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January 9, 1997

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Reply to the Notice of Violation, Inspection Report 70-01374/96-01.

Dear Madam/Sir:

In compliance of the provisions of 10 CFR 2.201, enclosed is our reply to the notice of violation resulting from NRC inspection 70-01374/96-01 of Materials License No. SNM-1373. As discussed in our reply, full license compliance will be achieved when approval of our proposed license amendment is granted by NRC. This amendment will be submitted to NRC by February 1, 1997.

Please feel free to contact me at (208) 236-2902 regarding any questions you may have concerning this matter.

Sincerely yours,

Dr. Jay F. Kunze, Ph.D., P.E., CHP
Dean and Professor

cc: Administrator, Region IV

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**REPLY TO A NOTICE OF VIOLATION
IDAHO STATE UNIVERSITY**

This is the reply to the Notice of Violation issued to Idaho State University (ISU) in the Nuclear Regulatory Commission (NRC) Inspection Report 70-01374/96-01 on Materials License SNM-1373 pursuant to the provisions of 10 CFR 2.201.

Item A: Violation 01374/9601-01: Failure on two occasions to perform required contamination and leak tests prior to operation of the subcritical assembly.

1. Reason for violation: The Reactor Supervisor (RS) at the time of the first infraction forgot that leak tests and contamination surveys were required prior to each operation of the subcritical assembly, and the faculty member who operated the subcritical assembly at that time was unaware of these requirements. At the time of the second infraction, the same faculty member, who was at the time the Acting RS, was still unaware that leak tests and contamination surveys are required prior to each use of the subcritical assembly. All personnel involved were aware of the requirements to perform semiannual leak tests of the fuel plates and uranium foils and monthly contamination surveys of Room 23. These tests and surveys had been completed within required periodicity prior to the two occasions that the subcritical assembly was operated.

2. Corrective actions taken and results achieved: All current personnel with operational responsibilities for the subcritical assembly have been trained on and are aware of the requirements to perform (1) leak tests on 10 percent of the fuel plates and uranium foils, and (2) general area contamination surveys of Room 23 prior to each operation of the subcritical assembly. New personnel will be similarly trained. In addition, the Reactor Administrator (RA) has assumed administrative responsibility and final authority for operation of the subcritical assembly. He will personally verify completion of required leak tests and contamination surveys before authorizing operation of the subcritical assembly.

3. Corrective actions that will be taken to avoid further violations: An amendment to Materials License No. SNM-1373 will be requested to give final authority for operation of the subcritical assembly to the RA. The RA will establish written operating procedures that will include steps for ensuring that the required leak tests and general area surveys are performed prior to each operation of the subcritical assembly. The RA will verify completion of the leak tests and contamination surveys prior to authorizing operation of the subcritical assembly.

4. Date when full compliance will be achieved: The proposed request for amendment to Materials License No. SNM-1373 will be drafted, reviewed internally, and submitted to NRC by February 1, 1997. A general operating procedure for the subcritical assembly is being prepared for implementation by February 1, 1997. An application for renewal of License No. SNM-1373, which expires October 31, 1997, will be submitted later (in the Spring of 1997). Full compliance will be achieved when the NRC approves the requested amendment to Materials License No. 1373.

Item B: Violation 01374/9601-02: Failure to notify the NRC and obtain approval through a license amendment before designating new individuals to serve in positions identified in the materials license application as having direct responsibility for operation of the subcritical assembly.

1. Reason for violation: The RA and RS were aware that individuals directly responsible for the operation of the subcritical assembly are identified by name in the application for renewal of Materials License No. SNM-1373. The RA and RS were also aware of the fact that the NRC had been promptly notified in writing of all staffing changes affecting the positions specified in the application. These notifications, however, were submitted to NRC with respect to the operation of the AGN-201 nuclear reactor, License No. R-110, Docket No. 50-284. The RA and RS incorrectly believed that such notification concerning the reactor license was sufficient to demonstrate the qualifications of personnel responsible for operating the ISU Nuclear Facility equipment governed by the SNM license. It was not clear that a separate license

amendment was required for the operation of the subcritical assembly.

2. Corrective actions taken and results achieved: The NRC is hereby notified that individuals with direct responsibility for the operation of the subcritical assembly area as follows:

Jay F. Kunze, Ph.D., P.E., CHP, Dean and Professor,
College of Engineering - the Institutional
Representative

John S. Bennion, Ph.D., P.E., SRO, NRRPT, Assistant
Professor, Reactor Administrator

Thomas F. Gesell, Ph.D., Professor of Health
Physics, Radiation Safety Officer

Biographical data describing the technical qualifications of these individuals have been appended to this response.

3. Corrective actions that will be taken to avoid further violations: An amendment to Materials License No. SNM-1373 will be requested to give direct responsibility for operation of the subcritical assembly to the RA, the College of Engineering Dean, and the ISU Radiation Safety Officer (RSO), and the individuals currently holding these positions (named above) will be identified by name in the amendment. In addition, in the event of turnover in any of these positions, NRC approval to designate a successor will be obtained promptly via the required request for license amendment.

4. Date when full compliance will be achieved: The proposed request for amendment to Materials License No. SNM-1373 will be drafted, reviewed internally as designed in 3 above, and submitted to NRC by February 1, 1997. Full compliance will be achieved when the NRC approves the requested amendment to Materials License No. SNM-1373.

JAY Frederick KUNZE

Dean and Professor of Engineering
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Pocatello, Idaho 83209
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3488 Desert View Ct.
Pocatello, ID 83201-8015
208-238-9385

EDUCATION

Doctor of Philosophy (Ph.D.) in Nuclear Physics (1959)
Master of Science (M.S.) in Physics (1955)
Bachelor of Science (B.S.) in Engineering Physics, minor in Mechanical Engineering (1954)
All of the above from Carnegie Institute of Technology (now Carnegie-Mellon University),
Pittsburgh, PA

LICENSES/CERTIFICATIONS

Licensed Professional Mechanical Engineer in Missouri (21035), Idaho (2124), Utah
(4864-0948-3), Nevada (5601), California (22628), New Mexico (8044), Colorado (18167)
(The last four are not current.)

Certified Health Physicist - American Board of Health Physics, 1992 -

PROFESSIONAL EXPERIENCE

1995 - present. Dean and Professor of the College of Engineering at Idaho State University.
The College of Engineering consists of 350 undergraduate students, 60 graduate students,
17 full-time faculty. The program is ABET-accredited
1993 -1995. Professor (R.L.Tatum Engineering Chair), Nuclear Engineering Program, Director
of Health and Medical Physics Options.
1983 - 1993 University of Missouri - Columbia, Chairman and Robert Lee Tatum professor of
Nuclear Engineering Program, an all-graduate program in the College of Engineering. The
program has approximately 60 graduate students, six full-time faculty, and nine part-time
affiliate faculty. Degree programs are in general nuclear power engineering, health physics
emphasis, and medical physics emphasis at the MS level. PhD degree is in Nuclear Engineering,
with various emphasis areas permitted. Personal research has included upgrading the power
capability of the current 10-MW research reactor, fusion energy research, thermalhydraulic
nuclear safety analysis, practical health physics research, laser enrichment of medical isotopes,
and general energy analysis, including a small peak power mitigation experimental project.

Service work for various organizations in the state of Missouri has been provided. 1985 to present: member, research Reactor Advisory Committee (10 MW, 6×10^{14} thermal flux reactor, operates 95% capacity factor, employs 120 full time, plus 50 part-time students). Chairman of Reactor Safety Subcommittee, 1988 to present.

PROFESSIONAL EXPERIENCE (CONTINUED)

1978 - 1983, Energy Services, Inc., Idaho Falls, ID. General Manager/President of consulting engineering firm engaged in development of geothermal and bio-mass energy projects, in energy conservation for large public buildings, and on research and development for advancing the state-of-the-art in ground water heat pump applications. Operated in the intermountain area, with seven employees, and professional engineering services sales of approximately \$0.5 million per year, which supported typically \$2.5 million per year in construction projects. (Affiliated with Forsgren Engineering, Rexburg, Pocatello, Salt Lake City, Wenatchee.)

1975 - 1978, EG&G - Idaho, Idaho Falls, ID. Manager of Advanced Energy Projects at Idaho National Engineering Laboratory. Initiated and directed \$20 million research and developed programs in geothermal, solar, hydroelectric, and in industrial energy conservation. Directed annual research expenditures of approximately \$8 million, and a geothermal construction project at Raft River Test Site of nominally \$20 million.

1970 - 1975, Aerojet Nuclear Co., Manager of Reactor Technology, involving calculational work on all major reactors at main Idaho National Engineering Laboratory complex, and operation of four critical experiments. Staff included 50 reactor physicists, engaged in code development, basic cross section data improvement, design of new experiments, as well as calculation of routine reactor operational parameters.

1969 - 1970, University of Utah, Associate Professor of Mechanical Engineering and Director of Nuclear Engineering Program (a sabbatical appointment, on leave from Idaho National Engineering Lab). A supporting undergraduate program, particularly for the Navy NESEP program, and graduate students with associated research in use of newly available Cf-252, neutron activation analysis, and reactor safety studies. Subsequently assisted in the licensing and installation of a 100 kw TRIGA reactor.

1962 - 1969, General Electric Co., Idaho Test Station. Manager of Nuclear Engineering, Space Nuclear Propulsion Projects, involving development of high temperature nuclear reactors for space electric power and space propulsion using hydrogen propellant and coolant. Directed the first full scale UF_6 critical experiment in simulated gas core configuration. Supervisor of Low Power Test Facility, with two critical experiment reactors.

1961 - 1962, General Electric Co., Manager of Analysis for SL-1 special accident recovery

operation, National Reactor Testing Station. Involved examination and analysis of the evidence, reconstruction of the accident sequence, scale model re-creation tests to reproduce the accident.

1958 - 1961, General Electric Co., Idaho Test Station. Reactor Engineer, Aircraft Nuclear Propulsion Project, involving advanced state-of-art high temperature reactor technology, special ceramic moderator and structure, and new control methods using rare-earth isotopes. Certified reactor operator.

1955 - 1958, Carnegie-Mellon University, Graduate Research Assistant.

1954 - 1958, University of Pittsburgh, telescope operator for 40" refractor telescope parallax observation research program, and public lecturer.

OTHER ACADEMIC AFFILIATIONS (prior to University of Missouri)

Visiting Associate Professor, Mechanical Engineering, University of Utah 1969-70. Director of Nuclear Engineering Program, both undergraduate and graduate (M.S. and Ph.D.)

Evening Graduate School Faculty, University of Idaho, 1959-83. Teaching graduate school engineering courses and directing of M.S. and Ph.D. thesis research.

Adjunct Associate Professor, Mechanical Engineering, University of Utah, 1970-1980.

Committee assignments for thesis research. Participation in licensing, construction and start-up of TRIGA research reactor.

University of Idaho College of Engineering Advisory Board, Member from 1975 - 1982, and Chairman of Board from 1979 to 1981.

CONSULTING (not including consulting work while president of Energy Services, Inc.)

Union Electric Co., St. Louis, Nuclear Safety Review Board, consultant and alternate member, 1985 to present.

Consultant to Corporate Radiation Safety Committee, 1990 to present.

Ellis Fischel State Cancer Center, Columbia, MO., member of Institutional Review Board, 1986 to 1990

Oak Ridge Association of Universities, Review and Selection Committee for U.S. Dept. of Energy Nuclear Engineering and Health Physics Fellowships, 1988, 1989

Argonne National Laboratory, advisory group for nuclear engineering education for the Integrated Fast Reactor Project, 1989.

State of Idaho, advisory panel for PhD program in Nuclear Engineering, 1989

PROFESSIONAL ORGANIZATION AFFILIATIONS

American Nuclear Society, elected Fellow in 1976. Member since 1959.

Board of Directors, 1978-81

Chairman, Central East Missouri Section, 1987-89 (V.Chm. 1986-87)

Chairman of Alternative Energy Division, 1979-80 (previously V.Chm.)
Chairman of Reactor Physics Division, 1974-75 (Previously V.Chm. & Sec'y)
Public Information Committee, 1975-78.

PROFESSIONAL ORGANIZATION AFFILIATIONS

American Nuclear Society (continued)

Chairman, Topical Meeting for Remote Systems Technology, 1969

Program Committee, 1965-68

Chairman, Eastern Idaho Section, 1965 (previously V.Chm. & Sec'y)

Treasurer, 1963 Annual Meeting, Salt Lake City, Utah.

Chairman of the Nuclear Engineering Department Heads Organization
1993 - 1994

National Society of Professional Engineers - Member since 1970

Chairman, NRTS Chapter - 1973-74

American Society of Mechanical Engineers, member of Advanced Reactors Comm. and Public
Information Chairman, 1986 - 1990

Secretary of Advanced Reactors Comm., 1990-1992

Vice Chair of Advanced Reactors Committee, 1992-1994

Chairman, Advanced Reactors Committee, member Nuclear Engineering Div., operating
committee, 1994 to 1996

American Society of Heating, Refrigeration, and Air-Conditioning Engineers -
Member since 1978

Health Physics Society - plenary member since 1990, American Academy of Health Physics,
since 1992

American Physical Society - Member since 1954

American Association of Physicists in Medicine - Member since 1987

American Society for Engineering Education - Member since 1985

Nuclear Engineering Division, Chairman, 1989-90, Program Chairman 88-89, Secretary
1987-88

Geothermal Resources Council - Member 1974 to 1993

Board of Directors - 1978-81

Chairman of Publications Committee - 1978-82

International Society for Neutron Capture, member since 1992

American Association for Advancement of Science

Sigma Xi - Member since 1957

INTERNATIONAL PROFESSIONAL ACTIVITIES

United States representative to the International Energy Agency (Paris) and to the NATO

Committee for Concerns of a Modern Society, from 1974-1977, on geothermal energy,
specializing in direct-heat-applications.

Led scientific eclipse expeditions to Labrador (1954) and Sudan (1955) for Georgetown Univ. for accurate eclipse timing under a USAF contract.

Nuclear reactor design consultant to the Institute of Nuclear Energy Research, Taiwan (Republic of China), summer of 1983.

HONORS, AWARDS, FELLOWSHIPS

Tau Beta Pi - 1953

Sigma Xi - 1957, member to present time

American Nuclear Society - "Best Paper Award", Aerospace Division - 1972

American Nuclear Society - Elected to Fellow - 1976

Professorial Chair, Robert L. Tatum Engineering Prof., Univ. of Missouri, 1983 to present.

CURRENT RESEARCH INTERESTS

- a) Health physics effects of contamination adsorbed, and later released from the surface of spent fuel shipping casks.
- b) Gas Core/Aerosol Core Nuclear Reactors for fission driven laser applications. Nuclear design and thermal hydraulic analysis for cooling of high temperature operations.
- c) Thermal hydraulic and nuclear analysis of normal and accident conditions for up-graded power level of Univ. of Missouri Research Reactor.
- d) Accelerator moderator system design for boron neutron capture (cancer) therapy treatment.
- e) Expert system applications to nuclear reactor operation.
- f) Thermal storage to mitigate peak loads while Increasing electric utility capacity factors by providing cost-effective storage systems for residential and small commercial HVAC systems.
- g) Analysis of low levels of man-made radioactivity in domestic sewage.
- h) Laser isotope enrichment methods applied to medical radioisotope production

RECENT TEACHING ASSIGNMENTS/INTERESTS

Nuclear Fuel Cycle/Radioactive Waste Management (graduate)

Physics of Diagnostic Radiology (graduate)

Physics of Radiation Therapy (graduate)

Magnetic Resonance Imaging and Ultrasound (graduate)

Energy Systems and Resources (senior/graduate)

Radiation Protection (graduate)

Law-Engineering Environmental Seminar (graduate, joint with Law School)

THESES DIRECTED AND ADVISED BY JAY F. KUNZE (Principal Advisor)

Kumuduni Kulasekere, MS, Nuclear Engineering, 1994, "A Calculation Using 'QAD' to Evaluate Gamma Dose Rates Produced by Accelerator-based Neutron Sources for BNCT"

Nicholas Schaff, MS, Nuclear Engineering, 1993, "Radiation Effects vs. Public Perception"

Earl Dietrich, MS, Nuclear Engineering, 1993, "Treatment Machine Quality Assurance for Medical Accelerator"

Yi Lee, MS, Nuclear Engineering, Analysis Using New Implementation Procedures for the DISNEL Code"

- George Vosnidis, MS, Nuclear Engineering, 1993, "Determining Parts per Trillion Content of Non-radioactive Metal Ions in Spent Fuel Pool Water"
- Esmail Parsai, MS, Nuclear Engineering, 1993, "Acceptance Testing and Performance Evaluation of a Philips Gyroscan Magnetic Resonance Imager"

THESES DIRECTED AND ADVISED BY JAY F. KUNZE (cont.)

- Vernon Shanks, MS, Nuclear Engineering, 1993, "Makeup Water Treatment Plant Evaluation, Sequoyah Nuclear Plant, Tennessee Valley Authority"
- James Rehfeld, MS, Nuclear Engineering, 1992, "Thermal Energy Storage Winter Operation at the MU Horticultural Research Center"
- Anthony Hanlin, MS, Nuclear Engineering, 1992, "Optimizing Design Characteristics Involving Operational Stability of a Gas-Core Nuclear Rocket"
- Wei-Wu (William) Chao, PhD, Nuclear Engineering, 1992, "Benchmark Experiments and Calculations on Convective Boiling in Narrow Channels"
- Terry H. Wu, PhD, Nuclear Engineering, 1992, "A Low Energy Accelerator-Based Neutron Source for Neutron-Capture Therapy"
- D. Jay Moreno Jalandoni, MS, Medical Physics emphasis in Nuclear Engineering, 1992, "An Experiment to Evaluate Calculations for the Design of an Accelerator for Boron Neutron Capture (Cancer) Therapy"
- Tod Moser, MS, Nuclear Engineering, 1992, "Expert System Characterization of the Callaway Plant Flow Anomaly"
- Haijo Jung, MS, Health Physics emphasis in Nuclear Engineering, 1992, "Accumulation of Cs-137 and K-40 in Trees as Measured in Wood Ash"
- Weimin Dai, MS, Nuclear Engineering, 1992, "Dissolved Air Effects in Narrow Vertical Channels/Experimental Verification Related to MURR"
- James Nurrenbern, MS, Medical Physics emphasis in Nuclear Engineering, 1991, "Investigation of Radionuclides Release from Shipping Cask Surfaces"
- Robert Maurer, MS, Nuclear Engineering, 1991, "Thermal Energy Storage Summer Operation at MU Horticultural Center"
- Charles Hansford, MS, Nuclear Engineering, 1991, "Thermal Energy Storage Demonstration Project Design for the MU Horticultural Research Center"
- David A. Smith, MS, Health Physics emphasis in Nuclear Engineering, 1990, "Effectiveness of Decontamination Methods on Shipping Cask Surfaces"
- Kang (Kevin) Huang, MS, Nuclear Engineering, 1990, "Thermal Hydraulic Benchmark Experiment"
- Kevin Reaves, MS, Health Physics emphasis in Nuclear Engineering, 1990, "Investigation of Environmental Weeping of Radioactive Contamination from the Surface of Spent Nuclear Fuel Shipping Casks"
- Kang Lu, MS, Nuclear Engineering, 1990, "Environmental Testing of Surface Contamination on Shipping Casks"
- Zhong, Guan, MS, Medical Physics emphasis in Nuclear Engineering, 1990, "Brachytherapy Isodose Distribution Calculation with QAD and Modulex RTP File"
- Albert Daume, MS, Nuclear Engineering, 1989, "Reduced Primary Water Inventory Operations for Commercial PWR Reactors"
- Vincent A. Miles, MS, Physics, 1989, "A Stability Study of the Coaxial Flow Gas Core Cavity Nuclear Rocket Engine"
- Alan Bako, MS, Medical Physics emphasis in Nuclear Engineering, 1989, "Investigative Effect of Static Magnetic Field Upon Cerebral Blood Flow in Rats Using HMPAO as a Monitoring Agent"
- Thomas P. Sharkey, MS, Nuclear Engineering, MU, 1989, "Design Basis Review of Callaway Plant Liquid Radwaste Effluent Radiation Monitor"

THESES DIRECTED AND ADVISED BY JAY F. KUNZE (continued)

- Chida Tseng, MS, Nuclear Engineering, Univ. of Missouri, 1988, "Verification of Wedge Angles with 6 and 15 MeV Photon Beams."
- Wun-Jin Lin, MS, NE, Univ. of Missouri, 1988, "Acceptance Test of Siemens Mevatron MD Linear Accelerator at Ellis Fischel State Cancer Center"
- Jan-Li Wang, Ph.D., Nuclear Engineering, University of Missouri, 1987, "MURR 30 MW Power Upgrade LOCA Analysis Using RELAP5/MOD2"
- Jae-Kon Shin, MS, Nuclear Engineering, Univ. of Missouri, 1987, "DISNEL 19-group Diffusion Code for IBM-PC and Compatibles."
- Phil Bennett, MS, Univ. of Missouri, 1987, "Robotics Applications to Remote Reprocessing Cells."
- Dheya Alothmany, MS, Nuclear Engineering (Health Physics), 1987, "High Level Nuclear Waste Storage for Saudi Arabia."
- Luis Granados, MS, Univ. of Missouri, 1987, "Reactor Safety Analysis for the RP-10 Peru Research Reactor."
- John M. Freeman, MS, Nuclear Engineering, UMC, 1985, "Mechanical Design of a 4-Tesla Magnetic Cusp Experiment."
- Michael S. Lesnet, MS, Nuclear Engineering, UMC, 1985, "Loss of Coolant Accident Analysis for MURR Upgrade."
- Chun Liu Hwang, M.S., Nuclear Engr., UMC, 1984, "Decay Heat and Radiation from Spent Fuel for MURR Upgrade." THESES WHICH WERE DIRECTED AND ADVISED BY JAY F. KUNZE (continued)
- Jan Li Wang, M.S., Nuclear Engr., UMC, 1984, "Analysis of Loss of Flow Accident for MURR Upgrade."
- Richard Brenton, M.S., Mechanical Engr., Univ. of Idaho, 1961, "Power Increase Analysis from 1 to 2 MW for Pool Reactor Convective Cooling."
- Arthur Lovell, PhD, Metallurgy, Univ. of Idaho, 1965, "Radiation Damage in Inconel Alloys."
- James M. Byrne, MS, Mechanical Engr., Univ. of Utah, 1968, "Neutron Lifetime Measurements in Fast Reactor Assemblies."
- Paul MacBeth, M.S., Physics, Brigham Young Univ., 1970, "Flow Stabilization in a Gas Core, Plasma Reactor."
- Melvin Johnson, MS, Mechanical Engineering, Univ. of Idaho, 1962, "Heat Exchanger Design for Forced Convective Flow Conversion of Nuclear Reactor"
- Farrell Sims, MS, Physics, Univ. of Idaho, 1962, "Reactor Parameter Measurements in Hot Critical Experiment."
- Dennis Goldman, Ph.D., Hydro-Geology, Univ. of Idaho, 1982, "Modelling of the Raft River Geothermal Resource. (co-director of research)."
- George Bakevitch, M.S., Physics, Univ. of Idaho, 1973, "Neutron Radiography of Irradiated Fuel Elements."
- Robert H. Dart, MS, Mechanical Engineering, Univ. of Idaho, 1976, "Analysis of Medium Temperature Fluid for the Production of Electricity."

CURRENT (May 1996) THESIS RESEARCH BEING DIRECTED:

Three PhD students from University of Missouri - studying various aspects of radioactive contamination adsorbed on, and later released from, the surfaces of spent fuel shipping casks, boron neutron capture therapy, hormesis of ionizing radiation, gas-core rocket engine operability.

CREATIVE ACTIVITY

U.S. Patent #3,888,733, Fluidized Bed-Nuclear Reactor (with E.A. Grimmett)

PUBLICATIONS

The following are full length refereed journal articles, as a principal author, unless indicated as co-author.

- Wei-Wu Chao, Jay F. Kunze, Weimin Dai, S.K. Loyalka, "Dissolved Gas Desorption Effects in Narrow Channels of a Research Reactor", Nuclear Technology, 105, p.201, February 1994.
- (co-author) Wu, Terry H., R.M. Brugger, and J.F.Kunze, "Low Energy Accelerator-based Neutron Source for Neutron Capture Therapy", Advances in Neutron Capture Therapy, edited by A. Soloway et al, p.105, (Pergamon, 1993)
- Miles, V.A. and J.F. Kunze, "Stability Study of Co-Axial Gas Core Nuclear Rocket," Space Nuclear Power Systems, VII, Vol. 1, January 1990, Univ. of New Mexico.
- Wang, J.L. and J.F. Kunze, "Using the RELAP5/MOD2 Code Under Low Pressure/Low Temperature LOCA Conditions", Nuclear Technology, 85, p.285, June 1989.
- Gu, G., Kunze, J.F., Boody, F.P., and Prelas M.A., "A UF₆-Fueled Visible Nuclear-Pumped Flashlamp", To be published in Space Nuclear Power Systems, M.S. El-Genk and M. Hoover, editors, Orbit Book Co., 1989.
- (co-author) Gu, G-X, Prelas, M.A., Kunze, J.F., et al, "Neutronics Considerations of Nuclear Pumped Laser/Reactor Concepts", Space Nuclear Power Systems, Editors: M.S. El-Genk and M. Hoover. Orbit Book Co. (1988).
- (co-author) Prelas, M.A., E.L. Leal-Quiros, J.F.Kunze, et. al, "Magnetic Cusp Contours & Measured ECRH Surfaces", Fusion Technology, 1989.
- Kunze, J.F., Prelas, M.A., Dolan, T.J., et al, "Design Study and Supporting Experiments for an Axially Symmetric Anchor for a Tandem Mirror", Fusion Technology, 10, p.1034 (Nov. 1986).
- (co-author) Gu, G.X., Prelas, M.A., and Kunze, J.F., "Studies of an Aerosol Core Reactor/Laser's Critical Properties", Laser Interactions and Related Phenomena, Vol. 7, Editors H. Hora and G. Miley, 603, Plenum Publishing Co., 1986.
- (co-author) Prelas, M.A., Kunze, J.F., and Boody, F.P., "A Compact Aerosol Core Reactor/Laser Fueled with Reflective Micropellets", Laser Interactions and Related Phenomena, Vol. 7, Editors H. Hora and G. Miley, 143, Plenum Publishing Co., 1986.
- Kunze, J.F. and Gould, R.W., "Low Temperature Geothermal Heating Systems in Two Greenhouse Facilities", American Society of Heating, Refriger., and Air Conditioning Engineers, Vol. 88, June 1982, TO-82-4, #2.
- Kunze, J.F., "Direct Utilization of Geothermal Energy". Editor of Chapter on Reservoir Development and Management, Geothermal Resources Council, 1979.
- Kunze, J.F., "Breaking the Economic Barrier: Generating Power from Fluids of Less Than 150 C.", Geothermal Energy Magazine, July 1978 (Vol. 6, #7).
- Kunze, J.F., Lofthouse, J.H. and Cooper, C.G., "Benchmark Gas-Core Critical" (selected as Best ANS Aerospace Div. Paper for 1972). Nuclear Science and Engineering, January 1972 (Vol. 47), p.59-65.
- Kunze, J.F., Sims, F.L., Byrne, J.M., and Reid, R.E., "Measurement of Control Methods in Compact Fast Reactors", Nuclear Applications, March 1970 (Vol. 3), p.226 to 239.
- Kunze, J.F., Lofthouse, J.H. and Hyland, R.E., "Cavity Reactor Critical Experiments", Nuclear Applications, Feb. 1969 (Vol. 6).
- Wood, R.E., Kunze, J.F., Sims, F.L. and Robertson, C.S., "Filter for Fast Flux Testing in a Thermal Reactor" Nuclear Applications, Sept. 1968 (Vol. 5).
- Kunze, J.F. and Henderson, W. S., "Experiments in the MSRE and 710 Assemblies" (co-author), p. 198, ANL-7320, Oct.1966, Proceedings of Intern. Conference on Fast Reactor Critical Experiments.
- Kunze, J.F., Ashkin, J., and Romanowski, T.A., "Polarization of Protons in Pi-Meson Scattering". Physical Review, (Vol. 117, #3, p. 859, 1960).
- Kunze, J.F., "The Heat from Beneath". USA TODAY, Vol. 108, p.31-34, July 1979. (Note, this was an invited

article, for a general interest monthly magazine.)

Kunze, J.F., "Observing a Solar Eclipse". Duquesne Science Counselor, March 1955. (This was an invited article for a general interest journal.)

PUBLISHED PEER-REVIEWED SUMMARIES (1 to 3 pages) OR FULL LENGTH PEER-REVIEWED ARTICLES FOR PROCEEDINGS OF PAPERS PRESENTED AT TECHNICAL MEETINGS AND PRINTED INTO BOUND VOLUMES OR AS ARTICLES AVAILABLE SEPARATELY. * Indicates those for which Kunze was principal author.

- *Kunze, J.F., R.Kudchadker, J.Luo, Y.Lo, F. Harmon, "Results of Benchmark Experiment of Accelerator/Moderator Configuration for BNCT - Using RFQ Accelerator", Proceedings of 1st International Conference on Accelerator Sources for Neutron Capture Therapy, Sept. 1993.
- Chao, W.W., J.F.Kunze, Weimin Dai, S.K.Loyalka, "Pulsed Boiling in Two Narrow Channels - Comparison of Experiment with RELAP", TRANS. of Am. Nuclear Society, 66, p.604, Nov. 1992
- *Kunze, J.F. and A.G. Gu, "Open Cycle Gas Core Start-up and Operational Stability", Proceedings of the Nuclear Technologies for Space Exploration Conference, Vol. II, p.371-379, August 1992 (Jackson, WY).
- Brugger, R.M., X. Luo, JF Kunze, "Targets for the Production of Neutrons from Low Energy Positive ion Accelerators", TRANS. Am. Nuclear Society, 65, p.146 June 1992
- M.A. Prelas and J.F.Kunze, "Direct Nuclear Energy Conversion Cycles using Excimer Fluorescence", 6th International Conference on Emerging Nuclear Energy Systems (ICENES '91), hosted by LLNL at Monterey, CA (June 1991)
- *Kunze, J.F., K. Huang, W.W.Chao, and S.K.Loyalka, "Desorption Effects in Narrow Vertical Channels following a LOCA", Trans. Am. Nuclear Society, 63, p.228, June 1991
- Bennett, P.C., J.F. Kunze, and B.M.Rutherford, "Scoping Experimental analysis of Factors Affecting Cask Contamination Weeping," Proceedings of 2nd Annual International Conference on high level Radioactive Waste Management, April 1991, p.1248
- *Kunze, J.F., S.K.Loyalka, R.A.Hultsch, O.Oladiran, J.C.McKibben, "RELAP Simulation and Experiment Verification of Transient Boiling condition in Narrow Coolant Channels", Proceedings of the Safety and Status of Non-Commercial Reactors, American Nuclear Society, Boise, Idaho, Sept. 1990
- Kunze, J.F., S.K. Loyalka, J.C.McKibben, R.L. Hultsch, W. Olidaran, "Benchmark Evaluation of the RELAP Code to Calculate Boiling in Narrow Channels", Trans. of Am. Nuclear Society, 61, p.473, June 1990
- *Reaves, K.M., J.F.Kunze, K. Lu, P.C.Bennett, "Adsorption of Sr at Fuel Storage pool contaminants on Metal Surfaces", Trans. of Am. Nuclear society, 61, p.79, June 1990
- *Wang, J.L., J.F.Kunze, J.C.McKibben, "The Development and Application of Transient Analysis at the University of Missouri Research Reactor", Proceedings of the International Symposium on Research Reactors, Dec. 1988, p. 351-358, National Tsing Hua University, Hsinchu, Taiwan.
- *Wideman, J.K., J.F. Kunze, J.B. Miies, M.A.Prelas, R.E.Schmunck, "Feasibility Studey of Aircraf. MHI", Proceedings of 26th Symposium on Engineering Aspects of MHD, June 1988, p. 8.2.1-9
- *Kunze, J.F. and R.M.Brugger, "The Influence of Research Reactors on Publication Productivity, Trans. of Am. Nuclear Society, 56, p.19, June 1988
- Wang, J.L., J.F. Kunze, and J.C. McKibben, "LOCA Analysis of Proposed Power Upgrade of the Univ. of Missouri Research Reactor", Trans. of Am. Nuclear Society, 55, p. 698 (Nov. 1987)
- *Kunze, J.F., Miller, W. and Durand, J., "Residential Energy Storage to Reduce System Power Peaks", Transactions of the 8th International Conference on Alternative Energy Sources, p.307-321, (Hemisphere Publishing, 1989).
- Gu, G., Prelas, M.A., and Kunze, J.F., "Space Based Nuclear-Pumped Laser/Reactor Concepts", Proceedings of the 4th Symposium on Space Nuclear Power Systems, Jan. 1987.

- *Kunze, J.F., "Reducing the Peak Power Crisis With Residential Energy Storage Systems", Trans. of Am. Nuclear Society, Vol. 52, p. 8, Nov. 1986
- Prelas, M.A., Kunze, J.F., et al., "Observations of a Hot Electron Mode in the MMMPX Spindle Cusp", Trans. of Am. Nuclear Society, 51, p. 231, June 1986
- *Kunze, J.F., Prelas, M.A. and Gu, G., "Dynamic Criticality Sensitivity of a Nuclear Pumped Laser", Trans. of Am. Nuclear Soc., Vol. 50, p. 574, Nov. 1985.
- *Kunze, J.J., Wang, J.L., Hwang, C.L., and Alger, D.M., "Loss of Flow Analysis for Upgraded Power Operation of MURR", Transactions of Am. Nuclear Soc., Vol. 47, p. 39 (June 1985).
- *Freeman, J.M., Kunze, J.F., Prelas, M.A., Baldwin, J.M., and Salane, H., "Structural and Volume Design Limitations for a 4-Tesla Magnetic Cusp", Transactions of Am. Nuclear Society, Vol. 47, p. 109 (June 1985)
- Brugger, R.M. and Kunze, J.F., "Neutron Capture Therapy Beam for the University of Missouri Research Reactor", Trans. of Am. Nuclear Society, Vol. 47, p. 39 (Nov. 1984).
- *Lofgren, B. and Kunze, J.F., "Pilgrim Springs Alaska Geothermal Exploration, Drilling, and Testing." Trans. of Geothermal Resources Council, Vol. 7, p. 301 (1983).
- *Kunze, J.F. and Gould, R.W., "Economic Results of Geothermal Heat for Two Large Greenhouses", Trans. of Geothermal Resources Council, Vol. 7, p. 611 (1983).
- *Kunze, J.F. and Gould, R.W., "Case Studies of Developing Geothermal Wells", Transactions of Geothermal Resources Council, Vol. 5, p. 251-252 (Oct. 1981)
- *Kunze, J.F. and Forsgren, K.F., "The Economics of the Heat Pump as a Device to Assist in Geothermal District Space Heating", Transactions of Geothermal Resources Council, Vol. 2, p. 383 (July 1978)
- *Kunze, J.F. and Spencer, S.G., "Environmental Necessity and Sufficiency: The Case of the Raft River Project", Trans. of Geothermal Resources Council, Vol. 2, p. 391 (July 1978)
- *Kunze, J.F. and Spencer, S.G., "Consumptive Use of Water in Geothermal Energy Applications", Proceedings of Topical Meeting on Environmental Aspects of Non-Consumptive Energy Resources, Am. Nuclear Soc., paper 39, (Sept. 1978)
- *Kunze, J.F. and Freund, G.A., "Incentives for Geothermal Energy Development", Proc. of 2nd Heliosciences Alternative Energy Conf., (April 1978)
- *Kunze, J.F., "Moderate-Temperature Geothermal Fluids - The Program to Make Their Use More Economical", Invited paper, Petroleum Society of Canada, 78-29-45 (July 1978).
- *Kunze, J.F., Stoker, R.C. and Donovan, L.E., "Geothermal Community Heating Systems", Proceedings of 1st International Conference on Alternative Energy, p. 2767-2783 (Dec. 1977).
- *Kunze, J.F., "Geothermal Space Heating, The Symbiosis With Fossil Fuel", Intersociety Energy Conversion and Engineering Conference, Sept. 1977.
- *Kunze, J.F. and Stoker, R.C., "Evaluating the energy Capacity and Lifetime of a Fracture-Dominated Reservoir", Proceedings of 12th Intersociety Energy Conversion and Engineering Conference, (Sept. 1977)
- Swanson, S.R., Sandquist, G.M., and Kunze, J.F., "Forced Convective Heat Transfer in Porous Media with Small Biot Number", Proceedings of AIChE-ASME Heat Transfer Conf., 77-HT-96 (Aug. 1977)
- *Kunze, J.F., Stoker, R.C., and Goldman, D., "Heat Transfer in Formation as a Geothermal Reservoir Engineering Tool", Proc. of AIChE-ASME Heat Transfer Conf., 77-HT-88 (Aug. 1977)
- *Kunze, J.F., Miller, L.G., and Stoker, R.C., "Raft River Wells & Reservoir Performance", Trans. of Geothermal Resources Council, Vol. 1, p. 177, (May 1977)
- *Kunze, J.F., Donovan, L.E., and Griffith, J.L., "The Size Effect for District Space Heating in Boise, Idaho", Trans. of Geothermal Resources Council, Vol. 1, p. 179 (May 1977)
- Kunze, J.F. and Witherspoon, P.A., "Energy Extraction & Reservoir Management of Moderate Temperature Hydrothermal System", Proceedings of Energy and Mineral Recovery Conf., DOE-CONF. 770440, P. 68 (Apr. 1977)

- *Kunze, J.F. and Hyland, R.E., "Flow and Criticality in the Open Cycle Gas Core Reactor". Proc. of 2nd Symposium on Uranium Plasmas, November 1971.
- *Kunze, J.F., Stoker, R.C., Goldman, D., and Miller, L.G., "Studies of a 3-well Reservoir System in Raft River", 2nd Workshop on Geothermal Reservoir Engineering, Stanford Univ., p.168 (Dec. 1976)
- *Kunze, J.F., Miller, L.G., and Whitbeck, J.F., "Moderate Temperature Utilization Project in the Raft River Valley", Proc. of 2nd United Nations Symposium on Development and Use of Geothermal Energy, p.2021-2029 (May 1975)
- *Kunze, J.F., Richardson, A.S., Hollenbach, K.M., Nichols, C.R., and Mink, L.L., "Nonelectric Utilization Project, Boise, ID", Proc. of 2nd United Nations Symposium on Dev. and Uses of Geothermal Energy, p.2141-2145 (May 1975)
- *Bakevitch, G.J., Miller, L.G., Kunze, J.F., and Sandquist, G.M., Experimental Comparison of an Unfueled Cf-252 Spectrum with that from a Multiplier, Trans. ANS, 16, 87 (1973)
- *Lofthouse, J.H., Kunze, J.F., Young, R.C., and Young, T.E., "Gamma Heating in a Gas Core Rocket Reflector", Trans. of ANS, 15, 7 (1972)
- Miller, R.G., Kunze, J.F., "A Californium-252 Neutron Multiplier for Neutron Radiography and Activation", Proceedings of ANS Topical Meeting on Cf-252, (1972)
- *Kunze, J.F., Lofthouse, J.H., and Shaffer, C.J., "Hydrogen Effect on a Demonstration Test for Open Cycle Gas Core Reactor", Trans. of ANS, 15, 616 (1972)
- Sandquist, G.M. and Kunze, J.F., "Educating High School Teachers on Nuclear Power", Trans. of ANS, 15, 637 (1972)
- Miller, L.G., Kunze, J.F., and Watanabe, T., Boosting Neutron Radiography Output from a Cf-252 Irradiator", Trans. of ANS, 14, (1971)
- *Kunze, J.F., Lofthouse, J.H., Suckling, D.E., and Hyland, R.E., "Flow Mixing and Reactivity Effects in the Gas Core Reactor", Trans. of ANS, 14, 11 (1971)
- *Lofthouse, J.H. and Kunze, J.F., "Spherical Gas-Core Benchmark Critical Experiment", Trans. of ANS, 13, 443 (1970)
- *Kunze, J.F., "The Physics of Cavity Reactors", (INVITED) Trans. of ANS, 12, 411 (1969)
- Sawyer, C.D., Wilkins, D.R., Gilliland, D.L., and Kunze, J.F., "Neutron Shield for Locally Flattening Flux Gradient in Reactor Test Facility", Trans. of ANS, 12, 797 (1969)
- Sawyer, C.D., Hill, P.R., and Kunze, J.F., "Thermionic Reactor Critical Experiment", Trans. of ANS, 12, 409 (1969)
- Pincock, G.D., Kunze, J.F., Wood, R.E., and Hyland, R.E., "Cavity Reactor Engineering Mockup Critical Experiment", Trans. of ANS, 11, 129 (1968)
- Masson, L.S., Pincock, G.D., Kunze, J.F., Wood, R.E., and Hyland, R.E., "Cavity Reactor Gas-Core Critical Experiment", Trans. of ANS, 10, 419 (1967)
- *Kunze, J.F., Sims, F.L., and Reid, R.E., "Control Methods in Space Power Reactors", Trans. of ANS, 10, 421 (1967)
- *Hyland, R.E., Pincock, G.D., Kunze, J.F., and Wood, R.E., "Cavity Reactor Critical Experiments", Trans. of ANS, 10, 8 (1967)
- *Kunze, J.F., Pincock, G.D., Sims, F.L., and Walsh, W.P., "Rossi-alpha Measurements on a Fast Reflected Critical Assembly", Trans. of ANS, 9, 467 (1966)
- *Lofthouse, J.H., Pincock, G.D., Kunze, J.F., Wood, R.E., and Hyland, R.E., "Cavity Reactor Critical Experiments", Trans. of ANS, 9, 341 (1966)
- *Sims, F.L., Kunze, J.F., Walsh, W.P., and Henderson, R.E., "Critical Experiments for 710 Fast Reactor Program", Trans. of ANS, 9, 489 (1966)
- *Kunze, J.F., and Bills, C.W., "Correlation of Neutron and Mechanical effects in the SL-1 Incident", Trans. of ANS, 5, 154 (1962)
- Churchill, J.W. and J.F. Kunze, "Nuclear and Thermodynamic Determination of Catcher Foil Efficiency", Trans. of ANS, 4, 61 (1961)
- *Kunze, J.F. and Poole, R.N., "K-excess and Rod Worth vs. Temperature", Trans. of ANS, 4, 106 (1961)

*Kunze, JF, "Comparison of Methods of Measuring K-excess", Trans. of ANS, 3, 424 1960)

*Kunze, JF and Kincaid, RN, "Reactivity Measurement in the Presence of Neutron Source", Trans. of ANS, 2 (1959)

RECENT TECHNICAL PAPERS PRESENTED - Unpublished except as abstracts or informally. Record only includes last eleven years.

Kunze, J.F., Y.Gu, J.Lu, P.C.Bennett, "Decontamination of Metal Surfaces Used for Spent Fuel Shipping Casks", 38th Annual Health Physics Society Meeting, July 1993, Abstracts, p.S-50.

"Contamination Cleanup and Subsequent weeping Observations on Metal Shipping Cask Surfaces, ABSTRACTS of the Health Physics Society, 60, p.567, July 1991.

"Review of Gas Core Reactor Criticality and Flow Tests", Seminar, Idaho National Engineering Lab, March 1991

"Assessment of RELAP vs. a Benchmark Experiment of Natural Circulation Boiling in Narrow Channels," International Workshop for RELAP Users, Sargent-Lundy, Chicago, Sept. 1990

"Swipe Effectiveness in Assessing Conditions of Metal Surfaces," ABSTRACTS of the Health Physics Society, 58, June 1990

"The Need for a Benchmark Test of RELAP Under Low Pressure and Temperature Transient Conditions", presented at RELAP Users Conference sponsored by USNRC and USDOE at Texas A&M University, January 1989

"Review of Gas Core Nuclear Propulsion Reactor Experiments", presented at NASA Nuclear Propulsion Workshop, Cleveland, OH, August 1988 (invited).

"Aerosol Core Reactor Concept for a Nuclear-Pumped Laser", Missouri Academy of Science, April 1986

"Development of Ground-Water Heat Source", invited paper presented at special session on Industrial Heat Pumps Workshop, Oct. 1983, Geothermal Resources Council.

EXTENSIVE (greater than 100 pages) TECHNICAL REPORTS - peer reviewed by industrial contractor or government agency (DOE or NSF) for which Kunze was principal investigator and author.

"MHD for Power Generation in a Compact, Mobile Unit", prepared for McDonnell Aircraft Company, March 1988

"Magnetic Refrigeration Feasibility Study for Aircraft Applications", prepared for McDonnell Aircraft Company, September 1986.

"Energy Conservation Technical Analysis Report on the Caldwell County Courthouse", for the Idaho Dept. of Water Resources, (1983)

"Energy Conservation Tech. Analysis Report on the Mechanical Technology Building of Eastern Idaho Vo-Tech School", for Idaho Dept. Water Resources, (1983)

"Energy Conservation Technical Analysis Report on the Technology Building of the Eastern Idaho Vo-Tech School", for the Idaho Dept. of Water Resources, (1983)

"Geothermal Exploration Well for the City of Alamosa, Colorado", DOE/ID/122259, April 1983

"Floral Greenhouse Geothermal Heating Demonstration", DOE/ET-27028-5, December 1982

"Industrial Food Processing and Space Heating with Geothermal Heat", DOE/ET- 27028-5 October 1982

"Energy Conservation Technical Analysis Report for the Madison Senior High School", for the Idaho Dept. of Water Resources, (1981)

"Energy Conservation Technical Analysis Report for the Irwin School", for the Idaho Dept. of Water Resources, (1981)

A listing of previous extensive reports (past fifteen years old), most produced while employed at the National Reactor Testing Station, is available.

RESEARCH GRANTS (while at MU, principal or co investigator - last 10 years)

MU Research Board, \$33,853, (1993) "Space Nuclear Propulsion Gas Core Stability Studies"

Kansas City Power & Light(1993), "Cold Fusion Evaluation", \$15,000(with D.Smith)

Sandia National Laboratory, "Investigation of Shipping Cask Weeping", October 1988 to present, \$140,700

U.S.Dept. of Energy, "Design of Accelerator Source of Neutrons for Boron Neutron Capture Therapy", with RM Brugger, 1990-1993, \$157,000

Argonne National Laboratory, "Aluminum-Lithium Target Test for Tritium Production Safety Testing of Production Reactor Targets", 1990-1992, \$14,000

Union Electric Co., "Assessment of Radioactivity in Domestic Sewage", (with WH Miller as P.I.), June 1992 to May 1994, \$74,000

U.S. Dept. of Energy, Idaho Nat.Engineering Lab., "Benchmark for RELAP5/MOD2 at Low Pres. & Temp. Conditions, October 1988 to May 1992, \$136,900

McDonnell Douglas Aircraft Co., June 1987, Feasibility Study of MHD for Fighter Aircraft, \$39,000

Emerson Electric Co., May 1986 - "A Device to Mitigate the Impending Peak Power Crisis", \$15,000 (plus \$12,000 graduate assist. support from Union Electric, with W. Miller).

McDonnell Douglas Aircraft Co., February 1986, "Feasibility Study of Magnetic Refrigeration for Aircraft", \$37,000

McDonnell Douglas Foundation, Fusion Energy Research, \$600,000, June 1986.(with M. Prelas)

Union Electric Co., Fusion Energy Research , \$100,000, April 1984 (with Prelas & Kimel)

COMMUNITY SERVICE AND RELATED AFFILIATIONS

Rotary International, since 1974 (clubs in Idaho Falls, Columbia, MO, and Pocatello, ID, served on Board of Directors of first two clubs)

Idaho Governor's Task Force on Nuclear Waste Management (1979-80)

US Dept. of Energy Interlaboratory Coordinating Committee on Geothermal Energy, 1973-1978

Boy Scouts of America, Unit Commissioner, 1982-83 (Teton Peaks Council), 1989-1991 (Great Rivers Council).

District Commissioner, Boonslick District (MO), Great Rivers Council, 1991- present
Missouri Radioactive Users Group, Coordinating Committee (1985-86)

Missouri Society of Professional Engineers, Energy Subcommittee (1984 to 1987)

Oak Ridge Assoc. of Universities, Fellowship Review and Selection Comm., for US Dept. of Energy Nuclear Engineering Fellowships, 1988, 1989

Religious service: various positions (High Council, Bishop's Councilor, etc.) LDS Church
Astronomy Club of Idaho Falls, President, 1962-1977

**COLLEGE OF ENGINEERING
IDAHO STATE UNIVERSITY
POCATELLO, ID 83209-8060 USA**

Curriculum Vitae as of January 1997

NAME

John Stradling BENNION

TITLES & POSITIONS

Assistant Professor, College of Engineering, Idaho State University
Reactor Administrator, Nuclear Reactor Laboratory, College of Engineering, Idaho State University
Adjunct Instructor, Department of Mechanical Engineering, University of Utah
Licensed Professional Engineer (States of Idaho and Utah)
Licensed Senior Reactor Operator (US Nuclear Regulatory Commission)
Registered Radiation Protection Technologist

EDUCATION

Doctor of Philosophy, Nuclear Engineering, University of Utah, 1996
Master of Science, Nuclear Engineering, University of Utah, 1990
Bachelor of Science, Chemistry, University of Utah, 1987
Bachelor of Science, Chemical Engineering, University of Utah, 1987

EXPERIENCE (Academic)

Assistant Professor, College of Engineering, Idaho State University, January 1995 - Present.
Adjunct Instructor, Mechanical Engineering Department, University of Utah, July 1992 - Present.
Graduate Teaching Assistant, Mechanical Engineering Department, University of Utah, September 1987 - June 1994.

EXPERIENCE (Industrial)

Acting Reactor Supervisor, Nuclear Reactor Laboratory, Idaho State University, January 1997 - Present.
Reactor Administrator, Nuclear Reactor Laboratory, Idaho State University, July 1996 - Present.
Acting Reactor Supervisor, Nuclear Reactor Laboratory, Idaho State University, December 1995 - July 1996.
Senior Reactor Engineer, Nuclear Engineering Laboratory, University of Utah, September 1987 - December 1993.
Graduate Research Assistant, Mechanical Engineering Department, University of Utah, September 1987 - December 1994.
Laboratory Assistant, Nuclear Engineering Laboratory, University of Utah, September 1985 - September 1987.

EXPERIENCE (Consulting)

Lockheed Martin Advanced Environmental Systems, Environmental Technology Division, Pocatello, ID.
Performed nuclear criticality safety analyses for the Pit-9 Comprehensive Demonstration Project at the Idaho National Engineering Laboratory. February 1996 - Present.
Rogers & Associates Engineering Corporation, Salt Lake City, UT. Determined probable routes and performed transportation risk assessment using the RADTRAN 4 computer code for the shipment of low-level radioactive waste from major waste generators in the State of Texas and the Vermont Yankee and Maine Yankee nuclear power plants to the proposed waste site in Hudspeth County, TX. July 1994 - December 1994.
Sandia National Laboratories, Albuquerque, NM. Beta testing of the SNL-SAND-II neutron energy spectrum unfolding and adjustment computer code. June 1993 - July 1994.
Lawrence Livermore National Laboratory, Livermore, CA. Beta testing of the HOTSPOT radioactive material atmospheric dispersion computer code. January 1993 - September 1993.
Westinghouse Electric Corporation, Commercial Nuclear Fuel Division, Western Zirconium Plant, Ogden, UT. Consultant for neutron activation and radiochemical analyses of actinide and rare earth elements in process streams. August 1992 - September 1993.
New Mexico State University, Las Cruces, NM and Sandia National Laboratories, Albuquerque, NM. Alpha and beta testing of the ERAD-computer-code graphical user interface. July 1992 - September 1993.

EXPERIENCE (Administrative)

- Reactor Supervisor Position Search and Screen Committee, College of Engineering, Idaho State University, January 1997.
- American Nuclear Society, NEED Committee, Member, 1996 - Present.
- Nuclear Engineering Department Heads Organization (NEDHO), Idaho State University College of Engineering Representative, 1996 - Present.
- American Society of Mechanical Engineers, 5th International Conference on Nuclear Engineering (ICONE-5), Nice, France, Session Organizer: Session 2.14 - Reactor Safety, 1996-1997.
- Pi Beta Tau Engineering Honor Society, Member of Advisory Board, Idaho State University Chapter, 1996 - Present.
- American National Standards Institute/American Nuclear Society, ANSI/ANS-8.6: Safety in Conducting Subcritical Neutron-Multiplication Measurements In Situ, Working Group Member, 1996 - Present.
- American Nuclear Society, 1996 Annual Meeting - Reno, NV. Session Co-Chair: Student Research in Nuclear Criticality Safety, 1996.
- Idaho Society of Professional Engineers, Southeast Chapter, President-Elect, 1996-1997.
- American Society of Mechanical Engineers, Nuclear Engineering Division Advanced Reactors Committee, Member, 1996 - Present.
- American Society of Mechanical Engineers, 4th International Conference on Nuclear Engineering (ICONE-4), New Orleans, LA, Session Chair: Session 2.12 - Demonstration Testing I, 11 March 1996.
- American Society of Mechanical Engineers, 4th International Conference on Nuclear Engineering (ICONE-4), New Orleans, LA, Session Chair: Session 2.14 - Component Demonstration Testing, 12 March 1996.
- Promotion Review Committee for Assistant Professor Solomon W. Leung, College of Engineering, Idaho State University, 1996.
- Reactor Supervisor Position Search and Screen Committee, College of Engineering, Idaho State University, December 1995 - January 1996.
- Eli M. Oboler Library General Collection and Documents Committee, College of Engineering Representative, Idaho State University, 1995 - Present.
- American Society of Mechanical Engineers, 4th International Conference on Nuclear Engineering (ICONE-4), New Orleans, LA, Session Organizer: Session 2.14 - Component Demonstration Testing, 1995-1996.
- Idaho Society of Professional Engineers, Southeast Chapter, Secretary-Treasurer, 1995-1996.
- Nuclear Criticality Safety Curriculum Committee, Joint University of Idaho/Idaho State University Graduate Nuclear Science & Engineering Program, 1995 - Present.
- American Nuclear Society Student Branch, Faculty Advisor, Idaho State University, 1995 - Present.
- Idaho State University Budget Council, Member, 1995 - Present.
- Reactor Safety Committee, College of Engineering, Idaho State University, Committee Member, 1995 - Present.
- Alpha Nu Sigma Nuclear Engineering Honor Society, Faculty Advisor, Idaho Alpha Chapter, 1995 - Present.
- Mathematics Curriculum Committee, Joint University of Idaho/Idaho State University Graduate Nuclear Science & Engineering Program, 1995 - Present.
- American Nuclear Society, Professional Engineers Examination Committee, Member, 1995 - Present.
- American Nuclear Society, Organizing Committee for 1996 Annual Meeting - Reno, NV: Student Program Chair, 1995-1996.
- Mechanical Engineering Faculty Position Search and Screen Committee, College of Engineering, Idaho State University, 1995.
- Joint Idaho State University/University of Idaho Engineering Faculty Committee to Investigate Cooperative Engineering Education in Eastern Idaho, College of Engineering, Idaho State University, 1995.
- Health Physics Society, Great Salt Lake Chapter, Science Teachers Workshop Program Finance Committee Chair, 1994.
- Health Physics Society, Great Salt Lake Chapter, Secretary-Treasurer, 1994 - 1995.
- Health Physics Society, Great Salt Lake Chapter, Secretary-Treasurer, 1993 - 1994.
- Reactor Safety Committee, University of Utah, Committee Member, 1987 - 1993.
- Reactor Safety Committee, University of Utah, Recorder, 1987 - 1991.
- American Nuclear Society, University of Utah Student Branch Chair, 1988 - 1990.
- Alpha Nu Sigma Nuclear Engineering Honor Society, University of Utah Chapter President, 1988 - 1993.

EXPERIENCE (Reviewing)

- American Nuclear Society, Professional Engineering Examination Committee, Problem Reviewer for 9710 Professional Engineering Examination.
- American Society of Mechanical Engineers, Paper Reviewer for 5th International Conference on Nuclear Engineering (ICONE-5) - Nice, France, 26-30 May 1997.
- American Nuclear Society, Judge for 1996 National Student Design Competition.
- American Nuclear Society, Professional Engineering Examination Committee, Problem Reviewer for 9610 Professional Engineering Examination.
- American Nuclear Society, Paper Reviewer for 1996 Annual Meeting, Paper Review Meeting, Reno, NV, 12-13 February 1996.
- American Society of Mechanical Engineers, Paper Reviewer for 4th International Conference on Nuclear Engineering (ICONE-4) - New Orleans, LA, 11-14 March 1996.
- American Nuclear Society, Professional Engineering Examination Committee, Problem Reviewer for 9510 Professional Engineering Examination.

RESEARCH INTERESTS

Radiation dosimetry and metrology, nuclear waste management, radiation transport and shielding, nuclear reactor physics, neutron activation analysis, probabilistic risk assessment, health physics, atmospheric dispersion of radioactive materials, nuclear-hardness-assurance testing of electronic components, research reactor operations, nuclear criticality safety.

CONTRACTS & GRANTS

1. Investigator, "Irradiation of Electronics," US Air Force Contract, 1989 - 1992, \$37,500.
2. Investigator, "USDOE Research Reactor Safety Analysis," LLNL-DOE Contract, 1989 - 1990, \$15,000.
3. Principal Investigator, "NATO Advanced Study Institute," North Atlantic Treaty Organization Grant, 1991, \$1,400.
4. Principal Investigator, "NATO Advanced Study Institute Travel Award," National Science Foundation Grant, 1991, \$1,200.
5. Investigator, "Risk Assessment for Nuclear Materials Transportation," LLNL-DOE Contract, 1991 - 1993, \$65,000.
6. Co-Principal Investigator, "Neutron Irradiation of Electronics," US Air Force Contract, 1993 - 1994, \$40,000.
7. Principal Investigator, "Neutron Radiation Effects in Thermoluminescence Materials," Teledyne Isotopes, Inc. Grant, 1993, \$1,200.
8. Principal Investigator, "Laboratory Equipment Upgrade: Gamma and Alpha/Beta Spectroscopy Instrumentation," Idaho State University College of Engineering Grant, 1995, \$12,500.
9. Principal Investigator, "Waste Assay Measurement Integration System - Nondestructive Assay (NDA) System Data Classification," Subcontract with ISU Physics Department/LMITCo-DOE, 1995, \$19,500.
10. Co-Principal Investigator, "Performance of Criticality Calculations for the Criticality Safety Benchmark Evaluation Study," LMITCo-DOE Contract, 1995 - 1996, \$67,000.
11. Principal Investigator, "Cooperative Research and Development Agreement between Idaho State University and the USAF Survivability and Vulnerability Integration Center," US Air Force CRDA, 1995 - Present.
12. Principal Investigator, "USDOE Reactor Sharing Grant," DOE Grant, 1995 - 1996, \$7,000.
13. Principal Investigator, "Performance of Criticality Calculations for the Pit-9 Comprehensive Demonstration Project," Lockheed Martin Advanced Environmental Systems Contract, 1996, \$10,000.
14. Principal Investigator, "Performance of Criticality Calculations for the Pit-9 Comprehensive Demonstration Project," Lockheed Martin Advanced Environmental Systems Contract Augmentation, 1996 - 1997, \$5,000.
15. Principal Investigator, "USDOE Reactor Sharing Grant," DOE Grant, 1996 - 1997, \$7,100.
16. Director/Principal Investigator, "AGN-201 Nuclear Reactor Control Console Upgrade: Modernization of Reactor and Nuclear Instrumentation Channels," American Nuclear Society (Idaho Section) Grant, 1996 - 1997, \$13,000.
17. Co-Principal Investigator, "Design-Based Engineering Education on the Internet," Idaho SBOE Grant, 1996 - 1997, \$147,000.

18. Co-Principal Investigator, "Development of a Nuclear Instrumentation Laboratory," National Science Foundation Grant, 1997, \$33,000 (Pending).

MEMBERSHIP

American Association for the Advancement of Science
American Chemical Society
American Nuclear Society
American Society for Engineering Education
American Society of Mechanical Engineers
American Society for Quality Control
Eastern Idaho Chapter of the Health Physics Society
Great Salt Lake Chapter of the Health Physics Society
Health Physics Society
Idaho Section of the American Nuclear Society
Idaho Society of Professional Engineers
Institute of Electrical and Electronic Engineers
Institute of Nuclear Materials Management
International Radiation Physics Society
National Organization of Test, Research, and Training Reactors
National Society of Professional Engineers
New York Academy of Sciences
Nuclear and Plasma Sciences Society of the Institute of Electrical and Electronic Engineers
Utah Academy of Sciences, Arts and Letters

CERTIFICATIONS, REGISTRATIONS & LICENSES

Hazardous Materials Operational Certification; 1995
Licensed Professional Engineer; State of Idaho; License No. 7802; 1995 - Present
Licensed Professional Engineer; State of Utah; License No. 173654; 1992 - Present
Registered Radiation Protection Technologist; National Registry of Radiation Protection Technologists; 1991 - Present
Licensed Senior Nuclear Reactor Operator; Idaho State University 0.005-kWt AGN-201M Reactor; US Nuclear Regulatory Commission License No. SOP-70156; 1995 - Present
Licensed Senior Nuclear Reactor Operator; University of Utah 100-kWt TRIGA Reactor; US Nuclear Regulatory Commission License No. SOP-43366; 1987 - 1993

HONORS & AWARDS

Phi Kappa Phi National Honor Society
Alpha Nu Sigma National Nuclear Science and Engineering Honor Society
Pi Tau Sigma National Honorary Mechanical Engineering Fraternity
Tau Beta Pi National Engineering Honor Society
Sigma Xi Scientific Research Honor Society
Order of the Engineer

LISTINGS & CITATIONS

International Directory of Nuclear Safety Personnel, 1993 - Present
National Registry of Nuclear Professionals, 1992 - Present
National Registry of Radiation Protection Technologists, 1991 - Present
Outstanding College Students of America, 1989
Who's Who Among Students in American Universities and Colleges, 1990, 1992
Who's Who in Science and Engineering, 2nd ed., 1994 - 1995
Who's Who in Science and Engineering, 3rd ed., 1996 - 1997
Who's Who in the World, 12th ed., 1995
Who's Who in the West, 25th ed., 1996 - 1997

UNIVERSITY COURSES TAUGHT (AS INSTRUCTOR)

ENGR 206: Statics (AS96)
ENGR 341: Fluid Mechanics (AS96, SS96, AS96, SS95)
ENGR 371: Introduction to Nuclear Engineering (SS97, SS96)
ENGR 400: Fluid Mechanics Review Session for FE Examination (SS97, AS96, SS96, SS95)

ENGR 431: Nuclear Reactor Analysis I (AS96)
ENGR 432: Nuclear Reactor Analysis II (SS97)
ENGR 433: Nuclear Reactor Experiments (SS97, SS96)
NS&E 601: Nuclear Engineering Experiments (SS96, AS95)
ENGR 651: Graduate Seminar on Special Topics in Engineering (SS95)
ENGR 652: Special Problems in Engineering (AS95)
ME 577: Nuclear Reactor Laboratory (University of Utah)
ME 672: Experimental Nuclear Reactor Physics (University of Utah)

UNIVERSITY COURSES TAUGHT (AS TEACHING ASSISTANT)

ME 130: Statics (University of Utah)
ME 570: Nuclear Engineering I (University of Utah)
ME 571: Nuclear Engineering II (University of Utah)
ME 670: Nuclear Reactor Physics I (University of Utah)
ME 671: Nuclear Reactor Physics II (University of Utah)

RESEARCH SUPERVISION (DOCTORAL STUDENTS)

1. Kazi Farriduddin Ahmed, "Iodine Neutron Capture Therapy," 1997.

TRAINING & COURSES ATTENDED

1. Radiation Safety Training for Users of Radioisotopes; training conducted by the University of Utah Radiological Health Department at the University of Utah, Salt Lake City, UT; 24 April 1987.
2. First Annual ANS Student Branch Presidents' Workshop; American Nuclear Society; Chicago, IL; 25 August 1989.
3. "Emergency First Aid;" training conducted by the American Red Cross at the University of Utah, Salt Lake City, UT; 27 June 1990.
4. "Training Program for Operation of the J.L. Shepherd and Associates Model Mark I-30 Irradiator;" training conducted by J.L. Shepherd and Associates and the University of Utah Radiological Health Department; University Hospital, Salt Lake City, UT; 27 February 1991.
5. "Medical Management in Radiation Accidents;" US DOE - REAC/TS emergency response training course; St. Benedict's Hospital, Ogden, UT; 14 May 1991.
6. "NASA Photovoltaic Short Course;" course presented by D.J. Flood, NASA Lewis Research Center, at the NATO Advanced Study Institute, "The Behavior of Systems in the Space Environment;" Pitlochry, Scotland, UK; 11-18 July 1991.
7. Laboratory Safety Seminar; University of Utah, Salt Lake City, UT; 24 September 1991.
8. RADTRAN Users Workshop; training conducted by S.K. Neuhauser, Sandia National Laboratories and R.F. Weiner, Western Washington University; Las Vegas, NV; 12 April 1992.
9. "Emergency Program Manager;" Emergency Management Institute, Federal Emergency Management Agency; October 1992.
10. "Models of Contemporary College Teaching;" Engineering Education Survival Course taught by Dr. D. Peck, Professor of Educational Studies; Sponsored by The College of Engineering, University of Utah and American Society for Engineering Education; 15 October 1992.
11. "Reorganizing College Teaching;" Engineering Education Survival Course taught by Dr. D. Peck, Professor of Educational Studies; Sponsored by The College of Engineering, University of Utah and American Society for Engineering Education; 22 October 1992.
12. "Evaluating College Teaching, Research on College Teaching;" Engineering Education Survival Course taught by Dr. D. Peck, Professor of Educational Studies; Sponsored by The College of Engineering, University of Utah and American Society for Engineering Education; 29 October 1992.
13. "Emergency Preparedness, U.S.A.;" Emergency Management Institute, Federal Emergency Management Agency; February 1993.
14. "Radiological Emergency Management;" Emergency Management Institute, Federal Emergency Management Agency; March 1993.
15. "Preparedness Planning for a Nuclear Crisis;" Emergency Management Institute, Federal Emergency Management Agency; March 1993.
16. "Hazardous Materials: A Citizen's Orientation;" Emergency Management Institute, Federal Emergency Management Agency; April 1993.
17. "Portable Emergency Data System;" Emergency Management Institute, Federal Emergency Management Agency; May 1993.

18. "A Citizen's Guide to Disaster Assistance;" Emergency Management Institute, Federal Emergency Management Agency; June 1993.
19. US DOE/Health Physics Society Science Teachers Workshop; training conducted by E.P. Katsikis, Health Physics Society, McLean, VA; Salt Lake City, UT; 17 September 1994.
20. "Gamma Spectroscopy;" 5-day course conducted by P.W. Frame, Oak Ridge Institute for Science and Education; Oak Ridge, TN; 20-24 March 1995.
21. "Hazardous Materials Operational Certification Training;" 16-hour certification course conducted by K. Quick and B. Estes, Pocatello Fire Department; Pocatello, ID; 17-19 April 1995.
22. Idaho Postsecondary Instructors Workshop; Center for Occupational Research and Development; Waco, TX; 21-23 May 1995.
23. "Cross Sections and Neutron Transport in Nuclear Criticality Analysis;" training conducted by C.V. Parks, L.M. Petrie, and R.M. Westfall, Oak Ridge National Laboratory; Criticality and Fuel Safety Group, Lockheed Martin Idaho Technologies; Idaho Falls, ID; 9-10 August 1995.
24. "Nuclear Criticality Safety Workshop;" training provided by T.P. McLaughlin, Los Alamos National Laboratory; U.S. Department of Energy Idaho Operations Office; Idaho Falls, ID; 4-5 October 1995.
25. "Nuclear Criticality Safety Short Course;" 5-day course conducted by R.A. Knief, Ogden Environmental & Energy Systems and R.D. Busch, University of New Mexico; Department of Chemical and Nuclear Engineering, University of New Mexico; Albuquerque, NM; 15-19 July 1996.

CONFERENCES ATTENDED

1. Eighth Topical Meeting on the Technology of Fusion Energy; American Nuclear Society; Salt Lake City, UT; 9-13 October 1988.
2. First Annual Conference on Cold Fusion; National Cold Fusion Institute; Salt Lake City, UT; 28-31 March 1990.
3. Technical Conference for Shipping AGN-201M Reactor Fuel to Y-12 Plant, Oak Ridge, TN; Idaho National Engineering Laboratory; Idaho Falls, ID; 9 January 1991.
4. Utah Academy of Sciences, Arts and Letters Spring Meetings; Westminster College, Salt Lake City, Utah; 10 May 1991.
5. Hypervelocity Impact Test Center Orientation, United Kingdom Atomic Energy Authority; Culham Laboratory, Oxon, UK; 6 July 1991.
6. NATO Advanced Study Institute, "The Behavior of Systems in the Space Environment;" North Atlantic Treaty Organization; Pitlochry, Scotland; 7-19 July 1991.
7. 1991 Winter Meeting; American Nuclear Society; San Francisco, CA; 11-14 November 1991.
8. Contractors' Meeting on US DOE Transportation System Risk Assessment; Lawrence Livermore National Laboratory; Livermore, CA; 15 November 1991.
9. Contractors' Meeting on US DOE Transportation System Risk Assessment; Lawrence Livermore National Laboratory; Livermore, CA; 25-26 March 1992.
10. Third Annual International High-Level Radioactive Waste Management Conference; Las Vegas, NV; 13-15 April 1992.
11. Nuclear Technologies for Space Exploration; American Nuclear Society; Jackson, WY; 16-19 August 1992.
12. Contractors' Meeting on US DOE Transportation System Risk Assessment; The University of Utah; Salt Lake City, UT; 10-11 September 1992.
13. Fifth International Topical Meeting on Nuclear Reactor Thermal Hydraulics; American Nuclear Society; Salt Lake City, UT; 21-24 September 1992.
14. Contractors' Meeting on US DOE Transportation System Risk Assessment -- Safety Guide Coordination Meeting; University of Utah; Salt Lake City, UT; 27 May 1993.
15. Contractors' Meeting on US DOE Transportation System Risk Assessment and Safety Guide Coordination Meeting; University of Utah; Salt Lake City, UT; 14-15 July 1993.
16. 30th Annual International Nuclear and Space Radiation Effects Conference; Institute of Electrical and Electronic Engineers; Snowbird, UT; 19-23 July 1993.
17. DOE Spent Nuclear Fuel: Challenges and Initiatives; American Nuclear Society; Salt Lake City, UT; 13-16 December 1994.
18. Idaho Engineering Educators' Conference; Sun Valley, ID; 28-29 April 1995.
19. Robotics and Automation, 32nd Annual Idaho Section ASME Symposium, American Society of Mechanical Engineers; Idaho Falls, ID; 19 May 1995.
20. University Working Conference; American Nuclear Society; Philadelphia, PA; 23-24 June 1995.
21. 1995 Annual Meeting; American Nuclear Society; Philadelphia, PA; 25-29 June 1995.

22. Fourth International Conference on Nuclear Engineering (ICONE-4), American Society of Mechanical Engineers, New Orleans, LA; 10-13 March 1996.
23. 1996 Conference on Hazardous Wastes & Materials; Idaho State University Continuing Education and Conferences; Idaho Falls, ID; 4 April 1996.
24. ASME Region VIII Graduate Student Technical Conference; Idaho State University Student Section of the American Society of Mechanical Engineers; Pocatello, ID; 12-13 April 1996.
25. Idaho Council of Engineering Educators Conference; McCall, ID; 26-27 April 1996.
26. University Working Conference; American Nuclear Society; Reno, NV; 14-15 June 1996.
27. 1996 Annual Meeting; American Nuclear Society; Reno, NV; 16-20 June 1996.
28. 1996 ANS/ENS International Meeting; American Nuclear Society and European Nuclear Society; Washington, DC; 10-14 November 1996.

PRESENTATIONS (Conferences, Seminars, & Workshops)

1. "Decommissioning of a Research Nuclear Reactor;" University of Utah Mechanical Engineering Department Graduate Seminar; Salt Lake City, Utah; 4 May 1990.
2. "Transportation of Nuclear Materials;" Utah Academy of Sciences, Arts and Letters Spring Meetings; Westminster College, Salt Lake City, UT; 10 May 1991.
3. "Comparison of NRC and DOE Reactor Maintenance Guidance and Requirements;" American Nuclear Society International Topical Meeting on Nuclear Power Plant and Facility Maintenance; Salt Lake City, UT; 10 April 1991.
4. "Irradiation Damage Assessment of Electronics;" NATO Advanced Study Institute, "The Behavior of Systems in the Space Environment;" Pitlochry, Scotland, UK; 16 July 1991.
5. "Risk Assessment for the Transportation of Nuclear Materials;" American Nuclear Society Winter Meeting; San Francisco, CA; 11 November 1991.
6. "Determination of Actinide and Rare Earth Element Concentrations in Waste Streams by Neutron Activation Analysis;" Westinghouse Electric Corporation, Commercial Nuclear Fuel Division, Western Zirconium Plant, Ogden, UT; 15 October 1992.
7. "Characterization and Qualification of a Fast Neutron Irradiation Environment for Radiation Hardness Assurance Testing of Electronic Devices;" Idaho State University College of Engineering Graduate Seminar; Pocatello, ID; 28 October 1994.
8. "Experiments Using a Subcritical Assembly;" U.S. DOE Nuclear Criticality Safety Workshop; Idaho State University College of Engineering; Pocatello, ID; 6 and 16 October 1995.
9. "A Nuclear Criticality Safety Analysis of the PACT-8 Melter for the INEL Pit-9 Comprehensive Demonstration Project;" Embedded Topical Meeting: Worldwide Experience - Decommissioning, Decontamination, and Reutilization, What Does It Mean?, 1996 American Nuclear Society/European Nuclear Society International Meeting; Washington, DC; 11 November 1996.

PUBLICATIONS (Journals & Proceedings)

1. Bennion, J.S., K.C. Crawford, T.C. Gansauge, and G.M. Sandquist; "Identification of Leaking TRIGA Fuel Elements;" Proceedings of the Twelfth TRIGA Users Conference; Austin, TX; 1-14 March 1990; 47-56.
2. Sandquist, G.M., J.S. Bennion, K.C. Crawford, and D.M. Slaughter; "Assessing the Maintenance, Quality Assurance and Control, and Decommissioning of DOE Research Reactors;" Proceedings of the American Nuclear Society Topical Meeting on The Safety, Status and Future of Non-Commercial Reactors and Irradiation Facilities, Boise, ID, 30 September - 4 October 1990; 172-178.
3. Sandquist, G.M., J.S. Bennion, C.Y. Kimura, and W.W. Banks; "Human Factor Design Guidelines of Maintainability of DOE Nuclear Reactors;" Proceedings of the American Nuclear Society Topical Meeting on Nuclear Power Plant and Facility Maintenance, Salt Lake City, UT, 7-10 April 1991; 87-94.
4. Bennion, J.S., G.M. Sandquist, and V.C. Rogers; "Comparison of NRC and DOE Reactor Maintenance Guidance and Requirements;" Proceedings of the American Nuclear Society Topical Meeting on Nuclear Power Plant and Facility Maintenance, Salt Lake City, UT, 7-10 April 1991; 153-163.
5. Bennion, J.S., and G.M. Sandquist; "Transportation of Nuclear Materials;" *Encyclia*, **68**, 364-365, 1991.
6. Bennion, J.S., G.M. Sandquist, and C.Y. Kimura; "Recent DOE and NRC Reactor Maintenance Regulations;" *Nucl. Plant J.*, **9**, No. 5, 46-89, 1991.
7. Sandquist, G.M., J.S. Bennion, and C.Y. Kimura; "Risk Assessment for the Transportation of Nuclear Materials;" *Trans. Am. Nucl. Soc.*, **64**, 70-71, 1991.

8. Taheri, M.S., G.M. Sandquist, D.M. Slaughter, and J.S. Bennion; "Graphite Epoxy Composite Degradation by Space Radiation," *Trans. Am. Nucl. Soc.*, **64**, 268-269, 1991.
9. Sandquist, G.M., J.S. Bennion, J.E. Moore, and C.Y. Kimura; "Consequence Analysis of a DOE Weapons Package in a Beyond 10 CFR 71.73 Transportation Accident Environment," Proceedings of the American Nuclear Society International Topical Meeting on Probabilistic Safety Assessment, Clearwater Beach, FL, 27-29 January 1993; 489-494.
10. Sandquist, G.M., J.S. Bennion, J.E. Moore, D.M. Slaughter, and C.Y. Kimura; "Risk Assessment of Radioactive and Hazardous Materials in DOE Defense Package Transportation Accidents," *Int. J. Radiat. Mat. Trans.*, **3**(2/3), 121-128, 1993.
11. Sandquist, G.M., J.S. Bennion, J.E. Moore, and D.M. Slaughter; "A Route-Specific Transportation Risk Assessment Model," *Trans. Am. Nucl. Soc.*, **68**, 151-153, 1993.
12. Bennion, J.S., G.M. Sandquist, and C.Y. Kimura; "Comparison of Health Effect Consequences from Atmospheric Releases of Pu-239 Using the ERAD and HOTSPOT Computer Codes," *Health Phys.*, **64**, No. 6, S31, June 1993.
13. Sandquist, G.M., J.S. Bennion, P.S. Sheehan, J.G. Kelly, and P.J. Griffin; "Characterization of the Neutron Energy Spectrum in the University of Utah TRIGA Reactor for Electronics Testing," *Trans. Am. Nucl. Soc.*, **69**, 181-182, 1993.
14. Bennion, J.S., G.M. Sandquist, P.S. Sheehan, and V.C. Rogers; "Irradiation Damage Assessment of Electronics," in *The Behavior of Systems in the Space Environment*; R.N. DeWitt, D.P. Duston, and A.K. Hyder (Eds.); Kluwer Academic Publishing Co.; Dordrecht (1993).
15. Kelly, J.G., P.J. Griffin, D.C. Raupach, T.H. Daubenspect, J.S. Bennion, and D.L. Newell; "Investigation of Laboratory Neutron Spectral Characterizations Used for the Testing of Electronic Parts," in *Reactor Dosimetry ASTM STP 1228*, Harry Farrar IV, E. Parvin Lippincott, David W. Vehar, and J.G. Williams, (Eds.); American Society for Testing and Materials; Philadelphia (1994).
16. Bennion, J.S., G.M. Sandquist, B.L. Hardy, V.C. Rogers, and B.W. Terry; "Comparative Response of Selected Thermoluminescence Materials in a Mixed Gamma and Neutron Radiation Environment," Proceedings of the 1994 International Conference on Nuclear Data for Science and Technology, Gatlinburg, TN; 9-13 May 1994, 104-108.
17. Bennion, J.S., G.M. Sandquist, and B.L. Hardy; "Gamma Radiation Environment in a Fast Neutron Irradiation Facility for Electronic Parts Testing," *Trans. Am. Nucl. Soc.*, **70**, 130-131, 1994.
18. Bennion, J.S., G.M. Sandquist, J.G. Kelly, P.J. Griffin, P.S. Sheehan, and B.L. Saxey; "Characterization and Qualification of a Neutron Irradiation Environment for Neutron Hardness Assurance Testing of Electronic Devices," Proceedings of the 32nd Annual International Nuclear and Space Radiation Effects Conference; Madison, WI; 17-21 July 1995.
19. Becker, G.K., T.J. Roney, C.L. Watts, and J.S. Bennion; "Utility of Neural Networks in Nondestructive Waste Assay Measurement Methods," Proceedings of the 4th Nondestructive Assay and Nondestructive Examination Waste Characterization Conference; Salt Lake City, UT; 24-26 October 1995; 161-187.
20. Bennion, J.S., G.M. Sandquist, J.G. Kelly, P.J. Griffin, P.S. Sheehan, and B.L. Saxey; "Characterization and Qualification of a Neutron Irradiation Environment for Neutron Hardness Assurance Testing of Electronic Devices," *IEEE Trans. Nucl. Sci.*, **42**, No. 6, 1886-1894, 1995.
21. McWhirter, J.D., J.S. Bennion, J.F. Kunze, H.A. Larson, M.J. Lineberry, D.T. Neill, and A.G. Stephens; "Re-Engineering Nuclear Science and Engineering Education at Idaho State University," 58th Annual Meeting Pacific Northwest Section of the American Society for Engineering Education and 13th Annual Symposium on Technology Education; Klamath Falls, OR; 25-27 April 1996.
22. Bennion, J.S., R.D. Boston, A.S. Johnson, and N.L. Pruvost, "A Nuclear Criticality Safety Analysis of the PACT-8 Melter for the INEL Pit-9 Comprehensive Demonstration Project," *Trans. Am. Nucl. Soc.*, **75**, 455-457, 1996.
23. Bennion, J.S., R.D. Boston, A.S. Johnson, and N.L. Pruvost, "A Nuclear Criticality Safety Analysis of the PACT-8 Melter for the INEL Pit-9 Comprehensive Demonstration Project," Proceedings of the Embedded Topical Meeting on Decommissioning, Decontamination, and Reutilization: Worldwide Experience - DD&R, What Does It Mean; Washington, D.C.; 11-14 November 1996.
24. Bennion, J.S., "Experimental characterization and qualification of a quasi-fission neutron irradiation environment for neutron hardness assurance testing of electronic devices and materials damage investigations," Ph.D. Dissertation, University of Utah, 1996.

25. Neill, D.T., and J.S. Bennion, "Suggestions for the Evaluation and Use of Reactivity Bias Mean and Standard Deviation," (submitted for presentation at the 1997 ANS Nuclear Criticality and Safety Division Topical Meeting, September 7-11, 1997, Chelan, WA).

PUBLICATIONS (Technical Reports)

1. Annual Report on AGN-201M Nuclear Reactor Operations, License No. R-25, Nuclear Engineering Laboratory, University of Utah, December 1987.
2. Annual Report on TRIGA Nuclear Reactor Operations, License No. R-126, Nuclear Engineering Laboratory, University of Utah, August 1988.
3. Annual Report on AGN-201M Nuclear Reactor Operations, License No. R-25, Nuclear Engineering Laboratory, University of Utah, December 1988.
4. Annual Report on TRIGA Nuclear Reactor Operations, License No. R-126, Nuclear Engineering Laboratory, University of Utah, August 1989.
5. Technical Report to the US Air Force Concerning the Neutron Irradiation of Electronics by the University of Utah Nuclear Engineering Laboratory, UTEC 90-19, August 1989.
6. Annual Report on AGN-201M Nuclear Reactor Operations, License No. R-25, Nuclear Engineering Laboratory, University of Utah, December 1989.
7. US DOE Class B Research Reactor Safety Study, Chapter 11: Maintenance, Lawrence Livermore National Laboratory, June 1990 (Contributor).
8. US DOE Class B Research Reactor Safety Study, Chapter 12: Decommissioning, Lawrence Livermore National Laboratory, June 1990.
9. Decommissioning Plan for the University of Utah AGN-201M Nuclear Reactor, License No. R-25, UTEC 90-18, July 1990.
10. Annual Report on AGN-201M Nuclear Reactor Operations, License No. R-25, Nuclear Engineering Laboratory, University of Utah, December 1990.
11. Quality Assurance (QA/QC) Program for Transporting Spent Fuel for AGN-201M Reactor, License No. R-25, Nuclear Engineering Laboratory, University of Utah, December 1990.
12. Annual Report on TRIGA Nuclear Reactor Operations, License No. R-126, Nuclear Engineering Laboratory, University of Utah, August 1991.
13. Modification Authorization M-3: Safety and Hazards Evaluation for the Implementation of a New Physical Security System, Nuclear Engineering Laboratory, University of Utah, September 1991.
14. Annual Report on AGN-201M Nuclear Reactor Operations, License No. R-25, Nuclear Engineering Laboratory, University of Utah, December 1991.
15. Annual Report on TRIGA Nuclear Reactor Operations, License No. R-126, Nuclear Engineering Laboratory, University of Utah, August 1992.
16. Annual Report on AGN-201M Nuclear Reactor Operations, License No. R-25, Nuclear Engineering Laboratory, University of Utah, December 1992.
17. US DOE Safety Guide 200: Overview of the Transportation System Risk Assessment, UCRL-ID-114670-Draft, Lawrence Livermore National Laboratory, September 1993 (Contributor).
18. US DOE Safety Guide 250: Radioactive and Hazardous Material Release and Dose Consequences, UCRL-ID-114675-Draft, Lawrence Livermore National Laboratory, September 1993 (Contributor).
19. Fast Neutron Fluence and Gamma Radiation Uniformity Over Irradiation Target: A Technical Report to the US Air Force Regarding Neutron Hardness Assurance Testing of Electronic Components at the University of Utah Nuclear Engineering Laboratory, Nuclear Engineering Laboratory, University of Utah, UTEC 93-66, December 1993.
20. Hazard Evaluation Report for the Use of Fission Foils to Characterize the Neutron Energy Spectrum in the Fast Neutron Irradiation Facility of the TRIGA Research Reactor, US NRC License No. R-126, Nuclear Engineering Laboratory, University of Utah, June 1994.
21. Environmental Report for the Idaho State University AGN-201 Nuclear Reactor, US NRC License No. R-110, Nuclear Reactor Laboratory, Idaho State University College of Engineering, October 1995.
22. Safety Analysis Report for the Idaho State University AGN-201 Nuclear Reactor, US NRC License No. R-110, Nuclear Reactor Laboratory, Idaho State University College of Engineering, November 1995 (Contributor).
23. A Preliminary Study of Nuclear Criticality Safety Concerns for the INEL Pit 9 Actinide-Contaminated Waste-Stabilization Demonstration Project, Idaho State University College of Engineering, March 1996.

24. Criticality Calculation Study on the Benchmark Experiment LEU-COMP-THERM-007 Done at Valduc, France; Technical Report No. TR 95/96-002; Idaho State University College of Engineering; May 1996 (Contributor).
25. Annual Report on AGN-201M Nuclear Reactor Operations, License No. R-110, Nuclear Reactor Laboratory, Idaho State University College of Engineering, June 1996.
26. Criticality Calculation Study on the Benchmark Experiment MIX-SOL-THERM-003 Done at Atomic Weapons Research Establishment, United Kingdom; Technical Report No. TR 95/96-004; Idaho State University College of Engineering; June 1996 (Contributor).
27. Criticality Calculation Study on the Benchmark Experiment HEU-MET-FAST-015 Done at All Russian Research Institute of Experimental Physics (VNIIEF), Russia; Technical Report No. TR 95/96-006; Idaho State University College of Engineering; July 1996 (Contributor).
28. Criticality Calculation Study on the Benchmark Experiments IEU-MET-FAST-003, IEU-MET-FAST-005, HEU-MET-FAST-020 Done at All Russian Research Institute of Experimental Physics (VNIIEF), Russia; Technical Report No. TR 95/96-008; Idaho State University College of Engineering; August 1996 (Contributor).
29. Summary of Nuclear Criticality Safety Calculations for the INEL Pit-9 Comprehensive Demonstration Project; Technical Report No. TR 96/97-001; Idaho State University College of Engineering; 3 September 1996.

STATEMENT OF QUALIFICATIONS AND EXPERIENCE RELEVANT TO
RADIATION SAFETY OFFICER POSITION

Thomas F. Gesell

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DUTIES

University Radiation Safety Officer; directs hazardous waste management; teaching, research and service in radiation protection and environmental science.

COURSES TAUGHT

Radiological Environmental Monitoring and Surveillance; Topics in Health Physics I & II; Accelerator Health Physics; Quantitative Methods in Physics; Non-ionizing Radiation Protection.

PREVIOUS EXPERIENCE

5/88-10/91 -- Director of the DOE Radiological and Environmental Sciences Laboratory (RESL) located on the Idaho National Engineering Laboratory (INEL) Site. Directed several programs related to protection of health and environment. These included: environmental sampling and analysis (surveillance) for the INEL and its environs (air, water, soil, vegetation, animals); analytical and radiochemistry; environmental, ecological and radio-ecological research; DOE Laboratory Accreditation Programs in personnel dosimetry, bioassay and whole body counting; support of the Nuclear Regulatory Commission with radiochemical standards and analyses; measurements in support of emergency response; oversight of programs in personnel radiation dosimetry, bioassay, and meteorology.

5/87-5/88 -- Deputy Assistant Manager for Nuclear Programs, DOE Idaho Operations Office. Served as Acting Assistant Manager for Nuclear Programs, supervised the Environmental Support Office, and managed the INEL environmental restoration program with its associated sampling and analysis. Nuclear Programs had responsibility for test reactors, nuclear fuel reprocessing, radioactive and hazardous waste management and technology development at the Idaho National Engineering Laboratory. The Environmental Support Office activity required close coordination with EPA and State regulatory programs.

5/81-6/87 -- Chief of the Dosimetry Branch, DOE Idaho Operations Office. Developed and implemented operational and applied research and development programs in personnel and environmental radiation dosimetry as well as a DOE-wide accreditation program

in personnel radiation dosimetry. Supervised the INEL personnel dosimetry program. Managed the development and implementation of a new dosimetry system and a new, computerized data acquisition, record-keeping and reporting system.

5/71-5/81 -- Assistant, then Associate Professor of Health Physics, University of Texas School of Public Health; Convener of the Environmental Sciences Discipline. Responsibilities included teaching, conducting research and consulting in radiation protection and environmental science.

EDUCATION

BS in physics from San Diego State University (6/65). MS (6/68) and PhD (6/71) degrees in physics with specialization in radiation protection from the University of Tennessee.

PROFESSIONAL ACTIVITIES

Associate Editor, Health Physics (1985-1990); chair, National Council on Radiation Protection and Measurements Hot Particle Committee (1988-present); member, International Commission on Radiological Protection Task Group on Skin (1989-1992); member, National Council on Radiation Protection and Measurements (1990-present); member, EPA Science Advisory Board, Radiation Advisory Committee subcommittee on standards for radioactivity in water (1990); member of the EPA/Industry Technical Review Group pertaining to the use of radioactive phosphate slag in construction (1992-present); member, International Atomic Energy Agency Panel on Radon in the Workplace (1994-present); member, DOE Environmental Management Board "FUSRAP" Advisory Committee (1995-present); consultant, EPA Science Advisory Board, Radiation Advisory Committee (1996-present).

SPECIAL ASSIGNMENTS

Special assignments have included: consultant to EPA Office of Radiation Programs (1974-1980); consultant, President's Commission on the Accident at Three Mile Island (1979); DOE Idaho's Liaison to the Idaho State Government (1/89-6/89); member, Secretary of Energy's Special Team assessing environmental conditions at the Rocky Flats Plant (6/89-8/89); chair, DOE fatal accident investigation committee (5/91-6/91); administrative lead, INEL Historical Dose Evaluation (12/88-9/91); member, Monitoring Activities Review Panel for the Idaho National Engineering Laboratory Waste Management Program (1992); member, ES&H Panel of the University of California President's Council on National Laboratories (1995-present).

REPRESENTATIVE PUBLICATIONS

Proceedings Edited

John A. S. Adams, Wayne M. Lowder and Thomas F. Gesell, Editors. The Natural Radiation Environment II (in two volumes), Energy Research and Development Agency, Oak Ridge, Tennessee, CONF-720805-P1 and P2 (1975).

T. F. Gesell and W. M. Lowder, Editors. Natural Radiation Environment III: Proceedings of the Third International Symposium on the Natural Radiation Environment, U. S. Department of Energy Technical Information Center, Oak Ridge, Tennessee, CONF-780422, (in two volumes) (1980).

T. F. Gesell, Executive Chairman. Proceedings of the International Beta Dosimetry Symposium, U. S. Nuclear Regulatory Commission Report NUREG/CP-0050 (1984).

T. F. Gesell and Paul Voilleque, Guest Editors. Evaluation of Environmental Radiation Exposures from Nuclear Testing in Nevada, Special Issue, Health Physics 59, No. 5, 501-746 (1990).

Articles and Reports

T. F. Gesell and E. T. Arakawa. Attenuation Length for Photoelectrons Excited in Aluminum by 21.2 eV Photons, Phys. Rev. Letters 26, 377-380 (1971).

T. F. Gesell. Radiation-Induced Head and Neck Tumors (letter), Lancet, 27 April, pp. 815-816 (1974).

T. F. Gesell. Estimation of the Dose Equivalent to the U. S. Population from Radon in Liquefied Petroleum, in Proceedings of the Eight Midyear Topical Symposium of the Health Physics Society - Population Doses, J. C. Hart, R. H. Ritchie and B. S. Varnadore, eds., USAEC Report CONF-741018, pp. 347-354 (1974).

J.A.S. Adams and T. F. Gesell. Real and Apparent Variations in the Terrestrial Gamma Ray Flux, in Proceedings of the Second USAEC Health and Safety Laboratory Workshop on Environmental Radioactivity, W. M. Lowder, ed., New York, USAEC Report HASL-287, pp. 60-69 (1974).

T. F. Gesell and J. A. S. Adams. Geothermal Powers Plants: Environmental Impact (letter), Science 189, 328 (1975).

T. F. Gesell and H. M. Prichard. The Technologically Enhanced Natural Radiation Environment. Health Physics 28, pp. 361-366 (1975).

T. F. Gesell. Occupational Radiation Exposure Due to ^{222}Rn in Natural Gas and Natural Gas Products. Health Physics 29, pp. 681-687 (1975).

T. F. Gesell, Gail de Planque Burke and Klaus Becker. An International Intercomparison of Environmental Dosimeters. Health Physics 30, pp. 125-133 (1976).

G. de Planque Burke and T. F. Gesell. Error Analysis of Environmental Radiation Measurements Made with Integrating Detectors, in NBS Special Publication 456, "Measurements for the Safe Use of Radiation," U.S.C.P.O., Washington, D.C., pp. 187-198 (1976).

D. L. Duncan, T. F. Gesell and R. H. Johnson. Radon-222 in Potable Water. Proceedings of the Tenth Midyear Topical Symposium of the Health Physics Society, Rensselaer Polytechnic Institute, Troy, New York, pp. 340-357 (1977).

H. M. Prichard and T. F. Gesell. Rapid Measurements of ^{222}Rn Concentrations in Water with a Commercial Liquid Scintillation Counter. Health Physics 33, pp. 577-581 (1977).

G. de Planque and T. F. Gesell. Second International Intercomparison of Environmental Dosimeters, Health Physics 36, pp. 221-233 (1979).

T. F. Gesell, H. Prichard and J. Haygood. Applications of Commercial Liquid Scintillation Counters to Radon-222 and Radium-226 Analyses, Proceedings of the 11th Midyear Topical Symposium of the Health Physics Society: Radiation Instrumentation. W. W. Wadman III, ed., San Diego, California, January 1978, pp. 258-271 (1979).

T. F. Gesell, D. C. Christian, R. E. Gammage and G. de Planque. Effects of Packaging on the Temperature of Environmental Radiation Dosimeters, Health Physics 38, pp. 690-696 (1980).

H. M. Prichard, T. F. Gesell and C. R. Meyer. Liquid Scintillation Analyses for Radium-226 and Radon-222 in Potable Waters. Liquid Scintillation Counting: Recent Applications and Development. Academic Press, New York, pp. 347-355 (1980).

C. V. Gogolak and T. F. Gesell, Intercomparison Experiment at NRE III. Natural Radiation Environment III, T. F. Gesell and W. M. Lowder, eds. D.O.E. CONF 780422 (1980).

T. F. Gesell and H. M. Prichard. The Contribution of Radon in Tap Water to Indoor Radon Concentrations. Natural Radiation Environment III, T. F. Gesell and W. M. Lowder, eds. D.O.E. CONF 780422 (1980).

T. F. Gesell and G. de Planque. Highlights of the Fourth International Intercomparison of Environmental Dosimeters. Nuclear Instruments and Methods 175, pp. 186-188 (1980).

H. M. Prichard, T. F. Gesell and E. Davis. Iodine-131 Levels in Sludge and Treated Municipal wastewaters Near a Large Medical Complex. The American Journal of Public Health 71, pp. 47-52 (1981).

H. M. Prichard and T. F. Gesell. An Estimate of Population Exposures Due to Radon in Public Water Supplies in the Area of Houston, Texas. Health Physics 41, pp. 599-606 (1981).

M. F. Jones, T. F. Gesell, J. Nanus and C. E. Racster. Radioactive Well Logging: A Review and an Analysis of Texas Incidents. Health Physics 40, pp. 361-368 (1981).

Gail de Planque and Thomas F. Gesell. Thermoluminescence Dosimetry - Environmental Applications. International Journal of Applied Radiation and Isotopes 33, pp. 1015-1034 (1982).

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