C. LEE KNOELL
SAFETY ANALYST

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CAREER OBJECTIVE: To work in a challenging and satisfying position in the field of Health and Safety or some closely related field that can effectively utilize my broad engineering, investigative, and analytical skills.

EXPERIENCE:

7/2000- **Department of Energy (DOE)/National Nuclear Security Administration (NNSA) – Los Alamos Area Office (LAAO), Los Alamos, NM** – I am a general engineer and qualified safety analyst in the Safety Authorization Basis Team (SABT). SABT is responsible for the safety oversight of all nuclear and non-nuclear facilities at the Los Alamos National Laboratory (LANL). Specific duties include the review and approval of Safety Analysis Reports (SARs), Technical Safety Requirements (TSRs), Unreviewed Safety Questions (USQs), Basis for Interim Operations (BIOs), Justification for Continued Operations (JCOs), and other related authorization basis documents for nuclear facilities. Additionally, duties include the review and approval of hazard analyses and other safety related documents for explosive firing sites, accelerator facilities, radiography facilities, chemistry facilities and other non-nuclear facilities. The review of the safety documents requires the ability to perform plume modeling and off-site dose determinations, fire modeling, chemical release modeling, biohazard determinations, various confirmatory engineering calculations, and identification and classification of hazard controls. Additionally, I negotiate contract performance measures, and I evaluate the contractor's performance to the measures.

1993-7/2000 **Los Alamos National Laboratory (LANL), Los Alamos, NM**
I was the senior occurrence investigator assigned to the Plutonium Processing and Handling Facility, TA-55, and held the position from late December 1993 to June 2000. Tasks included investigation of the incidents, performing causal analysis of the accidents/incidents, recommending corrective actions, and preparing the written reports for transmittal to the Department of Energy (DOE). During this time period, I personally investigated more than 300 nuclear and nonnuclear occurrences at TA-55 according to specifications outlined in the Department of Energy's (DOE) Order 232.1A. Several of my findings from the investigations lead to major engineering and administrative changes to the facility, the facility nuclear authorization basis regarding environmental protection and personnel safety, and some have affected major changes for the Laboratory. One specific example occurred during an investigation of a series of glovebox fires in the facility in late 1994. While investigating the cause of the fire, I discovered that the facility had many containers of cellulose materials containing plutonium-238 (Pu-238) oxide stored in what was termed a temporary staging area. After inspecting the room and noting the numerous containers of Pu-238 contaminated waste stacked about in the room, I questioned the appropriate personnel regarding the total quantity of Pu-238 material stored

in the waste containers in the room. I discovered that the total gram quantity of Pu-238 contaminated waste exceeded the allowable gram quantity of Pu-238 material postulated to be at risk in the bounding fire scenario for TA-55 in its Final Safety Analysis Report (FSAR). This indicated the facility was outside its authorization basis (AB). The fire scenario is still the bounding fire accident for TA-55 in its current FSAR. My discovery affected major engineering changes for the room including the installation of waste storage racks. These waste storage racks are currently listed in the 1996 DOE Safety Evaluation Report (SER) for the TA-55 FSAR and are required to be seismically qualified because of the postulated fire scenario. The discovery had significant administrative effects as well in that TA-55 personnel were not tracking quantities of material stored in temporary staging areas. This has since been corrected to ensure that no room at TA-55 will be allowed to exceed the quantity of material allowed in accordance with the authorization basis. Additionally, in March 1994, during the investigation of radioactive airborne contamination release in the basement of building PF-4, I discovered that there were numerous continuous air monitoring (CAM) units that were not monitored by the TA-55 facility control system (FCS) as described in the applicable TA-55 FSAR at the time. Because the FCS was physically incapable of accommodating the additional CAM units that had been added to the facility for personnel safety reasons subsequent to the facility being placed in service, the CAM units were not monitored by the FCS. Again, my discovery indicated TA-55 was outside its AB and resulted in an unreviewed safety question (USQ) for the facility. This discovery affected a major change to the TA-55 FCS, and the FCS was brought up to modern technological standards in late 1996. During an investigation of complete electrical power losses to TA-55 in 1997, I discovered that TA-55 never lost electrical power during any of the supposed electrical power losses. Instead, what was happening had to do with the TA-55 high-speed transfer circuitry and its under-voltage (UV) sensing coils of the two independent electrical power sources for the facility. As it turned out, any voltage fluctuation on either of two electrical feeders for the facility was being sensed by the UV coils of the high-speed transfer circuitry. I traced the problem back to a change in the electrical power grid for Technical Area 3 (TA-3). Circa 1985, the Laboratory upgraded the electrical power grid for TA-3 by installing electrical feeder connectors to create what is known as a "ring of power." The "ring of power" effectively negated the two independent electrical power sources described in the TA-55 FSAR. The findings affected major changes for the Laboratory as a whole in that the "ring of power" was created by the Laboratory's engineering division without consideration of the consequences to its nuclear facilities (e.g., TA-55). My findings caused the Laboratory to put in place a USQD program for reviewing proposed major changes in the Laboratory's utilities that could have deleterious affects on its nuclear facilities' AB.

I have received formal training in plume dispersion modeling from the Harvard School of Public Health. The instructors for this course were internationally renowned experts in dispersion modeling (Briggs and Hannah). I have been trained in nuclear

authorization basis activities associated with DOE Orders 5480.22 (Technical Safety Requirements) through courses conducted at LANL/TA55 as well as DOE Order 5480.21 (Unreviewed Safety Questions) approved course. I am familiar, and have used as part of investigations, hazard analysis techniques that are the first step in producing a Safety Analysis Report (SAR) in support of DOE Order 5480.23 and DOE-STD-3009-94. Specific investigatory/Hazards Analysis techniques that I routinely use that are commonly applied in nuclear hazards analyses include barrier analysis, fault tree analysis, cause and effect analysis, event tree analysis, change analysis, root cause analysis, MORT analysis, and mini-mort analysis. In addition, I have taught departmental safety analysis personnel how to perform health physics calculations, which apply to both worker and public accident analysis exposure assessments.

As stated above, during the period I have been an investigator, I have received training in Management Oversight and Risk Tree (MORT) Accident/Incident investigation techniques. I have been the accident investigator (AI) on three Type C investigations and have chaired one Type C investigation. In 1998, I attended a one week course given by the Harvard School of Public Health titled "Atmospheric Science and Risk Projections for Hazardous and Radioactive Materials." The course covered in depth DOE's "Handbook on Atmospheric Diffusion" authored by Steven Hanna, Gary Briggs, and Rayford Hosker, Jr. Additionally, the course provided me with a working knowledge of several plume dispersion modeling programs such as RASCAL-Version 2.2 (NUREG/CR-5247) and Hazard Prediction and Assessment Capability (HPAC) Version 3.2 produced by the Defense Threat Reduction Agency. HPAC 3.2 has the ability to model plumes from chemical, biological and radiological accidents. I also am conversant with the use of LLNL HOTSPOT dispersion modeling code.

During this period I received my certification from the State of California's, Office of Emergency Management as a hazardous materials (HAZMAT) specialist and became the first LANL employee to be dually certified for radiation protection and as a HAZMAT specialist.

1992-1993 Los Alamos National Lab, Los Alamos, NM

I served as a member of the Radiological Emergency Assistance (REA) team that included LANL's Radiological Assistance Program (RAP) team, the LANL portion of the DOE Accident Response Group (ARG) team, and the LANL portion of the Nuclear Emergency Search Team (NEST). While assigned to REA my responsibilities included providing radiological support for off-site responses of the RAP and ARG teams. I authored several field health physics procedures regarding setup and operation of the RAP team radiation detection instrument kits, setup and calibration of the Fidler Detector for detection of weapons grade plutonium, and establishment and operation of contamination control stations. I attended numerous training sessions regarding nuclear weapons and hands-on nuclear weapons exercises as a member of the ARG team. I was fortunate to serve as a Health Physics Exercise Controller for the Service Response Force Exercise 1990, at Seneca, NY. Additionally, I was one of a team of three instructors that provided training to DOE

RAP teams in and around the initial transportation corridor for the intended Waste Isolation Pilot Plant (WIPP) shipments. My responsibilities included instruction in radiological assessment of WIPP transportation accidents including the Incident Command System (ICS). Finally, I Performed radiological assessments for hazardous material (HAZMAT) team responses at LANL and was a member of LANL's HAZMAT team. During the period, I received certification from the State of California's, Office of Emergency Management as a HAZMAT technician.

1990-1992 **Los Alamos National Lab, Los Alamos, NM**
I served in the roll as a training instructor for radiological control technicians (RCTs). During this period I performed job task analysis for RCTs, prepared training objectives based on the job task analysis, was instrumental in designing a training program for LANL RCTs and performed radiological intake dose consequence estimates to workers in support of radiological jobs. The RCT training program is still in use by LANL to date. I authored numerous Health Physics Procedures for use by RCTs in the performance of their field assignments. Besides authoring the procedures, I provided the training of RCTs to those procedures. I was a member of a five-person team that provided training for LANL radiological workers. During the period, I was involved with the training of more than 2000 LANL employees to the DOE's Radworker training requirements. I received formal training in numerous training programs developed for DOE contractors in training the trainers including Basic Instructor training, Analysis and Design of Training Programs, Evaluation of Training, and On-the-job Training.

1981-1990 **Los Alamos National Lab, Los Alamos, NM**
I was a field Health Physics Supervisor in charge of providing health physics support for numerous LANL facilities. I personally supervised as many as 13 radiological control technicians (RCTs) in all aspects of radiation protection at various LANL facilities, including plutonium chemistry, critical experiments assemblies, laser fusion, free electron lasers, uranium casting and machining, experimental reactor, decontamination and decommissioning projects, liquid waste processing, solid waste management, radioactive waste incineration, radioactive solid waste size reduction, isotope production and separation, and radiological dose intake consequence assessments. Besides the supervision and direction of RCTs in support of the facilities, my responsibilities included reviewing engineering drawings for compliance with DOE Order 6430.1A requirements for both new construction and proposed modifications of existing LANL facilities and reviewing Safety Analysis Reports (SARs) for appropriate health physics concerns. In 1986 while trying to calculate airborne radioactivity levels that could be expected in the cutting chamber of the Size Reduction Facility (SRF) during decontamination efforts I discovered a serious mistake in the DOE approved SAR could have allowed a criticality accident to have occurred in the SRF. The approved FSAR allowed the accumulation of 1 E 10^{12} disintegrations per minute (dpm) per square centimeter (cm^2) of surface area in the cutting chamber of the SRF before

decontamination was required. By calculating the total surface area of the cutting chamber and assuming even distribution of the weapons grade plutonium, I calculated the FSAR allowed for the accumulation of up to 64 kilograms of weapons grade plutonium. The decontamination procedure allowed for the spraying down of the inside of the cutting chamber with water, which was then vacuumed into a 150 gallon catch tank located just below the large dropout port of the SRF. If allowed to continue, the quantity of plutonium and water that were to be collected in the catch tank could have become a critical mass with disastrous consequences for LANL because the SRF was located between two heavily populated technical areas, TA-55 and TA-35. This discovery not only resulted in a major change to the approved FSAR for the SRF but also changed the accountability process for the quantity of plutonium that was permitted in the SRF by the FSAR. As it turned out, no one was considering the accumulation of the plutonium in the cutting chamber following size reduction operations as part of the limit for the SRF and the quantity of material was not considered in the postulated accident scenarios for the facility. In the safety analysis terminology in effect today this would have been an Unreviewed Safety question (USQ). Additional responsibilities included reviewing Safe Operating Procedures (SOPs) for health physics concerns for the same LANL facilities regarding health and safety concerns. It also was my responsibility to investigate personnel radiation exposure problems.

1979-1981 **Los Alamos National Laboratory, Los Alamos, NM**
I was a Radiological Control Technician (RCT) and provided health physics support for various LANL facilities including the Omega Reactor, the radioactive liquid waste treatment facility, the radioactive solid waste management facility, the treatment development facility (TDF), the Van de Graf Accelerator, and the enriched uranium recovery facility. While at an RCT at the enriched uranium recovery facility, I instituted a routine glovebox inspection and survey program that had never been done at the facility. My program affected a major reduction in personnel contamination incidents for the facility and resulted in a significant decrease (approximately 50%) in personnel intakes of uranium.

1976-1979 **U. S. Naval Submarine Support Facility, Groton, CT**
I was a radiological control shift supervisor supplying radiological support for nuclear repair activities aboard operating nuclear powered submarines. As the senior Radiological Shift Supervisor for the inspection and repair of the reactor side of fourteen steam generators on various submarines, I received commendations from both the Commander of the Submarine Force, U.S. Atlantic Fleet and the Commander of Submarine Group Two for my outstanding devotion to my duties, the excellent safety record of the work parties under my supervision, and the significant reduction in the cost of the inspection and repair efforts. My collateral duties included being the leading Petty Officer in charge of personnel dosimetry program for over 500 nuclear repair personnel and assignment as leading Petty Officer in charge of reviewing nuclear repair work packages for radiological support

requirements. I qualified as an operator for a gamma spectrometer with a multi-channel analyzer, which was used to perform whole-body monitoring of naval personnel as well as analyze chemistry samples for radioactive material content.

1972-1976 USS Will Rogers (SSBN 659)

I was a member of the Electrical Division providing preventive and corrective maintenance for shipboard electrical systems. My collateral duties including being Petty Officer in charge of noise reduction and sound analysis shipboard rotating equipment mostly in an effort to predict bearing failures but also to ensure a noise quiet atmosphere for the ship. I was the leading Electrical Division Petty Officer in charge of oxygen generating equipment, which provided breathable oxygen for the entire ship's crew. I was Leading Petty Officer in charge of reactor plant electrical preventive maintenance on all reactor support systems except the reactor control equipment. I was Leading Petty Officer in charge of the submarine's main storage battery and associated maintenance. While aboard the USS Will Rogers, I qualified on all the engineering plant watch stations such as Engineering Officer of the Watch, Engineering Watch Supervisor, Reactor Operator, Electric Plant Operator, Engineering Laboratory Technician, Engine Room Supervisor, and Steam Plant Operator. The watch station for Engineering Officer of the Watch was a watch station normally only filled by commissioned officers. I was one of the few enlisted men in the Navy ever to qualify on this watch station. While assigned to the Will Rogers, I received numerous commendations from my commanding officer for my academic achievements in service schools. Additionally, I received commendations from the Commander Submarine Group Six and Commander Submarine Squadron Sixteen for my proficiency on the various watch stations.

EDUCATION: Completed seven semester hours towards a Masters of Science (M.S.) in Health Physics from National Technical University (NTU) before the program was cancelled due to lack of participation. I have accumulated a total of 205 college semester hours.

September 1994, I received my Bachelor of Science (B.S.) in Radiation Protection from Thomas Edison State College in Trenton, N.J.

May 1987, I received an Associate of Science (A.S.) in General Sciences from Mohegan Community College in Norwich, CT.

PROFESSIONAL TRAINING:

November 2002, Completed a 24-hour course on Initiation Theories & Design of Inititators.

October 2002, Completed a 24-hour course on Scaling, Engineering Design and & Application of Explosives.

August 2002, I taught an 8-hour course on Source Term Derivation and Plume Modeling.

July 2002, I completed a 14-hour course on Fundamentals of Fire Behavior and The NFPA-101 Life Safety Code.

June 2002, I completed a 24-hour course on 10 CFR 830, Subpart B Nuclear Safety Rule.

March 2002, I completed a 16-hour course in Advanced Computer Fire Modeling using CFAST/FAST Version 3.1.7.

March 2002, I completed a 12-hour course in Introduction to High Explosives.

June 2001, I completed a 32-hour course in Introduction to System Safety/Root Cause Analysis.

April 2001, I completed a 16-hour course on Operational Readiness Reviews for Team Members.

February 2001, I completed a 24-hour course in Contract Administration for Technical Representatives (COR).

August 2000, I completed a 24-hour course in Fire Hazard and Risk Analysis and Chemical Dispersion and Consequence Assessment.

May 2000, I completed an eight-hour introductory course on MACCS2 dispersion modeling program.

April 2000, I completed a four-hour course on GENII computer Code.

April 2000, I completed an eight-hour course on Radiological Dispersion/Consequence Analysis.

April 2000, I completed an eight-hour course on Radiological Safety Analysis Computer Program (RSAC-6) code.

April 2000, I completed a four-hour course on RADCALC computer program code.

April 2000, I completed an eight-hour course on Tritium Dispersion/Consequence Analysis.

August 1998, I completed a 40-hour course in Atmospheric Science and Risk Projections for Hazardous and Radioactive Materials at the Harvard School of Public Health in Boston, MA. The course of study included an in depth instruction on plume modeling as described in DOE's "Handbook on Atmospheric Diffusion" authored by Steven Hanna, Gary Briggs, and Rayford Hosker, Jr.

November 1998, I completed a 32-hour course of training at TA-55 on facility Technical Safety Requirements (DOE Order 5480.22).

June 1996, I completed 32 hours of training by DOE instructor personnel in Unreviewed Safety Question Determinations (USQDs).

August 1993, I completed 80 hours of training in Management Oversight and Risk Tree (MORT) Accident/Incident Investigation and other Accident/Hazard Analysis Techniques.

April 1993, I completed 80 hours of hands-on training at Special Training Institute for the State of California's, Office of Emergency Services, which lead to certification as a Hazardous Materials (HAZMAT) Specialist.

December 1992, I completed 200 hours of classroom training provided by instructors from the Specialized Training Institute of the State of California's, Office of Emergency Services, which lead to my certification as a Hazardous Materials (HAZMAT) technician.

August 1990, I completed 40 hours of training in Los Alamos for Training the On-the-Job trainer.

June 1990, I completed 40 hours of training on Evaluation of Training Programs given by EG&G personnel from Idaho Falls, Idaho.

May 1990, I completed 40 hours of training on Analysis and Design of Training Programs given by EG&G personnel from Idaho Falls, Idaho.

April 1990, I completed 40 hours of training for Basic Instructor Training given by EG&G personnel from Idaho Falls, Idaho.

January 1990, I completed 24 hours of training on IBM-PC basics that included Dbase IV, Lotus 123, Harvard Graphics, and Word Perfect.

August 1988, I completed 40 hours of training on Supervising at Los Alamos given by LANL Human Resources Development (HRD) personnel at Los Alamos.

November 1984, I completed 40 hours of training on Dynamics of Effective Supervision given by William Scherer and Associates.

June 1978, I completed 40 hours of training for Supervisory Skills for Industrial Managers at the Naval Submarine Base, New London, CT.

May 1978, I completed 40 hours of training for Supervisor's Alcohol Awareness at the Naval Submarine Base, New London, CT.

October 1972, I completed three weeks training submarine control systems and damage control.

August 1972, I completed six months training at the Nuclear Power Training Unit, S1W Prototype at Idaho Falls, Idaho

February 1972, I completed six months training at the U.S. Navy's Nuclear Power School in Mare Island, CA.

June 1971, I completed 16 weeks training for shipboard electricians at Service School Command, San Diego, CA.

February 1971, I completed six weeks training in basic electronics at Service School Command, San Diego, CA.

CERTIFICATIONS:

Certified by the Department of Energy (DOE) as reviewer for Unreviewed Safety Question Determinations (USQD) for Nuclear Facilities in June 1996.

Certified as a Hazardous Materials Specialist by the State of California, Office of Emergency Management (OEM), April 1993.

Completed Management Oversight and Risk Tree (MORT) Accident/Incident Investigation training August 20, 1993.

Certified by the National Registry of Radiation Protection Technologists (NRRPT) in February 1982.

AWARDS/HONORS/COMENDATIONS/PUBLICATIONS:

September 2002, Received a Time Off Award for superior achievement in meeting all the objectives of the SABT FY2002 Operational Plan.

August 2002, Received an individual Special Organization Achievement Recognition (SOAR) Award for exceptional reviews of authorization basis documents.

October 2001, Received Certificate of Achievement as a member of the LAAO Safety Authorization Basis Team from the Manager of the Albuquerque Operations Office.

August 2001, Received a Special Organizational Achievement Recognition (SOAR) Award for instrumental support to the Authorization Basis Process at Los Alamos and Contract Performance Measure support.

May 2001, Received a Special Organizational Achievement Recognition (SOAR) Award for instrumental support to Departmental safety objectives and the numerous safety analysis reviews I completed.

May 2001, Received a Special Organizational Achievement Recognition (SOAR) Team Award in recognition of my contribution to improved integration of project management and safety analysis activities.

Received a Department of Energy (DOE) Performance Excellence Award for Safety Authorization Basis Team activities in October 2000.

Awarded Member Emeritus status by the National Registry of Radiation Protection Technologists (NRRPT) in July 1996.

January 1992 to February 1993, served as LANL's representative to the Federal Radiological Measurement Assessment Center (FRMAC) Working Group.

January 1989 to January 1993, served as Chairman of the Panel of Examiners for the National Registry of Radiation Protection Technologists (NRRPT), and I am currently a member of the Panel of Examiners.

I am a member in good standing with the Rio Grande Chapter of the Health Physics Society.

Commendation by Commander Submarine Force U. S. Atlantic Fleet

Commendation from Commander Submarine Squadron 2

Commendation from Commander Submarine Group 6

Commendation from Commander Submarine Squadron 16

December 1986, Co-authored report LA-10890-MS, *TA-2 Water Boiler Reactor Decommissioning (Phase I).*