore, special reference was made to the Fukushima nuclear accident (2011), since PREPARE aims to address the problems identified at European level in the period after the accident. The first part of the meeting included a presentation of the conclusions drawn from the previous European programs EURANOS, FARMING.
During the second part of the meeting, the participants were asked to describe the responsibilities of their organizations and any previous experience in the management of contaminated goods, to share issues and concerns regarding cooperation and interaction with other stakeholders, as well as to comment on communication or information dissemination procedures. A long discussion followed.

- **topical panel on the "Management of contaminated ships, trucks and containers", held on 6 March 2014**.

Wednesday 6 March 2014
Management of contaminated ships, trucks and containers

10:00-10:30	Methodology - Objectives *V. Kamenopoulou*
10:30-11:30	Fukushima nuclear accident experience: ships, trucks, containers The European guidelines – Actions in Greece
11:30 -12:00	In case of nuclear accident in Europe, monitoring of: - Ships - Airplanes - Trucks
12:00-12:30	Break

12:30-14:00	• Infrastructure • Procedures for radiological control and decontamination • Radioactive waste management • Decision making • Measurements: equipment, available resources

The panel was attended by **16 participants representing 9 organizations:**

- Ministry of Mercantile Marine
- Greek Atomic Energy Commission
- Piraeus Port Authority SA
- Athens International Airport El. Venizelos
- University of Ioannina
- National Technical University of Athens
- Aristotle University of Thessaloniki
- Technical University of Crete
- NCSR "Demokritos"

Aim of this topical panel was to discuss the implications of a nuclear accident in the transport sector, taking into consideration the concerns raised in the aftermath of the Fukushima accident. To this purpose, authorities in charge of critical facilities, such as the Athens International Airport and the Piraeus Port, as well as laboratories specialized in performing radioactivity measurements, were invited to discuss on the current emergency response plans, coordination problems and communication.

The general emergency response plans currently in force for the Athens International Airport and the Piraeus port were presented.

➢ **topical panel on milk and dairy products management held in March 5, 2015.**

GAEC decided to organize a topical panel on this issue in order to get the industry perspective on the management of contaminated milk and dairy products, taking into account that:

- the milk is an important element of the daily diet, especially for specific age groups (older people, children);
- it is an important market sector of the national economy;
- decisions on the management of milk and dairy products will have an enormous impact on public perception.

Thursday 5 March 2015
Management of contaminated milk and dairy products

11:00-11:30	Introduction – welcome: project presentation, objectives of the meeting – tour de table *V. Kamenopoulou*
11:30-12:00	Environmental monitoring – mixed diet: introductory presentation, *K. Kehagia*
12:00-13:30	Discussion: • The Greek market of milk and dairy products: number of companies, percentage of imported milk used etc. • Decision making criteria in case of dairy products contamination, as a result of nuclear accident • Previous experience – cases of other emergencies affecting the mil consumption • Preparedness (safety culture, infrastructure) • Information of the consumers
13:30	Conclusions – Future plans

The panel was attended by **9 participants representing 5 organizations**:

- Hellenic Ministry of Rural Development and Food
- Hellenic Food Authority (EFET)
- Hellenic Association of Milk & Dairy Products Industry
- One private company (milk market)
- Greek Atomic Energy Commission.

A number of invited stakeholders did not respond to our invitation.

Aim of this meeting was to discuss aspects of milk and dairy products management in case of a nuclear accident. In this meeting, GAEC outlined the objectives and structure of PREPARE, focusing particularly on work package 3. Special reference was made to the Fukushima accident. A presentation of the environmental monitoring provisions of the European and national regulatory framework was included in the panel agenda.

During the second part of the meeting, a discussion took place on the following thematic areas:

- The domestic milk and dairy products market: number of companies, consumption, import/local production ratio, private owned - small size farms
- Decision making criteria/procedures
- Quality control
- Involved bodies
- International cooperation and emergency plans
- National infrastructure and safety culture
- Alternatives to cover the consumers demand
- Case studies of other types of threats that could be used as exemplary case
- Past experience in emergencies management
- Proposals for contaminated products management

- Information policies for employees and consumers
- Needs of the stakeholders regarding the issue.

GAEC was also interested in clarifying the responsibilities of the involved parties such as the Hellenic Ministry of Rural Development and Food, Hellenic Food Authority, Hellenic Association of Milk & Dairy Products' Industry and in sharing previous experience of contaminated goods management, in sharing issues and concerns regarding cooperation and interaction, as well as in the feedback on the communication and information dissemination procedures.
Taking into account the request to discuss in depth the milk and dairy products topic, GAEC is organizing in cooperation with the Hellenic Association of Milk & Dairy Products' Industry one more panel on the same topic, scheduled for July 13, 2015.

Outcome: main points and proposals

The ideas and arguments expressed during the panel discussions could be grouped in the following key thematic areas:

E&T

- the need for further and continuous training of the stakeholders personnel is a point of consensus among all stakeholders
- education and information activities within the organizations on radiation and radiation protection matters is considered necessary, in order to deal with personnel fears and concerns
- further cooperation with GAEC in terms of training, information and coordination is required

Information

- the stakeholders are not familiar with radiation-related and emergency-related issues
- public information: consultation with industry is necessary prior to any official decision

Infrastructure

- some of the stakeholders, such as the customs authority and the laboratories participating in the network of collaborating laboratories according to the provisions of the national emergency plan, identified needs for equipment upgrading
- the industry is not familiar with sample analysis procedures

Coordination

- the concerns identified following the Fukushima accident are related to the coordination among involved organizations, the safety of sites such as the ports, airports etc., the transportation of goods, the management and disposal of goods in case of verified contamination, as well as the concern of the staff involved regarding their safety
- the role and the specific responsibilities of the involved bodies are not always clear or not well communicated internally
- European – wide decisions are expected and will be followed in case of nuclear emergency
- the response capabilities differs from company to company
- there are general emergency plans in place in each industry, including risk assessment. The same plans are expected to be used in case of radiological contamination

Other

- industries have experience from past emergencies, e.g. dioxins
- critical facilities, such as airport, ports, have procedures in place and seem adequately prepared to deal with radiological emergencies
- monitoring of the milk production and the consumption of milk coming from free range animals may not be an easy task.

Stakeholders addressed the following suggestions for future actions:

- organization of seminars on radiation protection basic knowledge
- provision of information about legislation, limits, reference levels etc. related to radiological protection
- actions on public information
- continuation of the panel meetings with stakeholders beyond PREPARE WP3 (e.g. with media)
- discussion on emergency response lessons learned from past events
- organization of full scale national exercise – activation of the national emergency plan at the higher level
- organization of a large scale exercise in order to test the emergency preparedness and response in the transport sector
- organization of intercomparison exercises among the laboratories participating in the national emergency plan and provision of standard sources.

Perspectives

The establishment of the national panels was a fruitful way to bring together and engage different groups in the emergency preparedness procedures, despite the fact that a small number of invited stakeholders did not respond to our invitation, or that cancellations of participation of short notice occurred and the non-institutional stakeholders were difficult to be approached.

GAEC concludes that PREPARE provided a great opportunity to discuss emergency response issues and approaches with the national stakeholders, for the first time in such a broad composition. Specifically:

- the timing of this kind of discussion at national level was good, since the Fukushima experience has triggered the stakeholders to reflect on possible gaps, response actions and measures to be taken
- the multilevel benefits, in terms of networking and transparency enhancement, are acknowledged by GAEC and the participating stakeholders
- the training and information needs of the stakeholders shall be addressed.

GAEC wishes to thank the stakeholders that participated in the panel discussions, IRSN and CEPN for WP3 coordination and management, Karlsruhe Institute of Technology for the project coordination and the European Commission for funding.

GREEK ATOMIC ENERGY COMMISSION

Discussion of national stakeholders on management of contaminated goods

Vasiliki Tafili, Vasiliki Kamenopoulou, Costas Hourdakis, Constantinos Potiriadis
Greek Atomic Energy Commission (EEAE)

Introduction - background

The Fukushima nuclear accident (2011), for a non-affected country such as Greece, acted as an exercise to test the authority's own capabilities in emergency response. The management of contaminated goods, including cooperation and coordination among stakeholders, proved to be crucial in the post-accident period. In Greece, a non-nuclear country, the management of post-accident situations is based mainly on the provisions included in EC regulations and guides.
The Greek Atomic Energy Commission (EEAE), as the national radiation safety regulatory authority, organized and coordinated the national panel of stakeholders involved in the monitoring of contaminated goods, under the scope of its participation in the PREPARE project (WP3).

Methodology - timetable

18 December 2013
National panel-plenary meeting

6 March 2014
Topical panel on transportation

5 March 2015
Topical panel on milk/dairy products

October 2013
Establishment of methodology

July 2015
Final report

Stakeholders

20

- **Authorities/organisations** in charge of the control and management of goods at the national level in case of contamination
- **Laboratories** involved in emergency management plans
- **Scientific and professional associations**
- **Other bodies/unions** related to specific country-related activities

Main results

Education, training and information

- need for further and continuous training of stakeholders personnel,
- education and information activities within the organizations on radiation and radiation protection matters,
- further cooperation with EEAE in terms of training, information and coordination.

Infrastructure

- identification of equipment upgrading needs,
- need for familiarization of industry with existing sample analysis procedures.

Coordination

- concerns related to the coordination among involved organizations,
- european – wide decisions are expected and will be followed in case of nuclear emergency,
- there are general emergency plans in place in each industry, including risk assessment; the same plans are expected to be used in case of radiological contamination,
- different response capabilities from company to company.

PREPARE
Innovative integrated tools and platforms for radiological emergency preparedness and post-accident response in Europe

5.5. IRELAND

1. Global Organisation of the PREPARE WP 3 Project in Ireland

Ireland does not have any nuclear facilities but there are a large number of nuclear sites across Europe which could result in widespread but low level contamination of the Irish environment if a nuclear accident was to happen at any such site. If this was to happen, the most significant route of potential exposure for members of the Irish public would be from the consumption of food containing increased levels of radioactivity. The concentrations of radioactivity in food would be dependent on the severity of the accident and the quantity of radioactivity reaching Ireland. It would also be dependent on food controls and protective actions implemented during the operation of Ireland's National Emergency Plan for Nuclear Accidents (DECLG, 2005).

Most of the potential dose to the Irish population could be averted by taking protective actions to reduce the transfer of radioactivity to food products and by restricting the sale of contaminated food. While these measures have been shown to be very effective in controlling radioactivity levels in foods for sale, and hence radiation doses to people, they do have significant socio-economic implications which could last for months or even years.

Experience from severe nuclear accidents such as those at Chernobyl in 1986 and Fukushima in 2011 has shown that when systems are put in place to manage contaminated produce they do not always take into account stigmatisation or rejection attitudes from consumers or retailers who anticipate the fears of consumers. Depending on the scale and geographic extent of the accident, the consumer consideration is likely to be whether the food is contaminated or not rather than the degree of contamination. Public reassurance can be enhanced by quick, decisive introduction of protective actions in the aftermath of an emergency. Yet, experience elsewhere suggests that the economic consequences from the stigma of food that is contaminated with radioactivity can be considerable.

Ireland's national panel for PREPARE WP3 is focusing on agriculture and food because of their importance to Ireland's economy. The objective of the panel is to investigate the issues involved in placing Irish foodstuffs (meat, dairy and crops) in the marketplace (within and outside Ireland) following contamination from a nuclear accident abroad. The Irish national panel is building on work carried out previously to customise the EURANOS handbook (EURANOS, 2006) for managing the impact of potential nuclear or radiological accidents abroad on the Irish agricultural sector, on Irish production of safe food and on the safe disposal of contaminated matter.

2. Methodology for Setting up the Panel

In 2009 a multidisciplinary group was established to customise the EURANOS handbook for Irish conditions. The resulting document was called the Irish Food Handbook and it continues today to be a living document which is maintained by the Department of Agriculture, Food and the Marine (DAFM). The Irish Food Handbook provides a framework for managing the impact of nuclear accidents on the agricultural sector, the production of safe food and the disposal of contaminated material in Ireland. It specifically addresses potential Irish scenarios and their possible consequences and includes provisions for basic pre-emptive protective actions, for providing rapid advice to farmers, food producers, food distributors/retailers and the public, for the possibility that food restrictions may have to be applied, as well as guidance for food waste disposal. The timely application of agricultural protective actions will reduce or eliminate the need to introduce food restrictions, even if the level of contamination is such that food restrictions would otherwise be expected to be necessary.

In November 2013 the Radiological Protection Institute of Ireland (RPII) brought together a team of representatives from a number of sectors in DAFM (corporate affairs, veterinary health,

livestock breeding, meat, dairy and crops) to refresh their knowledge of this Handbook. Following on from this, RPII organised a table top exercise to test the handbook. This exercise was held in February 2014 and involved staff from both RPII and DAFM. A number of different scenarios involving radioactive contamination in Ireland during different seasons of the year were tested. This exercise helped to identify a number of areas in which updates to the Irish Food Handbook were required.

In August 2014 the Environmental Protection Agency (EPA) took over the functions and responsibilities of the RPII as part of a wider reform programme in the Irish Public Sector.

It was decided that the Irish national panel would include representatives from the organisations that customised the EURANOS food handbook for Irish conditions. Additional stakeholder groups from the Irish food industry were also identified. Invitations to participate in the panel were sent out to these organisations in spring 2014 and thirteen organisations responded positively.

3. Composition of the Panel and Panel Meetings

The organisations who accepted invitations to participate in the panel are shown below.

Government Departments	• Department of Agriculture, Food & the Marine (DAFM) • Department of the Environment, Community & Local Government (DECLG)
State Agencies	• RPII/ now EPA Office of Radiological Protection • Food Safety Authority of Ireland (FSAI)
Dairy Sector	• Irish Dairy Industries Association (IDIA) • Irish Dairy Board (IDB)
Farming Sector	• Irish Farmers Association (IFA)
Meat Sector	• Meat Industry Ireland (MII)
Crops Sector	• Teagasc • Irish Grain and Feed Association (IGFA)
Seafood Sector	• Sea Fisheries Protection Agency (SFPA)
Retail Sector	• Tesco • Musgrave Group
Consumer Sector	• Consumer Association of Ireland

The majority of the participants had no background in radiation or radioactive contamination. However, all participants are either involved in emergency preparedness and response or are involved in the food industry in Ireland and have insight into food contamination issues e.g. dioxins in pork and BSE.

Having secured acceptances to participate in the panel, the first meeting was then arranged. Panel meetings were limited to a half day each to encourage attendance. Since the panel members came

from different parts of the country, it was important to hold the meetings in an easily accessible location. The National Emergency Co-ordination Centre (NECC) in Dublin city centre was chosen to facilitate this. The NECC is a strategic response centre where all the relevant Government Departments and Agencies convene when a major emergency occurs and thus, is an attractive venue for people to visit. Two meetings of the panel were held in 2014. Each meeting started with introductory presentations which were followed with panel discussions on specific topics.

Given that the participants came from diverse backgrounds and the amount of time for discussions was limited, it was decided to engage a market research company with expertise in stakeholder engagement to facilitate the meetings. This turned out to be a very valuable decision as the facilitator was viewed by the panel members as being neutral. He was also expert at keeping the discussions on track and to the point and ensuring that no one person dominated discussions and that everyone had an opportunity to contribute if they so desired. The facilitator provided a person to take notes at the meetings and produce summary reports afterwards. Prior to each panel meeting, the facilitator was briefed on the content of the agenda and the objectives of the meeting.

The first panel meeting was held in May 2014 and while 25 individuals accepted the initial invitation to attend this meeting, 19 were present on the day. Prior to the meeting, a briefing note was sent to all members on the sources of radioactivity in the environment, the potential impact of a nuclear accident abroad on Ireland, the National Emergency Plan for Nuclear Accidents, EU maximum permitted levels of radioactive contamination in foodstuffs following a nuclear accident and finally a case study on the Irish experience of dealing with a food dioxin contamination crisis. At the start of the meeting, short presentations were given by RPII staff on how Ireland would respond to a nuclear emergency, the impact of the Chernobyl and Fukushima accidents and an overview of a risk assessment of the potential radiological implications for Ireland of the proposed nuclear power plants in the UK (RPII, 2013). Panel discussions were then held on issues surrounding food contamination, protective actions that could be implemented to reduce radioactivity in food and the impact on trade if food was contaminated following a nuclear accident.

The second panel meeting took place in October 2014. Prior to this meeting, a briefing note was sent to panel members on the main outcomes of the first meeting, outcomes from the other PREPARE panels in Europe and examples of protective actions that could be introduced in Ireland in the aftermath of a nuclear accident abroad to reduce activity concentrations in meat, milk and crops intended for sale. The meeting started with a presentation on the main points from the previous meeting and feedback from the other PREPARE panels. An expert from the UK who was one of the authors of the EURANOS handbook gave a presentation on food management options in the UK using the Windscale fire in 1957 as a case study. Discussions were then held on the feasibility of various protective actions that could be introduced in Ireland to prevent or reduce contamination of food intended for sale such as additives to cattle feed or changes in farming practices such as delaying slaughter times in conjunction with clean feeding.

4. Result Analysis and Main Issues Identified

The main issues identified by stakeholders at the two panel meetings can be grouped together under the headings of communications, public response, measurements, trade, retail, control options and agricultural protective actions. A description of the main points arising under each of these headings is given below.

Communications

One of the key issues that arose in both panel meetings was communications. Following a nuclear accident it is critical that communication paths are clear to avoid confusion and to ensure the public and industry are not receiving mixed messages. Key stakeholders in the food industry must be notified directly so that they do not receive their information from the media. It is important

that they receive this information quickly. Communications between industries is also very important e.g. between supplies and processors. Therefore, all the stakeholders in the food industry must be involved in the communications plan.

The development of pre-prepared key messages as part of the emergency plan was seen as very beneficial. In addition, careful consideration should be given when selecting the organisations/individuals who will deliver the communication as the public are more likely to trust independent health and scientific experts rather than politicians or those with vested interests in the food industry. Also, it was highlighted that the language used should be non-technical and the risks explained by comparison with everyday examples and familiar concepts.

Regarding the introduction and cessation of agricultural protective actions, the communications plan must be very clear on who will communicate instructions to farmers and where farmers can seek further information and support. It would be useful to provide farmers with examples of where these protective actions have been implemented in the past and their success rates.

Public Response

In order to predict how the Irish public will react in the event of a nuclear accident which impacts on Ireland, there needs to be an understanding of the public's perception of risk. It should be recognised that the public may over-react or respond irrationally e.g. panic buying of foodstuffs, and emergency plans should take this into account. However, it was also stated that emergency plans need to remain flexible as no two accidents are the same.

The public, and in particular consumers, cannot be treated as a single entity as some groups e.g. babies and pregnant women, will have special sensitivity. Adults may tolerate certain levels of contamination in food but they may be unwilling to give these foodstuffs to their children. It was recommended that radioactivity is included in the primary school curriculum, as is the case in Belarus, to increase general awareness and understanding of radioactivity in the environment.

Measurements

In the aftermath of a nuclear accident the ability to measure radioactivity concentrations in a large number of samples quickly will be critical for public reassurance and the protection of trade. Ireland has one laboratory which is accredited to ISO 17025 for the measurement of radioactivity in food and environmental samples. This laboratory is operated by the EPA and all routine national monitoring is carried out there. There are no commercial laboratories in the country providing these measurements and there is a very limited capability in the third level education sector.

Following a nuclear emergency there would be great demand for sample analysis and the ramping up of services to handle large numbers of samples would be very challenging and difficult to sustain long term. It was suggested that industry or other analytical laboratories could be used to provide a screening service and that the EPA's accredited laboratory could be used for official certification. It must be remembered that unlike other food contamination events the effects of a nuclear emergency can be felt for a very long time. This was highlighted by the fact that Ireland is still required to certify the levels of radioactivity in some food exports to third countries 29 years after the Chernobyl accident.

Trade

Ireland is a small country and 90% of Irish beef and dairy products are exported. If only part of Ireland is affected by radioactive fallout from a nuclear accident, it is likely that the country will be treated as a whole and food exports from all areas of the country, including those areas that have been unaffected by deposition, will be considered to be contaminated. Whereas a lot can be done to reassure consumers within Ireland, it was recognised that influencing external markets, particularly those outside Europe, would be a major issue.

To assist trade outside Europe, it is important that Ireland's message is aligned with messages from other European countries. If mixed messages are being received outside Europe this will have a negative impact on foreign markets. To protect foreign markets, the EU response was seen to be critical.

Retail

For retailers, customer confidence in the products for sale is the key issue. Retailers will not stock products that they cannot sell. Therefore, retailers will not stock contaminated foodstuffs which are within EU maximum permitted levels and are perfectly fit for human consumption, if they do not believe that they will be sold.

Retailers could source foodstuffs from unaffected countries but this will have economic consequences. If Ireland is affected by a nuclear accident in Europe then uncontaminated foodstuffs would have to be sourced from outside Europe. The transport costs would be more expensive and food products may be in short supply giving rise to increases in the cost of these foodstuffs on supermarket shelves. The price increase may dictate whether consumers will buy these products. Price increases may be tolerated by consumers for a limited period of time but may be difficult to sustain for a prolonged period. To explore this further, there are models available which can be used to predict human behaviour.

The shortage of uncontaminated products and the increased demand from new trade sources outside Europe could give rise to the food supply chain being paralysed. This should be taken into account in emergency plans.

Control Options

Certain protective actions such as the dilution of contaminated milk exceeding EU maximum permitted levels or the use of contaminated food to make other products e.g. milk into cheese, would never be acceptable in Ireland. Other relatively straightforward protective actions such as delaying slaughter times in conjunction with clean feeding or the addition of a radioactive caesium binder such as ammonium ferric hexacyanoferrate (AFCF) to the diet of dairy and meat producing animals were seen as possible options provided that the concerns of the farming, food production, retail and consumer sectors are addressed.

Agricultural Protective Actions

Clean feeding refers to the provision of uncontaminated feed to animals. For dairy animals clean feeding needs to be introduced on a continuous basis immediately following contamination whereas, for meat producing animals clean feeding would only be required in the weeks preceding slaughter. In Ireland, animals are only housed during the winter months and are let out to graze in early spring. Farmers cut silage during the summer months for use as feed while the animals are housed over winter. If an accident was to occur between April and June, farmers would have to rehouse the animals in order to accommodate clean feeding. However, they may have used most of their stock of silage from the previous year. The availability of clean feed from other sources could be problematic and would depend on the magnitude of the accident and the geographical extent of the contamination. The cost of clean feed sourced from abroad would be a burden to farmers but this could be alleviated by prioritising which animals should receive clean feeding based on time to slaughter or economic value, for example. Rehousing animals during the summer would also lead to problems associated with animal waste management.

For meat producing animals clean feeding would only be one element of a management strategy and would have to be considered alongside the manipulation of slaughter times. Two approaches were envisaged. Animals could either be slaughtered immediately before or very soon after deposition to minimise the amount of radioactivity being transferred to the meat or alternatively, slaughtering could be delayed to allow for clean feeding and the physical decay of short-lived radionuclides. While the manipulation of slaughter times was seen as an acceptable process it would also have cost implications for farmers either because animals would be sold at lower

weights, or animals would have to be kept longer than originally anticipated. Logistical problems for meat processors would inevitably ensue.

AFCF is a radioactive caesium binder which can be added to the diet of dairy cows, sheep and goats as well as meat producing animals to inhibit the transfer of caesium to the milk and the meat by reducing absorption in the gut. Like clean feeding, this would be most appropriate for dairy animals and only required for meat producing animals in the weeks leading up to slaughter. Similarly, the time of year in which the accident occurs could have an influence on whether it is required. AFCF is not commonly available and may be difficult to obtain in an emergency. Concerns were expressed over whether food labelling would be necessary to show that AFCF had been used. A general consensus was reached around the need for a communication plan to reassure consumers about the safety of AFCF.

All sectors agreed that, if feasible, the use of clean feeding and delayed slaughter times were preferable to using food additives for animals as it would be perceived to be a more natural protective action.

5. Conclusions and Perspectives

It is well established that even an accident at the nearest nuclear power plant from Ireland (Wylfa, UK) will not cause significant radiation exposure to people living in Ireland or will not result in immediate health effects (RPII, 2013). It is the socio-economic consequences rather than the health effects that may have the largest impact on the Irish public. Since agriculture and food exports are very important to the Irish economy, these sectors must be prepared for the consequences of radioactive contamination reaching the country following a nuclear accident abroad.

This is the first time in Ireland that so many representatives from key organisations in Government, farming, food production, retail and consumer sectors have been brought together to discuss the issue of radioactive contamination in food following a nuclear accident abroad. There were a number of key issues identified during discussions that now need to be addressed in national emergency plans.

Ireland's National Emergency Plan for Nuclear Accidents (DECLG, 2005) is currently undergoing a review process to update it with lessons learned from key developments in emergency preparedness and response since it was last updated in 2005. This is a very timely and valuable opportunity for the outcomes of the PREPARE WP3 discussions to feed into this review.

References

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Ireland's Stakeholder Panel for PREPARE WP3

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Background

- Ireland has no nuclear facilities
- Following a nuclear accident abroad the most significant route of potential exposure to the Irish population would be the consumption of contaminated food
- Most of the ingestion dose could be averted through the introduction of protective actions

Irish Panel's Objective

To investigate the issues involved in placing Irish produced foodstuffs (meat, dairy and crops) in the marketplace (at home and abroad) following contamination from a nuclear accident abroad

Panel Members

Government Departments	• Department of Agriculture, Food & the Marine • Department of the Environment, Community & Local Government
State Agencies	• Radiological Protection Institute of Ireland (now EPA Office of Radiological Protection) • Food Safety Authority of Ireland
Farming Sector	• Irish Farmers Association
Dairy Sector	• Irish Dairy Industries Association • Irish Dairy Board
Meat Sector	• Meat Industry Ireland
Crops Sector	• Teagasc • Irish Grain and Feed Association
Seafood Sector	• Sea Fisheries Protection Agency
Retail Sector	• Tesco • Musgrave Group
Consumer Sector	• Consumer Association of Ireland

Meetings

- 2 meetings - May & October 2014 in the National Emergency Co-ordination Centre in Dublin
- Approximately 20 participants at each meeting
- Meetings combined presentations with open discussions
- First meeting – issues surrounding contamination of food, protective actions that could be implemented to reduce radioactivity in food, and the impact on trade if food was contaminated following a nuclear accident
- Second meeting - feasibility of various agricultural protective actions

Issues Identified

Public Response	Communications	Measurements	Trade	Agricultural Protective Actions
• Need to understand public perception of risk • Should be prepared for irrational responses e.g. panic buying • Consumers cannot be treated as a single entity e.g. children vs. adults • Emergency response structures must be flexible enough to handle any type of emergency • More education for the public on radioactivity needed	• Clear communication paths needed to avoid confusion • Timely and accurate information can help to maintain or restore confidence • Notify industry stakeholders directly and quickly • Develop prepared messages • Consider who will deliver the communication • Use non-technical language • Online distribution of information important	• Sample measurements core to reassurance and certification • Ireland has one ISO 17025 accredited laboratory for measuring radioactivity in food and environmental samples • Concern regarding Laboratory capacity in time of emergency • Investigate use of other laboratories for screening • Contamination with radioactivity will last a long time	• Retailers will not buy what they cannot sell • Customer confidence is key • 90% of Irish beef and dairy products exported – how to influence external markets? • Ireland too small to regionalise • Ireland's message needs to be aligned with that from other EU countries. • EU response will be critical • Cost of food will increase	• Dilution not acceptable • Disposal of contaminated food could cause problems • Cost of protective actions – who will pay? • Availability of clean fodder • Capacity to house all animals • Logistics for live animal monitoring • Food labelling to reflect protective actions used • Communications with farmers

Conclusions

- Even an accident at the nearest nuclear power plant in the UK will not cause significant radiation exposure to people in Ireland or result in immediate health effects if appropriate agricultural and food protective actions are implemented
- Agriculture and food exports are very important to the Irish economy and must be protected following a nuclear accident abroad
- One of the most important issues in the event of a nuclear emergency is good communications - all stakeholders in the Irish food industry must be involved in the communications plan
- Ireland's National Emergency Plan for Nuclear Accidents is being reviewed - outcomes from PREPARE WP3 will be addressed in it

5.6. NETHERLANDS

I) Global organisation of the PREPARE WP 3 project

Background

After an incident it is important to have a good communication structure between the various stakeholders involved. Furthermore, all relevant factors need to be included to derive measures in order to minimise radiological contamination of food and feed.
In the Netherlands, EPAn (Unit Planning and Advice – Nuclear) assesses the radiological situation and advises the national and regional levels on protective actions. This EPAn consists of a Front Office and a Back Office: the Crisis Expert Team (CET) radiation. This back office consists of experts providing radiological information and experts providing medical information. CET gives recommendations on protective measures to be taken. Final decisions about measures to reduce exposure are taken at the ministerial level.
Initial analysis of the needs within this project revealed that CET currently lacks insight in the measures taken by food producers in case of a nuclear accident and communication with these stakeholders is limited. Furthermore, expectations from non-governmental organizations (NGOs) in case of a nuclear accident are also largely unknown. And finally, experience on recovery measures to be taken for the medium and late stage after an incident was limited.

Global objectives

The aim of the Dutch project was to bring together technical emergency management organizations with producers' organizations and NGOs in order to:

1. create awareness of the emergency management problems related to the contamination of food and feed after large scale accidents
2. to determine current communication structures between various stakeholders and to set up new communications between organizations
3. learn about countermeasure options available for the food industry and the applicability of predefined Maximum Protection Limits (MPLs)

Since discussions on recovery are relatively new in the Netherlands, the main aim in the project was to create awareness in various stakeholder groups and try to establish cooperation between these groups.

Focus

The project focused on food and feed as networks within this domain are currently limited.

II) Methodology for setting up the panels

The project was divided in two steps:
1. In-depth interviews (October 2013- March 2014)
2. Two panel meetings (26 November 2014 and 11 June 2015)

In order to gain insight in the role of various stakeholders in case of a nuclear accident, the project started with in-depth interviews with several stakeholders of the three stakeholders groups (government, industry and NGOs). From each group, at least three organizations were interviewed. A pre-defined questionnaire was used enabling comparisons between the stakeholders interviewed (see appendix 1). The results of the interviews were used to set up the panel meetings. In total 35 industrial stakeholders, 22 NGOs and 10 governmental organizations were invited to participate in the meetings.

III) Composition of the Dutch Panel and Panel meetings' agenda

Stakeholders from the following list were interviewed in the first step of the project:

Governmental organizations	Industry	NGOs
RIVM (National Institute of Public Health and the Environment)	Product Board for Horticulture[1]	Greenpeace
RIKILT Wageningen UR (Institute of Food Safety)	Trustfeed	Voedingscentrum (The Netherlands Nutrition Centre)
NVWA (Food and Consumer Product Safety Authority)	LTO (Dutch Federation of Agriculture and Horticulture)	WISE Nederland (World Information Service on Energy)
Ministry of Economic Affairs	Product Board Animal Feed[1]	
Ministry of Infrastructure and the Environment	Friesland Campina	
	NZO (Dutch Dairy Association)	

[1]The product boards were abolished from January 1st 2014.

Based on the outcome of the interviews, the panel meeting agendas were drafted. Both meetings started with presentations on the aim of the project and on background information related to nuclear incidents as not all panel members were familiar with the topic. Then various topics were discussed with the participants. The first meeting focused on the consequences of an incident for the individual participants. Since the interviews indicated that most exercises focus on the early phase of an incident, the participants worked in two groups on a case study focusing on the intermediate phase of a nuclear incident in the Netherlands. The case study involved a fictitious incident in the nuclear power plant in Borssele in the province of Zeeland. Questions to be answered were:

1. What is the effect of this incidence for me (as representative of a certain branch or governmental organization)? Which problems will occur where in the food chain?
2. Who is responsible for which problem and when?
3. Who are the stakeholders involved and where do I get my information?

The second meeting focused on the various aspects involved when considering countermeasures in the food chain after an incident. The same fictitious incident was used and participants were asked to evaluate packages of measures for one municipality and three groups of products (milk, pork

meat and carrots) as an example. They worked in two groups and were asked to assign scores for predesigned packages with countermeasures on technical feasibility, acceptance by the public, acceptance by the producer and reassurance of the public. Then the participants needed to weigh public health, costs, technical feasibility and social aspects. The online software of Webhipre (http://hipre.aalto.fi/) was used to perform a multi criteria decision analysis.

In total 13 participants attended the first meeting and 15 participants the second meeting. The following organizations attended one or both of the panel meetings:

Governmental organizations	**Industry**	**NGOs**
RIVM (National Institute of Public Health and the Environment)	Groente&Fruithuis (trade organization for fruits & vegetables)	Voedingscentrum (The Netherlands Nutrition Centre)
RIKILT Wageningen UR (Institute of Food Safety)	Agrifirm (feed company)	
NVWA (Food and Consumer Product Safety Authority)	NZO (Dutch Dairy Association)	
Ministry of Economic Affairs	CBL (organization representing supermarkets and food service companies)	
Ministry of Infrastructure and the Environment	FNLI (organization representing the Dutch food processing industry)	
Ministry of Health, Welfare and Sport	COV (trade organization for meat)	
Safety Region of the province Zeeland	HAK (fruits & vegetable processing company)	
Safety Region of the province Nord-Brabant		

IV) Result analysis and main issues

Interviews with governmental organizations showed that the communication structure for nuclear emergency management in the Netherlands is organized as follows:

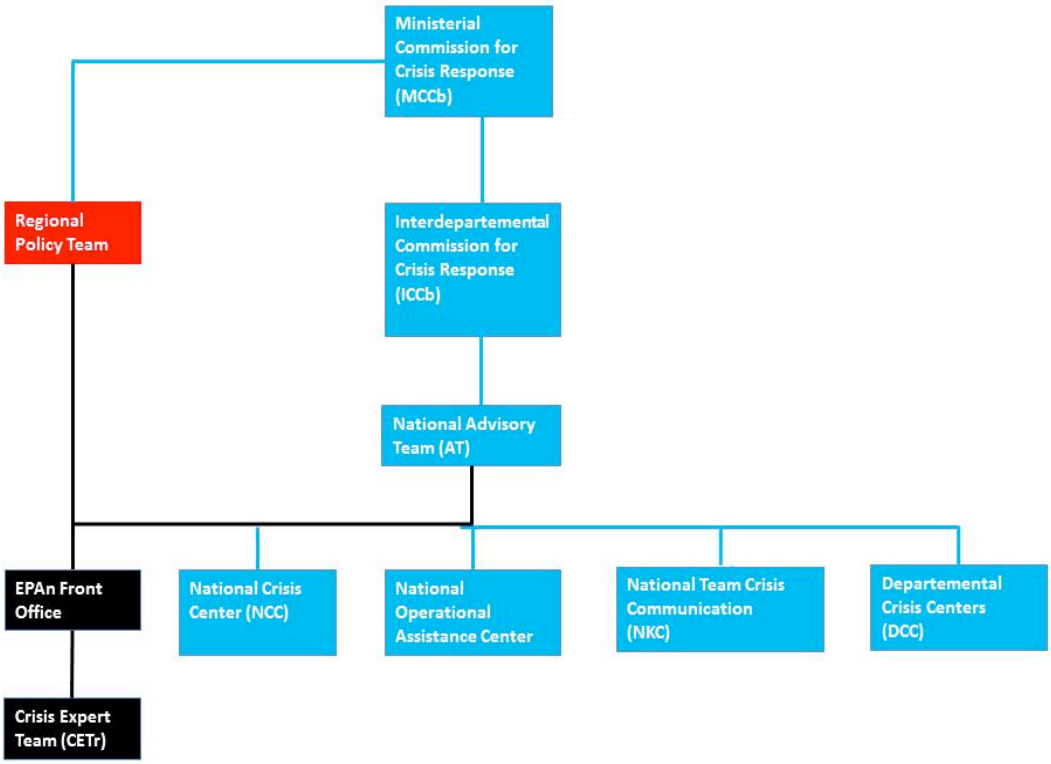

Figure 1. Structure of the national governmental management and response structure (NPK) in the Netherlands (adapted from *Factsheet: National Nuclear Assessment Team (EPAn)* from the Ministry of Infrastructure and the Environment).

The interviews with the three groups of stakeholders showed the following points of attention:

- Current exercises and governmental action plans focus on the early phase of a nuclear incident. These need to be extended to the intermediate (and late) phase in close collaboration with all stakeholders.
- Especially government and industry, but also NGOs, would like to get acquainted in the preparedness phase, for example via exercises.
- Industry and NGOs are not very familiar with the current national management and response structure (NPK) of the government and would like to be involved.
- Industry does not have action plans specific for nuclear incidents, although general crisis structures are available for common food and feed safety hazards.
- Industry indicates that apart from human health, economic interests should also be taken into account when drafting countermeasures in case of an incident.
- Analyses are needed during an incident to determine control measures.
- MPLs should be harmonized across Europe and should preferably be based on scientific knowledge. According to stakeholders interviewed, when two sets of MPLs are derived (one for the early and intermediate phase of an incident and one for normal circumstances (a background MPL)), this should be clearly communicated to the public.

The main conclusion from the interviews was that the different stakeholder groups are currently not aware of each other's action plans and there is limited interaction between the groups. Furthermore, stakeholders interviewed indicated they would like to get acquainted with each other in the preparedness phase, for example via exercises. This was accomplished by organizing a panel meeting in November 2014 with governmental organizations and industry with the aim to improve communication between these two groups of stakeholders.

Results from this first panel meeting showed that mutual trust is needed between government and industry in order to come to countermeasures to minimise food safety risks. Furthermore, trustworthy communication is of utmost importance. Stakeholders indicated that each party has its own responsibilities. Government is responsible for taking measures, crisis communication as well as setting up monitoring programs and enforcement measures. Industry should take measures to prevent and/or diminish food contamination. Furthermore, they should draft their own monitoring programs to secure their products in order to gain consumer trust and enable export of their products. Trade organizations are responsible for implementing measures, gathering information and communicating to their members. In general, there is a need for obtaining relevant information as fast as possible and synchronising communication towards producers and consumers. For this purpose a good cooperation between industry and government is needed.

This first meeting enabled a first acquaintance between industry and government and resulted in inviting industrial stakeholders to participate in an exercise in the safety region of the province Zeeland as well as an invitation for participation in a knowledge day organized by the Authority for Nuclear Safety and Radiation Protection (ANVS).

For the second meeting, NGOs were explicitly invited. However, it appeared to be difficult to interest the NGOs for this topic and only the Netherlands Nutrition Centre joined the meeting. This second meeting focused on the various aspects that need to be considered when setting up countermeasures at the intermediate stage of a nuclear incident. This showed that the two groups assigned different scores to the various aspects resulting in a different set of preferred countermeasures (Figure 2).

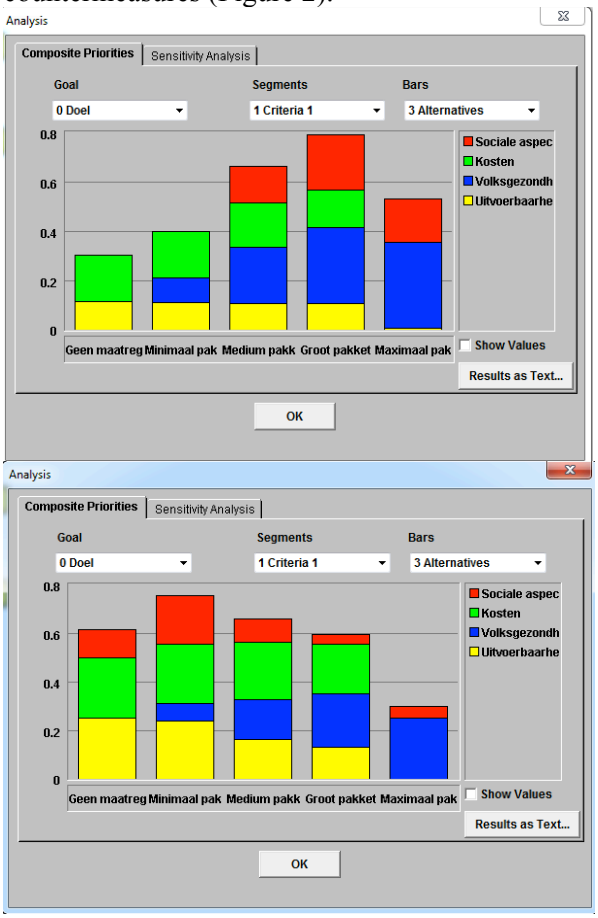

Figure 2. Results of the preference for packages of countermeasures in the two groups.

Overall, either taking no countermeasures or doing everything possible to remove the contamination scored lowest in both groups. Measures that will result in bankruptcy of producers are not realistic. Furthermore, measures that will result in products entering the market above the MPLs and/or diluting products are not accepted by the industry. This will only be accepted in case food security is in danger in the Netherlands as a result of the incident. In general, stakeholders understand that MPLs may be changed during an incident starting with high levels and slowly reducing the MPLs to return to the normal situation. However, they indicate that communicating these changing limits to producers and consumers may be difficult.
Stakeholders concluded that the use of MCDA helps to gain insight in the various aspects that are involved in decision making on establishing countermeasures after an incident. They do indicate that this approach has its limitations as several assumptions need to be made (like with other models). Furthermore, communication is missed in the evaluation of the countermeasures. Communication is extremely important in aspects such as reassurance and acceptance by the public.

V) Conclusions and Perspectives

Within the Netherlands the various stakeholder groups did not know each other before the project started and were not aware of action plans organized at governmental or industrial level. The PREPARE project brought industry and government together, which will help in drafting future nuclear response programmes. Both groups were very positive in working together on this topic. At the end of 2015 an action plan will be set up in order to continue the initialised cooperation in the future.
Based on the interviews and the two panel meetings the following recommendations were made that need to be addressed:

1. Preparing a catalogue with countermeasures for the Netherlands based on the European Handbook for Food Production Systems. This catalogue should be prepared in close cooperation with the trade organizations involved, the primary sector, the Netherlands Food and Consumer Product Safety Authority (NVWA), the Dutch Crisis Centre (NCC), drinking water companies and waste processers. Both the pros and cons of the various measures need to be addressed (aspects such as feasibility, acceptance etc.) as well as an indication of the costs.
2. Preparing scenario-based protocols or guidelines for nuclear incidences analogous to the guidelines that are already present for avian influenza. The catalogue with countermeasures can be included in these guidelines.
3. Setting up structural meetings with both stakeholder groups (industry and government).
4. Preparing (and keeping up-to-date) of a “facebook” with names and addresses of all organizations that need to be involved in case of a nuclear incident.

Appendix 1. Questionnaire for the in-depth interviews

The following questions were asked to all stakeholders from group 1 (governmental organizations), group 2 (industry) and group 3 (NGOs), unless specified otherwise:

1. Suppose something goes wrong with a nuclear installation in France and a radioactive cloud is passing over the Netherlands. Are you familiar with the governmental management structure (National Plan for Nuclear Emergency Management and Response (NPK))?
2. Does your organization have an action plan then?
3. Who is responsible for which actions (internally and externally)?
4. Do you have enough in-house expertise or do you consult external experts? If so, who?
5. How do you communicate with other stakeholders?
6. How do you communicate with consumers?
7. Which lessons have been learned from previous incidents (Chernobyl, Fukushima)?
8. Are actions and communication partners different in case an accident occurs outside Europe? (only asked to group 1 and 2)
9. The government takes decisions based on pre-set limits (MPLs). MS can deviate from these MPLs depending on dietary habits, presence of vulnerable groups etc. How should MPLs ideally be derived?
10. What information or communication needs do you have within your organization regarding this topic?

Additional questions for industry and NGOs:

11. What should the government do in case of a nuclear incident (sampling or communication)?
12. How should the government communicate with the public?

Stakeholder interactions in nuclear emergency response for the Dutch food supply chain

Esther van Asselt, Puck Brandhoff and Chris Twenhöfel

Background

In the Netherlands, EPAn (Unit Planning and Advice – Nuclear) assesses the radiological situation and advises the national and regional levels on protective actions. This advice is based on radiological and human health expertise provided by the Crisis Expert Team (CET) radiation. At the start of the project, CET lacked insight in the measures taken by food producers in case of a nuclear accident and communication with these stakeholders was limited. Furthermore, experience on recovery measures was primarily focused on the first stage after an incident.

Objective

- To create awareness of the emergency management problems related to the contamination of food and feed after large scale accidents.
- To establish cooperation between industry and government and learn from each other's action plans.
- To learn about countermeasure options available for the food industry and the applicability of predefined Maximum Protection Limits (MPLs)

Methodology

In-depth interviews were organised with governmental institutes (n=5), organisations in the food supply chain (n=5) and NGOs (n=3) as a preparation for two panel meetings. The aim of these meetings was to get acquainted and learn about the decision making process regarding nuclear emergency response. The two meetings focused on a case study with a fictive incident in the NPP Borssele (Figures 1 and 2).

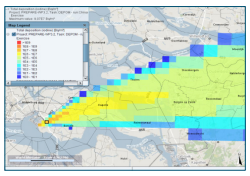

Figure 1. Model calculations performed with RODOS. Results show the contaminated area around Bergen op Zoom for the Iodine group (Bq/m²) after a fictive incident in Borssele.

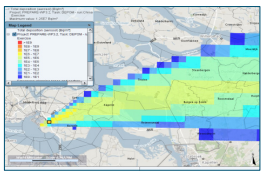

Figure 2. Model calculations performed with RODOS. Results show the contaminated area around Bergen op Zoom for the Caesium group (Bq/m²) after a fictive incident in Borssele.

Acknowledgements

The financial contribution from the Dutch Ministry of Economic Affairs and the EU FP7 project PREPARE is highly appreciated.

In the first meeting (n=13), problems encountered after an incident were discussed as well as responsibilities of the various stakeholders. The second meeting (n=12) focused on intervention measures for three products (pork, dairy and carrots) within one municipality. The effects for I-131 and Cs-134/137 were studied. Two groups of participants were asked to evaluate the feasibility and social aspects of five packages of intervention measures. Subsequently, they had to weigh the importance of human health, costs, feasibility and social aspects (acceptability and reassurance of the population). An MCDA approach was followed using Web-HIPRE (http://hipre.aalto.fi)

Results

The first panel meeting showed that a good cooperation is needed between government and industry in order to quickly exchange information and to streamline communication towards clients and consumers. The MCDA-analysis in the second meeting showed that the two groups of participants made different choices (figure 3).

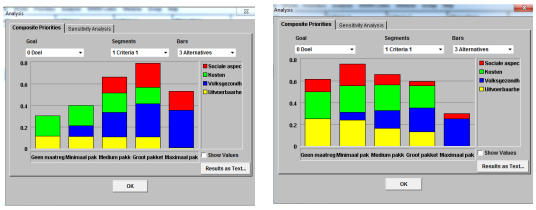

Figure 3. Outcome of the MCDA analysis in two groups of participants. Five packages of intervention measures ranging from no measures to maximum measures were weighed for human health aspects, cost aspects, feasibility and social aspects.

Lowest scores were obtained for package 1: no measures and package 5: maximum measures. The first package scores badly on human health and social aspects, whereas the last package scores badly on costs and feasibility. According to the participants, measures that result in levels above the MPLs are only acceptable in case of food shortages. Stakeholders stressed that good communication is essential for acceptance and reassurance of the population.

Conclusions

- PREPARE initiated cooperation between industry and government.
- MCDA helps to gain insight into the various aspects involved in the decision making process.
- Communication aspects and export interests need to be included in decision making.
- A good communication between stakeholders and with the public is extremely important.
- Input from both government and industry is needed in order to adapt current nuclear emergency response protocols.

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5.7. NORWAY

1. Global organisation of the PREPARE project in Norway

1.1 Background

Norway is a non-nuclear country with two research reactors. Radioactive fallout from atmospheric nuclear weapons testing during ~1950-70 resulted in elevated radiation levels in the environment, foodstuffs and humans and the country was also contaminated by fallout after the Chernobyl accident in April 1986. Norwegian nuclear and radiological emergency preparedness was developed post-Chernobyl and is constantly evolving to meet the needs of today. The Norwegian Nuclear Preparedness Organisation consists of the Crisis Committee for Nuclear Preparedness, the Crisis Committee's Advisors, and the County Governors. The Crisis Committee for Nuclear Preparedness is represented by the following central authorities: the Norwegian Radiation Protection Authority (NRPA), The Directorate for Civil Protection and Emergency Planning, The Armed Forces, The Directorate of Health, the Coastal Administration, The Food Safety Authority, The National Police Directorate and the Ministry for Foreign Affairs. The NRPA is head of and secretariat for the Crisis Committee. The County Governors are the Crisis Committee's representatives on the regional level (cf. Royal Decree of 23 August 2013). They have the responsibility to coordinate preparedness and recovery at the regional level in cooperation with the municipality administrations and local offices of various authorities. Each County Governor has a regional nuclear and radiological emergency preparedness committee that meets occasionally in peacetime and can be summoned on a short notice in case of an accident.

1.2 Involvement in PREPARE

The NRPA has involved the Crisis Committee and its Advisors in previous research activities in the Euratom projects STRATEGY, EURANOS and NERIS-TP. These involved mainly national actors from authorities and expert organisations and some stakeholders from municipalities affected by the Chernobyl accident. For PREPARE, the focus was put the regional and local level. Rogaland county was selected and many regional and local actors were invited to a series of seminars held in that county. The seminars were arranged in cooperation between NRPA, the County Governor of Rogaland and the Centre for Environmental Radioactivity (CERAD), to ensure a close link to the nuclear/radiological emergency preparedness in Norway.

CERAD is a Norwegian Centre of Excellence for Research funded by the Norwegian Research Council since 2013. It is led by the Norwegian University of Life Sciences (NMBU) and the NRPA is one of several partners. The centre has a broad research scope and includes *inter alia* studies on the societal aspects of nuclear accidents. Since NMBU and NRPA are active partners in both PREPARE and CERAD, working with funds from both projects enable wider stakeholder panel meetings and a larger participation at the Rogaland seminars.

1.3 Scenario preparation

One of the projects in CERAD has looked at the possible releases of radioactive substances from the Sellafield reprocessing plant in UK. The reprocessing results in large volumes of highly active liquor (HAL) as a waste by-product. We assume that a loss of the HAL tanks' integrity followed by release of Cs-137 (1% of all tank content) could be transported to Norway by atmospheric dispersion. The fallout in the scenario will be most severe in the Western part of Norway, an area not affected by the Chernobyl accident (Figure 1). The Rogaland county was chosen as the focus area of the subsequent study.

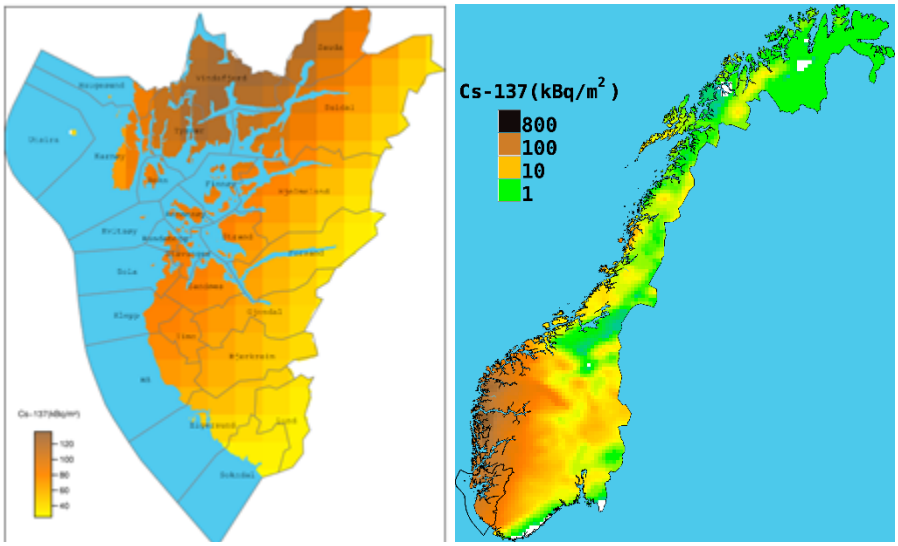

Figure 1: Modelled deposition (kBq/m^2 of Cs-137) in Norway from a hypothetical accident at the Sellafield reprocessing plant. The scenario is based on a 1 % release of Cs-137 from the 21 HAL tanks and real weather conditions on 19 October 2008. On the left: deposition across Norway; the county of Rogaland framed on the bottom left. On the right: deposition in Rogaland county.

This scenario was used as a starting point for environmental modelling of consequences in CERAD, named the Western Norway project. The results of the project were used on the seminars to demonstrate possible nuclear threat with impact on Norway.

2. Methodology for setting up the panel

2.1 Rationale and aim

Traditional preparedness seminars in Norway are focusing mainly on the national plans, actions and actors with national authorities and County Governor representatives as the main participants. These seminars usually focus on competence building through lectures on threats, preparedness and recovery and small table-top exercises. We acknowledge, however, that many local/regional actors from different sectors such as health, environment, agriculture, fisheries, aquaculture and tourism, will have an important part to play in implementing mitigating actions in case of radioactive fallout. We therefore decided to organise a series of seminars with wider range of stakeholders. The seminars would include both competence building and free discussions among participants on the challenges, roles and responsibilities, and possible recovery strategies. We wanted to measure how a series of dialogue seminars increases the learning, networking, involvement and problem solving compared to a standard competence-building seminar. The aim of the seminars was to evaluate a participatory process with a large number of stakeholders as an input to a more resilient emergency preparedness planning and response at the regional level.

2.2 Planning of the seminars

Planning of the seminars started in spring 2014 with a view to hold the meetings in Autumn 2014. The Rogaland county was chosen as the focus area, because of the modelled results in the Western Norway project and because the good cooperation NRPA has with the chief emergency planner of the Rogaland governor. The meetings were delayed until January and March 2015 to meet the availability of the County Governor and the envisaged regional and local stakeholders.
The seminar was divided into three days (see Table 1):

Table 1: Overview of the three seminar days

Date 2015	Seminar day	Venue	Focus	Number of participants
26 January	1	Hjelmeland	Competence building (lectures)	62
27 January	2	Hjelmeland	Discussions within and across sectors	48
10 March	3	Stavanger	Partly lectures, partly discussions across sectors	41

About a month separated day two and day three to give participants time to reflect on the knowledge gained and their role and responsibility should an accident occur.

2.3 Participants and invitation

The County Governor wanted to invite participants from all 26 municipalities in Rogaland, representatives from their regional nuclear preparedness committee and employees from various departments of the County Governor administration. NMBU and NRPA wanted in addition to invite representatives from fisheries, aquaculture, farming, food industry, tourism, various NGOs, national authorities and expert organisations. The potential number of participants was larger than the available funds from PREPARE and CERAD. It was thus decided to invite everyone to the first seminar day dedicated to competence building, and a reduced number for the full three days. 28 people were invited to participate only the first day, while 106 people were invited to participate on all three days of seminars. Separate invitations were made for these two groups of participants.

The invitation was sent by email to 134 different actors with the title: "Nuclear accident at Sellafield – what can happen in Rogaland?". A document with more detailed information about the aims of the seminar and the Sellafield scenario was attached. Participants were invited two month in advance, and received a reminder one month later if we had not received an answer. We adopted a pro-active approach to ensure all sectors were represented sufficiently. When one of the invitees declined our invitation, he/she was asked to propose someone else within a given sector whom we could invite or to spread the invitation within their organization in case some of their colleagues wanted to join. We contacted key participants by personal email and phone to convince them to join. The chief emergency planner of the Rogaland Governor also emailed several groups of invitees and recommended them to join the seminars.

3. Composition of the panel and panel meetings

The first two seminar days were organised at a SPA hotel in Hjelmeland, a rural town in the middle of the county. Boat transport was organised for all the participants both to and from the seminar. Participants invited for the whole seminar were provided with an overnight stay between the 1st and 2nd day. A common dinner was organised to allow participants to communicate in an informal way, get to know each other and establish useful contacts. The third day seminar was held six weeks later in a conference hotel in the centre of Stavanger, the county capital. The attendance was free for all participants all three days.

The list of participants included: regional actors (County Governor Administration officers, aquaculture industry, fisheries, police force, fire department, County Medical officer, Home Guard, Food Safety regional office, drinking water producer, Friends of the Earth Rogaland, Red Cross Rogaland, Civil Protection Rogaland, Farmers Union Rogaland, TINE dairy producer, Norwegian Sheep and Goat Association, Health Corporation Stavanger, Health Corporation Fonna); national actors (NRPA, Food Safety Authority, Directorate for Civil Protection, Directorate for fisheries, Seafood Council, Consumer Council, Farmers Union); local actors (farmer, fisherman, Agricultural chief officer, Mayor); Municipality representatives (Eigersund, Hjelmeland, Randaberg, Sandnes, Sola, Stavanger, Vindafjord and Tysvær municipalities) and experts (CERAD, Marine Research Institute, National Institute of Nutrition and Seafood Research, University of Oslo).

On the first day of the seminars, a range of presentations were given. They covered topics of nuclear emergency preparedness organisation in Norway, responsibilities of various actors

(national, regional, municipal), possible accident scenarios and Sellafield accident scenario with possible consequences in Rogaland, existing challenges and possibilities in Rogaland – view from different sectors, national threat assessment, consequences and countermeasures in agriculture, freshwater and seawater systems and individual risk perception.

The second day of the seminars started with brief presentations about reducing uncertainty in scenario prognoses / filling data gaps and meeting the demand for documentation of contamination levels in seafood. Afterwards, we introduced some limitations to the scenario, the plan for discussions and gave participant an opportunity to ask questions of clarification, before dividing them into four groups according to the sectors they were representing (County Governor office, Fishery/Aquaculture, Agriculture, Outdoor Life/Recreation). Each group had a facilitator from NRPA/NMBU and several experts who could answer technical questions. The groups were asked to appoint a rapporteur for the plenary session. After presentations in plenary and a short round of questions and opinions, the participants were divided into mixed sectorial groups for new discussions. The rapporteur from each group provided a summary of the inter-sectorial group discussions in plenary. The questions discussed are reported in chapter 4.

After a round of debates, participants identified four main topics to address on the third day of the seminars: roles and responsibilities, measurement capacities, health effects, and information/communication.

We tried to initiate discussions (`home reflection`) within each sector between day two and three, where they could be more concrete on which challenges they could solve within the sector and which would need cooperation with others and with whom. This was only successful for the agricultural sector where representatives from the Food Safety Authority and the Farmers Union were enthusiastic in starting to develop detailed procedures for mitigating actions.

We also provided the participants with links to various reports and information that could be useful for them to follow up from the first two days of seminar and prepare for the third day.

The programme for the third day included lectures on radiation health effects, national and regional measurement capacities, roles and responsibilities in nuclear preparedness (both national framework and examples from the County Governor office, Aquaculture and Agriculture) and information and communication (national emergency web site www.kriseinfo.no and The Crisis Committee`s communication plans). Two rounds of group discussions were organized where participants debated issues related to roles and responsibilities and information and communication. The procedure for group discussions was similar to that of day 1, results were presented in the plenum by the rapporteurs from each group. The seminars ended with the plenum discussion where participants evaluated the seminar meetings and expressed their views on how can the sectors and Rogaland county continue the work for improving emergency preparedness and how national authorities and experts can contribute to this work.

Two questionnaires were developed to measure whether a series of dialogue seminars increases the learning, networking, involvement and problem solving compared to a standard competence-building seminar. The first was given to participants at the end of day one and the second at the end of day three. The questions asked were similar or identical for the two versions. The participants had the same participant number in both questionnaires so we could directly compare the results after day one (competence-building) and day three (full stakeholder dialogue seminar). The results of the survey are given in chapter 4.

4. Results analysis and main issues identified

4.1 Results from discussions

On the second day, two different rounds of discussions were held. First, participants were divided into groups based on the sector they were representing: County Governor office, Fishery/Aquaculture, Agriculture, and Outdoor Life/Recreation. Each group was asked to discuss the following questions:

- What kind of consequences would your sector be facing in an accident situation?

- What would be specific challenges for your sector (sector sensitivity)?
- What would be your information needs?
- Do you have earlier experience with emergency preparedness (non-radiological) that you could build upon?

Each group had a facilitator from NMBU or NRPA who received a set of instructions about guiding the discussion. Nevertheless, some differences were observed in ways each group handled the task. A summary of issues, which came up in each group, is given below.

From the Agricultural sector:

- The time of fallout will influence on the range of issues to be addressed within sector (sheltering animals, covering vegetables, slaughter and harvest etc.)
- A good warning system at all levels is required to secure fast implementation of countermeasures. Would it be useful to establish a hot line for public? Who would be responsible for it?
- There is a need for clear and detailed fact sheets and overview of countermeasures for each season and type of produce; these should be developed in cooperation and made available for everyone. All the information about radioactivity and agriculture should also be collected in one place and made available.
- No detailed plan exists for radiological emergency, but there are preparedness plans for other emergency situations like animal diseases which can be used as a baseline.
- Radiological emergencies require coordination of several different authorities and actors, and understanding of one's role and duties within the system of emergency preparedness.
- System and priority of measurements has to be developed.

From the Fishery/Aquaculture sector:

- The fishery/aquaculture sector will experience both practical consequences and will have to deal with a loss of reputation on the market and of consumer trust.
- There is a clear need for a monitoring program for radionuclide concentrations in water and fish both before and after the accident. Is there capacity for radioactivity measurements within existing programs? Trustworthy certificates of water quality will be required – who should provide them?
- Quick communication between the Seafood Council and authorities is of vital importance. Information to public/media should also be provided very fast.
- The Seafood Council in Norway has a separate emergency preparedness unit to handle reputational crisis, they develop plans and perform exercises. The rest of the sector is dependent on them.

From the County Governor office:

- Time of the accident is important: the ability to have a fast reaction will depend on the time of the day when the warning is received. First responders would need to check how fast an alarm reaches through all parts of the preparedness system[14].
- Will need to contact all of the sectors to receive update on the status of situation in the region. It will be an immense workload on all the governmental organizations.
- After 4 days, all official bodies will be exhausted. It is important to find additional resources, both involving organisations outside the preparedness system and volunteers.
- Information crisis: the population requires information and the County Governor office requires correct timely information in order to react to the needs of the public and media.
- Communication channels: some of them are established, but would it be enough? Would there be a need for door to door actions?
- What is the capacity for measurement of food and drinking water? Are there additional organisations like civil defence who could be involved in street measurements? How to

[14] First responders were represented in this group, which resulted in a discussion partly skewed towards immediate response to the accident and not to consequences for the sector after 4 days, which was one of the limitations given to the scenario discussions.

protect those who perform measurement outside from over-exposure and how to calm down the public when they see someone measuring in full protection equipment?
- Important to address needs of the hospital patients both in communication of health risks to them (especially those who receive treatment with radioactive isotopes) and practical issues, for example clean water supply for machines performing dialysis.

From the Outdoor life/Recreation/Drinking water[15] sector:
- The immediate impact on tourism in the area will depend much on the time of the accident and will probably be more prominent during the high season. However, emergency plans should account for big events organized in Rogaland county outside the touristic season.
- Both foreign and Norwegian tourists are expected to avoid affected areas causing long-term consequences for the tourism in the region.
- A series of recreational activities will be affected, for example hunting, fishing and gathering. This is important for local people as fishing is a part of their identity.
- Both direct and indirect effect of radiation on natural ecosystems should be considered (e.g. overfishing in rivers of other counties if fishing in Rogaland was to be forbidden).
- Most of the drinking water in the Rogaland county comes from surface water sources that will be directly contaminated after the fallout. As drinking water is essential, measurement equipment should be available and routines developed.
- The drinking water producer has capacity to provide most of the region with groundwater (3-5 litres per person per day). However, issues of logistics will need to be resolved.
- No plans exist for emergency water supplies for animal farms.

After each group reported about the results of the discussions within the sectors, the participants were again divided, but now in mixed groups. They were then asked to reflect over what they had heard and discuss the following questions:

– important topics pointed out by other sectors.
– which challenges must be solved in cooperation between sectors?
– which challenges can be solved within the sector?

The following is a summary of important points raised during the inter-sectorial discussions:
- There is need for cooperation and coordination of efforts of all preparedness systems.
- Misunderstandings in the roles and responsibilities of actors in a nuclear/radiological emergency situation should be clarified.
- More seminars and exercises are needed in order to get to know each other and have an open discussion.
- It is important to give correct and relevant information when it is needed so people feel secure. Information on established communication channels (e.g. webpages) should be updated and available for the population.
- How does one achieve coordination of information from different sources?
- There will be a need for measurements both for local monitoring of food and environment, and for certifying quality of exported goods. Do we have laboratory and equipment capacity required? Who decides on the strategy for the measurements? Will each sector be responsible for certificates of radiological quality of their products? How to avoid a bottleneck?
- There is a difference between effects on export of products and possible health effects for Norwegian population since they need to eat food produced here whilst foreign customers can choose not to buy food from Norway.
- Various documentation should be prepared in peacetime: a manual for emergency bodies with instructions on how to act, fact sheets for the use in different sectors.
- The issues of drinking water supplies to both humans and farm animals should be addressed.

[15] This group also discussed issues related to drinking water due to participants representing the drinking water sector and the extensive use of surface water sources for drinking water supply in Norway.

A plenary discussion on the most important topics to address on the third day of the seminars concluded the second day. Four topics were identified: roles and responsibilities, measurement capacities, health effects, and information/communication.

On the third day of the seminars, information about existing measurement capacities and health effects of ionising radiation were given in the form of presentations. Information/communication issues, and roles and responsibilities were discussed in separate group sessions.

During the discussion on roles and responsibilities of actors, participants were defining their own role in emergency preparedness, and had a debate on those when implementing countermeasures and performing measurements. The results of the discussion are as follows:

- There is much confusion about the roles and responsibilities of various actors when it comes to nuclear/radiological emergency preparedness. The expectation is that the Crisis Committee will be providing solutions. On the other hand, the top-down approach was acknowledged to not be useful because during an exercise "we feel desperate for someone to tell us what to do". All actors need to work together and exercise so everybody knows what to do, as there will be a need to take decisions on the local level.
- Countermeasures should be developed in cooperation with the actual users, embedded into reality and adapted at the local level. They should be included as part of emergency plans and responsibilities of various actors should be predefined.
- It is important to coordinate actions, but it is possible that in a crisis situation some municipalities might implement countermeasures on their own.
- Actors like industry, research institutions, and NGO's are not involved in the emergency preparedness planning and not included in the discussions although they have relevant knowledge and resources. How can one reach them? It is easier to reach organisations with administrative structure than private companies within any sector (e.g. tourism, fisheries).
- Operating warning systems are very important for all levels of the emergency preparedness.
- Necessary measurements can be grouped into emergency and monitoring measurements and establishing a system for measurements of each group will be challenging. The areas with highest contamination levels will need to be prioritized. There will also be a need to address the public's wishes and measure samples that worry them the most.
- Drinking water must be measured in any case; foodstuffs depend on season and time of year.
- Is there expertise for interpreting results of measurements locally or regionally? Who will be paying for all the measurements?

The discussion on communication and information was concentrating on audience, information need, communication channels, and peacetime preparations. The most important issues and questions raised in the discussion on communication and information were as follows:

- Different sectors will have different audiences, they should be defined and a national communication template can be developed which will then be adapted in each region.
- Information should be coordinated and prepared in advance (factsheets, countermeasures instructions, brochures). It should be prepared in several languages.
- A lot of information has been collected on national and international level and should be made available. Where to put it? Who will be answering questions from public? Should social media be used in a more active way?
- It is important to have expertise in various spheres of knowledge on local/regional level.
- How does one raise public understanding of radiation related issues in peacetime? Should information be presented in an interactive way (e.g. movies, programs)?
- A dialogue is needed between authorities and food producers and distributors.
- Open, clear and timed information is necessary.

4.2 Questionnaire results

In addition to the output from the discussions, we wanted to measure how a series of dialogue seminars increases the learning, networking, involvement and problem solving by the participants compared to a standard competence-building seminar. Through the use of questionnaires, we

seeked to quantify the added value of three full days of stakeholder dialogue seminars as opposed to just one day with competence building. The following gives the most important results from analysis of the two questionnaires, given to participants after 1 day of seminar (competence-building) and after 3 days of seminars (full stakeholder dialogue meeting).

The degree of learning was measured by asking the participants what their level of knowledge was before the meeting, after 1 day and after 3 days of seminars for four topics:

1. Nuclear threats and possible consequences in Rogaland
2. Roles and responsibilities in nuclear emergency preparedness
3. Mitigating actions
4. Significance of information/communication

They were asked to assess their level on a scale from 1 (no knowledge) to 10 (very high knowledge). The results are shown in figure 4.2.1. For the first topic, day 1 contributed more to new knowledge than days 2 and 3. For the other three topics, the stepwise increase was equal for day 1 and for day 2 and 3. This shows that stakeholder meetings with a wide variety of actors and free discussions contributes considerably to new knowledge, beyond the learning gained through traditional competence-building seminars.
Participants made it clear that they gained new knowledge mostly through discussions, whether they were within or between sectors, in plenary, or as informal conversations between participants. Presentations of facts also contributes to new knowledge, but by discussing with others, participants grasp the full view of the challenges faced by a community impacted by radioactive fallout.

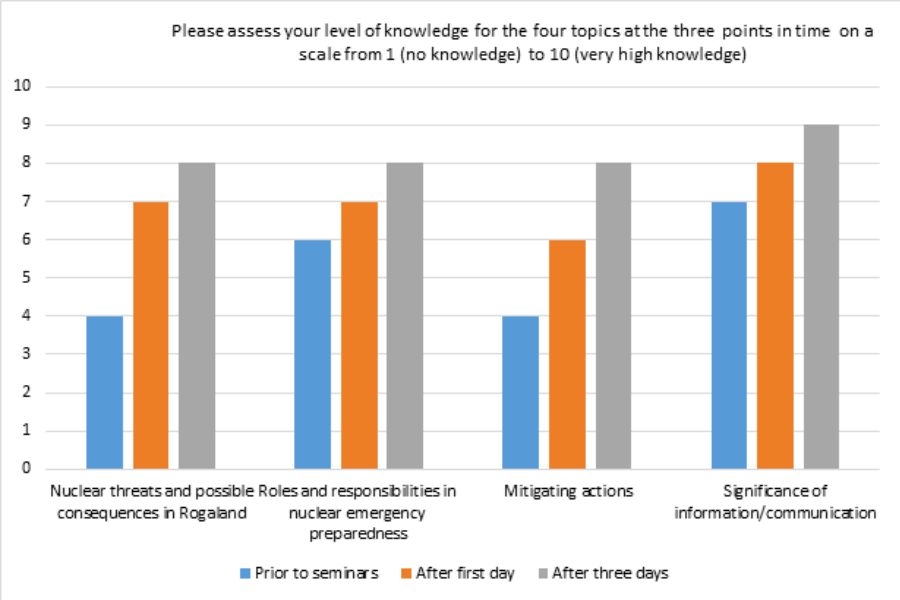

Figure 4.2.1: Level of knowledge (y-axis) reported by the participants for four different topics prior to the seminars, after one day and after three days (median values; n=30).

Emergency preparedness and response invloves a large number of actors with various responsibilities. Discussions and exercises help to achieve a shared view of the roles and responsibilites of various actors, in a better way than presentations of plans or frameworks. Figure 4.2.2 shows the degree of understaining gained on the challenges faced by the respondent`s own sector and by other sectors, while Figure 4.2.3 shows the change in understaing of the respondent`s own role in nuclear emergency preparedness and response. It is clear from these figures that 3 days of stakeholder seminars with presentations and discussions within and across sectors contributes more to this understanding than just one day of competence-building (i.e. just lectures on plans, actors, roles and responsibilities).

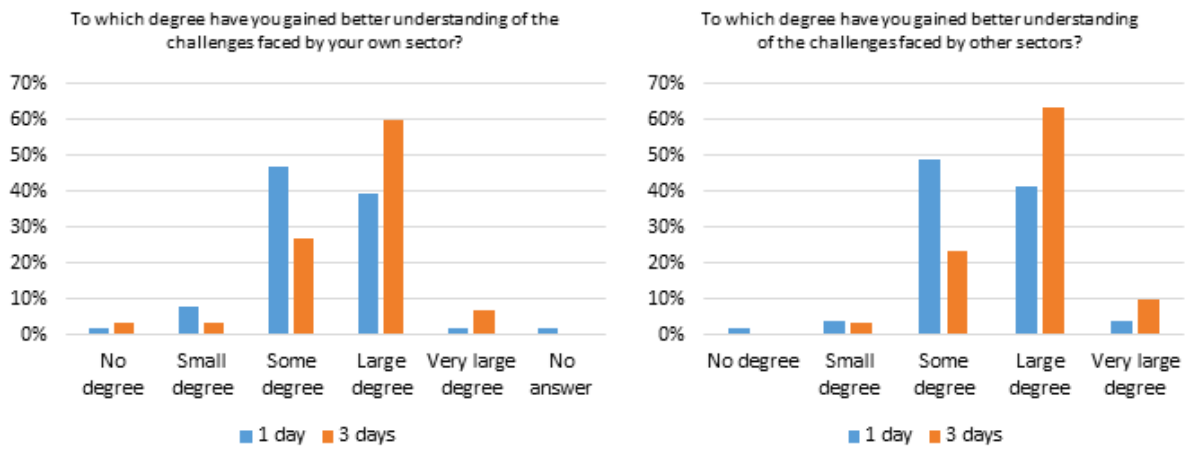

Figure 4.2.2: Percentage answers to the question "To which degree have you gained better understanding of the challenges faced by *Left*: your own sector; and *Right*: other sectors" (n=51 for 1 day, n=30 for 3 days). For both categories, the understanding is higher after three days of stakeholder seminars than after one day of competence-building.

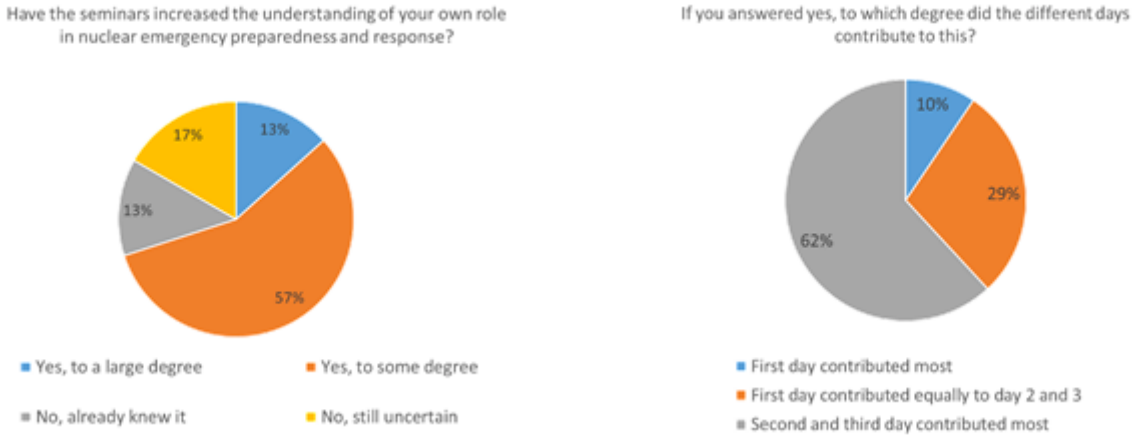

Figure 4.2.3: Percentage answers to the question whether the seminars have increased the understanding of the participant`s own role in emergency preparedness and response (*left,* n=30). 70 % answered "yes", to a large or some degree. For those who answered yes (n=21), 62 % answered that the second and third days of seminars contributed most to the increased understanding (*right*) while 29 % reported that the first day contributed equally to days two and three. Only 10 % felt that the first day increased understanding of their own role the most.

Both in emergency planning and in recovery situations, a large number of actors need to cooperate to find good, feasible and acceptable solutions. This cooperation would benefit from these actors being familiar with each other before an accident situation happened. One of the aims of the seminars was thus to increase the networking among actors in emergency preparedness and recovery. The participants were asked if they had made contacts that they were likely to contact in an emergency situation or for cooperation beyond an emergency situation. Results show that the number of respondents that answered "yes" increased after three days of seminars. It is clear that the networking between participants increased through both formal and informal discussions during the two last days of the seminars.

Finally, the participants were asked to which degree the seminars would be helpful for use in their work/organisation. 40 % answered to a small or some degree, while 44% answered to a large or very large degree. 17% answered "Don`t know" mainly because they were unsure about their own or their organisation`s role in nuclear emergency preparedness.

Several open questions were included in the questionnaire. These questions were focused on the participant's evaluation of the seminars and their view on the future of emergency preparedness.

The question "What do you see as the biggest challenge to strengthening the nuclear preparedness and response in Rogaland in the future?" revealed the following answers (in decreasing order of importance): communication/information (both between all the different actors and with the public), coordination (of information, activities, mitigating actions), resources (time, budget, measurement capacity, prioritisation), exercises (involving all levels and actors), cooperation (between authorities, sectors and levels) and increased knowledge.

Other issues mentioned were: further work (keep the momentum), roles and responsibilities, measurements (methods and strategies), good plans and guidelines, keeping in contact, operating warning systems, involving first responders and stakeholders, initiative from regional authorities.
The participants expressed that the seminar in general was well organized and useful. Among the positive aspects mentioned, was the possibility to meet a wide spectrum of participants, the good quality of presentations and the discussions. Participants felt the seminars contributed to increased understanding, knowledge and expertise. We received, however, some critique with regard to the number of days and a very intensive program with few breaks. This was improved for day 3 after the feedback from participants, but some still mentioned it on the last day. Some participants expressed a wish for a more concrete definition of our aims with the seminars as well as discussions on specific problems. Several presentations turned out to be too scientific and should have been simplified. A suggestion to involve more representatives from municipalities and health care, teachers, and local people was expressed.

5. Conclusions and perspectives in terms of "guidelines" / proposals / outputs to be addressed to experts and authorities

The nuclear/radiological emergency preparedness work in Norway is centralised at the national level, but the County Governor is the regional representative with the duty to coordinate and harmonize actions and information at the regional level (Royal Decree, 2013). Municipalities have the duty to include radiation in their emergency plans at the local level. The Crisis Committee is a cross-sectorial committee with extended powers in case of a nuclear or radiological accident. It meets several times annually, and once a year also with the advisors and the County Governors. The roles and responsibilities of the actors are well known at the national level. Yet, the stakeholder panels have shown that at the regional and local level the roles and responsibilities are not clearly understood and shared by the actors. There is an unrealistic expectation at the regional/local level that the Crisis Committee will instruct them in a very detailed way on what to do in case of a nuclear/radiological accident. The Committee will give instructions on what kind of mitigating actions to do, in a general way, but their adaptation and the actual implementation would need to be performed by regional and local representatives. It is thus crucial that the regional/local actors have sufficient understanding of the challenges they may face and clear understanding of their roles and duties should an accident occur.

The participants found particularly useful to have a meeting, which involves such a wide variety of actors, who don't usually meet during work. It increases an understanding of the full societal challenges faced by a county when affected by radioactive fallout. It also introduces those challenges to actors who are not usually part of the emergency preparedness work. The stakeholder panel meetings contributed substantially to both competence-building and networking within the county. Questionnaires showed that discussions within and across sectors, and conversations between participants were the most significant elements, besides presentations. The Rogaland County Governor representatives were content to arrange a stakeholder seminar with a broad variety of actors together with NRPA and CERAD/PREPARE, as the resources of the County Governor are limited.

The seminars clearly showed the importance of countermeasure instructions for different sectors where the actors and actions are clearly defined. This work was started in the agricultural sector, inspired by the seminars, and is continuing.

The need for good information and communication was acknowledged by all participants. A generic info should be produced in peacetime, so that it can be quickly and easily adapted to any emergency situation. Such material could preferably be produced in cooperation between experts,

national authorities and regional actors from various sectors. It should target different groups and in several languages. Good information provides people with a sound basis for rational choices.

Having two independent meetings showed to be useful. It gives the participants time to reflect on what they have learnt and allows them to define the topics to be addressed on the next meeting themselves. It is also important to have enough time during breaks to allow people get to know each other. The seminars and the informal networking both contribute to an increased knowledge about who has a given competence and to a smaller barrier for contacting people afterwards.

It is always challenging to find the good balance between presentations and discussions. The background of participants varies, as does their knowledge of the main topics. All actors need to reach a certain level of understanding before discussions on concrete challenges and possible actions could be useful. At the same time, experts use often too scientific language with jargon and acronyms unknown to many participants. The communication of complex issues in a clear and explicable way to a broad audience is challenging and presenters should be chosen carefully.

Clear needs for improving the regional/local emergency preparedness were identified during the seminars and questionnaires. A common regional effort to complement the work performed at the national level is needed. The County Governor plays an important role, but the individual sectors also need to take their responsibility in developing plans adapted to fisheries, agriculture, tourism, etc., since the sector representatives have the best knowledge about the challenges and feasible solutions. Emergency preparedness exercises should be performed for all the regional/local actors in the county and go beyond the immediate acute phase. When an accident happens all the necessary plans need to be in place, they must have been exercised and all the actors must know their roles and responsibilities and whom to contact. Only then can the emergency preparedness be seen as resilient at the regional/local level. Regional stakeholder dialogue seminars can contribute to this development.

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Stakeholder seminars in Norway

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Aim:

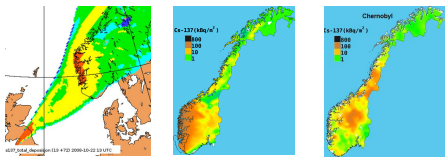
Participatory process with a large number of stakeholders as input to a more resilient emergency preparedness planning and response at the regional level

Background

Norwegian nuclear and radiological emergency preparedness was developed post-Chernobyl and is constantly evolving to meet the needs of today. The Norwegian Nuclear Preparedness Organisation consists of the Crisis Committee for Nuclear Preparedness, the Crisis Committee's Advisors, and the County Governors. The County Governors are the Crisis Committee's representatives on the regional level (cf. Royal Decree of 23 August 2013). They have the responsibility to coordinate preparedness and recovery at the regional level in cooperation with the municipality administrations and local offices of various authorities. The standard preparedness seminars are focusing mostly on the national plans/actions/actors. We acknowledge that local and regional actors will have an important part to play in implementing mitigating actions in case of radioactive fallout. We wanted to measure how a series of dialogue seminars increase the learning, networking, involvement and problem solving compared to a standard competence building seminar.

Scenario used:

- Explosion in the HAL tanks at the Sellafield reprocessing plant
- 1% of the estimated inventory reaches the atmosphere and is transported to Norway (Figure 1a)
- Substantial deposition estimated for Norway, in particular the south-west coast (Figure 1b), comparable to post-Chernobyl levels (Figure 1c)



a b c

Figure 1: Modelled deposition (kBq/m² of Cs-137) in Norway from a hypothetical accident at the Sellafield reprocessing plant. The scenario is based on a 1 % release of Cs-137 from the 21 HAL tanks and real weather conditions on 19 October 2008. a) the release being transported to Norway; b) deposition across Norway; the county of Rogaland framed on the bottom left; c) deposition across Norway after the Chernobyl accident.

Methodology:

The seminars were arranged as a cooperation between the County Governor of Rogaland, NRPA/PREPARE and CERAD. Participants received an e-mail with invitation (Figure 2) and a document with details about the aims of the seminar and the scenario to be discussed.

Figure 2 – Invitations to the seminar

The seminars were planned in a way which allowed to compare the effect of a standard competence-building seminar, where participants were given lectures on various subjects and a more interactive seminar with group discussions within and across sectors (Table 1). Two questionnaires were designed to measure whether a series of dialogue seminars increases the learning, networking, involvement and problem solving compared to a standard competence-building seminar.

Table 1 - Overview of the three seminar days

Date 2015	Seminar day	Venue	Focus	Number of participants
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Acknowledgements:

The seminars were arranged with the partial support of EC FP7 Grant agreement no: 323287, the Research Council of Norway (RCN) through its Centres of Excellence funding scheme, project number 223268/F50, and RCN project numbers 221391/E40 and 226130/E40.

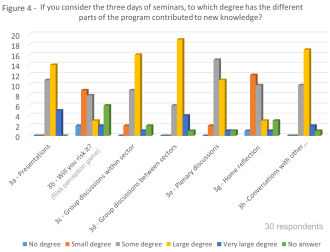
Participants:

Regional actors (County Governor Administration officers, aquaculture industry, fisheries, police force, fire department, County Medical officer, Home Guard, Food Safety regional office, drinking water producer, Friends of the Earth Rogaland, Red Cross Rogaland, Civil Protection Rogaland, Farmers Union Rogaland, TINE dairy producer, Norwegian Sheep and Goat Association, Health Corporation Stavanger, Health Corporation Fonna); **national actors** (NRPA, Food Safety Authority, Directorate for Civil Protection, Directorate for fisheries, Seafood Council, Consumer Council, Farmers Union); **local actors** (farmer, fisherman, Agricultural chief officer, Mayor); **Municipality representatives** (Eigersund, Hjelmeland, Randaberg, Sandnes, Sola, Stavanger, Vindafjord and Tysvær municipalities) and **experts** (CERAD, Marine Research Institute, National Institute of Nutrition and Seafood Research, University of Oslo).

Results:

Main issues raised in the discussions on day 2:

- Need for cooperation and coordination of efforts
- Roles and responsibilities of actors should be clarified
- More seminars and exercises are required
- Importance of correct and relevant information, coordination of information and availability of information channels
- Measurement capacity and certifying quality of the products
- Possible health effects for Norwegian population because they consume local food
- Preparation on documentation should be done in peacetime
- Issues of drinking water should be addressed



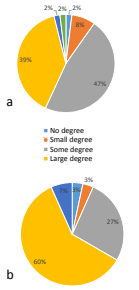
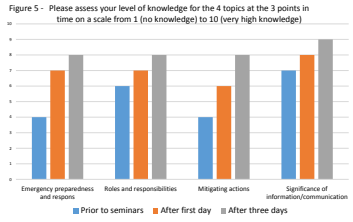


Figure 3 – Percentage of answers to question «To which degree have you gained better understanding of the challenges faced by your own sector?» a) after day 1 (n=51), b) after day 3 (n=30)

What do you see as the biggest challenge to strengthening the nuclear preparedness and response in Rogaland?

- Information/communication
- Coordination
- Resources
- Exercises
- Cooperation
- Increased knowledge



Conclusions:

- Roles and responsibilities on regional and local level are not clearly understood and shared by the actors. There is an unrealistic expectation at the regional/local level that the Crisis Committee will instruct them in a very detailed way on what to do in case of a nuclear/radiological accident
- A wide variety of stakeholders is beneficial for increased understanding of the challenge as a whole and for better networking
- Group discussion sessions and informal conversation between participants are significant elements in stakeholder involvement, besides presentations
- A series of meetings with ample time for discussions increase the understanding of the roles and responsibilities, the networking and the new knowledge for most participants
- Most participants found the seminars useful for their work/organisation
- The seminars contributed to increased wish/willingness to work more on R/N emergency preparedness (for most actors)

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5.8. PORTUGAL

Global organization of the PREPARE project

The Portuguese institutions that are involved in the PREPARE project are APA (Portuguese Environment Agency) and IST-ID (Association of IST for Research and Development), being both members of the NERIS platform. These organizations are involved in the following Work Packages (WP):

- WP2 – Analytical Platform (APA)
- WP3 – Consumer Goods (IST-ID)
- WP6 – Information and participation of the public (IST-ID)
- WP7 – Training courses, dissemination of knowledge and exercises (APA)

Regularly, progress meetings have been carried out involving IST-ID and APA to discuss issues related to PREPARE project.

Panels Organization

In the framework of PREPARE WP3 - Consumer Goods, IST-ID organized two National Panels with experts covering a wide range of relevant governmental and non-governmental stakeholders, such as national and regional competent authorities related to foodstuff/feedstuff, regulators, technical support organizations, port authorities, research centres, academia, agro food companies, food industries associations, road transporters companies and associations, professional organizations, consumer associations and NGOs. The stakeholders were selected taking into account the functions and roles that they may have during a radiological or nuclear (RN) emergency.

The 1st Panel - *"Management of contaminated foodstuff and feedstuff after a radiological or nuclear accident"* - took place on 11th of April 2014, while the 2nd Panel - *"Management of contaminated consumer goods after a radiological or nuclear accident"* – occurred on 9th of April 2015. Both panels took place at Campus Tecnológico e Nuclear (CTN) of IST, nearby Lisbon.

The main objective of the panels was to gather several national stakeholders and to discuss issues that should be address in a RN emergency: scientific and technical issues, management practices, regulatory issues, risk perception and risk communication. Additionally, the stakeholder's concerns regarding the radioactivity monitoring and control of goods were addressed and an exchange of experiences in previous emergencies situations with different Radiological Protection (RP) experts was promoted.

Panels Methodology

The methodology adopted for both National Panels was very similar. A thematic session took place in the morning, during which short presentations (indicative duration: 20-25 minutes) were delivered by experts, addressing the following topics and issues presented in Table 1.

Table 1 – Topics addressed during the thematic sessions of the National Panels.

1st Panel	2nd Panel
• Concepts of ionizing radiation and radiological emergencies; • Strategies to deal with contaminated food and feedstuff; • Regulatory issues (guidelines and reference levels); • Risk perception and acceptance of contaminated food; • Management of communication and public information in an emergency situation.	• Concepts of ionizing radiation and radiological protection during emergencies; • Contaminated consumer goods; • Detection and management of contaminated consumer goods; • Communication challenges in radiological and nuclear emergencies.

Regarding the 1st Panel, on the second part of the meeting (afternoon session), the participants were divided in two working groups, in order to discuss the concerns related with the regulation, monitoring and control of contaminated foodstuff and feedstuff. Each working group session was guided by one moderator with a pre-defined list of subjects to foster the discussion, while the main topics and findings of the discussion were registered by two rapporteurs. After the group sessions, the two groups joined again in a final panel session for the presentation of the conclusions delivered by the rapporteurs of each working groups.

For the 2nd Panel, during the afternoon session, a round table took place involving all the participants and experts in order to ascertain their previous experiences in past emergency situations and to discuss issues associated with the regulation, monitoring and control of contaminated consumer goods. This session was steered by two moderators, also with a pre-defined list of topics for discussion, while the main findings of the discussion were registered by two rapporteurs.

For each discussion session between the different stakeholders of the two panels, the Chatham House Rule was adopted in order to increase the openness of the discussion, since the information from the debate may be used, but the identity of the person who made the comment cannot be unraveled.

Panels Participants

For the 1st Panel, a total of 35 participants from 16 different stakeholders (10 governmental institutions and 6 non-governmental organizations) attended the meeting, while for the 2nd Panel, 36 participants also from 16 different stakeholders (12 governmental institutions and 4 non-governmental associations) joined this initiative.
The stakeholders that participated in these meetings are listed in Table 2. Nevertheless, for both national panels, despite the fact that members of the media and also from the communication Cabinets of some of the main organizations were invited to participate, none of them was represented.

Table 2 - List of the stakeholders present in the National Panels

In both Panels	
• **IST** ("*Instituto Superior Técnico*", the leading Portuguese University of Engineering, Science and Technology, University of Lisbon)[1] • **APA** (Portuguese Environment Agency)[1] • **DGS** (General Directorate for Health)[1] • **ANPC** (National Authority for Civil Protection)[1] • **COMRSIN** (Regulatory Commission for Nuclear Installations Security)[1] • **GPP** (Office of Planning and Policies, from Agriculture Ministry)[1] • **DECO** (Consumer Rights Association)[2]	
In 1st Panel	**In 2nd Panel**
• **ANIL** (National Association of Industrial Dairy)[2] • **ASAE** (Authority for Food and Economic Safety)[1] • **CCP** (Portuguese Confederation of Trade and Services)[2] • **CIP** (Portuguese Business Confederation)[2] • **DGAV** (National Authority for Food and Animal Welfare)[1] • **DRADR** (Regional Directorate of Agriculture and Rural Development) Madeira Island[1] • **DRAP** (Regional Directorate of Agriculture and Fisheries)[1] • **FIPA** (Federation of Portuguese Agriculture and Food Processing Industries)[2] • **INSA** (National Institute for Health, Ricardo Jorge)[1] • **IRAE** (Regional Inspection of Economic Activities) Azores Island[1] • **LACTOGAL** (Agro Food Company)[2]	• **ACT** (Authority for Working Conditions)[1] • **ANAC** (National Authority for Civil Aviation)[1] • **ANTRAM** (National Association of Public Road Transporters of Goods)[2] • **APL** (Lisbon Port Authority)[1] • **AT** (Portuguese Customs and Taxes Authority)[1] • **DGRM** (General Directorate of Natural Resources, Safety and Maritime Services)[1] • **IMT** (Mobility and Transports Institute)[1] • **QUERCUS** (National Association for Nature Preservation)[2] • **Road transport company,** José Maria Ferreira & Filhos, Lda[2]

[1]*Governmental organizations;* [2]*Non-governmental organizations*

Main Findings and Discussion

The conclusions presented result from the analysis of the overall discussion of the two Panels. Taking into account the guidelines used by the moderators to lead the discussion sessions, the results will be divided in four main topics: Management practices; Health and Environment; Economics and Policies; Communication, Education and Training.

- **Management practices**

One of the most important challenges identified during the overall discussions of the panels were the similar or overlapping competences between different entities in an emergency situation. The stakeholders identified the unclear, insufficient or lacking legislation, as factors which may lead to an inefficient articulation between institutions and to an incomplete knowledge of the different organization's skills.

The main conclusions from the 1st Panel were:

- Many of the competent authorities and public institutions related to the food products issues represented were not fully sure about the specific procedures related to the management of

radioactive contaminated foodstuff and feedstuff and asked for clearly defined protocols to be applied on the event of RN emergencies.

- Some limitations were identified by the participant organizations concerning the implementation of national and international recommendations such as insufficient human resources, lack of technical resources and of financial support from the Government.

Regarding the 2nd Panel, the institutional stakeholders presented at the discussion stated that their available operational procedures are adequate to respond to emergency situations. On the other hand, the non-governmental and private sector stakeholders are not very much aware of the operational procedures and their perception needs to be improved. The overall main conclusions were:

- There is a lack of clear rules or procedures on how to manage contaminated consumer goods.
- Harmonization is not in place in the management practices.
- In an emergency situation it is possible to setup operational procedures to control all the national entry points by road. These procedures can also be arranged if the emergency situation occurs at an airport or harbor.
- The existing radiological monitoring equipment is adequate to manage contaminated or suspicious goods in routine situations but it may not be sufficient and/or adequate during emergency situations.
- The incoming goods arriving through the Lisbon Maritime Harbor are well controlled by the Customs, due to the MEGAPORTS Initiative[16] implemented at this harbor which allows for a fast and efficient monitoring of 100% of the containers, since the radiation detectors placed at the harbor gates screen the incoming and out coming transit.
- However, the other harbors may be more vulnerable. It was mentioned that, as a preventive action other national strategic entrance points of the country (land, aerial and waterways) should be provided with monitoring capabilities.

- **Health and Environment**

The main findings were:

- Stakeholders are, in general, aware of the European regulations regarding the maximum permitted levels of radioactive contamination of foodstuff and feedstuff following a RN emergency.
- At national level the legislation is different for animal products and vegetables. However, concerns were raised about the implementation of harmonized reference levels in EU, since different countries have distinct consumption patterns.
- There was no receptivity of the public to consume contaminated products regardless compliance with legal radionuclide established reference levels, but lowering the costs of the foodstuff and the absence of direct health effects may change this behavior. Though, when questioned about the health effects related to the ingestion of contaminated foodstuff, the majority of the participants admitted complete lack of knowledge.

There was a consensus among governmental entities about their awareness of the problems involved in the follow-up of an accident and, in a first approach, their ability to cope and to deal with it. Nevertheless, this was not the feeling of the industrial stakeholders that have doubts about the country´s capacity to deal with the direct and indirect consequences of this type of emergencies and referred past cases non-radiation related.

[16]http://nnsa.energy.gov/aboutus/ourprograms/nonproliferation/programoffices/internationalmaterialprotectionandcooperation/-5

- **Economics and Policies**

The effects of possible contamination in foodstuff/feedstuff and other consumer goods on the regional and national economy were discussed. The participants agreed that in case of contamination after an emergency situation, even if there is no risk for the public, there could be resilience to the purchase of those products, resulting in an overall negative economic impact in the companies and enterprises. In the 2nd Panel, some participants expressed concerns about the possible existence of unknown contaminated goods in circulation at national level and showed some logistics-related concern if the containers need to be retained due to contamination.

It was also mentioned that private companies have no monitoring capabilities (economical and technical). However:

- During the 1st Panel, the industrial stakeholders did recognize the importance of their social role during and after the emergency phases by showing availability in investing in monitoring equipment for the control of their products. Moreover, the stakeholders pointed out that the bilateral cooperation between the EU and IAEA members in emergency situations establishes a good mechanism of rescuing and helping a country that may face these disasters.
- In addition, in the 2nd Panel, it was verified that transport companies are willing to assume some self-monitoring costs if this brings some competitiveness advantages.

- **Communication, Education and Training**

The following findings were consensual amongst the stakeholders in both panels:

- The public is sensitive to issues related with radioactive contamination and its perception depends on the way the subject is communicated. Non-reliable sources of communication and information may cause public mistrust regarding the information transmitted by the competent authorities. This distrust is also emphasized if contradictory information is provided by different institutions, which gives a wrong image about the competences and effectiveness of the management emergency and post-emergency crisis.
- All the stakeholders (governmental and non-governmental) seem to agree that risk communication is a key factor, as well as an effective and fast communication between the different organizations. In order to efficiently communicate scientific and technical issues, the experts, including media, should be trained to clearly communicate concepts using simple and transparent information based on straightforward language. Additionally, specific education modules should be developed and implemented routinely to prepare the stakeholders involved for the specificities of communicating RN emergencies and to avoid the public´s mistrust in the information conveyed by the *media* and various entities.
- Transparency in communicating facts and not rumors to the public opinion is also an ethical duty of all parts involved in the communication process. There was general consensus that the public will more easily trust the communication established and the information received from the governmental institutions, namely the one coming from technical authorities and scientific experts, than from the politicians. However, the public has no perception of who are the institutions involved in case of an emergency response.
- Good and effective communication between institutions in routine situations could help in emergency situations. Therefore, suggestions about routine exercises with all stakeholders' involved (competent authorities, regulators, technical and scientific experts, consumer's organizations, *media*, local political power and the general public) were made in an effort to also establish a relationship of proximity between the competent authorities and the remaining stakeholders.

- The first contact with the *media* is critical to develop an open dialogue and the existence of institutions that are trusted by the consumers involved in the communication process is a must in the management of an emergency or post-emergency situation. The difficulties in getting the message across the public were attributed to an issue horizontal to all institutions: unknown, inexistent or faulty communication policies.

The industrial stakeholders present in the panels felt that management of the information was poorly performed by referring the fact that, after the initial information loads during the emergency crisis, there was a steeply decline in the post-emergency crisis up to no information at all. In the 1st Panel, this was negatively perceived bearing in mind that the issue of contaminated foodstuff, in post-emergency situations, is still a problem that needs to be handled carefully in terms of public communication.

A wide consensus was achieved around the idea that it is fundamental to provide professional oriented education and training in issues related to RN emergencies, as well as to make available simple but clear information material for public dissemination. Additionally, all the participants agreed that education for risk perception is a fundamental issue and should start at the teaching basic levels, like it is already done for other type of risks (for example earthquakes). Education and training in emergency and post-emergency situations were regarded also as essential for technical, scientific, *media* and general public as well as for other stakeholders' awareness.

General Conclusions

- Overlapping of competences and inefficient articulation between the governmental organizations may jeopardize the effectiveness of emergency and post-emergency management.

- The public is not receptive to consume contaminated foodstuff regardless compliance with legally established reference levels for radionuclides contamination. The same lack of willingness was observed regarding the consumption of other contaminated consumer goods even in the absence of risk. The overall outcome is related to a possible negative impact on regional and national economies.

- Credibility of the information is a fundamental step to achieve public confidence in the authorities' decisions.

- The ability to efficiently communicate scientific and technical issues should be a concern for all parts involved, including the *media*. The use of a common language between the stakeholders is desirable.

- Education and training on risk perception and on emergency and post emergency situations is needed and of paramount importance for technical and scientific officers, for the *media* and for the general public.

Last but not least, the organization of the panels was a "first of a kind" initiative in Portugal. The participants in both panels engaged in dynamic and fruitful discussions, welcomed the initiatives and declared their interest in keeping these forums alive for future initiatives.

Future Perspectives

- The development of a handbook with procedures about what to do in the management of contaminated food/feedstuff adapted to the national reality.

- Implementation of training actions in order to improve stakeholders' awareness regarding radiological risk perception.

- Development of special education modules for the stakeholders involved in the specificities of communicating RN emergencies.

- Creation of information material for public dissemination related to risk perception and RN emergencies.

- Implementation of routine exercises with all stakeholders' involved in the management of a RN emergency.

IST-ID
Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento

PREPARE
Innovative integrated tools and platforms for radiological emergency preparedness and post-accident response in Europe

EURATOM

Management of Contaminated Goods after a Nuclear Accident: Overview of the Portuguese National Panels

Mariana Baptista [a], Octávia Monteiro Gil [a], Irene Lopes [a], Maria José Madruga [a], João Oliveira Martins [b], Isabel Paiva [a], Luis Portugal [b], Mário Reis [a], Pedro Vaz [a]

[a] Instituto Superior Técnico, Universidade de Lisboa, Campus Tecnológico e Nuclear, Estrada Nacional 10 (km 139.7), 2695-066 Bobadela LRS, Portugal
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1st National Panel

"Management of contaminated foodstuff and feedstuff after a radiological or nuclear accident"

IST/CTN, 11th of April 2014

35 participants

Panel Methodology

Thematic Session (1st Part):

- Concepts of ionizing radiation and radiological emergencies.
  Luis Portugal, APA
- Strategies to deal with contaminated food and feedstuff.
  Maria José Madruga, IST
- Risk perception and acceptance of contaminated food.
  Mário Reis, IST
- Regulatory issues (guidelines and reference levels).
  João Oliveira Martins, APA
- Management of communication and public information in an emergency situation.
  Filipe Távora, APA



Discussion session (2nd Part):

- Two working groups, each one with one moderator and two rapporteurs.
- Final panel session for the presentation of the conclusions of each working groups.

2nd National Panel

"Management of contaminated consumer goods after a radiological or nuclear accident"

IST/CTN, 9th of April 2015

36 participants

Panel Methodology

Thematic Session (1st Part):

- Concepts of ionizing radiation and radiological protection during emergencies.
  João Oliveira Martins, APA and Octávia Monteiro Gil, IST
- Contaminated consumer goods.
  Isabel Paiva, IST
- Detection and management of contaminated consumer goods.
  Luis Portugal, APA
- Communication challenges in radiological and nuclear emergencies.
  Filipe Távora, APA



Discussion session (2nd Part):

- One working group with two moderators and two rapporteurs.

Stakeholders in 1st Panel

ASAE, ANIL, LACTOGAL, Instituto Nacional de Saúde Ricardo Jorge, dgav, CCP, CIP Confederação Empresarial de Portugal, irae, fipa, agricultura desenvolvimento rural, Governo de Portugal – Ministério da Agricultura e do Mar

Stakeholders in both Panels

Técnico Lisboa, Agência Portuguesa do Ambiente, ANPC Autoridade Nacional de Proteção Civil, Governo de Portugal – Ministério da Saúde, DGS, Governo de Portugal – Ministério da Agricultura e do Mar, GPP, DECO, comrsin

Stakeholders in 2nd Panel

ANAC, ACT Autoridade para as Condições do Trabalho, Porto de Lisboa, dgrm, AT Autoridade Tributária e Aduaneira, Quercus, IMT Instituto da Mobilidade e dos Transportes, I.P., ANTRAM

Health and Environment

- Increase awareness of the European regulations (Maximum Permitted Levels) of radioactive contamination for foodstuff and feedstuff.
- Concerns about the implementation of harmonized reference levels in EU.
- No receptivity of the public to consume contaminated products regardless compliance with legal radionuclide established reference levels.
- Misconceptions about the health effects related to the ingestion of contaminated foodstuff.
- Governmental entities are aware of the problems involved in the follow-up of a RN accident.
- Industrial stakeholders have doubts about the country´s capacity to deal with the direct and indirect consequences of RN emergencies.

Economics and Policies

- Contamination in foodstuff/feedstuff and other consumer goods may have negative impacts on the regional and national economy.
- Concerns about the possible existence of unknown contaminated goods in circulation at national level.
- Logistics-related concerns if the containers need to be retained due to contamination.
- Bilateral cooperation between the EU and IAEA members in emergency situations.
- Private companies have no monitoring capabilities (economical/technical). However:
  - *1st Panel*: industrial stakeholders recognize the importance of their social role during and after the emergency phases and showed availability in investing in monitoring equipment for the control of their products.
  - *2nd Panel*: transport companies are willing to assume some self-monitoring costs if this brings some competitiveness advantages.

Main Findings

Management Practices

- Similar or overlapping competences between different entities .
- *1st Panel:*
  - Some authorities were not fully sure about the specific procedures related to management of contaminated foodstuff/feedstuff and asked for clearly defined emergency protocols.
  - Limitations to implement national and international recommendations - insufficient human and technical resources and financial support from the Government.
- *2nd Panel:*
  - Lack of clear rules or procedures on how to manage contaminated consumer goods.
  - Harmonization is not in place in the management practices.
  - Monitoring equipment is adequate to manage routine situations but it may not be sufficient and/or adequate during emergency situations.
  - The incoming goods arriving through the Lisbon Maritime Harbor are well controlled by the Customs due to the MEGAPORTS Initiative.

Communication, Education and Training

- Public is sensitive to issues related with radioactive contamination and its perception depends on the way the subject is communicated.
- Contradictory information given by different institutions gives a wrong image about the competences of the management emergency and post-emergency crisis.
- Existence of institutions trusted by the consumers involved in the communication process in the management of an emergency or post-emergency situation.
- Technical/scientific personnel trained in communicating clear concepts using simple and transparent information based on straightforward language.
- Education and training on risk perception, emergency and post emergency situations is needed for technical/scientific officers, *media* and general public.

Final Workshop of the European Research Project PREPARE-WP3

5.9. SPAIN

1. Global organisation of the PREPARE WP3 in Spain

The global organization of Spain´s National Panel for PREPARE WP3 has followed several steps,

- the methodological design regarding the topics to be addressed,
- the criteria for the selection of the stakeholders and the recruitment process,
- first panel meeting
- Delphi study
- second panel meeting

The topics chosen for the Spanish Panel are contaminated foodstuffs, feedstuffs and other consumer goods. Regarding these topics, a preliminary identification of the potential stakeholders was made, involving Government Departments and Agencies responsible for emergencies, nuclear safety and radiological protection, food and feed safety and public health. Regional and local Authorities as well as different associations (professional, consumers, scientific), food and feed industry (producers, processors, and distributors), communication experts and research centres and universities were also identified. A final list of 31 organizations and institutions was pre-selected to compose the Spanish Panel [Trueba et al., 2014].

2. Methodology for setting the Panel

Once identified the preliminary stakeholder composition of the panel, it was considered necessary to know, *i)* their type of implication, if any, in a real situation of management of contaminated goods, *ii)* their opinion in relation to the level of response, at a national level of such situations, *iii)* if they had any previous experience in the matter, *iv)* their level of knowledge in radiation protection issues as well as *v)* their interest in taking part in the panel.

For this reason, a pre-panel questionnaire was designed and distributed to be answered on-line. The answers showed, in general, a medium-high level of confidence in the management of these issues and different level of knowledge on radiation protection concepts and terminology. Only four institutions had to deal with the Fukushima crisis, three of them in relation to control of imported food, feed and consumer goods as well as the Spanish Nuclear Authority with the radiological survey and public information of the situation [Trueba et al., 2014]. Other issues highlighted in the answers were the need to assign roles and responsibilities among the institutions involved and their coordination as there is, at the moment, no National plan involving all of them together. Training exercises, communication and social aspects were also remarked.

3. Composition of the Spanish Panel and First Panel meeting

With the results obtained from the questionnaire, the Spanish Panel was finally established with the institutions shown in table 1. The first meeting was held at CIEMAT the 7th of May 2014, attended by 25 participants and organized in two sessions. The morning one was devoted to introduce the PREPARE project, and to know how does the National alert systems and radiological controls and survey systems work in Spain. The evening session was devoted to the discussion on the following topics,

- Applicable regulations; is the regulatory framework sufficiently clear?
- The need to develop guidelines
- The need for additional numeric values such as reference levels, release exemption levels and surface contamination levels
- Roles and responsibilities. Are levels of involvement well defined? Coordination
- Operational issues such as monitoring, decontamination/restriction and final management of food, feed and contaminated consumer goods

The previous day, the 6th, in response to the demand raised by some of the attendees, a specific training course to introduce basic issues on radiation protection was held and attended voluntarily by 18 participants.

Table 3.- Members of the Spanish Panel.

Type of stakeholder	Role	Name on institution
National Authorities and Public Agencies	Civil Protection and Emergencies	1. Ministry of Home Affairs. General Directorate of Civil Protection and Emergencies (DGPCE)
	Nuclear Regulatory Authority	2. Nuclear Safety Council (CSN)
	Food Safety, feed safety and Consumer Goods	3. Spanish Agency for Consumer Affairs, Food Safety and Nutrition (AECOSAN)
		4. Ministry of Agriculture, Food and Environment – Animal Feeding Area (MAGRAMA)
	Public Health	5. Ministry of Health. General Directorate of Public Health, Quality and Innovation (MSSSI)
		6. Ministry of Health. Directorate of Foreign Health (MSSSI-DGSE)
	Customs	7. Tax Agency. Border Radiological Control Area (AEAT)
Associations	Scientific	8. Spanish Radiation Protection Society SEPR (SEPR)[1]
	Organizations	9. Association of Farmers and Livestock (COAG)[1]
	Food Industries	10. Spanish Federation of Food Industries (FIAB)[1]
Researchers	Research Centers	11. Experimental Study Centre – Water Quality Control (CEDEX)[1]
		12. Health Research Institute Carlos III. Environmental Health Centre (CNSA)
		13. CIEMAT
	Universities	14. Universidad Politécnica de Madrid. Escuela Técnica Superior de Ingenieros Industriales
		15. Extremadura University[1] 16. University of Barcelona[2]

1 Attended only the first Panel meeting; 2 Attended only the second Panel meeting

Among the main findings that aroused during the discussions [Trueba et al, 2014], it was emphasized:

- The need to clarify the roles and responsibilities of the authorities involved and their coordination in case of the management of contaminated goods.
- The need to establish cooperation networks and increase coordination to benefit existing resources as well as to promote the exchange of information between all actors involved.
- The verification that the national alert networks to control the food chain are well developed and in close contact with European and international networks. The maximum permitted levels (MPLs) as defined by EU legislation are used to control the access from third countries. However, in the event of a radioactive contamination, the routine controls within our borders are not yet fully developed due to the lack of: *i)* coordination between all the institutions involved, *ii)* awareness of the all the resources available, *iii)* training.

- General believe that performing exercises using simulation tools and handbooks to aid decision-making can be very helpful to prepare for a potential emergency or existing contamination situations.

The meeting was very successful, as representatives of the different institutions and organizations, directly involved in the management of radioactively contaminated food, feed and consumer goods met for the first time, and took awareness of the need to work together in this issue.

4. Delphi study

Regarding these findings, a Delphi study [Linstone, 2002] was designed with the aim of obtaining some agreement about the main weaknesses or problems encountered in our country, regarding the management of radioactive contaminated goods, but also on the main challenges for its improvement. The questionnaire was developed to be answered on-line in a two-round approach. The first one was focused in a quantitatively testing of the topics and findings identified in the first Panel meeting, being the second round a feedback of the results obtained, with the aim of establishing a final re-ranking [Sala et al., 2016].

After extensive efforts for an exhaustive sampling, seventy-six invitations were sent by e-mail with the subject of the study and a link to the questionnaire, figure 1, shows the final sample.

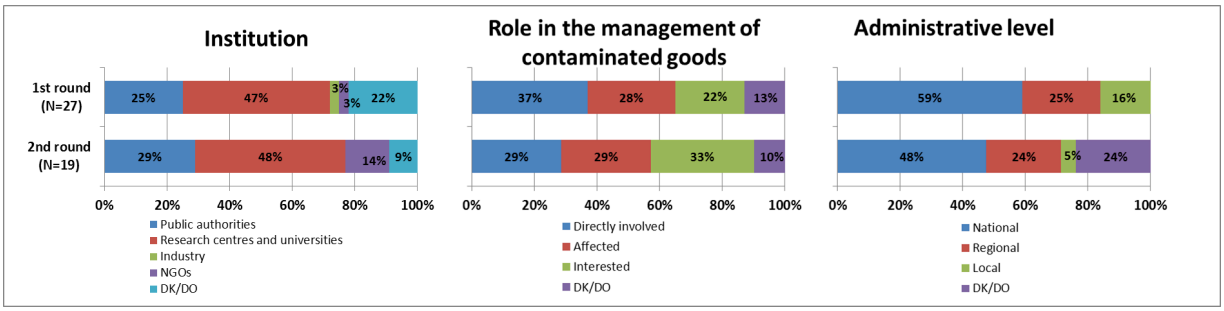


Figure 1.- Distribution of institutions, their role in the management of contaminated goods and administrative level.

The first round obtained a response rate of 36.3% with a total of 27 completed responses, and 19 uncompleted. Invitations to take part in the second round were sent to the 27 stakeholders who answered the first stage, obtaining a response rate of 70%, with 19 completed responses and 2 questionnaires uncompleted. In both rounds, the main part of the sample has been constituted by research centres and universities. The number of stakeholders directly involved in the management of contaminated goods has decreased slightly in the second round, whereas the number of participants from NGOs has increased reaching a 14% of the participants. Representatives from the industry did not participate in this second stage. National level institutions dominate the response

Table 2 summarizes the results obtained from the two-round approach, identifying the first five main problems or weaknesses as well as the first five main actions for improvement.

A descriptive analysis of the results indicate that the issues identified as the most problematic are: deficiencies in the current regulation (especially lack of clarity), the absence of guideline procedures and in general knowledge on how to proceed in these types of situation, together with limited technical knowledge on radiation protection issues and poor coordination between involved agencies.

Table 2.- Comparison of the results obtained from the two-round Delphi study.

Problems / weaknesses		Actions for improvement	
1st round	**2nd round**	**1st round**	**2nd round**
Lack of comprehensive guides	Lack of comprehensive guides	Establish inclusive action plans	Standardize and harmonize the regulation
Lack of procedural expertise	Lack of clarity in the regulation	Clarify roles and responsibilities	Establish inclusive action plans
Lack of coordination	Lack of procedural expertise	Establish cooperation networks	Incorporate the needs of other parties affected
Lack of clarity in regulation	Lack of coordination	Standardize and harmonize the regulation	Clarify roles and responsibilities
Inability to control possible undesirable effects of communication	Lack of technical expertise	Improve cross-border issues	Establish communication channels between the different actors

The main actions for improvement in our country, as seen by the Delphi study participants, are related to the need to: standardize and harmonize the regulation, establish a more inclusive action plan to incorporate the needs of all the involved stakeholders, clarify roles and responsibilities, and finally, open better communication channels between the different actors. So, an open and inclusive dialogue is clearly demanded, together with a review of the current regulation.

The comparison between the two rounds of the study show very few differences. Regarding the problems, most of those that appeared in the first round, came out in the first five positions of the second round except one item (Inability to control possible undesirable effects of communication). The same occurs for the improvement actions. All items appeared in both rounds except the one related to "Improve cross-border issues". It can be assumed that the results from the second round are more reliable because it involves a deeper reflection process from the participants.

To conclude, significant consensus or agreement among experts has been achieved and relevant results have been obtained [Sala et al., 2016]. The Delphi study pointed out clearly those aspects to work on in the near future to improve the management of radioactive contaminated goods in Spain:

- To improve the current regulation (make it more understandable) and to develop guideline procedures,
- To improve the coordination between the involved stakeholders,
- To provide training to those involved in the management, both in radiation protection issues and risk communication,
- More efforts are needed to involve all relevant stakeholders and interested parties.

5. Second Panel Meeting

The second Panel meeting was held at CIEMAT the 29th September 2015. The topics for discussion included the results of the Delphi study, the communication and risk perception on the

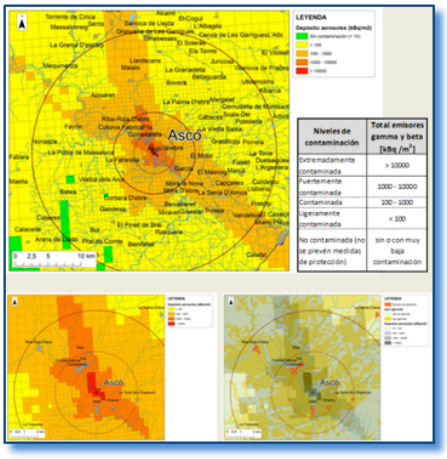
management of contaminated goods and a contamination exercise due to an accidental release in Ascó NPP [Trueba et al., 2016].

Figure 2 shows an example of the types of results obtained from the exercise, that facilitated further discussions on how to proceed in the management of contaminated food, feed and consumer goods in our country from the initial emergency phase [Trueba and Montero, 2016]. Having no previous experience and assuming, according to our regulations, that the restrictions in production and consumption begin once published the appropriated Royal Decree, the participants discussed that the implementation and follow up of this measure in not clear. For instance, once given the order to house the cattle, which institution/organization: will transfer the order to the breeder?, will control that there are available resources?, will control that the process is made correctly? Therefore, the establishment of roles and responsibilities, the coordination and communication among the different actors at national, regional and local level is needed.

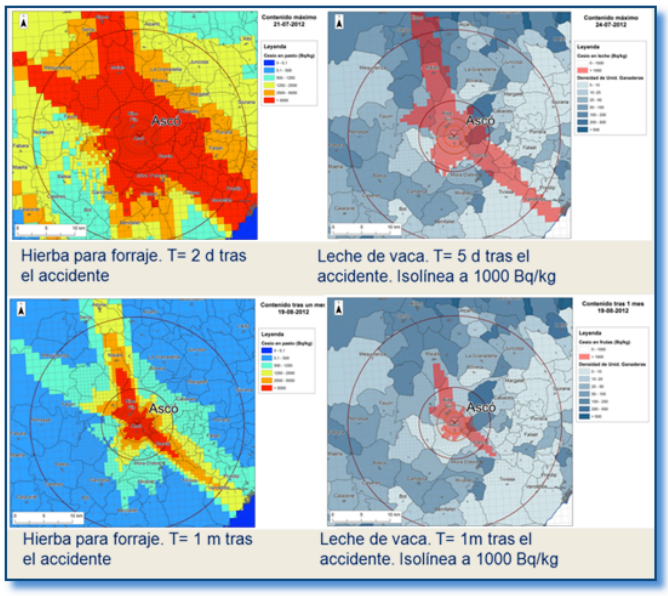
Following this trend other points of discussion dealt with:

- The National resources needed, in terms of measurements and monitoring plans to do the proper radiological characterisation of the affected area,
- The potential use of the different alert and measurement networks and other infrastructures already running for food safety and animal health, as well as the use of actual generic action plans for notifiable diseases designed for other types of contaminants,
- The need to develop guides and protocols which will help to act properly,
- The need for education and training (E&T) of the technical staff in charge of the management of contaminated food, feed and consumer goods, both in the emergency and transition phase,
- The economic compensation,
- The need of coordination between the possible countermeasures to be applied in food production systems, in terms of radiological protection (e.g., using EURANOS Manuals [EC, 2010]) and the European regulations on food safety and animal health,
- The decision between the disposal or market of any product with residual activity,
- The communication plans: the timing, the accuracy of the information and the type of message are important.

The attendees agreed that there is mutual distrust between public institutions and the population. Therefore, it should be important to prepare the population and involve them during the preparedness plans, before a crisis occurs.



Total deposition of ^{137}Cs



Product management after emergency phase. Distribution of the activity concentration of Cs isotopes in the grass for fodder and milk at the time of maximum and 1 month after the accident.

Figure 2.- Types of results of the contamination exercise, that facilitated further discussion [Trueba and Montero, 2016].

6. Conclusions and Perspectives

This has been the first time that so many representatives from different institutions have been brought together to discuss on the management of contaminated foods, feeds and consumer goods. Despite all the efforts, it has been difficult to contact and involve non-governmental stakeholders, such as consumers or industry.

Participants have agreed that the experience has been very positive and in the need of continuity of the panel, constituting a fixed group for future discussions. It is yet to be decided the public institution that will coordinate it.

Among the recommendations obtained from the meetings and Delphi survey, the following are highlighted:

- Revision of the current regulatory framework, in order to improve what is covered already and develop what is not yet considered.
- Establish in advance, an inclusive action plan incorporating the needs of all the stakeholders involved.
- Definition of the roles and responsibilities of the Public Administrations and other stakeholders involved and adequate coordination among them all.
- Develop guidelines and/or best practice protocols with affected sectors in order to complement the official proceedings.
- Continuous E&T programs for technical staff and specific radiation protection education programs for stakeholders with no background in this issue.
- Training exercises should include the transition and recovery phase.
- Develop the necessary infrastructure to carry on the sampling and measurements needed, it is important to optimise the available resources.
- Improve cross-border issues.
- A catalogue with countermeasures should be prepared in cooperation with stakeholders in order to be understood and accepted.
- Disseminate the radiological protection culture.

- Communication plans regarding, flow, content, timescales and language used.

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SPANISH PANEL ON MANAGEMENT OF RADIOACTIVELY CONTAMINATED FOODSTUFFS, FEEDSTUFFS AND CONSUMER GOODS

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INTRODUCTION

In the framework of the Work Package on "Contaminated goods after a nuclear accident" of the EU project PREPARE, national panels have been established. The Spanish approach is the next:

- **Objective** - The Panel aims to combine the participation of Governmental and Public Institutions, with direct responsibility for the management of such situations, with stakeholders, in order to facilitate joint discussions on the establishment of a management system that combines, product quality and social acceptance with the Radiation Protection principles of justification and optimization.
- **Methodology** - Foreseen as a participatory process of stakeholders, from an simple initial information stage to a more engaged process, including development of thematic seminars, discussion tables, workshops and table-top exercises.
- **Topics** - Contaminated foodstuffs, feedstuffs and other consumer goods.

METHODOLOGICAL DESIGN

First Contacts

NERIS Topical Workshop on Management of Contaminated Goods
22 May 2013. CIEMAT, Madrid, Spain

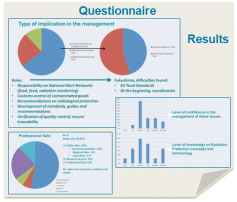
1. Identification of Stakeholders

Questionnaire

- Structured in 8 questions
- To be answered on-line
- Distributed among members of the 31 institutions preselected
- One month of open access to the link. Anonymous reply
- **Scope, to know:**
  - Perception on the responsiveness, at a National Level, on the management of contaminated goods
  - Previous experience on the matter
  - Level of knowledge in Radiation Protection principles and terminology
  - Interest in taking part in the panel

2. Preliminary Study of perception on different levels of responsibility in management of contaminated goods

Questionnaire — **Results**

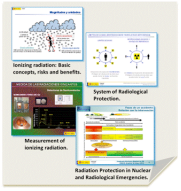


3. Selection and establishment of Spanish Panel

RESULTS

1. FIRST PANEL MEETING

- Objectives:
  - Establish first contacts with the participants, to assess the state of art in our country.
  - Determine the usefulness of the participatory methodologies and support tools that we present.
- Organisation:
  - Previous thematic session to introduce basic issues on radiation protection.
  - Panel session. As a facilitated workshop with two modules:
    - Presentations by participants
    - Discussion Table.



Thematic session

General issues addressed

- **Regulatory issues**
  - Is the regulatory framework clear?
  - Need to develop guidelines and to establish levels (reference, surface contamination, exemption/clearance,...)
- **Involvement and responsibilities**
  - Need to define and establish the roles and responsibilities of those directly involved in the management.
  - Coordination of them
- **Operational issues**
  - Radiation monitoring
  - Applicability of decontamination techniques
  - What to do with contaminated goods?

Other issues

- **Current management: strengths and weaknesses**
  - Operating protocols and National Alert Systems, depending on,
    - Origin of the product (inside/outside Spanish borders)
    - Type of product (food/crop/feed/other consumer goods)
  - Effects on production, distribution, commerce,...
  - Population protection : applicability of remediation techniques
  - Diagnosis: difficulties of the current procedures
- **Improvements**
  - Procedures that need to be changed
  - Predictive models/ Decision Support Systems
  - Exercises and drills
  - Training on radiation protection issues
  - Learn from the management of other contaminants
- **Communication**
  - Who?.
  - Types of messages

Discussion Table

Presentations by participants

2. DELPHI SURVEY ON WEAKNESSES AND IMPROVEMENTS

- The objective was to know in depth the views of the panelists regarding:
  - The weaknesses or potential problems on the actual management in our country of contaminated foodstuffs, feedstuffs and consumer goods, identifying specific issues or challenges to be treated (31 items).
  - How these should be addressed, identifying possible improvement actions (21 items).
  - Structured in a two round questionnaire.
  - To be answered on-line
  - Considering the following **thematic areas**:
    - Regulatory issues (5/4)
    - Competences and coordination (3/5)
    - Dose, levels and measurement issues (7/4)
    - Operational issues (5/3)
    - Cross-border issues (2/1)
    - Public communication (5/3)
    - Training (2/2)
    - Other issues (2/-)

FIRST ROUND QUESTIONNAIRE
April 2015

Invitations to the survey: 76
Total of completed answers: 27
Total of uncompleted answers: 15
Declined the participation: 1

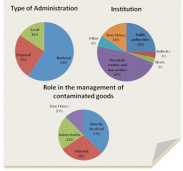
Response rate: 35.5%

SECOND ROUND QUESTIONNAIRE
July 2015

Invitations to the survey : 29
Total of completed answers : 19
Total of uncompleted answers : 2
Declined the participation : 0

Response rate : 72%

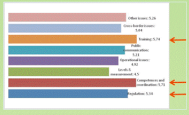
Respondent distribution



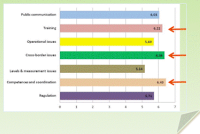
From the analysis of the results obtained in the first round, a second one, much shorter, was developed. The respondents were asked to score again the first 10 items selected as more important from the previous results of weaknesses and improvements, respectively.

Results of the first round

Main problems and weaknesses by thematic areas (averages)



Main improvement actions by thematic areas (averages)

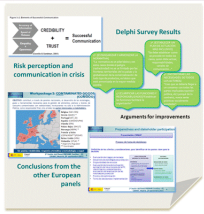


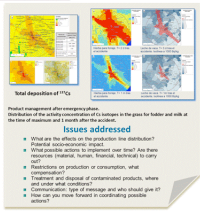
Results of the second round

Main weaknesses and problem	Average
1º. Lack of guides for the management of this issues	42,9%
2º. Lack of clarity in regulation	38,1%
3º. Lack of procedural expertise	28,6%
4º. Lack of coordination	28,6%
5º. Lack on technical expertise on Radiation Protection	28,6%

Main improvement actions	Average
1º. Standarise and harmonise of regulation	42,9%
2º. Establish an action plan involving all actors	28,6%
3º. Incorporate the needs of other affected parties	23,8%
4º. Clarify the roles and responsibilities	23,8%
5º. Establish communication channels between the different parties	23,8%

3. SECOND PANEL MEETING





Results of Panel Session — Table-top exercise

- Objectives:
  - Delphi survey results.
  - Risk perception and communication in the management of contaminated goods.
  - Discussion and focus on the detected weaknesses in the management system using a hypothetical case of radioactive contamination after a nuclear accident at a Spanish NPP.
  - Roundtable, discussion and final conclusions of the Panel.

CONCLUSIONS

Regarding the experience and continuity of the panel:

- The panelists agreed, that the experience has been very positive and in the need of continuity of the panel, constituting a fixed group for future discussions.
- It is yet to be decided the public institution that will coordinate its continuity.
- It has been difficult, despite all the efforts, to contact and involve non-governmental stakeholders, such as consumers.

Guidelines and proposals:

- Revision of the current regulatory framework, in order to improve what is covered already and develop what is not yet considered.
- Establish in advance, an inclusive action plan incorporating the needs of all the stakeholders involved.
- Definition of the roles and responsibilities of the Public Administrations and other stakeholders involved and adequate coordination among them all.
- Develop guidelines and/or best practice protocols with affected sectors in order to complement the official proceedings.
- Develop the necessary infrastructure to carry on the sampling and measurements needed, it is important to optimise the available resources.
- Improve cross-border issues.
- A catalogue with countermeasures should be prepared in cooperation with stakeholders in order to be understood and accepted.
- Continuous E&T programs for technical staff and specific radiation protection education programs for stakeholders with no background in this issue.
- Disseminate the radiological protection culture.
- Training exercises should include the transition and recovery phase.
- Communication plans regarding flow, content, timescales and language used.

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This work has received partial financial support from the European Commission Seventh Framework Programme (Nuclear Fission/Radiation Protection) under the PREPARE collaborative project: "Innovative integrative tools and platforms to be prepared for radiological emergencies and post accident response in Europe" (CP, Fission 2012, No 323287).

5.10. UNITED KINGDOM

1 Background

The Fukushima event identified a gap in the management of contaminated products after a nuclear or radiological incident. The European Commission project PREPARE was established to look at these issues. The challenges faced by the various authorities and regulatory organisations involved when contaminated goods arrive at ports or airports are complex. Work Package 3 of this project is intended to contribute to the development of appropriate strategies so that organisations are able to manage contaminated goods in a consistent way.

Two workshops were held, the first in March 2014 and the second in November 2014. The first workshop aimed to determine the scope and extent of the problem presented by contaminated consumer goods. The second workshop used case studies and flow charts to build on the findings of the first and draws together conclusions and proposals for dealing with unresolved issues. The workshops brought together the different authorities and regulators involved with dealing with radioactively contaminated consumer goods arriving at ports or airports as well as goods carriers and representatives of the steel industry.

Discussions at the workshops focused on clarifying the roles and responsibilities of the different organisations involved in the management of contaminated goods and identifying gaps in the procedures for dealing with such goods. Following feedback from stakeholders goods made with radioactively contaminated metal were considered in addition to goods contaminated after nuclear incidents.

The overall purpose of the workshops was to explore the issues related to these goods to help facilitate a coordinated and effective multi-agency response.

2 Stakeholder methodology

To ensure that the workshops achieved their aims, delegates were asked to prepare by reading and gaining an understanding briefing papers. The second workshop took account of feedback from the first meeting and included case studies and flow charts of the processes undergone when contaminated consumer goods are detected at ports and airports and within the country.

2.1. First workshop

Delegates were asked to consider questions relating to the project objectives. The principal project objectives are: to determine the roles of different organisations in implementing regulations and dealing with the contaminated goods; to determine if specific regulation and guidance are required to deal with goods contaminated with radioactive material; and to identify any practical and operational issues that there may be in implementing any regulations.

2.2. Second workshop

For the second workshop delegates were asked to review a document listing the roles and responsibilities of different organisations and a flow chart of the process undergone when contaminated consumer goods arrive at ports and airports. Delegates were asked to assess to the extent to which the flow charts represented their experiences of dealing with contaminated goods identified at borders and within the country. It was made clear that these documents were draft and intended for discussion and feedback as to whether they reflected the stakeholders understanding.

3 Composition of the stakeholder panel and meeting agenda

3.1. Stakeholder panel

Key stakeholders represented included regulatory authorities and government departments who have responsibilities for dealing with radioactively contaminated goods, local authorities, radiation protection advisers, UK Steel representatives and goods carriers. Twenty participants for 14 organisations took part. At the second workshop there was a slightly different mix of stakeholders with increased representation from local government agencies and the devolved administrations. There were seventeen participants from 12 organisations taking part.

The workshops were a mix of briefing, facilitated group work and feedback sessions.

3.2. First workshop

Introductions were followed by a presentation from the project lead, Tiberio Cabianca, who outlined the background to Work Package 3 and summarised the key issues facing organisations and authorities responsible for managing contaminated consumer goods. Following questions and points of clarification on this presentation, delegates were divided into two groups and were asked to consider the objectives of the project and points raised on the meeting paper. Each group was facilitated by a member of the workshop team. The final plenary session concentrated on feedback from the break out groups; discussion focussed on identifying a way forward and any gaps to be addressed. The project objectives provided a common thread throughout the day and a focus for discussion.

3.3. Second workshop

A presentation set the scene with the background and conclusions from the first workshop presented by the project lead. Case studies and flow charts were used to stimulate discussion which was carried out in a single group. The following items were considered: a draft document outlining the Roles and Responsibilities of the different organisations involved in the management of contaminated consumer goods; a generic flow chart of the process undergone by contaminated consumer goods when they arrive at UK ports or airports; case studies and example flow charts of contaminated goods identified both at a sea port; and within the UK, not at borders. Delegates were asked to assess to the extent to which the flow charts represented their experiences of dealing with contaminated goods identified at borders and within the country.

Discussions at the second workshop aimed to:

- capture the key points of feedback from the group in order to finalise the conclusions from the two workshops
- identify any gaps in guidance and regulation currently applied to contaminated goods
- establish the issues where there is consensus
- use the feedback from the group to produce updated flow charts and a list clarifying roles and responsibilities
- identify what future work needs to be done, who should do the work and whether guidance based on the findings of the workshop is needed.

4 Main issues identified in the panel discussions

4.1. Scope of PREPARE

Participants felt that dealing with goods made from contaminated metals, for example with where 60Co sources has been accidentally smelted with scrap metal, was a much more pressing issue than contaminated goods following a nuclear accident. Delegates asserted that the UK government needs to decide whether it wants to detect contaminated goods coming into the country. The Cyclamen Programme (Home Office UK Border Agency, 2010) used for detecting radiologically contaminated goods at UK ports and airports was set up in 2003 for security purposes. Participants questioned whether the Cyclamen Programme should be used purely for security or whether it should also be used for protection of the public from contaminated goods.

4.2. Capability in the event of an overseas emergency

In the event of an overseas radiological emergency there was strong consensus that the various UK agencies involved could cope with the influx of contaminated consumer goods. It was dealing with the routine cases of goods made from contaminated metals that were considered to be the greater problem.

4.3. Responsabilities

From the first workshop, it emerged that it can be difficult to establish who is responsible for contaminated goods. In particular, if the owner cannot be identified, it may be difficult to hold any organisation responsible for the contaminated goods. The second workshop aimed to delineate the roles using flow charts as an aid to exploring and defining the roles and responsibilities of the organisations involved. The draft list of Roles and Responsibilities was updated with the workshop findings.

4.4. Abandoned goods

Difficulties can arise when no-one takes ownership of contaminated goods detected at ports or airports and it is decided not to repatriate the goods. In such cases, the abandoned material is effectively radioactive waste.

Suggestions made by participants to deal with these problems were as follows:

- A new organisational structure could be set up to deal with the goods whereby one of the organisations involved could be designated as responsible for dealing with the consignor. This organisation could be given powers to apply pressure on the consignor to deal with the goods.
- Processes for the disposal of such goods could be streamlined with an Radiation Protection Adviser employed with specific responsibility to dispose of the items.
- A new central storage area could also be provided.
- Repatriation should incur financial penalties in order to act as a deterrent to importing contaminated goods.
- There should be funding for the disposal of abandoned contaminated goods with the disposal costs should be funded by the Government as an incentive to detect sources in scrap metal and thus remove them from the supply chain.

However, there was no consensus on these issues with some delegates considering funding of disposal as a disincentive towards the owners of the contaminated goods taking responsibility for these goods.

4.5. Criteria for release

There is no specific regulation or guidance on what criteria to use for the release of contaminated goods from detention after the detection by radiation monitors at ports or airports. At the first workshop participants stressed that they did not want more regulation, but guidance on how to apply the regulation that exists. The environment agencies have no regulatory power or responsibility in determining whether contaminated goods can be released following detection at ports of entry. Once the contaminated items have been fully assessed and characterised, they can advise on the application of the legislation and disposal of contaminated goods if they are deemed to be waste. The environment agencies criterion for release without the need for further legislative control would be the item being out of scope of the Environmental Permitting Regulations 2010 (EPR, 2010) or the Radioactive Substance Act 1993 (RSA, 1993). The Office for Nuclear Regulation will release the goods for onwards transport if they are below the levels defined as radioactive material in the IAEA transport regulations (IAEA, 2012). If the contaminated goods are above these levels, the goods must be repackaged according to the transport regulations before they are released for onwards transport.

4.3. Need for international approach

The stakeholders representing the carriers stated that any efforts to deal with contaminated goods needed to be co-ordinated internationally as goods are transported from all over the world. In addition, some developing countries do not have the expertise and infrastructure to deal with the repatriation of contaminated goods.

5 Conclusions and proposals

From the first workshop, it emerged that it can be difficult to establish who is responsible for contaminated goods, depending on the situation. Furthermore, in the event that no one comes forward, it may be difficult to hold any organisation responsible for the contaminated goods. Participants felt that dealing with goods made from contaminated metal was a much more pressing than dealing with contaminated goods from nuclear accidents as this is occurring routinely. There was consensus that, in the event of an overseas radiological emergency, the various UK agencies involved could cope with the influx of contaminated consumer goods.

The second workshop used flow charts and case studies as a way of defining the roles and responsibilities of the different organisations. Discussion based on the flow charts achieved greater clarification about which organisations took responsibility at different stages of the process of managing contaminated goods. However, roles and responsibilities were still not completely clear-cut. Delegates felt that PHE should produce a guidance document that clearly sets out the roles and responsibilities of the different organisations involved. Guidance should be based on the flow charts and endorsed by all agencies.

Delegates suggested that the following types of guidance would be particularly useful for the organisations involved:

- A brief information sheet endorsed by all agencies to hand out to owners or importers. The leaflet should be of the type ‘Why have my goods been detained and what do I need to do?’
- flow charts which show how contaminated goods are handled and identify the gaps
- a guidance document based on flow charts
- reports from the two workshops
- a website on which all of the above guidance documents are available.

One of two main ongoing issue identified is that there is no regulation or guidance on what criteria to use for the release of contaminated goods. Participants concluded that they did not want more regulation, but guidance on how to apply the regulation that exists.

The other main issue that needs to be addressed is when an owner or importer abandons the contaminated goods at ports or airports and they become waste. Such goods, which have not been through customs, are outside the UK regulatory system. The point at which the goods are declared radioactive waste needs to be clarified. In addition, it needs to be resolved whether goods can be sent for analysis if they have not cleared customs. There was no consensus on dealing with abandoned goods although the stakeholders made a number of suggestions.

5.1. Further work

Delegates generally agreed that further work regarding the issues presented by contaminated goods would be very useful. PHE suggested that it would look into the possibility of further work in discussion with other agencies such as the Department of Energy and Climate Change.

Additionally, delegates agreed that it would be useful to establish a working group to continue the work initiated in the project. PHE suggested maintaining a list of contact names of people who had expressed an interest in the work and keeping them updated with information about the progress of the project.

5.2. References

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UK Stakeholder Panel – Consumer goods

Public Health England

Protecting and improving the nation's health

Kelly Jones and Tiberio Cabianca

Centre for Chemical, Radiation and Environmental Hazards

STAKEHOLDER PANELS

The main objective was to discuss with UK stakeholders the key issues related to handling of goods contaminated with radioactivity following a nuclear accident, as part of the European Commission PREPARE project. Two stakeholder meetings were held; March and November 2014.

The primary objectives of the first workshop were to determine:

- The roles of different organisations in implementing regulations and dealing with the contaminated goods
- Whether specific regulation and guidance are required to deal with goods contaminated with radioactive material
- Any practical and operational issues that may need to be considered when implementing any regulations

Twenty people from 14 organisations attended. The panel's opinion was that in the event of an overseas radiological emergency, UK organisations could cope with the influx of contaminated consumer goods and that dealing with the routine cases of contaminated goods presented a bigger challenge. It was generally felt that some case studies should be used by Public Health England (PHE) to aid the development of flow charts detailing how these goods should be treated. Additionally the roles and responsibilities of the organisations involved could be clarified. The final point from the panel was that many of the challenges identified in developing a cohesive strategy managing contaminated consumer goods would benefit from cooperation at a European level.

The primary objectives of the second workshop were to determine:

- Further clarification on the roles and responsibilities of different organisations in implementing regulations and dealing with the contaminated goods
- Discuss flow chart (see figure) and case studies prepared by PHE to develop a procedure to deal with all likely situations. Identify what guidance is needed for the UK
- Agree on further work required and future of the stakeholders group

Seventeen people from 12 organisations attended. Greater clarification was gained about the role of various organisations at different stages in the process of managing contaminated goods. However, roles and responsibilities were still not clear-cut and there was no consensus about the protocol for dealing with abandoned goods. However, the stakeholders did make a number of suggestions. The panel felt that PHE should produce a guidance document that clearly sets out the roles and responsibilities of the different organisations involved and should be endorsed by all agencies. The guidance should set out how the regulations should be applied but the panel concluded that no additional legislation was required.

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Department for Business, Innovation and Skills
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DHL
Environment Agency
Fed Ex
Food Standards Agency
Government Decontamination Service
Health and Safety Executive
Local Authority - Southampton
Natural Resources Wales
NUVIA
Office for Nuclear Regulation – Radioactive Materials Transport
Port Health – Felixstowe and London
Scottish Environment Protection Agency
Swiss Air
Trading Standards
UK Steel

CASE STUDIES

Two case studies were used to explore the issues

Case Study 1 - Contaminated steel plasterboard anchor bolts detected at a sea port

A container arriving at Felixstowe sea port triggered radiation detectors and was found to contain packages of steel plasterboard anchor bolts some of which were contaminated with ^{60}Co. The bolts were stored at Felixstowe for some months initially awaiting repatriation. Given factors such as the high cost of repacking the goods in line with transport regulations and possible doses to the ship's crew it was decided to separate the active bolts from the non-active ones and send them to the UK's Low Level Waste Repository.

Case Study 2 - Contaminated cooking utensils detected on exit from a nuclear power station

Several stainless steel cooking utensils contaminated with ^{60}Co were discovered as they triggered the radiation monitors on leaving a nuclear site. Their contamination was not related to activities on the site and Trading Standards traced the supplier of the utensils. A public health risk assessment was performed and the risk judged to be very low. It was therefore decided that the utensils still in circulation did not need to be

FLOW CHART