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# Section 2
# DS491 Step 7: Deterministic Safety Analysis for NPPs

| COMMENTS BY REVIEWER<br>Reviewer: Page.... of....<br>Country/Organization: Date: | | | | RESOLUTION | | | |
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| Korea 1 (Rev 1) | General to Section 2 | [general comment]<br>Complementary relation between DSA and PSA should be briefly described in the Chapter 2 General Considerations. (GSR Part 4 para 4.53 and SSR-2/1 requirement 10) | [general comment] | | | **X** | *Section 2 has explanatory nature and does not provide recommendations to meet requirements. On the other hand, clarifications about the complementarity or recommendations to meet the requirements seems not necessary under the scope of this Safety Guide* |
| Korea 2 (Rev 1) | General to Section 2 | [general comment]<br>It could be useful to provide a flowchart of the basic steps in the safety analysis procedures in the Chapter 2 General Considerations. An example is shown in the FIG.I-1 of Annex 1, Safety Report Series | [general comment] | | | X | *Out of the scope of this Safety Guide. It may be more commonly included in safety reports or similar documents* |

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| | | No.23 | | | | | |
| Korea 3 (Rev 1) | General to Section 2 | [general comment]<br>It may be necessary to describe, in general, the management of the safety analysis required in GSR Part 4 Requirement 22 ("The process by which the safety assessment is produced shall be planned, organized, applied, audited and reviewed.") in the Chapter 2 or Chapter 8 of DS491. | [general comment] | | *(See current §3.1 about "Management System")* | ***X*** | *This Safety Guide deals with Deterministic Safety Analysis. Safety Analysis in general and Safety Assessment are out of its scope* |
| Czech 2 | 2.1<br>Line 5 | "…Deterministic safety analysis, supplemented by a number of investigations such as those related to fabrication, testing, inspection, evaluation of the operating experience and by PSA, is also aimed to contribute to demonstrate that the source term and eventually radiological consequences of different plant states are acceptable and that early ~~or~~ large releases are practically eliminated." | The past radiation emergencies (Chernobyl and Fukushima Daichi) demonstrate that large releases are not practically eliminated. "But early large releases" can be eliminated.<br>See text in para 3.25 and 3.55 and others of this guide too. In some para text "large or early" instead of "early or large" is used. What are the differences?<br>We can compare early to late or large to small, but compare early to large seems to be strange. These things are two different categories. | | *According to the wording used in §2.13 (4) and §5.31 of SSR-2/1 (Rev. 1):*<br><br>"…different plant states are acceptable and that the possibility of conditions arising that could lead to an early radioactive release or a large radioactive release~~s~~ are 'practically eliminated'." | | |

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| Ukraine 1 | 2.1 last line<br><br>and<br>Para 2.18 (b) | *[re 2.1 last line]* To add "radioactive" before "releases".<br>"… is also aimed to contribute to demonstrate that the source term and eventually radiological consequences of different plant states are acceptable and that early or large radioactive releases are practically eliminated". | To specify the formulation. | | *(2.1: See Czech-2 above)*<br><br>*(2.18 (b) will be also updated accordingly; see comments below about this paragraph; )* | | |
| France 1 | 2.1<br>Line 5 | Deterministic safety analysis, supplemented by a number of investigations such as those related to fabrication, testing, inspection, evaluation of the operating experience and by PSA, is also aimed to contribute to demonstrate that the source term and eventually radiological consequences of different plant states are acceptable and that situations which could lead to early or large releases are practically eliminated. | The "practical elimination" approach should be related to accidental situations or conditions or sequences and not to releases : consistency with SSR-2/1 §2.11, 4.3, 5.31 and INSAG 10 §5.1. | | *(2.1: See Czech-2 above)* | | |
| Observer ENISS-11 | 2.1<br>Lines 1-3 | 2.1 The objective of deterministic safety analysis for nuclear power plants is to confirm that safety functions and the needed ~~plant systems~~ SSCs, in combination where | Objective of deterministic safety analysis (DSA) is exclusively focused on sufficient "effectiveness" of the safety functions and their related SSCs in | | 2.1 The objective of deterministic safety analysis for nuclear power plants is to confirm that the safety functions and the needed ~~plant systems~~ SSCs, in combination where | | |

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| | | relevant with operator actions, are capable and sufficiently effective, with adequate safety margins, to keep the radiological releases from the plant ~~under~~ within acceptable limits. | contrast to the objective of a probabilistic analysis where the "reliability" of SSCs and safety functions are primarily in the focus. Exchanging "under" by "within" is suggested to correct English and even to be factual right. Otherwise it could be misinterpreted as rad. releases that have to be kept below the accepted release interval which is above operational release values but below assumed accident values and shortly circumscribed by "acceptable limits". | | relevant with operator actions, are capable and ~~sufficient~~ sufficiently effective, with adequate safety margins, to keep the radiological releases from the plant ~~under~~ within acceptable limits. | | |
| Observer ENISS-12 | 2.1 Line 4 | Deterministic safety analysis is aimed to demonstrate that SSCs designed as active or passive barriers to the release of radioactive material from the plant will maintain their integrity and function to the extent required. | For more clarity and precise expression | X | | | |
| Observer ENISS-13 | 2.1 | Deterministic safety analysis, supplemented by further specific information and analysis ~~a number of investigations~~ such as those related to fabrication, testing, inspection, evaluation of the | Complement to clearly state that practical elimination is associated to situations with core melt (see WENRA Safety of new NPP designs). Alternatively, in order to | X *(First modification)* | *Second modification: Covered in Czech-2 above* | | |

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| | | operating experience and by PSA, is also aimed to contribute to demonstrate that the source term and eventually radiological consequences of different plant states are acceptable and that accidents with core melt which would lead to early or large releases are practically eliminated. | align with SSR-2/1, "early or" should be omitted. | | | | |
| Observer EC/JRC-9 | 2.1 and 2.2 / all | The objectives of deterministic safety analysis are those found in para. 5.75 of SSR-2/1 Rev. 11 and paragraph 4.15 of GSR Part 4 Rev. 1. | Objectives are listed in a very clear manner in overarching SSR-2/1 Rev. 1 guide. For the sake of clarity and to avoid misleading, they should be reproduced here without modifications. If desired, only further explanations of each of them might be added. For instance, first sentence talks about "the objective" when actually there is more than one objective; besides, it says that the objective is "… to confirm that plant systems, in combination where relevant with operator actions…". However, LBLOCA containment peak pressure in critical flow conditions –checked with deterministic safety analysis– right after the | | | X | *(See ENISS-11 above). This formulation is not used in the Safety Guide* |

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| | | | break looks at containment pressure design so that safety systems capability to withstand such peak does not apply in this context (instead, passive heat sinks play a fundamental role if best-estimate calculations are to be performed). Another example is the use of such analysis in meeting with operational limits and conditions (i.e. Technical Specifications) where mentioned objectives in paras 2.1 and 2.2 do not match suitably. | | | | |
| Observer EC/JRC-10 | 2.3/5 | Computational simulations should be carried out specifically for all operational conditions of the plant from full power to shutdown. | It should be strongly stated the need for building as many input models of the plant as operational states exist. | | *("Should" statements are not used in Section2, see 1.12 line 2)* "… ~~The computations~~ Computational simulations are ~~should be~~ carried out specifically for predetermined operating modes and plant states ~~configurations"~~ | | |
| Germany 2 | 2.4 | 2.4. The results of computations are spatial and time dependent values of various physical variables (e.g. neutron flux; thermal power of the reactor; pressures, temperatures, flow rates and velocit~~y~~ies of the | In principle the concentrations of combustible gases like hydrogen and carbon monoxide are interesting. Thus, limitation of the concentrations to combustible gases. | X | | | |

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| | | primary coolant; loads to physical barriers; concentrations of combustible gases, … | The physical properties of the primary coolant have to be checked at different locations of the reactor circuit. | | | | |
| Canada 6 | 2.5, 1st sentence | Add new first sentence:<br><br>Acceptance criteria are essential components of deterministic safety analysis, since they are used for judgment of acceptability of the demonstration of safety of a nuclear power plant. | Some introductory text would make this paragraph clearer. The suggested text was originally at the end of the preceding paragraph, deleted during internal IAEA review. | | *At the beginning of 2.5 it will be added:*<br><br>"Acceptance criteria are used in deterministic safety analysis for judgment of acceptability of the demonstration of safety of a nuclear power plant. The acceptance criteria can be | | |
| Czech 3 | 2.5<br>Line 7 | …..these are criteria either directly related to the consequences of operational states or accident conditions or to the integrity of barriers against releases of radiation exposure and radioactive materials | Physical barriers serve not only against releases of radioactive material but against radiation too. | | | X | *Radiation exposure is out of the scope of this Safety Guide (and is not a safety criterion for DSA).* |
| Canada 7 | 2.6<br>(All) | Delete paragraph 2.6 and change all occurrences of "safety criteria" to "acceptance criteria". There are two in para 2.5 and one in para 7.21. | The purpose of the paragraph appears to be to explain that "safety criteria" are "acceptance criteria", but the text is very unclear.<br><br>Since the only occurrences of "safety criteria" are in paragraphs 2.5 and 7.21, it would be much simpler to change those occurrences | | *About 7.21:*<br>*In 7.21 "*safety criteria*" will be replaced by "*acceptance criteria*".*<br><br>*(See also ENISS-14, below)* | X | *About deleting 2.6: Para 2.6 defines acceptance criteria to be equal to safety criteria.* |

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| | | | to "acceptance criteria". | | | | |
| Observer ENISS-14 | 2.6 | In this Safety Guide, only the ~~safety~~ acceptance criteria that are the targets of deterministic safety analysis are addressed- ~~used in connection with the deterministic safety analysis and the wording acceptance criteria then refers to safety criteria~~. These acceptance criteria may include decoupling margins with respect to safety criteria. | In this para., safety criteria and acceptance criteria are merged. We strongly insist on the fact that acceptance criteria shall not systematically be mixed with safety criteria. In some cases, for convenience, acceptance criteria may be defined to include decoupling margins with respect to the safety criteria. As an example, one can choose to adopt a "no core uncovery" acceptance criteria in case of LOCA whereas the safety criteria shall rather adress the cladding embrittlement, the hydrogen production… | | "In this Safety Guide, only the ~~safety~~ acceptance criteria that are the targets of deterministic safety analysis are addressed- ~~used in connection with the deterministic safety analysis and the wording acceptance criteria then refers to safety criteria~~. The regulatory body may decide to approve acceptance criteria that may include margins with respect to safety criteria. | | |
| Japan 2 | 2.7 | Several methods for performing uncertainty analysis have been published (e.g. in Safety Report Series No. 52 [10] ~~para 6.21-6.29 and 7.43~~ ). | Para 6.24-6.29 and 7.43 do not exist in the referenced document [10]. | | "2.7. In this Safety Guide, uncertainty analysis are addressed in §6.21-§6.29. Several methods for performing uncertainty analysis have been published (e.g. in Safety Report Series No. 52 [10] ~~para 6.21-6.29 and 7.43~~). | | |
| Observer ENISS-15 | 2.7/ after last line | The assessment of uncertainty is fit for purpose in the safety analysis, according to an | For clarification, and to allow combination of the methods identified. | | *See Japan-2 above* | X | *Clarification / detail seems not necessary* |

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| | | appropriate method. Several methods for performing uncertainty analysis …. They include:<br>(a) Use of …;<br>(b) Use of …;<br>(c) Use of ….<br>A combination of (a), (b), and (c) is also possible. | | | | | |
| Observer EC/JRC-11 | 2.7/2 | Related to reference as indicated in the text: Safety Report Series No. 52 [10] para 6.21 – 6.29 and 7.43 | Paras in the referenced report are not numbered, i.e. it does not exist para 6.21. Please correct. | | *(See Japan-2 above)* | | |
| Observer EC/JRC-12 | 2.7/All | Additional information on uncertainty analysis should be included | Even if not aimed at exhaustively describe uncertainty analysis main steps and sound methods, the information provided here is too poorly described and should be extended, at least, to touch fundamental aspects just equivalently to what done in other introductory sections under point 2 on "general considerations". | | | X | *No specific suggestion provided* |
| Canada 8 | 2.8 | Correct Table 2 to Table 1. | | X | | | |
| Korea | 2.8 | Table ~~2~~ Table 1 | Errata | X | | | |
| Observer ENISS-16 | 2.8/Table 2, first line | Replace ~~"type of initial~~…" by "other initial…" | "systems availability" is part of "initial and boundary conditions" | | | X | *Systems availability can be considered as part of methodology and not an initial or* |

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| | | | | | | | *boundary condition* |
| Observer ENISS-17 | §2.8/Table 2 | Add a line in Table 2 to address DEC practices: An intermediate case between the BEPU and the realistic approach should be mentioned, where the assumption on systems availability would be "Best Estimate", rather than "conservative" | As mentioned in §7.50, the "Single Failure" rule shall not be applied in the frame of Design Extension Conditions. The case of systems availability during preventive maintenance is not explicitly treated in §7 but could be considered as very penalizing regarding the low initiating event frequency associated to this category of events. | | | X | *Major change. The main options currently used are included. The suggestion could add confusion regarding the differences with existing options 3 and 4.* |
| Observer EC/JRC-13 | 2.9/5 | In a conservative approach, evaluation models for phenomena simulation implemented into the codes deterministically lead to unfavorable effects regarding specific acceptance criteria calculation. Furthermore, this approach is also based on selecting scenario initial and boundary conditions increasing mass and energy loads challenging safety systems and radiological barriers. Nonetheless, since this approach does not provide with the actual safety margins (Bucalossi, 2008)1, and since | 1. Current sentence presents unclear wording.<br>2. It does not properly distinguish between evaluation models and boundary and initial conditions.<br>3. It is relevant to bring here the (IAEA, 2008) statement about this full conservative approach. | | | X | *The suggestion could be considered as too detailed* |

[1] Bucalossi A., "current use of best estimate plus uncertainty methods on operational procedures addressing normal and emergency conditions", European Commission Joint Research Centre Technical Report, 2008

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| | | there are scenarios where the real value of the relevant plant parameter provided by the calculation of the code is unknown –due to the deliberate pessimistic criteria characterizing the evaluation models–, sometimes even leading to non-conservative results (D'Auria et al., 2006)2, the use of this approach is no longer recommended by (IAEA, 2008)3. | | | | | |
| Canada 43 | 2.10 First sentence | Suggest the following changes,<br><br>*At present experimental research has resulted in a significant increase of knowledge and the development of computer codes has improved the ability to achieve calculated results that correspond more accurately to experimental results and post-accident conditions in power plant* | Although it is important for the computer code to accurately reproduce experimental results, it is post-accident plant conditions that are ultimately of interests. | | "…to experimental results and recorded event sequences in nuclear power plants. " | | |
| Observer EC/JRC-14 | 2.10/1 | At present, the state of the art of phenomena taking place in plant states from normal | 1. Rephrasing of para 2.10 aims, on one hand, at limiting this increase | | *(See Canada-43 above)* | | |

[2] D'Auria F. Bousbia Salah A. Petruzzi A., Del Nevo A., "State of the art in using best estimate calculation tools in nuclear technology", Nuclear Engineering and Technology, Vol. 38, No. 1, 2006

[3] International Atomic Energy Agency, "Best Estimate Safety Analysis for Nuclear Power Plants: Uncertainty Evaluation", Safety Report Series No. 52, 2008

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| | | operation up to design basis accidents has significantly improved as a result of wider and more reliable experimental research. Benefits from this increase in knowledge have subsequently been translated into corresponding improvement in simulation codes. | of knowledge to and up the DBA field, and on the other, removing / replacing / reformulating drawbacks in previous para 2.9. | | | | |
| Canada 44 | 2.11 Second sentence | Suggest the following changes,<br><br>*Best estimate codes are used in combination with conservative initial and boundary conditions, as well as with conservative assumptions regarding the availability of systems, assuming that all uncertainties associated with the code models are well established and plant parameters are ~~bounded~~ conservative based on plant operating experience.* | It is important for the plant parameters to be conservative, not necessarily bounded. With respect to code model uncertainties, the requirements should be well established, and not bounded. | X | are well established and plant parameters are ~~bounded~~ conservative based on plant operating experience. | | |
| Observer EC/JRC-15 | 2.11/5 | First part of next-to-last sentence (The complete analysis…) to be removed. | Computer code validation should be requested in all options so no reason to state it here linked to option 2. | | "…The complete analysis requires ~~adequate validation of the computer code and~~ use of sensitivity studies to justify conservative selection of input data" | | |

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| Observer EC/JRC-16 | 2.11/6 | Option 2 is commonly used for DBA and ~~conservative~~ anticipated operational occurrence analysis yet some national regulations, such as US Code of Federal Regulations, does not permit option 2, while allowing applying either option 1 and 3. | If current para 2.11 includes arguments on the practical use of deterministic safety analysis applications, it would be significant to balance the current statement ("commonly used") by introducing sound exceptions to avoid readers wrong belief in making 'common' a sort of equivalence to 'consensus'. | | *First part: See France-2 below to 2.12*<br><br>… Option 2 is commonly used for DBA and for conservative analysis of anticipated operational occurrences ~~analysis~~ (~~e.g. para6.12~~)."<br><br>*(see EC/JRC-17)* | | *Last part: Such detail seems not necessary* |
| Observer EC/JRC-17 | 2.11/7 | Reference into brackets to para 6.12 deals with option 2 further description so it should be removed or replaced above at the beginning of para 2.11 when option 2 is first mentioned | This reference is unnecessary. References within the text should be placed at the first time when they are introduced.<br><br>If this reference is to be kept, why then not applying the same for option 1 when introduced in para 2.9? | | "2.11. Option 2 is a combined approach based on the use of 'best estimate' models and computer codes instead of conservative ones (§6.12). ... | | |
| Observer EC/JRC-18 | 2.12/2 | … together with as-built plant boundary and initial conditions accounting only for existing uncertainties hence avoiding imposing any deterministic conservative burden. | Dealing with boundary and initial conditions, 'partially most unfavourable' statement is highly ambiguous. | | | X | *Too detailed* |

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| Observer EC/JRC-19 | 2.12/3 | In turn, avoidance of all type of conservatisms requires comprehensive analysis of the entire spectrum of uncertainty sources when simulating plant state scenarios to ensure success in mitigating systems performance and radiological barriers. | The meaning of 'the conservatism required in analysis of DBAs' is unclear. Which regulation is requiring it? Besides, removing conservatisms in performing safety analysis is precisely the goal pursued when switching from option 1 to 4, where option 4 is free of any degree of imposed conservatism. | | | X | *Too detailed* |
| France 2 | 2.12 Line 5 | "… Option 3 contains a certain level of conservatism and is at present accepted for some DBA and ~~conservative~~ anticipated operational occurrences analyses (e.g. para 6.21). | Word 'conservative' before AOO is to be removed as already mentioned at the beginning of the sentence. | | "… Option 3 contains a certain level of conservatism and is at present accepted for some DBA and for conservative analyses of anticipated operational occurrences ~~analyses (e.g. para 6.21).~~" | | |
| Observer EC/JRC-20 | 2.12/5 | Option 3 contains limited degree of conservatism only related to boundary and initial conditions and is at present accepted in some national regulations for DBA and anticipated operational occurrence analysis. | It seems that wording 'some' applies to 'DBA and anticipated operational occurrence'. However, this is wrong since regulation likely focuses on deterministic safety analysis applied to an entire set of so-called plant states so that if one specific option, e.g. option 3, can be applied to LBLOCA, it will | | *(See France-2 above)* | | |

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| | | | certainly be applicable – following that same regulation– to a SGTR. Therefore I believe 'some' applies to national regulations giving utilities and TSO the possibility of applying option 3 in this field. | | | | |
| Observer EC/JRC-21 | 2.12/7 | Last sentence should be removed | There is no need for explicitly mentioning one of the crucial aspects related to a correct uncertainty analysis in option 3. There are also several other ones, e.g. selection of significant and high-uncertainty phenomena, identification of user-effect sources of uncertainty (including nodalization analysis), which also have a very important role in properly conducting the uncertainty analysis. | XEC/JRC-21 | | | |
| Observer EC/JRC-22 | 2.13/All | Removed the entire para | This para does not contain any added value. Besides, it does not correspond to reality when stating that availability of extensive data is associated to best- | | | X | |

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| | | | estimate boundary and initial condition approach. If this were the case, best estimate in boundary and initial conditions is related to option 3, hence uncertainty analysis will be mandatory. On the other hand, utilities and TSO in charge of performing such deterministic analysis have access to as built, extensive and detailed data of the plant. Therefore and according to these two arguments, option 3 should be the first option for utilities and TSOs. Nonetheless, most applications worldwide still make use of option 2. | | | | |
| USA 3 | 2.15 Line 2 | …Option 4 may be appropriate for realistic analysis of anticipated operational occurrences aimed at assessment of control system capability and in general for best estimate design extension conditions analysis (see paras 7.17 and 7.54). Safety assessments | Safety assessments of operating events that may require short term relaxation of regulatory requirements are another potential application for best estimate modelling. | X | "… Option 4 may be appropriate for realistic analysis of anticipated operational occurrences (§7.17-§7.54) aimed at assessment of control system capability and in general for best estimate analysis design extension conditions analysis (§7.45-§7.67~~see paras 7.17 and 7.54~~). Additionally, this option | | |

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| | | performed for operating events that may require short term relaxation of regulatory requirements may rely on best estimate modelling. More detailed information… | | | may be used ~~Safety assessments performed~~ for the analysis of operating events that may require short term relaxation of regulatory requirements ~~may rely on best estimate modelling~~. More detailed information… | | |
| Japan 3 | 2.15<br>Line 4 | ... More detailed information regarding modelling assumptions applicable for different options is provided in ~~section 8~~ section 7 of this Safety Guide. | Editorial. | X | | | |
| Korea | 2.15<br>Line 4 | More detailed information regarding modelling assumptions applicable for different options is provided in section ~~8~~ 7 of this Safety Guide. | Errata | X | | | |
| Observer EC/JRC-23 | 2.15/1 | Option 4 allows using best estimate code modelling, system availability assumptions and initial and boundary conditions. | Ambiguous sentence when referring to parameters, on one hand, and modelling, on the other. | X | | | |
| Observer EC/JRC-24 | 2.15/3 | … aimed at assessment of control system capability (see paras 7.17 and 7.54). | The fact of removing last part of second sentence in para 2.15 stems from the increasing awareness on the strong impact that uncertainties have in the field of severe accidents. This issue will be | X | | | |

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| | | | developed later on in comment XXX | | | | |
| Czech 4 | 2.16 | In accordance with Ref. [3] (IAEA Safety Glossary) the source term is 'The amount and isotopic composition of material released (or postulated to be released) from the facility'; it is 'used in modelling releases of radionuclides…… | This definition is missing the timing of the radioactive substances releases. Modification needed. This definition speaks only about the fraction of the fission products released from the core or from any other source at NPP. | | | X | *The definition used in this Safety Guide has to be the one of the IAEA Safety Glossary* |
| France 3 | 2.16 Line 1 | Deterministic safety analysis includes ~~as its essential component~~ determination of the source | 'as its essential component' to be removed as DSA includes several other essential components | | "2.16 Deterministic safety analysis includes as one of its essential components determination of the source…" | | |
| Observer EC/JRC-25 | 2.16/1 | One of the sound results potentially drawn from deterministic safety analysis is source term calculation, which will ultimately serve for prediction of dispersion of radioactive substances to the environment and eventually does to the plant staff, to the public and radiological impact on the environment. | I don't agree when saying that source term determination is the essential component of deterministic safety analysis. Deterministic safety analysis have a wide spectrum of objectives each of which can strongly impact on safety analysis and assessment activities. Just to make an example, source term categorization as a consequence of | | *(See France-3 above)* | | |

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| | | | severe-accident sequence simulation with safety codes is performed through Level 2 PRA tool. However, up-to-date significance and number of consequences from Level 1 PRA application highly exceeds those coming from Level 2 PRA. Moreover, core damage figure of merit have also a much stronger impact within FSAR than source term categorization. | | | | |
| Observer EC/JRC-26 | 2.17/All | Source term evaluation under accident conditions requires simulation code capabilities dealing with fission product release from fuel elements, transport through primary system and containment or spent fuel pool building, and related chemistry. Risk-dominant and earliest, largest sequences leading to source term release to outside containment / spent fuel pool building environment or attached buildings should be taken into account. | It is unclear which actor is responsible for tasks identified in para 2.17. Safety engineer in charge of carrying out deterministic safety analysis will calculate source term by making use of dedicated simulation code. Therefore, I would recommend to reorient para 2.17 towards code capabilities in terms of affected source term phenomena. | | First sentence:<br>"Under accident conditions, source term evaluation requires simulation code capabilities dealing with fission product release from fuel elements, transport through primary system and containment or spent fuel pool building~~,~~ and related chemistry" | | *Second sentence would represent too much detail* |
| Germany 3 | 2.18 | 2.18. Source term is evaluated for operational states and accident conditions for the | The demonstration that early or large releases can be excluded can only be | | "…<br>(b) To support ~~by means of its quantification~~ the demonstration | | |

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| | | following reasons:<br>(a) To ensure that the design is optimized so that the source term will be reduced to a level that is as low as reasonably achievable in all plant states;<br>(b) To support by means of its quantification the demonstration that early or large releases can be considered as practically eliminated (should be done in co-operation with supporting probabilistic safety analyses);<br>(c) To demonstrate that the design ensures that requirements for radiation protection, including restrictions on doses, are met;<br>(d) To provide a basis for the emergency arrangements[2] that are required to protect human life, health, property and the environment in case of an emergency at the nuclear power plant;<br>(e) To specify the conditions for the qualification of the equipment required to withstand accident conditions.<br>(f) Provision of databases for training activities regarding emergency preparedness.<br>(g) Supporting Level 2 PSA | done in co-operation with probabilistc safety analyses. Thus, the usage of only deterministic event analyses is not sufficient. Other relevant objectives of source term analyses are to deliver data for the training of emergency preparedness and supporting Level 2 PSA analyses. | | that …<br>*(Regarding the last part of this bullet, see resolution to comment Czech-2 above)*<br>…<br>(f) To provide data for training activities regarding emergency arrangements. | | |

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| | | analyses. | | | | | |
| Czech 5 | 2.18 Bullet (b) | To support by means of its quantification the demonstration that early ~~or~~ large releases can be considered as practically eliminated; | See comment 2. | | *First part: See resolution to Germany-3 above.*<br><br>*Second part: See resolution to Czech-2 above (para 2.1)* | | |
| Ukraine | 2.18 Bullet (b) | To add "*radioactive"* before "releases".<br>"… is also aimed to contribute to demonstrate that the source term and eventually radiological consequences of different plant states are acceptable and that early or large ***radioactive*** releases are practically eliminated". | To specify the formulation. | | *See resolution to Czech-2 above (para 2.1)* | | |
| France 4 | 2.18 Bullet (b) | ~~(b) To support by means of its quantification the demonstration that early or large releases can be considered as practically eliminated~~ | 1) We are not sure to understand this sentence.<br><br>It seems to be in contradiction with 3.57 : "Consequences of event sequences that have been 'practically eliminated' do not need themselves to be deterministically analysed…."<br><br>2) Moreover, as for the previous comment, the "practical elimination" approach should be related to accidental situations and | | *See resolution to Germany above, regarding §2.18 (b)* | | |

| Comment No. | Para/Line No. | Proposed new text | Reason | Accepted | Accepted, but modified as follows | Rejected | Reason for modification/rejection |
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| | | | not to releases – see comment 1 | | | | |
| Observer EC/JRC-27 | 2.18/(b) | *Footnote 6 should be replaced / added here in* 'practically eliminated' | 'Practically eliminated' statement appears here for the first time so corresponding clarification note should be included. | | *See Germany-3* | X | *It appears also in 2.1. The footnote is placed in a "should" statement* |
| Canada 45 | 2.18 | Suggest a note be added to explain that thermal hydraulic conditions are equally important as the source term for equipment qualification. | Qualification of equipment is required to withstand the source term and thermal hydraulic accident conditions | | | X | *The subsection covers source term.* |
| Observer EC/JRC-28 | 2.18/(c) | First sentence of footnote 2 should be added here. | Last sentence of para 1.12 says that 'determination of the doses to the nuclear power plant staff is therefore not covered by this Safety Guide", hence footnote 2 on indicating that this reason goes beyond this Safety Guide should also apply here. | | | X | *Preferable not to enter into that detail in (c)* |
| Observer EC/JRC-29 | 2.19/new (2.18??) | To include a new bullet (f) such (f) To characterize so-called Level 2 PRA Release Categories and quantify related figures of merit, e.g. LERF. | Unless it is explicitly stated that the listed reasons only affect deterministic safety analysis, Level 2 PRA results on Release Categories constitute a key aspect of safety analysis interacting with deterministic safety analysis by making use of | | *(It seems applicable to 2.18 instead of 2.19)*<br>*See Germany-3* | | |

| Comment No. | Para/Line No. | Proposed new text | Reason | Accepted | Accepted, but modified as follows | Rejected | Reason for modification/rejection |
|---|---|---|---|---|---|---|---|
| | | | simulation code outcomes which should be here taken into account. | | | | |
| Observer EC/JRC-30 | 2.19/new (2.18??) | To include a new bullet (g) such (g) To help with the engineering design process related to severe-accident mitigating systems such as Filtered Containment Venting. | Decision criteria on some of the backfitting systems may include minimization of source term release and associated transport heat outside containment. | X | *(It seems applicable to 2.18 instead of 2.19)* (g) To support safety design of mitigating systems related to severe-accident (e.g. Filtered Containment Venting) | | |