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Duane Arnold Energy Center
Operated by Nuclear Management Company, LLC

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Report Of Facility Changes, Spent Fuel Storage Cask Design Changes, and Tests and Experiments

In accordance with the requirements of 10 CFR Section 72.48, please find enclosed the subject report covering the time period from August 15, 2003 through July 31, 2005. This letter makes no new commitments or changes to any existing commitments.

Should you have any questions regarding this matter, please contact this office.

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Enclosures (1)

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ENCLOSURE

SUMMARY OF CHANGES

This section contains brief descriptions of changes completed during the period of August 15, 2003 through July 31, 2005, and summaries of the evaluations for the changes, pursuant to the requirements of 10 CFR Section 72.48. All changes were reviewed against 10 CFR 72.48 by the Duane Arnold Energy Center (DAEC) Operations Committee.

Evaluation 72-03-001

Description and Basis of Change

This change involved Nuclear Management Company (LLC)'s (NMC's) adoption of Transnuclear (TN) changes identified in FSAR Change Notice Form FCN 72-1668. The changes requiring evaluation are described below.

- FSAR Section 8.2.2.2 and Appendix C.5 state that the Transfer Cask (TC) was designed for the same tornado missiles as stated for the Horizontal Storage Module (HSM) in FSAR Section 3.2.1.2 and Table 3.2-1. However, FCN 72-1668 did not mention the TC in its review for adding the wooden plank and gave no calculational basis for the TC. Therefore, this evaluation includes changing FSAR Section 8.2.2.2 and Appendix C.5 to show that the TC is not evaluated for the wooden plank listed for the HSM along with the TN FCN 72-1668 FSAR changes for the wooden plank missile. The deletion of the additional tornado missiles is included within the considerations of this evaluation.

- As a result of the absence of consideration of the DAEC site based wooden plank tornado missile, calculation CAL-M03-008 was performed to prove that the DAEC site-specific 108 pound wooden plank (4 in. X 12 in. X 12 ft.) traveling end-on at 300 mph was acceptable with respect to the NUHOMS system design and licensing basis materials for tornado missiles for use of the TC on site. The review of this additional tornado missile necessitates clarifying language in DBD-F16-001, Appendix A1 Section 11.2.4.1 (DAEC's evaluation of site-specific missiles for the HSM and the TC) and is included within the considerations of this evaluation.

Evaluation Summary

This change removed descriptions of unique tornado missiles from the FSAR. The accident under consideration with this change is the tornado event for the dry storage system. Removal of these specific missiles from consideration do not impact the frequency of a tornado, or the associated missiles, previously considered. Furthermore, tornado events are natural phenomenon and as such are not subject to an increased frequency by virtue of modifications to the licensing basis. As a result, no increase in

frequency of accidents are introduced by removal of these specific missiles from the NUHOMS FSAR. Since no change is being made to Structures, Systems, and Components (SSC) as a result of this change, no increase in the likelihood of a malfunction of SSCs will occur. This change has no effect on the consequences of the tornado accident as described within the FSAR, and the possibility for an accident of a different type than previously evaluated is not created. Since no malfunction will result due to the change, no increase in site dose consequences will be experienced as a result of this change. This change does not introduce any malfunction to SSCs important to safety and it does not introduce challenges to the system fuel cladding or Dry Storage Canister (DSC) confinement capabilities. As a result, no impact to the limits for a fission product barrier are introduced as a result of the change. No departure from the methods of evaluation are involved in this change.

The incorporation of a site unique tornado missile into the site DBD for ISFSI operations results in no change required to the NUHOMS FSAR. Since tornados, and their associated missiles, are natural phenomenon, no change in the frequency of occurrence is encountered due to the evaluation and inclusion of DAEC site tornado missiles within the site DBD. The actual frequency of occurrence for the DAEC site based tornado impact to the TC (the specific information being added to the DBD) was evaluated and compared to the material contained within the NUHOMS FSAR Appendix C. The material contained within the dry storage system FSAR indicated a higher frequency of occurrence for tornado risk during TC operations. As a result, the previously licensed material bounds the frequency for the DAEC ISFSI activities. Therefore, no increase in frequency of an accident is caused by incorporation of this change into the DBD. Also, no increase in the likelihood of occurrence of malfunctions of an Important To Safety (ITS) SSC is introduced as a function of this change. The outcome of the addition of the wooden plank tornado missile to the DAEC ISFSI Design Basis Document is a slightly further missile penetration into the transfer cask outer shell. All other analysis is bounded (stability and system stress calculations) by previously licensed materials. This additional penetration into the transfer cask is localized to the impact area. The additional penetration of the system results in the "removal" of an approximate additional 0.01% of the overall mass of the transfer cask. While the removal of this additional shielding does increase the consequences (site boundary dose) this increase is minimal. The only structural impact will be additional penetration due to the missile. Analysis shows that the additional penetration is acceptable. No gross structural failure of the transfer cask will occur. The cask shielding capability will be slightly impacted as a result of this new missile. The reduction in shielding capability is minor due to the additional 0.4 inch penetration by the missile. The consequences of the malfunction caused by the change is minimal. There is no possibility inserted for an accident of a type different from previously evaluated, and no possibility for new malfunction results to be introduced as a consequence of this change. The change does not propose to alter any fission product barrier limits. The analysis of the new wooden missile into the site level DBD material is consistent with the material and methods contained within FSAR Appendix C. No changes in method of evaluation are included as a function of this change.

Evaluation 72-03-002

Description and Basis of Change

This evaluation was for the repair of a non-conformance on HSM Base Unit DA-B-C2 (HSM-5). The non-conformance was that the top front vent liner on the left side of the unit was installed with one upper corner approximately 3/8 of an inch higher than design and will not allow the roof section to properly fit. The non-conformance disposition was repair by grinding the rear portion of the affected vent liner and adjacent concrete such that the top of the base unit wall between the two upper vents in the wall is 4 inches (+1/4 inch, -0 inches) below the top of the front and back walls of the base unit. Exposed steel surfaces were coated with Carbo Zinc 11 or TN approved equivalent. The repair reduced the vent opening by 3/4 inch. This repair enabled the HSM roof to fit up to the HSM unit so the HSM functions properly during normal, off-normal and accident conditions.

Evaluation Summary

The repair to the affected HSM vent liner has no significant impact on the structural, thermal, criticality, or shielding response of the HSM or the DSC that it contains. The previously evaluated accidents of concern are postulated HSM reduced air shielding (assumed to occur due to differential settling of the HSM) and full vent blockage (assumed to occur due to flooding, tornado or other such event). The reduction in the vent opening is minor in nature and does not relate to the type of occurrences that may cause these accidents. Since the affected Base Unit repair does not alter accident assumptions (magnitude of source term, radiological material available for release, etc.) and the opening in the HSM is smaller, there is no adverse change to the dose consequences from an accident. The HSM has reduced air flow due to the increased restriction but is bounded by previously evaluated flow restriction which shows that temperature limits for the HSM, the DSC, and the stored spent fuel will not be exceeded. The affected HSM remains in compliance with the allowable criteria for normal, off-normal, and accident conditions and there are no changes to loading, unloading or handling operations. The spent fuel storage system, after repair, continues to meet design, construction, fabrication, testing, and performance requirements will function as intended. Due to the passive nature of the HSM, there are not any malfunctions to this SSC (or others) foreseen as a result of the modification. The repair to the HSM Base Unit is relevant to the design basis limits for cladding temperature and DSC internal pressure. Based upon analysis, the change does not alter nor challenge the temperature limits for fuel cladding or change the DSC pressurization. The impact on the natural convection flow of cooling air through the HSM due to the repair is negligible. The thermal evaluation uses and references the existing design basis analysis and applies the same methods and criteria in assessing the change in air flow caused by the repair.

Evaluation 72-03-003

Description and Basis of Change

The DAEC adoption of Transnuclear (TN) changes identified and reviewed in TN's 72.48 Applicability and Screening Form SRS 72-1708 and 72-1743 and changes identified in their FSAR Change Notice Form FCN 72-1708 required evaluation of changing the shield wall to HSM connection bolts hole size from 4 inch to 4-1/2 inch diameter. The shield wall/HSM connection bolt hole size change was made to facilitate fabrication of the shield wall by using standard PVC pipe to form the holes.

Evaluation Summary

The 4 inch to 4-1/2 inch change in the diameter of the shield wall connection bolt hole size has no significant impact on the shielding and structural capacity of the shield wall. The only FSAR accident that discusses the shield wall/HSM connection is the massive tornado missile accident and it assumes the connection collapses and is then replaced or the HSM is removed from service in a timely manner. Therefore, the shield capacity in this event is not critical. The tornado wind and earthquake accidents take credit for the weight and thickness of the shield wall and do not discuss the connection. This bolt hole change does not affect the thickness of the shield wall and only minimally changes the overall weight of the massive shield wall. Therefore, in the event of a tornado wind or earthquake accident, the shield wall reaction will not be affected by the bolt hole size change from that stated in the FSAR. The shielding capacity of the shield walls with 4-1/2 inch bolt holes during a tornado or earthquake accident will be slightly reduced from that of the 4 inch hole. However, the bolt holes do not see direct radiation from the DSC since they are not in direct line of sight with the HSM vents, and radiation from the DSC at the shield wall bolt hole locations will first have diffusion from the HSM concrete sidewall. As a result, the reduction in the overall shield wall shielding capabilities is minimal. Therefore, this change has minimal affect on the consequences of an accident. This change also will not increase the frequency of an accident or create an accident of a different type since tornadoes and earthquakes are natural phenomena and the FSAR already assumes the shield wall/HSM connection collapses. The shielding function of the shield wall is for personnel and public dose reduction. As described above this change would minimally reduce the overall shielding capabilities of the shield wall. The 4-1/2 inch diameter connection bolt holes were found to be structurally qualified, therefore, the connection will not affect the function of the connection or its relationship to other important to safety SSCs. Therefore, this change will not affect the frequency or possibility of a new malfunction and has minimal affect on the consequences of a malfunction of important to safety SSCs. The shielding and structural functions of the shield wall/HSM connection do not challenge the fission barrier limits. The method of evaluation for the shield wall/HSM connection is not discussed in the FSAR. Therefore, no departure from the methods are involved in this change.

Evaluation 72-03-004

Description and Basis of Change

The 61BT DSC includes the provision to install spacers at either, or both, the top and bottom of the DSC cavity. The purpose of these spacers is to reduce the end gap for shorter fuel types and to position the fuel in the center of the DSC. The DSCs were procured with top and bottom spacers to accommodate shorter fuel. The fuel selected to be loaded was longer and did not require these spacers. Therefore, the spacers were removed from these DSCs. The only difference from a DSC without spacers is the presence of 122 attachment holes (3/8 inch diameter by 0.562 inches deep) in the bottom surface of the top shield plug. The basis for this change is the fuel with spacers is too long for the DSC fuel cavity.

Evaluation Summary

The existence of the small holes in the bottom of the shield plug does not have any impact on events that control the frequency of accidents listed in the FSAR. The holes do not cause additional challenges to the design from a structural, criticality, or thermal perspective. The removal of the material reduces the overall weight of the lid, thus reducing the applied loadings to the shield plug under all load conditions. The reduction in the overall weight provides more margin to structural design limits. The absence of the material does not have any adverse impact to the overall structural strength of the lid. The lid is a passive component within the DSC and as such has no role that would increase the likelihood of a malfunction. The shield plug serves a shielding function in most FSAR analyzed accidents. The absence of the small amount of material within the shield plug results in a reduction in the ability of the shield plug to perform this function of less than 1% increase in the calculated dose rate and thus has no more than a minimal increase in the consequences of an accident or malfunction. The changes (removal of the spacer plugs and the resultant voids in the shield plug where they attached) do not create new situations in which accidents previously not considered will occur. The change does not remove redundancy or change the method of performing the design function of shielding. Since the DAEC fuel has adequate length (the reason for removing the spacers) to safely fit within the basket, and completely fill the cavity top-to-bottom, no impact is actually imparted upon the criticality barrier. As a result, the change does not cause a fission product barrier to be altered or exceeded. All analysis was performed consistent with the methods described within the FSAR.

Evaluation 72-04-001

Description and Basis of Change

This evaluation covers installation of 2 security gates installed in the transfer cask haul route. Both of the gates are part of DAEC Security requirements.

Evaluation Summary

This evaluation is for two security gates installed in the transfer cask haul route such that in the unlikely event that the cask fell from the transfer trailer the cask could fall on the security gate post (worst case scenario) along the side of the route. The FSAR states there is no reasonable way for the cask to drop from the trailer, but the FSAR includes a cask drop accident. A cask drop onto the security post would be a cask penetration type accident and the FSAR contains penetration analyses in its tornado missile accidents. The security gate does not affect the cask transfer operations unless the cask does fall on it. Therefore, the change does not result in a more than minimal increase in frequency of occurrence of a previously evaluated accident or likelihood of occurrence of a previously evaluated malfunction of an SSC important to safety. The SSC affected by this change is the transfer cask during transfer operations with a DSC filled with spent fuel. The functions affected for the cask are the structural capability and the shielding capability. The only structural impact will be additional penetration into the transfer cask. Analysis (using the FSAR penetration analysis method) shows that the additional penetration will be acceptable and not penetrate the transfer cask outer shell. The stresses induced in the cask by the security post are bound by the FSAR existing cask drop accident analysis. The cask shielding capability will be slightly impacted as a result of the cask falling on the security post. The reduction in shielding capabilities is minimal, therefore any potential increase in consequences is not more than minimal. The security post does not penetrate the transfer cask and impact upon the DSC, therefore the change does not result in a design bases limit for a fission product barrier being exceeded or altered. No change in method of evaluation is included as a function of this change.