DAVIS A. REED

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OBJECTIVE

To work on challenging technical problems related to nuclear criticality and/or nuclear criticality safety (NCS).

CITIZENSHIP/CLEARANCE

U.S. citizen with active DOE Q-clearance.

EDUCATION

Bachelor of Science Degree in Nuclear Engineering, Mississippi State University (1979, GPA 3.66/4.00)
Graduate studies at the University of Tennessee (1979-1981, GPA 3.31/4.00 for 48 quarter hours)

EXPERIENCE

2008 - present: Research and Development Staff Member in the Radiation Transport and Criticality Group of the Nuclear Science and Technology Division (ORNL)

Primary responsibilities: Support various ORNL and external customers in criticality and criticality safety methods development, applications, and reviews. Present external customers include Babcock and Wilcox Technical Services (Oak Ridge Y-12 Plant Nuclear Criticality Safety Committee) and the Department of Energy Criticality Safety Support Group (DOE CSSG).

1995 - present: Instructor for the University of Tennessee

Primary responsibilities: Function as an instructor for the annual Tennessee Industries Week short course in NCS and for the graduate-level course in NCS (NE-543). Reed's presentation topics include performance of NCS evaluations, validation of NCS computational methods, criticality accident alarms, and emergency response for nuclear criticality accidents.

1994 - present: Instructor for H. L. Dodds Associates

Primary responsibilities: Same as above as a University of Tennessee employee, except that the course presentations are to nuclear industry customers via a private consulting agreement with H. L. Dodds.

1999 – 2008: NCS Program Lead in the Nuclear and Radiological Protection Division (ORNL)

Primary responsibility: Function as the technical leader for the NCS staff supporting fissionable material activities conducted by ORNL. Maintain the NCS programmatic and procedural infrastructure for ORNL, perform approvals of NCS staff work products, maintain controlled NCS software and workstations, function as the primary ORNL NCS trainer, guide work performed by other ORNL NCS staff, and provide comments and impact assessments for NCS-related DOE regulatory changes that potentially affect ORNL nuclear operations.

Work accomplishments as ORNL NCS Program Lead include revision of ORNL laboratory-level NCS command media (2002), development of an ORNL NCS Engineer Training and Qualification Program (2001, approved by DOE), development of an ORNL NCS Program Description (2004), and recruiting, hiring, and subsequent formal qualification of three NCS engineers (one each in 2003,2004, and 2007).

EXPERIENCE - CONTINUED

As ORNL NCS Program Lead, Reed also supported outside (non-ORNL) customers:

- the Bechtel-Jacobs Plant Nuclear Criticality Safety Committee (member, 2001-2006),
- the BWXT-Y12 Nuclear Criticality Safety Committee (ad-hoc member for 2001, 2003, 2004, and 2005 annual NCS program reviews),
- a special investigating committee for BWXT-Y12 (Dollinger Filter Investigation, 2006),
- DOE Y-12 NNSA (Readiness Assessment for Phase II Disassembly operations, 2001), and
- two site visits/assessments for the DOE Criticality Safety Support Group (an assessment of the Los Alamos National Laboratory NCS program in 2005, and an assessment of NCS for the Hanford Bulk Vitrification Project, 2005).

1995 – 2008: NCS Engineer, ORNL

Primary responsibility: Criticality safety engineering support to maintain safe storage and chemical processing of ^{233}U, ^{235}U of various enrichments, and plutonium and transplutonium isotopes at ORNL.

Work accomplishments as a formally qualified ORNL NCS engineer include support for:

- retrieval, characterization, repackaging, and shipment of a wide variety of spent nuclear fuel,
- deinventory of inactive ORNL reactor facilities,
- disassembly and repackaging of legacy stainless-steel-clad low-enrichment reactor fuel (N. S. Savannah), disassembly and repackaging of legacy space reactor fuel (SNAP-TSF),
- packaging and shipment of bulk inventories of low-enrichment uranium oxide in non-DOT-compliant packages (including technical basis for exemption from U. S. DOT transport regulations),
- evaluation of the DOT 9975 package for $^{237}NpO_2$ handling, storage and transport,
- fuel element and transplutonium target management at the High Flux Isotope Reactor (HFIR),
- chemical processing of targets irradiated at HFIR or at other reactors, and fabrication of HFIR targets at the Radiochemical Engineering Development Center,
- evaluation of the storage configuration of ^{233}U at ORNL (primary analyst),
- legacy ^{233}U package retrieval and inspections, ^{232}Th extraction for medical trials, plus several one-time efforts for receipt and storage of ^{233}U from other DOE sites,
- remediation efforts for $^{233}UF_6$ gas migration at the Molten Salt Reactor Experiment Site (including design and evaluation of a $^{233}UF_6$-to-oxide conversion facility, on-site transport of $^{233}UF_6$ traps, and storage and monitoring of stored traps),
- an NRC Pilot Program to examine the feasibility of ORNL nuclear activities being conducted according to NRC (rather than DOE) regulations, and
- support of various classified/sensitive activities for DOE.

EXPERIENCE - CONTINUED

1981 – 1995: NCS Engineer, Oak Ridge Y-12 Plant

Primary responsibility: Served as the primary NCS engineer for highly-enriched-uranium chemical recovery operations at the Y-12 Plant.

NCS work accomplishments included:

- support for NCS of day-to-day operations for two major enriched uranium chemical recovery complexes during a multi-year period of facility operation at maximum throughput,
- resolution of numerous off-normal conditions involving significant amounts of highly enriched uranium found in unanalyzed or unexpected conditions,
- support for several facility safety documentation upgrade efforts (e.g. "Safety Analysis Reports" and similar safety documents developed by the contractor for DOE approval),
- "design basis reconstruction"* for NCS, and
- NCS design support for several multi-million-dollar chemical recovery area upgrades: Restoration of Uranium Processing Capabilities (Building 9206), Process Capabilities Restoration (Buildings 9215, 9212, and 9818), Enriched Uranium Recovery Improvements (Building 9212), Enriched Uranium Conversion (UF_6 to UF_4) Facility Modifications (Building 9212), and Air Emissions Control Project (Buildings 9206 and 9212).

* In the early 1980s, original NCS design considerations and safety rationale were poorly documented (or not documented at all) for many Y-12 enriched uranium chemical recovery activities. Of the large number of NCS evaluations performed during the 1981-1995 time frame, much content generated by Reed remains in use (via reference or direct incorporation) in current Y-12 NCS documents for enriched uranium chemical processing.

1979 - 1981: Graduate Research Student for the University of Tennessee at ORNL

Primary responsibilities: Performed shielding calculations using a two-dimensional discrete ordinates code as part of ORNL support for a gas-cooled fast reactor design effort (1979-1980); performed data correlations for a light water reactor loss-of-coolant test loop (1980-1981).

1978 & 1979: Summer engineering intern at the Savannah River Plant (1978) and the Savannah River Laboratory (1979) for E. I. duPont Company

Primary responsibilities: Performed various engineering tasks in support of K-Reactor operations (1978) and in support of Nuclear Regulatory Commission projects related to light water reactor loss-of-coolant accident scenarios (1979).

TRAINING AND QUALIFICATION

As a new-hire into the Y-12 Plant Criticality Safety Department in 1981, Reed was temporarily assigned (for three months) as a front-line supervisor-trainee in the Building 9212 and 9206 enriched uranium recovery complexes. The trainee role and associated process area immersion (rotating shift assignments) resulted in an ideal process-learning situation for Reed. This familiarity with Y-12 nuclear facilities, chemical processes, and operating personnel proved to be an invaluable benefit to Reed's subsequent development as an NCS engineer.

Reed was the first intern in the Criticality Safety Specialist Intern Program (DOE Office of Nuclear Safety, September 1984 through April 1985). This program involved a three month assignment at the Oak Ridge National Laboratory, to work with developers of the SCALE computational system. Emphasis was placed on learning and testing recent improvements in SCALE analysis sequences (e.g., array-of-arrays capability) and application of SCALE to specific critical experiments. Also, significant effort was invested in locating and reviewing critical experiment records (many unpublished) for the former Oak Ridge Critical Experiments Facility (ORCEF).

The DOE Criticality Safety Specialist Intern Program included an additional three-month assignment, at the Los Alamos Critical Experiments Facility (LACEF). Reed participated in conducting critical experiments with mixtures of highly enriched uranyl nitrate solution and boric acid. Reed also assisted in use of the "source jerk" technique to perform subcritical measurements (1) during approach-to-criticals for the boron-poisoned solution experiments, (2) for a weapons component, and (3) for the Flattop 20-kg U(93) metal core under conditions of half-reflection by depleted uranium, bottom reflection by a depleted uranium pedestal, and no reflection (core was suspended by a small-diameter steel wire). The Flattop subcritical measurements were set up, executed, and analyzed by Reed.

Reed has experience in application of SCALE and MCNP routines to predict neutron multiplication values (k_{eff}) and to assess radiation transport associated with criticality accidents. These computational abilities were primarily developed by on-the-job training and NCS work assignments.

Formal NCS-related training modules or qualifications include (but are not limited to):

- Los Alamos Nuclear Criticality Safety Training Course,
- SCALE Shielding and Source Terms Training Course,
- Los Alamos MCNP Shielding Course,
- Los Alamos MCNP Advanced Topics Course,
- Lawrence Livermore National Laboratory Safety Analysis Reports for Packaging Course,
- qualifications as an ORNL NCS Analyst, NCS Technical Reviewer, and NCS Approver, and
- qualification as the ORNL NCS Software Administrator.

Y-12 and ORNL institutional training modules and qualifications include (but are not limited to):

- Kepner-Tregoe Problem-Solving and Decision-Making,
- Human Performance Improvement Fundamentals,
- Conducting Assessments Basics Training,
- Root Cause Analysis,
- Critique of Events Workshop,
- Instructor Skills Workshop,
- Unreviewed Safety Question Training, and
- Radiological Worker II Training.

PROFESSIONAL INVOLVEMENTS/OUTSIDE ACTIVITIES

Reed participates or has participated in these roles:

- Member (2005 - present) of the DOE Criticality Safety Support Group,
- Member (1987 - present) of the ANS-8 Standards Subcommittee for Fissionable Materials Outside Reactors,
- Chair (1989 - present) of American National Standards Institute Working Group ANSI/ANS-8.3, Criticality Accident Alarm System (the current revision of the Standard, ANSI/ANS-8.3-1997, was produced under Reed's chairmanship).
- Ad-hoc member (2001, 2003, 2004, and 2005) of the BWXT-Y-12 Company Nuclear Criticality Safety Committee (was appointed as a full member in June 2007),
- Member (2001 - 2006) of the Bechtel-Jacobs Company, LLC, Plant Nuclear Criticality Safety Committee,
- Member of the DOE Nuclear Data Advisory Group (2002 - present),
- Member of the DOE End-User's Group (1999 - 2008),
- Current member of the national and local chapters of the American Nuclear Society, and
- Secretary of the ANS Nuclear Criticality Safety Division (2005 - 2006).

OTHER ITEMS OF NOTE

In 1991, Reed detected and reported errors in TID-7016 Revision 2, "Nuclear Safety Guide," Table 2.8. The table was intended to present computed subcritical mass limits for U(93.5) metal-graphite-water mixtures. Some reported subcritical configurations were found to represent super-critical systems (k_{eff} ~ 1.05) due to previously undetected material modeling errors. In response, ORNL released a errata update for TID-7016 Revision 2. Reed received a commendation from the Oak Ridge Y-12 Plant Manager for this event.

In 2002, Reed determined and reported that non-trivial and potentially non-conservative cross section errors were present in the ENDF/B-V beryllium metal cross section set issued as part of the SCALE 4.3 code package. In response, the SCALE package developers released a corrected beryllium metal cross section set for SCALE 4.3.

PUBLICATIONS

Reed has functioned as the primary NCS analyst for approximately 400 original (i.e., not minor revisions of) NCS evaluations which are retained in records of the NCS organizations of either the Y-12 National Security Complex or the Oak Ridge National Laboratory. Reed has also authored several dozen internal technical NCS reports supporting of Y-12 or ORNL fissionable material activities. Due to work priorities, organizational missions, and/or classification reasons, only a very small fraction of Reed's NCS work products have been formally published. A comprehensive listing of Reed's more important NCS work products is available upon request.

Selected formal publications are listed below:

ORNL-5669, "Analysis of the Conceptual Shielding Design for the Upflow Gas-Cooled Fast Breeder Reactor," C. O. Slater, D. A. Reed, S. N. Cramer, M. B. Emmett, E. T. Tomlinson, Oak Ridge National Laboratory, 1981.

ORNL-5822, "Dispersed Flow Film Boiling in Rod Bundle Geometry-Steady State Heat Transfer Data and Correlation Comparisons," G. L. Yoder, D. G. Morris, C. B. Mullins, L. J. Ott, D. A. Reed, Oak Ridge National Laboratory, 1982

Y/DD-395, "Basic Nuclear Criticality Safety Guidelines for Enriched Uranium Recovery Areas at the Oak Ridge Y-12 Plant," D. A. Reed, Oak Ridge Y-12 Plant, 1987.

Y/DD-384, "Consequences of a Postulated, Moderated Nuclear Criticality Accident at the Oak Ridge Y-12 Plant," W. T. Mee, D. A. Reed, R. G. Taylor, Oak Ridge Y-12 Plant, 1988.

Y/DD-516, "A Criticality Safety Assessment of Uranium Compound Storage at the Oak Ridge Y-12 Plant," D. A. Reed, D. D. Butcher, and T. L. Krawczyk, Oak Ridge Y-12 Plant, 1991.

ANSI/ANS-8.3-1997, "Criticality Accident Alarm System," American Nuclear Society, 1997 (Reed was the Work Group Chair for the effort that resulted in the 1997 edition of the standard).

ORNL/TM-2003/200, "Nuclear Criticality Safety of the DOT 9975 Container for $^{237}NpO_2$ Storage, Handling, and Transport," D. A. Reed, S. Goluoglu, C. M. Hopper, R. M. Wham, Oak Ridge National Laboratory, 2003.

Last update of this resume: June 2008.