RAS 3954 **RELATED CORRESPONDENCE**

DOCKETED 02/26/02

February 25, 2002

Denise Chancellor, Esq.
Utah Attorney General's Office
160 East 300 South, 5th Floor
P.O. Box 140873
Salt Lake City, Utah 84114-0873

In the Matter of
Private Fuel Storage, L.L.C.
(Independent Spent Fuel Storage Installation)
Docket No. 72-22-ISFSI

Dear Ms. Chancellor:

Enclosed please find a copy of (1) "Summary Report on Seismic Analysis of HI-STORM 100 Casks at Private Fuel Storage (PFS) Facility," dated February 22, 2002, concerning the potential for tipover and sliding of the HI-STORM storage casks on the storage pads at the PFS Facility under 2,000 year and 10,000 year return period seismic events; and (2) the professional qualifications of Dr. Vincent K. Luk of Sandia National Laboratories, who served as the principal author of the enclosed summary report.

The enclosed documents are being produced in further response to the State of Utah's Seventeenth Set of Discovery Requests Directed to the NRC Staff, dated January 17, 2002. The Staff's initial response to that discovery request was filed on February 1, 2002.

Please be advised that the Staff is preparing a detailed report concerning the matters set forth in the enclosed summary report, and expects to be able to produce that detailed report within approximately two weeks. Further, the Staff intends to call Dr. Luk as a witness in the hearings on Contention Utah L/QQ, in support of the Staff's conclusion that sliding and tipover do not represent a concern for the proposed installation of the HI-STORM storage casks at the PFS Facility.

Sincerely,

/RA/

Sherwin E. Turk
Counsel for NRC Staff

Enclosure: As stated
cc w/Encl.: Service List

NRC Project on
Seismic Behavior of Spent Fuel Storage Cask Systems

Summary Report on
Seismic Analysis of HI-STORM 100 Casks at
Private Fuel Storage (PFS) Facility

February 22, 2002

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Summary of Seismic Analyses of Private Fuel Storage Casks

This brief report summarizes the development of the three-dimensional coupled finite element models and the seismic analysis results to examine the dynamic and nonlinear behavior of cylindrical HI-STORM 100 casks to be installed on the concrete storage pads at the Private Fuel Storage (PFS) Facility. The detailed analysis report will be issued shortly. The ABAQUS / Explicit code was used to analyze the coupled models that consist of a cylindrical cask, a flexible concrete pad, a soil-cement layer under and adjacent to the concrete pad, and an underlying layered soil foundation. The layout of the entire coupled model is shown in Figure 1. The cask is modeled as a rigid component, while the gravel, concrete pad, soil-cement and the soil are modeled as flexible linearly elastic materials. A structural damping of 5 percent critical damping was used for the analyses.

Two sets of seismic excitations were considered in the coupled model analyses using the seismic input time-histories specific to the PFS site, based on a 2,000-year and a 10,000-year return period. Each set has one vertical and two horizontal components of statistically independent seismic accelerations. For the 2,000-year return period, the peak ground accelerations (PGAs) modeled for the three components, based on artificial time histories, are 0.728 g (horizontal, east - west), 0.707 g (horizontal, north - south), and 0.721 g (vertical), which envelop the 2,000 year design basis response spectra of 0.711 g (horizontal) and 0.695 g (vertical) stated in the Staff's Safety Evaluation Report for the PFS Facility. The corresponding PGAs modeled for the 10,000-year return period are: 1.15 g, 1.15 g, and 1.33 g. A deconvolution procedure was used to adjust the amplitudes and frequency contents of the surface defined accelerations before applying them simultaneously at the base of soil foundation in the coupled model.

The coupled model has three interfaces at cask/pad, pad/soil-cement layer, and soil-cement layer/soil foundation, as shown in Figure 2. For the 2,000-year return period, three selected cases with different combinations of coefficients of friction at these interfaces were used in performing the seismic analyses. In the first two cases, a lower bound coefficient of friction of 0.20 (for investigating cask sliding) and an upper bound coefficient of friction of 0.80 (for examining the possibility of cask tipping-over) were used at the cask/pad interface while a coefficient of friction of 1.00 was assumed at the other two interfaces. In the third case, the case with a coefficient of friction of 0.20 at the cask/pad interface was re-examined by using a coefficient of friction of 0.31 at the other two interfaces. The analysis results using the 2,000-year return period and the best estimated soil profile data are summarized in Table 1.

For the 10,000-year return period, three seismic analyses were performed using the governing case of the combination of interfacial coefficients of friction as identified in Table 1. The best estimated, the lower bound, and the upper bound soil profile data were used separately in each of the three analyses. The analysis results for the cask subjected to this seismic loading are summarized in Table 2.

The separation distance between neighboring casks is 47.50 inches. Half of this distance, equal to 23.75 inches, has been regarded as the cask collision criterion. Since the maximum horizontal sliding displacement of cask for all analysis cases under investigation (15.94 inches for one case in the 10,000 year event) is smaller than this criterion, no cask collision will occur in any of these cases. In addition, the analysis results show that the maximum cask rotation about either horizontal axis is less than 1 degree, which is significantly less than the cask rotation needed for tipping over (approximately 29 degrees). Therefore, the HI-STORM 100 casks planned to be installed on the concrete storage pads at the PFS Facility are not anticipated to tip over during an earthquake return period of either 2,000 years or 10,000 years.

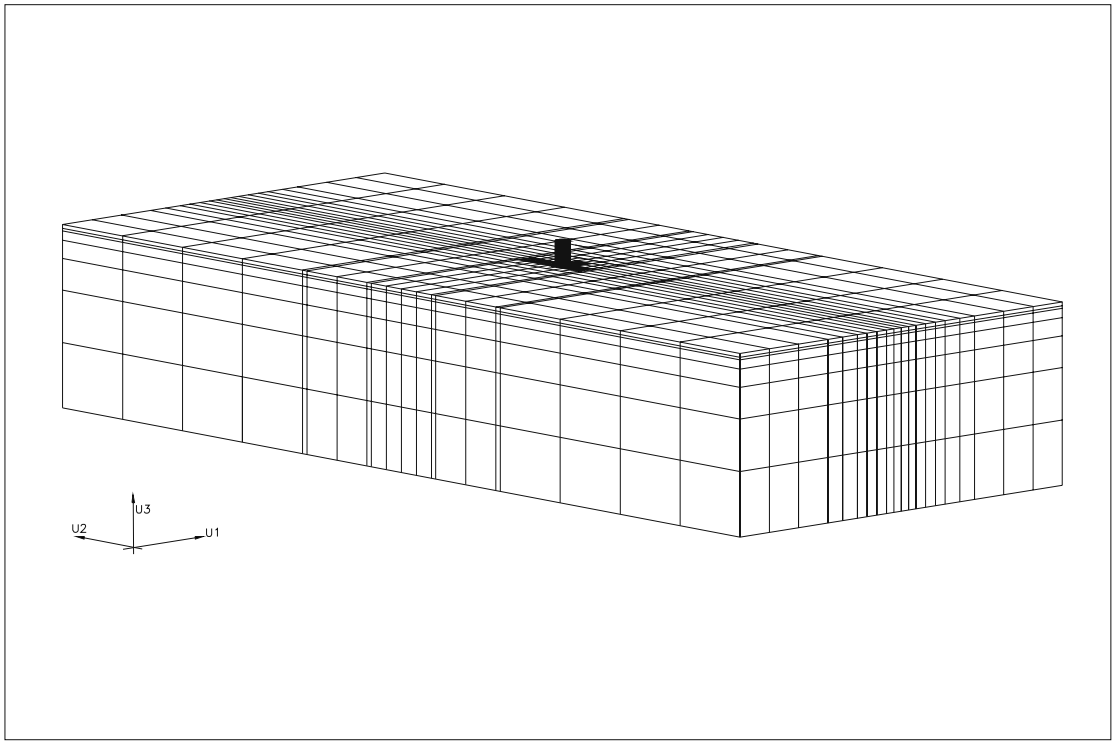

Figure 1. Layout of the Coupled Model at PFS Facilities

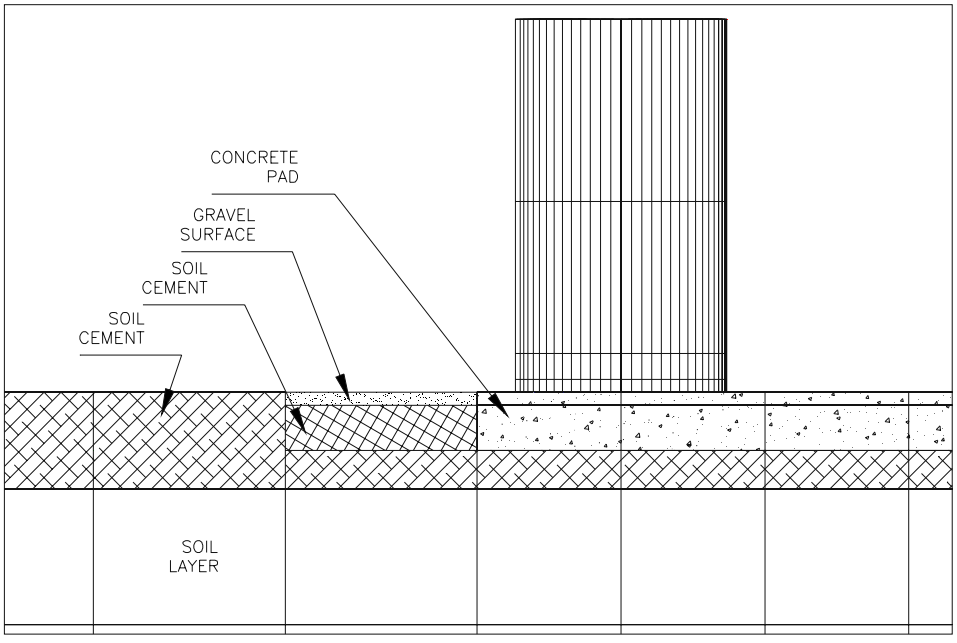

Figure 2. Detailed Interface Layout above Soil Foundation

Table 1. Summary table of seismic analysis results for Private Fuel Storage (PFS) casks subjected to 2,000-years return seismic loading

Interfacial Coefficient of Friction: μ1 at cask/pad and μ2 at pad/soil-cement layer and soil-cement layer/soil foundation	Location on Cask	Maximum Horizontal Sliding Displacement / Time				Maximum Rotational Angle (degrees)	
		U1		U2			
		in.	sec.	in.	sec.	East-West U1	North-South U2
μ1 = 0.20 μ2 = 1.00	Top	**3.01**	11.9	**2.85**	14.2	0.02	0.01
	Base	2.99	11.9	2.84	14. 2		
μ1 = 0.80 μ2 = 1.00	Top	**1.97**	11.0	**2.35**	5.6	0.22	0.40
	Base	1.46	7.9	1.10	5.7		
μ1 = 0.20 μ2 = 0.31	Top	**3.93**	12.9	**3.98**	14.2	0.02	0.01
	Base	3.92	12.9	3.96	14.2		

Table 2. Summary table of seismic analysis results for Private Fuel Storage (PFS) casks subjected to 10,000-years return seismic loading

Interfacial Coefficient of Friction: μ1=0.20 at cask/pad and μ2=0.31 at pad/soil-cement layer and soil-cement layer/soil foundation	Location on Cask	Maximum Horizontal Sliding Displacement / Time				Maximum Rotational Angle (degrees)	
		U1		U2			
		in.	sec.	in.	sec.	East-West U1	North-South U2
Best Estimated Soil Profile	Top	**9.80**	11.4	**6.78**	10.2	0.03	0.01
	Base	9.79	11.4	6.78	10.2		
Lower Bound Soil Profile	Top	**15.94**	11.5	**6.84**	9.2	0.10	0.05
	Base	15.82	11.5	6.80	9.2		
Upper Bound Soil Profile	Top	**12.19**	11.4	**6.00**	9.8	0.06	0.04
	Base	12.19	11.4	5.97	9.8		

Vincent K. Luk

EDUCATION:

Ph.D., Theoretical and Applied Mechanics, Northwestern University, 1978
M.S., Theoretical and Applied Mechanics, Northwestern University, 1975
B.S., Civil Engineering, University of Mississippi, 1974

WORK EXPERIENCE:

December 1993 to Present — Principal Member of Technical Staff
Nuclear Technology Programs Department, 6420
Sandia National Laboratories / New Mexico

- Team Leader of the Structural Analysis and Evaluation Team for an NRC Integrated Vulnerability Assessment Project. This project examines the vulnerability and structural integrity of nuclear power plants subjected to external high-energy impacts.

- Principal Investigator for the International Nuclear Energy Research Initiative (INERI) Project on "Condition Monitoring through Advanced Sensor and Computational Technology." This project is an international joint project with Korea Atomic Energy Research Institute (KAERI) of South Korea. This project focuses on developing and demonstrating advanced sensor and computational technology for continuous monitoring of the condition of components, structures, and systems in advanced and next generation nuclear power plants.

- Task Leader in the Nuclear Energy Research Initiative (NERI) Project on "Development of Advanced Technologies to Reduce Design, Fabrication and Construction Costs for Future Nuclear Power Plants." This task focuses on investigating the feasibility of developing the design-to-analysis tool to be used to enhance the efficiency of design/analysis cycle.

- Principal Investigator of an NRC project to examine the seismic behavior of freestanding dry cask storage systems subjected to earthquake excitations. In this project, coupled finite element models consisting of casks, concrete pad, and soil foundation were developed to investigate the nonlinear dynamic seismic behavior of cask systems and the soil-structure-interaction effect.

- Lead Engineer for the Steel Containment Vessel Project. This project is a part of the Cooperative Containment Program between Nuclear Power Engineering Corporation (NUPEC) of Japan and US NRC. Responsibilities include overall project management and coordination to conduct an overpressurization test of a scale model of a steel containment vessel and to perform finite element analyses to simulate model responses.

- Analysis Coordinator for NUPEC/NRC Cooperative Containment Program. Responsibilities include defining and monitoring pretest and posttest analysis tasks for simulating structural responses of scale models of steel and prestressed concrete containment vessels under severe pressure loading conditions. Additional assignments are to coordinate the Round Robin analysis activities that involve the participation of various US and international groups to perform independent analyses in pretest predictions and posttest evaluation.

April 1985 to November 1993 — Senior Member of Technical Staff
Advanced Munitions Department, 9723
Sandia National Laboratories / New Mexico

- Developed analytical penetration models based on spherical and cylindrical cavity-expansion approximations to predict dynamic loads on projectiles, projectile trajectories, and final penetration depths. Penetration problems included penetration and perforation of aluminum and steel targets, penetration of concrete and soil targets, and perforation of concrete slabs.

- Conducted laboratory-scale ballistic tests and full-scale sled-track tests.

- Team Coordinator for Penetration Technology Team, starting in 1991. Responsibilities included serving as a single point of contact for penetrator technology project activities, to interface with customers, to develop new projects and expand customer base, and to provide team networking of communication and interaction among participants of different disciplines.

- Project Manager for the MOU (Memorandum of Understanding) Tandem-Rod Kinetic Energy Projectile Project. This project involved activities from concept definition, system design and analysis, hardware design and fabrication, to the eventual system demonstration for dual penetrators as an anti-armor system.

- Project Manager for the MOU Penetration Technology Project. Principal project tasks included advancement of penetration technology in the common interests of weapon programs for DOE and DoD laboratories.

- Project Manager for the DOE/DP Penetrator Tech Base Project. Project tasks included providing penetrator technology support to the Defense Program to broaden operational options for the development of future penetrating weapons and developing computational codes as reliable weapon design tools.

January 1981 to March 1985 — Senior Staff Engineer
Engineering Mechanics Group
Franklin Research Center, Philadelphia, PA

- Performed structural analysis using finite element techniques on nuclear power plant containment vessel, condenser waterbox flange, valve/actuator assemblies, fan pedestals, and cartridge and barrel assembly of machine guns.
- Performed stress analyses, fatigue evaluation, and heat transfer analyses.
- Section Leader in an NRC project to review the feasibility and adequacy of the kinetic expansion process used to repair damaged tubes and to evaluate the performance of expanded tubes in the Once-Through Steam Generators at Three Miles Island Nuclear Power Station (TMI-1).

July 1978 to December 1980 — Stress Analyst
Joseph Oat Corporation
Camden, NJ

- Performed seismic analysis and design of heat exchangers and pressure vessels.
- Performed water-hammer analysis of piping system in heat exchangers for flow-induced vibration during start-up condition.
- Performed response spectra analysis and impact evaluation of new and intermediate fuel storage racks.
- Performed thermal fatigue analysis of tubesheets in regenerative heat exchangers.
- Project Leader in an EPRI project to conduct an experimental study on feedwater heater tube erosion; a laser doppler velocimeter was used to measure 3-dimensional turbulent flow profile inside the inlet header of a plexi-glass model of feedwater heater.

September 1974 to June 1978 — Research Assistant
Northwestern University
Evanston, Illinois

- Major fields: elasticity, fracture mechanics and solid contact problems.
- Fracture analysis of spot-welded elastic layers subjected to shear loads.
- Fracture analysis of a cylindrical cavity containing a circumferential edge crack.
- Three-dimensional stress analysis of an elastic half-space containing a partially embedded finite rod.

Awards and Honors:

Sandia National Laboratories

- Award for Excellence in November 1999 for outstanding work in executing the PCCV Round Robin Analysis task.

- 1996 President's Quality Award – Turquoise Award as a member of the NUPEC/NRC Containment Project Team.
- Award for Excellence in June 1992 for outstanding leadership of the Tandem Rod Project that resulted in high praise from the project sponsor.
- Award for Excellence in April 1993 for exceptional leadership of the EPW Tech Base Project.

Northwestern University

- Walter P. Murphy Fellowship in 1974-1975.
- Royal E. Cabell Fellowship in 1977-1978.

University of Mississippi

- Foreign Student Scholarship in 1971-1974.
- Faulkner Concrete Pipe Company Scholarship in 1972-1974.
- Recipient of Taylor Medal in Civil Engineering in 1973.
- Recipient of Taylor Medal Citation in Civil Engineering in 1974.
- President of the Student Chapter of the American Society of Civil Engineers in Senior Year.
- Recipient of the Outstanding Civil Engineering Student Award in 1974.
- Student Marshall for the School of Engineering in the 1974 Commencement.
- Chi Epsilon, Tau Beta Phi and Phi Kappa Phi

Professional Society Affiliations:

Member, American Society of Mechanical Engineers.

Journal Publications:

1. L. M. Keer and V. K. Luk, "Stress Analysis of an Elastic Layer Attached to an Elastic Half Space of the Same Material," International Journal of Engineering Science, Vol. 14, pp. 735-747, 1976.

2. L. M. Keer, V. K. Luk, and J. M. Freedman, "Circumferential Edge Crack in a Cylindrical Cavity," Journal of Applied Mechanics, Vol. 99, No. 2, pp. 250-254, 1977.

3. V. K. Luk and L. M. Keer, "Stress Analysis for an Elastic Half Space Containing an Axially-Loaded, Rigid Cylindrical Rod," International Journal of Solids and Structures, Vol. 15, pp. 805-827, 1979.

4. V. K. Luk and L. M. Keer, "Stress Analysis of a Deep Rigid Axially-Loaded Cylindrical Anchor in an Elastic Medium," International Journal for Numerical and Analytical Methods in Geomechanics, Vol. 4, pp. 215-232, 1980.

5. K. P. Singh and V. K. Luk, "An Approximate Analysis of Foundation Stresses in Horizontal Pressure Vessels," Journal of Engineering for Power, Vol. 102, No. 3, pp. 555-557, 1980.

6. K. P. Singh, M. Holtz, and V. K. Luk, "On Minimization of Rad-Waste Carry-Over in an N-Stage Evaporator," Heat Transfer Engineering, Vol. 5, Nos. 1-2, pp. 68-73, 1984.

7. M. J. Forrestal, Z. Rosenberg, V. K. Luk, and S. J. Bless, "Perforation of Aluminum Plates with Conical-Nosed Rods," Journal of Applied Mechanics, Vol. 54, No. 1, pp. 230-232, 1987.

8. V. K. Luk and M. J. Forrestal, "Penetration into Semi-Infinite Reinforced-Concrete Targets with Spherical and Ogival Nose Projectiles," International Journal of Impact Engineering, Vol. 6, No. 4, pp. 291-301, 1987.

9. M. J. Forrestal, V. K. Luk, and H. A. Watts, "Penetration of Reinforced Concrete with Ogival-Nose Penetrators," International Journal of solids and Structures, vol. 24, No. 1, pp. 77-87, 1988.

10. M. J. Forrestal and V. K. Luk, "Dynamic Spherical Cavity-Expansion in a Compressible Elastic-Plastic Solid," Journal of Applied Mechanics, Vol. 55, No. 2, pp. 275-279, 1988.

11. M. J. Forrestal, K. Okajima, and V. K. Luk, "Penetration of 6061-T6 Aluminum Targets with Spherical, Ogival, and Conical Nose Rods," Journal of Applied Mechanics, Vol. 55, No. 4, pp. 755-760, 1988.

12. V. K. Luk and M. J. Forrestal, "Comments on 'Penetration into Semi-Infinite Reinforced-Concrete Targets with Spherical and Ogival Nose Projectiles'," International Journal of Impact Engineering, Vol. 8, No. 1, pp. 83-84, 1989.

13. M. J. Forrestal, A. J. Piekutowski, and V. K. Luk, "Long-Rod Penetration into Simulated Geological Target at an Impact Velocity of 3.0 km/s," Proceedings of the 11th International Symposium on Ballistics, Brussels, Belgium, May 9-11, 1989.

14. M. J. Forrestal, V. K. Luk, and N. S. Brar, "Perforation of Aluminum Armor Plates with Conical-Nose Projectiles," Mechanics of Materials, Vol. 10, No. 1-2, pp. 97-105, 1990.

15. V. K. Luk, M. J. Forrestal, and D. E. Amos, "Dynamic Spherical Cavity-Expansion of Strain-Hardening Materials," Journal of Applied Mechanics, Vol. 58, No. 1, pp. 1-6, 1991.

16. M. J. Forrestal, N. S. Brar, and V. K. Luk, "Penetration of Strain-Hardening Targets with Rigid Spherical-Nose Rods," Journal of Applied Mechanics, Vol. 58, No. 1, pp. 7-10, 1991.

17. V. K. Luk and D. E. Amos, "Dynamic Cylindrical Cavity-Expansion of Compressible Strain-Hardening Materials," Journal of Applied Mechanics, Vol. 58, No. 2, pp. 334-340, 1991.

18. V. K. Luk and A. J. Piekutowski, "An Analytical Model on Penetration of Eroding Long Rods into Metallic Targets," International Journal of Impact Engineering, Vol. 11, No. 3, pp. 323-340, 1991.

19. M. J. Forrestal, V. K. Luk, Z. Rosenberg, and N. S. Brar, "Penetration of 7075-T651 Aluminum Targets with Ogival-Nose Rods," International Journal of solids and Structures, Vol. 29, No. 14/15, pp. 1729-1736, 1992.

20. M. J. Forrestal and V. K. Luk, "Penetration into Soil Targets," International Journal of Impact Engineering, Vol. 12, No. 3, pp. 427-444, 1992.

21. Y. Xu, L. M. Keer, and V. K. Luk, "Elastic-Cracked Model for Penetration into Unreinforced Concrete Targets with Ogival Nose Projectiles," International Journal of Solids and Structures, Vol. 34, No. 12, pp. 1479-1491, 1997.

22. Y. Xu, L. M. Keer, and V. K. Luk, "Stress Properties at the Tip of a Conical Notch," International Journal of Solids and Structures, Vol. 34, No. 12, pp. 1531-1546, 1997.

23. L. M. Keer, Y. Xu, and V. K. Luk, "Analysis of High Speed Axially Symmetric Cutting for Stripping Peripheral Coating," Journal of Manufacturing Science and Engineering, Vol. 120, No. 1, pp. 185-191, 1998.

24. L. M. Keer, Y. Xu, and V. K. Luk, "Boundary Effects in Penetration or Perforation," Journal of Applied Mechanics, Vol. 65, No. 2, pp. 489-496, 1998.

Conference Proceedings and Presentations:

1. G. K. Haritos, L. M. Keer, and V. K. Luk, "Two and Three Dimensional Stress Analysis of an Elastic Half Space Containing a Partially Embedded Finite Rod," presented at the 15th International Congress of Theoretical and Applied Mechanics, Toronto, Canada, August 18-22, 1980.

2. M. J. Forrestal, M. M. Hightower, V. K. Luk, and B. K. Chritensen, "Penetration and Perforation of Reinforced-Concrete Targets," Proceedings from the Workshop on Weapon Penetration into Hard Targets, Norwegian Defense Research Establishment, May 30-31, 1988.

3. V. K. Luk, J. Hickerson, A. E. Hodapp, and A. D. Foster, "System Development of a 120-mm Tandem-Rod Kinetic Energy Projectile," Proceedings of the Second Ballistics Symposium on Classified Topics, Johns Hopkins University, October 26-29, 1992.

4. J. D. Cargile, M. E. Giltrude, and V. K. Luk, "Perforation of Thin Unreinforced Concrete Slabs," Proceedings of the Sixth International Symposium on Interaction of Nonnuclear Munitions with Structures, Panama City Beach, Florida, May 3-7, 1993.

5. T. Matsumoto, K. Takumi, Y. Kobayashi, M. Fujii, S. Nakajima, J. F. Costello, W. A. von Riesemann, M. B. Parks, M. F. Hessheimer, and V. K. Luk, "Plan on Test to Failure of a Steel, a Prestressed Concrete and a Reinforced Concrete Containment Vessel Model," Proceedings of the 13th International Conference on Structural Mechanics in Reactor Technology, Vol. VI, pp. 89-94, Porto Alegre, Brazil, August 13-18, 1995.

6. V. K. Luk, M. F. Hessheimer, T. Matsumoto, K. Komine, and J. F. Costello, "Testing of a Steel Containment Vessel Model," Proceedings of the 14th International Conference on Structural Mechanics in Reactor Technology, Vol. 5, pp. 73-79, Lyon, France, August 17-22, 1997.

7. T. Matsumoto, K. Komine, S. Arai, V. K. Luk, M. F. Hessheimer, and J. F. Costello, "Preliminary Results of Steel Containment Vessel Model Test," Proceedings of the 14th International Conference on Structural Mechanics in Reactor Technology, Vol. 5, pp. 81-87, Lyon, France, August 17-22, 1997.

8. R. A. Dameron, Y. R. Rashid, V. K. Luk, and M. F. Hessheimer, "Preliminary Analysis of a 1:4 Scale Prestressed Concrete Containment Vessel Model," Proceedings of the 14th International Conference on Structural Mechanics in Reactor Technology, Vol. 5, pp. 89-96, Lyon, France, August 17-22, 1997.

9. V. K. Luk, M. F. Hessheimer, V. L. Porter, T. Matsumoto, and J. F. Costello, "Results of 1:10 Scale Steel Containment Vessel Model Test," SMiRT 14 Post Conference Seminar, Saclay, France, August 25-26, 1997.

10. R. A. Dameron and V. K. Luk, "Preliminary Assessment of Potential Liner Tearing Near the Equipment Hatch of a 1:4 Scale PCCV," SMiRT 14 Post Conference Seminar, Saclay, France, August 25-26, 1997.

11. T. Matsumoto, K. Komine, J. F. Costello, V. K. Luk, and M. F. Hessheimer, "Pressurization Test of a 1/10 Steel Containment Vessel Model," Proceedings of the Workshop on Severe Accident Research in Japan (SARJ-97), pp. 210-218, Yokohama, Japan, October 6-8, 1997.

12. D. W. Pace, M. F. Hessheimer, V. K. Luk, R. A. Dameron, M. Iriyama, and J. F. Costello, "Preliminary Analysis and Instrumentation of a Prestressed Containment Vessel Model," Proceedings of the Workshop on Severe Accident Research in Japan (SARJ-97), pp. 219-224, Yokohama, Japan, October 6-8, 1997.

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14. V. K. Luk, J. S. Ludwigsen, M. F. Hessheimer, K. Komine, T. Matsumoto, and J. F. Costello, "Results of Steel Containment Vessel Model Test," Proceedings of 1998 ASME/JSME Joint Pressure Vessels and Piping Conference, PVP-Vol. 362, pp. 177-188, San Diego, California, July 26-30, 1998.

15. R. A. Dameron, Y. R. Rashid, V. K. Luk, and M. F. Hessheimer, "Investigation of Radial Shear in the Wall-Base Juncture of a 1:4 Scale Prestressed concrete Containment Vessel Model," Proceedings of 1998 ASME/JSME Joint Pressure Vessels and Piping Conference, PVP-Vol. 362, pp. 189-198, San Diego, California, July 26-30, 1998.

16. V. K. Luk, M. F. Hessheimer, K. Komine, M. Iriyama, T. Matsumoto, and J. F. Costello, "Steel Containment Vessel Model Test: Results and Evaluation," Proceedings of the 15th SMiRT Conference, Vol. VI, pp. 267- 274, Seoul, Korea, August 15-20, 1999.

17. V. K. Luk, E. W. Klamerus, M. F. Hessheimer, K. Komine, M. Iriyama, T. Matsumoto, and J. F. Costello, "Round Robin Analyses of the Steel Containment Vessel Model," Proceedings of the 15th SMiRT Conference, Vol. VI, pp. 203-210, Seoul, Korea, August 15-20, 1999.

18. J. S. Ludwigsen, V. K. Luk, M. F. Hessheimer, T. Matsumoto, K. Komine, and J. F. Costello, "Posttest Analyses of the Steel Containment Vessel Model," Proceedings of the 15th SMiRT Conference, Vol. VI, pp. 219-226, Seoul, Korea, August 15-20, 1999.

19. V. K. Luk, J. A. Smith, S. K. Shaukat, R. M. Kenneally, R. A. Dameron, Y. R. Rashid, and V. P. Sobash, "Seismic Analysis of Evaluation of Spent Fuel Dry cask Storage Systems," Transactions, SMiRT 16, Paper # 1369, Washington DC, USA, August 12-17, 2001.
20. V. K. Luk, E. T. Eager, D. M. Mattson, L. D. Gerdes, and J. M. O'Connell, "Development of an Automated Design-to-Analysis Process for a Nuclear Power Plant," Transactions, SMiRT 16, Paper # 1904, Washington DC, USA, August 12-17, 2001.

21. M. F. Hessheimer, V. K. Luk, E. W. Klamerus, S. Shibata, S. Mitsugi, and J. F. Costello, "Pretest Round Robin Analysis of 1:4-Scale Prestressed Concrete Containment Vessel Model," Transactions, SMiRT 16, Paper # 1305, Washington DC, USA, August 12-17, 2001.

22. R. A. Dameron, Y. R. Rashid, V. K. Luk, and M. F. Hessheimer, "Pretest Analysis of a 1:4-Scale Prestressed Concrete Containment Vessel Model," Transactions, SMiRT 16, Paper # 1271, Washington DC, USA, August 12-17, 2001.

SAND Reports:

1. R. W. Ostensen, E. S. Hertel, C. W. Young, and V. K. Luk, "Evaluation of the Missile Threat for the NPR-HWR Containment," SAND 90-3256, 1991.

2. A. D. Foster, R. C. Henry, J. Hickerson, A. Hodapp, R. A. LaFarge, and V. K. Luk, "System Development of a 120-mm Tandem-Rod Kinetic Energy Projectile," SAND 93-1818, 1995.

NUREG Reports:

1. V. K. Luk and E. W. Klamerus, "Round Robin Pretest Analysis of a Steel Containment Vessel Model and Contact Structure Subject to Static Internal Pressurization," NUREG/CR-6517, 1998.

2. V. K. Luk and E. W. Klamerus, "Round Robin Posttest Analysis of a Steel Containment Vessel Model," NUREG/CR-5678, 2000.

3. J. S. Ludwigsen, V. K. Luk, and M. F. Hessheimer, "Posttest Analysis of the Steel Containment Vessel Model," NUREG/CR-6649, 2000.

4. V. K. Luk, M. F. Hessheimer, G. S. Rightley, L. D. Lambert, and E. W. Klamerus, "Design, Instrumentation and Testing of a Steel Containment Vessel Model," NUREG/CR-5679, 2000.

5. V. K. Luk, "Pretest Round Robin Analysis of a Prestressed Concrete Containment Vessel Model," NUREG/CR-6678, 2000.

Thesis and Dissertation:

1. "Fracture Analysis of a Spot Welded Elastic Layer in Shear," M.S. Thesis, Northwestern University, August 1975.

2. "Elastostatic Load-Diffusion Characteristics of Embedded Axially-Loaded Cylindrical Structures," Ph.D. Dissertation, Northwestern University, June 1978.