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ED Ad EO:4 NOW 66-61-707

July 19, 1999

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)

PRIVATE FUEL STORAGE, L.L.C.)

Docket No. 72-22-ISFSI

(Independent Spent Fuel
Storage Installation))

AFFIDAVIT OF DR. STEVEN R. ABT
CONCERNING CONTENTION UTAH M

I, Steven R. Abt, having first been duly sworn, do hereby state as follows:

1. I am currently employed as Professor of Civil Engineering and Interim Associate Dean for Research and Graduate Studies at the College of Engineering, Colorado State University, in Fort Collins, CO. I also serve as a consultant to the Southwest Research Institute ("SWRI") (and the Center for Nuclear Waste Regulatory Analyses ("CNWRA")), pursuant to a subcontract between Colorado State University and the SWRI, in conjunction with a contract between SWRI and the NRC Staff ("Staff"). A statement of my professional qualifications is attached hereto.

2. This Affidavit is prepared in response to the "Applicant's Motion for Summary Disposition of Utah Contention M" ("Motion"), filed on June 28, 1999, by Private Fuel Storage L.L.C. ("Applicant" or "PFS"), and the "Statement of Material Facts on Which No Genuine Dispute Exists" ("Statement of Material Facts") attached thereto.

3. As part of my official responsibilities on behalf of the Staff, I reviewed the Applicant's analysis of surface hydrology, including the Probable Maximum Flood ("PMF") for its proposed Independent Spent Fuel Storage Installation ("ISFSI"), to be located on the

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reservation of the Skull Valley Band of Goshute Indians in Skull Valley, Utah, as set forth (a) in section 2.4 of the Safety Analysis Report ("SAR") submitted with PFS' license application of June 1997, as revised on May 19, 1999, and (b) in PFS' responses to the Staff's requests for additional information and related submittals, dated **February 10, March 25, May 18, and June 22, 1999.**

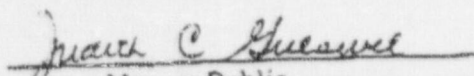
4. As part of my official responsibilities on behalf of the Staff, I also participated in preparing the "NRC Staff Position With Respect to Utah Contention M: Probable Maximum Flood" ("Staff Position") set forth in the "NRC Staff's Statement of Its Position Concerning Group I Contentions," dated June 15, 1999 (at pp. 17-18). The Staff Position on Contention Utah M accurately represents my views concerning this contention.

5. Also as part of my official responsibilities on behalf of the Staff, I have reviewed the Applicant's Motion and the attachments thereto, in which PFS seeks summary disposition of Contention Utah M. On the basis of my review of the Applicant's description of its revised PMF analysis, and the documents attached to the Applicant's Motion, I am satisfied that the Statement of Material Facts attached to the Applicant's Motion is correct.

6. I hereby certify that the foregoing is true and correct to the best of my knowledge, information and belief.


Steven R. Abt

Sworn to before me this
19th day of July 1999


Notary Public
My commission expires: 10/11/02

**STEVEN R. ABT
VITA**

07/14/99

EDUCATION:

Colorado State University: Fort Collins, Colorado			
Civil Engineering	Hydraulics	Ph.D.	1980
Civil Engineering	Water Resources	M.S.	1976
Civil Engineering		B.C.E.	1973

REGISTRATION:

Professional Engineer, State of Colorado	- No. 15474
Professional Engineer, State of Wyoming	- No. 5400

PROFESSIONAL ORGANIZATIONS:

American Society of Civil Engineers
American Society for Testing and Materials
American Water Resource Association
Colorado Association of Stormwater and Flood Plain Managers
International Erosion Control Association
Transportation Research Board
Chi Epsilon Honorary
Sigma Xi
Army Engineer Association
Reserve Officer's Association

EXPERIENCE:

September 1997- Present	Interim Associate Dean for Research and Graduate Studies College of Engineering Colorado State University, Fort Collins, Colorado
July 1988 - Present	Professor of Civil Engineering Department of Civil Engineering Colorado State University, Fort Collins, Colorado
July 1989 - June 1999	Director, Hydraulics Laboratory Engineering Research Center Colorado State University, Fort Collins, Colorado

September 1989 - August 1992	Associate Department Head for Research Department of Civil Engineering Colorado State University, Fort Collins, Colorado
July 1983 - June 1988	Associate Professor of Civil Engineering Department of Civil Engineering Colorado State University, Fort Collins, Colorado
September 1984 - August 1985	Associate Department Head/Academic Coordinator Department of Civil Engineering Colorado State University, Fort Collins, Colorado
September 1979 - February 1984	Assistant Department Head Department of Civil Engineering Colorado State University, Fort Collins, Colorado
May 1980 - June 1983	Assistant Professor of Civil Engineering Department of Civil Engineering Colorado State University, Fort Collins, Colorado
January 1976 - May 1980	Instructor of Civil Engineering Department of Civil Engineering Colorado State University, Fort Collins, Colorado

Duties have included instruction, research, administration, service, and outreach.

Administration

- Supervise the Engineering Research Center, allocate space, perform short-term and long-term planning activities, monitor College research activities, promote research for five departments, coordinate graduate recruiting, serve as primary contact for graduate information.
- Performed administrative duties as required in assigning faculty teaching loads, monitoring budgets, training of administrative personnel, equipment purchases, budget recommendations, evaluating equipment needs, student orientation, and student advising.
- Served as the Graduate Admissions Officer for the Civil Engineering Department. Reviewed and evaluated applications for the Graduate Program. Served as the Undergraduate Admissions Officer and scholarship officer for the Civil Engineering Department.
- Coordinate College Agricultural Experiment Station activities.

Research

- Serve as principal investigator, co-principal investigator, and investigator on numerous research and testing projects valued at over \$12 million in the areas of water resources and hydraulics.
- Conduct hydraulic studies to include pump intake, spillway, harbor, river, culvert, boat chute, energy dissipation, and hydraulic structures physical model and computer model studies.
- Conduct research on flow meters, Parshall flumes, cutthroat flumes, channel stabilization, riprap, gabions, soil covers, rock durability, erosion mats, articulated concrete blocks, sediment transport, localized scour, gully erosion, bridge and culvert scour, and tailings deposition. Also perform laboratory tests on flow meters, valves, pitots, flumes, and other hydraulic control and measurement devices.

Instruction

Responsible for content and teaching of the following classes and laboratories:

EG/CE 101	Freshman Engineering - Orientation and Programming
EG/CE 102	Freshman Engineering - Graphics and Problem Solving
EG 350	Computer Assisted Design and Graphics
CE 172	Construction Surveying
CE 173	Topographic Surveying
CE 256	Statics for Non-engineers
CE 260	Engineering Mechanics - Statics
CE 273	Engineering Surveying I
CE 301	Hydraulics
CE 358	Mechanics of Materials for Non-engineers
CE 360	Mechanics of Materials
CE 362	Properties of Materials for Engineers
CE 364	Properties of Materials for Non-engineers
CE 408	Civil Engineering Design I
CE 409	Civil Engineering Design II
CE 413	Environmental River Mechanics
CE 469	Senior Design Practice I
CE 470	Senior Design Practice II
CE 474	Engineering Planning and Management
CE 574	Engineering Planning and Management

Graduate Committees

Served on over 150 graduate committees at the M.S. and Ph.D. level.
 Advised 79 M.S. and 16 Ph.D. graduates.

Continuing Education

Served as either a member of organization committee, coordinator, instructor, or speaker at numerous short courses, symposia, seminars, or workshops held at, sponsored by, or in conjunction with Colorado State University including:

- ASCE National Conference on Water Resources Engineering (1995, 1998)
- The International Riprap Workshop (1993)
- ASCE National Conference on Hydraulic Engineering (1985-1990)
- Mill Tailings Management Short Course (1978-1983, 1985-87, 1990)
- Uranium Mill Tailings Symposium (1978-1987)
- Planning and Preliminary Design for Flood Hazard Mitigation (1986)
- Hydraulics Conference for the Highway Community, DOT (1985)
- Problems of Sediment Transport in Gravel-Bed Rivers (1985)
- Materials Sampling and Testing Short Course (1981, 1983, 1984)
- Hazardous Waste Management Seminar (1981)
- Contaminant Transport Short Course (1981)
- Pump Design Short Course (1979, 1980)

May 1974 -
 January 1976

Hydraulic and Staff Engineer
 Leonard Rice Consulting Water Engineers, Inc., Denver Colorado

- Performed hydraulic, economic, hydrologic, water quality, and water rights analysis for numerous engineering projects.
- Served as project engineer for projects requiring drainage, surveying, stream gaging, inspection, groundwater monitoring, and other field oriented expertise.
- Performed administrative duties involving supervision of technical staff and small project estimation. Responsible for financial and operational accountability of computer systems and computer program library.

October 1973 -
 May 1974

Graduate Research Assistant and Graduate Teaching Assistant
 Colorado State University, Fort Collins, Colorado

May 1973 -
 October 1973

U. S. Army Corps of Engineers, Active Duty, Fort Belvoir, Virginia

MISCELLANEOUS EXPERIENCE:

June 1973 - Present

U.S. Army Reserve

Currently serve in the rank of Colonel in the position of Director, Facilities Engineering TDA, 416th Engineer Command, Darien, IL. Previously served in the U.S. Army Corps of Engineers as a platoon leader and company commander, specializing in heavy equipment and facilities construction. Also served as a Civil Engineer, Mechanical Engineer, and Team Leader for the Denver and/or Cheyenne Facility Engineering Teams; and Operations Officer, Deputy Director, and Director of Engineer Support Group-SW, 416th Engineer Command, San Antonio, Texas. Other assignments have included the U.S. Army Health Services Command Individual Mobilization Augmentee and U.S. Military Academy Liaison. Completed the Engineer Officer Basic Course, Engineer Officer Advanced Course, Facilities Management Course, Senior Officer Legal Orientation Course, U.S. Army Command and General Staff College, and U.S. Army War College.

June 1981 - September 1994 U.S. Forest Service

Served as Contract Station Engineer for the U.S.D.A. Forest Service, Rocky Mountain Forest and Range Experiment Station. Duties entailed the conductance of needs assessment and feasibility studies of numerous construction projects; construction cost estimates; contract liaison and coordination; review of construction plans and specifications; maintenance surveys; value analysis, and construction inspections. Also, conducted an extensive energy conservation program for the station 10 state region. Performed site studies of underground storage tanks, radon emission, asbestos removal, and facility master planning. Implemented a facility inventory and database program. Provided assistance in uranium mine cleanup and rehabilitation. Supervised construction projects of: the erection of pre-engineered buildings, parking lot rehabilitation, roof replacements, UST removal and restoration, and building restorations. Assisted the Lakeview Ranger District, Fremont National Forest in the reclamation planning of the White King and Lucky Lass Uranium Mines.

June 1979 - June 1990

U.S. Nuclear Regulatory Commission

Performed reviews of mining and milling applications and amendments for the U.S. Nuclear Regulatory Commission. Reviews addressed the construction, modification, and reclamation of uranium tailing impoundments. Also reviewed rock sizing and rock quality procedures for reclamation of uranium and low-level waste disposal sites. Served as an inspector of uranium tailings dams during various stages of construction.

AWARDS AND HONORS:

Associate Editor for Civil and Environmental Engineering, Journal of the American Water Resources Association, June 99 - Present.

Service Award, American Society of Civil Engineers, Water Resources Engineering Division, 1998

Graduate, U.S. Army War College, Carlisle, PA., 1997

Most Distinguished Technical Paper Award, International Erosion Control Association, 1997

Fellow, American Society of Civil Engineers, 1994

Executive Committee, American Society of Civil Engineers, Hydraulics Division, 1990-94;
Chairman 1992-93

Certificate of Appreciation, Formation of the Colorado Transportation Institute, Colorado Department of Transportation, 1992

Certificate of Recognition for Service, American Society of Civil Engineers, Hydraulic Division, 1991

Oliver P. Pennock University Distinguished Service Award, Colorado State University, 1990-91

Halliburton Faculty Teaching Award, College of Engineering, Colorado State University, 1990

U. S. Forest Service, Certificate of Merit for Engineering Services, Rocky Mountain Forest and Range Experiment Station, 1987

Jack E. Cermak Undergraduate Advising Award, College of Engineering, Colorado State University, 1985

Stone and Webster Engineering Corporation Faculty Fellowship Program Award, 1984

Alumni Faculty Award, College of Engineering, Colorado State University Alumni Association, 1983

Dow Chemical Outstanding Young Faculty Award, American Society for Engineering Education, Rocky Mountain Section, 1983

U. S. Forest Service, Performance Award for Energy Conservation, Rocky Mountain Forest and Range Experiment Station, 1983

Halliburton Engineering Young Faculty Teaching Award, College of Engineering, Colorado State University, 1982

Ralph R. Teetor Awardee, Society of Automotive Engineers Conference and Exposition, 1981

U.S. Air Force ROTC Service Recognition Award, Detachment 90, Colorado State University, 1981

REFEREED JOURNALS:

1. Abt, S. R. and Grigg, N. S. "An Approximate Method for Sizing Detention Reservoirs." *AWRA Water Resources Bulletin*, Vol. 14, No. 4, pp. 956-965, August 1978.
2. Ruff, J. F. and Abt, S. R. "Evaluating Scour at Culvert Outlets." *Transportation Research Record No. 785, Hydraulics and Hydrology Division*, pp. 37-40, 1981.
3. Abt, S. R., and Ruff, J. F. "Estimating Culvert Scour in Cohesive Material." *Journal of Hydraulic Engineering, ASCE*, Vol. 108, No. HY1, Proc. Paper 16784, pp. 25-34, January 1982.
4. Mendoza, C., Abt, S. R., and Ruff, J. F. "Headwall Influence on Scour at Culvert Outlets." *Journal of Hydraulic Engineering, ASCE*, Vol. 109, No. HY7, Paper 18076, July 1983.
5. Abt, S. R., Ruff, J. F., and Mendoza, C. "Mound Formation at Culvert Outlets." *AWRA Water Resources Bulletin*, Vol. 19, No. 4, pp. 571-576, August 1983.
6. Abt, S. R., Ruff, J. F., and Mendoza, C. "Scour at Culvert Outlets in Multi-Bed Materials." *Transportation Research Record*, No. 948, pp. 55-62, October 1984.
7. Abt, S. R., Kloberdanz, R. L., and Mendoza, C. "Unified Culvert Scour Determination." *Journal of Hydraulic Engineering, ASCE*, Vol. 110, No. HY10, pp. 1475-1479, October 1984.
8. Charlie, W. A., Veyera, G. E., and Abt, S. R. "Predicting Blast Induced Porewater Pressure Increases in Soils." *Journal of Civil Engineering for Practicing and Design Engineers*, Vol. 4, No. 3, February 29, 1985.
9. Abt, S. R., Donnell, C. A., Ruff, J. F., and Doehring, F. K. "Culvert Slope and Shape Effects on Outlet Scour." *Transportation Research Record*, No. 1017, Hydraulics and Hydrology Division, pp. 24-30, October 1985.
10. Richardson, J. R., Abt, S. R., and Richardson, E. V. "Inflow Seepage Influence on Straight Alluvial Channels." *Journal of Hydraulic Engineering, ASCE*, Vol. 111, No. 8, Paper No. 19932, pp. 1133-1137, August 1985.
11. Abt, S. R., Ruff, J. F., and Doehring, F. K. "Culvert Slope Effects on Outlet Scour." *Journal of Hydraulic Engineering, ASCE*, Vol. 111, No. 10, pp. 1363-1367, October 1985.
12. Abt, S. R., Ruff, J. F., Doehring, F. K., and Donnell, C. A. "Influence of Culvert Shape on Outlet Scour." *Journal of Hydraulic Engineering, ASCE*, Vol. 113, No. 3, pp. 393-400, March 1987.

13. Smith, G. M., Abt, S. R., and Nelson, J. D. "Profile Prediction of Hydraulically Deposited Tailings." Transactions of the Society of Mining Engineers of AIME, Vol. 280, pp. 2024-2027, August 1987.
14. Wittler, R. J., Abt, S. R., and Sanders, T. G. "Channel Discharge Measurement by Thermodilution." AWRA Water Resources Bulletin, Vol. 23, No. 6, pp. 1109-1115, December 1987.
15. Shaikh, A., Ruff, J. F., and Abt, S. R. "Erosion Rate of Compacted N-Montmorillonite Soils." Journal of Geotechnical Engineering, ASCE, Vol. 114, No. 3, pp. 296-305, March 1988.
16. Shaikh, A., Ruff, J. F., Charlie, W. A., and Abt, S. R. "Erosion Rate of Dispersive and Non-dispersive Clays." Journal of Geotechnical Engineering, ASCE, Vol. 114, No. 5, pp. 589-600, May 1988.
17. Shaikh, A., Ruff, J. F., and Abt, S. R. "Salts Affect the Erosion Rate of Montmorillonite Clays." Transportation Research Record, No. 1151, Hydraulics and Hydrology Division, pp. 32-38, September 1988.
18. Abt, S. R., Wittler, R. J., Ruff, J. F. and Khattak, M. S. "Resistance to Flow Over Riprap in Steep Channels." AWRA Water Resources Bulletin, Vol. 24, No. 6, pp. 1193-1200, December 1988.
19. Maynard, S. T., Ruff, J. F., and Abt, S. R. "Riprap Design." Journal of Hydraulic Engineering, ASCE, Vol. 115, No. 7, pp. 937-949, July 1989.
20. Abt, S. R., Wittler, R. J., Taylor, A., and Love, D. J. "Human Stability in a High Flood Hazard Zone." AWRA Water Resources Bulletin, Vol. 25, No. 4, pp. 881-890, August 1989.
21. Abt, S. R., Thompson, K., and Staker, K. "Discharge Correction for Longitudinal Settlement of Parshall Flumes." Transactions of American Society of Agricultural Engineers, Vol. 32, No. 5, pp. 1541-1544, September-October 1989.
22. Shields, F. D. and Abt, S. R. "Sediment Deposition of Cutoff Meander Bends & Implications for Effective Management." Regulated Rivers Research and Management, Vol. 4, pp. 381-396, November 1989.
23. Abt, S. R., Nelson, J. D., Johnson, T. L., and Hawkins, E. F. "Cap Stabilization for Reclaimed Uranium Sites." Journal of Energy Engineering, ASCE, Vol. 115, No. 3, pp. 109-119, December 1989.

24. Abt, S. R., Richardson, J. R., and Wittler, R. J. "Inflow Seepage Influence on Pier Scour." *Transportation Research Record*, No. 1201, "Arid Lands: Hydrology, Scour and Water Quality," pp. 54-61, 1989.
25. Codell, R. B., Abt, S. R., Johnson, T. L., and Ruff, J. F. "Estimation of Flow Through and Over Armored Slopes." *Journal of Hydraulic Engineering*, ASCE, Vol. 116, No. 10, pp. 1252-1269, October 1990.
26. Abt, S. R. and Staker, K. J. "Rating Correction for Lateral Settlement of Parshall Flumes." *Journal of Irrigation and Drainage Engineering*, ASCE, Vol. 116, No. 6, pp. 797-803, November-December 1990.
27. Abt, S. R., Ruff, J. F., and Wittler, R. J. "Estimating Flow Through Riprap." *Journal of Hydraulic Engineering*, ASCE, Vol. 117, No. 5, May 1991.
28. Ingram, J. J., Abt, S. R., and Richardson, E. V. "Sediment Discharge Computation Using Point Sampled Suspended Sediment Data." *Journal of Hydraulic Engineering*, ASCE, Vol. 117, No. 6, pp. 758-773, June 1991.
29. Abt, S. R. and Johnson, T. L. "Riprap Design for Overtopping Flow." *Journal of Hydraulic Engineering*, ASCE, Vol. 117, No. 8, pp. 959-972, August 1991.
30. Abt, S. R., High, K. M., and McBee, J. M. "Refined Cap Design for Uranium Tailings Sites." *Journal of Energy Engineering*, ASCE, Vol. 117, No. 2, pp. 71-86, August 1991.
31. Santoro, V. C., Julien, P. Y., Richardson, E. V., and Abt, S. R. "Velocity Profiles and Scour Depth Measurements Around Bridge Piers." *Transportation Research Record*, No. 1319, "Highway Facility Design: Bridges, Other Structures, and Hydrology and Hydraulics," pp. 137-142, 1991.
32. Abt, S. R., Cook, C., Staker, Kenneth, J. and Johns, D. "Small Parshall Flume Rating Correction." *Journal of Hydraulic Engineering*, ASCE, Vol. 118, No. 5, pp. 798-803, May 1992.
33. Dortch, M. S., Chapman, R. S., and Abt, S. R. "Application of Three-Dimensional, Lagrangian Residual Transport." *Journal of Hydraulic Engineering*, ASCE, Vol. 118, No. 6, pp. 831-848, June 1992.
34. Abt, S. R., Richardson, J. R., Hogan, S. A., Van Zanten, B. L., and Siller, T. J. "Laboratory Tests of Scour Monitoring Devices." *Transportation Research Record*, No. 1350, Hydrology and Bridge Scour, pp. 19-27, 1992.

35. Abt, S. R., Peterson, M. R., Watson, C. C., and Hogan, S. A. "Analysis of ARS Low Drop Grade Control Structure." *Journal of Hydraulic Engineering*, ASCE, Vol. 118, No. 10, pp. 1424-1434, October 1992.
36. Abt, S. R., Brisbane, R. E., Frick, D. M., and McKnight, C. A. "Trash Rack Blockage in Super Critical Flow." *Journal of Hydraulic Engineering*, ASCE, Vol. 118, No. 12, pp. 1692-1696, December 1992.
37. Johns, D., Abt, S. R., Watson, C. C., and Combs, P. G. "Riprap Sizing for the ARS-Type Low Drop Stilling Basin." *Journal of Hydraulic Engineering*, ASCE, Vol. 119, No. 7, pp. 864-869, July 1993.
38. Adam, A., Ruff, J. F., Al-Qaser, G., and Abt, S. R. "Characteristics of a B-Jump with Different Toe Locations." *Journal of Hydraulic Engineering*, ASCE, Vol. 119, No. 8, pp. 938-948, August 1993.
39. Clark, J. R. and Abt, S. R. "Analysis of Temporary Water Transfers." *AWRA Water Resource Bulletin*, Vol. 29, No. 2, pp. 249-255, March/April 1993.
40. Genovez, A., Abt, S. R., Florentin, B., and Garton, A. "Correction for Settlement of a Parshall Flume." *Journal of Irrigation and Drainage Engineering*, ASCE, Vol. 119, No. 6, pp. 1081-1091, November/December 1993.
41. Thorne, C. R. and Abt, S. R. "Analysis of Riverbank Instability Due to Toe Scour & Lateral Erosion," *Earth Surface Processes and Land Forms*, Vol. 18, pp. 835-843, 1993.
42. Abt, S. R., Hamilton, G. B., Watson, C. C., and Smith, J. "Riprap Sizing for a Modified ARS-Type Basin." *Journal of Hydraulic Engineering*, ASCE, Vol. 120, No. 2, pp. 260-267, February 1994.
43. Abt, S. R., Genovez, A., and Florentin, B. "Correction for Settlement in Submerged Parshall Flumes." *Journal of Irrigation and Drainage Engineering*, ASCE, Vol. 120, No. 3, pp. 676-682, May/June 1994.
44. Abt, S. R., Pauley, C. J., Hogan, S. A., and Johnson, T. L. "Gully Potential in Soil Covered Uranium Waste Impoundments." *Journal of Energy Engineering*, ASCE, Vol. 120, No. 2, pp. 51-66, August 1994.
45. Abt, S. R., Clary, W. P., and Thornton, C. I. "Sediment Deposition and Entrapment in Vegetated Streambeds." *Journal of Irrigation and Drainage Engineering*, ASCE, Vol. 120, No. 6, pp. 1098-1111, November/December 1994.

46. Doehring, F. K. and Abt, S. R. "Drop Height Influence on Outlet Scour." *Journal of Hydraulic Engineering, ASCE*, Vol. 120, No. 12, pp. 1470-1476, December 1994.
47. Abt, S. R., Thornton, C. I., and Johnson, T. L. "Estimating Drainage Area on Steep Uniform Slopes." *AWRA Water Resources Bulletin*, Vol. 31, No. 1, pp. 53-58, February 1995.
48. Peters, M. R., Abt, S. R., Watson, C. C., Fischenich, J. C., and Nestler, J. M. "Assessment of Restored Riverine Habitat Using RCHARC." *AWRA Water Resources Bulletin*, Vol. 31, No. 4, pp. 745-752, August 1995.
49. Abt, S. R., Florentin, C. B., Genovez, A., and Ruth, B. C. "Settlement and Submergence Adjustments for the Parshall Flume." *Journal of Irrigation and Drainage Engineering, ASCE*, Vol. 121, No. 5, pp. 317-321, September 1995.
50. Milhouse, R. T., Hogan, S. A., Abt, S. R., and Watson, C. C. "Sampling River Bed - Material: The Barrel Sampler." *Rivers*, Vol. 5, No. 4, pp. 239-249, October 1995.
51. Clary, W. P., Thornton, C. I., and Abt, S. R. "Riparian Stubble Height and Recovery of Degraded Streambanks." *Rangelands*, Vol. 18, No. 4, pp. 137-140, August 1996.
52. Abt, S. R., Wittler, R. J., and Ruff, J. F. "Design Flood Impacts on Evaluating Dam Failure Mechanisms." *IWRA Water International*, Vol. 21, No. 3, pp. 152-157, September 1996.
53. Abt, S. R., Thompson, P. L., and Lewis, T. M. "Enhancement of the Culvert Outlet Scour Estimation Equations." *Geometric and Other General Design Issues, Transportation Research Record*, No. 1523, pp. 178-184, 1996.
54. Abt, S. R. and Ruth, B. C. "Flume Condition Assessment in Colorado." *Journal of the American Water Resources Association*, Vol. 33, No. 1, pp. 71-77, February 1997.
55. Watson, C. C., Abt, S. R., and Derrick, D. "Willow Posts Bank Stabilization, A Case Study at Harlan Creek." *Journal of the American Water Resources Association*, Vol. 33, No. 2, pp. 293-300, April 1997.
56. Thornton, C. I., Abt, S. R., and Clary, W. P. "Vegetation Influence on Small Stream Siltation." *Journal of the American Water Resources Association*, Vol. 33, No. 6, pp. 1279-1288, December 1997.
57. Dudley, S.J., Bonham, C.D., Abt, S.R., and Fischenich, J.C., "Comparison of Methods for Measuring Woody Riparian Vegetation Density." *Journal of Arid Environments*, Vol. 38, pp. 77-86, 1998.

58. Abt, S. R., Johnson, T. L., Thornton, C. I., and Trabant, S. C. "Riprap Sizing at the Toe of Embankment Slopes." *Journal of Hydraulic Engineering, ASCE*, Vol. 124, No. 7, pp. 672-677, July 1998.
59. Dudley, S.J., Bonham, C.D., Abt, S.R., and Fischenich, J.C. "Modification of the Point Frame for Quantitative Hydraulic Investigation." *Rangelands*, Vol. 20, No. 4, pp. 25-27, August 1998.
60. Bohrer, F.G., Abt, S.R. and Wittler, R.J. "Predicting Plunge Pool Velocity Decay of a Free Falling, Rectangular Jet." *Journal of Hydraulic Engineering, ASCE*, Vol. 124, No. 10, pp. 1043-1048, October 1998.
61. Dudley, S. J., Fischenich, J. C., and Abt, S. R. "Effect of Woody Debris Entrapment on Flow Resistance." *Journal of the American Water Resources Association*, Vol. 34, No. 5, pp. 1189-1197, October 1998.
62. Abt, S. R., Ruth, B. C., and Skowron, E. M. "Free-Flowing Rating Adjustment for Settlement of Cutthroat Flumes." *Journal of Irrigation and Drainage Engineering, ASCE*, Vol. 124, No.6, pp. 311-315, December 1998.
63. Arneson, L.A. and Abt, S.R., "Vertical Contraction Scour in Bridges Flowing Water Under Pressure Conditions." *General Design and Roadside Safety Features, Transportation Research Record*, No. 1647, pp. 10-17, 1999.
64. Leech, J. R., Abt, S.R., Thornton, C.I., and Combs, P.G. "Developing Confidence in Concrete Revetment Products for Bank Stabilization." Accepted for publication in the *Journal of the American Water Resources Association*, 1999.
65. Lewis, T.M., Abt, S.R., Wittler, R.J. and Annandale, G.W. "Predicting Impact Velocities of Developed Jets." Accepted for publication in *IWRA Water International*, 1999.

DISCUSSIONS/CLOSURES:

1. Shaikh, A., Ruff, J. F., Charlie, W. A., and Abt, S. R. "Erosion Rate of Computed N-Montmorillonite Soils." Closure, Journal of Geotechnical Division, ASCE, Vol. 115, No. 12, pp. 1826, December 1989.
2. Maynard, S. T., Ruff, J. F., and Abt, S. R. "Riprap Design." Closure, Journal of Hydraulic Engineering, ASCE, Vol. 117, No. 4, pp. 542-544, April 1991.
3. Abt, S. R. and Staker, K. J. "Rating Correction for Lateral Settlement of Parshall Flumes." Closure, Journal of Irrigation and Drainage Engineering, ASCE, Vol. 118, No. 2, pp. 339-340, March/April 1992.

OTHER REFEREED PUBLICATIONS:

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED
USNRC

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

JUL 20 4:40

In the Matter of)

PRIVATE FUEL STORAGE L.L.C.)

(Independent Spent)

Fuel Storage Installation))

Docket No. 72-22-ISFSI

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S RESPONSE TO APPLICANT'S MOTION FOR SUMMARY DISPOSITION OF UTAH CONTENTION M - PROBABLE MAXIMUM FLOOD" in the above captioned proceeding have been served on the following through deposit in the Nuclear Regulatory Commission's internal mail system, or by deposit in the United States mail, first class, as indicated by an asterisk, with copies by electronic mail as indicated, this 19th day of July, 1999:

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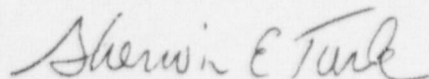
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