KHNPDCDRAIsPEm Resource

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Sent: Tuesday, July 21, 2015 12:46 PM
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Subject: APR1400 Design Certification Application RAI 92-8068 (03.09.05 - Reactor Pressure Vessel Internals)
Attachments: APR1400 DC RAI 92 MEB 8068.pdf; image001.jpg

KHNP,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, KHNP requests, and we grant, 45 days to respond to the RAI question. We may adjust the schedule accordingly.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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United States Nuclear Regulatory Commission
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REQUEST FOR ADDITIONAL INFORMATION 92-8065

Issue Date: 07/21/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 03.09.05 - Reactor Pressure Vessel Internals
Application Section:

QUESTIONS

03.09.05-1

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed.

A public meeting was held on June 23, 2015, and the applicant provided written material to support the meeting discussion, formally documented in a letter dated July 6, 2015.

The applicant stated that the hold-down ring provides axial force on the flanges of the UGS assembly and the core support barrel assembly in order to prevent movement of the structures under hydraulic forces. The hold-down ring is designed to accommodate the differential thermal expansion between the reactor vessel and the reactor internals in the vessel ledge region. The UGS assembly and core support barrel assembly including the hold-down ring are supported on the reactor vessel ledge. Therefore, the hold-down ring is classified as an internal structure since it is not a major component which provides direct support or restraint of the core within the reactor vessel.

The applicant also stated that loss of preload may occur due to loss of deflection of the hold-down ring as a result of wear on contact surface and stress relaxation during operation. This loss of preload will decrease an axial load on the core support barrel and the UGS flange surface and then induce relative motion between the core support barrel flange and the UGS flange under service and accident loadings. Considering loss of preload, the hold-down ring is designed to have enough preload to prevent relative motion of reactor internal components. The applicant further stated that the function of the hold-down ring is inspected via the Comprehensive Vibration Assessment Program (CVAP).

The staff reviewed this information and found the applicant's explanation to classify the hold-down ring as an internal structure, and the explanation for the potential loss of preload of the hold-down ring, to be insufficient. Specifically, the information the applicant provided regarding the function of the hold-down ring (i.e., it provides axial force on the flanges of the UGS assembly and the core support barrel assembly in order to prevent movement of the structures under hydraulic forces) is the same information already provided in DCD Tier 2, Section 3.9.5.1.2. Simply stating that the hold-down ring is classified as an internal structure because it is not a major component is not sufficient. In addition, as described above, the applicant stated that loss of preload may occur and induce relative motion between the core support barrel flange and the UGS flange under service and accident loadings. However, the applicant further stated that the hold-down ring is designed to have enough preload to prevent relative motion of reactor internals components. The staff found the applicant's explanation regarding loss of preload of the hold-down ring to be contradictory.

Therefore, the applicant is requested to provide a detailed explanation as to why the hold-down ring is classified as an internal structure. In addition, the applicant is requested to further explain the consequences of a loss of preload of the hold-down ring during all normal and accident conditions. The applicant is also requested to provide information for any analyses performed to confirm the functional and structural integrity of the core support barrel assembly and UGS assembly due to a loss of preload of the hold-down ring. A summary of this information should be included in the DCD.

03.09.05-2

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

A public meeting was held on June 23, 2015, and the applicant provided written material to support the meeting discussion, formally documented in a letter dated July 6, 2015.

The applicant indicated that threaded structural fasteners are used in the fuel locating pins, which are attached to the top of the lower support structure beams to provide orientation for the lower ends of the fuel assemblies. The fuel locating pins are secured by tack weld to the lock-bar. The fuel locating pins are designed in accordance with ASME BPV Code, Section III, Subsection NG.

The design of the fuel locating pins, however, is not completely clear. Specifically, the applicant is requested to provide the detailed design of the fuel locating pin, its classification, and its design code for both the fuel pin portion and the threaded structural fastener portion. A summary of this information should be included in the DCD.

03.09.05-3

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

A public meeting was held on June 23, 2015, and the applicant provided written material to support the meeting discussion, formally documented in a letter dated July 6, 2015.

The applicant stated that the plates of the lower support structure consist of a bottom plate and a raised bottom plate. The plates contain flow holes to provide a uniform distribution at the core inlet. Upon entering the inlet nozzles and into the downcomer region, the flow turns upward through the lower support structure plate and through the core. The plates are divided into various flow hole patterns. The patterns are determined by factors such as the ICI locations, the intersection of the support beams with the bottom plate, and the boundary between the raised (peripheral region) and the bottom (central region) portions of the bottom plate. The bottom plate is welded to the lower end of the main support beam, while the raised bottom plate is welded to the main support beam and the lower portions of the lower support structure cylinder. Based on the response provided by the applicant, the staff is unclear to the design of the bottom plate, as well as its function, classification, and design standard. Therefore, the applicant is requested to provide further explanation of the bottom plate for both the raised and bottom portions. The applicant is also requested to provide a drawing of the bottom plate.

03.09.05-4

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

A public meeting was held on June 23, 2015, and the applicant provided written material to support the meeting discussion, formally documented in a letter dated July 6, 2015.

The applicant stated that the lower support structure assembly has four support column assemblies to support the bottom plate and the ICI nozzle support plate. Each support column assembly consists of one column boss and three support columns. The upper part of the support column is welded to the lower support structure bottom plate, and the lower part of the support column is welded to the column boss attached to the ICI nozzle support plate. The applicant also provided a detailed drawing showing the support column assembly.

The applicant is requested to further explain the means by which the column boss is attached to the ICI nozzle support plate, as well as the function, classification and design code used for the design of the support column assembly, including the support columns and column boss. The applicant is also requested to include Figure 6-2 of the written response in DCD Tier 2, Section 3.9.5 such that the DCD depicts the complete design arrangement of the reactor internals.

REQUEST FOR ADDITIONAL INFORMATION 92-8065

03.09.05-5

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

A public meeting was held on June 23, 2015, and the applicant provided written material to support the meeting discussion, formally documented in a letter dated July 6, 2015.

Based on this information, it remains unclear how the core shroud is secured to the lower support structure and the core barrel. Therefore, the applicant is requested to provide this explanation. The applicant is also requested to describe any core bypass flows. A summary of this information should be included in the DCD.

03.09.05-6

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects. 10 CFR 52.47(a)(22) 10 CFR 52.47(a)(22) requires design certification applications to include information regarding how operating experience insights have been incorporated into the design.

A public meeting was held on June 23, 2015, and the applicant provided written material to support the meeting discussion, formally documented in a letter dated July 6, 2015. In addition, from June 29 to July 2, 2015, the staff conducted an audit of the applicant's design specification and summary stress report for reactor internals components (described in the audit plan available using ADAMS Accession No. ML15173A245). Upon further discussion with the applicant during the audit and further review of the applicant's response above, the staff requests additional information related the design of the control element guide tubes, as well as the overall design of the UGS assembly, to support the necessary findings associated with this review section. A summary of the information provided in the response should be added to the DCD.

1. DCD Tier 2, Section 3.9.5.1.2 states that the control element guide tubes bear the upward force on the fuel assembly hold down devices. The staff needs additional information to make a finding regarding the structural integrity of the control element guide tubes in both the normal operating condition and accident conditions, such that insertability of the CEA is not compromised. The applicant is requested to provide a discussion of the following:
    - How the structural integrity of the control element guide tubes is maintained due to the upward force induced from the fuel assemblies through its stated design life of 60 years, including in events such as an SSE.
    - The mechanism to prevent the control element guide tubes from buckling during both normal operating conditions and other postulated conditions such as an SSE.
2. The staff also requests additional information about design provisions that would prevent misalignment from the fuel assembly guide posts and its impact on the control element guide tubes and insert tubes after each refueling outage. According to the letter referenced above, after the core is defueled and refueled, a total of 964 tubes (both the control element guide tubes and insert tubes) need to fit into the fuel assembly guide posts when the UGS assembly is lifted and put back into the reactor vessel, on top of the fuel assemblies. If there is any misalignment, the bottom end of these control element guide tubes or insert tubes could be pitched or crimped without any indication. This not only could potentially damage the fuel assemblies due to excess compressive force exerted on them, but in the case of a fuel assembly with control element guide tubes, this could also prevent the CEA from inserting into the fuel assembly if a control element guide tube is pitched or crimped. Operating experience, documented in PNO-IV-96-016, "Damaged Fuel Assembly Found During Core Defueling," dated March 28, 1996, and its supplements detail an event that took place during an refueling outage on March 24-25, 1996 at Palo Verde Unit 2. A fuel assembly could not be removed and was found to be damaged. Damage was also found to the upper guide structure in the area where the damaged fuel assembly was located. The applicant is requested to provide a discussion of the following:
    - Analyses performed for the control element guide tubes and insert tubes in terms of how the structural integrity can be maintained throughout its design life
    - Design provisions to address any misalignment issue during refueling outages when the UGS assembly is put back into the reactor vessel
    - Design provisions to ensure that a similar incident to the Palo Verde event stated above, or other significant operating experience related to reactor internals, will not occur inthe APR1400 design
    - Inspection results from similar operating plants that address these issues

03.09.05-7

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

A public meeting was held on June 23, 2015, and the applicant provided written material to support the meeting discussion, formally documented in a letter dated July 6, 2015.

More information is needed for the staff to make its finding for the UGS assembly. Based on the information the applicant provided in the letter dated July 10, 2015, the staff is still unclear how the shroud tubes and web plates inside the IBA are attached to the bottom of the UGS plate. It also appears to the staff that, from DCD Tier 2, Figure 3.9-13, the UGS assembly consists of two major barrels: the IBA and UGS barrel. No information is provided in terms of how these two barrels are attached to each other and how they are attached to the UGS support plate, and how the shroud tubes and web plates are connected to the IBA. In addition, the applicant is requested to provide justification on why the IBA is classified as internal structure as indicated in DCD Tier 2, Section 3.9.5.1, rather than as a core support structure. Lastly, DCD Tier 2, Figure 3.9-13 shows an inverted top plate at the top of the UGS assembly. No information is provided in the DCD for this inverted top plate. Therefore, the applicant is requested to provide information for the aforementioned requests and to provide a detailed drawing of how the UGS assembly is assembled. A summary of this information should be included in the DCD.

03.09.05-8

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

DCD Tier 2, Section 3.9.5.1.3 provides a description of the flow skirt. The flow skirt is a right circular cylinder, perforated with flow holes, and reinforced with two stiffening rings. It is supported by nine equally spaced machined sections that are welded to the bottom head of the reactor vessel. The function of the flow skirt is to reduce inequalities in core inlet flow distribution and to prevent formation of large vortices in the lower plenum.

Based on the information provided in the DCD, additional information is needed to understand the design arrangement of the flow skirt. Therefore, the applicant is requested to provide a detailed drawing of the flow skirt and the location and method at which it is attached to the bottom head of the reactor vessel. In addition, the applicant is requested to clarify the classification of the flow skirt and the structural integrity of the flow skirt under all service level conditions. A summary of this information should be included in the DCD.

03.09.05-9

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

No information is provided for the static o-ring seal at the seal table for the In-Core Instrumentation system, which forms the reactor coolant pressure boundary. Therefore, the applicant is requested to provide information for the static o-ring seal, including its classification and design requirement. A summary of this information should be included in the DCD.

03.09.05-10
GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

A public meeting was held on June 23, 2015, and the applicant provided written material to support the meeting discussion, formally documented in a letter dated July 6, 2015.

The applicant stated that the surveillance capsule assembly is not classified as reactor internals, but as part of the reactor vessel since it is attached to the inside wall of the reactor vessel. The applicant also stated that DCD Tier 2, Section 5.3.1.6 "Material Surveillance" provides information on the surveillance capsule assembly.

The staff understands that the surveillance capsule assembly is attached to the reactor vessel, but disagrees that by virtue of its location, that it is not classified as part of the reactor internals components. SRP Section 3.9.5 defines reactor pressure vessel internals as all structural and mechanical elements inside the reactor vessel, but does not specify a component's mounting location. The review scope of SRP Section 3.9.5 is not the functionality of the surveillance capsules, but rather the structural integrity of the surveillance capsule assemblies and the method by which the surveillance capsule assemblies are mounted on the reactor vessel. Specifically, the DCD should demonstrate how the surveillance capsule assemblies are mounted to the reactor vessel walls so that their structural integrity can be maintained throughout its design life, and not become loose parts upon a high flow or severe seismic event. Therefore, the applicant is requested to explain the design requirement and mounting mechanism of the surveillance capsule assemblies. In addition, if there are other components that are mounted either on the reactor vessel wall or on the core support barrel (e.g., a neutron shield), the applicant is requested to provide similar information for such components. A summary of this information should be included in the DCD.

03.09.05-11
GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

DCD Tier 2, Figure 3.9-8 provides an overview of the reactor internals arrangement. A DVI nozzle is shown in the figure, but no description is provided in DCD Tier 2, Section 3.9.5. The applicant is requested to provide information on the impact of the core support barrel due to DVI nozzle injection, specifically, the temperature difference between the injection water and the normal operating coolant temperature, its impact to the core support barrel stresses, and which operating transients listed in DCD Tier 2, Figure 3.9-1 would cause a DVI nozzle injection.

03.09.05-12
GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 1 includes the physical and design arrangements of all reactor internals structures, components, assemblies, and systems, including the positioning and securing of such items within the RPV, the provision for axial and lateral retention and support of the internals assemblies and components, and the accommodation of dimensional changes due to thermal and other effects.

DCD Tier 2, Figure 3.9-8 provides an overview of the reactor internals arrangement. A core stop is shown in the figure, but no description is provided in DCD Tier 2, Section 3.9.5. The applicant is requested to provide information for the core stop, its design and intended function, its quantity and location, and the means by which the core stop is attached. In addition, the applicant is

requested to identify under what accident conditions or operating transients is the core stop expected to function. A summary of this information should be included in the DCD.

03.09.05-13

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 2 includes the basis for the design of the reactor internals, loading conditions of normal operation, anticipated operational occurrences, potential adverse flow effects of flow-excited vibrations and acoustic resonances, postulated accidents, and seismic events.

The applicant is requested to provide information regarding any method different from DCD Tier 2, Section 3.9.3 that are used to determine the loads listed in DCD Tier 2, Section 3.9.5.2 for reactor internals components under design loading and Service Levels A, B, C, and D loading conditions. A summary of this information should be included in the DCD.

03.09.05-14

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 2 includes the basis for the design of the reactor internals, loading conditions of normal operation, anticipated operational occurrences, potential adverse flow effects of flow-excited vibrations and acoustic resonances, postulated accidents, and seismic events.

Based on the information provided in DCD Tier 2, Section 3.9.5.2.3 for Level B service loading, it is unclear to the staff whether the loss of external load with turbine control system failure is an upset event of emergency event. According to DCD Tier 2, Table 3.9-1, loss of external load is upset event 2; however, Section 3.9.5.2.3 states that the loss of external load is an emergency event. Therefore, the applicant is requested to clarify this discrepancy. A summary of this information should be included in the DCD.

03.09.05-15

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 2 includes the basis for the design of the reactor internals, loading conditions of normal operation, anticipated operational occurrences, potential adverse flow effects of flow-excited vibrations and acoustic resonances, postulated accidents, and seismic events.

DCD Tier 2, Section 3.9.5.2.4, is inconsistent with DCD Tier 2, Table 3.9-1, which states that there are no events classified as a Service Level C condition. DCD Tier 2, Section 3.9.1.1.2, item (r) addresses the failure of small lines outside containment, and DCD Tier 2, Table 3.9-1 includes Upset Event-6 that includes this item. These events appear to be similar to the DBPB load but are categorized as a Service Level B event. Therefore, the applicant is requested to address the apparent inconsistency in the DCD between Tier 2, Section 3.9.1 and Tier 2, Sections 3.9.4 and 3.9.5, which both describe DBPB loads. A summary of this information should be included in the DCD.

03.09.05-16

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 2 includes

the basis for the design of the reactor internals, loading conditions of normal operation, anticipated operational occurrences, potential adverse flow effects of flow-excited vibrations and acoustic resonances, postulated accidents, and seismic events.

The staff reviewed the service loads described in DCD Tier 2, Section 3.9.5 in comparison to the transients presented in DCD Tier 2, Table 3.9-1 and found several apparent discrepancies in the description and categorization of these events. For example, based on the information provided in DCD Tier 2, Table 3.9-1, a main steam pipe break and a main feedwater pipe break are included in faulted events 1 and 2. It is, however, unclear to the staff whether the other faulted events listed in DCD Tier 2, Table 3.9-1 are included in the Service Level D loads for reactor internals. Therefore, the applicant is requested to clarify this discrepancy and describe and justify any differences between Table 3.9-1 and the loads applied to the reactor internals for all service levels. A summary of this information should be included in the DCD.

03.09.05-17

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 2 includes the basis for the design of the reactor internals, loading conditions of normal operation, anticipated operational occurrences, potential adverse flow effects of flow-excited vibrations and acoustic resonances, postulated accidents, and seismic events.

DCD Tier 2, Section 3.9.5.3 states that the reactor internals are designed to meet interface cold gaps between reactor internals and the reactor vessel and between the main parts of the reactor internals. The applicant is requested to provide information on the design of the reactor internals to accommodate a hot gap at their operating temperature and pressure. A summary of this information should be included in the DCD.

03.09.05-18

GDC 1 and 10 CFR 50.55a require that SSCs important to safety be designed to quality standards commensurate with the importance of the safety functions performed.

DCD Tier 2, Table 3.2.1 (page 56 of 86) lists the core support structures as safety Class-3, Quality Group C, seismic Category I with full compliance of 10 CFR 50 Appendix B quality assurance requirement. Note N-2 states that only those core support structures necessary to support and restrain the core and to maintain safe shutdown capability are classified as seismic Category I.

It is unclear to the staff that whether note N-2 from DCD Tier 2 Table 3.2-1 encompasses all core support structures, and if there are any core support structures that are not within the scope of note N-2, that is, that are not classified as seismic Category I. In addition, DCD Tier 2, Table 3.9-12 and Table 3.2.1 do not provide any safety class, quality group, seismic category classification, or quality assurance requirement for reactor internal structures other than core support structures. Therefore, the applicant is requested to provide information for these issues. A summary of this information should be included in the DCD.

03.09.05-19

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 2 includes the basis for the design of the reactor internals, loading conditions of normal operation, anticipated operational occurrences, potential adverse flow effects of flow-excited vibrations and acoustic resonances, postulated accidents, and seismic events.

DCD Tier 2, Section 3.9.5.3 states that to properly perform their functions, the reactor internals are designed to meet the following deformation limits:

1. Under Level A, Level B and Level C service loadings, the core is held in place, and deflections are limited so that the CEAs can be inserted under their own weight as the only driving force.

2. Under Level D service loadings that require CEA insertability, deflections are limited so that the core is held in place, adequate core cooling is preserved, and all CEAs can be inserted. Those deflections that would influence CEA movement are limited to less than 80 percent of the deflections required to prevent CEA insertion.

The applicant establishes allowable deformation limits as 80 percent of the loss-of-function deflection limits. The applicant is requested to explain and justify why the use of 80 percent as the loss-of-function deflection limit is acceptable. The applicant is also requested to provide references for this justification. In addition, the applicant is requested to clarify to which reactor internals components this deflection limit is applicable. A summary of this information should be included in the DCD.

03.09.05-20

GDC 1 and 10 CFR 50.55a require that SSCs important to safety be designed to quality standards commensurate with the importance of the safety functions performed.

DCD Tier 2, Section 3.9.5.3 states that in the design of critical reactor internals that are subject to fatigue, stress analysis is performed using the design fatigue curve of Figure I-9.2 of ASME BPV Code, Section III. It is unclear which components are considered “critical” reactor internals and are subjected to fatigue analysis. Therefore, the applicant is requested to clarify in the DCD which reactor internals components are analyzed for fatigue.


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