Response to Public Comments on Proposed Revision 5 to Regulatory Guide (RG) 1.82 - Draft Regulatory Guide (DG)-1385
"Water Sources for Long-Term Recirculation Cooling Following a Loss-of-CoolantAccident"

On February 8, 2022 the U.S. Nuclear Regulatory Commission (NRC) published a notice in the *Federal Register* (87 FR 7209-7211) that Draft Regulatory Guide DG-1385, a proposed regulatory guide revision, was available for public comment. The Public Comment Period ended on April 8, 2021; the NRC received comments from the following:

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Comments are in ADAMS at their accession numbers, or at Docket Number PROJ0689, and their proposed resolutions are in the following Public Comment Resolution table:

Table of Public Comments and Their NRC Resolutions to Proposed Revision 5 of Regulatory Guide 1.82: Draft Regulatory Guide DG-1385

Commenter	Section of DG-1385	Specific Comments	NRC Resolution
NEI	**ALL**	**NEI_Request** Comment Period Extension Request on Draft RG: DG-1385 (2-11-2022)	The staff agreed with the request. Public comment period extended an additional 30 days, ending April 8, 2022 (ML22060A046).
NEI	**Purpose, Applicability**	**NuScale_1** The Purpose section references use of the regulatory guide (RG) relative to the following structures, systems, or components (SSCs) only: sumps, suppression pools, emergency core cooling system (ECCS) pumps, and containment heat removal pumps. In addition, all of the regulatory positions in Section C are related to maintaining ECCS pump performance and net positive suction head (NPSH). The Applicability section expands applicability of the RG beyond the scope of the aforementioned SSCs to all licensees subject to 10 CFR Part 20, Appendix I of 10 CFR Part 50, and to all holders of and applicants for a power reactor combined license, design certification, standard design approval, or manufacturing license under 10 CFR Part 52. This is incorrect because the RG cannot be used as guidance for designs that do not contain any of the SSCs mentioned in the Purpose section. **Recommendation:** Revise the Applicability section to be more precise regarding scope of applicability as follows: "This RG applies to nuclear power reactor designers, applicants, and licensees of LWR designs that utilize pumps to perform emergency core cooling or containment heat removal functions and are subject to 10 CFR Part 50 "Domestic Licensing of Production and Utilization Facilities" or 10 CFR Part 52 "Licenses, Certifications, and Approvals for Nuclear Power Plants."	The staff disagrees with this comment. This RG is applicable to reactor designs that employ post-accident core cooling systems that utilize features similar to those described in the RG or that may be affected by phenomena similar to those addressed therein. Although new or alternate designs may not incorporate all of the features described in this RG, topics discussed in the guidance may be applicable to these alternate designs. For example, the RG provides information regarding the effects of debris accumulation at the core inlet and within the fuel following an accident. Also, some designs may employ debris filters but not use ECCS pumps. Although the guidance may not be directly applicable to an alternate reactor design, the concepts described therein should be considered for post-accident response for all reactor designs. As stated in Section 1.1, research has shown that the phenomena discussed in RG 1.82 indicate that similar approaches may be used in many areas related to water sources for long term core cooling. In designs where it is determined that these phenomena do not need to be evaluated, the guidance would not have to be applied. The intent of this revision is not to rewrite the RG to apply to new designs. As guidance, the RG is not mandatory and applicants or licensees can use alternate methods or justify exceptions for its use. No changes were made to the DG as a result of this comment.

NuScale	**C.1**	**NuScale_2** The section states: "This section includes regulatory positions on design criteria, performance standards, and analysis methods that relate to all watercooled reactor types (Section C.1.1)…" The regulatory positions are not relevant to reactor designs that do not contain ECCS sumps, suppression pools, suction strainers, and debris interceptors. **Recommendation:** Revise the section to state: "This section includes regulatory positions on design criteria, performance standards, and analysis methods that relate to water-cooled reactor types that contain ECCS pumps (Section C.1.1)…".	See the Response to NUSCALE_1. No changes were made to the DG as a result of this comment.
NuScale	**C.1.1**	**NuScale_3** The section states: "1.1 Regulatory Positions Common to All Water-Cooled Reactors Research, analysis, and lessons learned have shown that in many areas, similar approaches to performing the long-term recirculation capability evaluation are appropriate for all water-cooled reactors." The regulatory positions in this section are not relevant to reactor designs that do not contain ECCS sumps, suppression pools, suction strainers, and debris interceptors. **Recommendation:** Revise this section to state: "1.1 Regulatory Positions Common to All Water-Cooled Reactors with ECCS Pumps Research, analysis, and lessons learned have shown that in many areas, similar approaches to performing the long-term recirculation capability evaluation are appropriate for all watercooled reactors with ECCS pumps."	The staff disagrees with this comment. The current revision includes the qualifier, "in many cases," making the revision unnecessary. The current fleet makes up most of the cases to which this guidance is applied, with some potential for alternate designs. The purpose of the current revision of the RG is not to update the guidance to include new reactor designs. Therefore, the existing wording is acceptable. No changes were made to the DG as a result of this comment.

NEI	**B-2** "Boiling Water Reactor Pumps"	**NEI_1** The abbreviation, CS, is used for Core Spray in the first paragraph, but it is used for containment spray in the bullet items below. It is not obvious why a distinction is made between containment spray pumps and RHR pumps with respect to the NPSH, and why the RHR and containment spray are singled out rather than including all ECCS pumps here. Containment spray is a function of the RHR pumps. The title of Section B-4 correctly identifies the pumps in the scope of this guide as "ECCS and Containment Heat Removal Pumps" **Recommendation:** Replace "residual heat removal (RHR) system and core spray (CS) pumps" by Emergency Core Cooling System (ECCS) and containment heat removal pumps at a minimum. However, this section is confusing in its entirety and the purpose of it is not clear. It is recommended that this subsection be rewritten.	The staff agrees with the comment in the first paragraph. The acronym "CS" is assigned to containment spray for both BWRs and PWRs. The acronym "LPCS" is assigned to low pressure core spray system for BWRs. The staff disagrees with the comment in the second paragraph. As is obvious from the title and its contents, Section B-2 describes the role of the BWR and PWR pumps, which may use CAP for determining the available NPSH. Conforming changes using the acronyms above have been made to the DG, Appendix B, Section B-2 as a result of the NEI recommendation in the first paragraph. No changes were made to the DG-1385, Appendix B as a result of the NEI recommendation in the second paragraph.
NEI	**B3** Uncertainty Analysis	**NEI_2** Only the proprietary version of the BWROG topical report, NEDC-33476P-A is referenced. Public does not have access to this version of the report. **Recommendation:** Replace "NEDC-33347P-A" by "NEDC-33347P-A/NEDO-33347-A, Revision 2"	The staff agrees with the comment. The second paragraph under the title "Uncertainty Analysis" is revised by adding NEDO-33347-A. Conforming changes have been made in the DG-1385, Appendix B, Section B-3 as a result of this comment.

NEI	**B5**	**NEI_3** This section provides some information on impeller blade erosion due to cavitation. If this is a concern, it may look like it applies whether or not CAP is credited. However, if the reasoning of including this only in Appendix B is that there is already margin if CAP is not credited due to the higher pressure than credited in the NPSH calculation, this should be clarified. **Recommendation:** Clarify the regulatory position regarding Section B-5 or remove this section from Appendix B.	The staff agrees with this comment. The first sentence of Section B-5 is modified to the following: "One of the adverse effects of insufficient NPSH margin whether CAP is used or not used in the determination of NPSHa…." Conforming changes have been made in the DG-1385, Appendix B, Section B-5 as a result of this comment.
NEI	**General**	**NEI_4** The report should include discussions on alternate calculations that would be acceptable to the staff. In particular, a section should be added that overviews the risk-informed methods that were used to resolve the suction strainer issues. **Recommendation:** New Section added to Appendix B – "Acceptable Alternate Risk Informed Methodologies"	The staff disagrees with this recommendation.The NRC has approved LARs for plants that used risk-informed methods to evaluate long-term core cooling. These licensees have used guidance developed by the staff in (draft) RG 1.229, which has not yet been issued as final. The precursor to RG 1.229, DG-1332, was issued in 2015 to support the 10 CFR 50.46 rulemaking and was based on the South Texas Project (STP) risk-informed LAR to resolve Generic Letter 2004-02, which covers the effect of debris on long-term core cooling. The STP LAR was a pilot for future similar applications. Licensees and the NRC staff have used the draft of RG 1.229 as informal guidance when writing and evaluating LARs for this purpose. Finalization and issuance of the RG is dependent on the rulemaking for 10 CFR 50.46. This rulemaking includes a risk-informed option for evaluating long-term core cooling. This rulemaking has not yet been completed. No changes were made to the DG-1385 as a result of this comment.
NEI	**Appendix B Page B-3 Pressurized-Water Reactor Pumps**	**NEI_5** Appendix B (page B-3) of the draft guidance states that the function of the Containment Spray (CS) System is to cool the containment. Some PWRs also use the CS system to reduce fission products from the containment atmosphere. **Recommendation:** Reference the additional function of the CS system to reduce fission products from the containment atmosphere for some PWRs	The staff agrees with this comment. The second from last sentence of Section B-2 is modified to read as follows: "The function of the containment spray system is to cool the containment and also to remove fission products from the containment for some PWRs by spraying water following a LOCA." Conforming changes have been made in the DG-1385, Appendix B, Section B-3 as a result of this comment.

NEI	B-4	**NEI_6** The NRC draft guidance for the use of Containment Accident Pressure (CAP) to determine the Net Positive Suction Head available (NPSHa) of safety-related pumps, is provided in Appendix B of the Draft Regulatory Guide DG-1385. The guidance indicates for Design Basis Analyses (DBAs) that credit CAP should use a value of effective NSPH required (NPSHreff) that includes the uncertainty in the value of the required NPSH based on a 3% drop in pump head (NPSHr3%) based on vendor testing and installed operation. The effects of motor slip, suction piping configuration, and air content should be included. **Recommendation:** Based on the evaluations discussed in PWROG-15050-P, the incorporation of an uncertainty factor on required NPSH of 21% is not required. See Attachment 2 for further detail.	The staff disagrees with this comment. The guidance provided in the DG for the uncertainty in the required NPSH based on a 3% drop in pump head ($NPSHr_{3\%}$) does not specify the 21% value. This uncertainty should be determined by the licensee on a plant specific basis with appropriate justification for NRC staff review and approval. No changes were made to the DG-1385, Appendix B as a result of this comment.
NEI	Appendix B Page B-18 Pressurized -Water Reactor Plants	**NEI_7** The NRC draft guidance specifies that if the NPSHa is less than NPSHreff (DBA), operation in this mode is acceptable if appropriate tests are performed to demonstrate that the pump will continue to perform its safety function(s). The tests are to be performed on the actual pump, with the same mechanical shaft seal (including flush system), or at least on a pump of the same model, size, impeller diameter, materials of construction, and pump seal/flush system. **Recommendation:** A sufficient set of bounding tests have been performed, and additional testing is not required. See Attachment 2 for further detail.	The staff disagrees with this comment. The generic guidance on testing of pumps to justify their operation if the NPSHa is less than $NPSHr_{eff}$ is included in the DG based on SECY-11-0014, Enclosure1, Section 6.6.6. On a plant specific basis, the licensee may propose an alternate with appropriate justification for NRC staff review and approval. No changes were made to the DG-1385, Appendix B as a result of this comment.
NEI-Attachment 2 **Additional Basis information for comments 6 and 7 on Draft Regulatory Guide DG-1385, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident"**			Attachment 2 contains additional basis for comments 6 and 7 and does not warrant an additional NRC response. For the NRC's response to comments 6 and 7 see above.
NEI	Comment 6	The NRC draft guidance for the use of Containment Accident Pressure (CAP) to determine the Net Positive Suction Head available (NPSHa) of safety-related pumps, is provided in Appendix B of the Draft Regulatory Guide DG-1385. The guidance specifies for Design Basis Analyses (DBAs) that credit CAP should use a value of effective NSPH (NPSHreff) that includes the uncertainty in the value of the NPSH based on a 3% drop in pump head (NPSHr3%) based on vendor testing and installed operation. The effects of motor slip, suction piping configuration, and air content should be included.	

An earlier version of the NRC draft guidance was provided to the PWROG in 2010 (Reference 1). The earlier version of the draft guidance defined the uncertainty in NPSH as 21%. Based on Reference 1, the PWROG completed a project which resulted in topical report PWROG-15050-P (Reference 2), "Use of Containment Accident Pressure to Demonstrate Acceptable PWR Pump NPSH." PWROG letter OG-15-191 (Reference 3) transmitted PWROG-15050-P to the NRC for information only. The current draft guidance does not specify an uncertainty value; instead, it specifies that the uncertainty in NPSH will be identified. During preparation of this response, it was assumed that the uncertainty may be as high as the 21% identified in Reference 1.

PWROG-15050-P summarizes an investigation into containment analyses to determine the minimum available NPSH for a representative W NSSS ice condenser containment, W NSSS sub-atmospheric containment, CE NSSS large-dry containment and W NSSS large-dry containment. An analysis of a B&W NSSS large-dry containment was also assessed; however, it was felt that these results were redundant because they were sufficiently similar to the CE NSSS large-dry containment example, with respect to the elements that are relevant to this work. PWROG-15050-P documents three investigations which are summarized as follows:

1. PWROG-15050-P Section 4.1 summarizes conservative deterministic containment analyses to determine the minimum available NPSH from the containment sump to the ECCS pumps. These results indicate that in all cases, the PWR designs have positive margin, and in most cases, this margin can offset the proposed 21% uncertainty in NPSHr.

2. PWROG-15050-P Section 4.2 summarizes an assessment of the impact of relaxing two very conservative assumptions in the containment analyses to determine NPSH margin.

    a. The conservative containment analysis assumed the saturated liquid portion of the mass and energy (M&E) exiting the break was discharged directly into the containment sump liquid inventory. A more realistic assumption was used in the evaluation contained in PWROG-15050-P, which modeled this portion of the M&E as discharging to the containment atmosphere. PWROG-15050-P demonstrates that reducing this assumption increases the minimum difference between the containment accident pressure and the saturation pressure at the sump liquid temperature from 2.3 psi to 4.6 psi. This represents an increase in margin of 2.3 psi, which doubles the previous margin.

    b. The conservative analyses assumed that all heat exchangers used to cool the sump inventory had zero fouling. A more realistic assumption was used in the evaluation contained in PWROG-15050-P, which models design fouling factors for these heat exchangers. PWROG-15050-P demonstrates that reducing this assumption increases the minimum difference between the containment accident pressure and the saturation pressure at sump liquid temperature from 2.3 psi to 3.4 psi. This represents an increase in margin of 1.1 psi.

   Given that the 21% uncertainty in NPSH margin for a PWR ECCS pump is approximately 2 psi, the impact of relaxing the M&E conservative assumptions more than offsets the proposed NPSH uncertainty of 21%.

3. PWROG-15050-P Section 4.3 assessed the maximum potential time for which the PWR ECCS pumps could operate with an NPSHa deficit. PWROG-15050-P concludes that the times varied within the range from 0.1 to 1.1 hours. These times are much lower than the time required for cavitation damage of the pump to occur.

PWROG-15050-P Section 4.4 summarizes a pump evaluation performed by Flowserve, which investigated the impact of a postulated 21% NPSH deficit on the three models of ECCS pumps for the representative plants (RHR 8 x 20 WDF; LPSI 18-CKXH; and HPSI 3-HMTA7). The following sections summarize the key results documented in PWROG-15050-P.

1. Pump Operation with NPSHa<NPSHr with a Fixed System Resistance

   PWROG-15050-P Section 4.4.1 discusses that the nuclear safety pumps considered in the evaluation all operate in fixed systems (constant hydraulic resistance) at a flow rate greater than or equal to the best efficiency point (BEP) flow rate of the pump. This mode of operation is fundamentally different from the way an NPSH-suppression test is performed. In the NPSH test the system is not fixed; rather, a valve is opened enough to maintain the flow rate, as the NPSHa is decreased toward NPSHr. As the 97% head or break point is approached, cavitation instabilities in the form of pressure pulsations can occur, and these can be quite severe at flow rates substantially below the BEP flow rate, often resulting in an adverse mechanical response, such as

		extreme fluctuating axial and radial loads and/or excessive vibration – any or all of which can lead to stress-related failures, mechanical seal failures, etc., of the pump. These issues do not exist in the applications that were considered in PWROG-15050-P. If the pump supplying a fixed system loses suction pressure such that the NPSHa drops below the NPSHr with a flow greater than BEP, the pump can no longer deliver that high flow rate. Rather, it will deliver a lower flow rate through the same system, and in doing so, produces less head to move the smaller amount of fluid through the same system. For such a pump, then, both the flow rate and the head it produces are less. PWROG-15050-P Section 4.4.1 also includes the results of testing conducted with the Ingersoll Rand 3-HMTA7 used in the CE NSSS and a 16,000 HP (12 MW) Ingersoll Rand 95-CHTA feed pump at values of NPSHa significantly less than 79% of NPSHr (corresponding to a 21% NPSH deficit). These tests confirmed that these pumps operated smoothly in a fixed system when the NPSHa was reduced to significantly less than 79% of NPSHr; the 12 MW pump was tested at NPSHa values as low as 59% of NPSHr. This is very significant, because, if a 12 MW multistage pump can operate smoothly at a significantly greater NPSHa reduction as a percent of NPSHr than is specified for the evaluation of nuclear safety pumps, all of which operate at less than half a megawatt, then it can be concluded that an adverse mechanical response of any kind will be insignificant for the nuclear safety pumps. 2. Minimum Calculated Life in Resistance to Cavitation Erosion PWROG-15050-P Section 4.4.3 summarizes an assessment of the impact on the estimated pump life due to impeller erosion. As discussed above, PWROG-15050-P Section 4.3 concluded that the pump operating time with an NPSHa deficit varied between 0.1 hour and 1.1 hour. The cavitation life varies from a minimum of 2,600 hours (0.2 hours cavitation deficit) to 4,900 hours (1.1 hour cavitation deficit). The ratio of the estimated life to the maximum possible time (operating at an NPSH deficit of at least 21%) is greater than 4,000 in all cases. Therefore, the impact of cavitation is negligible. 3. Mechanical Performance PWROG-15050-P Section 4.4.4 summarizes the expected mechanical performance of the pumps under the postulated reduced NPSH conditions. It was concluded that minimum flow-related instabilities are not experienced to occur unless the impeller is full of liquid (that is, NPSHa > NPSHr) at a low flow rate relative to the BEP flow. All of the pumps evaluated in PWROG-15050-P operate in a fixed system through which the DBA pump flow rates are greater than the BEP flow rates when there is adequate NPSHa and the impellers are full of liquid. In such systems, the application of the NPSHa lower than the NPSHr needed for these high flow system flow rates relative to pump flow capability results in partially filled impellers with a vapor core and a surrounding liquid ring that is incapable of sending backflow into the entry region of the impeller; therefore, the pump runs smoothly. PWROG-15050-P discusses that the high-energy 95-CHTA test pump ran smoothly when the NPSHa was less than NPSHr and this further supports the conclusion that the low-energy nuclear safety pumps are expected to run smoothly, without any adverse mechanical response and with minimal cavitation damage. Based on the evaluations discussed in PWROG-15050-P, the incorporation of an uncertainty factor on NPSH is not specified for the following reasons: a. PWROG-15050-P Section 4.2 demonstrates that the containment analyses used to define the available NPSH utilize conservative assumptions which more than offset an NPSH uncertainty of 21%. Therefore, the conservatism in the containment analyses obviates the need to explicitly consider an uncertainty in NPSH. b. Ignoring the conservatism in the containment analyses, if a 21% penalty on the available NPSH for ECCS pumps is applied, PWROG-15050-P Section 4.3 demonstrates that the maximum time the ECCS pumps would operate at an NPSH deficit is 1.1 hours. PWROG-15050-P Section 4.4.3 demonstrates that the pump erosion lifetime corresponding to this scenario is 4,900 hours. Therefore, the substantial erosion margin eliminates the need to consider an uncertainty in NPSH. c. PWROG-15050-P Section 4.4.1 demonstrates the PWR ECCS pumps operate in a fixed resistance manner when taking suction from the containment sump. Therefore, a deficit in the NPSH does not result in a mechanical problem, and only results in a reduction in pump flow rate and developed head proportional to the NPSH deficit. PWROG-15050-P Section 4.4.1 documents the results of testing conducted with a 16,000 HP (12 MW) Ingersoll Rand 95-CHTA feed pump at NPSHa values significantly less than 79% of the NPSHr (corresponding to a 21% NPSH deficit). These tests confirmed that these

		pumps operated smoothly in a fixed system, when the NPSHa was lowered much below 79% the NPSHr; the 12 MW pump was tested at NPSHa values as low as 59% of NPSHr. This is very significant, because, if a 12 MW multistage pump can operate smoothly at a significantly greater NPSHa reduction as a percentage of the NPSHr than is specified, for the nuclear safety pumps evaluated in PWROG-15050-P, all of which operate at less than half a megawatt, it can be concluded that an adverse mechanical response of any kind will be insignificant for the nuclear safety pumps. d. PWROG-15050-P Section 4.4.4 concluded that the PWR ECCS pump impeller is protected by a vapor core that precludes mechanical instabilities, because the pump operates at a flow rate greater than the BEP flow rate when suction is taken from the pump.	
NEI	**Comment 7**	The NRC draft guidance states that if the NPSHa is less than NPSHreff (DBA), operation in this mode is acceptable if appropriate tests are performed to demonstrate that the pump will continue to perform its safety function(s). The tests are to be performed on the actual pump, with the same mechanical shaft seal (including flush system), or at least on a pump of the same model, size, impeller diameter, materials of construction, and pump seal/flush system. The performance of these tests would be extremely costly, and this testing is not needed based on the following: a. PWROG-15050-P Section 4.4.1 demonstrates that the PWR ECCS pumps operate in a fixed resistance manner when taking suction from the containment sump. As a result, the flow is not held constant as the available NPSH decreases, causing the pump to operate at an available NPSH much less than the specified NPSH at that flow rate. Rather, a deficit in available NPSH relative to the specified NPSH only results in a reduction in pump flow rate and developed head that is proportional to the NPSH deficit. PWROG-15050-P Section 4.4 documents that many non-nuclear pump applications require the pump to continually operate in this mode where the system flow rate is controlled by the available NPSH. b. PWROG-15050-P Section 4.4.1 also documents the results of testing performed on a 16,000 HP (12 MW) Ingersoll Rand 95-CHTA feed pump at values of NPSHa significantly less than 79% of NPSHr (corresponding to a 21% NPSH deficit). These tests confirmed that these pumps operated smoothly in a fixed system when the NPSHa was lowered significantly less than 79% of NPSHr; the 12 MW pump was tested at NPSHa values as low as 59% of NPSHr. This is significant, because, if a 12 MW multistage pump can operate smoothly at a significantly greater NPSHa reduction as a percent of NPSHr than is specified in the evaluation of nuclear safety pumps, all of which operate at less than half a megawatt, then an adverse mechanical response of any kind will be insignificant on the nuclear safety pump. c. PWROG-15050-P Section 4.3 demonstrates that the maximum time that the ECCS pumps would operate at an NPSH deficit is 1.1 hours. PWROG-15050-P Section 4.4.3 demonstrates that the pump erosion lifetime corresponding to this situation is 4,900 hours. Therefore, the substantial erosion margin eliminates the need to consider a 21% uncertainty in the specified NPSH. Based on these above, a sufficient set of bounding tests have been performed, and additional testing is not needed.	
NEI		**References** 1. “NRC Draft Guidance for the Use of Containment Accident Pressure in Determining the NPSH [Net Positive Suction Head] Margin of ECCS and Containment Heat Removal Pumps,” Agencywide Document Access and Management System under Accession Number ML100550869. 2. PWROG-15050-P, Rev. 0, “Use of Containment Accident Pressure to Demonstrate Acceptable PWR Pump NPSH,” May 2015. 3. Letter OG-15-191, “Transmittal of PWROG-15050-P: “Containment Accident Pressure for PWR Pump NPSH,” For Information Only (PA-SEE-0929-R1),” May 2015.	
Nubar			
Commenter	**Section of DG-1385**	**Specific Comments**	**NRC Resolution**
Nubar	**B-3**	**General Comment_1**	The staff disagrees with this comment. The purpose of Appendix B of the DG-1385 is to provide guidance on the use of CAP in the

			Per Section B-3 of DG-1385, staff were to include the guidancein Enclosure 1 of SECY-11-0014 in DG-1385.Enclosure 1, *Section 5.2, Conservative Calculations and Statistical Approach*, contains Tables for conservative assumptions to be used on the calculation of NPSHa. However, this important and specific information is not included in the proposed DG otherthan a caveati.In addition the tables from the SECY-11-0014 enclosure are not suitable for industryguidance; pleasesee attachment for comments.I would recommenda second round of comments anda public meetingto addressthe calculationconservatisms.	calculation of available NPSH for ECCS and containment heat removal pumps and their margin based on the pump required NPSH. It also provides guidance on the calculation of uncertainty in the pump required NPSH. It is not intended for guidance on how to conservatively determine the available NPSH. The assumptions listed in SECY-11-0014, Enclosure 1, Section 5.2, Tables 4 and 5 are typical for performing conservative BWR and PWR containment analysis respectively for the determination of available NPSH to meet the requirement of 10 CFR Part 50, Appendix A, GDC-38. Therefore, these tables are appropriate for inclusion in the DG-1385. No changes were made to the DG-1385, Appendix B as a result of this comment.
Nubar			**General Comment_2** Also, the memorandum from Ahsan Sallman, NRC, to Robert Dennig, NRC, "*GOTHIC Calculations for a Typical BWR/4 with a Mark I Containment to Study the Use of Containment Accident Pressure*", ADAMS Accession No. ML 100480097should be made publically available.This is Reference 58 to Enclosure 1 of SECY-11-0014.	The staff agrees with this comment. Reference 58 in SECY-11-0014, Enclosure 1, ADAMS Accession Number ML100480097 is now available as a public document. Conforming changes have been made to DG-1385 as a result of this comment.
Nubar	**BWR:** (Table 4, Enc 1, SECY-11-0014) The worst single failure occurs.	**PWR** (Table 5, Enc 1, SECY-11-0014) The worst single failure occurs.	**Nubar_1** This criterion is quite problematic for both passive and active failures. PASSIVE FAILURE In practice, passive failures of fluid systems are not postulated in the ECCS injection phase, but are postulated in the recirculation phase. In the applicationof passive failures it is current practiceto assume fluid leakage owing to gross failure of a pump or valve seal during the long-term cooling mode following a LOCA (SECY-77-439, Single Failure Criterion); this is the phase where CAP credit is desired. Usually, the passive failure is taken to be apiping breach in a train of ECCS/support system or a 50 gpm leak on an ECCS pump mechanical seal. **Recommendation:**NRC staff to determine application of passive failure with respect to CAP application.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.

			ACTIVE FAILURE The most conservative application ofactive single failure is not clear. The number of failures (e.g., full ECCS train, single Containment Spray pump, single RH pump, recirculation sump isolation valve etc) and their interactions with the key parameters of CAP and sump temperature, preventsan *a priori*determination of the limiting active single failure. **Recommendation:** Licensees to perform studies sufficient to determine the limiting active single failure.	
Nubar	**BWR** Core decay heat is based on conditions bounding specific plant cycles.	**PWR** Not listed.	**Nubar_2** Requirement is not clear and the operating history is specified in ANSI/ANS 5.1-1979. **Recommendation**: Delete this parameter.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** The initial drywell and suppression chamber pressures are at the minimum expected values to minimize the containment accident pressure.	**PWR** Not listed.	**Nubar_3** Add equivalent statement for PWRs.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** The maximum operating value of the drywell temperature and the maximum relative humidity (100	**PWR** A conservatively high value of initial containment temperature is assumed. This temperature could be	**Nubar_4** 1. Use consistent wording between BWR and PWR parameters; not "A conservatively high value..." and "...maximum operating value...". 2. The relative humidity of 100% should be added to the PWR parameter.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.

	%) are used to minimize the initial noncondensable gas mass and minimize the long-term containment pressure.	based on containment coolers not in service before the postulated accident.		
Nubar	**BWR** The initial suppression pool temperature is the maximum technical specification value to maximize the calculated suppression pool temperature.	**PWR** The RWST initial temperature is at its maximum technical specification value.	**Nubar_5** The direction of conservatism is not apparent. For PWRs, the Containment Spray pumps initially draw water from the RWST. A hot RWST supplying CS may result in an initial increase in CAP (non-conservative) as well as a hot sump (conservative). A cooler RWST could result in a reduced CAP (conservative) and a cooler sump (non-conservative). **Recommendation:** Perform a sensitivity analysis with respect to temperature.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** Passive heat sinks are modeled to reduce containment pressure.	**PWR** Not listed.	**Nubar_6** Passive heat sinks should be modeled for PWRs.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** All core spray and RHR pumps have 100 percent of the brake horsepower rating (rather than the water horsepower) converted to pump heat that is added	**PWR** Not listed.	**Nubar_7** This parameter appears quite arbitrary. **Recommendation:** Unless this item has a rigid precedent in BWR analysis, it should be deleted or a least subject to a sensitivity study.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.

	to the suppression pool water.			
Nubar	**BWR** Feedwater flow into the vessel continues until all feedwater that would increase the suppression pool temperature has been added.	**PWR** N/A for PWRs	**Nubar_8** Credit should be allowed for Feedwater Isolation.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** The initial suppression pool water volume is the minimum allowed by the technical specifications to maximize the suppression pool temperature and minimize the positive contribution resulting from the static head.	**PWR** The RWST level is at its minimum technical specification value. This causes recirculation to begin at a lower sump water level and with a hotter core.	**Nubar_9** For PWRs, the direction of conservatism is not apparent. While a reduced inventory during the injection phase may cause the sump water to be hotter, CAP will also be higher (non-conservative) due to the reduced amount of Containment Spray. This comment is inter-related with that of RWST temperature. **Recommendation:** Licensees to perform sensitivity studies to determine direction of conservatism.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** For the LOCA, a conservative estimate is made of blockage of	**PWR** The head loss resulting from debris on the sump screens is maximized.	**Nubar_10** With the exception of “sump screens” and “suction strainers” the PWR and BWR versions of this parameter should be identical.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.

	the suction strainers resulting from LOCA-generated debris. This increases the head loss (hloss).			
Nubar	**BWR** Containment leakage is equal to La.	**PWR** Not listed	**Nubar_11** Add for PWRs	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** The water flowing through the debris bed on the suction strainer is assumed to be at a temperature below the peak suppression pool temperature. This assumption results in ahigher than expected head loss.	**PWR** The head loss resulting from debris on the sump screens is maximized.	**Nubar_12** With the exception of "sump screens" and "suction strainer" the PWR and BWR versions of this parameter should be identical.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** Not listed	**PWR** Initial conditions are chosen to minimize containment pressure and	**Nubar_13** This is very high level and is more appropriate as introductory material. It is also redundant to the last sentence in Position C.1.3.1.2. **Recommendation:** Move to introductory material.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.

		maximize containment emergency sump water temperature.		
Nubar	**BWR** Not listed	**PWR** The pressure of the containment atmosphere is equal to the vapor pressure of the sump water at the sump water temperature. This results in the static height of water in the sump above pump suction elevation as the only positive contribution to the NPSHa.	**Nubar_14** As written, this negates the application of CAP. **Recommendation:** Delete	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** Not listed	**PWR** The distribution of the energy released with the assumed break is distributed in the containment atmosphere in such a way that the sump temperature is maximized	**Nubar_15** A reference is needed for the statement: "...liquid in the break flow that does not flash to vapor is dispersed as droplets of a size that maximizes the sump temperature and minimizes the containment pressure as the droplet falls to the containment floor and heat and mass are transferred between the droplets and the containment atmosphere." Also, evaluate for applicability to BWRs.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.

		and the containment pressure is minimized. For older computer simulations, this is accomplished with the “pressure flash” model. More current, physically based analysis methods accomplish this by assuming that the liquid in the break flow that does not flash to vapor is dispersed as droplets of a size that maximizes the sump temperature and minimizes the containment pressure as the droplet falls to the containment floor and heat and mass are transferred between the droplets and the		

		containment atmosphere.		
Nubar	**BWR** Not listed	**PWR** The sump recirculation switchover setpoint (RWST level) is at its maximum. This leaves more water in the RWST, which minimizes the water initially in the sump.	**Nubar_16** For PWRs, the direction of conservatism is not apparent. While a reduced inventory during the injection phase may cause the sump water to be hotter, CAP will also be higher (non-conservative) due to the reduced amount of Containment Spray. This comment is inter-related with that of RWST temperature.	This comment is applicable to SECY-11-0014, Enclosure 1 and not DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.
Nubar	**BWR** N/A for BWRs	**PWR** Not listed	**Nubar_17** The mass of the Safety Injection Accumulator water (approximately 250,000 lb, or almost half the mass of the RCS), should be included in a manner similar to the RWST. This would include variations of initial temperature and mass and analysis of sensitivities.	This comment is not applicable to DG-1385. See resolution to General Comment_1. No changes were made to the DG-1385 as a result of this comment.