Discussion Paper

How do we answer the question: “What is safe?”

1 Introduction

Nuclear and radiological emergencies (radiation emergencies) can have local, national and transboundary consequences. With the expansion of new nuclear power programmes as well as emerging security threats, and experience from nuclear and non-nuclear threats, crises and emergencies, emphasis on the field of public communications as a factor in ensuring public safety and protection has increased.

Experience from past emergencies has proven the fundamental need to communicate with the public in an effective way, not only to ensure the appropriate implementation of protective actions but also to mitigate the consequences of fear and the psychological effects of radiation emergencies, and facilitate effective recovery from emergency situations at a later stage.

Requirement 13 of the IAEA Safety Standards Publication No. GSR Part 7 explicitly states, that “the government shall ensure that arrangements are in place for communication with the public throughout a nuclear or radiological emergency.”¹ Furthermore, GSR Part 7 requires that “arrangements shall be made for providing useful, timely, true, clear and appropriate information to the public in a nuclear or radiological emergency...”² and that Governments should “ensure that a system for putting radiological health hazards in perspective in a nuclear or radiological emergency is developed and implemented with the following aim:

- To support informed decision making concerning protective actions and other response actions to be taken;
- To help in ensuring that actions taken do more good than harm;
- To address public concerns regarding potential health effects.”³

There are a number of factors that must be taken into consideration in order to engage in effective public communication throughout an emergency. Messages must be understandable and take full consideration of the health hazards associated with nuclear or radiological emergencies, both in connection to radiation exposure and in the public actions during and

after an emergency. All messages must be placed into context and adaptable for various forms of public communications.

However, for ensuring effective public communications related to a radiation emergency, plain language and well developed messages won’t be sufficient. Of equal importance is the credibility of the messenger.

Whereas there is common understanding that truthful and credible plain language communications is essential for the affected population’s compliance with protective actions and for informed decision making, the international community has failed so far to deliver a unilateral answer to the most important question the public, the media and decision makers ask when it comes to radiation emergencies: “Am I safe?” and “Why should I believe you?”

This was identified by the participants of the International Conference on Global Emergency Preparedness and Response, organized by the IAEA in Vienna in October 2015, as one of the crucial challenges, too. In his recommendations the conference president, Mr Ramzi Jammal, pointed out that not answering this question “would further reduce the credibility, not only of experts, but of authorities and organizations responsible for protecting the public”, and that these answers need to be presented “in simple and clear language so that it may be understood by the broadest audience.”

1.1 Objective of this discussion paper

The objective of this paper is to provide a starting point for discussion within the Emergency Preparedness and Response Standards Committee (EPReSC) on how to enhance the communication of “What is safe?” It is also meant to foster a clear understanding that the discussion has two dimensions: the criteria to put health hazards into perspective, based on subject matter expertise and how to communicate these criteria effectively, in a credible manner, and in plain language to the public and decision makers.

The ultimate goal is to provide the Secretariat and the Member States with recommendations on this regard and a way forward, based on the discussion within EPReSC.

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1.2 Scope

This paper focuses on aspects related to emergency preparedness and response (EPR). It is not specifically considering health hazards from and risk communication about routine situations (radon etc.).

2 Basic Considerations

Plans, procedures, training and other arrangements for public communications formulated at the emergency preparedness stage, including ongoing public engagement, contribute to effective emergency communications during the response. Targeted communications at the preparedness stage can inform, for example, residents near a nuclear power plant about radiation safety and emergency arrangements likely to be implemented during a response. It can be understood as a “trust account” in which you invest at the preparedness stage. Likewise, routine preparedness communications with the media may be used to improve the credibility of the organization or officials involved in emergency response. This will help build trust in the response organization, which will be vital during an emergency. However, it always has been a considerable challenge to reach the broader public at the preparedness stage as their interest in radiation safety and protection is extremely low when there is no significant event being reported in the media report. Effective public communications in an emergency therefore cannot count on knowledge within the public.

2.1 Risk Perception

Effective public communications during emergency response must consider and be based upon the role that risk perception plays in how people respond to emergencies. Recently, there has been growing recognition that, “for many high impact risks we [governments] do not understand what the public actually expects in a situation, or how tolerant they may be of ‘abnormal’ risks during an emergency”\textsuperscript{5}. The impact of risk perception on public behaviour during emergencies, regardless of their cause or severity, highlights the need for early development of emergency arrangements for public communications with a foundational basis centred on an understanding of the relationship between the scientific foundations, public risk perception, risk communication and public behaviour.

2.1.1 Understanding variations in expert and public perceptions of risk

To enhance effective and transparent public communications in the event of a radiation emergency, responsible authorities need to acknowledge varying risk perceptions amongst

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different stakeholders. There is a gap between public and expert understandings of risk\textsuperscript{6} and too often a tendency on the behalf of experts to underestimate the impact that risk perceptions can have in determining the actions people may take during an emergency in the belief they need to protect themselves.

The differences of expert and public risk perception pose substantial challenges for organizations tasked with risk communication. Experts who don’t take the differences in risk perception of the public seriously can generate distrust with the public. The public may not only consider themselves to be exposed to a perceived risk voluntarily; they may also feel that their very real concerns are being dismissed. Risk communicators must address this difference of expert and public understanding in order to ensure that their communication is effective.

Bridging this gap requires the development of an understanding of the psychological factors behind the formation of these perceptions including the psycho-social impact an emergency situation has on the affected and the general public as well as the decision makers. Experts in the field of risk perception often generate complex statistical methods and analyse large amounts of data in order to identify the risks that are the most likely to impact public health. This quantitative approach often fails to take the qualitative social context into account. The public risk perception is based on a range of factors including levels of familiarity of the subject matter, whether or not exposure to the risk is, or believed to be, voluntary, the perceived level of control in actions taken to protect against the risk and in the trust the public places with decision makers.

When emergency communicators fail to take these specifics of risk perception into account and not enough background knowledge was built at the preparedness stage, messages during the emergency response might not be understood or trusted by the affected population and the broader public. This might result in non-compliance with protective actions and the spreading of fear that might influence the affected population and decision makers resulting in unwarranted actions such as self-evacuation.

Radiation is a particularly challenging risk when it comes to its public perception and effective risk communication. Radiological incidents typically score high on psychometric risk scales of fear and dread. Risk communicators need to be aware of this to design messages and methods addressing public concerns and scale the public communications accordingly.

### 2.2 Scientific aspects

To effectively communicate with the public it is important to understand the different audiences that need to be addressed as the might have different interests. Subsequently the

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\textsuperscript{6} IAEA (2012), Report on “Enhancing Transparency and Communication Effectiveness in the Event of a Nuclear or Radiological Emergency”, p. 10
right choice of channels, the use of a clear and understandable language, and tailored but consistent messages for the previously identified audiences are essential. This includes a proper selection of the most trustworthy spokesperson. Missing one of these elements usually results in failure of communication. Whereas the first three factors are solely within the expertise of the communicator, the clear and unambiguous input of subject matter experts is needed to define the message. To be able to answer the question of “What is safe?” communicators need to base their messages on the scientific risk assessment and management laid down by radiation emergency response experts applying the principles of public risk communication.

In the Scientific Annex A to its 2012 report the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) presented an evaluation on “Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks”.

As UNSCEAR points out, with the lacking of sound empirical data, scientifically founded inferring of risk is essential for effective decision making responding to an emergency.

The evaluation concludes that above the radiation thresholds determined for deterministic health consequences “it can be stated with confidence that these consequences will occur in individuals, although there may be some variation in the actual threshold for a particular health effect between individuals. Below the thresholds, no such health effects are predicted.” However, the Committee comes to the conclusion that for stochastic effects “only conditional predictions can be generally made about the possible stochastic effects of exposure to low and very low doses or even of the possible heritable effects of exposure to high doses. This is because these health effects have not been demonstrated for these situations. Such conditional predictions can be made using plausible assumptions about the possible occurrence of such health effects, and the available scientific information, for example, on the interaction of radiation with cells. Such assumptions are necessary for the purposes of policy and decision-making”, and consequently for communicating the related risk to the public.

3 Communicating with the public

Risk communication is any combination of actions, words and other interactions that incorporates and respects the risk perceptions of the information recipients. These recipients have a very legitimate need to comprehend their risk exposure and come to actionable conclusions by using the best available information they have at their disposal with a firm understanding of the factors making a risk acceptable.

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10 IAEA (2012), Report on Enhancing Transparency and Communication Effectiveness in the Event of a Nuclear or Radiological Emergency, p. 11
3.1 Definition of public communication types related to a radiation emergency

There are numerous definitions of risk communications and crisis/emergency communications. The following attempt to tailor these definitions to radiation emergency aspects might help to facilitate the discussion.

Public Risk Communications

The objective of Public Risk Communications is to inform about potential or actual health threats to support informed decision making and to foster understanding about a certain risk. Some definitions identify various stages of Public Risk Communication.\textsuperscript{11} For this discussion Public Risk Communication is best divided in three phases. At the preparedness stage the focus is on providing general background information, discussing potential hazards connected to ionizing radiation and informing about arrangements to mitigate risk. During the emergency Public Risk Communication supports Public Emergency Communication focusing on specific aspects of the emergency. A third stage is initiated in the transition phase to an existing exposure situation after an accident and is focusing on the risks related to post-accident remediation and the increased exposure in the affected area.
Focus: background information.

Public Emergency Communications

The objective of public emergency communication is to support the immediate and urgent mitigation of effects of a radiation emergency. This does not mean that public emergency communication is only necessary during an event. Especially the population in the vicinity of nuclear installations needs to be informed about emergency response arrangements, their purpose and the backgrounds at the preparedness stage. However, as public emergency communication aims at a maximum of compliance with protective actions and to support informed decision making it will always need to rely on the foundations laid by risk communications.
Focus: mitigating immediate effects of the emergency.

3.2 How to communicate risk?

Public risk communication is intended to support more informed decisions regarding health hazards and safety and to retain control of these decisions. Based on a sound understanding of risk perception, risk communication can have far-reaching consequences for effective public communication in emergencies.\textsuperscript{12}

Effective risk communication can play a variety of roles in preparing for and responding to an emergency. It can be used to reduce anxiety in times of crisis, to manage awareness in

\textsuperscript{11} Chris P. Lowbridge and Julie Leask (2011), Risk communication in public health, NSW Public Health Bulletin Vol. 22, p. 34.

\textsuperscript{12} IAEA (2012), Communication with the Public in a Nuclear or Radiological Emergency, p 46 – 47.
order to maintain engagement, or to raise awareness of issues when engagement is low. Most importantly, risk communication messages can influence the public’s psychological and behavioural responses to risks and, as a result, help to determine the consequences of an emergency in terms of likelihood of morbidity and mortality.

A better understanding of the dynamic interactions between risk perception, risk communication and behaviour can enable organizations tasked with managing, responding to and communicating about a radiation emergency to engage in more effective emergency communication. Public emergency communication must address the factors driving public compliance with protective health behaviours.

### 3.2.1 Basic principles of public risk and emergency communications

There are a number of key factors that influence the effectiveness of public risk and emergency communications. The subsequent list mentions the most important ones.

**Timeliness**

This is especially important for public emergency communications as time is a factor to mitigate the immediate effects of a radiation emergency. Information needs to be provided as soon as possible. This is why it is so important to have a system to put health hazards into place prepared already at the preparedness stage and to limit approval processes to a minimum. With social media having changed the media landscape significantly, timely communication has become even more important. Today, news breaks on Twitter&Co. the moment an event occurs. Immediate communication is necessary for rumour control as rumours will contribute to faulty risk perceptions eventually leading to unwarranted actions.

**Many voices, one message**

Although there might be many voices heard during an emergency, but also at the preparedness stage, it is decisive, that there will; be no contradicting messages issued. Coordination amongst all communicators on a local, national and international level is essential, especially in a new media world in which all significant events become a subject of media interest globally in no time.

**Use of plain language**

It has been mentioned before, but it needs to be listed again as one of the essential principles of risk and emergency communications: the use of plain language. This means to avoid technical or scientific jargon and to speak a language the general public will understand. This includes putting health hazards into perspective and to avoid the use of doses and dose rates when possible.

**Building and maintaining trust**

One lesson identified by the IAEA International Experts Meeting on Enhancing Transparency and Communication Effectiveness in the Event of a Nuclear or Radiological Emergency in
2012 was that “if members of the public do not trust the information source and feel they
have been exposed to a risk without their knowledge and consent, they will react in anger and
fear, leading ultimately to the rejection of the information provided, thus jeopardizing an
essential partnership.” To create and maintain trust, public risk communications need to
begin at the preparedness stage to invest in the “trust account” that will be a valuable resource
during an emergency. It is therefore also essential to keep in mind which organisations might
be most trusted by the public when designating a lead spokesperson.

3.3 “What is safe?”-communications during a radiation emergency

Communicators dealing with a radiation emergency are likely to, almost instantly, receive
questions by the media and the public on the potential harmful effects that the event will have
on people and the environment. Social media, as an established communication channel, will
demand that authorities, operators and international organizations answer the public directly.
No matter who asks the questions, it comes down to one essential aspect: “Am I and my
beloved ones safe?” Whereas this seems to be a yes or no question in theory and no
communicator can dodge it, it is important to understand that the definition of safe will vary
from individual to individual as long as there is no well-founded answer provided by the
authorities.

To ensure compliance with protective actions and to avoid unwarranted actions, communicators must have a concise answer, both at the preparedness stage and during an
emergency, on what is safe and what is not. In responding to an emergency, failure or success
to do so might directly affect the health of the public.

3.3.1 Putting health hazards in perspective

Nuclear or radiological emergencies will have detrimental social, psychological, economic
effects on the public. Risk perception, as was considered above, can lead the public, but also
decision makers and others (e.g. medical staff) to take inappropriate and damaging actions
that result in injuries or increased risks to health that were not justified based on the radiation
hazard. This is often the result of conflicting and confusing information being provided by
official sources and the failure to answer the resulting questions in a simple, consistent and
understandable way. These non-radiological consequences can compound upon the potential
consequences of the radiation effects and are an area where effective public communications
can have a profoundly positive effect.

This is also reflected in Requirement 13 of GSR Part 7. Putting health hazards in perspective
within the context of public communications in an emergency will support informed decision

13 IAEA (2012), Report on Enhancing Transparency and Communication Effectiveness in the Event of a Nuclear
or Radiological Emergency, p. 14.
making concerning protective actions and other response actions to be taken. If the public understand the health hazards in a clear manner this will help address their concerns about potential health effects and ensure that no actions are taken which do more harm than good. Another important aspect is the need to weigh all hazards, including non-radiological ones, against each other.

As stated in GSR Part 7, a system needs to be developed to ensure that all these needs are met. Although GSR Part 7 doesn’t provide guidance how it should look like, the IAEA previously undertook some effort to develop such a system that could serve as an example.14

However, any situation where the communication of acceptable risks during an emergency are inadvertently translated into being applicable in all situations needs to be avoided.

### 3.3.2 The way forward

It is important to understand that a system to put health hazards into perspective has two dimensions: the decision making criteria related to the inferred risk based on radiation emergency response expertise and the way how and by whom these criteria, respectively the inferred risk assessment, are communicated to the public.

Based on the scientific foundation of such a system, as well as risk acceptability, the task of public communication is to explain the system to the public, which will also influence decision makers. This communication has to follow the basic principles of effective public communications and, therefore, needs to be “useful, timely, clear and appropriate.”15 As a consequence, the wording to explain the system needs to be in plain language, understandable to the general public, and well prepared in advance, as part of the system. The messages can then be distributed by the channels and means of public communication e.g. via press releases, social media, first responders, an emergency website or, when appropriate, at stakeholder engagement meetings.

It is the EPR community’s task to develop the technical foundations of this system and to cooperate with public risk and emergency communications experts to effectively use this system when communicating to the public. UNSCEAR concludes that if such a system is not developed and “uncertainties are not addressed properly by the scientific community, apparent differences in risk estimates can cause anxiety and undermine confidence among the public, decision-makers and professionals.”16

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14 IAEA (2013), Actions to Protect the Public in an Emergency due to Severe Conditions at a Light Water Reactor.
4 Theses and questions for further discussion

The following points are presented as a starting point for the discussion:

a) The word “safe” has a long history and has been avoided in emergency communications and radiation protection. Any guidance based on, or just using, this word will raise fierce discussion. Do we need the word “safe” for our messages? Are there other words or formulations to bring across our messages effectively?

b) The public and the media will always ask: “What is safe?” and “Are we safe?” Will any avoidance and paraphrasing of the word “safe” damage the credibility of public communications and decision makers during a radiation emergency?

c) What makes risk associated with radiation during a nuclear or radiological emergency different from other risks? (pharmacological side effects, skin cancer caused by sunlight etc.) What can we learn – best and worst practice – from other industries (aviation, chemical, oil etc.) regarding public risk and emergency communications?

d) Many challenges in communicating with the public during a radiation emergency arise from the public’s limited knowledge of the basics of radiation. Member States therefore should take actions to increase the baseline level of public knowledge by incorporating this topic e.g. in high-school curricula.

e) Effective public communications during an emergency is not possible without a system that puts health hazards and inferred risk in perspective. However, the requirement in GSR Part 7 does not provide specific criteria. What could a system to place health hazards into perspective look like?

f) Can there be any effective international guidance on putting health hazards into perspective as long there is fierce scientific argument in the radiation protection community about what can be considered to be safe and if there is any safe level of radiation at all (potential stochastic risk for any dose above zero etc.)? Developing plain language for the public communication of such a system can only be a second step.

g) How do we have to differentiate between decision makers and the public as target audiences when developing a system to put health hazards into perspective and corresponding plain language explanations?

h) Does such a system need to differentiate between (educating) public risk communication at the preparedness stage and mitigating public emergency communication during the emergency response? If yes, how can the broader public be attracted to the topic and what risks could be attached to this approach?

i) Would a scale provide a useful basis for a system to put health hazards into perspective at all? If yes, what are the basic principles of such a scale (levels and their assessment, visualization etc.)?

j) As lessons learnt from most radiation emergencies show that plain language is needed to inform the public effectively, should dose and dose rate figures be avoided completely in public communications?
k) Major radiation emergencies will most likely be a subject of high media interest worldwide. Does the use of different units in different countries contribute to confusion in international communication? If yes, how can this confusion be minimized?

l) Hazard, risk, threat, danger – not all languages know these words and sometimes only use one to express all these varieties. Does international guidance need to reflect this fact and if yes: how?

m) What kind of plain language material is needed to support informed decision making?

n) How do we measure if a system to put health hazards into perspective or the corresponding plain language communication is successful?

o) How do we communicate the need to weigh all hazards, including the non-radiological ones, against each other when talking about protective actions? (e.g. that an evacuation might be the bigger risk compared to shelter in place when infrastructure is destroyed).

p) Which organisation would be most trustworthy and should take the communication lead, especially regarding public emergency communications (regulator, EPR organisation, public health or environmental agency etc.)?

q) Risk communications concepts related to radiation emergencies need to be consistent with the approach of other international organizations. Otherwise, contradicting messages could lead to a lack of trust and a loss of credibility.