

Draft Safety Guide DS520
“Hazards Associated with Human Induced External Events in Site Evaluation for Nuclear Installations”
(Draft dated August 2021)
Status: STEP 11

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page.... of....					
Country/Organization:		Date:					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Belgium – 0	General	We provided comments on Step 8 and now we reviewed your resolution table concerning these comments. Some of our comments formulated on Step 8, were, to our opinion, rejected for an inappropriate reason. Our further arguments are given below.		x			
Belgium – 1 (= former comment 2 on Step 8)	General comment (amongst others related to Articles 3.13, 5.21, 6.20 and 9.10)	Our comment in Step 8 was: These articles should be reworded to indicate clearly that the probabilistic screening cannot be done on a “particular event”. Instead, it has to be done at the level of “event categories” as defined in Article 1.9. It is only when the total occurrence frequency of an “event category” is lower than a SPL that this “event category” can be screened out for further consideration.	We maintain our position that the term “particular event” is not appropriate for performing a screening. There is no clear definition indicating how the term “event” has to be interpreted and all possibilities are left open (sometimes it looks like an “event family”, “event type” or “event category” (e.g. external explosion), but sometimes it looks like a particular event), and hence it is not clear what kind of SPL should be applied. This ambiguity is also clearly illustrated by item 3.13 footnote 4, which speaks on the one hand about “the SPL if applied to all events of the same type (such as all aircraft crashes, all explosions)” and which says on the other hand “such grouping of similar	x Relevant paras. are revised after re-considering your comments			

			events may not be appropriate where a specific single event has very severe consequences and requires a very low SPL“. So, how should the SPL then be defined/chosen if it depends on how an “event” is defined ? Moreover, the “reason for rejection” (i.e. “Each event has to be considered independently and its probability of occurrence has to be estimated”) is not clear to us.				
Finland - 1	General	References should be checked	Many reference numbers do not refer to the document mentioned in the text.	x			
Russia - 2	General	It is recommended to include in this draft Safety Guide combinations of human induced external events, by compiling matrices of combinations of external events. The draft Safety Guide does not include recommendations for the analysis of combinations of human induced external events.				x	Recommendations on hazard combinations are provided in IAEA Safety Standard SSG-68, Design of Nuclear Installations against External Events Excluding Earthquakes. A TECDOC on ‘Safety Assessment of Nuclear Installations Against Combination of External Hazards’ is under development and extensive discussions are in progress to screen/combine all possible scenarios and matrices.
Russia - 3	General	It is recommended to include in draft Safety Guide the following screening criteria: - an external event capable of affecting a nuclear installation is included in the definition of another event; - external event is characterized by a slow nature of development and there is sufficient time either to eliminate the source of the hazard or to take adequate protective				x	Screening criteria by distance and probability are used for preliminary evaluation. If the source cannot be screen out using preliminary evaluation, detailed evaluation is necessary to needs to be performed.

		<p>measures to prevent conditions affecting the safety of nuclear installation with a high degree of confidence.</p> <p>The draft Safety Guide provides only two criteria for selecting external events: distance and probability, which is insufficient for complete analysis.</p>					<p>Detailed evaluation will show whether hazard from the source may affect the nuclear installation and how intense the hazard is. This safety standard covers characterization of possible human induced external hazard in the region of nuclear installation site. Design and protective measures against those hazards covered in IAEA Safety Standard SSG-68, Design of Nuclear Installations against External Events Excluding Earthquakes</p>
Russia - 4	New para	<p>The selection of external events and the assessment of the probabilities (frequencies) of external events are recommended to be performed taking into account developed PSA.</p>	<p>It is recommended to include a para in draft Safety Guide. In draft Safety Guide does not indicate that the selection of external events and the assessment of the probabilities (frequencies) of external events are performed in PSA.</p>			x	<p>This aspect is out of scope of this document.</p>
Russia - 1	1.8, 1.12		<p>Para 1.8 of DS520 states “the recommendations in this Safety Guide are intended to be use for ... evaluation of these hazards and utilizing these evaluations in the design and operation of nuclear installations ...”. At the same time para 1.12 states” the recommendations in this Safety Guide are intended to be use apply to all stages of the lifetime of a nuclear installation, from site selection to decommissioning”. It would be useful to clarify or</p>	x Reworded			

			eliminate this contradiction in the text of the draft.				
Japan - 1	1.14	Due consideration should be given to the sensitivity of the information on HIEEs from a nuclear security perspective. For example, information on HIEEs that might be beyond the safety design basis is highly sensitive because terrorists could use it in planning an attack. Therefore, such Such information should be handled carefully in cooperation with nuclear security specialists.	It is not necessary to show such example of using information with malicious intention, and then suggested to be deleted.	x			
Japan - 2	3.4	Local topography, and regional and local meteorological effects may significantly modify the initially assumed safe distances. If there are any peculiar site conditions or significant specific hazards, the source(s) of HIEEs should be considered in the next evaluation step even if they were originally screened out in previous evaluation step with respect to distance. Safe distances from potential sources differ greatly, for example for a chemical plant located close to a nuclear installation that is well protected by hills, as compared to a nuclear installation located further away on flat area with predominant winds blowing towards the site.	Better wording. It may be misunderstood <u>what “originally” refers to. It should be clarified</u> that the HIEE screened out by the procedure in para. 3.3 (box1 in Fig.1) will be revived in the next step (para. 3.5, box2 in Fig.1).	x			
Belgium - 2 (= former comment 8 on Step 8)	3.9	New proposal concerning the sentence to be added: “The SDVs of both hazards will be quite different as a gas vapor cloud may travel much longer distance than the pressure wave. <u>In this case and based on the “caution principle”, it is recommended to define the SDV as the longer distance related to the hazard.”</u> ”	Our proposal in Step 8 was rejected, but we think that a clarification remains needed. Therefore, we make this new proposal (avoiding also the use of the word “shall”, which is indeed not appropriate for a SG).		x Agreed with slight modification: ‘In this case, SDV of this source should be taken as the longer distance’.		
Germany - 1	3.9	HIEEs might potentially generate different types of hazard (e.g. an event at a chemical plant might produce toxic gas and a pressure wave) at the nuclear installation site (see box 4 in Fig. 1), as explained in para. 2.10 . 2.12	Please check a reference. Para. 2.12 seems more suitable		x 2.10 is not correct. Correct para is 2.20.		
Japan - 3	4.7	The information received from operating organizations of the sources of HIEEs	Clear description is necessary to distinct the role of operating	x			

		<p>should be verified and validated and, wherever possible, be validated by an independent reviewer. Often, the appropriate regulatory body could provide an independent review.</p>	<p>organization from the role of regulatory body. As an independent review is one of the quality management activity conducted by operating organization, the regulatory body should not play a role of reviewing them in support of operating organization.</p>				
Japan - 4	4.9	<p>Many States have well developed land-use planning legislation that will apply to any new or proposed nuclear or conventional development; this same legislation is also likely to have been applied to any existing sources of HIEEs in the region at the time of their planning and development. An objective of land-use planning legislation is usually to ensure that all national and local government agencies requiring knowledge of a planned hazardous site are able to obtain the information they need at an appropriate stage before and during the development process (including the data needed for the development of regional emergency plans) and have the opportunity to provide advice to the planning process on any public safety issues raised by the development. A further objective is to provide a platform for informing the general public (including the operating organizations of other industrial sites) that might be affected by the development and for facilitating public comment. The government planning authority for the region surrounding the nuclear installation may be able to provide useful information on sources of HIEEs. The degree to which land use planning legislation considers subsurface land use differs between States. The potential for subsurface human activities to change the external hazards for a nuclear installation should be considered under the national</p>	<p>Para. 5.29 of SSR-1 is not directly related to the content of this paragraph. If reference is needed, para. 5.34, which deals with human induced events, is more appropriate.</p>	x			

		legal framework (see also para. 5.29 of SSR-1 [1]).					
Finland - 3	4-13, 6.16	(see Table A-1 in the Annex)	As the Guide has an appendix and an annex with tables, in would be helpful to point out that this refers to the annex. Table A-1 could also be included in the Appendix as, e.g., Table 4.		x Agreed with first part. It was proposed and justified by MS to include as Annex.		
France - 1	4.14	...and the hazard analysis should be undertaken including expert judgement. In other words, both epistemic and aleatory uncertainties should be considered	The sentence implies that the consideration of both uncertainties categories is specific to the considered topic, which is not true. It is a general statement applicable to any topic	x			
Germany - 2	4.17	Pipelines carrying hazardous material from or between different stationary source locations should be included <u>considered</u> as mobile sources.	Wording	x			
Germany - 3	4.21 Line 2	.. Military airports and their associated air traffic systems, including training areas, should be considered <u>as</u> potential sources of HIEEs.	Wording	x			
Finland - 2	4.22	Aircraft (and other any manned or unmanned aerial vehicles)	In most contexts aircraft means aerial vehicles of all types.	x			
Japan - 5	4.27 Line 9	Air transport 4.24. With regard to aircraft crash hazards (see para. of SSR-1 [1]), a study should be made of the following: (c) Information on aircraft accidents for the region and for similar types of airport and air traffic. Information should be collected for general aviation, civil and military air traffic. Of particular interest are military aircraft training areas (especially low flying areas) and areas within the region used for filling firefighting planes <u>aircrafts</u> with water, since these might be areas of relatively high crash probability.	“Firefighting planes” should be described as “firefighting aircrafts” to include other flying objects such as helicopters.	x			

Germany - 4	4.27	(c) The sizes, numbers and types of vessels;	Vessels in plural is more suitable here	x			
Germany - 5	5.2	HIEEs and dispersion mechanisms are addressed in this section; explosive effects are addressed in Section 0 6.	Please verify, this should be Section 6	x Section 6 is correct and correctly written in our word file. Seems a problem in pdf version			
Germany - 6	5.20 Line 3	...Sources that lie further away from the nuclear installation site <u>than the generic screening distance values</u> can be screened out.	Clarification	x			
Germany - 7	5.21	If a hazard cannot be screened out using distance, generic event data (i.e. <u>based</u> on the frequency of a particular event)	Clarification. Same for 6.19, 7.11, 9.10 and further in text	x			
Germany - 8	5.22 Line 2	... If there is an interaction, hazard characterization is required to be performed: see para. 4.19 and Requirement 7 <u>and para. 4.19</u> of SSR-1 [1].	Clarification. Same for 6.20, 7.13, 8.20 and further in text	x			
Germany - 9	6.1 Line 7	... These should be used with care as described in para. 6.19 <u>6.18</u> .	Please check reference. Para 6.18 might be more suitable	x			
Japan - 6	6.11	A significant factor affecting the propagation of blast waves is the presence of obstacles inside the vapour cloud between the source of the HIEEs and the nuclear installation site <u>and inside the vapor cloud</u> ; local topography and the layout of the site may also play a role and both effects should be considered.	This sentence should be returned to the description in Step 8. The phrase “inside the vapour cloud” has been moved, but obstacles between the source and the site, and inside the vapor cloud, both are factors affecting the propagation of blast wave.	x			
Germany - 10	7.5	The heat flux in quiescent conditions will obey the inverse square law of energy attenuation; however, some fire related hazards such as smoke and dust may propagate	“dust” may be deleted because it is covered by “smoke”, which includes particles.	x			

Germany - 11	7.18	a) Nature of flammable material <u>and its source</u> : — Flashpoint, flammability concentrations in air, or other ignition criteria; — Maximum credible material release or thermal release, or the relationship between fire frequency and severity; — Thermal load as a function of time.	Clarification	x			
Germany - 12	7.19	a) Maximum temperature <u>heat flux</u> and duration	Clarification	x			
Belgium - 3 (= former comments 32 and 33 on Step 8)	8.1, 8.9 and related articles	In step 8, we proposed to replace the categorization in article 8.9 by the following: <ul style="list-style-type: none"> • General aviation (up to 5.7 ton); • Commercial civil aviation; • Military aviation 	We maintain this proposal. The “reason for rejection” in Step 8 (i.e. “Three types of aircraft crashes as explained in 8.9 for each aircraft category. These three types are widely accepted and being followed by MSs for a long time”) does not address our concern. IAEA now recommends to perform the “screening by probability” for each one of the aircraft crash types 1, 2 and 3 (defined in item 8.9): see items 8.12-8.13, 8.16 and 8.19. We would like to see the “screening by probability” for each one of the aircraft categories (general aviation, commercial aviation, military aviation), e.g. by grouping the probabilities of the aircraft crash types 2 and 3 for commercial aviation (and similarly for military aviation), since the screening of aircraft categories is important for design of installations. On the other hand, the aircraft crash type can also determine certain crash characteristics, such as impact angle and impact speed (e.g. a lower impact angle and lower impact		x Agreed with a slight change in the aircraft categories (general aviation, medium and large commercial, and military aircrafts) to be make it more broad/flexible. Second suggestion agreed.		

			speed for aircraft crash type 2 (= crashes close to an airport) in comparison to aircraft crash type 3 (= in-flight crashes)), but such crash characteristics are then to be considered further in the analysis for the screened-in aircraft categories.				
Germany - 13	8.22	An approach similar to <u>that of</u> the zone of influence approach should be used.	Clarification	x			
Germany - 14	9.10 Line 4	... The probability of an impact of a commercial vessel with the <u>water</u> intake structure could be very low if protective embankments are constructed with an opening for the cooling water.	Clarification	x			
Germany - 15	9.18 Line 4	... Consideration should be given to the fact that the spillage of explosive or highly flammable liquids on water can produce floating pools, which might approach a nuclear installation on the shore or along a riverbank	Clarification	x			
Japan - 7	9.24	Hazard analysis of screened-in sources <u>should be performed to check the interaction with the nuclear installation. If there is an interaction,</u> load characterization is required to be performed (see para. 4.19 and Requirement 7 of SSR-1 [1]) for load characterization . Materials released into the sea or a river could disperse and dilute in complex ways that need explicit modelling by experts to determine how the different types of hazardous material travel in the sea or river and how these might affect the structures or equipment of the nuclear installation, and to calculate the load characterization parameters.	To keep a consistency with para. 9.11 and other Section (5.22, 6.20, 7.13).	x			
Germany - 16	10.15	The following are examples of parameters	Wording - plural is more suitable	x			
Finland - 4	10.16	For clarity, para 10.16 should be rewritten so that expressions with a specific military meaning are avoided or they are be explained.	Expressions “overhanging ordnance” and “recovery site” seem to have a specific meaning in military usage, but they cannot be found in easily			x	“overhanging ordnance” means ordnance carried on for an extended period. “recovery site” means a site recovered.

			available military dictionaries or glossaries. Google searches are not very helpful either.				These terms cannot be avoided as used in military and suggested by a MS.
France – 2	10.17	<p>HAZARDS DUE TO MISCELLANEOUS EVENTS</p> <p>10.17. The following events that might occur in the vicinity of the site should be also considered:</p> <p>(a) A severe accident on nearby nuclear installations (radiation hazard);</p> <p>(b) Disturbances in the connection of external electric grid, including its unavailability;</p> <p>(c) Damage to headrace or tailrace facilities (in the case of once through cooling water on river sites).</p>	<p>Bullet a: Consideration of release of radioactive materials is included in 5.1. Moreover, this bullet may mean that high radiation doses from a nuclear installation is plausible which is not consistent with objectives mentioned in SSR-2/1, SSR-3 and SSR-4.</p> <p>Bullet b: it should be explain what is complementary in this bullet compared to other part of the guidance or to other event to be considered according to other IAEA document (LOOP is to be considered anyway, not as an external event)</p> <p>Bullet c: release of hazardous substance is to be considered according to other part of the current guidance.</p> <p>If the goal of this bullet is flooding or low level of UHS, it has to be considered within the scope of natural hazard. If it is LUHS, it has also to be considered independently of the origin.</p> <p>If the bullet are maintained, further guidance are highly necessary. It is not possible to limit the content of the guidance to a list without explanation</p>		x	Text is revised for (a). Including external events as described in (b) and (c) are proposed by MS. Occurrence of these events needs to be discussed in site evaluation report and taken care of by the designer.	
Germany - 17	11.9	The application of a graded approach can <u>should</u> be based on a categorization of the installation.	Clarification	x			

Germany - 18	11.10	Three or more categories of nuclear installations may be defined on the basis of national practice and criteria.	Clarification	x			
Germany - 19	11.11	In applying a graded approach to nuclear installations, it should be noted that installations other than nuclear power plants might not have sufficient inherent robustness against HIEEs <u>as far as reasonable practicable</u> . It might also be excessively costly to protect them against some HIEE through design, e.g. the crash of a large aircraft.	Clarification			x	It is preferred to keep the text as it is for clarification.
Germany - 20	12.13.	Paragraph 3.4 <u>3.5</u> of SSR-1 [1] states: ...	Please check a reference. Para. 3.5 seems to be a correct one	x			
Finland - 5	Annex Table A.1	References would be useful.	The generic screening distances are important practical information for site evaluation. References would be useful to make the values and their justification traceable.			x	The name of a country is not mentioned for using a particular practice and only the word 'state' is used in IAEA safety standards.