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MULTI-CASK SEISMIC RESPONSE AT THE PSF ISFSI

DOCKETED USNRC

FOR

PSF

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OFFICE OF THE SECRETARY RULEMAKINGS AND ADJUDICATIONS STAFF

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REVIEW AND CERTIFICATION LOG

DOCUMENT NAME :	MULTI-CASK SEISMIC RESPONSE AT THE PSF ISFSI
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REVISION BLOCK

REVISION NUMBER *	AUTHOR & DATE	REVIEWER & DATE	QA & DATE	APPROVED & DATE !	DIST. x
ORIGINAL	Alan Soler A.S. 5/19/97	Scott H. Pellet SHP 5/19/97	M.PHIPPS for V.GUPTA MP 5/19/97	S. Agace S. Agace 5/19/97	C
REVISION					
REVISION					
REVISION 3					
REVISION 4					
REVISION 5					
REVISION					

This document conforms to the requirements of the design specification and the applicable sections of the governing codes.

Note : Signatures and printed names required in the review block.

* A revision of this document will be ordered by the Project Manager and carried out if any of its contents is materially affected during evolution of this project. The determination as to the need for revision will be made by the Project Manager with input from others, as deemed necessary by him.

! Must be Project Manager or his designee.

x Distribution : C : Client
M : Designated Manufacturer
F : Florida Office

*** Report category on the cover page indicates the contractual status of this document as ***
A = to be submitted to client for approval I = for client's information N = not submitted externally

THE REVISION CONTROL OF THIS DOCUMENT IS BY A "SUMMARY OF REVISIONS LOG" PLACED BEFORE THE TEXT OF THE REPORT.

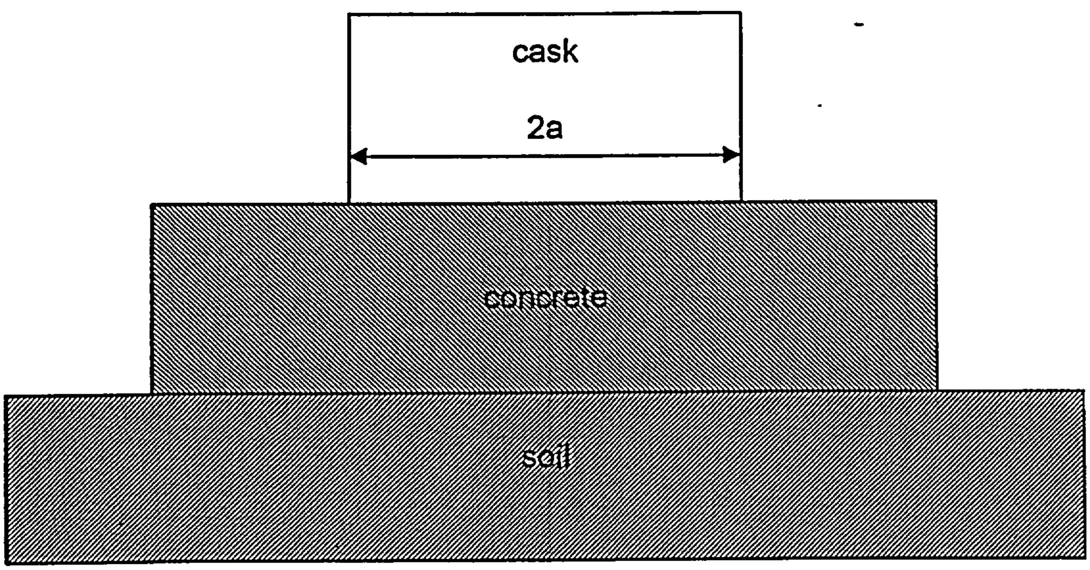
APPENDIX C CALCULATION OF SPRING CONSTANTS FOR HI-STORM SEISMIC ANALYSIS IN STORAGE FACILITY

Scope: Determine all spring rates for HI-STORM seismic model for storage scenario.

C-1.0 Spring rate for concrete contact

Conservatively use elastic spring rate based on classical solution for rigid punch on a semi-infinite half space. We neglect the effect of the underlying soil since this effect is included in the spring set representing the soil behavior. For the purpose of establishing a local spring rate for the pad resistance, the solution for a circular contact patch on a concrete half space is used. Following the reference below,

Reference: Timoshenko and Goodier, Theory of Elasticity, Third Edition, McGraw-Hill, 1970, pp. 407-409.



Properties

Concrete compressive strength

$f_c := 4000 \cdot psi$

Concrete Young's Modulus

$E_c := 57000 \cdot \sqrt{f_c \cdot psi}$ (ACI Code, 318-89, or similar)

$E_c = 3.605 \cdot 10^6 \cdot psi$

Poisson's Ratio of Concrete $v_c := .17$

Contact Patch Radius of Each Cask

$a := \frac{132.5}{2} \cdot in$ $a = 66.25 \cdot in$

$Area_t := \pi \cdot a^2$ $Area_t = 95.754 \cdot ft^2$

The spring rate for the contact between cask and concrete pad is set as

$K = (E_c (Area_t)^{1/2})/(m(1-v_c^2))$ $m := .96$

$$K := \frac{E_c \cdot \sqrt{Area_t}}{m \cdot \left(1 - v_c^2\right)} \qquad K = 4.541 \cdot 10^8 \cdot \frac{lbf}{in}$$

The resistance to the cask motion is concentrated around the periphery; therefore, if NS is the number of individual springs situated around the periphery, the value for K for each spring is

$$NS := 36 \qquad k := \frac{K}{NS} \qquad k = 1.261 \cdot 10^7 \cdot \frac{lbf}{in}$$

NUCLEAR REGULATORY COMMISSION

Docket No. ____________ Official Exh. No. 226

In the matter of ____________

Staff ____________ IDENTIFIED ✓

Applicant ✓ RECEIVED ____________

Intervenor ____________ REJECTED ____________

Other ____________ WITHDRAWN ____________

DATE 060802 Witness Soler

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