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Proposal by the Expert Group on a Post-Accident Food Safety Framework for Long-Term Trade in Food and Trust in the Food Supply Chain after a Nuclear or Radiological Accident

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List of abbreviations and acronyms

CAC	Codex Alimentarius Commission
CRPPH	Committee on Radiological Protection and Public Health (NEA)
EFFoST	European Federation of Food Science and Technology
EFSA	European Food Safety Authority
EGFSF	Expert Group on a Post-Accident Food Safety Framework (NEA)
EU	European Union
FAO	Food and Agriculture Organisation
IACRS	Inter-Agency Committee on Radiation Safety
IAEA	International Atomic Energy Agency
IAFP	International Association for Food Protection
ICRP	International Commission on Radiological Protection
IFT	Institute of Food Technologists
NEA	Nuclear Energy Agency
RP	Radiological protection
RANET	Response and Assistance Network
SME	Subject matter expert
SOT	Society of Toxicology
WHO	World Health Organization

Executive summary

The NEA Committee on Radiological Protection and Public Health (CRPPH) Expert Group on a Post-Accident Food Safety Framework (EGFSF) has made recommendations for implementing a mechanism to independently validate the approach taken to food monitoring and trade controls. This is to facilitate long-term trade after a nuclear or radiological accident. This methodology, based on independent scientific review, could facilitate regaining consumer trust in the food supply chain and will benefit trade over the long term. This methodology could be integrated into the existing and emerging international system of guidelines and recommendations in this field.

Past nuclear accidents, such as Chernobyl and Fukushima Daiichi, have shown that the management of radioactivity in food can lead to long-term health and trade impacts that need to be addressed. The lack of international harmonisation and independent scientific evaluation can lead to both confusion and trade dispute, which affect public health and international trade.

The EGFSF recommends the implementation and operationalisation of a scientific review mechanism to independently validate food monitoring and trade controls in support of the post-accident management of food. This mechanism would involve standardised sampling and testing protocols, expert panels for scientific review, and transparent processes for effective communication of findings, recommendations and actions to the public. The EGFSF recommends governments formally adopt the scientific review mechanism and implement it through an international legal mechanism.

Implementation and operationalisation of this mechanism would enhance trust in food safety decisions, support international trade, and ensure the safety of food products. The aim would be to provide clarity and consistency for stakeholders, thereby strengthening public and international confidence in the food supply chain after a nuclear or radiological accident.

The adoption of the EGFSF's recommendations could improve the management of food and trade in food following a nuclear or radiological accident. An, internationally recognised methodology based on scientific assessments and reviewed by a panel of international experts could help to address some of the remaining concerns around food safety, ultimately promoting a safer and more reliable post-accident food supply chain.

1. Introduction and background

The experience derived from past nuclear accidents, such as Chernobyl in 1986 or Fukushima Daiichi in 2011, has shown that the management of contaminated food after such accidents can lead to several health and socio-economic impacts that must be addressed under the national sovereignty of all affected countries. At the same time, experience has clearly demonstrated that a lack of international harmonisation and independent scientific evaluation of the situation can lead not only to increased confusion around food safety in affected and non-affected populations but can also hamper international trade and lead to disagreements between countries. Ensuring the safety and quality of food products and maintaining consumer confidence are paramount to limit the health and economic impacts of nuclear or radiological accidents.

International food safety guidance and recommendations exist and are issued by international bodies such as the International Atomic Energy Agency (IAEA), the International Commission on Radiological Protection (ICRP), the Food and Agriculture Organization (FAO), and the World Health Organization (WHO). Despite the individual relevance of each guideline and recommendation issued by international bodies, a noticeable challenge remains in identifying and implementing relevant aspects on the long-term trade of food following a nuclear or radiological accident. In 2014, the NEA presented the first argument for the need for a framework for the post-accident management of contaminated food and outlined a path towards an independent scientific review of measures taken in this regard (NEA, 2014). The aim of the framework would be to reinforce public and international confidence in the implementation of food safety decisions.

The NEA Committee on Radiological Protection and Public Health (CRPPH) during its 79th meeting in April 2021 decided to revitalise the NEA Food Safety Framework project by creating the Expert Group on a Post-Accident Food Safety Framework (EGFSF). The overarching objective of the EGFSF is to identify options to develop an accepted, internationally recognised mechanism, based on scientific assessments made by a panel of international experts, to solve some of the remaining challenges with food safety after an accident.

This report provides recommendations for the implementation of independent validation of food monitoring and trade controls mechanisms to facilitate long-term trade after a nuclear or radiological accident. It does not intend to interfere with established national arrangements and criteria, which are a national competence. Decisions on food safety are likely to require flexibility in light of national and regional cultural and agro-economic circumstances. Approaching these aspects through an international lens will facilitate coherent, cross-country risk communication, information sharing and assessments on the long-term international trade in food.

Such an international mechanism would aim to reinforce the confidence of stakeholders, including the public, in the food supply chain at the national and international levels through independent validation based on scientific review. The implementation of such a mechanism would improve the management of food trade in the event of a future nuclear or radiological accident, mostly from the viewpoint of preparedness and long-term recovery. Additionally, it should encourage the use of coherent approaches for long-term trade after a nuclear or radiological accident that aim, to the extent possible, to harmonise efforts and actions at the international and national levels.

2. EGFSF recommendations

Based on the proposal in this report, the EGFSF recommends that:

1. an international, scientifically based mechanism be established and adopted by governments for the independent validation of the approach taken to food monitoring and trade control by the accident and importing countries with the aim of providing assurance on food safety;
2. the existing guidance from international bodies concerning the long-term domestic and international trade in food following a nuclear or radiological accident be supported by operational recommendations with the aim of assisting authorities to build trust in the food supply chain; and
3. governments formally adopt the scientific validation mechanism and implement it through an international legal mechanism.

This report seeks to provide support and evidence for the three recommendations, with the following objectives:

- Recommendation 1:
    - Provide an outline of an international, scientifically based mechanism, its terms of reference and functioning.
- Recommendation 2:
    - Identify, in addition to the available international guidance, recommendations and practical advice on the adoption of a coherent and comprehensible approach, facilitating stakeholder communication and building consumer trust. This advocates for clarity about the situation, co-operation between affected people, regulatory bodies, producers and retailers, as well as for consistency between actions and expected outcomes.
    - Encourage clarity in the use of existing terminology and on which existing criteria to use in the context of long-term food trade after a nuclear or radiological accident to support clear communication and thus build trust.
    - Match the sovereignty principle and international trade agreements, which are well established.
- Recommendation 3:
    - Propose options to implement the overall process through a suitable approach on the policy, political or legal level to be agreed internationally.

2.1. Recommendation 1

An international, scientifically based mechanism should be established and adopted by governments for the independent validation of the approach taken to food monitoring and trade control by the accident and importing countries with the aim of providing assurance in food safety.

Summary of recommended actions:

A. Once sampling and testing protocols are established based on standard values (e.g. CODEX), governments should formally agree 1) to implement standardised monitoring mechanism(s) and 2) to support them through the provision of subject matter experts (SMEs).

B. This implementation and support should be codified quickly to have it in place together with the sampling and testing.

C. Expert panels should be organised through independent multilateral and/or international bodies with appropriate scientific and technical expertise.

D. The panel review and validation of the monitoring and trade control process should be transparent activities.

E. The goal of providing assurance in food safety should be the primary driver in the technical overview and independent validation. Governments should formally agree to recognise the outcomes of the ongoing validation process.

F. Where process failures are identified that do not meet the standards of validation, governments should formally agree to develop and implement, within a reasonable time frame, modifications and corrections to those processes so as to provide assurance in food safety. The initial response to process failures should be corrective rather than punitive.

2.1.1. The scientific review mechanism

A. Sampling and testing protocols should be established based on standard values (e.g. CODEX). Governments should also formally agree to:

1. implement standardised monitoring mechanism(s) and
2. support them through the provision of SMEs.

Justification:

It is prima facie useful from a technical perspective to have a commonly agreed-upon set of standards for sampling and testing protocols. Such standards prevent conflicting protocols, simplify data collection and monitoring, and ultimately support trade and public health. However, these standards will only be of value in protecting the public's health and safety if they are used consistently by trade partners in food impacted by nuclear or radiological accidents. This consistent use in the food commercial and regulatory sphere(s) is predicated upon the demonstrable political support for these standards by the relevant individual nations and collective trading blocs.

The standard values to be adopted are, by their nature, based on the scientific and technical aspects of food science, and on radiological protection related disciplines underpinning the relationship between radiation exposure and biological effects, and ultimately health risk, which can inform the response to a nuclear or radiological accident. Trading partners who have a demonstrated interest in supporting the reasonable, fair and consistent implementation of these standards can best serve that interest by providing for the involvement of appropriate SMEs to validate the application, verification and (if necessary) the amendment and/or modification of those standards in the years following the nuclear or radiological accident.

B. This implementation and support should be codified quickly so as to have it in place together with the sampling and testing

Justification:

With regard to sampling and testing protocols, experience has shown that administrative actions can add considerable time between when the protocols are finalised and when they are implemented. In the wake of a nuclear or radiological accident, when food is at risk or unavailable, either for local consumption or for international commerce, this delay may mean that public health and safety is compromised. The committed support of trading partners and other concerned parties, affirmed early in the process (i.e. while protocols are being developed) will shorten this critical period between review/adoption and implementation.

C. Expert panels should be organised through independent multilateral and/or international bodies with appropriate scientific and technical expertise

Justification:

Although each nuclear or radiological accident will be unique in its specifics (location, type, source, intensity, projected duration, commodities impacted, etc.), there are certain technical skill sets which can be reasonably expected to be required following any such accident. The broad organisation of these expert panels should be done in advance to provide a quicker response in the event of an actual nuclear or radiological accident. Moreover, the organisation of panels to provide SMEs with key skill sets will be of value. While it is beyond the scope of this report to provide an exhaustive list of skill sets that would be best incorporated into the expert panels, the following technical disciplines are likely to be appropriate as SMEs: crop science, livestock and/or poultry science, soil science, agronomy, food science, fisheries science, toxicology, radiological chemistry, epidemiology, statistics, water quality/hydrology.

Representatives from government agencies (trade and regulatory) and location-specific academics with knowledge and expertise in the specific commodities and conditions associated with the actual nuclear or radiological accident are expected to work with SME panels, drawn from multilateral and international bodies. As a group, the SME panels must have the expertise to effectively develop testing and validation protocols, as well as the independence needed to ensure fair, equitable and science-based recommendations. Examples of these international bodies are:

- Institute of Food Technologists (IFT);
- European Food Safety Authority (EFSA);
- International Association for Food Protection (IAFP);
- European Federation of Food Science and Technology (EFFoST);
- Society of Toxicology (SOT).

Draft Terms of Reference for governance of the SME panel:

The guiding objective of the SME panel is science-based management of the food monitoring and trade control through an independent validation protocol that will ensure safe food in the context of international trade and confidence in the food supply chain in the long-term aftermath of a nuclear or radiological accident.

A small core group of SMEs covering all major regions of the world should be established in advance of an accident to enhance preparedness for the implementation of the validation protocol with activities addressing e.g. terminology, communication strategy, scientific review, exercises. In the immediate wake of a nuclear or radiological accident, this small core group should be extended to a full panel considering affected countries and should prepare for an active role in validation when necessary. All panel members will be identified through a call for experts to the NEA specialised governance committee(s), with additional observers including experts from the Inter-Agency Committee on Radiation Safety (IACRS). The panel will report to the NEA Director-General under a three-year mandate, renewable for successive three-year periods at the discretion of the NEA Director-General.

Ideally, the panel will consist of 15 SME members and will operate under the NEA governance rules, with a Chair and one or two Vice-Chairs acting as the Bureau, supported by a NEA Secretariat. The Bureau will serve as the core leadership team for the panel, reporting to the NEA Director-General, setting and driving agendas, scheduling meetings, managing internal and external communications, co-ordinating the functions of administrative support staff, and performing other necessary management tasks. The panel will seek consensus through open discussion, formal decisions and actions.

The panel will report its activities and findings at ad hoc frequency. It will produce an annual report detailing activity level trends in various food items, recommended actions, and other key matters. The report will also include the detailed review and validation of the bases used by the affected country (i.e. the specific criteria applied, the methods and technology used to measure food products, how analytical results are handled and reported, and accuracy control methods) to ensure the appropriateness of the government's methods as protective of public safety. The annual report will incorporate an executive summary suitable for communication to non-experts. The Bureau will work with administrative support staff to ensure open, effective communication of findings, recommendations and actions to the public, using accessible language and the tools of science communication.

The composition of the panel will balance subject matter expertise and geographic alignment. Each panel member will represent several factors. The identification of specific individuals will therefore require a balanced approach in selection. An illustration is given below:

- **Subject matter expertise:** three SMEs in radionuclide persistence and dispersion and transfers in the environment; one representative from the Codex Alimentarius advisory group on radionuclides; two SMEs in food toxicology; two SMEs in crop science/agronomy; two SMEs in livestock and poultry production; one SME in soil science; one SME in hydrology; one SME in food science/technology; one SME in public health; one SME in epidemiology. A single individual may provide expertise in multiple areas.
- **Geographic alignment:** four from the country with the site of the nuclear or radiological accident; four from the affected/adjacent region; seven global/international.

The panel will provide for the presence of up to 20 additional observers. Observers will contribute to meetings, discussions, reports, etc. only when invited to do so by the Chair. Observers will be drawn from interested parties such as affected economic trading blocs, non-governmental organisations, independent observers, and other interested parties. Three observer positions will be reserved for representatives from the country whose territory contains the site of the radiological release.

D. The panel review and validation of the monitoring process should be transparent activities

Justification:

In the wake of a nuclear or radiological accident, public confidence in the food supply will be a prime goal for consumers in proximal areas and for all impacted trading partners. Transparency in the presentation of the testing protocols and implementation monitoring will help to ensure this confidence.

To ensure transparency, it is recommended that the approach taken by the government in establishing the reference values and the parameters used in deriving the standard values be disclosed.

Monitoring results should be published promptly, as such data are important for consideration of lifting restrictions on food produced in affected countries. To transparently provide meaningful information, the establishment of pre-agreed international guidelines on necessary information to be published would be useful. (e.g. activity concentrations of radionuclide, detection limit, and the region of food production, whether it is wild or cultivated, distributed or not).

E. The goal of providing assurance in food safety should be the primary driver in the technical overview and independent validation. Governments and trading partners should formally agree to recognise the outcomes of the ongoing validation process

Justification:

The goal of providing assurance in food safety should be the primary driver in the technical overview and independent validation. Based on experience with previous accidents, it is reasonable to expect significant disruptions to food production, distribution, sales and consumption following a nuclear or radiological accident. Although it is possible for one or more trading partners to see such disruptions as an opportunity for economically advantageous realignment of international supply chains, market structures, etc., such efforts should be viewed as outside the scope and intention of the food safety validation process. A formal agreement to that effect will ensure the widest acceptance of, and adherence to, the food safety testing and validation protocols developed by the expert panel(s).

F. Where monitoring and trade control processes are identified that do not meet the standards of validation, governments should formally agree to develop and implement, within a reasonable time frame, modifications and corrections to those processes to provide assurance in food safety. The initial response to process failures should be corrective rather than punitive.

Justification:

Given the complexity of ensuring food safety process validation, particularly in the wake of a nuclear or radiological accident, it may be expected that upon implementation, the recommended process will fall short in one or more areas. With the goal of food safety being held first and foremost, a transparent and corrective response to these failures by

impacted trading partners will drive improvements in the testing and validation protocols. In contrast, a punitive response to process failures, i.e. a response that assumes bad intent, will likely complicate and hamper the co-operative working relationships required to best ensure effective implementation of the food safety validation protocols.

Investigations of process failures are responsible and expected. Unintentional process failures arising from problematic or unworkable issues in protocol design or implementation will warrant corrective action based on sound science.

2.2. Recommendation 2

The existing guidance from international bodies concerning the long-term domestic and international trade in food following a nuclear or radiological accident should be supported by operational recommendations with the aim of assisting authorities to build trust in the food supply chain.

2.2.1. Ensure appropriate preparedness for long-term management of post-accident food trade, building upon national arrangements

To facilitate long-term trade of food, as well as to avoid losing the public's trust in food safety decisions, specific post-accident recovery preparedness arrangements at the national level are necessary, building upon existing arrangements, rather than changing them. This will ensure readiness in relevant areas such as food monitoring, radiological criteria and the communication of their meaning to the public, as well as coherent decision making on protective actions and their lifting. Detailed guidance on developing post-nuclear or radiological accident recovery preparedness arrangements is provided in the publication, "Building a Framework for Post-Nuclear Accident Recovery Preparedness – National-Level Guidance" (NEA, 2022).

The volume of requests and duration of the response to a nuclear or radiological accident stress the post-accident recovery arrangements. For example, the monitoring requirements can have an impact on laboratory capacity and incur analysis delays. International guidance to laboratories regarding the prioritisation of analysis of food and feed versus other aspects of the incident should be available. Furthermore, clarity is needed on whether the IAEA Response and Assistance Network (RANET) could be available to co-ordinate assistance.

Stakeholder engagement is a key factor in the management of post-accident food trade to maintain and build trust. Existing national arrangements should use the experience from previous accidents to grow knowledge and understanding of contaminated food (i.e. train the trainer).

2.2.2. Develop plans for transparent monitoring and trade control systems for food management

Governments should put in place in advance the necessary arrangements to allow the radiological characteristics of the situation to be quickly identified and for measurements in food to be undertaken. Monitoring and trade control of foodstuffs is a key aspect of food and drinking water management to both reassure the public and facilitate trade inside and outside the affected area. Sampling and testing methods should include pre-treatment of food samples, analytical methods, how analytical results are handled and reported, and accuracy control methods to ensure inspection reliability. Guidelines should be developed for scaling up from routine monitoring and trade controls to broader emergency monitoring, and for transitioning back to routine monitoring and trade controls. To effectively

implement long-term monitoring programmes, it is important to periodically review monitoring plans in response to past monitoring results.

2.2.3. Codex guideline levels for radionuclides in food should be used in international trade on a permanent basis

The Joint FAO/WHO Codex Alimentarius Commission (CAC) developed guideline levels for radionuclides in food with the intent of having them used in international trade in the first year following a nuclear or radiological emergency. In 1991, the CAC agreed to extend the period of application of the Guideline Levels indefinitely i.e. they would no longer apply only to the first year after a nuclear or radiological accident. The IAEA has pointed out that these levels, based on a dose criterion of 1 mSv per year "are also applicable on a permanent basis" (IAEA, 2016). Given the conservative approach used in derivation of the Codex guideline levels and the need for criteria in international trade in the longer term following a nuclear or radiological accident, it is recommended that the Codex guideline levels be used for international trade on a permanent basis (Codex Alimentarius, 2011). If less stringent or more stringent values are adopted at the national level, the rationale for the choice and variations from Codex assumptions must be established, explained and clearly communicated to consumers and other stakeholders (e.g. food processors, retailers and authorities) in both exporting and importing countries. But the EGFSF is keen to point out that the coexistence of several differing values/levels poses problems of communication and of understanding (however justified they may be from a purely scientific point of view).

2.2.4. Envisage harmonisation between nationally consumed and internationally traded food

National frameworks should, to the greatest extent possible, be harmonised with consensual international guidance established by governing bodies of relevant international intergovernmental organisations. Codex guideline levels would therefore be an appropriate starting point when implementing national criteria in a post-accident situation. However, it is recognised that national governments may already have a different set of criteria in place for domestic trade or may wish to adopt different values for internal use within their own territories due to specific national considerations (see below).

2.2.5. Provide flexibility in national criteria where needed, supported by a robust narrative

Flexibility is needed to deal with unique situations that arise in each country based on the prevailing circumstances. For instance, assumptions concerning food distribution that have been made to derive the guideline levels from Codex Guidelines may not apply (different consumptions or percentages of imported contaminated food). It is also necessary to balance the interests of producers, retailers and consumers at the local, national and international levels. For example, it may be appropriate to adopt higher activity concentrations for forest foods that are culturally or nutritionally significant to local populations, in consultation with the affected people. The absence of sufficient alternative food may be another reason for (temporarily) adopting higher activity concentrations. Overall, the application of a clear, transparent and science-based approach should be the basis to define permitted activity concentrations, even if these might vary due to unique situations.

2.2.6. Use consistent and understandable terminology as part of a risk communication strategy

Existing guidance uses technical terms that can be difficult to comprehend for non-experts. The affected/exporting country should, where possible, determine the use of coherent terminology applying to all traded food. The used term should be clearly defined in a language that is understandable to non-experts.

Applying an appropriate risk communication strategy will promote a better understanding of the information regarding the levels of radioactivity in foods. Risk communication should, to the extent possible, clearly state that applied criteria are appropriate for protecting those most at risk. The use of different criteria for infant food and other food should be explained transparently. More details on preparing post-accident stakeholder communication strategies are provided in the publication, "Building a Framework for Post-Nuclear Accident Recovery Preparedness – National-Level Guidance" (NEA, 2022).

2.2.7. Focus on consumer concerns rather than technical radiological protection aspects

The focus of post-accident long-term food trade strategies should be on the safety and acceptability on the food rather than technical radiological protection considerations, such as different exposure situations. The approach to long-term trade should be understandable and based on measurable quantities (activity concentrations). Individual radiation doses that might be incurred from consumption of food are not directly measurable in a practical way and therefore are not the most appropriate targets for establishing controls.

2.3. Recommendation 3

Governments should formally adopt the scientific review process and implement it through an international legal mechanism, e.g. on the OECD level.

There are several options available within the OECD framework to legally implement the above-described scientific review process. The most appropriate solution should be identified based on the preference of member countries. Below is a representative, non-exhaustive list of potential legal tools, ranking from the legally most binding option to the least binding option.

2.3.1. International treaty

The establishment of an international treaty would give a formal existence to the review process and could be adapted to the specific needs in terms of obligations placed on potential parties. However, the process of drafting an international treaty until its entry into force is long and uncertain, including notably establishing a negotiating body, reaching consensus before adoption, and adopting the implementing and ratifying legislation in each country willing to become a party. This process could take several years (possibly decades) and would need to be repeated every time that the treaty needs to be amended.

2.3.2. OECD Council Decision

A second option is the adoption of a decision by the OECD Council. This instrument is legally binding on all OECD members (except those that abstain at the time of adoption) and, under certain conditions, may also be adhered to by non-members.

2.3.3. OECD Council Recommendation

A third option is the adoption of a recommendation by the OECD Council. This instrument is not legally binding but materialises a political commitment of adherents to implement it. Recommendations are also open to non-members. It is also possible to have instruments partly composed of a decision and a recommendation.

2.3.4. NEA Steering Committee for Nuclear Energy Statement or Declaration

A fourth option is the adoption of a Statement by the NEA Steering Committee for Nuclear Energy. This instrument is not legally binding and there is no established process for the adherence of non-NEA members countries.

A Declaration is an OECD Legal Instrument, generally prepared at the level of a subsidiary body. They usually set general principles or long-term goals, have a solemn character, and are adopted at ministerial meetings of the OECD Council or other OECD committees.

Within the NEA, a Declaration requires Steering Committee approval prior to signature. Once approved, the Declaration is then transmitted to OECD Council to be noted.

Conclusion

The implementation and operationalisation of a scientific review mechanism could enhance harmonisation and trust in the field of food safety monitoring and trade controls following a nuclear or radiological accident. Harmonisation of national frameworks with consensual international guidance established by governing bodies of relevant international intergovernmental organisations could provide needed clarity for practitioners and stakeholders. The implementation of a methodology needs international consent and a formal proposal for a policy instrument.

The proposed mechanism offers an opportunity to strengthen international collaboration by ensuring that decisions taken after a nuclear or radiological accident are aligned with transparent scientific principles. By promoting shared understanding and structured co-operation, countries can reduce discrepancies that might otherwise generate confusion among consumers, regulators and trading partners. The mechanism therefore serves not only as a technical tool but also as a platform for enhancing mutual confidence and collective preparedness.

The establishment of a durable, internationally recognised process could support long-term resilience within the global food supply chain. By reinforcing public trust, improving communication practices, and ensuring a consistent application of radiological criteria, the mechanism could position governments and stakeholders to respond more effectively to future events. In doing so, it contributes to broader recovery objectives, safeguarding both public health and socio-economic stability over time.

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