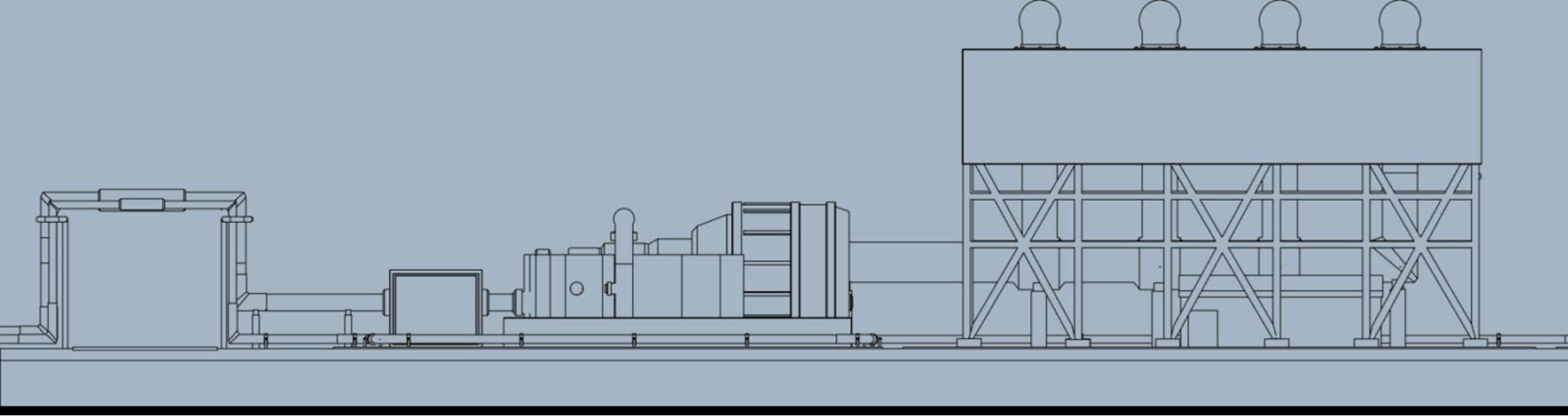


**Enclosure 1 – Non-Proprietary version of Blue Energy Topical Report
BE-BOPTR-02-NPA, “Resequencing Balance-of-Plant and Nuclear Island
Construction for Blue Energy Deployments,” Revision 1**

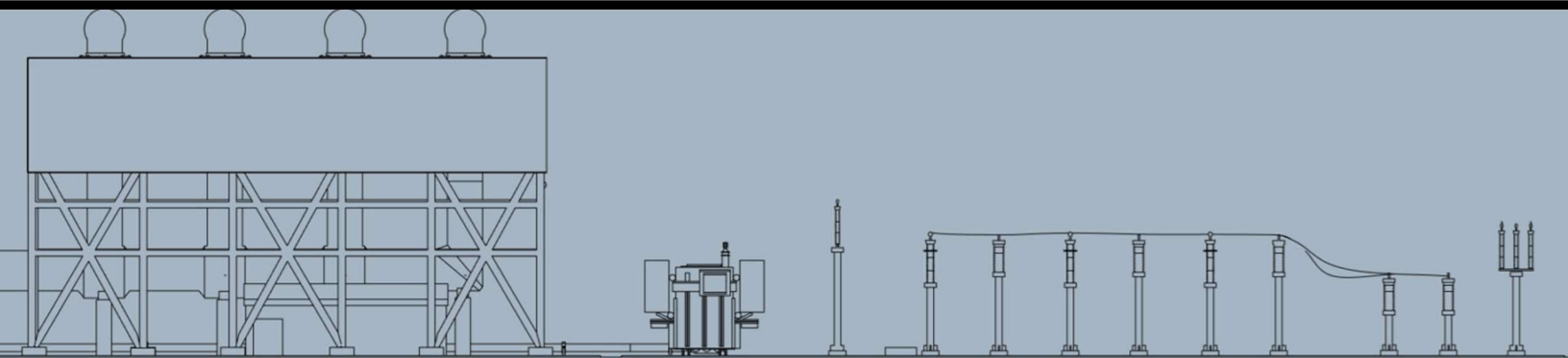


Resequencing Balance-of-Plant and Nuclear Island Construction for Blue Energy Deployments

Non-Proprietary Accepted Version

BE-BOPTR-02-NP-A

Revision 1



From: [Prosanta Chowdhury](#)
To: regulatoryaffairs@blueenergy.co
Cc: [ext_CJ_Fong](#); [ext_Antonios_Zoulis](#); [Mahmoud -MJ- Jardaneh](#); [Riley Maynard](#); [Alina Schiller](#)
Subject: ACTION: Final Safety Evaluation for Blue Energy Topical Report BE-BOPTR-02, Resequencing Balance-of-Plant and Nuclear Island Construction for Blue Energy Deployments, Revision 1 (Non-Proprietary)
Date: Tuesday, December 30, 2025 2:00:00 PM
Attachments: Safety Evaluation for Blue Energy Topical Report BE-BOPTR-02, Rev. 1.pdf

By letter dated September 11, 2025, Blue Energy Global, Inc. (Blue Energy) submitted Revision 1 of Topical Report (TR) BE-BOPTR-02, "Resequencing Balance-of-Plant and Nuclear Island Construction for Blue Energy Deployments," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML25254A215), to the U.S. Nuclear Regulatory Commission (NRC). The NRC staff has prepared a final safety evaluation for BE-BOPTR-02, Revision 1. The non-proprietary final safety evaluation is attached (ML25260A494). The NRC staff has found BE-BOPTR-02, Revision 1, to be acceptable for referencing in future licensing applications to the extent specified and under the limitations and conditions delineated in the attached final safety evaluation.

The NRC staff requests that Blue Energy publish the accepted version of this TR within three months of receipt of this electronic mail. The accepted version shall incorporate this electronic mail and the enclosed final safety evaluation after the title page. It must be well indexed such that information is readily located. Also, it must contain historical review information, including NRC requests for additional information and accepted responses. The accepted version of the TR shall include a "-A" (designated accepted) following the report identification number.

If the NRC's criteria or regulations change such that the NRC staff's conclusion in this electronic mail (that the TR is acceptable) is invalidated, Blue Energy and/or the applicant referencing the TR will be expected to either revise and resubmit its respective documentation or to submit justification for continued applicability of the TR without revision of the respective documentation.

If you have any questions or comments concerning this matter, I can be reached at (301) 415-1647 or via e-mail at Prosanta.Chowdhury@nrc.gov.

Sincerely,

Prosanta Chowdhury

Project No. 99902137

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REGARDING TOPICAL REPORT BE-BOPTR-02, REVISION 1,
“RESEQUENCING BALANCE-OF-PLANT AND NUCLEAR ISLAND CONSTRUCTION FOR
BLUE ENERGY DEPLOYMENTS”

1.0 INTRODUCTION

1.1 Summary

By letter dated September 11, 2025 (Reference 1), Blue Energy Global, Inc., (Blue Energy) submitted Revision 1 of Topical Report (TR) BE-BOPTR-02, “Resequencing Balance-of-Plant [BOP] and Nuclear Island [NI] Construction for Blue Energy Deployments,” (BOP-NI) (Reference 2) for the U.S. Nuclear Regulatory Commission (NRC) staff (the staff) review and approval. The staff conducted a regulatory audit from August 19 to August 29, 2025 (Reference 3) on BE-BOPTR-02, Revision 0 (Reference 4).

Blue Energy’s BOP-NI TR describes a methodology to determine if fabrication and installation of the BOP structures, systems, and components (SSCs) are activities not constituting construction per the definition in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities,” §50.10(a)(1) “License required; limited work authorization.” The application of this methodology will provide the basis for building the BOP prior to the issuance of a construction permit (CP).

Blue Energy aims to disconnect the start of building the BOP from the NI construction, ensuring BOP activities do not meet the criteria of “construction” per NRC regulations. The TR presents a high-level overview of the logic supporting the proposed sequencing approach, including dependency mapping and preliminary safety justifications.

However, the TR identifies several key elements that will be addressed in future submittals. The staff notes that the acceptability of the proposed methodology is contingent upon the adequacy of the future submittals. Thus, the TR may form a partial basis for planning purposes, but no regulatory conclusions regarding the acceptability of the approach on specific nuclear designs can be drawn until all outstanding issues are addressed and formally submitted for NRC review.

1.2 Scope of NRC Staff review and Approval

The scope of the staff’s review of TR BE-BOPTR-02 was limited to the evaluation of the methodology proposed by Blue Energy, for determining whether specific BOP building activities may be performed prior to the issuance of a CP, in accordance with the requirement of 10 CFR 50.10(b) and 10 CFR 50.10(c) and the definition of “construction” in 10 CFR 50.10(a)(1). The review assessed whether the proposed approach adequately distinguishes BOP building activities from those constituting “construction” as defined in 10 CFR 50.10(a), and whether it provides sufficient criteria to prevent unintended impacts on safety-related SSCs. The NRC’s approval of this topical report will be limited to the acceptability of the methodology described as a general framework. It does not constitute approval of any specific plant design, site-specific implementation, or exemption requests. Approval of future licensing actions, building plans, or operational activities based on this methodology will be contingent upon the review of additional

information submitted in accordance with the conditions and limitations identified in this safety evaluation (SE).

2.0 REGULATORY BASIS

This SE considers applicable NRC regulations that govern construction activities, exemptions, maintenance, and record-keeping to ensure compliance with regulatory requirements and protection of public health and safety. Key regulations evaluated in the TR and assessed by the NRC include:

10 CFR 50.10 – Construction Permit and Limited Work Authorization Requirements

This regulation defines the scope of activities considered as "construction" and mandates that such activities cannot proceed without an appropriate CP or limited work authorization (LWA). The evaluation verifies that the process for resequencing of BOP and NI building proposed in BE-BOPTR-02 aligns with these requirements and that any building activities conducted prior to issuance of a full CP do not conflict with the requirements in 10 CFR 50.10.

10 CFR 50.2 – Definitions, including Safety-Related

The regulation's definitions, particularly for "safety-related" SSCs, guide the evaluation of which portions of a facility are subject to heightened regulatory control. The SE confirms that safety-related SSCs are managed in accordance with regulatory expectations.

10 CFR 50.12 – Exemptions

This section provides the regulatory framework for granting specific exemptions from requirements of 10 CFR Part 50. The NRC would evaluate whether a proposed exemption to accommodate construction sequencing is acceptable after receiving an exemption request for specific activities.

10 CFR Part 51 "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions"

10 CFR Part 51 outlines the NRC's procedures for complying with the National Environmental Policy Act (NEPA) in support of licensing actions such as CPs and LWAs.

Pursuant to 10 CFR 50.10(e), an LWA may only be granted after completion of the appropriate environmental review required by Part 51. This review must address potential environmental impacts from activities defined as "construction" under 10 CFR 50.10(a)(1). Consequently, determining whether specific BOP activities constitute "construction" directly affects the treatment of these activities in the NEPA-related environmental reviews.

10 CFR Part 73, "Physical Protection of Plants and Materials"

This regulation defines the physical protection requirements for nuclear facilities, including provisions for access control, intrusion detection, and emergency response. Pursuant to 10 CFR 50.10(a)(1)(v), any installation of SSCs necessary to meet the requirements of 10 CFR Part 73 is considered "construction" and therefore may not proceed without a CP or LWA.

In reviewing TR BE-BOPTR-02, the staff evaluated whether the proposed resequencing could involve or affect SSCs associated with physical security functions. If such SSCs are included in early BOP construction activities, the applicant must demonstrate that the methodology conforms to 10 CFR Part 73 requirements. In such cases, NRC approval may be required to ensure that the facility's physical protection systems remain fully effective and compliant throughout construction.

3.0 TECHNICAL EVALUATION

This section presents the staff's technical review of Blue Energy's NI and BOP resequencing activities as described in BE-BOPTR-02. The evaluation focuses on the methodology outlined in the Topical Report (TR) for determining modifications to the building sequence of safety-related and non-safety-related SSCs within the NI and BOP.

BE-BOPTR-02 proposes a construction resequencing methodology intended to allow early initiation of BOP building activities prior to NI construction. The methodology seeks to demonstrate the acceptability of the described process for determining which activities fall within the scope of construction under §50.10(a).

The staff's review of BE-BOPTR-02 evaluates whether the methodology:

- Clearly defines the boundaries between safety-related and non-safety-related activities.
- Provides sufficient criteria to prevent unlicensed construction.
- Identifies any dependencies or interface risks between BOP and NI that could compromise safety.
- Ensures that early BOP work does not indirectly affect safety-related SSCs.

This technical evaluation addresses whether the proposed activities fall outside the scope of construction work defined under applicable NRC regulations, including 10 CFR 50.10, and assesses any implications for the licensing basis, safety, and regulatory compliance. Particular emphasis is placed on the impact of resequencing on safety-related SSCs, required inspections, and the necessity for exemptions or NRC approvals under 10 CFR 50.12.

3.1 Description of proposed activities

BE-BOPTR-02 proposes modifications to the construction sequencing of selected NI and BOP SSCs. The proposed resequencing described in the TR can be used to support a strategy that separates the building and installation of those BOP systems that do not constitute "construction" as defined under 10 CFR 50.10(a)(1) from the construction of the NI.

Pursuant to 10 CFR 50.10(c), "no person may begin the construction of a production or utilization facility on a site on which the facility is to be operated until that person has been issued either a CP... or a limited work authorization [LWA]" The 10 CFR 50.10(a) definition of "construction" is divided in two parts: 10 CFR 50.10(a)(1) specifies activities deemed to constitute "construction," and 10 CFR 50.10(a)(2) specifies certain specific activities which are excluded from the definition.

3.2 Evaluation Against 10 CFR 50.10

10 CFR 50.10(a)(1)(i) - Assessment of Whether BOP Activities include Safety-related structures, systems, or components (SSCs) of a facility, as defined in 10 CFR 50.2

Section 50.10(a)(1)(i) defines construction activities to include those involving safety-related SSCs as outlined in 10 CFR 50.2.

Upon review of the TR, the staff found that the methodology described in the TR for determining which activities constitute construction under §50.10(a)(1)(i) does not conflict with the definition of construction and remains within the scope of activities for which a license is required pursuant to §50.10(c) activities. The TR states that the intention is to resequence only those BOP activities that are not safety-related. The BOP portions identified for early building are those which are not intended to perform safety-related functions, and no safety-related SSCs are expected to be included.

Section 4.1 of the TR specifies that there are no safety-related SSCs in the BOP that would be built prior to the issuance of a CP. Therefore, the staff considers that even if safety-related SSCs were later included in the BOP, the topical report methodology properly identifies the requirement for NRC approval prior to construction of those SSCs.

10 CFR 50.10(a)(1)(ii) - Assessment of Whether BOP Activities Involve SSCs Relied Upon to Mitigate Accidents or Transients or Used in Emergency Operating Procedures

In 10 CFR 50.10(a)(1)(ii) defines "construction" to include activities related to the installation of *non-safety-related* structures, systems, or components (SSCs) that are "relied on to mitigate accidents or transients or used in plant emergency operating procedures."

The staff reviewed BE-BOPTR-02, Revision 1, submitted by Blue Energy, which proposes a methodology to permit the resequencing of the construction schedule such that BOP structures and systems that meet the specified criteria are built in advance of the NI, without requiring a license under 10 CFR 50.10(c).

Section 4.2 of the TR specifies that there are no SSCs in the BOP that would be built prior to the issuance of a CP and that are relied upon to mitigate anticipated operational occurrences (AOOs) or postulated accidents, including emergency operations of the reactor. Section 4.2 correctly identifies the wording of the criteria in 10 CFR 50.10(a)(1)(ii) to include both SSCs relied upon to mitigate AOOs or postulated accidents and SSCs that are used in plant emergency operating procedures. The staff notes that whether or not a particular SSC falls within these criteria is known once a design is selected. Therefore, the staff cannot independently verify that none of the BOP SSCs fall within this criterion. However, the staff considers that even if SSCs meeting the criteria in 10 CFR 50.10(a)(1)(ii) were later included in the BOP, the topical report methodology properly identifies the requirement for NRC approval prior to construction of those SSCs.

Therefore, the staff finds the methodology proposed in the TR acceptable and notes that they are not making a finding with regard to whether or not any SSCs in the BOP design would meet the criteria in 10 CFR 50.10(a)(1)(ii).

10 CFR 50.10(a)(1)(iii) - Assessment of Whether BOP Activities Involve SSCs Whose Failure Could Prevent Safety-Related SSCs from Fulfilling Their Safety Function

BE-BOPTR-02 outlines a proposed strategy allowing the early installation of BOP SSCs prior to the issuance of a CP. The TR consistently states that these BOP activities are intended to exclude safety-related SSCs and avoid physical or functional dependencies with the NI, where most safety-related systems are located.

The TR indicates that the BOP systems chosen for early construction are not intended to support or provide critical functions to safety-related SSCs. It also makes clear that none of the components installed under the resequencing plan are anticipated to influence or compromise the performance of safety-related systems, either during installation or afterward.

While the TR asserts functional independence between early BOP installations and safety-related systems, the staff notes that the TR acknowledges that specific SSC classification and interface documentation will be provided in future submittals, including identification of components subject to review under 10 CFR 50.10(a)(1)(iii).

Based on the information provided in the TR—particularly the applicant’s statement in Section 2.3 that the BOP systems selected for early building do not support or affect safety-related SSCs—the staff finds that the conceptual approach appears consistent with the definition of construction in 10 CFR 50.10(a)(1). The TR does not propose activities that clearly meet the definition of “construction” under the regulation at this stage.

Section 4.3 of the TR specifies that “actuation or failure of a BOP SSC will not impair the NI’s response to safely shutdown the reactor and maintain it in a safe shutdown condition,” and that “there are no SSCs in the BOP to be built prior to issuance of a CP or relevant exemption that meet criterion (iii).” Therefore, the staff considers that even if in the final design stages an SSC in the BOP met criterion (iii), the methodology specified in the topical report properly identifies the requirement for NRC approval prior to construction of those SSCs.

10 CFR 50.10(a)(1)(iv) Assessment of Whether BOP Activities Involve SSCs Whose Failure Could Cause a Reactor Scram or Actuation of a Safety-Related System

BE-BOPTR-02 proposes to resequence construction by initiating fabrication and installation of BOP SSCs prior to the issuance of a CP.

The TR asserts that the BOP SSCs planned for early construction do not interface functionally with systems that could initiate a scram or the actuation of safety-related systems. The sequencing excludes equipment or control pathways that could result in unintended signal propagation, failure dependencies, or transient system responses.

The staff find this general statement aligns with the intent of §50.10(a)(1)(iv). However, the TR does not include a detailed identification or analysis of:

- BOP systems or components that may interface electrically, mechanically, or through control logic with NI systems.

- Potential failure modes of BOP SSCs that could inadvertently cause a reactor trip or actuate safety systems.

TR methodology

Section 4.4 of the TR notes that the criteria in Section 2.4 ensure that the failure of SSCs in the BOP built prior to issuance of a CP or relevant exemption would not result in a reactor scram or actuation of a safety-related system. Further, the criteria in Section 2.4 includes, in part, a statement that “failure or errant/intentional actuation of a BOP SSC built prior to issuance of a CP shall not...result in a reactor trip or actuation of a safety-related SSC.”

Detailed design information will be needed for the NRC to independently verify that no failure of BOP SSCs could result in a scram or safety system actuation, particularly if future BOP components involve power distribution, or control interfaces that cross-connect with the NI. Further, the specific NI design selected may impact which, if any, BOP components could meet criterion (iv). However, the staff considers that even once an NI design is selected, and once the SSCs are designed, if an SSC in the BOP met criterion (iv), the methodology specified in the topical report properly identifies the requirement for NRC approval prior to construction of those SSCs.

10 CFR 50.10(a)(1)(v and vi) SSCs necessary to comply with 10 CFR Part 73 and 10 CFR 50.48 Criterion 3 of 10 CFR Part 50, Appendix D

BE-BOPTR-02 is a topical report intended for construction sequencing purposes and does not involve security or physical protection systems. Security requirements under Part 73 are not relevant to the methodology being proposed, so they were not included in the TR. However, future submittals should explicitly state how Part 73 requirements are considered in relation to construction sequencing.

BE-BOPTR-02 does not include any fire protection-related SSCs within the scope of the proposed resequenced activities. As a result, the requirements of this provision are not currently applicable. However, future submittals should clearly indicate whether any fire protection SSCs are involved and ensure that such systems are either explicitly excluded or addressed in a manner consistent with regulatory expectations.

10 CFR 50.10(a)(1)(vii)

At the point of this review, 50.10(a)(1)(vii) is not applicable to the TR because BE-BOPTR-02 does not propose or authorize construction of SSCs important to safety, it only provides a sequencing framework that could later be applied in a licensed project. Actual construction activities involving SSCs would be reviewed under a separate license application or LWA request, where 50.10(a)(1)(vii) compliance would be required.

Additional screening criteria

In Section 4.8 of the TR, Blue Energy provided information on how it intends to further demonstrate the lack of safety-based reliance on BOP SSCs through imposing additional screening criteria “for what can be installed in the BOP or otherwise, outside of the 10 CFR 50.10(a)(1) framework.” The staff considers the inclusion of additional criteria to be a

conservative aspect of the methodology. The staff notes that the criteria in 10 CFR 50.10(a)(1) are the requirements that must be met, or an exemption must be sought, prior to issuance of a CP.

Discussion on 10 CFR 50.10(a)(1)

SECY-25-0074 (Reference 5) seeks to clarify construction and nexus to radiological safety for non-safety-related SSCs. The SECY states:

In regard to the provisions of 10 CFR 50.10(a)(1)(ii)-(vii), which pertain to non-safety-related SSCs, the NRC staff will ensure that the application of the definition of construction for a facility focuses on only those SSCs that have a reasonable nexus to radiological safety and common defense and security based on a review of the design of that facility. The non-safety-related SSCs that are not within the scope of the definition of construction would include those SSCs that do not directly affect the radiological health and safety of the public or the common defense and security, and their indirect effect on such health and safety or common defense and security is so low as to be considered negligible. They could include non-safety-related SSCs that are not directly relied upon to mitigate an accident or transient or used in plant emergency operating procedures (10 CFR 50.10(a)(1)(ii)), whose failure would not directly prevent safety-related SSCs from performing their safety-related function (10 CFR 50.10(a)(1)(iii)), whose failure would not directly cause a scram or actuation of a safety-related system (10 CFR 50.10(a)(1)(iv)), which are not used directly to comply with security and emergency preparedness requirements (10 CFR 50.10(a)(1)(v), (vi), and (vii)) and whose indirect effect is so low as to be considered negligible.

The SECY also states:

If an applicant determines that a non-safety-related SSC has a direct effect on one of the criteria in 10 CFR 50.10(a)(1), or if an indirect effect had a more than negligible effect on health and safety and common defense and security, that applicant could submit an exemption request to the NRC to allow for this construction activity to occur before issuance of a license, and the exemption will be granted if the underlying requirements of 10 CFR 50.12 are met.

The SECY also includes illustrative examples to highlight the difference between direct and indirect effects. The staff review of the TR discussion on 10 CFR 50.10(a)(1) sections notes that Blue Energy states they will implement this methodology and implement the results in future regulatory submittals. The above SECY could be used in evaluation of necessary regulatory actions depending on the future reactor technology used and the specific designs of the BOP SSCs. This would allow Blue Energy or future applicants using the TR methodology to take advantage of optimized time frames and reduce costs.

TR Section 5.6

The staff reviewed the discussion of interfaces between the NI and the BOP components as presented in Section 5.6 "NI/BOP Interfaces". The evaluation looked to see that the proposed resequencing of construction activities does not introduce potential risk to safety-related functions. The methodology appropriately identifies the physical and functional separation

required by the regulations and that NI/BOP interface considerations are adequately addressed to prevent inadvertent impacts on safety during resequencing of BOP building activities.

TR Section 5.7

In TR Section 5.7, “Transient Demonstration,” the staff reviewed the strategy regarding AOOs and Transients and agrees that this methodology should be acceptable. The staff notes that since the design of the Nuclear Island is not yet known, the staff did not review the list in Table 1 under Section 5.7 for completeness since it may change based on the selected design. The Blue Energy strategy of evaluation laid out in Section 2 of the TR as well as Section 5.7 should allow future applicants to evaluate the impacts of the resequencing on AOOs and postulated accidents and support future licensing submittals.

TR Section 5.8

The staff reviewed TR Section 5.8 “BOP SSCs,” which describes the scope and classification of BOP SSCs. The information was included to demonstrate that when the BOP resequencing methodology is implemented, BOP SSCs will meet 10 CFR 50.10(a)(1)(iv) or form the basis for an exemption request. Section 5.8 of the TR states that the list of BOP SSCs to be built prior to issuance of a CP will be evaluated to determine whether the SSCs meet the definition of construction per 10 CFR 50.10(a)(1) consistent with the BOP SSC scoping process described in Section 5.8. Based on its review of the information in TR Section 5.8, the staff finds that classification and treatment of BOP SSCs in the TR provide an acceptable framework to support compliance with the regulation. The staff notes (as does Blue Energy) that the bulleted list of components and systems in Section 5.8 may not be all-inclusive depending on future design updates. Therefore, the staff are not making a finding of the adequacy of the list. The staff does find that the methods described in the TR Section 5.8 to evaluate the BOP resequencing acceptable.

4.0 CONCLUSION

Based on the current contents of TR BE-BOPTR-02, the staff finds that the proposed methodology is conceptually consistent with 10 CFR 50.10(a)(1) regarding resequencing of construction activities and the definition of construction specified in 10 CFR 50.10. However, this conclusion is subject to the limitations and conditions listed in the following section of the SE.

Section 5.2 of the TR proposes an order of licensing actions to support the resequencing effort. The staff has reviewed the order of the actions and agrees that they should be satisfactory to support the resequencing and eventual CP submittal(s).

The staff notes that the TR does not specify a reactor design when it comes to the NI. While the current design is unspecified, future applicants using this TR may achieve different levels of efficiency in achieving resequencing of many of the BOP SSCs, since different reactor designs are expected to impact whether or not some of the criteria in 10 CFR 50.10(a)(1) are met. As part of the methodology, as described in Section 5.2 of the TR, the applicant will submit exemption request(s) and/or an LWA application if BOP SSCs are to be built prior to staff issuance of a CP meet any of the criteria in 10 CFR 50.10(a)(1).

The adequacy of record-keeping and data management programs related to BOP construction activities could assist future licensing submittals, inspections, and safety reviews in demonstrating compliance with applicable regulatory requirements.

The NRC's approval of TR BE-BOPTR-02 is limited to the acceptability of the methodology described as a general framework. It does not constitute approval of any specific plant design, site-specific implementation, or exemption requests.

5.0 LIMITATIONS AND CONDITIONS

TR BE-BOPTR-02, Revision 1, evaluated in this SE, describes a methodology to determine if fabrication and installation of the Balance of Plant (BOP) structures, systems, and components (SSCs) are activities not constituting construction per the definition in 10 CFR 50.10(a)(1).

Blue Energy proposed four limitations and conditions (L&Cs) in Section 7.0 of its TR. Based on the staff's review of the TR including the four L&Cs identified by Blue Energy in Section 7.0 of the TR, the staff has determined that the four L&Cs are applicable to an applicant or licensee that uses the methodology of the TR.

The staff notes that TR BE-BOPTR-02, Revision 1, applies to the building of non-safety-related structures, systems, and components (SSCs) within the BOP prior to issuance of a construction permit (CP). An applicant referencing the TR must confirm that all BOP SSCs built prior to the issuance of a CP are non-safety-related. If an applicant proposes to include safety-related SSCs in pre-CP building activities, the applicant must submit supplemental licensing information to the NRC demonstrating compliance with all applicable regulatory requirements (e.g., 10 CFR Part 50, Appendix B) and must obtain NRC approval prior to initiating construction of those SSCs.

6.0 REFERENCES

1. Letter from CJ Fong, Submission of Topical Report BE-BOPTR-02 "Resequencing Balance-of-Plant and Nuclear Island Construction for Blue Energy Deployments" ("Blue Energy"), September 11, 2025 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML25254A215).
2. Blue Energy Global, Inc., Topical Report BE-BOPTR-02, "Resequencing Balance-of-Plant and Nuclear Island Construction for Blue Energy Deployments," Revision 1, September 11, 2025 (ML25254A218 [proprietary]; ML25254A217 [non-proprietary]).
3. Plan for the Regulatory Audit of Blue Energy Global, Inc. Topical Report BE-BOPTR-02, "Resequencing Balance-of-Plant and Nuclear Island Construction for Blue Energy Deployments" (ML25216A095).
4. Blue Energy Topical Report BE-BOPTR-02-NP, "Resequencing Balance-of-Plant and Nuclear Island Construction for Blue Energy Deployments" Revision 0, May 28, 2025 (ML25148A421 [Proprietary]; ML25148A420 [non-proprietary]).
5. SECY-25-0074 "Expedited Construction of Certain Structures, Systems, and Components," August 28, 2025 (ML25157A119).

RESEQUENCING BALANCE-OF-PLANT AND NUCLEAR ISLAND CONSTRUCTION FOR BLUE ENERGY DEPLOYMENTS BLUE ENERGY GLOBAL, INC.

REVISION 1



Document Number:	BE-BOPTR-02-NP-A	Revision:	1
Document Title:	Resequencing Balance-of-Plant and Nuclear Island Construction for Blue Energy Deployments		
Effective Date:	Immediately upon issuance		

	Name / Title	Signature	Date
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RECORD OF REVISION PAGE

Revision	Approval Date	Change Description	Page(s)	Effective Date
0	05.23.2025	Initial Release	ALL	06.01.2025
1	09.09.2025	<p>Revised to incorporate edits made during NRC audit</p> <p>All sections – responded to NRC audit questions and comments</p> <p>Section 1 (various parts) – clarified scope of SSCs to be built prior to issuance of a CP, clarified potential for SR SSCs to be installed in BOP after resequencing with prior approval, made explicit potential need for exemption</p> <p>Section 2 (various parts) – clarified scope of SSCs to be built prior to issuance of a CP, clarified safety functions</p> <p>Section 4 – added subsection 4.8, made explicit potential need for exemption</p> <p>Section 5 - made explicit potential need for exemption, clarified scope of SSCs to be built prior to issuance of a CP</p>	1-8, 9-10, 16-19, 20-35, 36-37	Immediately upon issuance

Information Notice

This is a non-proprietary version of the Blue Energy (BE) document BE-BOPTR-02-NP-A Revision 1. Portions of this document will indicate the proprietary information by an open and closed double bracket as shown here [[]].

The design, engineering, and other information contained in this document is furnished for the purpose of obtaining Nuclear Regulatory Commission (NRC) review and determination of acceptability for the Blue Energy Small Modular Reactor design and licensing basis information contained herein. The use of this information by anyone for any purpose other than that for which it is intended is not authorized; and with respect to any unauthorized use, Blue Energy makes no representation or warranty, and assumes no liability as to the completeness, accuracy, or usefulness of the information contained in this document.

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1.0 Introduction

1.1. Purpose

The purpose of this licensing topical report is to request Nuclear Regulatory Commission (NRC) approval of a methodology to allow for fabrication and installation of 1) non-safety related balance-of-plant (BOP) structures, systems, and components (SSCs) and other onsite facilities limited to those outside of the 10 CFR 50.10(a)(1) “License required; limited work authorization,” framework that constitutes construction (Reference 1), and 2) limited non-safety related balance-of-plant (BOP) structures, systems, and components (SSCs) that may meet criteria in 10 CFR 50.10(a)(1). This methodology does not extend into the nuclear island, regardless of SSC classification. This report provides the basis for designing, fabricating, and erecting an operational BOP initially connected to a combined cycle natural gas plant prior to seeking NRC approval for, or installation of, any safety-related (SR) SSCs that would be required to support an NRC-approved nuclear island (NI)¹ by adhering to the definition of construction in 10 CFR 50.2 and detailed criteria of 10 CFR 50.10(a)(1).

Blue Energy is requesting NRC review and approval of the methodology and determinations provided in Section 4.0, and certain portions of Section 5.0. If approved, subject to any NRC limitations and conditions, this methodology will be referenced in future licensing submittals and regulatory engagements.

This topical report outlines a method for determining which SSCs do not meet the definition of “construction” under 10 CFR 50.10(a)(1) and can be fabricated, installed, and built on site. Additionally, to support the construction and operation of a fully functional BOP and combined-cycle natural gas plant, it is anticipated that some SSCs, while not safety-related, will meet one or more criteria in 10 CFR 50.10(a)(1).

If BOP SSCs are determined to meet the definition of “construction” under 10 CFR 50.10(a)(1), Blue Energy would seek NRC approval through additional mechanisms, such as requesting an exemption from the applicable provisions of 10 CFR 50.10(a)(1) or after obtaining prior NRC approval through a construction permit application or other regulatory actions. The methodology described in Section 5 of this topical report will serve as the technical basis for such exemption requests. Accordingly, this topical report serves as a means to proactively engage with the NRC regarding site activities that do not require NRC oversight and to outline the approach that Blue Energy intends to take to expedite certain non-safety-related construction.

¹ The NI is the portion of the plant that will contain all safety-related SSCs [REDACTED]

[REDACTED] abcde, including the reactor and reactor coolant system, as well as certain non-safety-related SSCs. The BOP constitutes the remainder of the plant (e.g. power conversion system) and does not include any safety-related SSCs.

1.2. **Blue Energy Deployment Approach**

A key feature of the Blue Energy deployment strategy is to resequence general construction and intentionally disconnect the deployment of a BOP and combined cycle natural gas plant from NRC defined construction activities per 10 CFR 50.10(a)(1). The proposed approach is to demonstrate where the criteria of 10 CFR 50.10(a)(1) do and do not apply to the overall design. Blue Energy would then provide NRC with detailed site activities and SSCs to be installed outside of 10 CFR 50.10(a)(1) while continuing NRC engagement for those activities that fall under construction. If the BOP must contain safety-related SSCs to support a nuclear island, such SR SSCs would require additional NRC exemptions or approvals, such as a limited work authorization or construction permit. Blue Energy's proposed deployment strategy includes:

- Implementing internal design requirements for the NI to ensure that design choices are made such that the criteria of 10 CFR 50.10(a)(1) are not satisfied by the majority of BOP SSCs and therefore the BOP SSCs built prior to issuance of a Construction Permit (CP) is largely not considered construction per 10 CFR 50.10(a)(1).
- If fabrication and installation of the BOP is not considered construction per 10 CFR 50.10(a)(1), it is not considered construction as per 10 CFR 51.4.
- Where SSCs do meet the definition of construction per 10 CFR 50.10(a)(1), Blue Energy will apply for an exemption or seek other NRC approval. This is not anticipated to include safety-related SSCs.
- Fabricating and installing BOP SSCs to be built prior to issuance of a CP in accordance with local, state, and federal agencies other than NRC (e.g., state air permit requirements, local construction ordinances, etc.)
- Submitting an application to the NRC that would allow construction of an NI and installation of any additional SSCs, including those that are safety-related, in the BOP that satisfies applicable regulations to ensure the health and safety of the public and protection of the environment.
- Controlling NI construction in accordance with the regulations of 10 CFR 50.10(a).

To allow for this strategy, the portions of the BOP to be built prior to issuance of a CP:

- Will not include any SSCs or facilities that meet the criteria of 10 CFR 50.10(a)(1) or will be granted any necessary exemptions prior to fabricating and installing the BOP.
- Will be clearly and functionally separate from the NI to ensure distinction between the NI and BOP.
- Will be comprised of components that may eventually support a NI and will accordingly be rigorously assessed for safety significance and 50.10(a)(1) criteria applicability, with a burden being on Blue Energy to ensure that no safety-related SSCs are installed prior to a construction permit or other NRC approvals.

- Will be [REDACTED]
- [REDACTED]

2.0 Key Design Requirements

The following design requirements for a Blue Energy plant provide the underlying basis to determine that the definition of construction per 10 CFR 50.10(a)(1) is not applicable to the majority of BOP SSCs of a Blue Energy site, as discussed in Section 4.0. Each key design requirement shall be verified or demonstrated via a subsequent regulatory submittal to satisfy the methodology in Section 4.0. Blue Energy acknowledges that if a key design requirement cannot be demonstrated for a specific SSC, then an exemption from select regulations may be required.

The following sections provide each of the key design requirements, including a brief discussion and explanation of its importance and how it will be addressed in a future regulatory submittal. This is necessary because the NI and BOP design has not yet advanced to a stage where there is sufficient detail to demonstrate that each criterion is met. Blue Energy is seeking NRC approval of the methodology to allow for effective inclusion of these requirements in the facility design.

2.1. *Reliance on NI SSCs for Design Basis Accidents*

NI SSCs or SSCs installed with prior NRC approval shall be exclusively relied upon to mitigate anticipated operational occurrences (AOOs) and postulated accidents².

² 10 CFR 50.2 defines safety-related SSCs as those needed "...to remain functional during and following design basis events...." Section 15.0, "Introduction – Transient and Accident Analyses," Revision 4, of NUREG-0800, "Standard Review Plan," directs the NRC staff to review AOOs and postulated accidents to evaluate the safety of a nuclear power plant. Appendix A to 10 CFR 50 contains several General Design Criteria (GDC) which are specifically meant to ensure AOOs are mitigated. For the methodology presented in this topical report, Blue Energy will demonstrate that 10 CFR 50(a)(1)(i) and (ii) are not met for BOP SSCs. These criteria state that SR SSCs and those SSCs needed to mitigate accidents or transients (i.e. AOOs) are considered "construction." Blue Energy uses the phrase "AOOs and postulated accidents," in this topical report to encompass design basis events (as used in 10 CFR 50.2), as well as to be consistent with SRP Section 15.0 and the GDC. Therefore, in the context of this topical report, AOOs and postulated accidents encompass the events that could cause an SSC to meet either 10 CFR 50(a)(1)(i) or (ii). Additionally, SSC classification is preliminary given the stage of plant design. Because the methodology in this topical report only provides a way to demonstrate whether an activity is

Protection of the health and safety of the public and protection of the environment for AOOs and postulated accidents will be provided using exclusively the SSCs located within the NI or installed in the BOP post issuance of a construction permit. This is consistent with the definition of safety-related SSCs in 10 CFR 50.2 (Reference 1). AOOs and postulated accidents are mitigated by ensuring that the general reactor safety functions are maintained with safety-related SSCs only. These general reactor safety functions are to provide 1) reactivity control, 2) core cooling, 3) reactor coolant system pressure boundary integrity, 4) containment integrity, and 5) heat removal.

Verification of this requirement requires demonstration that NI SSCs or SSCs installed with prior NRC approval are sufficient SSCs to mitigate AOOs or postulated accidents within the licensing basis of the facility (e.g., demonstrate that the dose limits specified in 10 CFR 50.34(a)(1) and 10 CFR 100 (Reference 2) are met), including emergency operations of the reactor.

2.2. Clear Functional Separation

NI and BOP SSCs shall be clearly and programmatically separate.

The line of demarcation between the NI and BOP must be easily identified throughout all parts of the facility. From an SSC classification perspective, all SSCs classified as safety related (per 10 CFR 50.2) will be included in the scope of the construction permit application. Only SSCs classified as non-safety-related (NSR) will be included in the SSCs to be built prior to issuance of a CP.

Verification of this requirement requires demonstration that the NI and safety-related BOP SSCs are separated in terms of the design, procurement, layout, construction, and programmatic processes. For example, the NI and BOP facilities may be physically separated by some distance, with select interfaces where SSCs are physically connected between the facilities that are clearly defined.

2.3. No Reliance on BOP SSCs to be Built Prior to Issuance of a CP for Design Basis Accidents

BOP SSCs built prior to issuance of a CP shall not be credited for any safety-related functions to prevent or mitigate AOOs and postulated accidents, but may be considered for beyond design basis events and in probabilistic risk assessments. Also, the initial BOP SSCs shall not be necessary for meeting security regulations, fire protection regulations, nor emergency planning/preparedness requirements.

“construction” pursuant to 10 CFR 50(a)(1), it does not require all SSCs needed to mitigate an AOO to be SR. SSC classification is outside the scope of this topical report and will be addressed in a future submittal.

This requirement addresses the contrapositive of Requirement 2.1. Specifically, that the capabilities of BOP SSCs built prior to issuance of a CP will not be credited for mitigating AOOs or postulated accidents nor be credited for meeting the regulations of similar programmatic requirements (e.g., security, emergency planning, etc.). The requirement for defense in depth identified in regulations will also be met by only considering SSCs posed in a construction permit.

Note that, consistent with Limitation/Clarification 7 in Reference 3, some SSCs necessary to comply with the security requirements in Part 73 may be implemented at the BOP facility after its construction. These SSCs (if needed) will not be installed or operated without prior NRC approval. This approach will also apply to SSCs required for compliance with fire protection and emergency preparedness requirements.

2.4. BOP SSCs to be Built Prior to Issuance of a CP Outside of the Definition for Construction Under 10 CFR 50.10(a)(1) Have no Adverse Impacts on the NI

Failure or errant/intentional actuation of a BOP SSC built prior to issuance of a CP shall not impair safety functions of SR SSCs within the NI, nor result in a reactor trip or actuation of a safety-related SSC.

In large LWRs, there are interactions between NSR and SR SSCs that need to be considered when evaluating certain events (e.g., NSR SSCs impact the capability of SR functions). The Blue Energy design will only have select interfaces between the NI and BOP that will need to be assessed in order to ensure BOP SSCs do not adversely impact the ability of the NI to perform its functions. The purpose of this requirement is to simplify interactions between the NI and BOP and therefore require the design to demonstrate that actuation of BOP SSCs built prior to issuance of a CP will not impair the ability of NI, or post construction permit BOP SR SSC, to maintain reactor safety. The NI does not have to be so completely isolated that the BOP cannot cause changes in NI system conditions. However, the NI will be separated from the BOP such that the magnitude of any feedback from the BOP to the NI is bound by other transients, and that safety-related SSCs are not functionally degraded.

Requirements 2.1 and 2.3 impose limitations on the SSCs that can be credited in the deterministic safety analysis of AOOs and postulated accidents. Requirement 2.4 focuses on justifying that operation or failure of non-construction BOP SSCs will not hinder reactor safety.

Note that select regulations (e.g., 10 CFR 50.62, risk reduction for anticipated transients without scram for LWRs) may refer to SSCs that are contained within the BOP (e.g., the main turbine). These select regulations do not rely on nor impact the definition of “activities constituting construction” as described in 10 CFR 50.10(a)(1). Therefore, because the methodology described in Section 4.0 is limited to evaluating the applicability of 10 CFR 50.10(a)(1), these regulations are beyond the scope of the methodology described below. Blue Energy acknowledges that applicable regulations must be met in order to obtain an operating license. However, these regulations do not

need to be met in order to construct the BOP because these regulations are not related to the definition of activities constituting construction.

Verification of this requirement requires demonstration that errant or intentional actuation of a non-construction BOP SSC does not impact the NI's ability to perform required safety functions. This verification will be provided via the NI safety analysis, as part of a future regulatory submission.

3.0 Regulatory Definition of Construction

3.1. Purpose

Based upon a review of the regulatory history of 10 CFR 50.2, 50.10, and of similar changes in Part 73 (Reference 4), it is Blue Energy's perspective that the purpose of the current regulations defining "construction" is to:

- Avoid a situation where construction begins but the NRC subsequently concludes either the site or design does not satisfy regulatory requirements.
- Protection of the environment by assessing the potential environmental effects of building and subsequently operating and decommissioning a nuclear reactor facility.
- Allow the NRC to monitor early activities that are significant to reactor safety, such as adequacy of NI foundations and installation of safety-related SSCs.

3.2. Regulations Pertaining to Construction

The scope of construction is identified in multiple regulations (e.g., 10 CFR 51.4 for all licensees plus 10 CFR 30.4 for byproduct licensees; 10 CFR 50.2 and 10 CFR 50.10 for reactor licensees; 10 CFR 70.4 for special nuclear material licensees). In relation to 10 CFR 50.10, the definition of construction has evolved over time.

The initial issue of 10 CFR 50.10 in 1956 did not contain a restriction on initiating construction (21 FR 355 Jan. 19, 1956, Reference 5). In 25 FR 8712 Sep. 9, 1960 (Reference 6), the Atomic Energy Commission implemented a clarification of work permitted or prohibited with respect to any production or utilization facility prior to the issuance of a construction permit [emphasis added]:

"(b) No person shall begin the construction of a production or utilization facility on a site on which the facility is to be operated until a construction permit has been issued. As used in this paragraph, the term 'construction' shall be deemed to include pouring the foundation for, or the installation of, any portion of the permanent facility on the site; but does not include: (1) Site exploration, site excavation, preparation of the site for construction of the facility and construction of roadways, railroad spurs and transmission lines; (2) Procurement or manufacture of components of the facility; (3) Construction of non-nuclear facilities (such as turbo-generators and turbine buildings) and temporary buildings (such as construction equipment storage sheds) for use in connection

with the construction of the facility; and (4) With respect to production or utilization facilities, other than testing facilities, required to be licensed pursuant to section 104 a. or section 104 c. of the Act, the construction of buildings which will be used for activities other than operation of a facility and which may also be used to house a facility. (For example, the construction of a college laboratory building with space for installation of a training reactor is not affected by this paragraph.)”

Therefore, the initial inclusion of limitations on construction activities explicitly excluded non-nuclear facilities and specifically excluded turbine buildings. These exclusions constitute a major portion of the BOP.

Subsequently, 37 FR 5748 March 21, 1972 (Reference 7), stated that construction activities included those actions “determined by the Commission to have a significant impact on the environment” and reversed the position on turbine buildings, saying [emphasis added]

“Commencement of construction’ is defined to include any clearing of land, excavation or other substantial action that would adversely affect the natural environment of a site and construction of nonnuclear facilities (such as turbogenerators and turbine buildings),...”

This reversal is associated with the National Environmental Policy Act (NEPA), which was signed into law in 1970. As a result, not only are non-nuclear buildings deemed construction but so are many site preparation activities. As the regulator for nuclear facility safety, the AEC (now NRC) was assigned responsibility for evaluating issuing a federal Environmental Impact Statement (EIS), as codified in 10 CFR 51 (Reference 8).

By the early 1980s, new plant construction had mostly ceased, and the definition of construction was not of much significance. In anticipation of new nuclear plant projects in the mid-2000s, the NRC pursued a number of initiatives, one of which was responding to industry requests to allow construction to begin earlier to shorten the time from site preparation to commercial operation.

The LWA rulemaking in 2007 evaluated the NRC’s role under NEPA, and led to a revision of the definition of construction in 10 CFR 50.10 to expressly exclude certain activities and to define what activities required an early site permit (ESP), limited work authorization (LWA), CP, or combined operating license (COL). The NRC determined that its NEPA obligations and responsibilities arise only when the Commission undertakes a Federal action within the agency’s statutory responsibility (72 Fed. Reg. 57416 and 57427 Oct. 9, 2007, Reference 9). Specifically, the NRC noted that NEPA, essentially a procedural statute, does not expand the NRC’s jurisdiction beyond the scope of the Atomic Energy Act (AEA). The NRC further determined that,

“[W]hile NEPA may require the NRC to consider the environmental effects caused by the exercise of its permitting/licensing authority, the statute cannot be the source of the expansion of the NRC’s authority to require . . . other forms of

permission for activities that are not reasonably related to radiological health and safety or protection of the common defense and security. Since NEPA cannot expand the Commission's . . . authority under the AEA, the elimination of the blanket inclusion of site preparation activities in the [then existing] definition of construction does not violate NEPA."

In 2010, the NRC staff issued SECY-10-0018 (Reference 100) with the aim to provide consistency across different parts of the regulations. It was intended to enable applicants for materials licenses to perform non-safety or non-security related site preparation activities not related to radiological health and safety or common defense and security considerations. The SECY provided the following examples: clearing land, site grading and erosion control, and construction of main access roadways, non-security related guardhouses, utilities, parking lots, or administrative buildings not used to process, handle or store classified information.

The line dividing construction from non-construction is generally defined in 10 CFR 50.2:

"Construction or constructing means, for the purposes of § 50.55(e), the analysis, design, manufacture, fabrication, quality assurance, placement, erection, installation, modification, inspection, or testing of a facility or activity which is subject to the regulations in this part and consulting services related to the facility or activity that are safety related."

However, 10 CFR 50.10(a) provides more specific definition of "activities constituting construction":

"Activities constituting construction are the driving of piles, subsurface preparation, placement of backfill, concrete, or permanent retaining walls within an excavation, installation of foundations, or in-place assembly, erection, fabrication, or testing, which are for:

- (i) Safety-related structures, systems, or components (SSCs) of a facility, as defined in 10 CFR 50.2;*
- (ii) SSCs relied upon to mitigate accidents or transients or used in plant emergency operating procedures;*
- (iii) SSCs whose failure could prevent safety-related SSCs from fulfilling their safety-related function;*
- (iv) SSCs whose failure could cause a reactor scram or actuation of a safety-related system;*
- (v) SSCs necessary to comply with 10 CFR part 73;*

(vi) SSCs necessary to comply with 10 CFR 50.48 and criterion 3 of 10 CFR part 50, appendix A; and

(vii) Onsite emergency facilities necessary to comply with either § 50.160 or § 50.47 and appendix E to this part, as applicable.”

These seven criteria ensure that appropriate NRC review and approval occurs prior to beginning construction of key SSCs with a reasonable nexus to reactor safety, security, or emergency preparedness.

As discussed in COL/ESP-ISG-4, “Interim Staff Guidance on the Definition of Construction and on Limited Work Authorizations” [ML082970729], (Reference 11) the scope of SSCs falling within the definition of construction in the LWA rule was derived from the scope of SSCs that are included in the program for monitoring the effectiveness of maintenance at nuclear power plants, as defined in 10 CFR 50.65(b), and supplemented with additional criteria (10 CFR 50.10(a)(1)(v–vii)). However, determining which SSCs fall within these additional criteria (10 CFR 50.10(a)(1)(v–vii)) should not be based on the maintenance rule guidance. Instead, SSCs are considered within the definition of “construction” if they are designed to comply with 10 CFR Part 73, “Physical Protection of Plants and Materials”; 10 CFR 50.48, “Fire Protection”; Criterion 3, “Fire Protection,” of Appendix A, “General Design Criteria for Nuclear Power Plants,” to 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities”; 10 CFR 50.47, “Emergency Plans”; or Appendix E, “Emergency Planning and Preparedness of Production and Utilization Facilities,” to 10 CFR Part 50

COL/ESP-ISG-4 includes examples of SSCs in and out of scope of construction. For example, the category Turbine Building Structure or Foundation is described as [emphasis added]:

“The turbine/generator system is within the scope of construction because failure of the turbine/generator could cause a reactor scram. However, depending on the plant design, it is possible for an applicant to demonstrate that a plausible failure of the turbine building structure or foundation (settling) would not result in a reactor scram or safety system actuation. Depending on the facility design, the turbine building structure or foundation may not fall within the scope of construction, if the reactor scram or safety system actuation criterion is the only reason to consider it.”

For large LWRs such as the PWRs currently operating in the U.S., the turbine building is a large structure adjacent to the reactor building. Because of the potential interactions between structures, specific structural considerations such as Seismic Category 2 over 1 apply to portions of the turbine building. This differs substantially from planned plant designs (such as Blue Energy’s) in which the BOP, which includes the building housing the turbine(s) and other non-radiological systems, will be remote and effectively isolated from directly affecting the NI.

As discussed above, the definition of “construction” in NRC regulations is intended to ensure that activities with a reasonable nexus to reactor safety, security, or emergency preparedness are performed with appropriate review and oversight. Therefore, within the purview of 10 CFR 50.10(a)(1), activities that fall outside the scope of “construction”, are not subject to the NRC’s review and oversight. Thus, these non-nuclear construction activities would be permitted to proceed without NRC approval.

3.3. Exemptions from Regulations

This section identifies NRC requirements for requesting and granting regulatory exemptions.

Subpart A of 10 CFR 51 implements section 102(2) of NEPA, 10 CFR 51.4 includes a definition of construction, and 10 CFR 51.6 allows the Commission to grant exemptions to regulations in Part 51.

Similarly, 10 CFR 50.12 allows granting specific exemptions to Part 50:

“(b) Any person may request an exemption permitting the conduct of activities prior to the issuance of a construction permit prohibited by § 50.10. The Commission may grant such an exemption upon considering and balancing the following factors:

“(1) Whether conduct of the proposed activities will give rise to a significant adverse impact on the environment and the nature and extent of such impact, if any;

“(2) Whether redress of any adverse environment impact from conduct of the proposed activities can reasonably be effected should such redress be necessary;

“(3) Whether conduct of the proposed activities would foreclose subsequent adoption of alternatives; and

“(4) The effect of delay in conducting such activities on the public interest, including the power needs to be used by the proposed facility, the availability of alternative sources, if any, to meet those needs on a timely basis and delay costs to the applicant and to consumers.

“Issuance of such an exemption shall not be deemed to constitute a commitment to issue a construction permit. During the period of any exemption granted pursuant to this paragraph (b), any activities conducted shall be carried out in such a manner as will minimize or reduce their environmental impact.”

Part 52, as identified in § 52.7, describes exemptions as:

“The Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations of this

part. The Commission's consideration will be governed by § 50.12 of this chapter, unless other criteria are provided for in this part, in which case the Commission's consideration will be governed by the criteria in this part. Only if those criteria are not met will the Commission's consideration be governed by § 50.12 of this chapter. The Commission's consideration of requests for exemptions from requirements of the regulations of other parts in this chapter, which are applicable by virtue of this part, shall be governed by the exemption requirements of those parts."

Exemptions are required for deviations from regulations. In the process proposed by this topical report, the NRC would not necessarily be the government agency initially responsible for reviewing compliance with NEPA for the BOP construction. As the BOP construction is disconnected from that of the NI, the activities requiring NRC as the lead federal agency may occur after the BOP construction is authorized by other government entities. Blue Energy believes that this is acceptable, as the BOP (even if completed at the time of NRC's determination under 10 CFR 51) may be remediated, repurposed, or relocated, if the NI is not approved.

4.0 Methodology for Evaluating the Applicability of Construction Definition

This section describes a methodology by which the regulations in 10 CFR 50.10(a)(1) can be evaluated in a manner that determines where additional NRC approval should be sought for installation of BOP SSCs. This methodology is founded on two principles:

- The site on which the NI will be built will have an environmental review performed by the NRC (e.g. via the construction permit process). This satisfies the NEPA provisions for which the NRC is responsible. A redress plan will be provided prior to beginning site work.
- The facility design will meet the requirements defined in Section 2.0. Demonstration of a specific nuclear facility design that meets these requirements will be provided in subsequent licensing submittals such as a topical report, a limited work authorization application, a construction permit application, or a combined license application.

Blue Energy acknowledges that the term "construction" is defined elsewhere in regulations (such as 10 CFR Part 51 and other non-NRC regulations). Blue Energy considers that the methodology outlined in this topical report will satisfy NRC regulatory requirements for both safety and environmental considerations. Construction activities that are subject to non-NRC regulations will comply with the applicable regulations (e.g., state and local). Items that are construction and/or require an exemption under 50.12 would also require an exemption under 51.6 for environmental considerations.

4.1. 10 CFR 50.10(a)(1)(i)

This criterion applies exclusively to safety-related SSCs as defined by 10 CFR 50.2. Per Requirement 2.2, no safety-related SSCs will be included within the boundary of the BOP, prior to seeking and receiving NRC approval.

Therefore, pending demonstration of Requirement 2.2 in a subsequent licensing submittal, there are no SSCs in the BOP to be built prior to issuance of a CP that meet criterion (i).

4.2. 10 CFR 50.10(a)(1)(ii)

This criterion applies exclusively to the SSCs relied upon to mitigate AOOs or postulated accidents or that are used in plant emergency operating procedures. Per Requirement 2.1, the SSCs that are relied upon to mitigate AOOs or postulated accidents (e.g., required to ensure that the dose limits specified in 10 CFR 50.34(a)(1) and 10 CFR 100 are met), including emergency operations of the reactor, will not be included in the BOP to be built prior to issuance of a CP. As per Requirement 2.3, the capabilities of the BOP SSCs will not be credited for mitigating accidents or transients.

Therefore, pending demonstration of Requirements 2.1 and 2.3 in a subsequent licensing submittal, there are no SSCs in the BOP to be built prior to issuance of a CP that meet criterion (ii).

4.3. 10 CFR 50.10(a)(1)(iii)

This criterion applies to any SSCs that could have an interaction with SR SSCs that would prevent the SR SSC from performing its safety function. Per Requirement 2.4, an actuation or failure of a BOP SSC will not impair the NI's response to safely shutdown the reactor and maintain it in a safe shutdown condition.

Therefore, pending demonstration of Requirement 2.4 in a subsequent licensing submittal, there are no SSCs in the BOP to be built prior to issuance of a CP or relevant exemption that meet criterion (iii).

4.4. 10 CFR 50.10(a)(1)(iv)

This criterion addresses SSCs that have a nexus to radiological safety but not explicitly perform a safety function. In traditional LWRs, there is an interface between SSCs that provide safety-related functions and/or asset-protection functions (e.g., NSR SSCs impact the capability of SR functions). For many new SMR technologies, this overlap is much more separated, as the nuclear reactor is designed to be inherently and passively safe, not requiring active functions to safely shutdown. Per Requirement 2.4, failure of a BOP SSC built prior to issuance of a CP will not result in a reactor scram or actuation of a safety-related system.

Therefore, pending demonstration of Requirement 2.4 in a subsequent licensing submittal, there are no SSCs in the BOP built prior to issuance of a CP or relevant exemption that meet criterion (iv).

4.5. 10 CFR 50.10(a)(1)(v)

This criterion applies to SSCs necessary to comply with 10 CFR 73, which delineates the NRC's physical protection requirements. Construction related to these SSCs can be integral to the NI (e.g., reactor housing) or separate (e.g., dedicated physical barriers). Per Requirement 2.3, there will not be any security-related SSCs implemented in the BOP prior to receiving appropriate NRC authority via a permit or license approval.

Therefore, pending demonstration of Requirement 2.3 in a subsequent licensing submittal, there are no SSCs in the BOP built prior to issuance of a CP that meet criterion (v).

4.6. 10 CFR 50.10(a)(1)(vi)

This criterion applies to SSCs necessary to comply with the fire protection requirements defined in 10 CFR 50.48 and General Design Criteria 3 in 10 CFR 50, Appendix A. Per Requirements 2.1 and 2.3, only NI SSCs will be required to ensure safe operation of the nuclear facility, and per Requirement 2.4, inadvertent actuation of BOP SSCs will not adversely impact the ability of NI SSCs to perform their required functions. Note that per Requirement 2.3, there will not be any SSCs required for NI fire protection implemented in the BOP prior to receiving appropriate NRC authority via a permit or license approval. Therefore, impacts from potential fires on the NI will be sufficiently mitigated using exclusively NI SSCs and SSCs implemented in BOP after NRC approval of a permit or license (if any). Similarly, potential fires on the BOP will not prevent or adversely impact the operation of any NI SSCs.

Thus, pending demonstration of Requirements 2.1, 2.3 and 2.4 in a subsequent licensing submittal, there are no SSCs in the BOP built prior to issuance of a CP that meet criterion (vi).

4.7. 10 CFR 50.10(a)(1)(vii)

This criterion applies to onsite emergency facilities necessary to comply with the emergency preparedness requirements defined in 10 CFR 50.160 or 10 CFR 50.47 and 10 CFR 50, Appendix E. Per Requirement 2.3, BOP SSCs will not contribute to meeting emergency preparedness requirements. Also, as noted in Requirement 2.3, there will not be any SSCs required for NI emergency preparedness installed or operated in the BOP without prior NRC approval.

Therefore, pending demonstration of Requirement 2.3 in a subsequent licensing submittal, there are no SSCs in the BOP built prior to issuance of a CP that meet criterion (vii).

4.8. Additional Criterion

Additionally, Blue Energy is choosing to further demonstrate the lack of safety-based reliance on BOP SSCs to be built prior to issuance of a CP in a manner familiar to NRC.

[[
[REDACTED]

[REDACTED]]]^{ab}

There are no SSCs that will be installed in the BOP to be built prior to issuance of a CP that meet these criteria without prior NRC approval, such as an exemption request, limited work authorization, or construction permit.

5.0 Blue Energy Plant Design Features

5.1. Introduction

The purpose of this section is to describe preliminary aspects of the Blue Energy plant design that will facilitate the implementation of this topical report. It may also be used to

[[
[REDACTED]]]^{ab}

5.2. *Regulatory Request*

When the methodology described in this topical report is implemented, the BOP SSCs described in Section 5.8 can be fabricated, installed, and operated, with no additional NRC approval pursuant to 10 CFR 50.10(a)(1). If implementation of this methodology shows that certain BOP SSCs meet 10 CFR 50.10(a)(1)(iv), then Blue Energy will submit an exemption request, or Limited Work Authorization request to allow for fabrication and installation of those SSC(s). Blue Energy requests the NRC review and approve the scope of analysis in Sections 5.6, 5.7, and 5.8 that will support a future submittal that implements the methodology in this topical report. Below is a summary of the proposed order of licensing actions to implement this topical report:

[[

[REDACTED]

]]^{ab}

Accordingly, Blue Energy will not fully implement the methodology described in this topical report as part of this submittal. As noted in several parts of Section 5, Blue Energy will implement this methodology and detail the results of the implementation in a future regulatory submittal.

5.3. *Blue Energy Plant Description*

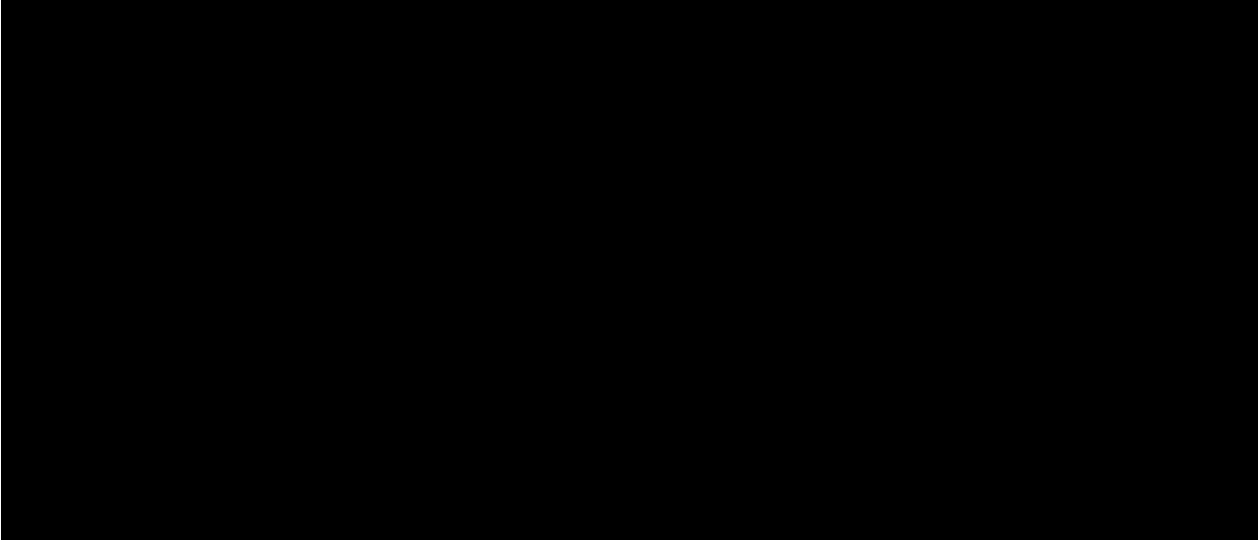
The Blue Energy plant will be [REDACTED]

[REDACTED]

]c.

Figure 1 shows the relative relationship between the NI and BOP. NI SSCs are highlighted in blue, and BOP SSCs are highlighted in orange. Figure 1 is conceptual and is not meant to reflect the exact layout of the plant.

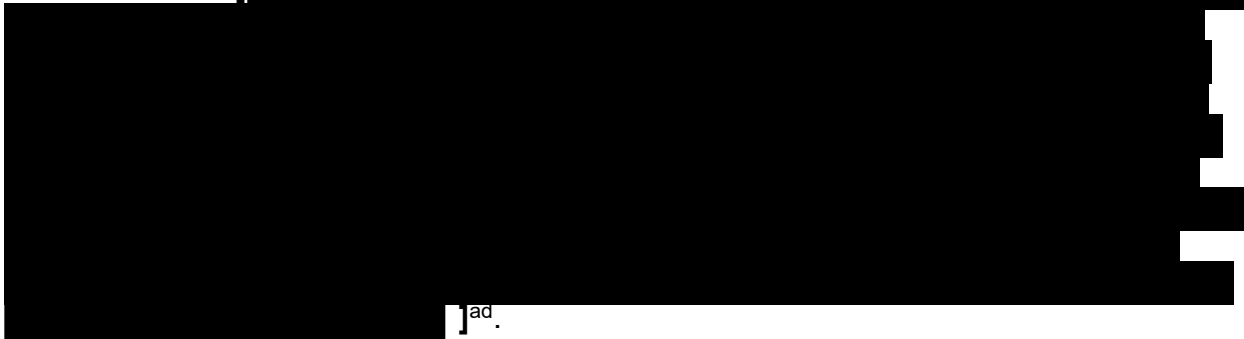
[[



]]de

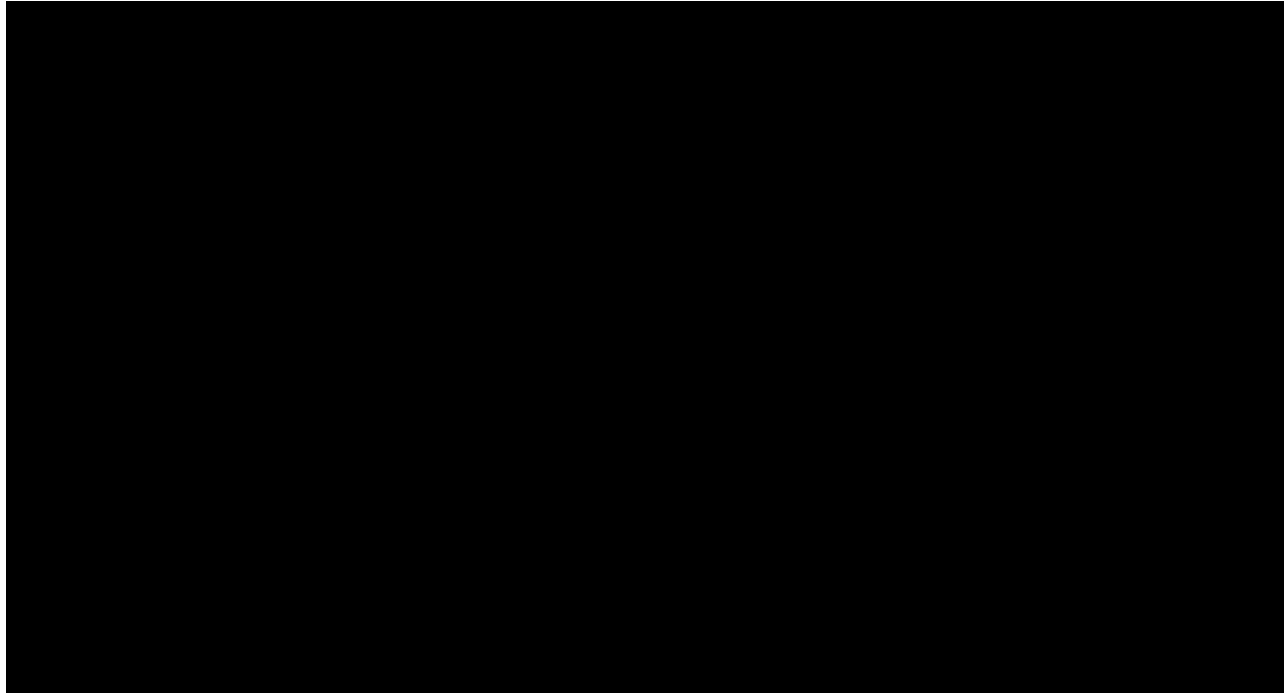
Figure 1 - Top View of NI and BOP SSCs

The IMS will be [[



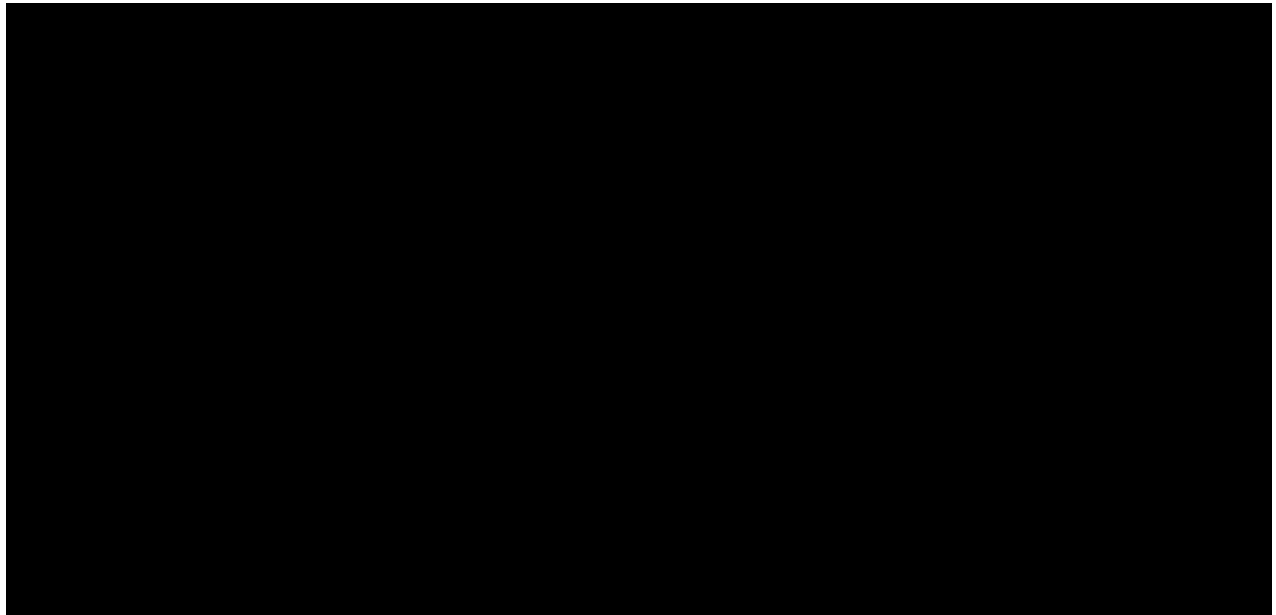
]ad.

[[



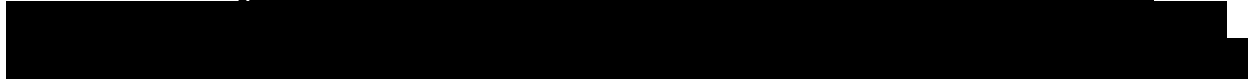
]]^d Figure 2 - Top View of NI, BOP, and Shared SSCs

[[



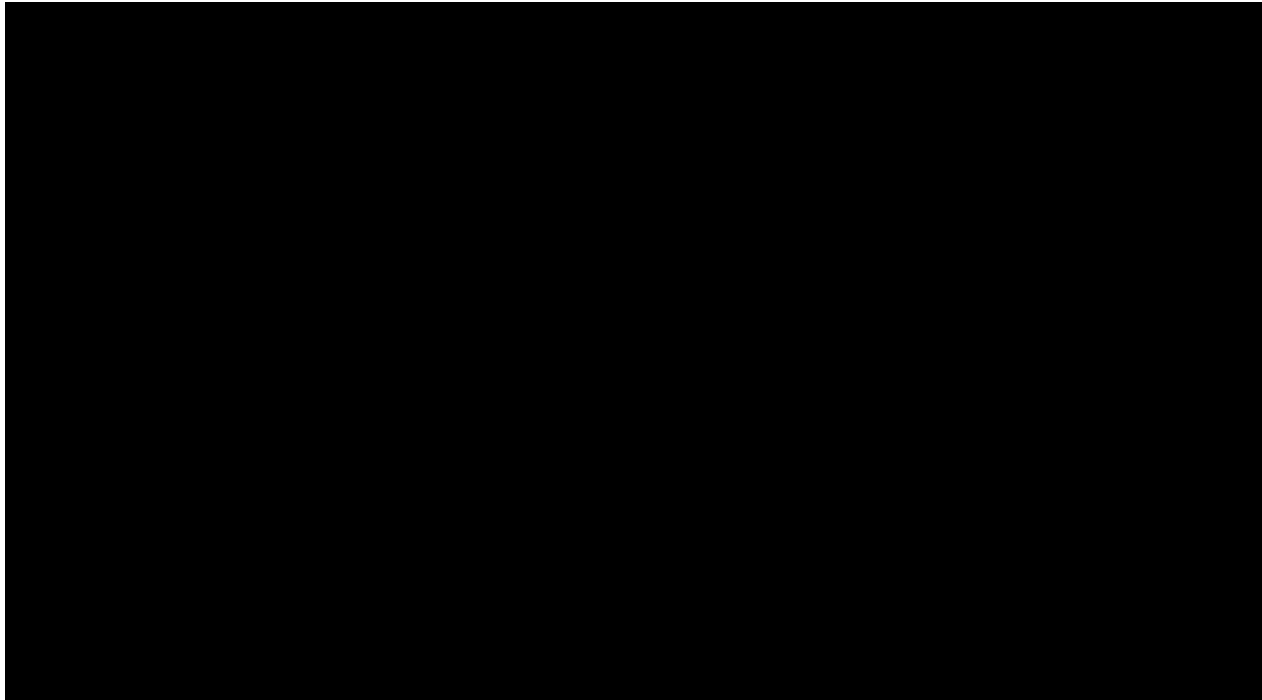
]]^d Figure 3 – Top View of Plant Layout

The IMS will be [[



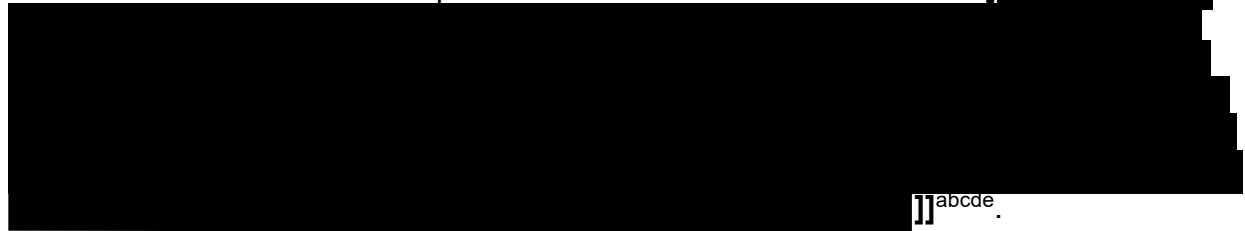
[REDACTED]]]de. The control room is outside the scope of this topical report and will not be constructed as part of the BOP.

[[



]]de Figure 4 - Preliminary IMS Typical Section (Note that dimensions are representative for a single design and are subject to change based on reactor design)

Blue Energy intends to re-sequence the commissioning of the NI and BOP SSCs for several reasons. The primary reason is this will allow Blue Energy to use a combined cycle natural gas plant to generate power with a subset of the BOP SSCs prior to installation of the NI. A subsequent submittal will contain information [REDACTED]



]]abcde.

5.4. NI Design Features

The NI design features described below are used to implement the resequencing methodology to demonstrate that BOP SSCs to be built prior to issuance of a CP do not meet 10 CFR 50.10(a)(1)(i), (ii), (iii). The NI portion of the plant will be [REDACTED]

[REDACTED]

- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]

These characteristics allow for complete functional and physical separation of the NI from the BOP.

5.5. *IMS and Physical Separation*

This section describes how the Blue Energy plant achieves physical separation of the NI and the BOP. The physical separation between the IMS and the BOP SSCs is used to demonstrate that BOP SSCs do not meet 10 CFR 50.10(1)(a)(iii). As shown in Figures 1 and 2, [REDACTED]

[REDACTED]

The IMS is a [REDACTED]

³ [REDACTED]

[REDACTED]]]de.

Blue Energy is also considering a version of the IMS that is a [[REDACTED]]]de.

As part of the methodology in this topical report, Blue Energy will use [[REDACTED]]ade

Future licensing submittals will demonstrate that there is no SR equipment outside of the proposed separation demarcation, no class 1E power will be needed, and that no critical digital equipment will be installed in the BOP without prior NRC approval. Additionally, a future submittal will demonstrate how separation of these systems ensures no adverse interaction between the non-SR and SR portions of the systems.

5.6. NI/BOP Interfaces

NI SSCs, and the BOP, will interface at the separation point shown on Figure 2. The information in this section will be used to demonstrate that 10 CFR 50.10(a)(1)(ii) and (iii) are not met for BOP SSCs. There will also be a portion of the BOP that will be installed prior to the issuance of a CP^a, as shown on Figure 5.

Although the NI and BOP are physically separated, they interface at several points. As shown in Figure 1, these interfaces include the following:

- [[REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

█ [REDACTED]]]^e

The separation boundary and resulting interfaces were chosen to [REDACTED]
[REDACTED]]]^a.

The interfaces between the NI and BOP will be reviewed, and Blue Energy will demonstrate in a future licensing submittal that the BOP, and its interfaces with the NI, are compatible with the SR aspects of the plant design. Blue Energy will demonstrate this compatibility consistent with the methodology described below.

For each of the SSC interfaces described in Section 5.4, Blue Energy will [REDACTED]
[REDACTED]]]^{ae}.

After the [REDACTED]
[REDACTED]]]^{ae}.

Once all required scenarios have been analyzed, results will be [REDACTED]
[REDACTED]]]^{ae}.

All analyses and results of interfacing SSC interactions will be [REDACTED]
[REDACTED]]]^{ae}.

Blue Energy will ensure that [REDACTED]
[REDACTED]

⁴ Because Blue Energy might not yet be a licensee at the time the methodology in this topical report is implemented, [REDACTED].

[REDACTED]]]ae.

Certain interfaces between the NI and BOP [[REDACTED]

[REDACTED]]]abde.

[[REDACTED]

[REDACTED]

[REDACTED]]]abd

5.7. *Transient Demonstration*

Table 1 lists [[REDACTED]

[REDACTED]

]]ae. This section provides information that will be used to demonstrate 10 CFR 50.10(a)(1)(i), (ii), and (iii) are not met for BOP SSCs built prior to issuance of a CP.

[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

]]^{ae}.

The BOP portion of the plant will be designed to include [REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]]]^{de}.

Final design details that demonstrate the Key Design Requirements in Section 2 of this topical report will be provided as part of a future licensing submittal. The analyses and evaluations described above will be documented as part of this methodology, and programs, or procedures, will be implemented to ensure changes BOP SSCs are evaluated to determine if they impact the analyses in Table 1, or associated acceptance criteria.

5.8. BOP SSCs

As part of the Blue Energy deployment approach, Blue Energy will fabricate, install, and operate BOP SSCs prior to construction of the NI. One reason to build certain BOP SSCs prior to the NI is to generate electricity via one or multiple natural gas turbine generators in a combined cycle format. The combined cycle natural gas plant will generate electricity using portions of the BOP. The information in this section demonstrates that when the BOP resequencing methodology is implemented, BOP SSCs will not meet 10 CFR 50.10(a)(1)(iv) or form the basis for an exemption request. The methodology in this section will be used to ensure [REDACTED]

[REDACTED]]].

[[

[REDACTED]

[REDACTED]]]acde

To account for [[[REDACTED]
[REDACTED]
[REDACTED]]]acde.

- [[[REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]]]acde

[[[REDACTED]

⁶ At the time the methodology in this topical report is implemented, Blue Energy might not yet be a licensee. Therefore, Blue Energy [[[REDACTED]]].

⁷ Blue Energy will apply Revision 2, 3, or 4. The applicable Revision will be stated in a future licensing submittal.

[REDACTED]

Blue Energy will implement [REDACTED]

Blue Energy will [REDACTED]

The [REDACTED]

Blue Energy will [REDACTED]

⁸ If a BOP SSC to be built prior to issuance of a CP meets the definition of construction in 10 CFR 50.10(a)(1), Blue Energy may opt to remove the SSC from the scope of resequencing instead of pursuing an exemption request. The SSC will then be described in a future CPA and constructed with prior NRC approval.

[REDACTED]]]ad.

Blue Energy will evaluate BOP SSCs against the [[REDACTED]]]ae.

Table 2, "Regulatory Analysis of BOP SSCs"

[[

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

]]ae

[REDACTED]

]]ae.

[REDACTED]

]ae.

[REDACTED]

]]ae.

[REDACTED]

fire protection requirements defined in 10 CFR 50.48 and General Design Criteria 3 in 10 CFR 50, Appendix A, are not located in the BOP.

4. Prior to the use of this topical report as a basis for non-applicability of 10 CFR 50.10(a)(1)(vii) to the BOP, an applicant referencing this topical report must provide detailed information demonstrating that any SSCs needed to comply with the emergency preparedness requirements defined in 10 CFR 50.160 or 10 CFR 50.47 and 10 CFR 50, Appendix E, are not located in the BOP.

8.0 References

1. “Domestic Licensing of Production and Utilization Facilities”, *Code of Federal Regulations*, 10 CFR 50.
2. “Reactor Site Criteria”, *Code of Federal Regulations*, 10 CFR 100.
3. *TerraPower, LLC – Final Safety Evaluation for Topical Report NATD-LIC_RPRT-0001, “Regulatory Management of Sodium Nuclear Island and Energy Island Design Interfaces,” Revision 0*, September 28, 2023 (ML23257A259).
4. “Physical Protection of Plants and Materials”, *Code of Federal Regulations*, 10 CFR 73.
5. Federal Register, Volume 21, pg. 355, January 19, 1956.
6. Federal Register, Volume 25, pg. 8712 September 9, 1960.
7. Federal Register, Volume 37, pg. 5748 March 21, 1972.
8. “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions”, *Code of Federal Regulations*, 10 CFR 51.
9. Federal Register, Volume 72 pgs. 57416 and 57427, October 9, 2007.
10. *Proposed Rulemaking to Revise the Definition of Construction in 10 CFR Parts 30, 36, 40, 51, 70, and 150 (M081211 – Staff Requirements)*, NRC Commission Paper SECY-10-0018, February 5, 2010.
11. *Interim Staff Guidance on the Definition of Construction and on Limited Work Authorizations*, NRC Interim Staff Guidance COL/ESP-ISG-4, February 9, 2009. [ML082970729]
12. “Licenses, Certifications, and Approvals for Nuclear Power Plants”, *Code of Federal Regulations*, 10 CFR 52.
13. United States Nuclear Regulatory Commission, Regulatory Guide RG 1.70, “Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants,” Revision 3 (ML011340072).
14. Federal Register, Volume 72, pg. 57416 November 08, 2007
15. United States Nuclear Regulatory Commission, NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” various sections.

^aWithheld pursuant to 10 CFR 2.390(a)(4) as information which discloses process, method, or apparatus, including supporting data and analyses, where prevention of its use by Blue Energy competitors without license or contract from Blue Energy constitutes a competitive economic advantage over other companies in the industry.

^b Withheld pursuant to 10 CFR 2.390(a)(4) as information, which if used by a competitor, would reduce his or her expenditure of resources or improve his or her competitive position in design, manufacture, shipment, installation, assurance of quality.

^c Withheld pursuant to 10 CFR 2.390(a)(4) as information which reveals aspects of past, present, or future Blue Energy or customer funded development plans or programs, of potential commercial value to Blue Energy.

^d Withheld pursuant to 10 CFR 2.390(a)(4) as information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

^e Withheld pursuant to 10 CFR 2.390(a)(4) as information obtained through Blue Energy actions which could reveal additional insights into reactor system development, testing, qualification processes, and/or regulatory proceedings, and which are not otherwise readily obtainable by a competitor.

NRC Audit Question A-2.2/4.3-1:

Section 2.2 of Rev. 0 of the TR stated that all SR SSCs would be in the NI and only NSR SSCs would be in the BOP. Rev. 1A of the TR changed design requirement 2.2 to allow the possibility that SR SSCs could later be constructed in the BOP.

10 CFR 50.10(a)(1)(iii) states that the definition of construction is applicable to “SSCs whose failure could prevent safety-related SSCs from fulfilling their safety-related function.”

If SR SSCs are eventually included in the BOP, explain how these SR SSCs could perform their SR function in the event that BOP SSCs like the BOP building structure or foundation were to fail, and how constructing the BOP structures would not fall under the definition of construction in 10 CFR 50.10(a)(1)(iii).

NRC Audit Question A-2.4/4.4-1:

Section 2.2 of Rev. 0 of the TR stated that all SR SSCs would be in the NI and only NSR SSCs would be in the BOP. Rev. 1A of the TR changed design requirement 2.2 to allow the possibility that SR SSCs could later be constructed in the BOP.

10 CFR 50.10(a)(1)(iv) states that the definition of construction is applicable to “SSCs whose failure could cause a reactor scram or actuation of a safety-related system.”

If SR SSCs are eventually included in the BOP, explain how failure of BOP SSCs like the BOP building structure or foundation would not cause a reactor scram or actuation of a safety-related system, and how constructing the BOP structures would not fall under the definition of construction in 10 CFR 50.10(a)(1)(iv).

Blue Energy Response:

Consistent with 10 CFR 50.10(a)(1), the methodology described in the topical report requires Blue Energy to receive prior NRC approval, either via an approved Construction Permit (CP) or exemption pursuant to 10 CFR 50.12, before building BOP SSCs that meet the definition of “construction.” This provides the NRC staff an opportunity to review how Blue Energy implements this methodology, and the justification to build BOP SSCs that may meet the definition of “construction” prior to these SSCs being built. Additionally, Blue Energy will submit a CP Application (CPA) prior to constructing the Nuclear Island (NI) or connecting the NI to the BOP SSCs built prior to issuance of a CP. This will provide the NRC staff an opportunity to review the plant as a whole and determine whether the plant meets applicable regulations and can be operated safely.

The discussion below provides more detail and context for how Blue Energy will implement the methodology described in the topical report to demonstrate BOP SSCs built prior to issuance of a CP either do not meet the definition of “construction,” or that building these SSCs is [REDACTED]

]]^{de}.

The methodology described in the topical report requires Blue Energy to [REDACTED]

]]^{de}.

The changes in Revision 1A to the topical report were made to address the possibility that a very limited number of SR SSCs may need to be installed in the BOP after SSCs are built in the BOP prior to issuance of a CP. Preliminary analysis indicates that these SSCs, if needed, would likely [REDACTED]

]]^{de}.

The methodology described in the topical report (primarily Sections 2 and 4) allows Blue Energy to evaluate SSCs in the BOP to determine whether they meet the definition of “construction” in 10 CFR 50.10(a)(1). Implementation of the approved methodology will determine which SSCs, if any, meet the definition of “construction.” If any SSCs meet one or more criteria in 10 CFR 50.10(a)(1), Blue Energy will either not build this SSC prior to issuance of a CP (i.e. wait until an approved Construction Permit), or it will pursue an exemption pursuant to 10 CFR 50.12 to allow a BOP SSC that meets the definition of “construction” to be built prior to issuance of a Construction Permit.

Section 5 of the methodology describes how Blue Energy plans to use plant design features and programs to either demonstrate BOP SSCs do not meet the definition of “construction,” or to demonstrate that a [REDACTED]

]]^{de}.

Implementation of the methodology and how it demonstrates the [REDACTED]]]^{de} will be described in a future licensing submittal, consistent with the proposed order of future licensing activities in Section 5.2 of the topical report. Blue Energy has added a clarification to the text in Section 5.2 bullet 3 to note that it will [REDACTED]

]]^{de}.

Blue Energy believes that upon successful implementation of this methodology, the BOP foundations and structures would not meet the definition of construction in 10 CFR 50.10(a)(1)(iv) because the failure of foundations, supports, and buildings is inherently considered in the impacts of postulated failures of other SSCs. To demonstrate this, an approach [(

[REDACTED]

In addition to the actions Blue Energy will take as part of this methodology, reactor trips and actuation of safety systems for advanced LWRs are less severe relative to large LWRs currently operating. This is because of the passive response to transients, enhanced safety features, and reduced number of SR components (especially active mechanical components) in advanced LWRs. Topical report Section 5.4 contains

[(

Changes to the topical report:

5.2. *Regulatory Request*

When the methodology described in this topical report is implemented, the BOP SSCs described in Section 5.8 can be [REDACTED]^{abcde} with no additional NRC approval pursuant to 10 CFR 50.10(a)(1). If implementation of this methodology shows that certain BOP SSCs meet 10 CFR 50.10(a)(1)(iv), then Blue Energy will submit an exemption request, or Limited Work Authorization request to allow for fabrication and installation of those SSC(s). Blue Energy requests the NRC review and approve the scope of analysis in Sections 5.6, 5.7, and 5.8 that will support a future submittal that implements the methodology in this topical report. Below is a summary of the proposed order of licensing actions to implement this topical report:

[REDACTED]

[REDACTED]

Accordingly, Blue Energy will not fully implement the methodology described in this topical report as part of this submittal. As noted in several parts of Section 5, Blue Energy will implement this methodology and detail the results of the implementation in a future regulatory submittal.

5.3. *Blue Energy Plant Description*

The Blue Energy plant will be [REDACTED]

[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

]]^{ae}.

The BOP portion of the plant will be designed to include [REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]]]^{de}.

Final design details that demonstrate the Key Design Requirements in Section 2 of this topical report will be provided as part of a future licensing submittal. The analyses and evaluations described above will be documented as part of this methodology, and programs, or procedures, will be implemented to ensure changes BOP SSCs are evaluated to determine if they impact the analyses in Table 1, or associated acceptance criteria.

5.8. BOP SSCs

As part of the Blue Energy deployment approach, Blue Energy will [REDACTED]
[REDACTED]]]. The information in this section

demonstrates that when the BOP resequencing methodology is implemented, BOP SSCs will not meet 10 CFR 50.10(a)(1)(iv) or form the basis for an exemption request. The methodology in this section will be used to ensure [REDACTED]

[REDACTED]]].

BOP SSCs to be built prior to issuance of a CP [(b)(5) - ACP]

- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED] ae.

These SSCs do not include [(b)(5) - ACP]

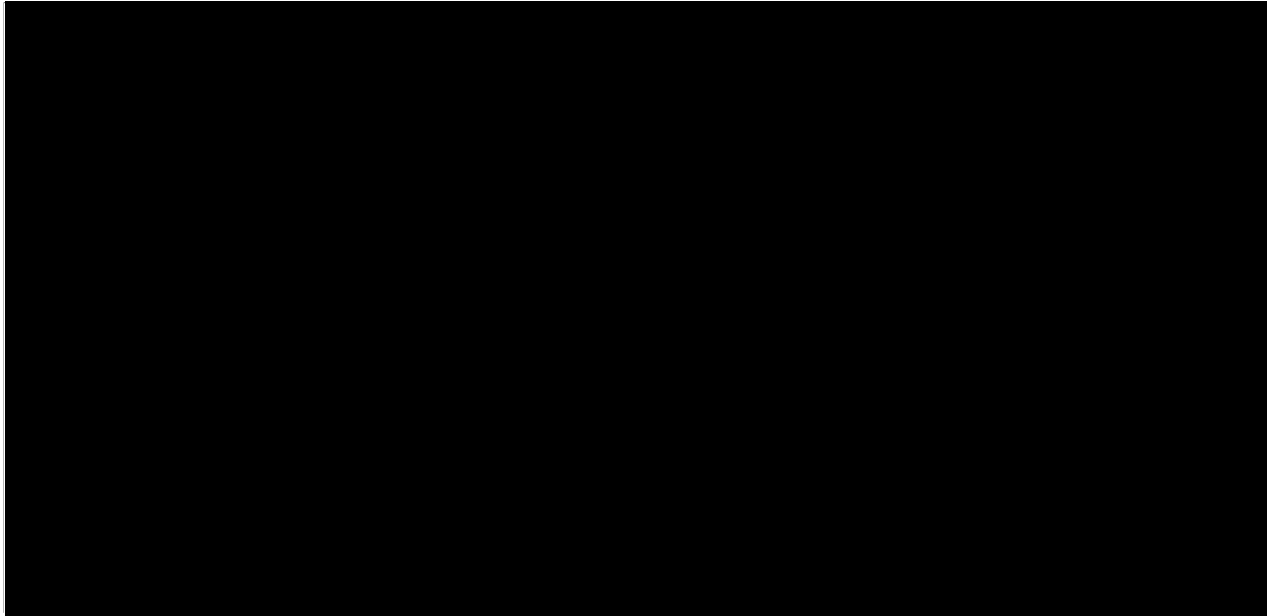
[REDACTED]

[REDACTED] acde.

Figure 6 below shows a process flow diagram with the SSCs needed to [(b)(5) - ACP]

[REDACTED] acde.

[[



acde

To account for [[
acde.

- [[
acde

[[

⁶ At the time the methodology in this topical report is implemented, Blue Energy might not yet be a licensee. Therefore, Blue Energy [[

⁷ Blue Energy will apply Revision 2, 3, or 4. The applicable Revision will be stated in a future licensing submittal.

[REDACTED]

Blue Energy will implement [REDACTED]

Blue Energy will [REDACTED]

The [REDACTED]

Blue Energy will [REDACTED]

⁸ If a BOP SSC to be built prior to issuance of a CP meets the definition of construction in 10 CFR 50.10(a)(1), Blue Energy may opt to remove the SSC from the scope of resequencing instead of pursuing an exemption request. The SSC will then be described in a future CPA and constructed with prior NRC approval.

NRC Audit Question A-2.4/4.3-1:

10 CFR 50.10(a)(1)(iii) states that the definition of construction is applicable to “SSCs whose failure could prevent safety-related SSCs from fulfilling their safety-related function.”

In TR section 4.3 addressing this, the applicant states that "an actuation or failure of a BOP SSC will not impair the NI's response to safely shutdown the reactor and maintain it is a safe shutdown condition." Section 4.3 of the TR suggests that requirement 2.4 addresses this. This section also seems to focus on the ability of NI SSCs to safely shut down the reactor and maintain safe shutdown.

Clarify if there are any other safety-related function of SSCs that could be impacted by non-construction SSCs

Blue Energy Response:

The question was resolved by editing Section 2.4 of the topical report to state BOP SSCs built prior to issuance of a CP shall “...not impair safety functions of SR SSCs within the NI, nor result” This is done to remain consistent with the definition of safety-related in 10 CFR 50.2.

Changes to the topical report:

This requirement addresses the contrapositive of Requirement 2.1. Specifically, that the capabilities of BOP SSCs built prior to issuance of a CP will not be credited for mitigating AOOs or postulated accidents nor be credited for meeting the regulations of similar programmatic requirements (e.g., security, emergency planning, etc.). The requirement for defense in depth identified in regulations will also be met by only considering SSCs posed in a construction permit.

Note that, consistent with Limitation/Clarification 7 in Reference 3, some SSCs necessary to comply with the security requirements in Part 73 may be implemented at the BOP facility after its construction. These SSCs (if needed) will not be installed or operated without prior NRC approval. This approach will also apply to SSCs required for compliance with fire protection and emergency preparedness requirements.

2.4. BOP SSCs to be Built Prior to Issuance of a CP Outside of the Definition for Construction Under 10 CFR 50.10(a)(1) Have no Adverse Impacts on the NI

Failure or errant/intentional actuation of a BOP SSC built prior to issuance of a CP shall not impair safety functions of SR SSCs within the NI, nor result in a reactor trip or actuation of a safety-related SSC.

In large LWRs, there are interactions between NSR and SR SSCs that need to be considered when evaluating certain events (e.g., NSR SSCs impact the capability of SR functions). The Blue Energy design will only have select interfaces between the NI and BOP that will need to be assessed in order to ensure BOP SSCs do not adversely impact the ability of the NI to perform its functions. The purpose of this requirement is to simplify interactions between the NI and BOP and therefore require the design to demonstrate that actuation of BOP SSCs built prior to issuance of a CP will not impair the ability of NI, or post construction permit BOP SR SSC, to maintain reactor safety. The NI does not have to be so completely isolated that the BOP cannot cause changes in NI system conditions. However, the NI will be separated from the BOP such that the magnitude of any feedback from the BOP to the NI is bound by other transients, and that safety-related SSCs are not functionally degraded.

Requirements 2.1 and 2.3 impose limitations on the SSCs that can be credited in the deterministic safety analysis of AOOs and postulated accidents. Requirement 2.4 focuses on justifying that operation or failure of non-construction BOP SSCs will not hinder reactor safety.

Note that select regulations (e.g., 10 CFR 50.62, risk reduction for anticipated transients without scram for LWRs) may refer to SSCs that are contained within the BOP (e.g., the main turbine). These select regulations do not rely on nor impact the definition of “activities constituting construction” as described in 10 CFR 50.10(a)(1). Therefore, because the methodology described in Section 4.0 is limited to evaluating the applicability of 10 CFR 50.10(a)(1), these regulations are beyond the scope of the methodology described below. Blue Energy acknowledges that applicable regulations must be met in order to obtain an operating license. However, these regulations do not