
LONGENECKER and ASSOCIATES

Dr. Leslie J. Jardine

EXPERIENCE SUMMARY

Thirty-five years of experience in leading, managing and participating in scientific and engineering groups for complex nuclear projects in applied nuclear fuel cycle research technology, nuclear weapons production complex component manufacturing, fissile material disposition, nuclear measurement spectroscopy, radioactive waste management and pyrochemical reprocessing at three National Laboratories and in the engineering nuclear design industry. Dr. Jardine's responsibilities included the planning, organizing, budgeting, scheduling, monitoring, managing and leading of the project's elements under his jurisdictions. He has an extensive history of successful DOE and Contract sponsor interactions, including development, implementation and completion of new projects and studies. He has prepared engineering assessments for the production of nuclear weapon secondaries and primaries, directed fissile materials disposition analyses, conducted innovative performance assessments for engineered systems, structures and sites, made nuclear radiation spectroscopy measurements, performed safety analyses for nuclear fuel cycle facilities, developed criteria and methods for evaluating the levels of radiation releases to the environment from nuclear facilities, and provided guidelines and supervised the preparation of probabilistic risk type analyses for safety analyses. He developed and led a nuclear materials measurement and characterization science group for waste management. Dr. Jardine has had over ten years of Russian contract negotiations, implementation and administration totaling 70 contracts regarding fissile materials and waste management with Russian engineers and scientists from nuclear weapons facility design, scientific institutes and plutonium industrial production sites, including Minatom (Rosatom) and ISTC projects.

DETAILED EXPERIENCE

1989 –2006: Lawrence Livermore National Laboratory (retired June 2006)

FY95-June 2006: Dr. Jardine was assigned as the Fissile Materials Russian Projects Manager in the Nonproliferation Arms Control and International Security (NAI) (renamed in May 2006 Nonproliferation, Homeland and International Security (NHI)) Directorate) responsible for managing, developing and leading fissile materials and nuclear fuel cycle projects in Russia. In this capacity, he developed program strategies consistent with Russian and US policies for weapons plutonium storage, packaging and transportation, spent fuel storage and transportation, plutonium immobilization, waste treatment, processing, storage and disposal of Russian excess weapons plutonium-containing materials. He defined scopes-of-work, negotiated budgets and schedules, issued purchase requisitions for contracts, monitored technical progress and approved technical deliverables of contracts in Russia. Over 70 LLNL contracts with Russian plutonium industrial sites, scientific research institutes and design organizations were issued in 10 years and monitored under his management, including a total ~\$10M in payments to Russian organizations engaging over a hundred Russian scientists and engineers in a typical year.

FY02: Dr. Jardine was assigned the additional responsibility for Russian nuclear materials packaging, storage and transportation and radioactive waste treatment, storage and disposal in Russia and developed and implemented this work scope for DOE NA-26 as required supporting MOX fuel fabrication in Russia.

FY00: Dr. Jardine was assigned responsibility for Russian spent fuel storage in Russia and developed and implemented Russian contracts for DOE-MD and DOE-NN needs. He also developed new bilateral initiatives for geologic disposal and nuclear materials safety in the Russian fuel cycle for DOE NE, including the publication in FY98 and FY99 as a co-author of

two NATO books on the latter subject. In FY00, he was assigned the new title, International Program Manager for the Fission Energy and Systems Safety Program (FESSP) in the Energy Directorate, focusing on new Russian projects.

FY93-99: Dr. Jardine was the Senior Technical Advisor for the LLNL Fission Energy and Systems Safety Program for FY93-99. In this capacity, he was Scientific Advisor to the Program for nuclear technology and waste management Program elements and assisted the Deputy Associate Director of the Energy Directorate in Program development.

FY96-97: Dr. Jardine was the Principal Deputy and Senior Scientific Advisor for the NAI Fissile Materials Disposition Program. He provided technical oversight to the Program Leader, developed new initiatives with the Russians in fissile nuclear materials and conducted joint studies with Russian scientists. He led, in FY96, a three-laboratory, three-DOE production site systems stockpile management study for DOE-AL on manufacturing pits for nuclear weapons.

FY94-96: Dr. Jardine was the LLNL Deputy Program Leader for the disposition of domestic special nuclear materials from dismantled nuclear weapons in FY94-96 and was a U.S. Co-chairman for a Joint U.S. Russian Study on Plutonium Disposition. He represented LLNL at DOE-Headquarters monthly status meetings providing cost, schedule and technical status reports of LLNL activities for Fissile Materials Disposition. He provided day-to-day programmatic guidance to LLNL staff, developed the framework for LLNL and the national efforts, participated in public PEIS meetings, and started the US collaborative efforts on geologic disposal in Russia.

FY93-94: Dr. Jardine was a technical specialist in LLNL's nuclear weapons complex reconfiguration project, responsible for LLNL's nuclear secondary components manufacturing processes and simulation modeling, high enriched uranium storage activities and coordination of the architect engineer (AE) engineering design team and the PEIS contractor. He represented LLNL at monthly DOE DP-Headquarters status meetings summarizing technical progress, costs and schedules, serving as Deputy Project Leader. He led a multi-discipline team from LLNL, LANL and Y-12 to effectively define the downsizing manufacturing plan adopted by DOE for Y-12 for nuclear secondaries. He performed a special study for managing wastes from the manufacturing of high explosives for nuclear weapons.

For DOE-NE, he developed and documented a strategy for qualifying pyrochemical processing waste forms for geologic disposal while serving as a participant in the Integral Fast Reactor (IFR) Actinide Recycle Program in FY92-93. LJJ05085r1/ke June 2006 update 3 6/19/2006

FY92: Dr. Jardine was a special assistant for nuclear energy to the Energy Program Leader, responsible for developing new projects, including pyrochemistry reprocessing for advanced nuclear reactors and characterization of defense, RCRA, and mixed wastes. These responsibilities included identifying new opportunities, initiating contacts, identifying principal investigators for the projects and marshaling appropriate staff and facilities from the various Laboratory Directorates. In FY92, he served on the Independent Review Group for Hanford's Single-Shell Waste Tank Retrieval Program. In this capacity he reviewed the Hanford Programmatic activities and developed recommended courses of action for Westinghouse-Hanford senior management consideration based on systems engineering and decision analyses.

FY89-91: Dr. Jardine was responsible for management of all Yucca Mountain Project (YMP) activities at LLNL as the Project Leader with an annual budget of up to \$21M, with major subcontracts for waste form characterization at multiple laboratories, PNL-Hanford and ANL-East. The principal activity was the development and specification of an engineered barrier system for a geologic repository in tuff. This work included engineered system component and radioactive waste form and materials characterizations, mechanical design, underground near

field host rock characterization, field testing, computer analyses, and systems engineering for a mined geologic disposal system. The project leader served as a Technical Project Officer in the YMP, interacting with other project participant organizations, National Laboratories, Department of Energy officials at DOE Headquarters, Nevada Operations Office and San Francisco Operations Office. He was responsible for a NQA-1 Quality Assurance Program and an earned value budget reporting system, in addition to usual LLNL requirements for administration of programs.

1982 - 1989: Bechtel - San Francisco, California

Dr. Jardine was the Project Manager for two nuclear radioactive waste management projects, including conceptual designs for a tuff repository waste handling and processing facilities complex and a Japanese vitrified waste handling and storage facility. He also served as a deputy project manager, a project engineer and a lead nuclear engineer on various nuclear fuel cycle design projects. He has managed and integrated a staff of engineers, systems engineering analysts and specialized technical consultants in the preparation of design criteria, safety analyses, technical engineering studies, and preliminary designs for the project facilities. In his project management duties, he was responsible for the planning, monitoring, controlling and implementation of the engineering and administration of the project. In addition, Dr. Jardine served as a technical specialist in nuclear engineering, spent fuel, and safety studies responding to consultation requests from governmental agencies and Bechtel client organizations. On these projects, he implemented specialized and innovative methods that he developed for conducting formalized performance assessments of facilities designs, safety assessments and radiation protection analyses. LJJ05085/ke 4 6/19/2006

Dr. Jardine led the development of conceptual facility designs and process flowsheets for two pyrochemical AVLIS (uranium) processes. Cost estimates, schedules, secondary waste quantities and R&D needs were derived from these conceptual designs. Dr. Jardine previously directed a group of nuclear engineers for the Defense Waste Processing Facility Vitrification project conducting radiation shielding analyses, radiation dose assessments, and quality assurance assessments.

While on the staff of the Chief Nuclear Engineer, he prepared and implemented nuclear design and regulatory guidelines and developed standardized methods for analyses used on projects. He also assisted the Chief Nuclear Engineer in the management, training and recruitment of the Nuclear Group. In addition, he conducted specialized technical studies on spent fuel storage and disposal options and alternatives for radioactive waste immobilization processes. His work encompassed estimating the long-term behavior and performance assessment of spent fuel and high-level wastes for various geologic repository and surface facility design options.

1975 - 1982: Argonne National Laboratory - Illinois

Dr. Jardine was the leader of a research group in the nuclear fuel cycle section of the Chemical Engineering Division. He was responsible for the managing, planning, scheduling, budgeting and leading the group activities, while guiding the direction of staff members in theoretical and experimental applied nuclear materials research projects. He monitored and supervised subcontracted waste management work to consultants and universities. He also gave technical direction, documented results, controlled budgets and schedules, and reported on waste management projects supported by DOE's high-level waste technology program. Dr. Jardine served on the Laboratory's Office of Waste Management Programs Technical Waste Management Advisory Committee. He also conducted independent experimental applied research and systems studies in waste management and non-aqueous pyrochemical spent fuel reprocessing.

Dr. Jardine initiated and developed a verification testing program to characterize the dispersion resistance of solid radioactive waste forms and waste packages from mechanical impacts. He devised and applied a standardized impact test for conducting comparative brittle fracture impact examinations of alternative waste forms. Dr. Jardine developed and demonstrated procedures employing radioactive tracers and neutron activation techniques to measure leaching rates of multiple elements from solid glass and alternative high-level waste forms. He designed and supervised construction of a 50-gallon loop for performing measurements on molten radioactive sodium from decommissioned fast reactors.

While at Argonne, Dr. Jardine reviewed and published a summary of the status of the metal encapsulation technology for waste forms. He conducted molten-alloy casting experiments to define workable metal encapsulation processes and materials handling requirements, and performed characterization tests of metal encapsulated waste forms to measure the chemical stabilities, impact resistance, and leaching characteristics. He defined the waste solidification systems and scope of work for a subcontracted comparative economic trade-off cost study of four high-level waste immobilization processes. LJJ05085r1/ke June 2006 update 5 6/19/2006

1971 - 1975: Lawrence Berkeley Laboratory, University of California

As a research engineer, Dr. Jardine performed basic research of radiochemistry and radionuclide decays. His responsibilities included designing and conducting cyclotron target bombardments, radiochemical separations, nuclear spectroscopy and radiation detection measurements and computer code development for the analyses of radioactive decay data. Dr. Jardine is a co-author of the seventh edition of the book Table of Isotopes for which he evaluated and compiled nuclear spectroscopic data.

EDUCATION

B.S., Chemistry, Indiana State University, 1967

M.S., Nuclear Engineering, University of California, Berkeley, 1969

Ph.D., Nuclear Engineering, University of California, Berkeley, 1972

PROFESSIONAL DATA

Author or co-author of 3 books, over 140 journal or proceedings articles and over 110 reports on radioactive decay, nuclear fuel cycle facilities, fissile materials disposition, nuclear weapons component manufacturing, radioactive waste management, spent fuel storage, plutonium packaging and storage, non aqueous fuel reprocessing, and nuclear measurement instrument calibration.

Atomic Industrial Forum Committees: Former Chairman of High-Level Radioactive Waste Subcommittee and member of Spent Fuel Subcommittee (1984-1987).

University of Chicago, Argonne National Laboratory, Materials Science Division Review Committee (1989-1990).

Recipient of the 1971 ANS Northern California Edward Teller Award.

Member of American Nuclear Society, Technical Program Advisory Committee for Waste Management Symposium, Tucson, AZ and the National Ski Patrol.

Held DOE "Q" and "SCI" Security Clearances.