

## RESUME

**SAM A. KIGER, PhD, PE, F.ASCE**  
Associate Dean for Research  
C.W. La Pierre Distinguished Professor  
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College of Engineering  
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### EDUCATION

Ph.D., Theoretical and Applied Mechanics, University of Illinois-Urbana, 1972

M.S., Theoretical and Applied Mechanics, “”, 1967

B.S., Engineering Mechanics (with High Honors), “”, 1966

### PROFESSIONAL REGISTRATION

Licensed Professional Engineer

### SECURITY CLEARANCE

Yes, security credentials are available on request.

### EXPERIENCE

**June 2007-Present:** College of Engineering Associate Dean for Research, CW LaPierre Distinguished Professor of Engineering, and Director and Director of the Center for Explosion Resistant Design, University of Missouri-Columbia.

**September 2005-June 2007:** C.W. La Pierre Distinguished Professor of Engineering, and Director of the Center for Explosion Resistant Design, University of Missouri-Columbia.

**October 1996 to 2005:** Chairman and C.W. La Pierre Distinguished Professor of Civil & Environmental Engineering and Director of the Center for Explosion Resistant Design, University of Missouri-Columbia.

**November 1989 to October 1996:** Chairman and Professor, Department of Civil and Environmental Engineering, West Virginia University (WVU), Morgantown, WV.

**July 1973 November 1989:** Research Structural Engineer, Army Engineer Research and Development Center, Vicksburg, Mississippi.

**February 1970 to July 1973:** Assistant Professor of Civil Engineering, Oklahoma State University, Stillwater, OK.

Dr. Kiger is one of the foremost experts in the world on explosion effects and blast resistant structural design. On Oct 28, 2008 he was awarded a Lifetime Achievement Award in Shock and Vibration Effects “for outstanding contributions and leadership in the community, and for profound contributions in blast resistant design”. In 1985 Kiger was recognized as the US Army Corps of Engineers Researcher of the Year for his work in explosion resistant structural analysis and design. He has authored or co-authored numerous (over 100) technical papers and reports and he is the principal author of the US Army Technical Manual, TM5-855, “Fundamentals of Protective Construction”. Kiger is a Fellow of the American Society of Civil Engineers (ASCE); previous chairman of the ASCE Technical Committee on Shock and Vibratory Effects, Past President of the WV Section of ASCE; and a member of the National Research Council’s Committee for Oversight and Assessment of Blast Effects and Related Research.

## MAJOR CONTRIBUTIONS

1. **Developed procedures to calculate the vulnerability of shallow buried structures to nuclear weapons.** These methods included, for the first time, the effects of dynamic soil-structure interaction and resulted in a significant revision (up to a 10-fold increase) in official estimates of hardness of strategically important targets. This research also resulted in the realization that much harder protective structures could be designed. Repercussions from this research were increased efforts to improve the targeting accuracy of U.S. nuclear weapons, improved designs for US and NATO command and control facilities, and a research program to develop very hard silos to protect U.S. nuclear missiles.
2. **Developed new failure criteria for reinforced concrete structures.** Previous criteria were based on civilian construction and estimated failure at ductility of about 10. The new failure criteria corresponds to ductility of about 300, and are based on allowable deflection to span ratios or maximum allowable support rotations. These new failure criteria are now widely used in the military targeting and protective design communities, and are adopted in the Army Manual TM5-855-1, "Fundamentals of Protective Design".
3. **Counterterrorist Work for White House Special Projects Office and US Secret Service.** Performed vulnerability surveys and analysis on several nationally prominent structures and worked on terrorist and explosion protection of personnel at the highest levels of our government, 1987-1992.
4. **Developed procedure to calculate in structure shock from conventional weapons.** This procedure was developed for the underground command center for Headquarters Supreme Allied Powers Europe, Brussels, Belgium, and adopted in the Army Manual, TM5-855-1, "Fundamentals of Protective Design," 1986. This procedure was also adopted by the US Navy for the design of the Kings Bay Trident Reentry Body Complex, Kings Bay, GA 1985. Previous procedures, based on nuclear weapons and earthquake response methods, greatly overestimated in structure shock from the localized effects of a conventional weapon. The new procedure predicts an order of magnitude lower shock levels than the old procedures and greatly reduces the expense of shock isolation for shock sensitive equipment in command and control structures.
5. **Designed and tested the first reinforced concrete structure for total containment of an accidental explosion.** This structure, in the Kirtland Underground Munitions Complex, is a maintenance bay designed to contain all by-products from an accidental detonation of over 400-lb of high explosives. Developed and directed design verification tests utilizing a Special Forces team to simulate terrorist attack. This design established new reinforcement design methods for opening moments and specifies non combustible interior wall coatings in containment structures.
6. **Training courses developed and taught.** Over the past 7 years Dr. Kiger has developed and taught a series of training courses on explosion effects and blast design to protect from potential terrorist bombing. This course has been taught over 15 times and more than 1,000 practicing engineers and first responders, including several from international locations, have participated in this training. Since the tragic events on 9-11 this training has had a significant impact on training practicing engineers and government first responders to better understand and protect the public from explosion effects. In the mid 1970's the Corps of Engineers established a requirement that a dynamic analysis must be used for all Corps structures designed to resist earthquakes. This replaced a policy that stipulated a quasi-static analysis. Dr. Kiger developed and taught a series of training courses in structural dynamics (2 weeks), earthquake engineering (5 days), and explosion resistant design (5 days), and almost all structural engineers in the Corps attended one or more of these courses over the 14 year period 1974-1988. Also, many engineers from other government agencies participated in this training. These courses had a broad and lasting impact in training a generation of government engineers in the fundamentals of structural dynamics and in promoting the use of new technology for earthquake engineering and explosion resistant design.

## AWARDS

1. **Lifetime Achievement Award In Shock and Vibration**, “for outstanding contributions and leadership in the community”, presented at the 79<sup>th</sup> Shock and Vibration Symposium on October 28, 2008 in Orlando, FL. The award citation reads: “The Shock and Vibration Information Analysis Center (SAVIAC) Lifetime Achievement Award is presented to Dr. Sam A. Kiger in highest recognition of his accomplishments in the field of dynamic structural response to weapons effects. It fully recognizes his profound contributions toward blast resistant design, soil-structure interaction, in-structure shock, and other topics central to the proper design of protective structures subjected to weapons effects. Even further, it commends his foresight and diligence while teaching these skills to a new generation of engineering talent, providing an unusual element of timelessness to a highly distinguished career.”
2. Elected a **Fellow of the American Society of Civil Engineers**, October 2009.
3. Recognized by the Society of American Military Engineers with the “**Engineers Make a World of Difference Award**”, for research leadership in government and in universities; Fort Leonard Wood, MO February 23, 2008.
4. Recognized as a “**Distinguished West Virginian**” from Governor Gaston Caperton, September 1996, for “Outstanding Achievement and Meritorious Service” to the State of West Virginia.
5. **Special Service Award from the Flexible Pavements Council of West Virginia**, September 1996, “In appreciation of his leadership, commitment and faithful service to his students and members of the engineering and construction industries in West Virginia”.
6. **Outstanding Faculty Participation Award** from ASCE/Chi Epsilon Students at West Virginia University “In Recognition of Outstanding Participation Associated with Student Activities”, 1994.
7. U.S. Army Corps of Engineers, “**Researcher of the Year**” for 1985 for “An analytical method that allows for much harder and more economical structures than was previously thought possible”. I was the first recipient of this prestigious award.
8. **Director's Research and Engineering Achievement Award**, U.S. Army Engineer Waterways Experiment Station, for “Improving computational procedures related to vulnerability/hardness of shallow buried structures subjected to conventional and nuclear weapons”, 1978.
9. **A medal for Scientific Achievement** and Certificate of Outstanding Achievement, for a paper presented at the 1978 Army Science Conference. Also received a Special Service Award and a Letter of Congratulations from James E. Spates, Acting Chief, Research and Development, Office Chief of Engineers for this award-winning paper, 1978.
10. **Department of the Army Special Service Award** for developing, directing, and serving as principal instructor for the Corps training course “Earthquake Engineering,” 1975. This 5-day training course was taught several times at various locations to train Corps engineers in dynamic analysis procedures for earthquake resistant design.
11. **NASA Fellowship** recipient at the University of Illinois for the years 1966-1970.
12. **Designated a James Scholar in Engineering**, awarded to the top three percent of the undergraduate engineering students at the University of Illinois, 1964-1966.
13. The **Annual Award for Excellence in Mathematics**, Morton Junior College, June 1964.
14. Member of the Honor Societies: Tau Beta Pi (Engineering), Pi Mu Epsilon (Mathematics), and Phi Kappa Phi (University).
15. Received ten consecutive annual **Exceptional Performance Ratings** for my last 10 years with the federal government, plus about 30 **Performance Awards and Special Service Awards** during my service with the federal government.

## SIGNIFICANT PROJECTS (A Partial List)

1. **White House office of Special Projects**, 1989-1992. I performed vulnerability analyses

- of several nationally prominent structures and designed retrofit concepts to improve blast resistance.
2. **US Secret Service**, 1987-89: I served as an expert consultant in the development of automated procedures to assess the vulnerability of VIP's staying in temporary quarters like hotel rooms and developed test platforms for high explosive testing of blast resistant vehicles.
  3. **Key Worker Blast Shelter Designs**, 1985-88. Sponsor: Federal Emergency Management Agency, Washington, DC. I was program manager and responsible for developing concept design and design verification tests, developing guidance on backfill specifications, concrete and steel strength parameters, depth-of-burial, in structure shock, and radiation environment for 18-, 100-, and 400- person blast shelters. At the time, the construction of up to 20,000 of these shelters was planned.
  4. **NATO Full-Scale Structures Tests**, 1985-88. Sponsor: Air Force Engineering and Services Center, Tyndall AFB, Fl. I proposed and directed this test series. A full-scale structure incorporating the existing NATO standard design along with several proposed new design concepts in different walls was constructed. The structure included a basement, a variety of blast doors and blast valves along with equipment shock isolation devices that were currently being used in NATO structures. A total of 11 full-scale tests using general purpose bombs were conducted to evaluate existing NATO design criteria, blast door and blast valve performance, equipment shock isolation methods, new design concepts, and upgrade retrofit concepts.
  5. **Aircraft Shelter Weapon Storage Vault**, 1986-87. Sponsor: Defense Nuclear Agency, Washington, DC. I was responsible for analysis and design modifications for a weapon storage vault in the shelter floor. The vault was to withstand and remain accessible after an accidental detonation of all bombs on a fully loaded bomber inside the shelter. The vault was also designed to survive and remain accessible after the worst case burning of a fully loaded fuel tanker inside the shelter.
  6. **Kirtland Underground Munitions Complex**, 1983-86. Sponsor: Defense Nuclear Agency, Washington, DC. I was responsible for the design and design verification tests of a weapon maintenance bay to completely contain an accidental explosion. I also designed and directed field tests to evaluate shock and blast parameters in one storage bay from a simulated accident in an adjacent bay. Finally, I conceived and directed tests to evaluate and improve security from terrorist attacks against the complex.
  7. **Kings Bay Trident Reentry Body Complex**, Kings Bay, GA 1985. Sponsor: Naval Civil Engineering Laboratory (NCEL), Port Hueneme, CA. I was responsible for developing all soil-structure interaction and in structure shock design guidance for the Design Criteria Document published by NCEL.
  8. **Pantex Building 12-84 Weapon Assembly Bays**, 1983-84. Sponsor: US Department of Energy, Albuquerque Operations Office. I conceived and directed an experimental program using simulated accidental explosions in full-scale and half-scale structural tests to verify separated-bay design concept and safety of personnel from blast and debris in the event of an accident at the weapon assembly plant at Pantex, TX. Data from these experiments were used to develop new design criteria which were used to design and build new facilities.
  9. **Saudi Command Center Design**, 1980-1984. Sponsor: Corps of Engineers, Middle East Division. I was responsible for developing preliminary designs for four command centers for the Royal Saudi Ministry of Defense, Air Force, and two Navy centers. My responsibilities included specification of structural dimensions, structural materials, depth of burial, backfill specifications, calculation of in structure shock, access tunnel design, blast valve specifications, and acting as the expert consultant to insure integrity of blast resistance at all design review meetings.
  10. **NASA Control Room Design**, 1981. Sponsor: NASA Lewis Research Center, Cleveland, OH. I was responsible for evaluating the safe design limits for an existing observation and data collection control room at a rocket test facility and designing an additional control room adjacent to the existing room to be equally secure. Finally, I developed and

presented a seminar for NASA engineers and safety personnel explaining the design procedure used and rationale for personnel safety during a postulated accident.

11. **Shallow-Buried Structures Test Program**, 1975-1985. Sponsor: Defense Nuclear Agency, Washington, DC. I conceived and directed a program investigating survivability and vulnerability of shallow-buried command and control type structures. I developed several new design concepts and vulnerability analysis procedures that have had a significant impact on targeting and basing of US nuclear forces. I was designated the Corps of Engineers Researcher of the Year in 1985 for my work on this research program.
12. **Project 85: Design of Underground Command Center for Headquarters, Supreme Allied Powers Europe, Brussels, Belgium**, 1975-80. Sponsor: Defense Nuclear Agency, Washington, DC. I designed and conducted field tests to develop and verify structural design concepts. Also, I developed criteria for soil-structure interaction, procedures for calculating in structure shock, and criteria for designing equipment shock isolation.
13. **Underwater Blast Demolition at the Old River Control Structure**, near Natchez, Mississippi, 1974. Sponsor: New Orleans District, Corps of Engineers. Due to major flooding on the Mississippi River the control structure suffered extensive damage and was in danger of failing. Part of the structure (a 1,000 ft long 50 foot high wing wall) had failed and was partially blocking the main stream flow; resulting in significant erosion under the control structure. During emergency underwater demolition to remove the failed wing wall Dr. Kiger monitored the explosive induced dynamic structural response of the nearby control structure, evaluated of the response data, and determined the maximum allowable explosive charge size the contractor could safely use in the demolition.

#### **RECENT FUNDED RESEARCH PROJECTS:**

1. Response of Curtain Wall Architectural Envelopes to Negative Phase Blast: University of Kentucky/Department of Homeland Security, \$160,000; January 2009-December 2012; Kiger PI.
2. Blast Vulnerability and Mitigation Technology for Suspension and Cable Stayed Bridges, US Army Engineer Research and Development Center (ERDC); \$156,000; 09/01/2007-05/31/2010; Kiger PI. Program sponsor for ERDC is the US Department of Homeland Security.
3. Blast Mitigation Technologies: Blast Effects and Blast Remediation, Air Force Research Laboratory, \$263,000, April 2008 – September 2009, (PI: Salim, Co-PIs: Kiger and Orton).
4. Blast Protection Measures for Weapons Storage Vaults: Idaho National Laboratory, \$37,465, May 07-September 08, Kiger PI.
5. Vulnerability Assessment and Mitigation Against Explosions; US Department of Transportation/Iowa State University Midwest Transportation Consortium Duration; \$81,110; 03/01/2007-03/28/2008; Kiger PI, Co-PI; Hani Salim
6. Bridge Vulnerability Assessment and last Mitigation: Experimental Validation of Structural Response to Blast Loading; \$25,000; California Dept of Transportation; 04/01/07-06/30/07; Kiger PI, Co-PI; Hani Salim; Scope; to investigate vulnerability of box girder bridges to explosive attack by terrorist.
7. Transportation Security and Blast Mitigation for Large Close-in Explosions, Protecting Bridges from Terrorist Bombs; \$170,000; US Department of Transportation; 09/04/06-09/30/08; Kiger PI, Co-PI; Hani Salim
8. Blast Mitigation Using Sacrificial Walls; US Air Force Research Laboratory; \$115,000; 09/01/06-09/30/08; Sam Kiger PI, Co-PI; Hani Salim

9. Blast Testing & Research, Bridge at the Tenza Viaduct ; US Secretary of Defense Technical Support Working Group (TSWG) ; \$30,250; 01/14/05-02/13/06; Sam Kiger, PI. Scope; to serve as program advisor; participate in a one-week workshop in Naples, Italy; and to co-author a bridge vulnerability guide.
10. Blast Mitigation Technologies: Blast Barriers, Department of the Air Force, \$345,953, April 2005 – October 2007; Co-PIs: Kiger, Salim, Chen: PI Uddin (Department of Architectural Studies, MU).
11. Analytical and Experimental Evaluation of Infill Wall Systems Under Static Pressure – DOD/Army Corps of Engineers, Engineer Research and Development Center, \$294,817, September 2001 – September 2003. (PI: Kiger; co-PI: Salim).

### **Consulting Activities:**

1. Expert Consultant for Garver Engineering, Little Rock, AR to do a blast analysis, recommend any necessary design modifications, and prepare a report for the roof of the design for a new Visitors Center at Tyndall, AFB, OK; December, 2009.
2. Expert Consultant for Coreslab, OK to do a blast analysis, recommend any necessary design modifications, and prepare a report for the prestressed concrete walls in the design for a new Visitors Center at Tyndall, AFB, OK; December, 2009.
3. Expert Consultant to SIAC for an independent assessment of the proposed design for the Bechtel-Parsons Blue Grass Chemical Agent-Destruction Pilot Plant (BPBGCAPP) Munitions Demilitarization Building (MDB); Sept 08-present.
4. Expert consultant on explosion effects and blast resistant structural design to Cromwell Architects Engineers, Little Rock, AR on the new design for the Jackson Barracks in New Orleans; 2007-present.
5. Expert consultant for R. Stresau Laboratory, Inc.; Spooner, Wisconsin. Conducted an analysis of a postulated explosive accident in a small press room at a new R&D Laboratory to predict the consequences of this accidental explosion in terms of structural damage and potential injury to occupant of the laboratory. I provided a report documenting my analysis. February-March, 2007.
6. Expert Consultant to National Aeronautics and Space Administration's Goddard Space Flight Center, Greenbelt, MD. To Provide an analysis and final report on safety of high pressure proof testing of fuel and oxidizer tanks on the Solar Dynamics Observatory (SDO) Propulsion Subsystem, 3/06-11/06.
7. Expert consultant to Northrop Grumman IT (NGIT) serving on the Modeling Assessment Group (MAG) in support of the Defense Threat Reduction Agency (DTRA) and US Strategic Command (STRATCOM). The MAG serves as an advisory group to the DTRA and STRATCOM program directors for the Tunnel Target Defeat (TTD) Advanced Concept Technology Demonstration (ACTD). May 2003-2007.
8. Expert Consultant to National Aeronautics and Space Administration's Marshall Space Flight Center, Huntsville, AL. Provided an analysis and final report on safety of a planned impact test range that will utilize two high pressure gas guns to propel explosive and non-explosive projectiles, up to 30 mm in diameter, to test the destructive effects of the projectiles on various materials and assemblies. Analyzed the fragment and blast hazards associated with these experiments. Also analyzed safety of explosives stored on site, 2005.
9. Expert consultant on explosion effects and blast resistant structural design to Cromwell Architects Engineers, Little Rock, AR. Provided explosion resistant design recommendations and a report documenting design guidance and calculations in support of the design Dental Clinic expansion at Ft Irwin, CA following Unified Facilities Criteria-DOD Minimum antiterrorism Standards for Buildings, 2005.
10. Expert consultant to Kier Group, UK on blast resistant designs for a dormitory and a Family Support Center located at the RAF airbase in Lakenheath, UK. Responsible for all blast resistant design guidance and provided final report documenting blast design for the design submittal, 2004-05.

11. Expert consultant to Entergy Operations, Inc. on retrofit blast protection designs for Arkansas Nuclear One Power Plant in Russellville, AR, 2004.
12. Expert consultant to Cromwell Architects Engineers, Little Rock, AR. Provided explosion resistant design recommendations and a report documenting design guidance and calculations in support of the design of a new commissary facility in San Diego, CA. The design is consistent with Unified Facilities Criteria-DOD Minimum antiterrorism Standards for Buildings, 2003.
13. Expert consultant to the Black & Veatch Corporation, Kansas City, MO, on various designs and design reviews for blast protection. 2000-present.
14. Expert consultant on explosion effects and blast resistant structural design to Cromwell Architects Engineers, Little Rock, AR. Provided preliminary design recommendations for an Air National Guard facility required to meet the new Unified Facilities Criteria-DoD Minimum antiterrorism Standards for Buildings. November 2002 to March 2003.
15. Expert consultant to Garver Engineering, Inc., Little Rock, AR, on a blast analysis and recommended retrofit design concepts for a baggage claim expansion project at the Little Rock International Airport, January 2002- March 2003.
16. Murrah Federal Building Bombing in Oklahoma City, April 19, 1995. Consultant to ICI Explosives, Inc. during a civil action on blast related damage to the Murrah Building, 1997-98
17. Expert consultant to the Quaker State Oil Corporation on the design of in-ground waste treatment tanks during a civil action; Quaker State vs. the U.S. Government, 1995-1997.
18. Montana Rail Link Accident in 1989, Helena, Montana. Served as an expert consultant quantifying the effects from the explosion of a tank car of hydrogen peroxide following the accident. The energy released in this explosion was equivalent to about 100 tons of TNT, 1993-1997.
19. Development of blast and fragment hazard criteria for the DOE. "A Manual for the Prediction of Blast and Fragment Loadings on Structures," DOE/TIC 11268, was published February 1992.
20. The development and computerization of the design manual Army TM 5-1300, Navy NAVFAC P-397, Air Force AFR 88-22, "Structures to Resist the Effects of Accidental Explosion," dated November 1990. I was the Corps of Engineers representative on the oversight committee for the manual development. The personal computer version of this 6-volume manual is now fully operational.

#### **Advisory/Workshop Activities:**

1. Member of the Department of Homeland Security Blast Mitigation Advisory Group, Nov 2007-present.
2. Member of Technical Oversight Committee for the US Army Engineer Research and Development Center on a project to evaluate vulnerability of reinforced concrete cable-stay bridge towers; June 2007-present.
3. **Stabilization of Buildings Workshop**, August 25-27, 2009. Hosted by the US Department of Homeland Security, participation by invitation only; hosted at the US Army Research and Development Center in Vicksburg, MS.
4. **Workshop on "Explosion Effects and Structural Design for Blast"**, the Structural Engineering Institute of the American Society of Civil Engineers invited me to organize and teach this workshop in conjunction with the 2005 Structures Congress, St Louis, MO, May 2005. There were about 100 participants.
5. **Workshop on "Protecting People from the Effects of Terrorist Bombs,"** sponsored by the National Research Council at the National Academy of Sciences, Washington, DC, November 28-30, 2000. Dr. Kiger was one of four co-organizers of this workshop. About 70 participants representing all relevant national agencies attended the workshop. Attendance was by invitation only.

6. **Workshop on “Innovations for Lock Navigation,”** sponsored by the US Army Corps of Engineers, Vicksburg, MS, December 4-7, 2000. About 50 Corps engineers participated. Dr. Kiger served as one of four workshop facilitators.
7. **Workshop on “Explosion Resistant Retrofit Concepts for Infill Masonry Walls,”** sponsored by the US State Department, Albuquerque, NM, October 18-22, 1999. About 50 national and international experts met (by invitation only) to develop retrofit concepts. Dr. Kiger was paid by the US Dept of State to serve as one of two workshop facilitators.
8. **“Graybeard Structures Workshop,”** sponsored by the Defense Threat Reduction Agency, Kirtland AFB, NM, July 28-31, 1998. About 100 experts participated in this workshop, by invitation only. The purpose of the workshop was to record and archive information on the effects of nuclear weapons. Dr. Kiger served as a workshop session panel member/speaker for two of the sessions.
9. **Workshop on “Blast Mitigation for Structures, Translating Research into Practice”**, sponsored by the National Research Council at the National Academy of Sciences in Washington, DC, September 25, 1997. Participation was by invitation only.
10. **Workshop Instructor for “Design of Structural Slabs under Impulsive Loads,”** sponsored by the Norwegian Construction Defense Service,” Trondheim, Norway, June 14-16, 1993.
11. U.S. State Department Building Design Criteria. Served as advisor and consultant on several projects to develop safe distances for barriers to prevent approach of car or truck bombs, to test and develop blast resistant glass and glazing, develop blast resistant retrofit designs, and to develop designs for receiving rooms to minimize personnel injury for internal explosions, 1980-1995.

**Short courses developed and taught for practicing engineers include:**

1. **Explosion Effects and Blast Resistant Design**, Developed and taught a 2-day training course; taught about 14 times since 2004. Locations include: Albuquerque, NM, Nov 3-4, 2009; St Louis MO, April 14-15, 2009; San Antonio, TX, Dec 9-10, 2008; Washington, DC, July 22-23, 2008; St Louis, MO, March 3-4, 2008 and July 30-31, 2007; Atlanta, GA, Feb 21-22, 2007; Chicago, IL, June 15-16, 2006; Virginia Beach, VA, Feb 22 and 23, 2006; Huntsville, AL, Sept 27- 28, 2005; St Louis, MO, February 28 and March 1, 2005; BWI Airport near Washington, DC, August 13-14, 2004; St Louis, MO, March 8-9, 2004.
2. **Explosion Effects and Blast Resistant Design**, a 3-day training course developed and taught for the US Navy NAVFAC in San Diego, CA, April 12-14, 2005.
3. **Structural Dynamics and Blast Design AT/FP Training Course**. Sponsor: Virginia Society of Professional Engineers, Virginia Beach, VA. About 180 engineers and architects participated, 5 days, April, 2002
4. **Blast Resistant Design, AT/FP Training Course**. Sponsor: Southern Division NAVFAC Engineering Command, Charleston, SC. About 30 NAVFAC engineers participated, 5 Days, 2001.
5. **Blast Resistant Structural Design** Sponsor: Oak Ridge Associated Universities Students: Structural Engineering Professors (presented at Boulder, CO). About 35 professors participated, 5 days, 1993.
6. **Blast Protective Design**, 1992. Sponsor: Federal Emergency Management Agency. Students: FEMA Engineers and Consultants (presented at Emmitsburgh, MD. About 50 participants, 10 days
7. **Design of Civil Defense Structures**. Sponsor: Singapore Ministry of Development. Students: About 60 government engineers and consultants (presented in Singapore). Duration: 5 days, 1991.
8. **Protective Construction Seminar**; sponsor: US Air Force Europe. About 100 Air Force

- safety personnel and engineers participated at Ramstein AFB, Germany, 3 days, 1987
9. **Blast Resistant Structural Design**, taught once each year, 1986-1988, 5 days/course. Sponsor: Corps of Engineers. Students: Structural engineers from various government agencies, 1986-88.
  10. **Earthquake Engineering**, taught once each year, 5 days/course. Sponsor: Corps of Engineers. Students: Government Structural Engineers, 1975-1985.
  11. **Structural Dynamics**, taught one or two times each year, 2 weeks/course Sponsor: Corps of Engineers. Students: Government Structural Engineers (mostly Corps), 1974-1986

Over a 12 year period between 1974 and 1986 Dr. Kiger trained a generation of government structural engineers in structural dynamics and earthquake engineering to help them meet the requirement that all Corps of Engineer projects must use a dynamic analysis for earthquake resistant design.

### **PROFESSIONAL SOCIETY ACTIVITIES**

Member – National Research Council Committee for Oversight and Assessment of Blast Effects and Related Research, 1999-2003

**National Society of Professional Engineers**, Member

**Missouri Society of Professional Engineers**, Member

- Chair, Missouri Professional Engineers in Education Practice Division
- Co-Chair, Kimmel Program Committee

**American Society of Civil Engineers (ASCE), Fellow and Life Member**

- Charter Member of the Engineering Mechanics Institute
- Member of the Bridge and Tunnel Security Committee  
Chair of Sub-Committee on Structural Hardening
- President of the West Virginia Section of ASCE, 1994-1995
- Member of the Editorial Board of Structures Journal, ASCE, 1986-1989
- Chairman of the ASCE Shock and Vibratory Effects Committee, 1986-1989
- Member of the Advisory Committee, ASCE 1995 Civil Engineering Education Conference; Denver, Colorado, June 8-11, 1995.
- Prepared the initial proposal to ASCE, helped organize, and co-chaired the ASCE Specialty Conference, "Structures for Enhanced Physical Security and Safety," Washington, DC, 8-10 March 1989.

**American Society of Military Engineers**, Member

- Member, Committee for Advancement of Technology
- Member, Select SAME Committee to lead in naming the Technology Advancement Medal

**Organized and served as co-chairman of the 57th Shock and Vibration Symposium, New Orleans, LA, 14-16 October 1986.**

Organized and served as chairman or co-chairman of numerous technical sessions at national and international conferences, workshops, and symposia.

### **LIST OF PUBLICATIONS**

1. James Ray, Sam Kiger, Bob Walker, and James O'Daniel; "Hardening of Steel Structural Members against Vehicle Bomb Threats"; accepted for publication in the Shock and Vibration Journal of Critical Technologies (A Classified Publication).
2. S.A. Kiger and H. Salim; Contract Report, "*Solar Dynamics Observatory Proof Pressure Test Evaluation*", for NASA Goddard Space Flight Center, Greenbelt, MD, November 29, 2006
3. W.N. Marianos and S.A. Kiger, "*Best Practices Guide for Identifying Potential Threats to Bridges*", June 06. Published by the Technical Support Working Group (TSWG) Training and Technology Development Subgroup, P.O. Box 16224, Arlington, VA 22215-1224;. Distribution of this document is restricted by TSWG to Federal, State, and local government; and other bridge owners and

operators. June 2006.

4. Zhen Chen, Bryan Bewick, Hani A. Salim, Sam A. Kiger, Robert J. Dinan, and Wenqing Hu; A PC-Based Tool for Coupled CFD and CSD Simulation of Blast-Barrier Response; Proceedings of the ASCE Structures Congress, St Louis, MO, May 2006.
5. S.A. Kiger, et.al., Protecting People and Buildings From Terrorism, Technology Transfer for Blast-effects Mitigation, Final Report from the National Research Council Committee for Oversight and Assessment of Blast-effects and Related Research, The National Academy Press, Washington, DC, 2001.
6. S.A. Kiger and H.A. Salim, "The Use and Misuse of Structural Damping in Blast Response Calculations," American Concrete Institute SP-175, Concrete and Blast Effects, pp. 121-130, 1998.
7. H.A. Salim, J.F. Davalos and S.A. Kiger, "A Shear-Deformation Series Solution for Design Analysis of FRP Composite Deck-and-Stringer Bridges," Proceedings of the Second International Conference on Composites for Infrastructure, NSF and University of Arizona, Tucson, AZ, Vol. 1, pp. 578-592, 1998.
8. M.A. Gabr, J. Wang, and S.A. Kiger, "Pile Buckling Capacity and Corresponding First Modes," Proceedings of the Fifth Pan American Congress of Applied Mechanics, San Juan, Puerto Rico, January 2-4, 1997.
9. H.A. Salim, J.F. Davalos, P.Z. Qiao, and S.A. Kiger, "Analysis and Design of Fiber Reinforced Plastic Composite Deck-and-Stringer bridges," Journal of Composite structures, 38(1-4): 295-307.
10. E.J. Barbero, J.F. Davalos, S.A. Kiger, and J.S. Shore, "Reinforcement with Advanced Composite Materials for Blast Loads," Proceedings of the ASCE Structures Congress XV, Portland, OR, April 13-16, 1997, pp. 663-667.
11. A.P. Ohrt, S.A. Kiger, and M.A. Gabr, "Effects of Blast Loading on Geogrid-Reinforced Earth" Proceedings of the Seventh International Symposium on Interaction of the Effects of Munitions with Structures, NATO Closed Session No. 3, Mannheim, Germany, April 24-28, 1995, pp. 115-121.
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