Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

April 13, 2016
NOC-AE-16003357
10CFR50.12
10CFR50.90

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498 and STN 50-499
Revision to Proposed Exemption to 10CFR50.46 Described in STP Pilot Submittal and Requests for Exemptions and License Amendment for a Risk-Informed Approach to Address Generic Safety Issue (GSI)-191 and Respond to Generic Letter (GL) 2004-02
(TAC NOS. MF2400 - MF2409)

Reference:

Letter, G. T. Powell, STPNOC, to NRC Document Control Desk, "Supplement 2 to STP Pilot Submittal and Requests for Exemptions and License Amendment for a Risk-Informed Approach to Address Generic Safety Issue (GSI)-191 and Respond to Generic Letter (GL) 2004-02", August 20, 2015, NOC-AE-15003241, (Letter ML15246A126, Relevant Attachments ML15246A129)

This submittal revises the referenced STP Risk-Informed GSI-191 application to change the portion of 10CFR50.46 for which exemption is requested from 10CFR50.46(d) to 10CFR50.46(a)(1). STPNOC is making the change based on discussions with the NRC staff and further review of the regulation. The technical and regulatory basis for the exemption request is unchanged.

Attachment 1 revises Attachments 2-1 and 2-2 of the reference correspondence (ML15246A129) to remove references to 10CFR50.46(d) and add references to 10CFR50.46(a)(1). STPNOC also identified references to 10CFR50.46(d) in other attachments to the reference letter. These are listed in the attachment as being superseded by the new reference to 10CFR50.46(a)(1). Changes to Attachments 2-1 and 2-2 are marked with change bars in the margin.

The revisions to the attachment are limited to those related to changing 10CFR50.46(d) to 10CFR50.46(a)(1). STPNOC expects to make additional changes to its application that will affect text in the requests for exemption (e.g., the number of affected weld locations and the requested date for approval). However, these future changes do not affect the regulation from which exemption is requested or the technical or regulatory basis for the exemption.

There are no commitments in this letter.

If there are questions regarding this submittal, please contact Mike Murray at 361-972-8146, or me at 361-972-7344

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NRR

STI 34294003

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 13, 2016

James Connolly
Site Vice President

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Attachments:

1. Revised Requests for Exemption to 10CFR50.46
   2-1 General
   2-2 Request for Exemption from 10CFR50.46(a)(1)
   Corrections to Other References
2. Definitions and Acronyms

cc:

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Attachment 1

Revised Requests for Exemptions to 10CFR50.46

2-1 General

Introduction

In support of the South Texas Project (STP) risk-informed approach to addressing Generic Safety Issue (GSI)-191 and response to GL 2004-02, Attachments 2-2 through 2-5 provide STP Nuclear Operating Company (STPNOC) requests for exemptions under 10CFR50.12 from certain requirements in 10CFR50.46 and 10CFR50 Appendix A General Design Criteria (GDC). The exemption requests complement a proposed license amendment request (LAR) provided in Attachment 3 to this letter, proposing methodology changes that will be incorporated in the South Texas Project (STP) Units 1 and 2 Updated Final Safety Analysis Report (UFSAR) and Technical Specifications based on NRC acceptance of the risk-informed method and results.

Specific exemption requests, pertaining to requirements that concern Emergency Core Cooling System (ECCS) and Containment Spray System (CSS) system functions for core cooling, and containment heat removal and atmosphere cleanup following a postulated loss of cooling accident (LOCA), are provided as follows:

Attachment 2-2, Request for Exemption from 10CFR50.46(a)(1)

Attachment 2-3, Request for Exemption from GDC 35

Attachment 2-4, Request for Exemption from GDC 38

Attachment 2-5, Request for Exemption from GDC 41

Approval of the exemptions will allow use of a risk-informed method to account for the probabilities and uncertainties associated with mitigation of the effects of debris following postulated LOCAs. The method evaluates the effects on strainer blockage and core blockage resulting from debris concerns raised by GSI-191. In order to confirm acceptable sump design, the risk associated with GSI-191 is evaluated to include the failure mechanisms associated with loss of core cooling and strainer blockage.

With respect to other requirements for ECCS, Attachment 2-2 addresses 10CFR50 Appendix K. Attachment 2-5 addresses 10CFR50.67 and GDC 19. Based on those evaluations, STPNOC concluded that no exemptions were needed for Appendix K, 10CFR50.67 or GDC 19.

Each separate Attachment 2-2 through 2-5 identifies the applicable rule from which exemption is requested, the regulatory requirements involved, the purpose of the request, and the technical basis and justification for the exemption request, including the presence of special circumstances pursuant to 10CFR50.12(a). The requested exemptions are part of a risk-informed approach to resolve GSI-191 issues. The risk-informed approach is designed to be consistent with the guidance in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis."

The scope of the exemptions applies for all debris effects addressed in the risk-informed element of the STP RoverD methodology described in Attachment 1 that was used to respond to GL 2004-02, and which are associated with LOCA break sizes and locations that potentially generate fine fiber debris that exceeds the quantity bounded by STP plant-specific testing described in Attachment 1. That scope is generally described as breaks larger than approximately 12.8" ID in locations where a sufficient amount of fiber debris can be generated and transported to the sump to exceed the amount of fine fiber debris in the STP plant-specific testing described in Attachment 1. Forty-five weld locations have currently been identified on the pressurizer surge line and RCS main loop piping. To minimize the potential that a later analysis could cause the specific locations to change, the requested exemptions are based on the breaks' ability to generate sufficient transportable debris, as described in RoverD. The key elements of each of the exemption requests are:

1. It applies only to the effects of debris as described in Attachment 1.
2. It applies only for LOCA breaks that can generate and transport fiber debris that is not bounded by STP plant-specific testing.
3. It applies to any LOCA break that can generate and transport fiber debris that is not bounded by STP plant-specific testing and is not limited to the 45 specific break locations noted in this application, provided that the ΔCDF and ΔLERF associated with the break size remains in Region III of RG 1.174.

The exemptions are requested for the scope of breaks that can generate fiber debris that exceeds the amount of fiber debris bounded by the plant-specific testing. In Attachment 1-2 and 1-3, STPNOC determined that only large breaks were in this scope and listed 45 examples. STPNOC is requesting exemption for this scope of breaks to allow evaluation of the debris effects using a risk-informed methodology because there is no practical deterministic methodology currently available.

STPNOC uses the plant-specific core fiber loading test analysis described in Attachment 1-2 together with a thermal-hydraulic screening analysis to show there is no risk contribution from downstream effects above the risk assessed for ECCS sump strainer fiber loading. In Section 5 of Attachment 1-3, STPNOC used RELAP5 to perform the thermal-hydraulic evaluation of down-stream effects necessary to support the risk assessment and confirmed adequate core cooling for the entire spectrum of breaks.

STPNOC is not requesting exemption for the thermal-hydraulic analysis because it is a calculation used in a risk-informed screening (see Section 2 of Attachment 1-3). The use of the thermal-hydraulic analysis is addressed in the LAR for the methodology change (Attachment 3).

The STP risk-informed approach addresses the five key principles in RG 1.174 for risk-informed decision-making. The resulting risk metrics, i.e. changes in Core Damage Frequency (CDF) and Large Early Release Frequency (LERF), associated with GSI-191 concerns are used to determine whether plant modifications are warranted to ensure acceptable sump performance. The requested exemptions support this

approach. A generic methodology for the STP approach is provided in Attachment 1 to this letter.

The approach is intended to be a pilot for other licensees that are pursuing a risk-informed approach to addressing GSI-191. The STP approach is the risk-informed part of an overall graded approach that is based on the amount of fiber insulation in the plant, as discussed in SECY-12-0093, "Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance". STP Units 1 and 2 contain large amounts of fiber-debris material such as insulation and coatings in the containment buildings and are expected to have higher risk of containment sump strainer blockage and in-vessel core blockage as a result of potential debris-generating postulated loss of coolant accidents (LOCAs) than plants with relatively less fiber loading.

Based on the results for STP Units 1 and 2 showing that the risk for the effects of debris is less than the threshold for Region III, "Very Small Changes," of RG 1.174, no additional physical changes to the facility or changes to the operation of the facility are proposed.

Background and Overview

GSI-191 concerns the possibility that debris generated during a LOCA could clog the containment sump strainers in pressurized-water reactors (PWRs) and result in loss of net positive suction head (NPSH) for the ECCS and CSS pumps, impeding the flow of water from the sump. Generic Letter (GL) 2004-02 requested licensees to address GSI-191 issues focused on demonstrating compliance with the 10CFR50.46 ECCS acceptance criteria. GL 2004-02 requested licensees to perform new, more realistic analyses using an NRC-approved methodology and to confirm the functionality of the ECCS and CSS during design basis accidents that require containment sump recirculation. As stated in GL 2004-02:

> *Although not traditionally considered as a component of the 10CFR50.46 ECCS evaluation model, the calculation of sump performance is necessary to determine if the sump and the ECCS are predicted to provide enough flow to ensure long-term cooling.*
>
> *Based on the new information identified during the efforts to resolve GSI-191, the staff has determined that the previous guidance used to develop current licensing basis analyses does not adequately and completely model sump screen debris blockage and related effects. As a result, due to the deficiencies in the previous guidance, an analytical error could be introduced which results in ECCS and CSS performance that does not conform with the existing applicable regulatory requirements outlined in this generic letter. Therefore, the staff is revising the guidance for determining the susceptibility of PWR recirculation sump screens to the adverse effects of debris blockage during design basis accidents requiring recirculation operation of the ECCS or CSS. In light of this revised staff guidance, it is appropriate to request that addressees perform new,*

more realistic analyses and submit information to confirm the functionality of the ECCS and CSS during design basis accidents requiring recirculation operations.

Also, in its section on Applicable Regulatory Requirements, GL 2004-02 identifies requirements from the Code of Federal Regulations, as excerpted below.

NRC regulations in Title 10, of the Code of Federal Regulations Section 50.46,10 CFR 50.46, require that the ECCS have the capability to provide long-term cooling of the reactor core following a LOCA. That is, the ECCS must be able to remove decay heat, so that the core temperature is maintained at an acceptably low value for the extended period of time required by the long-lived radioactivity remaining in the core.

Similarly, for PWRs licensed to the General Design Criteria (GDCs) in Appendix A to 10CFR50, GDC 38 provides requirements for containment heat removal systems, and GDC 41 provides requirements for containment atmosphere cleanup. Many PWR licensees credit a CSS, at least in part, with performing the safety functions to satisfy these requirements, and PWRs that are not licensed to the GDCs may similarly credit a CSS to satisfy licensing basis requirements. In addition, PWR licensees may credit a CSS with reducing the accident source term to meet the limits of 10 CFR Part 100 or 10 CFR 50.67. GDC 35 is listed in 10 CFR 50.46(d) and specifies additional ECCS requirements. PWRs that are not licensed to the GDCs typically have similar requirements in their licensing basis.

STP Units 1 and 2 have implemented compensatory and mitigative measures in response to Bulletin 2003-01 and GL 2004-02 to address the potential for sump strainer clogging and other concerns associated with GSI-191. Larger containment sump strainers have been installed that greatly reduce the potential for loss of net positive suction head (NPSH). Defense in Depth measures such as operating procedures and instrumentation to monitor core level and temperature, and actions taken by operators if core blockage is indicated, are described in Attachment 1-4.

The Commission issued Staff Requirements Memorandum (SRM)-SECY-10-0113 directing the staff to consider alternative options for resolving GSI-191 that are innovative and creative, as well as risk-informed and safety conscious. Subsequently, STPNOC, through interactions with the staff, developed a risk-informed approach to address GSI-191 using the methods described in RG 1.174 and in a letter dated December 14, 2011 (ML11354A386), notified the NRC of the intent to seek exemption from certain requirements of 10CFR50.46.

SECY-12-0093 described the staff plans to use STP as a pilot for other licensees choosing to use this approach, and the STP approach referred to as risk-informed Option 2. This approach requires an exemption request in accordance with 10CFR50.12 from certain requirements of 10CFR50.46, based in part on meeting the guidance in RG 1.174. Because the residual risk of GSI-191 concerns meets RG 1.174 acceptance guidelines, the approach allows fiber insulation and other contributors to GSI-191 concerns to remain in containment.

The STP risk-informed methodology is described in Attachments 1-2 and 1-3. Attachments 2-2, 2-3, 2-4 and 2-5 address the deterministic requirements in 10CFR50.46, GDC 35, 38 and 41 with proposed exemptions and justify that no exemption to 10CFR50.67 or GDC 19 is needed.

Special Circumstances Common to Proposed Exemptions to 10CFR50.46(a)(1), GDC 35, GDC 38, and GDC 41

10CFR50.12(a)(2)(ii) applies:

> *Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.*

An objective of each of the regulations (10CFR50.46(a)(1), GDC 35, GDC 38 and GDC 41) for which an exemption is proposed is to maintain low risk to the public health and safety through functions (ECCS and/or CSS) that are supported by the containment sump. By regulatory precedent, licensees are required to demonstrate this capability by the use of a bounding calculation or other deterministic method. The supporting analysis demonstrates that a risk-informed approach to sump performance is consistent with the Commission's Safety Goals for nuclear power plants and supports operation of those functions with a high degree of reliability. Consequently, the special circumstances described in 10CFR50.12(a)(2)(ii) apply to each of the exemptions proposed by STPNOC.

10CFR50.12(a)(2)(iii) applies:

> *Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.*

In order to meet a deterministic threshold value for containment debris loading, the amount of debris generating contributors in the STP plant design would need to be significantly reduced. Estimates of radiological exposure for insulation modifications are significant and on the order of hundreds of person-Rem, depending on the scope of the modifications.

With respect to the presence of such special circumstances, dose estimates for removal of insulation from STP Units 1 and 2 are described in some detail in Reference 1 to the cover letter. These dose estimates are for additional modifications to insulation in containment that would be required to achieve full resolution of GSI-191 using the previous deterministic methods. The residual risk associated with GSI-191 concerns bounds the expected improvement to overall plant risk that could be achieved by implementing these modifications.

STPNOC estimated the occupational dose for STP Units 1 and 2 that would be expected to be expended if plant modifications were undertaken for GSI-191, including insulation replacement and other modifications. The scope of the estimate included the replacement of fiberglass insulation with reflective metal insulation (RMI) for reactor coolant pump (RCP) insulation and a portion of the steam generator (SG) insulation,

and the banding of existing fiberglass insulation on piping in containment. SG insulation replacement considered whether locations were within the 17D zone of influence (ZOI).

The total dose expected to be expended for STP Units 1 and 2 in support of insulation replacement for GSI-191 is estimated to be 158 to 176 rem (79 – 88 rem per unit). These values significantly exceed the industry ALARA standard of 55 rem per fuel cycle for collective radiation exposure.

For the above estimates, the highest dose contributor is personnel work hours in close proximity to high dose sources such as steam generators and primary coolant piping. The estimates did not include any replacement of reactor pressure vessel (RPV) insulation, which is RMI as originally designed for STP, therefore while the estimates may be indicative of a plant with high fiber loading, they do not necessarily account for activities that may be required for similar plants assuming 100-percent replacement of fiber insulation in all areas that could be affected by a postulated LOCA. The dose estimates for STP Units 1 and 2, in addition to the actual insulation replacement, considered man-hours required to erect and remove scaffolding to support the insulation modifications and the dose associated with removal of insulation. The estimates did not consider dose associated with disposal of removed insulation or dose associated with potential hanger modifications for small bore piping insulation change to RMI.

The dose considerations discussed above demonstrate that compliance would result in substantial personnel exposure due to insulation modifications in the containment which is not commensurate with the expected safety benefit based on the results showing that the risk associated with GSI-191 concerns is less than the threshold for Region III in RG 1.174. Consequently, the special circumstances described in 10CFR50.12(a)(2)(iii) apply to each of the exemptions proposed by STPNOC.

Environmental Consideration

Pursuant to the requirements of 10CFR51.41 and 10CFR51.21, "Criteria for and identification of licensing and regulatory actions requiring environmental assessments," the following information is provided. As demonstrated below, this exemption qualifies for a categorical exclusion in 10CFR51.22. However, if the NRC determines that an environmental assessment is necessary, this information will support a finding of no significant impact. The assessment applies to all of the proposed exemptions.

Identification of the Proposed Action

The proposed exemption is to allow for use of a risk-informed approach to evaluate the residual risk associated with GSI-191, i.e. those concerns that have not been fully addressed using deterministic methods, for the purpose of amending the design basis for acceptable mitigation of the effects of debris during recirculation mode following postulated LOCAs. Approval of the proposed exemption would complement approval of the methodology change to be incorporated in the UFSAR and TS, as provided in Attachment 3 to this letter, for implementation of the risk-informed method for STP Units 1 and 2.

Need for the Proposed Action

In the Commission's Policy Statement on "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities", the Commission stated that "*the use of PRA technology in NRC regulatory activities should be increased to the extent supported by the state-of-the-art in PRA methods and data and in a manner that complements the NRC's deterministic approach*" and that is consistent with traditional defense-in-depth concepts.

The intent of the Commission's Policy Statement intent is to use the PRA to further understand the risk associated with a proposed change for the purpose of removing unnecessary conservatism associated with regulatory requirements in order to focus attention and allocation of resources to areas of true safety significance.

To implement the Commission Policy Statement, the NRC issued RG 1.174 to provide guidance on an acceptable approach to risk-informed decision-making, based on a set of five key principles. The proposed action is needed to allow STPNOC to use a risk-informed method to address the issues associated with GSI-191 concerns regarding the potential for insulation and other debris generated in the event of a postulated LOCA within the containment impacting acceptable recirculation operation for ECCS, and challenge the ability of ECCS to provide adequate long-term core cooling. This proposed exemption is consistent with the key principle in RG 1.174 which requires the proposed change to meet current regulations unless explicated related to a requested exemption.

Environmental Impacts Consideration

The proposed exemption has been evaluated and determined to result in no significant radiological environmental impacts associated with the implementation of the change. This conclusion is based on the following.

The proposed exemption is to allow a risk-informed method for demonstrating the design and licensing bases for the ECCS are not significantly affected by debris effects identified in GSI-191. No physical modifications or changes to operating requirements are proposed for the site or facility, including any systems, structures and components relied upon to mitigate the consequences of a LOCA. The intent of the proposed change is to quantify the risk associated with GSI-191 concerns. This quantification, provided in the form of risk metrics using the guidance in RG 1.174, demonstrates that the risk is less than the threshold for Region III, "Very Small Changes," in RG 1.174. Therefore, the proposed exemption supports a change that represents a very small change in Large Early Release Frequency (LERF) that corresponds to an insignificant impact on the environment.

Based on the results of the risk-informed method demonstrating that the increases in risk are very small, the proposed exemption has a negligible effect on accident probability, and adequate assurance of public health and safety is maintained. The proposed exemption does not involve any changes to the facility or facility operations that could create a new or significantly affect a previously analyzed accident or release path, and therefore would result in no significant changes in the types or quantities of radiological effluents that may be released offsite. The proposed change does not affect

the generation of any radioactive effluents, and does not affect any of the permitted effluent release paths.

The proposed exemption has no impact on requirements related to the integrity of the reactor coolant system piping or any other aspect related to the initiation of a LOCA. No physical modifications or changes to operating requirements are proposed for the facility, including any systems, structures and components relied upon to mitigate the consequences of a LOCA. Therefore, the proposed exemption does not affect the probability of an accident initiator.

The proposed exemption does not significantly impact a release of radiological effluents during and following a postulated LOCA. The design-basis LOCA radiological consequence analysis in the current licensing basis is a deterministic evaluation based on the assumption of a major rupture of the reactor coolant system piping and a significant amount of core damage as specified in RG 1.183. The current licensing basis analysis shows the resulting doses to the public and to control room and technical support center personnel are acceptable. The proposed change validates and does not change the input parameter value used in the radiological analysis. Therefore, the proposed exemption does not affect the amount of radiation exposure resulting from a postulated LOCA.

The proposed exemption does not involve any changes to the site property, physical changes to the facility, or changes to the operation of the facility. Therefore there are no irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. The risk-informed method requires a determination that the risk associated with the proposed change meets the Commission's safety goals. Therefore the proposed action would not result in a significant increase in any radiological hazard beyond those events previously analyzed in the UFSAR. There will be no change to radioactive effluents that affect radiation exposures to plant workers and members of the public. Therefore, no significant changes or different types of radiological impacts are expected as a result of the proposed action. The proposed exemption does not change the input parameter value used in the radiological analysis. Therefore, the proposed change would not significantly increase the probability or consequences of an accident, and there will be no significant offsite impact to the public from approval of the proposed exemption.

No additional physical modifications or changes to operating requirements are proposed for the facility, including any systems, structures and components relied upon to mitigate the consequences of a LOCA. Therefore, the proposed exemption does not result in a significant increase in individual or cumulative occupational radiation exposure, and will not cause radiological exposure in excess of the dose criteria for restricted and unrestricted access specified in 10 CFR Part 20.

The proposed exemption does not involve any changes to non-radiological plant effluents or any activities that would adversely affect the environment. The proposed exemption does not affect any procedures used to operate the facility, or any physical characteristics of the facility, system, structure and components. The proposed change only pertains to the licensing basis for components located within the restricted area of the facility, to which access is limited to authorized personnel. Therefore the proposed

exemption would not create any significant non-radiological impacts on the environment in the vicinity of the plant.

Since implementation of the exemption request, if approved, would result in no physical changes to the facility, there is no possibility of irreversible or irretrievable commitments of resources. Similarly, the proposed exemption does not involve the use of any resources not previously considered by the NRC in its past environmental statements for issuance of the facility operating licenses or other licensing actions for the facility. As a result, the proposed exemption does not involve any unresolved conflicts concerning alternative uses of available resources.

Alternatives

The alternative to this exemption is compliance with the existing provisions in 10CFR50.46(a)(1) and the relevant GDC. Compliance with 10CFR50.46(a)(1) and the relevant GDC would entail removal and disposal of significant amounts of insulation and installation of new insulation less likely to impact sump performance in the event of a LOCA. As discussed below, the alternative would not be environmentally preferable or cost justified.

The exemption entails a very small risk and, correspondingly, an environmental impact, which is so small that it is remote and speculative for environmental purposes.

Removal and reinstallation of insulation would entail appreciable radiation exposures to workers (estimated from 158 to 176 rem). This option results in extensive modifications to the facility and significant occupational dose. As such, the alternative is not environmentally preferable. Additionally, the cost of the installation replacement would be approximately $55 million. This cost is not justified in light of the very small risk associated with the risk-informed exemption.

Categorical Exclusion Consideration

STPNOC has evaluated the proposed exemption against the criteria for identification of licensing and regulatory actions requiring environmental assessments in accordance with 10CFR51.21 and determined that the proposed exemption meets the criteria and is eligible for categorical exclusion as set forth in 10CFR51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," paragraph (c)(9).

This determination is based on the fact that this exemption request is from requirements under 10CFR50 with respect to the installation or use of a facility component located within the restricted area, as defined in 10CFR20, specifically to authorize a change to the licensing basis for ECCS as it relates to acceptable containment sump performance in recirculation mode following a postulated LOCA. The proposed amendment has been evaluated to meet the following criteria under 10CFR51.22(c)(9).

(i) *The exemption involves no significant hazards consideration.*

An evaluation of the three criteria set forth in 10CFR50.92(c) as applied to the exemption is provided below. The evaluation is consistent with the no significant hazards consideration determination provided in Attachment 3 in support of the LAR.

(1) *The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.*

Approval of the proposed exemption and accompanying license amendment request would allow the results of a risk-informed evaluation to be included in the UFSAR that concludes the ECCS and CSS systems will operate with a high probability following a LOCA when considering the impacts and effects of debris accumulation on containment emergency sump strainers in recirculation mode, as well as core flow blockage due to in-vessel effects, following loss of coolant accidents (LOCAs).

The proposed change does not implement any physical changes to the facility or any structures, systems and components (SSCs), and does not implement any changes in plant operation. The proposed change confirms that required SSCs supported by the containment sumps will perform their safety functions with a high probability, and does not alter or prevent the ability of SSCs to perform their intended function to mitigate the consequences of an accident previously evaluated within the acceptance limits. The safety analysis acceptance criteria in the UFSAR continue to be met for the proposed change. The proposed change does not affect initiating events because it addresses existing initiating events; i.e., loss of coolant accidents. The proposed change does not significantly affect the operation of the containment systems needs to ensure that there is a large margin between the temperature and pressure conditions reached in the containment and those that would lead to failure so that there is a high degree of confidence that damage of the containment cannot occur.

The calculated risk associated with the proposed change is very small and less than the threshold for Region III as defined by RG 1.174, for both CDF and LERF. In accordance with the guidance of RG 1.174, there is substantial safety margin and defense in depth that provide additional confidence that the design basis functions are maintained.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of any the accident previously evaluated in the UFSAR.

(2) *The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.*

The proposed change is a risk-informed analysis of debris effects from accidents that are already evaluated in the STP UFSAR; no new or different kind of accident is being evaluated. The change neither installs nor removes any plant equipment, nor alters the design, physical configuration, or mode of operation of any plant structure, system or component. The proposed change does not introduce any new failure mechanisms or malfunctions that can initiate an accident. The proposed change does not introduce failure modes, accident initiators, or equipment malfunctions that would cause a new or different kind of accident.

Therefore, the proposed change does not create the possibility for a new or different kind of accident from any accident previously evaluated.

(3) *The proposed change does not involve a significant reduction in a margin of safety.*

The proposed change does not involve a change in any functional requirements, the configuration, or method of performing functions of plant SSCs. The effects from a full spectrum of LOCAs, including double-ended guillotine breaks for all piping sizes up to and including the largest pipe in the reactor coolant system, are analyzed. Appropriate redundancy and consideration of loss of offsite power and worst case single failure are retained, such that defense-in-depth is maintained.

Application of the risk-informed methodology showed that the increase in risk from the contribution of debris effects is very small as defined by RG 1.174 and that there is adequate defense in depth and safety margin. Consequently, STP determined that the containment sumps will continue to support the ability of safety related components to perform their design functions when the effects of debris are considered. The proposed change does not alter the manner in which safety limits are determined or acceptance criteria associated with a safety limit. The proposed change does not implement any changes to plant operation, and does not significantly affect SSCs that respond to safely shutdown the plant and to maintain the plant in a safe shutdown condition. The proposed change does not significantly affect the existing safety margins in the barriers for the release of radioactivity. There are no changes to any of the safety analyses in the UFSAR. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

(ii) *The exemption involves no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.*

No physical modifications or changes to operating requirements are proposed for the facility, including any systems, structures and components relied upon to mitigate the consequences of a LOCA. Approval of the exemption requires the calculated risk associated with GSI-191 to meet the acceptance guidelines in RG 1.174, thereby maintaining public health and safety. Therefore, there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

(iii) *The proposed exemption involves no significant increase in individual or cumulative occupational radiation exposure.*

No physical modifications or changes to operating requirements are proposed for the facility, including any systems, structures and components relied upon to mitigate the consequences of a LOCA. Therefore, with respect to installation or use of a facility component located within the restricted area there is no significant increase in individual or cumulative occupational radiation exposure as a result of granting the exemption request.

Based on the above, STPNOC concludes that the proposed exemption meets the eligibility criteria for categorical exclusion set forth in 10CFR51.22(c)(9). Additional technical justification for this conclusion is provided on the basis that the guidance and acceptance criteria provided in RG 1.174 are satisfied as described in Attachments 1-2, 1-3 and 1-4.

Part 2-2

Request for Exemption from Certain Requirements of 10CFR50.46(a)(1)

1. Exemption Request

Pursuant to 10CFR50.12, STP Nuclear Operating Company (STPNOC) is submitting this request for exemption from certain requirements of 10CFR50.46(a)(1), namely, "*..other properties*," as it relates to using specific deterministic methodology to evaluate the effects of debris on long-term core cooling.

10CFR50.46(a)(1) is shown below with the "other properties" portion for which exemption is requested in bold.

> *(a)(1)(i) Each boiling or pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical zircaloy or ZIRLO cladding must be provided with an emergency core cooling system (ECCS) that must be designed so that its calculated cooling performance following postulated loss-of-coolant accidents conforms to the criteria set forth in paragraph (b) of this section. ECCS cooling performance must be calculated in accordance with an acceptable evaluation model and must be calculated for a number of postulated loss-of-coolant accidents of different sizes, locations,* ***and other properties sufficient to provide assurance that the most severe postulated loss-of-coolant accidents are calculated. Except as provided in paragraph (a)(1)(ii) of this section, the evaluation model must include sufficient supporting justification to show that the analytical technique realistically describes the behavior of the reactor system during a loss-of-coolant accident. Comparisons to applicable experimental data must be made and uncertainties in the analysis method and inputs must be identified and assessed so that the uncertainty in the calculated results can be estimated. This uncertainty must be accounted for, so that, when the calculated ECCS cooling performance is compared to the criteria set forth in paragraph (b) of this section, there is a high level of probability that the criteria would not be exceeded. Appendix K, Part II Required Documentation, sets forth the documentation requirements for each evaluation model.*** *This section does not apply to a nuclear power reactor facility for which the certifications required under §50.82(a)(1) have been submitted.*
> *(ii) Alternatively, an ECCS evaluation model may be developed in conformance with the required and acceptable features of appendix K ECCS Evaluation Models.*

The STP risk-informed approach to addressing GSI-191 and responding to GL 2004-02 is consistent with the NRC staff safety evaluation of NEI 04-07 that discussed the modeling of sump performance as follows:

> *While not a component of the 10CFR50.46 ECCS evaluation model, the calculation of sump performance is necessary to determine if the sump and the residual heat removal system are configured properly to provide enough flow to ensure long-term cooling, which is an acceptance criterion of 10CFR50.46. Therefore, the staff considers the modeling of sump performance as the validation of assumptions made in the ECCS evaluation model. Since the modeling of sump performance is a boundary calculation for the ECCS evaluation model, and*

acceptable sump performance is necessary for demonstrating long-term core cooling capability (10CFR50.46(b)(5)), the requirements of 10CFR50.46 are applicable.

The statement below on p. 85 of the proposed 10CFR50.46c final rule change package attached to SECY-16-0033 (ML15238B016) applies to the new 10CFR50.46c(d), which will replace the current 10CFR50.46(a)(1). Just as the new risk-informed 10CFR50.46c(e) is an alternative to 10CFR50.46c(d), STPNOC's proposed risk-informed approach is an alternative to the current 10CFR50.46(a)(1) "other properties" and requires exemption since there is currently no risk-informed alternative.

Demonstration of consideration of such factors may also be achieved through analytical models that adequately represent the empirical data obtained regarding debris deposition. The proposed rule would alternatively allow the use of risk-informed approaches to evaluate the effects of debris on localized coolant flow and delivery of coolant to the core during the long-term cooling (post-accident recovery) period.

The result will be that the risk-informed methodology will be allowed rather than the currently required demonstration of mitigation capability by use of a bounding calculation or other deterministic method to model LOCA debris effects, as discussed in Generic Letter 2004-02 and associated guidance documents such as NEI 04-07 and its associated NRC Safety Evaluation. STPNOC requests an exemption from those deterministic requirements in order to enable the use of a risk-informed method to demonstrate acceptable sump performance and LOCA debris mitigation and to validate assumptions in the Emergency Core Cooling System (ECCS) evaluation model.

The scope of the exemption applies for all debris effects addressed in the STP RoverD methodology described in Attachment 1 that was used to respond to GL 2004-02, and which are associated with LOCA break sizes and locations that potentially generate fine fiber debris that exceeds the quantity bounded by STP plant-specific testing described in Attachment 1. That scope is generally described as breaks larger than approximately 12.8" ID in locations where a sufficient amount of fiber debris can be generated and transported to the sump to exceed the amount of fine fiber debris in the STP plant-specific testing described in Attachment 1. Forty-five weld locations have currently been identified on the pressurizer surge line and RCS main loop piping. To minimize the potential that a later analysis could cause the specific locations to change, the requested exemption is based on the breaks' ability to generate sufficient transportable debris, as described in RoverD. The key elements of the exemption request are:

1. It applies only to the effects of debris as described in Attachment 1.
2. It applies only for LOCA breaks that can generate and transport fiber debris that is not bounded by STP plant-specific testing.
3. It applies to any LOCA break that can generate and transport fiber debris that is not bounded by STP plant-specific testing and is not limited to the 45 specific break locations noted in this application, provided that the ΔCDF and ΔLERF associated with the break size remain in Region III of RG 1.174.

This exemption request is complemented by the accompanying License Amendment Request (LAR) (Attachment 3) seeking NRC approval of the changes to the South Texas Project Electric Generating Station (STPEGS) Updated Final Safety Analysis Report (UFSAR) and Technical Specifications, to amend the licensing basis based on acceptable design of the containment sump. The risk-informed method provides assurance, with high probability, for acceptable sump performance and debris mitigation during ECCS operation in recirculation mode as calculated by the ECCS evaluation model.

2. Regulatory Requirements Involved

By regulatory precedent, licensees are required to demonstrate this compliance with the relevant regulations by the use of a bounding calculation or other deterministic method. STPNOC seeks exemption to the extent that 10CFR50.46(a)(1) "other properties" requires deterministic calculations or other analyses to address the concerns raised by GSI-191 related to acceptable plant performance during the recirculation mode in containment following a LOCA. The proposed changes to the licensing basis and Technical Specifications, submitted for NRC approval with Attachment 3, address GSI-191 and provide closure to GL 2004-02 for STP Units 1 and 2 on the basis that the associated risk is shown to meet the acceptance guidelines in Regulatory Guide (RG) 1.174 and that, in conjunction with the existing licensing basis, adequate safety is demonstrated.

This exemption request is for the purpose of allowing the use of a risk-informed method to demonstrate acceptable mitigation of the effects of debris following postulated loss of coolant accidents (LOCAs). The effects of LOCA debris have been evaluated, using deterministic methods, to meet the current licensing basis assumptions for analyzing the effects of post-LOCA debris blockage in the sump and in-vessel; however, these evaluations have not been shown to fully address debris effects for the as-built, as-operated plant. The risk-informed approach evaluates the debris effects as part of the assessment of the residual risk associated with GSI-191 concerns. Based on confirmation of acceptable ECCS design as determined by the resulting risk meeting the acceptance guidelines in RG 1.174, the licensing basis for ECCS compliance with 10CFR50.46(a)(1) is amended.

2.1 Evaluation of Impacts on the Balance of 10CFR50.46 and Appendix K to 10CFR50

The exemption request to support closure for GL 2004-02 for STP is intended to address ECCS cooling performance design as presented in 10CFR50.46(a)(1) as it relates to imposing the deterministic requirements in "other properties".

For the purposes of demonstrating the balance of the acceptance criteria of 10CFR50.46, the design and licensing basis descriptions of accidents requiring ECCS operation, including analysis methods, assumptions, and results, which are provided in South Texas Project Electric Generating Station (STPEGS) Updated Final Safety Analysis Report (UFSAR) Chapters 6 and 15 remain unchanged. The performance evaluations for accidents requiring ECCS operation described in UFSAR Chapters 6 and 15, based on the Appendix K Large-Break Loss-of-Coolant Accident (LBLOCA) analysis, demonstrate that for breaks up to and including the double-ended severance of a reactor coolant pipe, the ECCS will limit the clad temperature to below the limit specified in 10CFR50.46 and

assure that the core will remain in place and substantially intact with its essential heat transfer geometry preserved.

The requirements of 10CFR50.46(a)(1) remain applicable to the model of record that meets the required features of Appendix K. Approval of the requested exemption does not impact the current ECCS evaluation. This evaluation model remains the licensing basis for demonstrating that the ECCS calculated cooling performance following postulated LOCAs does not exceed the acceptance criteria.

The STP risk-informed approach uses the break frequencies from NUREG 1829 to quantify the residual risk associated with GSI-191 for those LOCAs which have not been resolved using deterministic methods, and shows that it meets the acceptance guidelines defined in RG 1.174. The exemption request is specific to the requirement for demonstrating ECCS cooling performance design as required by 10CFR50.46(a)(1) as it pertains to the requirements for deterministic analyses as described in "other properties". It is not intended to be applicable to other requirements provided in 10CFR50.46 or Appendix K to 10CFR50.

As noted above, the NRC staff considers the modeling of sump performance as an input to the ECCS evaluation model, and therefore the requirements of 10CFR50.46 are applicable. Consistent with this, the requirements and attributes for the proposed STP risk-informed method include a full spectrum of postulated, double-ended guillotine breaks is evaluated, up to and including the largest piping in containment.

Engineering analyses and evaluations used to perform plant-specific testing to address the deterministic scope of the STP analysis consider a wide range of effects, including those addressed in NEI 04-07 and related NRC guidance for evaluation of sump performance. The proposed exemption does not affect any of the 10CFR50.46 (a)(1) or Appendix K requirements for an acceptable ECCS evaluation model, and does not change the ECCS acceptance criteria in 50.46(b) as it applies to the calculated results. Application of the exemption request allows use of a risk-informed approach to evaluate the effects of LOCA debris associated with GSI-191 that may be present in an acceptable evaluation model. The results of the risk-informed method demonstrate that the risk associated with GSI-191 meets the acceptance guidelines of RG 1.174. The current licensing basis for addressing the adequacy of ECCS to meet the criteria of 10CFR50.46, including the Appendix K Large-Break LOCA analysis and the associated Chapter 15 accident analysis for LOCA, remain in place.

2.1 Evaluation of Impacts on other Regulatory Requirements - Conclusion

The proposed exemption does not result in any physical changes to the facility or changes to the operation of the plant, and does not change any of the programmatic requirements. Based on demonstrating acceptable LOCA debris mitigation and containment emergency sump and ECCS design for amending the current licensing basis for 10CFR50.46(a)(1) as described above, compliance with other regulatory requirements that rely on acceptable design for these systems and components continue to be met in the current licensing basis.

3. Basis for the Exemption Request

Under 10CFR50.12, a licensee may request and the NRC may grant exemptions from the requirements of 10CFR50 which are authorized by law, will not present an undue risk to the public health and safety, are consistent with the common defense and security, and when special circumstances are present.

The exemption request meets a key principle of RG 1.174, which states "*The proposed change meets the current regulations unless it is explicitly related to a requested exemption.*" This exemption request is provided in conjunction with the proposed License Amendment Request in Attachment 3.

3.1 Justification for the Exemption Request

As required by 10CFR50.12(a)(2), the Commission will not consider granting an exemption unless special circumstances are present. Special circumstances are present whenever one of the listed items (i) through (vi) under 10CFR50.12(a)(2) are applicable. STPNOC has evaluated the proposed exemption against the conditions specified in 10CFR50.12(a) and determined that this proposed exemption meets the requirements for granting an exemption from the regulation, and that special circumstances are present. The information supporting the determination is provided below.

Pursuant to 10CFR50.12, "Specific exemptions," the NRC may grant exemptions from the requirements of this part provided the following three conditions are met as required by 10CFR50.12(a)(1):

The exemption is authorized by law.

The NRC has authority under the Atomic Energy Act of 1954, as amended, to grant exemptions from its regulations if doing so would not violate the requirements of law. This exemption is authorized by law as is provided by 10CFR50.12 which provides the NRC authority to grant exemptions from 10CFR50 requirements with provision of proper justification. Approval of the exemption from 10CFR50.46(a)(1) would not conflict with any provisions of the Atomic Energy Act of 1954, as amended, any of the Commission's regulations, or any other law.

The exemption does not present an undue risk to the public health and safety.

The purpose of 10CFR50.46 is to establish acceptance criteria for ECCS performance, and together with GDC 35, to provide a high confidence that the systems will perform the required functions. The proposed exemption does not involve any modifications to the plant that could introduce a new accident precursor or affect the probability of postulated accidents, and therefore the probability of postulated initiating events is not increased. The PRA and engineering analysis demonstrate that the calculated risk is small and consistent with the intent of the Commission's Safety Goal Policy Statement, which defines an acceptable level of risk that is a small fraction of other risks to which the public is exposed.

As discussed in previous 10CFR50.46 rulemaking, the probability of a large break LOCA is sufficiently low that the application of a risk-informed approach to evaluate the ability of the ECCS to meet 10CFR50.46 and relevant GDC with high probability and with low uncertainty, rather than using a calculational model using deterministic methods to

achieve similar understanding, would have little effect on public risk. This is applicable to evaluating acceptable containment sump design in support of ECCS and CSS recirculation modes.

The proposed change is to apply a risk-informed method rather than a traditional deterministic method to quantify the risk associated with GSI-191 and to establish a high probability of success for performance of ECCS in accordance with the ECCS cooling performance design addressed in 10CFR50.46(a)(1). The risk-informed approach involves a complete evaluation of the spectrum of LOCA breaks, including double-ended guillotine breaks, up to and including the largest pipe in the reactor coolant system. The risk-informed approach analyzes LOCAs, regardless of break size, using the same methods, assumptions, and criteria in order to quantify the uncertainties and overall risk metrics. This ensures that large break LOCAs with relatively small contribution to CDF due to the low probability of such a break as well as smaller break LOCAs with higher probabilities of occurrence are considered in the results. Since the design basis requirement for consideration of a double-ended guillotine breaks of the largest pipe in the reactor coolant system is retained and since no physical changes to the facility or changes to the operation of the facility are being made, the existing defense-in-depth and safety margin established for the design of the facility is not reduced.

This exemption only affects 10CFR50.46(a)(1) "other properties", and does not impact the adequacy of the acceptance criteria for cladding performance that is important to maintain adequate safety margins.

The exemption is consistent with the common defense and security.

The exemption involves a change to the licensing basis for the plant that has no relation to the control of licensed material or any security requirements that apply to STP Units 1 and 2. Therefore the exemption is consistent with the common defense and security.

3.2 Special Circumstances

This section discusses the presence of special circumstances as related to 10CFR50.12(a). 10CFR50.12(a)(2) states that NRC will not consider granting an exemption to the regulations unless special circumstances are present. Special circumstances are present whenever one of the listed items (i) through (vi) under 10CFR50.12(a)(2) are applicable.

Such special circumstances are present in this instance to warrant exemption from the requirements in 10CFR50.46(a)(1) "other properties" which use deterministic calculational methods as the design basis for acceptable sump performance to validate the results of the ECCS evaluation model demonstrating long-term cooling criterion. Approval of this exemption request would allow the use a risk-informed method to amend the design basis for acceptable performance of the containment emergency sump, as a validation of inputs in the ECCS evaluation model, and in support of the existing licensing bases for compliance with 10CFR50.46.

Specifically, 10CFR50.12(a)(2)(ii) applies:

> *Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.*

The intent of 10CFR50.46(a)(1) is to ensure ECCS cooling performance design requirements imposed by 10CFR50.46 are determined by a rigorous method that provides a high level of confidence in ECCS performance. This exemption request is consistent with that purpose in that use of the proposed risk-informed approach accounts for the effect of debris on the ECCS cooling performance and supports a high probability of successful ECCS performance, based on the risk results meeting the acceptance guidelines of RG 1.174.

As discussed in the Commission's Policy Statement on "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities", NRC regulations and their implementation are generally based on deterministic approaches that consider a set of challenges to safety and determine how those challenges should be mitigated.

The need is based for this exemption is based on the requirements in the regulations for using deterministic methods to demonstrate acceptable design. Regulatory requirements are largely based on a deterministic framework, and are established for design basis accidents, such as the LOCA, with specific acceptance criteria that must be satisfied. Licensed facilities must be provided with safety systems capable of preventing and mitigating the consequences of design basis accidents to protect public health and safety. The deterministic regulatory requirements were designed to ensure that these systems are highly reliable. The LOCA analysis and the General Design Criteria (GDC) were established as part of this deterministic regulatory framework.

In comparison, the risk-informed approach considers nuclear safety in a more comprehensive way by examining the likelihood of a broad spectrum of initiating events and potential challenges, considering a wide range of credible events and assessing the risk based on mitigating system reliability.

An objective of 10CFR50.46 is to maintain low risk to the public health and safety through a reliable ECCS, as supported by the containment sump. The supporting analysis demonstrates that a risk-informed approach to sump performance is consistent with the Commission's Safety Goals for nuclear power plants and supports ECCS operation with a high degree of reliability. Consequently, the special circumstances described in 10CFR50.12(a)(2)(ii) apply.

Specifically, 10CFR50.12(a)(2)(iii) applies:

> *Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.*

The specific hardship is the excessive 158 – 176 rem occupational radiological dose that are estimated to be incurred for plant modifications to remove insulation. This was described in Attachment 2-1, above.

In conclusion, special circumstances in 10CFR50.12(a)(2)(ii) and 10CFR50.12(a)(2)(iii) are present as required by 10CFR50.12(a)(2) for consideration of the request for exemption.

4. Technical Justification for the Exemption

Technical justification for the risk-informed method is provided in Attachment 1 and Attachment 3.

The proposed risk-informed approach meets the key principles in RG 1.174 in that it is consistent with the defense-in-depth philosophy, maintains sufficient safety margins, results in small increase in risk, and is monitored using performance measurement strategies. This proposed exemption to allow use of the risk-informed method is consistent with the key principle in RG 1.174 that requires the proposed change to meet current regulations unless explicated related to a requested exemption.

The results show that the risk associated with GSI-191 concerns is less than the threshold in Region III, "Very Small Changes," of RG 1.174, and therefore are consistent with the Commission's Safety Goals for public health and safety.

5. Conclusion

Approval of an exemption to allow the use of the risk-informed approach is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security as required by 10CFR50.12(a)(1). Furthermore, special circumstances required by 10CFR50.12(a)(2) are present for item 10CFR50.12(a)(2)(ii) in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule.

Based on the determination that the risk of the exemption meets the acceptance guidelines of RG 1.174, the results demonstrate there is reasonable assurance that the ECCS will function in the recirculation mode and that the public health and safety will be protected.

6. Implementation

STPNOC requests that this exemption request be approved for implementation by ~~November 2015~~[Later].

Corrections to Other References to 10CFR50.46(d) in August 20, 2015 LAR Supplement

Location	Text	Revised Text
Att. 1-1, p. 1 of 1	The regulations require a deterministic analysis. Implementation of the licensing basis requires justification in accordance with 10CFR50.12 of exemptions to the relevant regulations; i.e. 10CFR50.46(d),	The regulations require a deterministic analysis. Implementation of the licensing basis requires justification in accordance with 10CFR50.12 of exemptions to the relevant regulations; i.e. 10CFR50.46(a)(1),...
Att. 1-2, p. 1 of 95	The proposed methodology changes to implement replace the current deterministic methodology with a risk-informed methodology also require changes to the descriptions of how STP meets 10CFR50.46(d), GDC 35, GDC 38 and GDC 41. Those changes require exemptions to certain requirements of 10CFR50.46(d), GDC 35, GDC 38 and GDC 41, and the requests for the exemptions are provided in Attachments 2-1 through 2-4 to this letter.	The proposed methodology changes to implement replace the current deterministic methodology with a risk-informed methodology also require changes to the descriptions of how STP meets 10CFR50.46(a)(1), GDC 35, GDC 38 and GDC 41. Those changes require exemptions to certain requirements of 10CFR50.46(a)(1), GDC 35, GDC 38 and GDC 41, and the requests for the exemptions are provided in Attachments 2-1 through 2-4 to this letter.

Location	Text	Revised Text
Att. 2-4, p. 3 of 6	As discussed in previous 10CFR50.46 rulemaking, the probability of a large break LOCA is sufficiently low that the application of a risk-informed approach to evaluate the ability of the ECCS to meet 10CFR50.46(d) with high probability and with low uncertainty, rather than using a calculational model using deterministic methods to achieve similar understanding, would have little effect on public risk. This is applicable to evaluating acceptable containment sump design in support of ECCS and CSS recirculation modes.	As discussed in previous 10CFR50.46 rulemaking, the probability of a large break LOCA is sufficiently low that the application of a risk-informed approach to evaluate the ability of the ECCS to meet 10CFR50.46(a)(1) with high probability and with low uncertainty, rather than using a calculational model using deterministic methods to achieve similar understanding, would have little effect on public risk. This is applicable to evaluating acceptable containment sump design in support of ECCS and CSS recirculation modes.
Att. 3, p.2 of 22	The proposed change to the licensing basis implements a risk-informed rather than a deterministic method to demonstrate compliance. In conjunction with the proposed LAR, STPNOC is also requesting exemptions from 10CFR50.46(d), GDC 35, GDC 38 and GDC 41, as provided in Attachments 2-1 through 2-4 to this letter. The UFSAR markups are attached for the staff's information.	The proposed change to the licensing basis implements a risk-informed rather than a deterministic method to demonstrate compliance. In conjunction with the proposed LAR, STPNOC is also requesting exemptions from 10CFR50.46(a)(1), GDC 35, GDC 38 and GDC 41, as provided in Attachments 2-1 through 2-4 to this letter. The UFSAR markups are attached for the staff's information.
Att. 3, p. 5 of 22	• ECCS: 10CFR50.46(d),GDC 35 • Containment Heat Removal: GDC 38 • Containment Atmosphere Cleanup: GDC 41	• ECCS: 10CFR50.46(a)(1), GDC 35 • Containment Heat Removal: GDC 38 • Containment Atmosphere Cleanup: GDC 41

Location	Text	Revised Text
Att. 3, p.7 of 22	The methodology is governed by 10CFR50.46(d) by its incorporation of GDC 35. The LAR supports the exemptions to 10CFR50.46(d) and GDC 35 described in Attachments 2-1, 2-2, and 2-3.	The methodology is governed by 10CFR50.46(a)(1) by its reference to "other properties" and deterministic requirements. The LAR supports the exemptions to 10CFR50.46(a)(1) and GDC 35 described in Attachments 2-1, 2-2, and 2-3.
Att. 3, p. 18 of 22	• 10CFR50.46(d) • GDC 35, "Emergency core cooling" • GDC 38, "Containment heat removal," • GDC 41, "Containment atmosphere cleanup,"	• 10CFR50.46(a)(1) • GDC 35, "Emergency core cooling" • GDC 38, "Containment heat removal," • GDC 41, "Containment atmosphere cleanup"
Att. 3-4, p. 9 of 23	Exemptions to 10CFR50.46(d), GDC 35, GDC 38 and GDC 41 have been approved to allow application of the risk-informed analysis instead of the deterministic methods required by GDCs.	Exemptions to 10CFR50.46(a)(1), GDC 35, GDC 38 and GDC 41 have been approved to allow application of the risk-informed analysis instead of the deterministic methods required by GDCs
Att. 3-4, p. 14 of 23	The use of a risk-informed method, rather than the deterministic methods prescribed in the regulations required exemptions to 10CFR50.46(d), GDC 35, GDC 38, and GDC 41, which have been granted pursuant to 10CFR50.12.	The use of a risk-informed method, rather than the deterministic methods prescribed in the regulations required exemptions to 10CFR50.46(a)(1), GDC 35, GDC 38, and GDC 41, which have been granted pursuant to 10CFR50.12.

Location	Text	Revised Text
Att. 3-4, p. 23 of 23	… and affect the following requirements: • 10CFR50.46(d) – the governing requirement in 10CFR50.46 to establish GDC 35 as the technical design basis for ECCS analysis. …	…"and affect the following requirements: • 10CFR50.46(a)(1) – the governing requirement in 10CFR50.46 to establish "other properties" and deterministic requirements for ECCS analysis. …

Attachment 2

Definitions and Acronyms

Definitions and Acronyms

ANS	American Nuclear Society
ARL	Alden Research Laboratory
ASME	American Society of Mechanical Engineers
BA	Boric Acid
BAP	Boric Acid Precipitation
BC	Branch Connection
BEP	Best Efficiency Point
B-F	Bimetallic Welds
B-J	Single Metal Welds
BWR	Boiling Water Reactor
CAD	Computer Aided Design
CASA	Containment Accident Stochastic Analysis, also a short name for the CASA Grande computer program that uses the analysis methodology
CCDF	Complementary Cumulative Distribution Function or Conditional Core Damage Frequency
CCW	Component Cooling Water
CDF	Core Damage Frequency
CET	Core Exit Thermocouple(s)
CHLE	Corrosion/Head Loss Experiments
CHRS	Containment Heat Removal System
CLB	Cold Leg Break or Current Licensing Basis
CRMP	Configuration Risk Management Program
CS	Containment Spray
CSHL	Clean Strainer Head Loss
CSS	Containment Spray System (same as CS)
CVCS	Chemical Volume Control System
DBA	Design Basis Accident
DBD	Design Basis Document
D&C	Design and Construction Defects
DEGB	Double Ended Guillotine Break
DID	Defense in Depth
DM	Degradation Mechanism
ECC	Emergency Core Cooling (same as ECCS)
ECCS	Emergency Core Cooling System
ECWS	Essential Cooling Water System (also ECW)
EOF	Emergency Operations Facility
EOP	Emergency Operating Procedure(s)
EPRI	Electric Power Research Institute
EQ	Equipment Qualification
ESF	Engineered Safety Feature
FA	Fuel Assembly(s)
FHB	Fuel Handling Building
GDC	General Design Criterion(ia)
GL	Generic Letter
GSI	Generic Safety Issue
HHSI	High Head Safety Injection (ECCS Subsystem)
HLB	Hot Leg Break
HTVL	High Temperature Vertical Loop
HLSO	Hot Leg Switchover
HVAC	Heating, Ventilation & Air Conditioning
ID	Inside Diameter
IGSCC	Intergranular Stress Corrosion Cracking
ISI	In-Service Inspection
IOZ	Inorganic Zinc
LAR	License Amendment Request
LBB	Leak Before Break
LBLOCA	Large Break Loss of Coolant Accident
LLOCA	Large Break Loss of Coolant Accident
LCO	Limiting Condition for Operation
LDFG	Low Density Fiberglass
LERF	Large Early Release Frequency
LHS	Latin Hypercube Sampling
LHSI	Low Head Safety Injection (ECCS Subsystem)
LOCA	Loss of Coolant Accident

Definitions and Acronyms

LOOP/LOSP	Loss of Off Site Power
MAAP	Modular Accident Analysis Program
MAB/MEAB	Mechanical Auxiliary Building or Mechanical Electrical Auxiliary Building
MBLOCA	Medium Break Loss of Coolant Accident
MLOCA	Medium Break Loss of Coolant Accident
NIST	National Institute of Standards and Technology
NLHS	Non-uniform Latin Hypercube Sampling
NPSH	Net Positive Suction Head, (NPSHA – available, NPSHR – required)
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
OBE	Operating Basis Earthquake
OD	Outer Diameter
PCI	Performance Contracting, Inc.
PCT	Peak Clad Temperature
PDF	Probability Density Function
PRA	Probabilistic Risk Assessment
PWR	Pressurized Water Reactor
PWROG	Pressurized Water Reactor Owner's Group
PWSCC	Primary Water Stress Corrosion Cracking
QDPS	Qualified Display Processing System
RAI	Request for Additional Information
RCB	Reactor Containment Building
RCFC	Reactor Containment Fan Cooler
RCS	Reactor Coolant System
RG	Regulatory Guide
RHR	Residual Heat Removal
RI-ISI	Risk-Informed In-Service Inspection
RMI	Reflective Metal Insulation
RMTS	Risk Managed Technical Specifications
RVWL(S)	Reactor Vessel Water Level (System)
RWST	Refueling Water Storage Tank
SBLOCA	Small Break Loss of Coolant Accident
SLOCA	Small Break Loss of Coolant Accident
SC	Stress Corrosion
SI/SIS	Safety Injection, Safety Injection System (same as ECCS)
SIR	Safety Injection and Recirculation
SR	Surveillance Requirement
SRM	Staff Requirements Memorandum
SSE	Safe Shutdown Earthquake
STP	South Texas Project
STPEGS	South Texas Project Electric Generating Station
STPNOC	STP Nuclear Operating Company
TAMU	Texas A&M University
TF	Thermal Fatigue
TGSCC	Transgranular Stress Corrosion Cracking
TS	Technical Specification(s)
TSB	Technical Specification Bases
TSC	Technical Support Center
TSP	Trisodium Phosphate
UFSAR	Updated Final Safety Analysis Report
UNM	University of New Mexico
USI	Unresolved Safety Issue
UT	University of Texas (Austin)
V&V	Verification and Validation
VF	Vibration Fatigue
WCAP	Westinghouse Commercial Atomic Power
ZOI	Zone of Influence