Response to Public Comments on Draft Regulatory Guide (DG)-1275
"Ultimate Heat Sink for Nuclear Power Plants"
Proposed Revision 3 of Regulatory Guide (RG) 1.27

On September 9, 2013, the NRC published a notice in the *Federal Register* (78 FR 55117) that Draft Regulatory Guide, DG-1275 (Proposed Revision 3 of RG 1.27), was available for public comment. The Public Comment period ended on November 8, 2013. The NRC received comments from the organizations listed below. The NRC has combined the comments and NRC staff responses in the following table.

Comments were received from the following:

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Commenter	Section of DG-1275	Specific Comments	NRC Resolution
NEI 1	Page 4 & 5 Discussion, Background "Sufficient conservatism …capability of a single sources"	Too prescriptive, with some elements that may not have an established or NRC endorsed mechanism to evaluate, and new design inputs that may belong to 'beyond design basis' considerations, a process still in regulatory development. For example, "consider the effects of climate changes that might occur over the design life of the facility", etc. What would be the criteria & methodology to quantify? Moreover, the Fukushima Flooding Task Force is working with NRC on various guidance on dam failures, etc. and language here is duplicative of other guidance.	The staff partially disagreed with this comment. In proposed revision 3 of draft RG-1.27 (DG-1275), the staff added discussions on design considerations for the ultimate heat sink (UHS) such as the transient analysis, the potential effects of recirculation on the same and/or interference on adjacent UHS wet cooling towers, etc. The staff also clarified the discussions on the meteorological conditions to be considered in the design of the UHS. The staff disagreed that these discussions represent beyond design basis scenarios. Regarding the example cited, the intent of this statement was to ensure that long-term possible environmental changes are considered in the

			design of the UHS. Staff has further clarified the sentence to read: "For natural sources, historical experience indicates that river blockage (e.g., ice dams or flood debris) or diversion may be possible, as well as potential changes in ocean, river, or lake levels as a result of severe natural events, or possible changes in climatological conditions in the site region resulting from human or natural causes, that may occur during the plant lifetime." The staff also added the following sentence in Regulatory Position C.1.e.(1) : "Current literature on possible changes in the climatological conditions in the site region should also be reviewed to be confident that the methods used to predict weather extremes are reasonable. " This addition is consistent with the Standard Review Plan (SRP) Section 2.3.1 "Regional Climatology".
NEI 2	Page 6, last paragraph and page 11, sect. 5 paragraph d	The guidance for scoping of SSC's in the Maintenance Rule is in NUMARC 93-01 Rev. 4a, and endorsed by R.G. 1.160. Further, in many cases, the water controlling structures are not in the jurisdiction of the licensee, but other entities. Reference to the Maintenance Rule should be removed, as it is an arbitrary inclusion as written.	The staff partially agreed with this comment that not all water control structures affecting a plant site would be within the jurisdiction of the licensee/applicant. The discussion of the Maintenance Rule has been revised to clarify that only those structures within the jurisdiction of the licensee should be monitored in accordance with the Maintenance Rule and RG 1.160.
NEI 3	Page 7, Harmonization with International	Use of international standards should go through a formal endorsement review process, preferably with adequate stake holder input as applicable, similar to adoption of other standards.	The staff agreed with the comment. The discussion of the IAEA Safety Guide is not an endorsement of the Safety Guide. It is to only make the reader/user of this RG aware that a

	Standards		corresponding international standard exists. Any endorsement of an international standard would be incorporated into Section C of the RG and subject to public comment. No change to the RG is needed.
NEI 4	Page 9, paragraph j	Pumps and some valves typically require operator action to start. Operator action times have been evaluated to ensure they meet system requirements. Either eliminate this paragraph on 'autostart', or include flexible language to permit operator manual action to start the system.	The staff partially disagreed with this comment. Since the 'active' UHS typically support decay heat removal or emergency diesel generators, the "should automatically start" language remains as-is. The staff added the following to allow operator action: "If the UHS mechanical component does not incorporate design features that automatically start and open/close, operator actions are required to support its intended safety function".
NEI 5	Page 11, sect 5, paragraph a: entire paragraph	This is duplicative of Item III page 6 of GL 89-13 and could be deleted.	The staff agreed in part with this comment that the text is duplicative of the guidance provided in GL 89-13. However, the staff disagreed with deleting this text from proposed Revision 3 to RG 1.27. Generic communications such as generic letters or interim staff guidance are intended to be informal guidance to address emerging issues in a timely manner. It is appropriate to incorporate these interim communications into more permanent guidance such as the regulatory guides. Therefore, the staff decided to keep this guidance in the proposed Revision 3 to RG 1.27.
NEI 6	Page 11, sect 5, paragraph b: entire paragraph	This paragraph would move HX testing from GL 89-13 into the IST program. GL 89-13 allows HX testing frequency to be based on test results from each HX. IST frequency is time-based. This would increase work scope with no increase in safety margins.	The staff disagreed with this comment. It was not the staff's intention to move heat exchanger (HX) testing from GL 89-13 into the in-service testing (IST) program. The intent of this paragraph was to ensure that the UHS systems, including those safey-related heat exchangers are tested periodically. The staff has revised the sentence to

			read: "Both the initial pre-service test program and the periodic test program should encompass those safety-related heat exchangers that are connected to the UHS and required for the UHS to perform its nuclear safety-related functions." This should eliminate the confusion with the ASME Operation and Maintenance (OM) Code IST program. The staff also revised the heading of Section 5 to read: "Inspection, Maintenance, and Performance Testing"
NEI 7	Page 11, sect. 5, paragraph c: "Performanc e testing of UHS heat exchangers should be in accordance with ASME OM-2009, Part 21"	Part 21 section 7.3 states that test temperatures should be as close as possible to accident conditions as possible to minimize errors from fluid property changes. The available heat load for most HX testing is much lower than design basis. Therefore the testing must be performed at cooling water temperatures much lower than design so that the temperature differential between shell-side and tube-side fluids is maximized. Otherwise, temperature instrument error and test uncertainty could yield a meaningless result. See attached ASME OM-2012, Part 21 page. Delete this paragraph or further clarify. Please note that ASME OM-2012 supersedes OM 2009.	The staff agreed in part with this comment. The scope of Part 21 of the OM starndards states that "This Part establishes the requirements for preservice and inservice testing to assess the operational readiness of certain heat exchangers used in nuclear power plants. The heat exchangers covered are those required to perform a specific function in shutting down a reactor to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident." Based on this, the staff concluded that it was reasonable to perform testing of UHS heat exchangers in accordance with Part 21 of the ASME OM standards or an equivalent test method as stated in the proposed Revision 3 to RG 1.27. Specific test requirements regarding OM standards should be addressed by the appropriate ASME technical committee. The staff has updated ASME OM-2009 to ASME OM-2012.

NEI 8	Page 11, sect 6, paragraph a: entire paragraph on chemical treatment of service water.	This is duplicative of paragraph B of Enclosure 1 of GL 89-13 and could be deleted.	The staff agreed in part with this comment that the text is duplicative of the guidance provided in GL 89-13. However, the staff disagreed with deleting this text from proposed Revision 3 to RG 1.27. Generic communications such as generic letters or interim staff guidance are intended to be informal guidance to address emerging issues in a timely manner. It is appropriate to incorporate these interim communications into more permanent guidance such as the regulatory guides. Therefore, the staff decided to keep this guidance in the proposed Revision 3 to RG 1.27.
NEI 9	Page 11, sect 6, paragraph b: entire paragraph on flushing redundant and infrequently used cooling loops.	This is duplicative of paragraph C of Enclosure 1 of GL 89-13 and could be deleted.	The staff agreed in part with this comment that the text is duplicative of the guidance provided in GL 89-13. However, the staff disagreed with deleting this text from proposed Revision 3 to RG 1.27. Generic communications such as generic letters or interim staff guidance are intended to be informal guidance to address emerging issues in a timely manner. It is appropriate to incorporate these interim communications into more permanent guidance such as the regulatory guides. Therefore, the staff decided to keep this guidance in the proposed Revision 3 to RG 1.27.
NEI 10	D. Implementation, 'Use by NRC Staff' 2nd para, last sentence	This is not industry's understanding of the appropriate application of backfit requirements. Please see Attachment 3 on Section D. Section D. Implementation The stated purpose of this section is to provide information on how applicants and licensees may use Revision 3 to Regulatory Guide 1.27, as well as to explain how the NRC plans to use Revision 3. Section D states that applicants and licensees may voluntarily use the guidance contained in Revision 3 to demonstrate compliance with underlying regulations, but leaves	The staff agreed in part with these comments. The comments generally agreed with the NRC position by re-articulating the Agency position. However, the NRC took exception to NEI's conversion of the phrase "essential consideration" to read "indispensable consideration" in the last paragraph of Attachment 3 to NEI's comments. Specifically, NEI stated that "[T]he 'essential

		open the possibility of alternative methods. Section D also clarifies that "voluntary" use of the guidance by a licensee means that "the licensee is seeking the action of its own accord, without the force of a legally binding requirement or an NRC representation of further licensing or enforcement action."[1] Importantly, with respect to maintenance of a licensee's current licensing basis, the guide states: "Current licensees may continue to use guidance the NRC found acceptable for complying with the identified regulations as long as their current licensing basis remains unchanged."[2] Further, Section D clarifies that unless Regulatory Guide 1.27 is part of the licensing basis for the facility, the NRC staff may not take the position that failure to comply with the guide constitutes a violation of the agency's requirements. NEI agrees with these statements regarding maintenance of a licensee's current licensing basis. Imposition of new or different positions contained in Revision 3, in the circumstances described above, would likely meet the definition of backfitting provided in 10 C.F.R. § 50.109, and must be analyzed as such prior to being imposed on licensees. Section D goes on to describe limited circumstances in which the NRC staff may request that a licensee adopt new or different positions in Revision 3, or an equivalent alternative: If an existing licensee voluntarily seeks a license amendment or change and (1) the NRC staff's consideration of the request involves a regulatory issue directly relevant to this new or revised regulatory guide and (2) the specific subject matter of this regulatory guide is an essential consideration in the staff's determination of the acceptability of the licensee's request, then the staff may request that the licensee either follow the guidance in this regulatory guide or provide an equivalent alternative process that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered	consideration' criteria … should limit application of the forward-fit concept to new or different positions contained in Revision 3 that are indispensable in order for the NRC staff to approve the voluntary licensee request at hand." The staff concluded that an "indispensable consideration" was an unnecessarily higher standard than an "essential consideration," and NEI failed to show why the less stringent test would be insufficiently protective. The higher standard would unduly limit the NRC's capability to make regulatory decisions that are defensible and have public confidence. It was also not needed to achieve NEI's goals, based upon NEI's own example in its comment. A review of NEI's example for applying the "indispensable test" (i.e., rejecting missile protection and pipe whip as not an indispensable consideration to changes in water chemistry), would reveal that the same outcome would be achieved even under the "essential consideration" test. Thus, it was unclear why a more stringent test is needed. No changes were made to proposed Revision 3 of RG 1.27 as a result of this comment.

		backfitting ... or a violation of any of the issue finality provisions in 10 CFR Part 52.[3] This language describes an important category of so-called "forward fits,"[4] to which the backfitting rule and issue finality provisions in 10 CFR Part 52 do not apply. In a June 2010 letter, the NRC General Counsel described "forward-fits" as follows: [T]here are guidance documents which the NRC staff intends only to be "forward fit," that is, the guidance will be applied only to: (i) future applicants; and **(ii) applications from existing licensees for license amendments, requests for exemptions, and other requests for dispensation from compliance with otherwise-applicable legally binding requirements (an example of such a request would be an application to use an alternative under 10 CFR 50.55a).** In these circumstances, the NRC does not consider the issuance of "forward fit" interpretive guidance to constitute "backfitting." As the NRC has stated in several different contexts, the Backfit Rule does not protect the expectations of future applicants (including licensees seeking NRC permission to conduct licensed activities in a manner different than what the NRC previously approved) regarding the regulatory requirements that they must meet to obtain NRC approval.[5] The second category of "forward-fits" highlighted in the above-quoted passage is of particular concern to industry because it applies to existing licensees, rather than "future applicants." Unlike "future applicants," licensees justifiably rely on the adequacy of their current licensing bases to ensure compliance with NRC requirements. A stable (although not necessarily static) licensing basis is vital to ensuring predictable and reliable regulatory framework. In this vein, a primary purpose of the backfitting rule and issue finality provisions in 10 C.F.R. Part 52 is to ensure that changes to that framework are properly	

		evaluated and justified, prior to being imposed on licensees. Thus, it is vital that the language in Section D that limits and conditions imposition of new or different positions on licensees that are seeking voluntary changes to their current'licensing bases be applied in a consistent, reliable, and disciplined manner. Specifically, new or different positions contained in Revision 3 (or acceptable alternatives to such positions) may be imposed on licensees that voluntarily seek changes to their current licensing bases, without prior application of the backfitting rule or issue finality provisions, **only where**: 1. The NRC staff's consideration of the licensee's voluntary request involves a regulatory issue **directly relevant** to Revision 3; and 2. The specific new or different position contained in Revision 3 that the staff wishes to impose on the licensee is an **essential consideration** in the staff's determination of the acceptability of the licensee's voluntary request. Criteria 1 - *i.e.,* the "direct relevance" criteria - should limit application of the forward-fit concept to voluntary requests for changes involving issues that are directly and explicitly addressed in Section C. "Staff Regulatory Guidance" of Revision 3. These issues include: • System design considerations for the Ultimate Heat Sink • Natural phenomena and site hazards for the Ultimate Heat Sink (UHS) • Defense-in-Depth considerations for the UHS • Technical Specifications explicitly addressing the UHS • In-service testing, maintenance, and performance testing of the UHS piping, structures and components • Water testing and microbiological control of water used in	

		the UHS Applied in this way, the "direct relevance" criteria appropriately limits application of the forward-fit concept to voluntary licensee requests dealing with changes that are directly and explicitly covered by the specific regulatory guidance actually provided in Revision 3 to Regulatory Guide 1.27. Criteria 2 - i.e., the "essential consideration" criteria - should limit application of the forward-fit concept to new or different positions contained in Revision 3 that are indispensable in order for the NRC staff to approve the voluntary licensee request at hand. For example, a new or different position in Revision 3 dealing with missile protection and the effects of pipe whip would not be an "essential consideration" in approving a voluntary licensee request to change a portion of the current licensing basis dealing with UHS water chemistry.[6] Thus, in this example, the backfitting rule would need to be addressed prior to imposition new or different positions on missile protection and the effects of pipe whip, notwithstanding the fact that the licensee is voluntarily requesting a change to its CLB on UHS water chemistry. Applied in this way, the "essential consideration" criteria would appropriately limit application of the forward-fit concept to issues that are indispensable to the staff's approval of the voluntary licensee request at hand. [1] DG-1275, at FN3. [2] Id. at pg. 12. [3] Id. *See also*, Letter from Stephen Burns (General Counsel, NRC) to Ellen Ginsberg (Vice President, General Counsel, and Secretary, NEI) (June 14, 2010), at FN2. [4] Id. [5] *Id* (emphasis added). [6] This example is included purely for illustrative purposes. It is not meant to imply that there are actually new or different	

		positions on missile protection or the effects of pipe whip in Revision 3.	
Chris Dudley	General Comment	Missing from this is any consideration of how sea level rise may impact the reliability of the UHS during the license period. Pond banks that were initially safe may be washed away by enhanced storm surge for example leaving no cooling water supply. Cooling water that was initially fresh may become brackish and damage equipment not designed for the changed water chemistry leading to failure of critical cooling systems. Changed tidal flow patterns may lead to accumulation of clogging debris where the original design prevented this. If the effects of subsidence on ground water are to be considered, then surely the effects of sea level rise up to at least 2 meters by 2080 must be considered as well.	The staff agreed in part with this comment. The staff agreed that these are important considerations for the design of the UHS systems. In fact, the potential change in sea level was included in the discussion section of proposed Revision 3 to RG 1.27, which states: "For natural sources, historical experience indicates that river blockage (e.g., ice dams or flood debris) or diversion may be possible, as well as changes in ocean or lake levels as a result of severe natural events". The staff has added a new regulatory position under section C.2.a to further address this comment: "(5) potential changes in ocean, river, or lake levels as a result of severe natural events, or possible changes in climatological conditions in the site region resulting from human or natural causes, that may occur during the plant lifetime."
Anonymous 1		Draft Regulatory Guide 1.27, Revision 3, has removed the worst 24-hour period following the initial design specific critical time period for peak cooling water temperature. Concern: Revision 2 of the Regulatory Guide 1.27, required transient analysis to include the worst 24-hours following the initial critical time period. This analysis period should remain part of the design basis analysis because peak heat loads from a realistic or conservative analysis may occur several hours after the start of the initial accident. The proposed relaxation of the transient	The staff disagreed with this comment. The commenter refers to specific provisions in Revision 2 of RG 1.27, and by extension an apparent absence from the draft of Revision 3 to RG 1.27, as "requirements" or that inclusion of a specific time period in a certain analysis is "required". The staff wishes to clarify by referring the commenter to Section A of proposed Revision 3 to RG 1.27 under the heading "Purpose of Regulatory Guides" which states, among other

		analysis requirements would allow under prediction of the peak temperature, as the initial water mass may not reach the plant until after the first critical time period. For example, the delay in peak temperatures will occur because of the time required to the heat up of the suppression pool, following the event, before that energy is transferred to the UHS. Additionally, plant specific procedure requirement and time required to alignment plant system could delay the peak heat load (e.g. spent fuel pools cooling may not occur immediately following an event). Suggested Revision: Following the site specific UHS critical time period the worst 24-hour period should be maintained as a requirement for transient analysis for peak cooling water temperature.	things, that compliance with them (i.e., regulatory guides) is not required. The proposed revision did not relax considerations for the transient analysis. Instead, the proposed revision specified that "The meteorological conditions resulting in the maximum intake water temperature to the plant from the UHS should be the worst combination of controlling parameters, including diurnal variations, where appropriate, for the critical time period(s) unique to the specific design of the UHS." Depending on the UHS design, the critical time period (i.e., the time interval after a design-basis accident (DBA) to when the intake water to the plant from the UHS reaches its maximum value) varies. For example, if a wet cooling tower is used as the UHS, the critical time period may be on the order of several hours. As another example, the plant intake water temperature from a cooling pond used as the UHS may reach a maximum several days following a shutdown or DBA. In practice, the 24-hour, post-accident time period has, in many cases, been looked upon as a default time period. Now rather, the proposed revision clarifies that the responsibility for defining and justifying the time period(s) critical to the UHS design lies with the applicant or licensee. The staff added the following sentence in Section B Discussion, paragraph 7 to further clarify this: "Determining the maximum temperature to the plant from the UHS after a DBA and the associated critical time period can be an iterative process since the maximum temperature to the plant from

			the UHS can be a function of meteorological conditions, plant heat input, and recirculation time.”
Anonymous 2		The draft guidance discusses that "the UHS should be able to dissipate the heat for that accident safely, permit the concurrent safe shutdown and cooldown of the remaining units, and maintain them in a safe-shutdown condition". Furthermore, it is stated that there should be sufficient conservatism and freedom of movement. Concern: The existing guidance allows flexible to defer cooling of the spent fuel pools to gain transient analysis margin. Requirements discussing cooling of spent fuel pools should be clarified. Also, the existing guidance allows for significant delays in cooling the non-accident unit to gain transient analysis margin. Emergency procedures direct operates to cool the units to ensure safety margin. Limiting the cooling capability for the UHS structure is inappropriate for a shared safety system (e.g. a cooling pond). Reducing UHS cooling capacity in this manner restricts operational flexibility and reduces plant safety margin. These modeling approaches gain analytical margin by slowing the transfer of heat into the UHS instead of ensure that the UHS can cope with peak heat loads that may be necessary to protect the public. Suggested Resolution: The guidance should prescriptively discuss cooling requirements and the treatment of the associated heat loads in transient analysis to ensure that safety margin is adequately maintained.	The staff partially agreed with the comment. A change was added to Section C.1.b to address the combined theme of the comments and better clairify NUREG-0800 expectations: “The analysis should account for all variations of design parameters and the full range of operating conditions that may exist at the time of the postulated event. This type of analysis is commonly accomplished when the most severe set of operating parameters and/or operational conditions is assumed to occur simultaneously and is commonly referred to as a bounding analysis. Alternatives to this approach should be communicated for review.” An additional safety function was added to the Background information to further clarify spent fuel pool cooling: “The UHS performs three principle safety functions: (1)……. and (3) dissipation of maximum expected decay heat from the spent fuel pool to ensure the pool temperature remains within the design bounds for the structure,” This addition concurs with the SRP 9.1.3, “Spent Fuel Pool Cooling and Cleanup System.” No specified time was included for cooling the non accident unit because neither General Design Criterion (GDC) 5 nor Branch Technical Position

			(BTP) 5-4 specify a cooldown time. GDC 5 specifies an orderly shutdown and cooldown of the accident unit and BTP 5-4, "Design Requirements of the Residual Heat Removal System," Section B 1.D, specifies the RHR system must be capable of bringing the reactor to a cold shutdown condition, with only offsite or onsite power available, within a reasonable period of time following shutdown, assuming the most limiting single failure.