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BGE

September 30, 1998

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Independent Spent Fuel Storage Installation; Docket No. 72-8 (50-317/318)
Annual Report of Changes, Tests, and Experiments --10 CFR 72.48

The attached report is submitted in accordance with 10 CFR 72.48(b)(2). This report was due on September 20, 1998. It is being submitted late because of a problem with the computer system where the data is stored. This delay was discussed with the NRC Independent Spent Fuel Storage Project Manager and the Resident Inspector at Calvert Cliffs.

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

James R Lemons
for
C. H. Cruse
Vice President - Nuclear Energy

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NF06

CHC/EMT/bjd

050016

Attachment

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ATTACHMENT (1)

Calvert Cliffs Independent Spent Fuel Storage Installation

Annual Report of Changes, Tests, and Experiments

[10 CFR 72.48(b)(2)]

Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
September 30, 1998

SE00005

This activity allowed the use of aluminum coated carbon steel as an alternative material for the spacer disks and support rods to reduce fabrication costs. The alternative material was evaluated by Pacific Nuclear Fuel Services in 1991 via vendor calculation no. BGE001.0216 (Carbon Steel DSC Basket Assembly) and concluded that it was structurally acceptable, and that the previous DSC structural vendor calculation no. BGE001.0203 (DSC Structural Analysis) was still valid. The calculation evaluated the DSC for allowable stresses, ductility, and corrosion resistance. The strength of carbon steel for structural support of the stored spent fuel exceeds that of the stainless steel. The DSC basket assembly is constructed to ASME Boiler & Pressure Vessel Code, Division 1, Section NF (Component Supports). The original DSC's use stainless steel components (ASME SA-240, type 304). The newer DSC's have carbon steel support rods (ASME SA-696, Gr. B) and carbon steel spacer disks (ASME SA-516, Gr. 70).

SE00006

This activity justified the use of demineralized water in the Dry Shielded Canister (DSC)-Transfer Cask (TC) annulus. Use of demineralized water in the annulus prevents contamination of the DSC outer surface by the spent fuel pool water. The NRC SER states in Section 1.5.5 that the DSC-TC annulus is filled with borated water rather than demineralized water. However, Table 1-2, states in part that the water in the TC-DSC annulus is demineralized. The use of demineralized water is consistent with the manufacturer design as detailed in the NUHOMS-24P Topical Report, Section 5.1, Operation Description, which describes filling of the DSC-TC annulus with clean, demineralized water. The annulus between the DSC and cask is filled with demineralized water and sealed with an inflatable seal to prevent contamination of the DSC outer surface by the spent fuel pool water. Dry shielded canister loading procedures require that the annulus between the transfer cask and DSC be filled with demineralized water and sealed prior to immersion in the spent fuel pool. This Safety Evaluation clarifies an existing condition and does not change the original design or operation of the DSC-TC annulus. This clarification has no detrimental impact on equipment important to safety.

SE00007

This Safety Evaluation clarifies an existing condition and does not change the original design or operation of the DSC. The NRC SER states in Section 1.5.5 to weld the DSC shield plug and then helium leak test the seal welds. However, BGE performs the following steps as detailed in the ISFSI USAR: 1) Seal weld top shield plug to DSC; 2) Perform NDE on seal weld; 3) Drain remaining water from DSC; 4) Vacuum dry DSC; 5) Backfill DSC with helium; 6) Perform helium leak test. Dye penetrant testing is performed upon completion of the seal weld. The reasoning behind this is to ensure the weld is in compliance with the BGE Weld Program, as it provides the primary closure for the DSC. In addition, the helium leak test would not be performed without the DSC vacuum dried. This order of operations is consistent with the manufacturer design as detailed in the NUHOMS-24P Topical Report, Section 5.1, Operation Description, which describes the performance of dye penetrant weld examination of the seal weld just after the weld is created. This clarification has no detrimental impact on equipment important to safety.

SE00009

This Safety Evaluation clarifies an existing condition and does not change the original design or operation of the DSC. The NRC SER states that the water in the DSC/cask annular gap will be drained when the water inside the DSC is drained following completion of the top shield primary seal weld, and that subsequent DSC closure operations will be performed with the DSC cavity and the annular gap dry. The shielding calculations were performed assuming that water would be present in the annular gap when the DSC is flooded, and that the annular gap would be drained when the DSC is drained. The ISFSI USAR provides in Section 5.1.1 a narrative that describes operations unique to the Nutech Horizontal Modular Storage (NUHOMS) systems, such as draining, drying and closure of the dry shielded canister (DSC), in some detail but it is not intended to be limiting or restrictive. Operational procedures may be revised according to the requirements of the plant, provided that the limiting conditions of operation are not exceeded. The justification is that over time, procedures will be revised to incorporate more efficient and/or safer work practices. BGE has written and revised technical procedure ISFSI-01, Independent Spent Fuel Storage Installation (ISFSI) Loading. The procedure requires that demineralized water remain in the annulus through the last closure operation for ALARA purposes. This approach is conservative, in that shielding is provided for as long as possible. This clarification has no detrimental impact on equipment important to safety.

SE00010
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) guide sleeve corner weld. The subject guide sleeve corner weld design change meets the weld design requirements as established by Pacific Nuclear Fuel Services (PNFS). This change does not affect any design or licensing requirements. The original weld on the drawing was a full length (100%) fillet weld. The revised weld is an intermittent weld which provides approximately 30% of the length of the original weld. However, because the fuel loads are transmitted directly to the spacer discs, the weld stresses are negligible, and the full length weld was not necessary. Intermittent welding is a common practice for components not subjected to direct loading. The weld symbol on the drawing indicates that the 4" continuous weld is required at both ends. This is to ensure that the free ends are not unwelded. In addition, Note 12 on the drawing (84-002-E) states that the welds shall be ground flush outside and shall not protrude inside the guide sleeve. This is required to protect the fuel assemblies from protruding weld material. Based on this information, the subject design change will not affect the form, fit or function of the DSC guide sleeve, is not detrimental to the structural integrity of the guide sleeve, will not obstruct insertion of the fuel assemblies into the guide sleeves and will not adversely affect the ability of the DSC to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00011
This safety evaluation addresses a tolerance design change to the DSC (Dry Shielded Canister) guide sleeve. The subject change in tolerances meets the current design requirement as established by Pacific Nuclear Fuel Services (PNFS). These dimensions are not critical for proper DSC operation. This change has no effect on DSC design. The design change relaxed the tolerances for the lengths of the guide sleeve and flare from ± 0.06" to ± 0.12". The drawing (84-002-E) indicates that the tolerances are applied at the top end for the flare and overall length, and both are +/- 0.12". Since the spacer disc detail shows that the guide sleeves are separated by 1.50", the flare tolerance is acceptable. For the length, the possible additional 0.06" is negligible, and is therefore acceptable. The subject tolerance change will not affect the form, fit or function of the guide sleeve, and will not adversely affect the ability of the DSC to perform its intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00012
This safety evaluation addresses a design change to the surface finish requirements of the DSC (Dry Shielded Canister) spacer disc interior cut-outs. The subject design change allowed the interior finish of the spacer disc cut-outs to be relaxed to 500 micro-inches to provide the fabricator a wider choice of cutting methods. The DSC spacer disc cut-out interior surface finish design change meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). The cut-out finish only needs to be adequate to allow the guide sleeves to be installed in the basket. The drawing (84-002-E) indicates that the outside dimension of a guide sleeve is (8.70" +/- 0.03") + 2(0.105" +/- 0.005") = maximum 8.95". The spacer disc cut-out 9.10" +/- 0.015", thus it has a minimum opening of 9.085". This leaves a gap of (0.135 / 2) = 0.0675" on each side of the guide sleeve (less the finish coat) when centered during insertion. The 500 micro-inch finish, which equals (500)(1/1,000,000) = 0.0005", is insignificant compared to 0.0675". The drawing symbol indicates that this is the minimum finish required. Even if a finish of, say 10 mils is applied, that is still only 0.01" thick". Therefore, the change to the 500 micro-inch surface finish is adequate to allow the guide sleeves to be installed in the basket. This change therefore does not affect the operation or design of the DSC. The subject change in surface finish will not affect the form, fit or function of the spacer disc, will not adversely affect the ability of the DSC to perform it's intended design function, and has no detrimental impact on equipment important to safety.

SE00014
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) grapple ring. The subject activity changed the grapple ring material classification from ASTM A-240 Type 304 to ASME SA-240 Type 304 (see drawing 84-003-E). The subject change meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). The grapple ring material classification was upgraded for consistency with the grapple ring code classification. This change does not adversely affect the design, since the material did not change, only the classification of the material. Although the grapple ring material did not change, the designation was upgraded to ASME from ASTM. The ASME material has the same properties as the ASTM, but, in addition, material documentation (chemical/physical characteristics) would be provided. The subject material designation

change does not affect the form, fit or function of the grapple ring, and will not adversely affect the ability to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00015
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) grapple ring. The subject design change deleted the grinding requirement from the inside surface of the grapple ring to facilitate fabrication (grinding of the surface is difficult) and is not required (a weld crown on the inside surface does not affect the operation of the grapple or DSC). The subject deletion of grapple ring inside surface grinding requirements meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). The subject design change will not affect the form, fit or function of the grapple ring , and will not adversely affect the ability of the DSC to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00016
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) top and bottom shield plug plate thickness tolerances. The subject design change broadened the thickness tolerances of the top and bottom shield plug plates to provide maximum / minimum calculated thicknesses (see drawing 84-003-E). The subject change in tolerances meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). The material thickness in the shield plugs were re-dimensioned to clarify the minimum and maximum acceptable thicknesses of each material. The thicknesses shown represent the bounding analyzed configurations of the DSC. The thickness requirements were computed during the DSC structural analysis. The DSC end plugs provide confinement and radiation shielding. The bottom end plug sandwiches lead between an outer plate and an inner plate of Type 304 stainless steel. The top plug is formed by two covers, separately welded to the DSC stainless steel shell. The inner cover and outer cover are manufactured from Type 304 stainless steel with lead placed between these cover plates. The increase in DSC weight due to the increase in the shield plug thickness is negligible as compared to the weight of the entire DSC. The subject tolerance change will not affect the form, fit or function of the top and bottom shield plugs, and will not adversely affect the ability of the DSC to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00017
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) lead shielding inspection requirement. The subject design change deleted the requirement that the lead casting have full surface contact with the shield plug plates to facilitate the fabrication and pouring of the lead plugs (see drawing 84-003-E). The subject design change meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). Full surface contact between the lead casting and the shield plug plates is neither necessary nor detectable, since any gap between the lead and the shell would not form a streaming path due to the geometry of the DSC. The gamma scan required by the fabrication specification ensures that full shielding thickness is obtained. This change therefore does not affect the design or operation of the DSC.

SE00018
This safety evaluation addresses a design change to the inside surface of the DSC (Dry Shielded Canister) shell for the top cover bevel weld preparation. The subject design change added a bevel of 0.75" x 22.5° to the inside surface of the DSC shell for the top cover weld preparation to facilitate DSC shell fabrication (see 84-003-E). The top end of the DSC shell has a tendency to bow inward during the placement of the shield plug weldment. This change prevents the movement of the shell from interfering with the installation of the top cover plate. The subject change in weld prep configuration meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS), and does not affect the in-use configuration of the DSC. The revising of the DSC shell inside surface weld prep configuration for installation of the top cover plate does not reduce the joint weld throat thickness and does not have a detrimental affect on the weld configuration strength. The subject change does not compromise design integrity, will not affect the form, fit or function of the DSC shell configuration, and will not adversely affect the DSC's ability to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00019
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) top cover plate weld preparation and top cover to shell weldment. The top cover weld preparation was reduced from 45 degrees to 30 degrees, and the top cover plate to shell weldment was changed from a 5/8" J weld to a 5/8" V weld (see drawings 84-006-E and 84-009-E). The reason for this design change was to prevent burning through the plate during fabrication. The revised weld symbol, but unchanged plate details, give an identical weld throat to that of the original design. The subject change in weld configuration meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). This change has no effect on the DSC structural calculations. The subject design change does not affect the DSC shell to top cover plate weld NDE (Non-destructive examination) requirements, does not reduce the weld throat thickness, and does not have a detrimental effect on the weld strength. The subject change does not compromise design integrity, will not affect the form, fit or function of the top cover plate to DSC shell configuration, and will not adversely affect the DSC's ability to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00020
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) siphon tube. The subject change meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). The siphon tube was previously dimensioned to be 0.12" below the face of the bottom cover. It is now dimensioned to be 0.19" +/- 0.06" (see drawing 84-004-E), which gives it the range of 0.13" to 0.25" above the bottom of the (bottom cover plate) cut out, which is 0.25" deep. The subject change in siphon tube dimensioning was made to better control the position of the siphon tube in order to reduce the likelihood of the tube becoming clogged during water removal. The siphon tube is used with the Vacuum Drying System to pump water from the canister to the spent fuel pool. The cut-out is designed to capture what little excess water will remain at the bottom of the canister that could not physically be removed. The fact that the siphon tube will be no higher than the top of the cut-out makes this change acceptable. This change does not affect the DSC design or operation, and will not have a detrimental impact on the water removal ability of the siphon tube, in fact, the water removal ability is enhanced. The subject change does not compromise design integrity, will not affect the form, fit or function of the siphon tube or DSC shell configuration, and will not adversely affect the DSC's ability to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00021
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) drain and fill block weldment to the DSC shell. The subject design change deleted the weld between the bottom of the drain/fill block and the DSC shell. The weld was a 5/16" fillet weld, as originally found on DWG DUK-03-1003 of the NUHOMS TR (Topical Report). The subject design change meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). The function of the weld is served by the fillets on the side and the groove weld on top of the drain & fill block (see 84-004-E). This is structurally acceptable as there will be over 37 inches of weld for the drain & fill block. This change does not affect the DSC design or operation, does not compromise design integrity, will not affect the form, fit or function of the drain and fill block to DSC shell joint, and will not adversely affect the DSC's ability to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00022
This safety evaluation addresses a design change to the length of the DSC (Dry Shielded Canister). The subject design change increased the DSC design length from 172.87" to 172.93" (see drawing 84-006-E). The subject change meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). This change was made to better control this critical interface dimension. The DSC will fit inside the transfer cask under worst case thermal conditions, and as such, this design change has a negligible effect on the interface between the DSC and the transfer cask. The additions of 0.06" of material is negligible from a structural standpoint. The subject change does not compromise design integrity, will not affect the form, fit or function of the DSC, and will not adversely affect the DSC's ability to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00023
This design change permitted the use of a single bent plate to fabricate the keyway in the DSC top shield plug in lieu of five plates joined by four double v-groove welds surrounding the drain & fill block. The reason for this design change was to provide the fabricator the option to bend one piece of material as compared to welding five plates together. The subject change meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). The use of a single plate to form the shield plug keyway in place of several joined plated does not affect the DSC design or operation. The subject design change, providing the option to form the DSC shield plug keyway from one piece of material, will not adversely affect the form, fit or function of the DSC or the assembly interface between the top shield plug and drain & fill block. Additionally this design change will not have a detrimental impact on the DSC's ability to perform it's intended design function.

SE00024
This design change realigned the DSC top cover lifting holes to the same locations as those in the top shield plug to reduce streaming through the lifting holes. The function of the top cover plate lifting holes is to assist with the lifting, positioning, and placement of the 1-1/4" thick top cover plate on the DSC. The lifting holes for both the top shield plug assembly and the top cover plate are right above the support rod locations. There was no change to the diameter, thread pitch, or hole depth. The subject design change meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). This change does not affect the DSC interface with any other item, including the welding machine. In addition, this change does not affect the DSC design or operation. This design change has no detrimental impact on the DSC structure, and does not cause an interference with any other component (including the transfer cask). The subject change does not compromise design integrity, will not affect the form, fit or function of the DSC top cover plate, and will not adversely affect the DSC's ability to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00025
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) side casing to top casing plate joint configuration. The subject change meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). The bar is 1/2" x 1/2" ASTM A479 or ASTM A240 Type 304 and is non-safety related (see drawing 84-006-E). The reason for this change was to prevent the lead plug from "wicking" into the side casing plate to casing plate weld pool during fabrication. The joint between the side casing plate and the top casing plate is made after lead has been poured into the shield plug. Lead has a tendency to wick through the joint and into the weld pool during welding. A backing bar has been added in accordance with NB-4435 to reduce the likelihood of this occurrence (see drawing 84-007-E). The addition of the backing bar does not affect the structural calculations. The presence of the backing bar (and the corresponding lack of lead) will slightly increase dose rates during installation of the shield plug. This slight increase will have a negligible effect on occupational doses, which will be offset by the increased ease of placing the shield plug to shell weldment. The shorter time required to install the plug should offset the higher dose rate. Therefore, based on the above information, the subject change does not compromise design integrity, will not affect the form, fit or function of the DSC side casing plate to top casing plate joint configuration, and will not adversely affect the DSC's ability to perform it's intended design function. This design change has no detrimental impact on equipment important to safety.

SE00026
This safety evaluation addresses a design change to the DSC (Dry Shielded Canister) top shield plug casing plate thickness tolerances. The subject design change allowed the thickness of the top shield plug top casing plate to vary between 0.24" and 0.52" to allow the fabricator flexibility in machining the top shield plug casing plate (see drawing 84-007-E). The previously allowed range was 0.24" to 0.30". The subject change in tolerances meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). The design change made to provide the fabricator with additional flexibility to achieve a flat surface. The fabricator can start with a 1/2" thick plate and does not have to machine it if it meets the flatness tolerance. The minimum allowable thickness is unchanged. The maximum DSC length is controlled separately, so the additional allowed thickness will not affect the cask / DSC interface. The increase in DSC weight due to the potential increase in top shield plug casing plate thickness is extremely negligible compared to the weight of the DSC. The subject tolerance change will not affect the form, fit or function of the top shield plug casing plate, and will not adversely affect the ability of the DSC to

perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00027
This safety evaluation addresses weld upgrades to the DSC (Dry Shielded Canister). The following changes were made to the DSC, which are shown on drawing 84-007-E:

1) A test port was added to the shield plug to demonstrate leak tightness of the shield plug welds. The test port is welded out and vacuum box tested after the shield plug pressure testing is completed.
2) A 5/16" backing fillet was added to the weld between the side casing and top pressure plates.
3) The welds joining the keyway plates were upgraded from 1/4" groove welds to full penetration welds.
4) Added PT requirements to the welds between the casing plate and the lifting lug posts and center post.

The welds were upgraded to allow the shield plug to be pressure tested through the test port to demonstrate leak tightness of the shield plug. The side casing and keyway weldments were upgraded to reduce the likelihood of leakage during final weld-out of the plug. The test port weld is a 3/8" groove weld. Under normal and accident DSC internal pressures, this weld resists the pressure load on the 2.0" diameter lug. The shear stress induced in the weld is minor (less than 1 ksi). The resistance strength of the 3/8" single vee groove weld is 21 ksi, which far exceeds the expected stress in the weld. During the drop accident, this weld resists the 75g acceleration of the 2.0" diameter by 1/2" thick plug. Therefore, the addition of the test port will not adversely affect the integrity of the DSC. The addition of the test port does not affect the fit, form, or function of the DSC. The changes described above are considered upgrades to the DSC design and do not adversely affect the DSC. During the DSC fabrication process final inspection, leakage was observed through a breakdown in the top shield plug welds. The side casing and keyway weldments were upgraded to reduce the likelihood of leakage during the final weld-out of the plug. These changes will improve the integrity of the DSC and will not affect any other ISFSI SSC.

SE00028
This safety evaluation addresses a non conformance with the DSC (Dry Shielded Canister) guide sleeves identified during DSC fabrication. This non conformance applies only to DSC BGE24P-R001. The subject non conformance (Ranor, Inc. NCR No. 9500-3) identifies the DSC guide sleeves having oversize inside dimensions. The allowable dimension is 8.70" +/- 0.03" (see drawing 84-002-E). The maximum recorded deviation is 0.025" over the high tolerance limit. The oversize dimension has no effect on the design as long as the guide sleeves fit in the basket assembly. The fuel assemblies are located in the basket assembly by the spacer disc cutouts and the guide sleeve thickness. Neither of these items are out of tolerance. It must be noted that this non conformance applies only to DSC BGE24P-R001, which was loaded and stored in the HSM in 1996. The minimum possible gap between the inside of the spacer disc cutout and the outside of the guide sleeve is 0.0675" less the finish thickness. This non conformance reduces the possible gap to {0.0675" - (0.025" / 2)} = 0.0675" - 0.0125 = 0.0550". This still leaves enough of a gap for the required minimum 500 micro-inch finish. The subject non conformance meets the current design requirements as established by Pacific Nuclear Fuel Services (PNFS). Based on the above information and a review of the design drawings, the subject non conformance will not affect the form, fit or function of the DSC, is not detrimental to the structural integrity of the DSC, and will not adversely affect the ability of the DSC to perform it's intended design function. There is no detrimental operational impact associated with this activity. Additionally, the subject justification will not create any component assembly interference, including the guide sleeve and spacer disc interface. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00030
This safety evaluation addresses a non conformance with the DSC (Dry Shielded Canister) bottom interior seal weld identified during DSC fabrication. This non conformance applies only to DSC Nos. BGE24P-R001, BGE24P-R002, and BGE24P-R003. The subject non conformance (Ranor, Inc. NCR No. 9500-6) identifies that the interior 1/4" seal weld at the bottom end of the DSC was not made with at least two passes and at least two levels of PT inspection (see drawing 84-003-E). The subject closure weld was made with a single pass and a single liquid penetrant (PT) inspection was performed on the weld. The PT inspection showed the weld to be satisfactory. It must be noted that this non conformance applies only to DSC Nos. BGE24P-R001, BGE24P-R002, and BGE24P-R003. All other DSC's meet the existing requirement for the weld. The safety function of the DSC is to provide a

physical containment barrier to prevent the release of radioactive materials from spent fuel which is stored inside. The double closure welds at each end of the canisters form a part of this physical containment barrier. The structural quality of the double closure seal weld is not affected by the number of passes. The multiple liquid penetrant inspection, which reduces the probability of coincidental pinhole flaws, is compensated by the requirement to leak test the weld. Leak testing the closure weld provides positive assurance of leak tightness. There is no reduction in the structural support or quality of the DSC. The subject non conformance meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Based on the above information and a review of the design drawings, the subject non conformance is not detrimental to the structural integrity of the DSC and will not adversely affect the ability of the DSC to perform it's intended design function. Leak testing of the closure weld assures leak tightness of the DSC and compensates for the liquid penetrant inspection. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00033

This safety evaluation addresses design changes to the TC (Transfer Cask) upper and lower trunnion sleeves. The subject activity changed the material for the trunnion sleeves to SA 182 F304N (see drawing 84-021-E). They were 533 Gr B Cl2 or 508 Cl 3A (upper) and 516 Gr 70 or 508 Cl 3A (lower). The outer diameter of the upper trunnion sleeves (see drawing 84-023-E) was changed to 17.0" from 15.15". The subject changes meet the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). The trunnion changes were analyzed in revision 4 of calculation BGE001.0202. The revised trunnion analysis shows that stresses due to the design basis loads remain below allowables. A review of calculation BGE001.0202, Transfer Cask Structural Analysis, revealed that the upper and lower trunnions (with the new material SA 182, F304N) were analyzed for seven load conditions (three handling and four transportation). The total design weight of the transfer cask and DSC is 200k, versus an estimated absolute worst case actual weight of 188.5k. Trunnion stresses were limited to Fy/6 or Fu/10. In addition, all handling cases were increased by 15% for motion loads. This is required per CMAA #70. The revised trunnion design is therefore acceptable from a structural standpoint, and has no operational or radiological impact. Based on this information, the subject design changes will not affect the form, fit or function of the TC trunnions, are not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. These design changes do not affect the lifting or positioning of the transfer cask. Therefore, these design changes have no detrimental impact on equipment important to safety.

SE00034

This safety evaluation addresses a design change to the TC (Transfer Cask) upper trunnion structural shell. The subject activity involved the replacement of the 2" thick trunnion insert plates with the 2" thick upper shell section (see drawing 84-023-E). The 2" thick portion of the structural shell is equal to, or larger than, the insert plate that it replaces. The penetration stresses calculated in BGE001.0202 are therefore conservative for the 2" thick upper shell and no additional calculations are required. The revised design has no significant radiological or operational impact. A review of calculation BGE001.0202, Transfer Cask Structural Analysis, revealed that the use of a thicker shell in lieu of insert plates will indeed result in a more conservative design. Based on this information, the subject design change will not affect the form, fit or function of the TC upper trunnions, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. The increase in weight of the TC caused by the increased shell thickness is insignificant compared to the weight of the entire TC. This small weight increase would not be detrimental during the lifting or positioning of the TC. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00035

This safety evaluation addresses a design change to the TC (Transfer Cask) upper trunnion sleeve. The subject activity deleted the inconel butter layer from the end of the upper trunnion sleeves, and also changed the weldment between the upper trunnion sleeve and the trunnion from a 7/8" "J" weld with a 3/8" fillet to a 1-1/4" "J" weld with a 3/8" fillet (see drawing 84-018-E). The butter layer was no longer needed since the upper trunnion sleeve was changed to stainless steel. The weld size was increased to add strength to the upper trunnion to trunnion sleeve joint. The subject change meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Inconel butter requirements are not needed for corrosion protection because the trunnion sleeve was changed to stainless steel. The redesigned weld detail is analyzed in calculation BGE001.0202. A review of calculation BGE001.0202, Transfer Cask Structural Analysis, revealed that all actual weld stresses were below the allowables. The welding filler material used was ERNICR-3 or AWS ENICRFE-3. The critical lift analysis yielded the highest actual to allowable stresses in both potential failure planes of 0.88 and 0.66, respectively, where 1.00 is the point that the actuals equal the allowables. The revised design is therefore acceptable from a structural standpoint. The revised design has no operational or radiological impact. Based on this information, the subject design change, deleting of the stainless butter layer and increasing the subject weld size, will not affect the form, fit or function of the TC trunnions, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. This design change does not affect the lifting or positioning of the transfer cask. There is no detrimental operational impact associated with this design change. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00036
This safety evaluation addresses design changes to the TC (Transfer Cask) lower trunnion sleeve. The subject activity deleted the stainless butter layer from the end of the lower trunnion sleeve, and increased the height of the sleeve from 4.25" to 4.5" (see drawing 84-024-E). Since the lower trunnion sleeve was changed to stainless steel, the subject butter layer was no longer needed. The butter layer was used to provide corrosion protection for the carbon steel trunnion sleeve. The height of the lower trunnion sleeve was changed to compensate for the increased thickness of the structural shell upper section. The structural shell upper section thickness was increased by 1/2" to 2", and centerline increase is therefore (1/2") / (2) = 1/4". The subject changes meet the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Revision 4 of calculation BGE001.0202 shows that the stress intensities in the redesigned trunnion are below allowables for each of the design basis loadings. In addition, a review of calculation BGE001.0202, Transfer Cask Structural Analysis, revealed that all actual weld stresses were below the allowables. The revised trunnion design is therefore acceptable from a structural standpoint, and has no operational or radiological impact. Based on this information, the subject design changes will not affect the form, fit or function of the TC trunnions, are not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. These design changes do not affect the lifting or positioning of the transfer cask. Therefore, these design changes have no detrimental impact on equipment important to safety.

SE00037
This safety evaluation addresses a design change to the TC (Transfer Cask) surface finish requirements. The subject activity improved the cask surface finish requirements on all exposed surfaces to 63 micro-inches rms (see drawing 84-021-E). The sole reason for this design change was to improve the TC surface finish to facilitate cask decontamination. This change does not change the structural adequacy of the cask. The subject change meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Based on this information, the subject design change will not affect the form, fit or function of the TC structural shell, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. This design change does not affect the lifting or positioning of the transfer cask. There is no detrimental operational impact associated with this design change. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00038
This safety evaluation addresses design changes to the TC (Transfer Cask) bottom cover plate. The subject activity moved the bottom cover bolt circle out and the seal installation groove in to allow the bottom cover seal to be placed inside the bolt circle (see drawings 84-027-E and 84-030-E). The bolt circle on the temporary shield plug was changed accordingly. The reason for these changes was to reduce the likelihood of leakage through the cask bottom cover. The subject changes meet the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). These changes do not change the structural adequacy of the cask. The bottom cover plate assembly is to be used for transfer cask operations within the Auxiliary Building. The temporary shield plug is to be installed for all cask operations outside of the Auxiliary Building during which spent fuel is present. The design changes are therefore acceptable from a structural standpoint, and have no operational or radiological impact. Based on this information, the subject design changes will not affect the form, fit or function of the TC bottom cover plate, are not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the

TC to perform it's intended design function. These design changes do not affect the lifting or positioning of the transfer cask. Therefore, these design changes have no detrimental impact on equipment important to safety.

SE00039
This safety evaluation addresses a design change to the TC (Transfer Cask) upper trunnion covers. The subject activity removed the tapped holes for the upper trunnion covers and added a weld between the trunnion and cover (see drawing 84-029-E). The reason for this design change was to eliminate the trapping of crud between the cover plate and trunnion, thus easing cask decontamination. The method of attachment for the upper trunnion covers was changed from bolting to welding (5/16" all-around fillet weld). The gap between the cover and the trunnion was thus removed, easing the decontamination of the cask. The weld material provides equivalent strength to the bolts that were replaced. This change therefore, has no negative impact on the structural adequacy of the cask. The subject change meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Based on this information, the subject design change will not affect the form, fit or function of the TC upper trunnions, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. This design change does not affect the lifting or positioning of the transfer cask. There is no detrimental operational impact associated with this design change. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00040
This safety evaluation addresses a design change to the TC (Transfer Cask) top flange. The subject activity added threads to the relief holes in the TC top flange to allow them to be plugged when the cask is immersed in the fuel pool (see drawing 84-022-E). This helps ease the decontamination of the top cover bolt holes before installation of the cover. Water relief holes are tapped 3/8"-16 UNC-2B x .50" deep, and are provided at each pin and bolt hole, drilled horizontally to meet bottom of the vertical holes. Based on this information, the subject design change will not affect the form, fit or function of the TC top flange or the flange to top cover plate joint interface, is not detrimental to the structural integrity of the TC and will not adversely affect the ability of the TC to perform it's intended design function. This design change enhanced TC design, in that, it reduces the potential for the relief holes to become contaminated. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00041
This safety evaluation addresses a design change to the TC (Transfer Cask) structural shell weld process. The subject activity allowed the use of automatic submerged arc weld process for weldments between structural shell and forgings, with proper protection of the heat affected zone. The other allowed welding methods were gas tungsten arc and gas metal arc. The reason for this change is to facilitate fabrication of the TC shell. Welds made by the submerged-arc process are found to have uniformly high quality, good ductility, high density, high impact strength, and good corrosion resistance. Mechanical properties of the weld are consistently as good as the base metal. The subject change meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Based on this information, the subject design change will not affect the form, fit or function of the TC structural shell, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. This design change does not affect the design properties of the cask or the weld joints. There is no detrimental operational impact associated with this design change. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00042
This safety evaluation addresses a design change to the TC (Transfer Cask) top flange location pin hole. The subject activity changed the length of the location pin hole at the 185 degree azimuth from 1.75" to 2.75" (see drawing 84-022-E). This depth is now consistent with the depth of the location pin hole at the 5 degree azimuth. The reason for this change is to assure adequate depth of the location pin, and to maintain consistency with the depth of the other location pin hole, since the hole at 5 degree azimuth was already designed for 2.75" with a water relief hole at the end of the pin hole. This change does not change the structural adequacy of the cask. The subject change meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Based on this information, the subject design change will not affect the form, fit or function of the TC top flange, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's

intended design function. This design change does not affect the lifting or positioning of the transfer cask. There is no detrimental operational impact associated with this design change. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00043
This safety evaluation addresses a design change to the TC (Transfer Cask) lead shielding inspection requirement. The subject design change deleted the requirement that the lead casting have full surface contact with the structural shell to facilitate fabrication and pouring of the TC lead shielding. The subject change meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Full surface contact between the lead casting and the cask shell is neither necessary nor detectable, since any gap between the lead and the shell would not form a streaming path due to the geometry of the cask. The gamma scan required by the fabrication specification ensures that full shielding thickness is obtained. This change therefore does not affect the design or operation of the cask, and does not impact any safety or licensing criteria. Based on the above information, the subject design change will not have a detrimental impact on the integrity or shielding capability of the TC. The subject design change will not affect the form, fit or function of the lead shielding and will not adversely affect the ability of the TC to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00044
This safety evaluation addresses a design change to the TC (Transfer Cask) upper neutron shield panel support ring. The subject activity loosened the tolerance on the placement of the upper neutron shield panel support ring from +/- 0.06" to +/- 0.12" (see drawings 84-018-E and 84-025-E). The purpose of the old tolerance was to prevent an interference of the weld between the supporting ring and the structural shell with the access port cover. This purpose is now achieved by adding a note to the weldment requiring the weld to be a 5/16" seal weld only where adjacent to access hole cover. The subject change meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). Based on this information, the subject design change will not affect the form, fit or function of the TC shell, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC/upper neutron shield panel support ring from performing their intended design functions. There is no detrimental operational impact associated with this design change. Additionally, the revised tolerance dimensions will not create any component assembly interference. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00045
This safety evaluation addresses a design change to the TC (Transfer Cask) top cover plate. The subject activity changed the material for the TC top cover plate from carbon steel ASTM A516 Gr 70 with stainless steel ASTM A240 Type 304 to reduce the probability of corrosion of the top cover plate and improve the overall operability of the cask (see drawing 84-027-E). The structural impact of the change is negligible and justified in calculation BGE001.0202 revision 4. The change in material results in a negligible effect on the dead weight (0.286 vs. 0.283 lbs./cu.ft.). For the static analysis performed, the reduction in Modulus of Elasticity E (26.5E6 vs. 27.7 E6) and the increased coefficient of thermal expansion (9.80 E-6 vs. 7.60 E-6) resulted in a reduction of the calculated stresses. Based on this information, the subject design change will not affect the form, fit or function of the TC top cover plate, is not detrimental to the structural integrity of the TC or the top plate joint interface, and will not adversely affect the ability of the TC to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00046
This safety evaluation addresses a design change to the TC (Transfer Cask). The subject activity added mounting holes to provide locations for mounting the cask alignment targets (see drawings 84-027-E and 84-029-E). The structural integrity of the cask is not affected. Based on this information, this activity will not affect the form, fit or function of the TC, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. There is no detrimental operational impact associated with this design change. Additionally, this design change will not create any component assembly interference. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00047
This safety evaluation addresses a design change to the TC (Transfer Cask) surface finish requirements for the top cover plate welds. The subject activity clarified the surface finish requirements of the TC top cover welds for fabrication purposes. Essentially, all exposed external cask, interior cavity, and top and bottom cover plate assembly surfaces shall be finished to 63 (micro) inch RMS or better (see drawing 84-028-E). Plate surfaces which will not be exposed to pool water shall have an ASTM A480 No. 1 or 250 (micro) inch RMS finish. Top cover plate assembly welds are not exposed to the spent fuel pool and need not meet surface finish requirements. These welds shall be ground to permit NDE as required. The subject clarification of the TC top cover plate weld surface finish meets the original design requirements as established by Pacific Nuclear Fuel Services (PNFS). These welds are not exposed to the pool and therefore need only be ground as required for NDE. This change does not affect the cask design basis. Based on this information, the subject surface finish requirement clarification will not affect the form, fit or function of the TC or the TC top cover plate, is not detrimental to the structural integrity of the TC and will not adversely affect the ability of the TC to perform it's intended design function. There is no detrimental operational impact associated with this design change. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00048
This safety evaluation addresses a design change to the TC (Transfer Cask) shield plug plate material. The subject activity allowed the use of ASTM A36 or A516 Gr 70 in place of ASTM A283 Grade C plate in the shield plug assembly to provide flexibility in shield plug fabrication (see drawing 84-030-E). The alternate materials are acceptable since they have equal or better allowable stresses, and since the assembly plates are essentially unstressed in this application. This is an acceptable practice to use materials of comparable properties. All three are carbon steels. A36 is a primary structural steel (Fy = 36 ksi), A516 is a pressure vessel steel (Fy = 38 ksi), and A283 is a low tensile strength carbon steel (Fy = 30 ksi). The temporary shield plug assembly is non-safety related. Based on this information, changing the subject temporary shield plug assembly material will not affect the form, fit or function of the TC temporary shield plug, is not detrimental to the structural integrity of the TC or the shield plug, and will not adversely affect the ability of the TC to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00049
This safety evaluation addresses a design change to the TC (Transfer Cask) shield plug. The subject activity relaxed the tolerance requirements on the width of the shield plug assembly inner plug (was +/- .03", now +/- .06"), inner plug support bracket (was 5.00" +/- .03" now "to be free sliding"), and inner diameter of outer plug (was +/- .06", now +/- .12") (see drawing 84-030-E). The reason for this design change was to provide flexibility in shield plug fabrication. The new tolerances are consistent with the functional requirements of the components. The prime consideration is that the components fit together without binding. The shield plug assembly is non-safety related. Based on this information, changing the subject temporary shield plug tolerances will not affect the form, fit or function of the TC temporary shield plug, is not detrimental to the structural integrity of the TC or the shield plug, and will not adversely affect the ability of the TC to perform it's intended design function. Additionally, the revised clearance dimensions will not create any component assembly interference. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00050
This safety evaluation addresses a non conformance with the TC (Transfer Cask) shell identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 108826) identifies the TC structural shell as-built plate average thickness to be 1.459" at one of thirty-four measured areas. The minimum allowable thickness of 1.490" was not met. Calculation BGE001.0202, revision 4, shows that the maximum calculated stress versus allowable for the transfer cask structural shell occurs for the Level A Cases 1 through 5 load combinations. The corresponding maximum calculated stress is 55.8 ksi with an allowable of 56.1 ksi. The SA 240 Type 304 plate material for the structural shell has a yield strength of 42.5 ksi and a tensile strength of 89.0 ksi at room temperature, as determined by a CMTR (Certified Material Test Report). This compares with the ASME code minimum values for yield strength of 30 ksi and a tensile strength of 75 ksi used for design.

The Code allowable stress intensity for the plate materials is proportional to the material strength properties. Conservatively assuming that the increased stress in the reduced plate section is resisted entirely by bending, and that the bending stress is inversely proportional to the square of the plate thickness, the minimum acceptable material thickness is determined as follows:

$\{(tmin) / (1.50)\}^2 = \{S_{design} / S_{actual}\}$

$t_{min\text{-}} >/= 1.50 \{30.0 / 42.5\}^{1/2}$

$t_{min} >/= 1.26$ inches

Substituting based on tensile strength:

$t_{min} >/= 1.50\{75 / 89\}^{1/2}$

$t_{min} >/= 1.38$ inches

Since the actual thickness of the structural shell exceeds the minimum required thickness, the structural shell is acceptable as is. The reduced shell thickness has a negligible affect on the thermal and shielding calculations. A review of the calculation showed that the design was based on a shell thickness of 1.50", not the minimum required 1.490". However, there are several cases throughout the calculations that the expected loads were conservatively increased (a common practice in design). For example, the total design weight of the transfer cask and DSC is 200k, versus an estimated absolute worst case actual weight of 188.5k. In addition, the transfer cask analytical models were developed and analyzed using a carbon steel SA 516 Gr. 70 shell. The fabricator elected to use a stainless steel SA 240 Type 304 shell. This resulted in lower calculated stresses. Also, the minimum average value of 1.459" was only found in one of thirty-four measured areas. All other areas measured at least 1.472". Based on the above information, the subject non conformance will not affect the form, fit or function of the TC shell, is not detrimental to the structural integrity of the TC and will not adversely affect the ability of the TC to perform it's intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00051

This safety evaluation addresses a non conformance with the TC (Transfer Cask) shell identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 108831) identifies the TC lead cavity exceeding the maximum allowable thickness. The maximum measured thickness is 4.138" while the maximum allowable is 4.12". A slight increase in the transfer cask weight will result from the increased lead cavity thickness. Calculation BGE001.0202, Revision 4, is based on a total weight of 200 kips. The actual weight of the transfer cask plus the DSC (dry) is 180 kips. The 20 kip weight margin is more than adequate to accommodate the increased lead thickness. Also, the average lead cavity thickness is within the nominal design thickness. The transfer cask is therefore structurally adequate. The thickness increase has a negligible effect on the transfer cask thermal calculations and a positive effect on the shielding calculations. The estimated absolute worst case actual weight is 188.5k, which occurs during the critical vertical handling condition at the spent fuel pool. The 180k referenced above occurs with the cask loaded with the DSC and fuel assemblies during transfer. Still, the design is more than adequate even with the increased lead cavity thickness. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC shell, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00052

This safety evaluation addresses a non conformance with the TC (Transfer Cask) top flange identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 108834) identifies the maximum bore dimension of the TC cask top flange as 69.654" while the maximum allowable is 69.58". The oversize condition evidently resulted from shrinkage of the flange to shell weldment which caused an axisymmetric rotation of the flange about its centerline. The flange became slightly conical with an included angle of about 1 degree, so that it is slightly bell mouthed. The slight increase in maximum flange diameter will not affect the ability of the annulus seal to perform its function, and has no impact on any other cask design condition. The bore dimension is shown to be 69.55 +/- 0.03". Thus, the variance is only 0.074". Since the flange ring is 5.48" wide, this variance will not affect the annulus seal. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC shell or the top flange, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC annulus seal to perform its intended design function. Additionally, the subject justification will not create any component assembly interference. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00053
This safety evaluation addresses a non conformance with the TC (Transfer Cask) shell identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 109612) occurred during the preheat of the cask prior to the lead pour in which the area around the trunnions exceeded the maximum temperature of 725°F to a temperature of 880°F for approximately one hour. The shell material that experienced the temperature excursion is ASME SA Grade 304 with an actual carbon content of 0.058%. Per the Committee of Stainless Steel Producers of AISI, a time of 10 hours at a temperature of 500°C. (932°F) would be needed to form harmful amounts of chromium carbides. Since the actual temperature excursion was approximately one hour at 880°F, the time at temperature was insufficient to sensitize the material. The maximum temperature was observed about four inches from the trunnions. The actual ramp-up from 750°F to 880°F was quite rapid, about 15 minutes in duration, with an exposure of 30 minutes over 800°F and a total exposure of 1 hour and 50 minutes over 725 degrees F. It is not known what temperature was reached directly at the trunnion. It is known that the trunnion saw direct flame impingement during the 880°F temperature and that the high temperatures were only in the area of the trunnion. It is therefore likely that the trunnion was exposed to an even greater temperature. A sample was removed from the trunnion and tested for sensitization. The test confirmed that a condition of sensitization does not exist on the surface of the trunnion sleeve exposed to the elevated temperature. The material is therefore acceptable for use. The cask design is not otherwise affected by the temperature excursion. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC shell or the trunnions, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00054
This safety evaluation addresses a non conformance with the TC (Transfer Cask) lead identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 109705) states that the measured silver content in the cask lead was less than 0.001%. ASTM B29, Chemical Grade requires silver content between 0.002% and 0.02%. The minimum reported lead content of 99.93% is greater than the 99.90% required by the specification. The shielding properties of the lead are not affected by the absence of trace silver. This deviation is therefore acceptable and has no impact on the cask design. ASTM B29 is the standard specification for pig lead, which is refined lead in pig form. Pig is defined in the specification as an oblong or square mass of metal that has been cast while still molten into a mold that gives the metal its particular shape. Based on the above information and review of design drawings, the subject non-conformance will not affect the form, fit or function of the TC, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform it's intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00055
This safety evaluation addresses a non conformance with the TC (Transfer Cask) shell identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 109731) identifies the temperature on the cask shell O.D. exceeding the maximum allowable of 725°F at several times during the lead pour operations. The maximum temperatures and durations are:

Location	°F	Duration (hrs)
1	750	5.00
2	760	5.00
3	765	5.00
4	760	1.17
5	740	1.17
6	730	1.25
7	733	1.50
8	730	1.00
9	730	1.00
10	730	1.00

11	730	1.00
12	730	1.92
13	740	3.75
14	780	1.75
15	750	5.00
16	740	1.08
17	735	1.75
18	740	1.00
19	730	1.00

The shell material that experienced the temperature excursion is ASME SA240, GR 304 with an actual carbon content of 0.058% on the lower shell and 0.039% on the upper shell. The times for which the cask temperatures exceeded the limits set by the procedure were insufficient to sensitize the material. Per the Committee of Stainless Steel Producers of AISI, for a worst case of 800°F for sixteen hours, with the given carbon content, there is no condition of sensitization of the material. The material is therefore acceptable for use. The cask design is not otherwise affected by the temperature excursion. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC shell O.D., is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00056

This safety evaluation addresses a non conformance with the TC (Transfer Cask) inner liner identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 109732) identifies the temperature on the inner liner I.D. exceeding the maximum allowable of 725°F at several times during the lead pour operations. The maximum temperatures and durations are:

Location	°F	Duration (mins)
1	770	10
2	770	25
3	750	5
4	825	10
5	860	5
6	810	20
7	800	10
8	780	10
9	770	30
10	790	30
11	760	30
12	750	25
13	740	30
14	740	30
15	810	15
16	740	75
17	770	15

The inner liner material that experienced the temperature excursion is ASME SA240, GR 304 with an actual carbon content of 0.058%. The times for which the cask temperatures exceeded the limits set by the procedure were insufficient to sensitize the material. Per the Committee of Stainless Steel Producers of AISI, for a worst case of 860°F for ninety minutes, with the given carbon content, there is no condition of sensitization of the material. The material is therefore acceptable for use. The cask design is not otherwise affected by the temperature excursion. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC inner liner I.D., is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00057
This safety evaluation addresses a non conformance with the TC (Transfer Cask) shell identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 110603) identifies that the as-poured cask lead thickness is less than the allowable in some locations. The minimum measured lead thickness is 3.845", which is less than the minimum allowable thickness of 3.880". The effect of the below tolerance lead shielding is analyzed in calculation BGE001.0616, revision 0. This calculation determined that under worst case conditions the maximum cask surface dose rate in the localized areas where the lead thickness is below the minimum required is 106 mrem/hr., as opposed to the nominal 85 mrem/hr. for the remainder of the cask site surface. Since the surface area where the lead thickness is below the minimum required is less than 0.6% of the total cask surface area, this increase will not significantly increase occupational exposure. This deviation therefore has a minimal impact on the cask design and is acceptable. A review of calculation BGE001.0616 revealed that the cask was designed so that the cask surface dose rate was less than 100 mrem/hr. A computer model (ANISN) was used to compute the maximum cask surface dose rate. Several assumptions were made and documented in the calculation to help maximize the dose rate. It is very unlikely these assumptions would all come true at once, so that the realistic maximum cask surface dose rate will be less than 100 mrem/hr. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC lead shield, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00058
This safety evaluation addresses a non conformance with the TC (Transfer Cask) upper trunnion identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 111333) identifies the TC upper trunnion outer shoulder diameter was reduced from 8.000" to 7.800" +/- 0.05". The trunnion outer shoulder diameter was changed to repair a false cut incurred during fabrication. Calculation BGE001.0217 revision 0 analyzed this condition and verified the structural adequacy of the upper lifting trunnion body. The supporting calculations are shown below.

Assuming outer and inner diameters of 7.75" and 4.00" respectively, the section properties of the upper trunnion body are:

$$\text{Area} = \pi[\{(7.75)^2 - (4.00)^2\} / 4] = 34.6 \text{ in}^2$$

$$S = \pi[\{(7.75)^4 - (4.00)^4\} / \{(32)(7.75)\}] = 42.5 \text{ in}^3$$

The maximum shear and moment handing loads, as shown in calculation BGE001.0202 revision 4, are 115 kips and 201 inch-kips respectively. The resulting stresses in the upper lifting trunnion body are:

$$\sigma_v = 115 / 34.6 = 3.3 \text{ ksi}$$

$$\sigma_b = 201 / 42.5 = 4.7 \text{ ksi}$$

The resulting stress intensity is therefore,

$$\text{S.I.} = (4.7 / 2) +/- [(4.7 / 2)^2 + (3.3)^2]^{1/2} = 6.4\text{ksi}$$

The calculated stress intensity increase from 5.9 ksi to 6.4 ksi is less than half of the ANSI N14.6 allowable stress intensity of 13.5 ksi. The upper trunnion shoulder are therefore adequate to perform their function. All other trunnion body stresses are unchanged. The section modulus above is validated by AISC, Ninth Edition. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC upper trunnion, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00059
This safety evaluation addresses a non conformance with the TC (Transfer Cask) bottom neutron shield identified during TC fabrication. The subject non-conformance (Sulzer Bingham NCR No. 111338) identifies the gap

between the bottom surface of the bottom forging and the bottom of the bottom neutron shield cover varies within the range of 0.04" and 0.19". The allowable gap is 0.12" +/- 0.05. The 0.75" thick cask bottom neutron shield cover plate is designed to be recessed below the bottom flange by 0.12". The purpose of this design is to force the cask to rest on the bottom flange, a rigid machined flat surface, rather than the relatively yielding and uneven bottom cover plate when set vertically. With the as-built configuration the recess is maintained, although it deviates from the design tolerances. Since the recess is specified for clearance only, these deviations do not affect any function ^f the cask. No analytical condition is affected. Based on the above information, the subject non conforman .ll not affect the form, fit or function of the TC bottom neutron shield cover, is not detrimental to the stru . integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. ı herefore, this activity has no detrimental impact on equipment important to safety.

SE00060
This safety evaluation addresses a non conformance with the TC (Transfer Cask) lower trunnion identified during TC fabrication. The subject non conformance identifies the diameter of the plug for the TC lower trunnions was changed from 2.00" to 2.25" to ease fabrication. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC lower trunnion, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00061
This safety evaluation addresses a non conformance with the TC (Transfer Cask) optical plug identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 111861) identifies an optical plug target alignment hole on a trunnion is oversized. The hole I.D. is 0.2530" at the outside and 0.2506" at the inside. The allowable is 0.2500" + 0.001" - 0.000". The function of the alignment hole is to provide a base for insertion of an optical plug target which is specified to be within 0.01" of the true position of the cask centerline. Although the shape of the hole (slightly conical) results in part of the hole exceeding the specified diameter tolerance, the actual location of the hole, combined with the oversize diameter, will not result in a t get position outside the required tolerance. No analytical condition is affected. Since the final location of the optical plug location will still fall within the 0.01" design tolerance, then the fact that the target holes are oversized per their very constraining tolerances is acceptable. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC optical plug, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00062
This safety evaluation addresses a non conformance with the TC (Transfer Cask) Nitronic 60 rail identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 111908) identifies the width of the TC Nitronic 60 rails is below the minimum tolerance. The minimum width of the rails is 2.916", while the minimum allowable is 2.95". This is acceptable since the DSC bears on the center portion of the rails, and not on the edges. The amount of the undersize of the rail represents roughly a reduction in width of 1% and does not adversely affect the performance of the rails when the canister is slid out of or back into the cask. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC or Nitronic 60 rails, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. In addition, there is no detrimental operational impact associated with this activity, including the insertion and removal of the DSC. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00063
This safety evaluation addresses a non conformance with the TC (Transfer Cask) alignment target hole identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 111912) identifies an optical plug alignment target hole on a trunnion is oversized. The upper half of the target hole is oversize at 0.252". The allowable is 0.2500" + 0.001" - 0.000". The upper half of the target hole of 0.001" oversize at 0.252'. The function of the alignment hole is to provide a base for insertion of an optical plug target which is specified to be within

0.01" of the true position of the cask centerline. The true position of the hole is 0.008" from its specified location and the oversize condition will therefore not exceed the 0.010" tolerance. The oversize condition will not cause excessive looseness in the fit of the alignment target. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC optical plug, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00064
This safety evaluation addresses a non conformance with the TC (Transfer Cask) bottom O-ring identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 111918) identifies the design depth of the TC bottom cover plate bottom O-ring groove of 0.183" was exceeded. The maximum measured depth is 0.185". The O-ring seal is designed for a nominal compression of about 0.025". An excess depth of 0.002" will not reduce the pressure retaining capacity of the seal according to the manufacturer. In addition, the function of the seal has been demonstrated by hydrostatic testing. The O-rings are Parker O-rings made of ethylene propylene with an inside diameter of 17.955" and a width a of 0.21". The nominal compression expected by the manufacturer will meet the design needs. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC bottom O-ring, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00065
This safety evaluation addresses a non conformance with the TC (Transfer Cask) bottom forging identified during TC fabrication. The subject non conformance (Sulzer Bingham NCR No. 110210) identifies the outside of the TC bottom forging with a minimum I.D. of 71.875" while the minimum allowable is 71.950" (a difference of 0.075"). Flatness on the inside of the bottom forging was also not met. The design flatness is 0.060", while the maximum deviation is 0.125". The 2" thick cast bottom plate is specified to be flat within 0.060". The as-built plate is concave with a maximum deviation of 0.125" due, evidently, to distortion from the attachment weld to the flange. The cask cavity length is not reduced by this deviation. The as-built geometry will result in the DSC being supported by the rim of the bottom plate, under normal conditions, so that the DSC dead weight is transmitted to the cask directly through the shell of the DSC. This is consistent with the existing analytical assumptions. During fabrication, deviations are expected to occur. The tolerances are often conservative, thus when they are exceeded, the magnitude of variance must be evaluated. In this case, the deviation does not affect the structural design nor the functionality of the transfer cask. Based on the above information, the subject non conformance will not affect the form, fit or function of the TC bottom forging, is not detrimental to the structural integrity of the TC, and will not adversely affect the ability of the TC to perform its intended design function. Therefore, this activity has no detrimental impact on equipment important to safety.

SE00069
This safety evaluation addresses the classification of the lifting yoke. It clarifies an existing condition, and does not change the approved safety-related design of the TC yoke system. The NRC SER states in Section 2.2.4, that the yoke system is classified as equipment "not important to safety". The ISFSI USAR states in Section 4.7 that the lifting yoke is a special lifting device which provides the means for performing all cask handling operations in the plant's Auxiliary Building. It is designed to support a loaded transfer cask weighing up to 100 tons. A lifting pin connects the Spent Fuel Cask Handling Crane hook and the lifting yoke. The lifting yoke is designated safety-related since it is in the direct load path of the cask. The codes and standards used to design and fabricate the lifting yoke are presented in ISFSI USAR Section 4.7.4. The lifting yoke was designed, fabricated, and procured as a safety-related component for ISFSI operations. The SER and the SAR both correctly state that the TC yoke system is only used inside the spent fuel pool building and is controlled by 10CFR Part 50 regulations. This analysis assures the safety-related classification as described in the USAR. This clarification has no detrimental impact on equipment important to safety.

SE00070
This safety evaluation addresses a design change which removed the Loctite from the yoke connection bolts. The subject activity removed the Loctite from the yoke connection bolts, which does not affect any design conditions of

the yoke. The yoke connection has bolts, nuts, and washers which are acceptable for this application. The bolts are torqued to 500 ft-lbs after assembly, which eliminates the need for the Loctite. This activity has no impact on the fit, form, or function of the yoke connection bolts or the lifting yoke. Based on this information, eliminating the Loctite will not affect the form, fit or function of the lifting yoke, is not detrimental to the structural integrity of the lifting yoke, and will not adversely affect the ability of the lifting yoke to perform its intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00071
This safety evaluation addresses a design change to the lifting yoke bearing plate profile since the original profile of the bearing plate did not match that of the yoke hook. The subject activity changed the profile of the bearing plate since the original profile of the bearing plate did not match that of the yoke hook. The change was made to ease installation of the bearing plate and does not affect the completed form of the lifting yoke. Therefore, the redesigned plate has no impact on the fit, form, or function of the lifting yoke, is not detrimental to the structural integrity of the lifting yoke, and will not adversely affect the ability of the lifting yoke to perform its intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00072
This safety evaluation addresses a design change to the lifting yoke which changed the pin support with a pin cradle. The pin support / cradle serves to hold the yoke pin when it is not engaged with the plant crane. The intent of this design change is to provide better full pin support and to ease the insertion and removal of the component without binding. The cradle is not safety-related and is not a structural component of the lifting yoke. This design change does not affect any analytical conditions. Based on this information, the lifting yoke pin support / cradle design change will not affect the form, fit or function of the lifting yoke, is not detrimental to the structural integrity of the lifting yoke, and will not adversely affect the ability of the lifting yoke to perform its intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00073
This safety evaluation addresses a design change which upgraded the lifting yoke cable assemblies to comply with ANSI N14.6-1986. This change moved the turnbuckles to the bottom of the assemblies, replaced the lower connector with a jaw, replaced the upper connector with a shackle, and increased the cable size to 1/2" diameter 6x19 cable. The result of this change was that the yoke cable assemblies load rating increased. The cable assemblies were redesigned as a dual load path system with a design load of 7,900 pounds. In addition, each of cables were factory load tested to 6,000 pounds with a working load rating of 4,550 pounds, with a safety factor of 5:1. The function of the cable assemblies is to lift and transfer the shield plug during the DSC transfer and closure operations. This design change was fully evaluated and approved via calculation BGE001.0209, Revision 5. This design change does not adversely affect any hardware and does not affect any analytical conditions. Based on this information, the lifting yoke cable assemblies design change will not affect the form, fit or function of the lifting yoke, is not detrimental to the structural integrity of the lifting yoke, and will not adversely affect the ability of the lifting yoke to perform its intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00074
This safety evaluation addresses a non conformance with the lifting yoke identified during fabrication in which the plate used to fabricate the lifting yoke hooks and beams was oversized by 0.02". The maximum allowable was 3.03" and the actual plate used was 3.05". The calculated stresses were reduced slightly by the oversized plate and the fit-up of the yoke with the cask was assured by testing. This non conformance does not adversely affect any hardware. This non conformance does not affect any analytical conditions. Based on this information, the lifting yoke fab plate non conformance will not affect the form, fit or function of the lifting yoke, is not detrimental to the structural integrity of the lifting yoke, and will not adversely affect the ability of the lifting yoke to perform its intended design function. Therefore, this non conformance has no detrimental impact on equipment important to safety.

SE00075
This safety evaluation addresses a non conformance with the lifting yoke bearing plate material identified during fabrication. The subject non conformance (Sulzer Bingham NCR No. 111339) involved the use of an aluminum bronze tube for the lifting yoke bearing plates with an 8% aluminum content, while the allowable aluminum range was 9% ± 1/2%. The yield strength of the material is 24.1 ksi, which is slightly less than the 25 ksi required by ASTM B148. The bearing plates are used as a bearing surface only and are not in tension. Any tensile strength in the general range of aluminum bronze properties is acceptable. The bearing function and galling resistance are not affected by this minor out-of-specification condition. This non conformance does not adversely affect any hardware. This non conformance does not affect any analytical conditions. Based on this information, the lifting yoke bearing plate material non conformance will not affect the form, fit or function of the lifting yoke, is not detrimental to the structural integrity of the lifting yoke, and will not adversely affect the ability of the lifting yoke to perform its intended design function. Therefore, this non conformance has no detrimental impact on equipment important to safety.

SE00076
This safety evaluation addresses a non conformance with the lifting yoke beams maximum spacing identified during fabrication. The maximum spacing is 7.84", while the allowable spacing is 7.81". The deviation in the beam spacing is due to the waviness in the lifting beam plate material which is not machined on the surfaces. The deviations are local and do not affect the fit-up of the lifting hook plates or of the crane hook pin with the lifting beams. Based on this information, the lifting yoke beams maximum spacing non conformance will not affect the form, fit or function of the lifting yoke, is not detrimental to the structural integrity of the lifting yoke, and will not adversely affect the ability of the lifting yoke to perform its intended design function. Therefore, this non conformance has no detrimental impact on equipment important to safety.

SE00077
This safety evaluation addresses the air flow openings for the HSM. The NRC SER states in Section 2.2.6.1.2 that each HSM has two air inlets. The ISFSI USAR states in Section 4.3.1 that each HSM has one air inlet. Both documents are in agreement that each HSM has two outlets and rely on convective cooling by natural circulation. BGE Dwg. No. 84-081-E, Rev. 0, HSM Concrete Sections, clearly indicates that there is only one air inlet per HSM. In addition, a site tour confirmed that, as constructed, there are one inlet and two outlets for each HSM. The justification for one air inlet and two air outlets can be found in the Pacific Nuclear Fuel Services calculation BGE001.0407. This safety evaluation clarifies an existing condition and does not change the original design or operation of the HSM. This clarification has no detrimental impact on equipment important to safety.

SE00078
This safety evaluation addresses Horizontal Storage Module (HSM) contact dose rate. The NRC SER states in Section 2.2.8.1 that the design criteria for the contact dose rate on the HSM exterior surfaces away from the door or penetrations is 15 mrem/hr or less, which is less than the Topical Report which cited 20 mrem/hr. The ISFSI USAR states in Section 7.1.2 that the Topical Report contact dose rate is used. The justification for this difference is that this HSM design was used by BGE to ensure consistency with the NRC approved Topical Report. The Topical Report is the design basis used in preparation of the CCNPP site specific ISFSI USAR. This contact rate was selected to maintain ALARA exposure to the general public and to on-site personnel working around the HSM. There was no justification provided in the NRC SER for their more conservative 15 mrem/hr contact dose rate. This safety evaluation clarifies an existing condition and does not change the original design or operation of the HSM. This clarification has no detrimental impact on equipment important to safety.

SE00079
This safety evaluation addresses Horizontal Storage Module (HSM) reinforced concrete load combinations. The NRC SER states in Table 2.2.3-1 omission of an ANSI 57.9 load combination is not acceptable unless tornado missile loadings and a drop of the HSM access door are acceptably analyzed. The omitted load combination of ANSI 57.9, Paragraph 6.17.3.1(f) is D+L+H+T+A, where D= Dead Weight x 1.05, L= Live Load, H= Lateral Soil Pressure Loads, T= Normal Condition Thermal Load, A= Accident (e.g. drop accident). The SER also states that the HSM load combinations shown in the SAR are considered to be acceptable, except that tornado missile forces are not included. These forces are of the nature of other "accident" forces and could therefore be treated by

substituting the missile impact forces (with appropriate dynamic analysis) for the E, or earthquake, in load combination 5 and 6. Based on the following acceptable substitutions for current approved SAR load combination calculations, W (tornado wind loads) can be used as an accident load, or A. Currently, combination 3,4 of the ISFSI USAR (table 8.2-11) is: 0.75(1.4D + 1.7L + 1.7H + 1.7T + 1.7W) = 1.05D + 1.275L + 1.275H + 1.275T + 1.275W. Substitute A for W and the result is: 1.05D + 1.275L + 1.275H + 1.275T + 1.275A, which exceeds the load combination omitted in the ISFSI USAR of D + L + H + T + A. Also, substituting A (accident load) for E (earthquake load) in combination 5,6 (of ISFSI USAR table 8.2-11) will yield the omitted load combination as well. The SER also states that the SAR is very conservative in that combining forces, all forces are assumed to be positive and additive regardless of point and direction of occurrence in the structural component. The (NRC) staff does not consider that this method of load combination is necessary for the monolithic HSM since: (1) multiple concurrent missile strikes need not be assumed, and (2) the analysis of resistance capability does not include the capability of adjacent members to assume load on any initiation of yield in a single wall or roof panel. As a result, the treatment of the tornado missile forces is considered to be acceptable. Although the ISFSI USAR does not list the ANSI 57.9 Load Combination calculation for tornado missile loading, based on the above analysis, it can be seen that tornado missile loading is in fact analyzed in the ISFSI USAR. The omission of the load combination is covered by enveloping NRC approved allowable substitutions. Additionally, the HSM has been analyzed to withstand tornado wind loads and tornado generated missiles (reference ISFSI USAR section 8.2.2.2.A). Therefore, the HSM Enveloping Load Calculation Results found in the ISFSI USAR in Table 8.2-11 are acceptable for analyzing tornado missile loadings. The SER also states that the HSM structural design criteria, the load combinations, and the final design of the HSM as represented in the current docketed material is considered to be structurally acceptable.

The HSM access door was analyzed and documented in section 8.1.1.6 of the Topical Report, which is referenced in section 8.1.1.6 of the ISFSI USAR. This section of the Topical Report discusses that the door was designed for the worst normal operating load, which was assumed to be three times the dead weight of the door acting on the bottom angle section of the door frame. The normal operating loads on the door are much lower than the design allowables. Additionally, the HSM door is designed to withstand tornado wind loads and tornado generated missiles (reference ISFSI USAR section 8.2.2.2.C and Topical Report section 8.2.2.2.C). The above is an acceptable analysis for design of the HSM access door.

This safety evaluation clarifies an existing condition and does not change the original design or operation of the HSM. This clarification has no detrimental impact on equipment important to safety.

SE00080
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) roof heat shield bolts. The subject activity changed the roof heat shield bolts from 48-1/2" diameter Maxibolts to 48-1/4" diameter Hilti Kwik bolts, which was documented in the heat shield details. The Hilti Kwik bolts are shown to be an acceptable substitution in calculation BGE001.0214. A review of that calculation shows that the maximum tensile load on the roof panels is only 49 lbs., and there are no calculated shear loads. Since the chosen Hilti Kwik bolts have an allowable tension of 520 lbs. and allowable shear of 470 lbs., there is adequate margin to support the total weight of the heat shield panels. The function of the heat shield panels is to reduce the HSM roof temperature to within acceptable limits for all conditions. Based on this information, the subject design change will not affect the form, fit or function of the HSM roof or roof shield, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00081
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) temporary hand rails. The subject activity added embedded angles for temporary hand rails. The temporary hand rails are non-safety related and have been added as an upgrade to the HSM for personnel safety. The hand rails are 8'-0" on center with each 6" x 6 "x 3/4" angle embedment plate anchored with four 1/2" diameter x 3-1/8" long Nelson studs. The location of the 24 embedments is shown on drawings 84-080-E and 84-095-E. Passive additions to concrete are within ACI Code practices. The embedded angles were added as permanent fixtures during the construction phase, whereas the handrails are inserted at locations on a temporary basis whenever personnel safety is required (i.e. roof inspections, etc.). Based on this information, the subject design change will not affect the form, fit or

function of the HSM roof, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00082
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) secondary roof slopes. The subject activity removed the secondary roof slopes from the outlet vents. The original intent of the secondary slopes was to prevent water from entering the outlet vents. However, the outlet vents are nominally 5-1/2" above the primary roof surface. The elevation difference, along with the primary roof slope, prevents water from entering the vents. This design change simplified the roof construction by removing the unnecessary secondary roof slopes. Based on this information, the subject design change will not affect the form, fit or function of the HSM roof, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00083
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) roof finish requirements. The subject activity clarified the roof finish requirements and provided a non-slip finish for safety. The design change was made to reduce the injury potential of personnel working on the HSM roof. The roof's formed surfaces meet the requirements of ACI 301-84, section 10.2. The roof slab is float finished in accordance with the requirements of ACI 301-84, section 11.7.2. ACI 301-84 is the specification for structural concrete for buildings. Based on this information, the subject design change will not affect the form, fit or function of the HSM roof, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00084
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) inlet and outlet screens. The subject activity added security/bird screens on the inlet and outlet vents. The intent of this design change is to reduce the amount of debris within the HSM and help maintain security within the ISFSI. The design change added angle frames, an intrusion screen, and an insect screen to the inlet and outlet openings. The security/bird screens include a 16 x 16 SS mesh insect screen separated from a 1" x1/8" bar grating security/bird screen by at least 1/2". The effect of the screens on the air flow through the HSM is that the DSC shell temperature will increase slightly. As determined in calculation BGE001.0409, the increase will range from 0.3°F to 2.5°F for all ambient temperatures. The temperature increase will have negligible impact on the HSM concrete and fuel cladding temperatures (Concrete normal temperature will increase from 150°F to 153°F, and the off-normal temperature will increase from 194°F to 197°F. Per ACI 349-90, the normal allowable temperature is 200°F, and the off-normal allowable temperature is 350°F. For fuel cladding, normal temperature will increase from 618°F to 621°F, and the off-normal temperature will increase from 732°F to 735°F. Per calculation BGE001.0403, the normal allowable and the off-normal allowable temperature is 1058°F). Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00085
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) cask restraint. The subject activity replaced the cask restraint eyebolt and modified the HSM block out for the TC restraint. The block outs were changed from 9" tall trapezoids to 7-7/8" tall triangles. The eyebolts were changed from 2" diameter ASTM A-489 with a rated capacity of 26,000 lbs. to a 1-1/2" diameter turnbuckle eye with a jam nut with a safe working load of 21,400 lbs. and a safety factor of 5 to the ultimate load. The length of the embedded rod was reduced from 36" to 23" (This change in embedment length met the requirements of ACI 349-90, Appendix B - Steel Embedments). In addition, Calculation BGE001.0220, HSM Cask Restraint, confirmed the adequacy of this design change. The intent of the design change was to correct a clearance problem with the TC / HSM restraint. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not

detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00086
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) slab edge bars. The subject activity allowed the slab edge bars to be placed on either side of the #10 main bars to maintain 2" minimum cover. This design change simplified the construction of the HSM. It meets the minimum concrete slab cover requirements of ACI 318-89, section 7.7.1, which states that reinforcing bars No. 6 through No. 18 that reinforce concrete exposed to the earth or weather require a minimum concrete cover of 2 inches. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00087
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) welded wire fabric. The subject activity allowed the use of an alternate wire mesh (WWF 6x6-D10xD10 deformed bar) instead of the original mesh wire (WWF 6x6-W10xW10) called out in the plan views of the roof vent cover. This design change was incorporated because the alternate wire mesh has better bend characteristics and is more easily obtained. Per ACI 439.4R (Steel Reinforcement - Physical Properties and U.S. Availability), both wire meshes have the same reinforcing characteristics for the concrete. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00088
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity allows an alternative 180 degree rotation of the 10CC46 reinforcing bar so that the 45 degree bends are located over the wall concrete sections. The change made to simplify construction, and the area of steel reinforcement remains the same. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00089
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity allowed the 10CC47 splice length to be reduced by 12", if required, to provide the 2" minimum concrete cover. In addition, the excess length of the bar splices were removed to ease construction congestion. It meets the minimum concrete slab cover requirements of ACI 318-89, which states that reinforcing bars No. 6 through No. 18 that reinforce concrete exposed to the earth or weather require a minimum concrete cover of 2 inches. It also meets the ACI 318-89 splice requirements for reinforcing steel. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00090
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity allows an alternative 90 degree rotation of the 10CC47 reinforcing bar to simplify construction, while the area of steel reinforcement remains the same. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00091

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity allows the 10CC46 reinforcing bar to be bent to clear 10CC7 dowels or cut and spliced to 10CC7 dowels, if required for installation. It meets the ACI 318-89 bend and splice requirements for reinforcing steel. The change was made to simplify construction, and the area of steel reinforcement remains the same. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00092

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity revised the location of the 10CC7 reinforcing bars in corners at elevation 114'-0". This change made to simplify HSM construction and does not affect the HSM design. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00093

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity allowed the 10CC7 dowel to be cut 5' ± 6" above elevation 114'-0" to provide clearance for cask restraint and door frame embedments. The excess length of the dowel was removed to ease construction congestion in the front wall. The 10CC46 bar splices will provide the required load transfer mechanism to prevent cracking in the front face and satisfactorily transfer all loads. These changes meet the requirements of ACI 349-90 as described in Sections 7 and 12. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00094

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity changed the location of the reinforcing bars for the roof plan at elevation 129'+0 for the phase 1A north side only, and the 8CC13 bars on top were replaced with 8CC113 and 8CC213 bars. The design of reinforcement placement is typically flexible so that field construction changes can be accommodated. This design change was necessary to clarify the bar placement requirements. The steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00095

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity added additional #7 U-bars to the front edge of the roof. It was incorporated to satisfy the required steel reinforcing ratio of the concrete, since the original design had an inadequate number of bars in this area. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00096

This safety evaluation addresses a design change to the minimum concrete cover for the HSM (Horizontal Storage Module) vertical outlet vent rebar. The subject activity provided an allowance for the minimum concrete cover for the vertical outlet vent rebar to be reduced from 2" to 1", if necessary. This design change was incorporated due to the tight bend required for the 8CC13 rebar at each outlet vent. The closed loop rebar details originally specified a minimum concrete cover of 2" on all outlet vent surfaces. The reduced concrete cover applies only to the roof vertical side of each outlet vent, which is not exposed to the weather. The details of this rebar configuration can be found in Section F-F of BGE Drawing No. 84-087-E. This clearly shows the vertical configuration of the rebar and the protection provided by the outlet vent overhang (18", as shown in Section B-B of BGE Drawing No. 84-081-E). Additional protection is provided via the intrusion and insect screens at the outlet. Per ACI 318-89, section 7.7.1(c), concrete for walls and slabs not exposed to weather or in contact with the ground will require a minimum concrete cover of 3/4" for rebar size no. 11 and smaller (8CC13 is rebar size no. 8, which is in this category). Therefore, this design change to reduce the minimum concrete cover for the vertical outlet vent rebar only from 2" to 1" does meet the minimum concrete cover requirements of ACI 318-89. In addition, the area of steel reinforcement remains the same, and all ACI requirements are met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00097
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity adds 10CC1 bars to act as carriage bars under the 8CC13 temperature steel in the roof slab. The sole purpose of these carriage bars is to support the reinforcing bars that will be used to help minimize the shrinkage of the roof concrete. The carriage bars help ensure that the temperature steel concrete cover will be consistently met throughout the roof. The steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00098
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity deleted the 3" and 9" location dimensions for dowels 10CC7 for phases 1A and 1B only. This change was made to assure the correct reinforcing bar spacing is met. The location of the construction joint is permitted to float +/- 6" and dimensioning the bars from the joint does not ensure the required bar spacing of 12". Deleting the 3" and 9" dimensions clarifies the drawing requirements. This change made to simplify HSM construction and does not affect the HSM design. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00099
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity added reinforcing steel to the roof at exposed edges and adjacent to vents to meet maximum spacing requirements as defined in ACI-349, Nuclear Safety Structures Code. The original design had an inadequate number of bars as discovered during the NRC review of the original SAR submittal. This design change ensured the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00100
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity ensured the front face of the HSM's were adequately reinforced by placing the reinforcing at the minimum concrete cover location. This change was made to simplify HSM construction, in that the design of reinforcement placement is typically flexible and most field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00101
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity added an additional #8 bar to reinforce the corner between the top of the foundation mat and underside of access sleeve for the 1A unit only. This change was made to provide required crack control since the 10CC47 installed with a 45 degree bend turned outward did not provide the required crack control. The #8 bar was therefore added to reinforce the corner. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00102
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity added additional #5 reinforcing bars 5CC69 to the HSM face to provide the required crack control. Although cracking can not be expected to be eliminated, it is generally more desirable to have many fine hair cracks than a few wide cracks. Thus crack control is a matter of controlling the distribution and size of cracks rather than eliminating them. To control cracking, it is better to use several smaller bars at moderate spacing than larger bars of equivalent area. This change added 48 #5 bars, which should provide good crack control. ACI 318-89, section 10.6 provides crack control provisions for beams and one way slabs. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00103
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity defined the location of bars 7CC64 through 7CC68 since the bar locations were not completely specified on the design drawings. The change was made to simplify construction, and the area of steel reinforcement remains the same. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00104
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity reduced the clear distance between 8CC13 bars and the vent structure from 2" (typ) to 1" (min). The minimum clear distance was invoked to allow for bar fabrication cut and bend tolerance. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00105

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity changes the bar size from 6CC55 to 10CC55 on the cut sheets only (bill of materials). This corrected an error on the bar cut and bend listing. The bar size was correctly specified on the layout drawing. (Note: Although this safety evaluation addresses the change of rebar from 6CC55 to 10CC55, another safety evaluation SE00106 addresses the deletion of 10CC55 from the cut sheets.) Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00106

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity deleted rebar 9CC34 and 10CC55 on the cut sheets only (bill of materials). The deletion of the rebar occurred during the design review stage, thus the final detail drawings were accurate. This design change was made to make the rebar cut and bend lists consistent with the detail drawings. It was determined during the design review stage that this reinforcement was not required. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00107

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity changed the quantity of rebar 9CC31 from 50 to 130, and changed the length from 15'-10" to 37'-0". This additional amount of reinforcing steel was offset by replacing large quantities of the same size but shorter reinforcing steel (see safety evaluations SE00108 and SE00109). The longer bars are easier to handle and place and therefore simplify construction. Due to the offset, this design change does not change the amount of rebar in the walls. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00108

This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity changed reinforcing bar from 9CC32 to 6CC32 and the quantity was changed from 80 to 140. The length was changed from 17'-5" to 4'-7", and changed the type from 2 to 17. Dimension "A" was deleted, dimension "B" was changed from 15'-10" to 1'-6", changed dimension "C" to 1'-7" and added dimension "D" as 1'-6". The use of 9CC31 as described in safety evaluation SE00107 eliminated the need for the 9CC32. This net effect resulted in the addition of the 6CC32 reinforcing steel, which was used to provide better rebar distribution in the walls. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00109
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity changed reinforcing bar from 9CC33 to 6CC33 and the quantity was changed from 50 to 10. The length was changed from 28'-8" to 5'-4", and changed the type from straight to 17. Added dimension "B" as 1'-6", dimension "C" as 2'-4" and added dimension "D" as 1'-6". The use of 9CC31 as described in safety evaluation SE00107 eliminated the need for the 9CC33. This net effect resulted in the addition of the 6CC33 reinforcing steel, which was used to provide better rebar distribution in the walls. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00110
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC37 from 7'-10" to 7'-8", and shortened dimension "B" from 4'-0" to 3'-10". The bar sizes were adjusted to clear contractor installed form supports which interfere with the bars as detailed. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00111
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC38 from 7'-7" to 7'-5", and shortened dimension "B" from 3'-9" to 3'-7". The bar sizes were adjusted to clear contractor installed form supports which interfere with the bars as detailed. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00112
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC39 from 7'-10" to 7'-8", and shortened dimension "B" from 4'-0" to 3'-10". The bar sizes were adjusted to clear contractor installed form supports which interfere with the bars as detailed. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00113
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC41 from 8'-8" to 8'-4", and shortened dimensions "B" and "D" from 3'-1" to 2'-11". The bar sizes were adjusted to clear contractor installed form supports which interfere with the bars as detailed. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00114
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC42 from 8'-1" to 7'-5", shortened dimensions "B" and "D" from 3'-1" to 2'-11", and shortened dimension "C" from 1'-11" to 1'-7". The bar sizes were adjusted to clear contractor installed form supports which interfere with the bars as detailed. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00115
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC43 from 7'-10" to 7'-5", shortened dimensions "B" and "D" from 3'-1" to 2'-11", and shortened dimension "C" from 1'-8" to 1'-7". The bar sizes were adjusted to clear contractor installed form supports which interfere with the bars as detailed. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00116
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC44 from 8'-1" to 7'-5", shortened dimensions "B" and "D" from 3'-1" to 2'-11", and shortened dimension "C" from 1'-11" to 1'-7". The bar sizes were adjusted to clear contractor installed form supports which interfere with the bars as detailed. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00117
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC45 from 8'-8" to 8'-4", and shortened dimensions "B" and "D" from 3'-1" to 2'-11". The bar sizes were adjusted to clear contractor installed form supports which interfere with the bars as detailed. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00118
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) reinforcing bars. The subject activity shortened the length of reinforcing bar 10CC47 by 8". The bar length was shortened to simplify bar installation. The revised bar provides code required embedment and development lengths. The design of reinforcement placement is typically flexible, in that field construction changes can usually be accommodated. The important element in reinforcement design is to ensure the steel reinforcement ratio is satisfied and all ACI requirements are met. In this case, the steel reinforcement ratio was satisfied and all ACI requirements were met. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00119
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) access sleeve. The subject activity deleted the requirement that the Nelson studs shown on the HSM access sleeve be attached after delivery of the sleeves. Nelson studs may be fixed to sleeve at the fabrication shop or construction site. The quality of work is typically better when fabrication can occur at the shop in a controlled environment. This change does not affect the completed HSM and therefore has no impact on the HSM design or analysis. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00120
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) rail lubricant. The subject activity changed the rail lubricant from Everlube 823 to Permaslik RN. The lubricant change was made as an improvement to the HSM design. The Permaslik RN has superior tribological properties to the Everlube 823 while containing no molybdenum disulfide (which is not allowed in the fuel pool). Tribological properties refers to the friction, lubrication, and wear of interacting surfaces that are in relative motion. The change to eliminate a chemical not allowed in the spent fuel pool was necessary and is an improvement which does not adversely affect the HSM design or analysis. Since 1993, all fuel moves have resulted in a smooth transfer of the DSC from the TC into the HSM without any damage to the sliding surfaces. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00121
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) rail alignment tolerance requirements. The subject activity clarifies the HSM-DSC rail alignment requirements. The rails shall be level within 1/16" between the front and rear of each module. Additionally, the two rails in each module shall not deviate by more than 1/16" in elevation when measured across the rails. Tightening the installation tolerances improves the rail alignment and overall safety of the system, as well as provide for a smooth transfer of the DSC.

This design change is an improvement to the HSM which does not adversely affect the HSM design or analysis. Since 1993, all fuel moves have resulted in a smooth transfer of the DSC from the TC into the HSM without any damage to the sliding surfaces. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00122
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) W8x48 beams orientation. The subject activity provided an allowance for the orientation of the W8x48 beams to be reversed (180° in the horizontal plane) to match the as-built centerline of the HSM access sleeve. It also allowed the length of the slots to be increased if required to match the as-built location of the rails. This design change did not affect the structural adequacy of the beams in any way, in that the strong axis remained in the vertical plane. The intent of this design change was to give the field personnel additional flexibility in the construction of the DSC support structure. Since 1993, all fuel moves have resulted in a smooth transfer of the DSC from the TC into the HSM without any damage to the sliding surfaces. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00123
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) door lifting lugs. The subject activity revised the hole diameter in the HSM door lifting lugs from 11/16" to 1.0" to allow the use of 3/4" shackle pins. Per the AISC Eight Edition, Section 1.16.5, the minimum edge distance from the center of a 1.0" hole to a rolled edge is 1-1/4", and that distance requirement was still met through this design change. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00124
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) door frame weld requirements. The subject activity added a requirement for a seal weld between structural stitch welds between the door frame support angles and the HSM embed plates. This change was made to prevent water seepage between the angle and the embed plate of the door frame. Seal welds are considered non-structural and are added to improve the seal of affected areas. This change is an improvement and does not affect the HSM design or analysis. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00125
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) seismic restraint. The subject activity revised the DSC seismic restraint to minimize its weight and to add a handle for remote installation. These changes will result in reduced occupational exposure during the installation of the restraint. The structural adequacy of the revised restraint is verified in calculation BGE001.0218, "Revised DSC Seismic Restraint". Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00126
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) W8x48 beams connections. The subject activity added slots to the W8x48 cross-beam supports to provide more flexibility in the installation of the support steel. In addition, the rail support steel was mounted on 10-1/2" x 9" x 3/4" plates and attached to the cross beams by 4 - 5/8" diameter bolts. The bolts were used to add flexibility to the joints to

eliminate thermal stresses due to differential movement of the beams. The mounting bolts provide an equivalent shear resistance to the welds which were previously designed. This change also simplifies the installation and alignment of the DSC rails. The intent of this design change was to give the field personnel additional flexibility in the construction of the DSC support structure and to eliminate the thermal stresses. Since 1993, all fuel moves have resulted in a smooth transfer of the DSC from the TC into the HSM without any damage to the sliding surfaces. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00127
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) W8x48 beams support angles. The subject activity increased the size of the support angles for the cross beam supports from L4X3 to L4X4. This design change was made to meet the AISC requirement to provide minimum edge distances for the attachment bolts. The slightly larger angle provides a leg length of 4" in lieu of 3", which increased the edge distance from 1/2" to 1-1/2". The AISC required edge distance for a 5/8" bolt is 7/8". Since 1993, all fuel moves have resulted in a smooth transfer of the DSC from the TC into the HSM without any damage to the sliding surfaces. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00128
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) W8x48 beams support steel welds. The subject activity changed the welds attaching the rail support steel to the cross beams mounting plates to change from one 1/2" and one 1/4" groove weld to two 3/8" groove welds. The new weld configuration has an identical 3/4" total throat as the original design, and as such, the allowable shear resistance for welds will remain the same. Since 1993, all fuel moves have resulted in a smooth transfer of the DSC from the TC into the HSM without any damage to the sliding surfaces. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00129
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) door frame angles. The subject activity changed the four door guide angles from L7x4x¾ with L9x4x5/8. This design change is analyzed in calculation BGE001.0213 Revision 2, HSM Door Analysis. The reason for the change was to provide an angle with a longer leg (9" in lieu of 7") which would provide the required angle overlap and length to serve as a guide for the HSM door, which is 12¾" thick. This angle, combined with a L7x4x¾ and the required angle overlap, results in a guide spacing of 13-1/8". The calculation verified that the stresses associated with the angle change were safely below the allowables. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00130
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) door frame angles. The subject activity provided a construction alternative to substitute L8x4x¾ angles for all L7x4x¾ and L9x4x5/8 door frame angles. This design change is analyzed in calculation BGE001.0213 Revision 2, HSM Door Analysis. The reason for the change was to provide the constructor with one angle size for an order in lieu of two, and to eliminate the possibility of incorrectly constructing the frame by mixing the angles. This alternative design is equivalent to the original design, which was discussed in ISFSI Safety Evaluation SE00129. The use of this angle, along with the required angle overlap, results in a guide spacing of 13-1/8", which provides the spacing necessary for the 12¾" thick HSM door. The calculation verified that the stresses associated with the angle change were

safely below the allowables. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00131
This safety evaluation addresses a design change to the HSM (Horizontal Storage Module) door frame angle welds. The subject activity reduced the amount of weld used to attach the door frame angles to the embedded steel. This change was made to reduce the heat input to the concrete and lower the potential for concrete cracking. This design change is analyzed in calculation BGE001.0213, Revision 2, HSM Door Analysis. As shown in this calculation, the revised weld design meets the code allowables. Based on this information, the subject design change will not affect the form, fit or function of the HSM, is not detrimental to the structural integrity of the HSM, and will not adversely affect the ability of the HSM to perform it's intended design function. Therefore, this design change has no detrimental impact on equipment important to safety.

SE00136
This safety evaluation is prepared to clarify and correct a non-conforming condition for the NUHOMS system in use at the Calvert Cliffs Independent Spent Fuel Storage Installation (ISFSI) with respect to the Dry Shielded Canister (DSC) internal pressure during blowdown and reflood conditions. The USAR has been revised to reflect the pressures and the associated stress values that are expected under blowdown and reflood internal pressures.

1) USAR Tables 3.6-2 and 3.6-3 will be updated to show that the DSC internal pressures under Service Level B and Service Level D conditions (ref. ASME B&PV Code) include pressures due to blowdown and reflood activities, respectively (40.0 psig for each).
2) USAR Section 8.1.1.1.B will be revised to add a statement that the DSC internal pressure loads include a consideration of pressures due to blowdown and reflood conditions, and that reflood is a Service Level D condition. A re-analysis which includes the effects of these loadings has been conducted, and concludes that these conditions are adequately addressed by the design.
3) USAR Table 8.1-4 will be updated to show the new off-normal stress levels in the DSC components resulting from the blowdown internal pressure load case.
4) USAR Table 8.2-8 will be updated to show the new enveloped stress levels in the DSC components resulting from the blowdown internal pressure.

Increases in stresses which could occur under these scenarios have been examined and do not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the SAR. Nor is the possibility for an accident or malfunction of a different type created. The increased stresses do not reduce the margin of safety as defined in the basis for any ISFSI Technical Specification, and, because of the maintenance of DSC structural integrity, criticality control, and retrievability, do not result in any increase in occupational dose. Finally, this activity does not constitute an Unreviewed Environmental Impact.