RAS 8616

RELATED CORRESPONDENCE

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
LOUISIANA ENERGY SERVICES, L.P.	)	Docket No. 70-3103
(National Enrichment Facility)	)	

NMED'S ANSWERS TO
APPLICANT'S INTERROGATORIES TO NMED

Pursuant to 10 CFR § 2.706, the New Mexico Environment Department (NMED) answers the Applicant's Interrogatories to NMED as follows:

INTERROGATORY 1

Provide the name, address, profession, employer, and area of professional expertise of each person whom NMED experts to call a witness, including any expert witness at the hearing.

ANSWER TO INTERROGATORY 1

NMED intends to call Stanley Fitch as an expert witness. His employer and address are: NMED, P.O. Box 26110, Santa Fe, New Mexico 87502. He is a health physicist. His area of expertise is radiation protection, specifically operational health physics and standards.

INTERROGATORY 2

Provide the educational and scientific expertise of each witness.

ANSWER TO INTERROGATORY 2

Mr. Fitch's curriculum vitae is attached.

INTERROGATORY 3

Provide the subject matter on which each of the witnesses is expected to testify.

ANSWER TO INTERROGATORY 3

Mr. Fitch will testify as to the adequacy of the radiation protection program proposed in the Application of Louisiana Energy Services, L.P. (LES).

INTERROGATORY 4

Provide the substance of the facts and opinions to which each witness is expected to testify and a summary of the grounds for each opinion, including the documents and all pertinent pages or parts thereof upon which each witness will rely or will otherwise for his testimony.

ANSWER TO INTERROGATORY 4

The Application does not comply with the requirements of 10 CFR § 20.1101 because it fails to provide sufficient information to demonstrate the establishment of an adequate radiation protection program. Specifically, the Application is deficient in providing the technical bases for monitoring and assessing effluent discharge, and in estimating occupational and public radiation doses.

Radiation dose quantities are provided, but are not supported by calculation protocols, formulae, or variables (e.g., occupancy factors, seasonal variations, diffusion coefficients). This additional information must be provided in order to verify the information in the application. The dose quantities provided in the Application are not corroborated with technical factors pertaining to the variables of release, pathways, transport, and intake. As set forth by NUREG/CR-3332, these factors will be used in developing scenarios that analyze likely radiation exposures resulting from routine operations and emergencies. The factors are thereby necessary to demonstrate ensured compliance with applicable standards for occupational and public dose.

10 CFR Part 70 requires that an integrated safety analysis (ISA) be performed to limit the risk of credible high-consequence events resulting in high doses to workers and the public.

According to 10 CFR § 70.62(c), the ISA must account for the radiological hazards that would result from such an event. The ISA detailed in Section 3.0 of the LES Safety Analysis Report, pertinent to process failure and protection from accidents, identifies the radiological hazards and provides various scenarios for liquid and gaseous effluents. Calculated radiation doses are provided (*see* Figures 3.7-1 and 3.7-4), but specific calculation protocols, formulae, and variables (e.g., occupancy factors, seasonal variations, diffusion coefficients) are omitted. There is no evidence that the meteorological factors provided in Section 3.6 of the Environmental Report are correlated in the ISA as would be appropriate to demonstrate that dose to the public would be adequately minimized in the event of an accident. These correlations would need to support postulated releases, pathways, transports, and public intakes. Given the complexity of the fuel enrichment process, this additional information is necessary for NRC to confirm the degree of hazard and to verify the information in the Application.

Based on Regulatory Guide 4.16, the Application contains insufficient information on postulated concentrations and quantities of radionuclides in liquid and gaseous effluents for NRC staff to adequately evaluate environmental impact, estimate the potential annual radiation doses to the public, ascertain whether regulatory requirements have been met and that concentrations will be kept as low as reasonably achievable (ALARA) and evaluate the adequacy and performance of effluent controls. Examples of how the Application lacks sufficient information include: (1) Section 4.12.2 of the Environmental Report specifies that less than 10 grams of uranium will be discharged annually via air emission; however, no proof is provided to verify this representation; (2) while Tables 4.12-1 and 4.12-2 in the Environmental Report provide occupancy factors and population data, they are not directly correlated by calculation protocols, formulae, seasonal variations, or diffusion coefficients to arrive at the expected doses to the

public listed in associated tables at the back of Section 4.12 of the Environmental Report.; and (3) Section 4.0 of the Safety and Analysis Report entitled "Radiation Protection" focuses exclusively on occupational safety. It provides no anticipated airborne concentrations to estimate occupational radiation doses, only a representation by the applicant to comply with NRC regulations and to utilize applicable NRC guidance.

See also answers to interrogatories 7 and 9.

INTERROGATORY 5

Explain the relevance of Nuclear Regulatory Guidance Document 4.14, "Radiological Effluent and Environmental Monitoring at Uranium Mills", to the adequacy of a radiation protection program for a uranium enrichment facility.

ANSWER TO INTERROGATORY 5

The criteria contained Nuclear Regulatory Commission (NRC) Regulatory Guides 4.16 and 8.37 are directly applicable to the proposed facility. Nevertheless, certain technical bases in Regulatory Guide 4.14 could be considered as reference material for licensing uranium enrichment facilities. Certain technical bases in Regulatory Guide 4.14 not explicitly discussed in Regulatory Guides 4.16 and 8.37 would serve as appropriate references in licensing a fuel enrichment facility, including:

- Preoperational sampling of soil, water, and vegetation to establish baseline radioactivity concentrations.
- Significant ingestion pathways for man from contaminated vegetation and meat.

According to Section 3 of Regulatory Guide 8.37 regarding ALARA levels for effluents, if a licensee chooses to demonstrate compliance with dose limits to the member of the public likely to receive the highest dose by calculating the total effective dose equivalent (TEDE), all

significant environmental pathways should be evaluated. The LES application chooses to demonstrate compliance by calculating the TEDE for maximally exposed individuals. Therefore, the methods recommended in Regulatory Guide 4.14 for analyzing significant ingestion pathways could be considered as reference material. (According to Section D of Regulatory Guide 8.37, the NRC will use the methods described therein to evaluate applications for new licenses.)

INTERROGATORY 6

Explain the relevance of Chapter 6.0 of the Safety Analysis Report, "Chemical Process Safety", to the adequacy of a radiation protection program for a uranium enrichment facility.

ANSWER TO INTERROGATORY 6

Upon further review by NMED staff, NMED has concluded that Chapter 6.0 of the SAR is not relevant to the contention that the radiation protection program proposed in the Application is inadequate.

INTERROGATORY 7

Identify the specific deficiencies in the Application relative to the technical bases for monitoring and assessing effluent discharge.

ANSWER TO INTERROGATORY 7

The specific instruments and procedures intended for monitoring and assessing effluent discharge were not specified or otherwise submitted with the LES Application. In NMED's view, the monitoring instruments and protocols should be specified by LES, as an addendum to its Application, and analyzed by NRC for adequacy, prior to issuance of the license. This is based on the following:

Section D of Regulatory Guide 8.37 regarding ALARA levels for effluents provides that

"[e]xcept in those cases in which an applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the methods described in this guide will be used in the evaluation of applications for new licenses, license renewals, or license amendments and for evaluating compliance with 10 CFR 20.1001--20.2401." Therefore, the LES Application should have followed this recommendation in Regulatory Guide 8.37.

Based on Section 3.1 of Regulatory Guide 8.37, the instruments should be specified in the Application to determine whether the effluent monitoring systems are designed in accordance with ANSI N13.1 (1969), "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities,"(4) and ANSI N42.18, "Specification and Performance of On-site Instrumentation for Continuously Monitoring Radioactive Effluents." Regarding procedures, Section B of Regulatory Guide 8.37 states, "Components of an effective radiation protection program, as required by 10 CFR 20.1101(b), include...written procedures and policies..." Therefore, for NRC to determine the adequacy of the intended monitoring program, the instruments and procedures must be delineated as part of the application process.

INTERROGATORY 8

Identify the specific technical bases for monitoring and assessing effluent discharge that you believe are required to be included in the application, including the applicable reference to the provision(s) in the NRC's regulations, as well as the provision(s) in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility" (March 2002) and NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (August 2003), that require the inclusion of such information.

ANSWER TO INTERROGATORY 8

The specific instruments and procedures intended for monitoring and assessing effluent

discharge were not specified or otherwise submitted with the LES Application. For additional information, refer to the answer to interrogatory 7.

INTERROGATORY 9

Identify the specific deficiencies in the Application relative to estimating occupational and public radiation doses.

ANSWER TO INTERROGATORY 9

The dose estimates provided in the Application for various exposure scenarios are not corroborated with technical factors that thoroughly delineate and associate specific variables for release, pathways, transport, and intake. The estimates should be correlated (as pertinent to application) by release quantities, airborne concentrations, calculation protocols, formulae, seasonal variations, or diffusion coefficients. To demonstrate proof of adequacy of radiological controls, the dose estimates should be substantiated with specific equations coupled with the data sets utilized (large data sets could be substituted with smaller data cross-sections). Providing these equations and data would allow for verification of the Application's dose estimates and adequacy of the intended radiological controls. Based on the introduction to NUREG-1520, such variables and postulations are appropriate for NRC license application reviewers to independently prove that the intended radiation protection program is sufficient to minimize, or otherwise comply with applicable standards for, occupational and public dose:

> In reviewing a license application, renewal application, or license amendment for a fuel cycle facility, the [NRC] staff must determine whether there is reasonable assurance that the facility can and will be operated in a manner that will not be inimical to the common defense and security, and will adequately protect the health and safety of workers, the public, and the environment. To carry out this responsibility, the [NRC] staff evaluates the information that the applicant provides and, through independent assessments, determines whether the applicant has proposed an adequate safety program that is compliant with regulatory requirements.

As set forth by NUREG/CR-3332, entitled "Radiological Assessment," these factors are needed to adequately develop scenarios that analyze radiation exposures likely to result from routine operations and emergencies. NUREG/CR-3332 sets guidelines on how assessments are to be performed for environmental dose analysis. The introduction to this document states in part:

> The ultimate goal of radiological assessment is to show the relationship between the "source term," or quantity and types of released radionuclides, and the potential effect on human health. The assessment process must proceed in a logical fashion, following the radioactive pollutant of interest from its point of origin along various exit pathways to the environment, then considering its transport in air, water, soil, or food sources to man. Once transport and intake are determined, the dose from radiation and resulting risk to health can be calculated.

According to Section 3 of Regulatory Guide 8.37 regarding ALARA levels for effluents, if a licensee chooses to demonstrate compliance with dose limits to the member of the public likely to receive the highest dose by calculating the TEDE, all significant environmental pathways should be evaluated. The LES Application chooses to demonstrate compliance by calculating the TEDE to maximally exposed individuals. Therefore, the variables of release, pathways, transport, and intake (as they affect significant environmental pathways) should be thoroughly explored in the Application.

> According to 10 C.F.R. § 70.23 "Requirements for the approval of applications":
>
> (a) An application for a license will be approved if the Commission determines that:
> ...
> (3) The applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life or property;
>
> (4) The applicant's proposed procedures to protect health and to minimize danger to life or property are adequate;
> ....

Pursuant to NUREG-1520 and Section D of Regulatory Guide 8.37, NRC will use the methods described therein to evaluate applications for new licenses. Based on these requirements and

guidance, the NRC should not approve the Application unless the applicant satisfies acceptable criteria for ALARA and dose estimation contained in NRC guidance. While NRC regulatory guides are not rule, it is clear that NRC uses them as protocols to determine the acceptability of proposed and existing radiation protection programs.

INTERROGATORY 10

Identify the specific information that you believe is required to be included in the Application with regard to estimating occupational and public radiation doses, including the applicable reference to the provision(s) in the NRC's regulations, as well as the provision(s) in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility" (March 2002), NUREG-1748, and "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (August 2003), that require the inclusion of such information.

ANSWER TO INTERROGATORY 10

Please refer to answer to interrogatory 9.

INTERROGATORY 11

At the time that Contention TC-3/EC-4 was proffered as a contention, or subsequently, has NMED or any of its advisors, representatives, or consultants reviewed any of the following guidance documents?

ANSWER TO INTERROGATORY 11

- Regulatory Guide 1.109, Revision 1 - Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purposes of Evaluating Compliance with 10 CFR Part 50 Appendix 1
  No

- Regulatory Guide 4.15, Revision 1 – Quality Assurance for Radiological Monitoring Programs (Normal Operations) – Effluent Streams and the Environment

Yes

- Regulatory Guide 4.16, Revision 1 – Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants
  Yes

- Regulatory Guide 8.2 – Guide or Administrative Practice in Radiation Monitoring
  Generally familiar with

- Regulatory Guide 8.4 – Direct-Reading and Indirect-Reading Pocket Dosimeters
  Generally familiar with

- Regulatory Guide 8.7 – Instructions for Recording and Reporting Occupational Radiation Exposure Data
  Generally familiar with

- Regulatory Guide 8.9 – Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program
  Yes

- Regulatory Guide 8.10 – Rev. 1-R – Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As is Reasonably Achievable
  Yes

- Regulatory Guide 8.13 – Instruction Concerning Prenatal Radiation Exposure
  Generally familiar with

- Regulatory Guide 8.15 – Acceptable Programs for Respiratory Protection
  Generally familiar with

- Regulatory Guide 8.24 – Health Physics Surveys During Enriched Uranium – 235 Processing and Fuel Fabrication
  Yes

- Regulatory Guide 8.25 – Air Sampling in the Workplace
  Yes

- Regulatory Guide 8.29 – Instructions Concerning Risks from Occupational Radiation Exposure
  Yes

- Regulatory Guide 8.34 – Monitoring Criteria and Methods To Calculate Occupational Radiation Doses
  Yes

- Regulatory Guide 8.37 – ALARA Levels for Effluents from Materials facilities
  Generally familiar with

- NUREG-1302 – Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors
  No

- NUREG-1400 – Air Sampling in the Workplace
  Generally familiar with

- NRC 1993b – License Condition for Leak-Testing Sealed Byproduct Materials Sources
  Generally familiar with

- NRC 1993c – License Condition for Leak-Testing Sources Which Contain Alpha and/or Beta-Gamma Emitters
  Generally familiar with

- NRC 1993d – License Condition for Leak-Testing Sealed Uranium Sources
  Generally familiar with

- NRC 1993e – Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct Source or Special Nuclear Material
  Generally familiar with

- EPA-520/1-88-020, Federal Guidance Report No. 11 – Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion
  Generally familiar with

- EPA-402-R-93-081, Federal Guidance Report No. 12- External exposure to Radionuclides in Air, Water, and Soil, K.F. Eckerman and J.C. Ryman
  Generally familiar with

- ANSI N13.1-1969 (R1993) – Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities
  Generally familiar with

- ANSI N323-1978 – Radiation Protection Instrumentation Test and Calibration
  Generally familiar with

- ANSI N13.11-1983 – Dosimetry- Personnel Dosimetry Performance-Criteria for Testing

Generally familiar with

- ANSI N13.15-1985 – Radiation Detectors- Personnel Thermoluminescence Dosimetry Systems-Performance
  Generally familiar with

- ANSI/HPS N13.22-1995 – Bioassay Program for Uranium
  Generally familiar with

- ANSI N13.27 – 1981 – Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters
  No

- ANSI/HPS N13.30-1996 – Performance Criteria for Radiobioassay
  No

- ANSI N13.6-1966 – Practice for Occupational Radiation Exposure Records Systems
  No

- ANSI N510-1980 – Testing of Nuclear Air Cleaning Systems
  No

- ANSI Z88.2-1992 – Practices for Respiratory Protection
  Generally familiar with

- ASTM C986-89-1989 – Developing Training Programs in the Nuclear Fuel Cycle
  No

- ASTM E1168-95-1995 – Radiological Protection Training for Nuclear Facility Workers
  No

- CGA Publication G-7.1, 1997 – Commodity Specification for Air
  No

- ERDA 76-21, 1976 – Nuclear Air Cleaning Handbook
  Generally familiar with

- NCRP Report No. 59, 1978, - Operational Radiation Safety Program
  Generally familiar with

INTERROGATORY 12

In the event that LES complies with the guidance documents identified in 5, above (as

reflected in the license application), identify what issues, if any, remain with regard to the adequacy of the calculation protocols, formulae, or variables used in establishing LES's radiation protection program.

ANSWER TO INTERROGATORY 12

NMED assumes interrogatory 12 refers to the documents identified in interrogatory 11, not interrogatory 5. NMED objects to this interrogatory as vague. Notwithstanding the objection, NMED answers that discussion regarding the adequacy of calculation protocols, formulae, or variables is set forth in NMED's answer to interrogatory 9 above.

Certification

Pursuant to 10 CFR § 2.706(b)(2), I hereby affirm that the answers provided herein are, to the best of my knowledge, true and correct.

Stanley Fitch
NMED Radiation Protection Bureau

Respectfully submitted,

NEW MEXICO ENVIRONMENT DEPARTMENT

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Certificate of Service

I hereby certify that a copy of the foregoing pleading was served by mail and, as indicated by an asterisk (*), by electronic mail on this 1st day of October, 2004.

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Thomas Edison State College

Associate of Arts
New Mexico State University

Certified by the NRRPT
(National Registry of Radiation Protection Technologists)

Delegate for certification by ABHP
(American Board of Health Physics)

PROFESSIONAL EXPERIENCE

New Mexico Environment Department, Radiation Control Bureau (1998–present)
Health Physicist
U.S. Nuclear Regulatory Commission Qualified Materials Safety Inspector
Statutory and Regulatory Development

Sandia National Laboratories, Radiation Protection Program (1993–1998)
DOE Certified Radiological Control Technician
Team Member – Facilities ES&H Program
Radiation safety and assessments for Facilities maintenance, construction, and custodial services.

Atlantic Richfield Company, Bluewater Uranium Mill (1988–1993)
Health Physics Technician, Lab and Data Supervisor
Extensive Title 2 Uranium Mill Tailings Remediation Action (UMTRA) uranium mill decommissioning and tailings remediation project.
Manager of databases, analytical lab, dosimetry, and bioassay programs.

Chem-Nuclear Systems, Inc., DOE UMTRA Project (1987–1988)
Lead Technician and HP Supervisor
Certified DOE Radiological Control Technician
Title 1 uranium mill decommissioning project.

PROFESSIONAL AFFILIATIONS

Organization of Agreement States, Inc. (OAS)
Chair (2003–present)

Chair-Elect (2002–2003)
Secretary (2001–2002)
Chairman, Incorporation Working Group (2001–2002)

Conference of Radiation Control Program Directors (1998–present)
Member, Part U Working Group for the development of national uranium mill regulations. (2001 to present)

Health Physics Society (HPS), member 1990–present

Rio Grande HPS Chapter, member 1990–present

Co-Chair, NRC's Materials Security Working Group (MSWG), May 2003 to June 2004
The MSWG is charged with devising appropriate measures for safeguarding radioactive materials from terrorist exploitation. The measures are written to be later issued by the Commission under orders. The MSWG is also charged with overseeing the development of guidances, inspection procedures, licensing procedures, and enforcement practices that will accompany the Commission's orders.

EDUCATION, TRAINING, AND CERTIFICATIONS

1. Degrees

The following lists degrees or degree programs I have completed or undertaken:

Year	Institution Name and Degree
1987	New Mexico State University Associates Degree in Government
2002	Thomas Edison State College Trenton, New Jersey Bachelor of Science in Radiation Protection Pursuant to this degree program, I completed credit for courses in nuclear physics, radiation biology, radiation biophysics, radiation dosimetry, radiation protection and control, radiation detection and measurements, applied health physics, and radioactive waste management. **Pursuant to the radiation biophysics course, in June 1999 I completed a paper entitled,** "Proposed 1999 Amendment Of The 1990 Radiation Exposure

Compensation Act". **The paper explored the validity of expanding the coverage of the 1990 RECA. Extensive material was drawn from research in lung damage and cellular kinetics for uranium miners. Sources of information also included US Senator Jeff Bingaman of New Mexico, members of the New Mexico Uranium Workers Council, and officials of the Navajo Nation (native American tribe).**

2. Training Courses

Following is a list with descriptions of training courses I have taken pursuant to my health physics employment:

Year	Course Name and Topic(s)
1988	Department of Energy (DOE) Radiological Control Technician (160 hours)

Pursuant to: Employment by Chem-Nuclear Systems, Inc. in accordance with DOE requirements. Certified as a DOE Radiological Control Technician (RCT).

Topics included: radiation fundamentals, radiation protection technology, interaction of charged particles and electromagnetic radiation with matter, surveying and monitoring equipment and operations, counting room equipment and operations, internal and external exposure hazards, dosimetry, external and internal dose estimation, detection, counting statistics, airborne sampling, mitigation of sources of radon and radon progeny, contamination control, respiratory protection, response to radiological incidents and emergencies. Additional focus on uranium decay series constituents found at Uranium Mill Tailings Remedial Action (UMTRA) Program sites.

1990	Radiation Protection at Uranium Mills (40 hours) **Paul Steinmeyer, Radiation Safety Associates, Inc.** **Hebron, Connecticut**

Pursuant to: Employment by Atlantic Richfield Company.

Topics included: exposure hazards, internal and external dose estimation, detection, protection, surveying and monitoring equipment and operations, and mitigation of uranium decay series constituents encountered at uranium mills.

1995 DOE Radiological Control Technician (200 hours)
Sandia National Laboratories

Pursuant to: Employment by Sandia National Laboratories in accordance with DOE requirements. Re-certified as a DOE RCT.

Topics included: radiation specifics, in-depth radiation protection technology, interaction of charged particles with matter including living tissue, surveying and monitoring equipment and operations, radiological documentation, hazard communication systems, counting error and statistics, internal and external dosimetry for both particulate and photon radiations, contamination control, airborne sampling methods, respiratory protection, radiological source control, access control and work area setup, requisite personnel protective equipment for various radionuclides and applications, radiological work coverage, radiological incidents and emergencies, personnel decontamination and chelation techniques, radiological considerations for first aid, radiation survey instrumentation for both particulate and photon radiations, contamination monitoring instrumentation, air sampling equipment, and counting room equipment. Primary focus on radiological constituents found at federal research and defense facilities.

1998 Radiation Protection at Superfund Sites (24 hours)
Halliburton Company
Santa Fe, New Mexico

Pursuant to: Employment by the New Mexico Environment Department.

Topics included: examination of various radiological constituents commonly found at Superfund sites, contamination control, airborne sampling methods, radiological source control, access control and work area setup, requisite personnel protective equipment, and basic radiological work coverage.

1998 Gamma Irradiator Radiation Safety (8 hours)
MDS Nordion, Inc., sponsored by Ethicon Endo-Surgery at their irradiator facility.

Albuquerque, New Mexico.

Pursuant to: Employment by the New Mexico Environment Department.

Topics included: Radiation safety requirements for megacurie Cobalt-60 irradiators. Focused on conduct of operations for extremely high dose rate gamma irradiators.

1998 **Advanced Transportation of Radioactive Materials (40 hours)**
United States Department of Energy
Albuquerque Training Center

Pursuant to: Employment by the New Mexico Environment Department in accordance with Nuclear Regulatory Commission (NRC) requirements.

Topics included: Highly entailed Department of Transportation and United Nations requirements for the shipment of radioactive materials.

1998 **Inspection Techniques for Radioactive Material Regulators (40 hours)**
ProTechnics Incorporated
Albuquerque, New Mexico

Pursuant to: Employment by the New Mexico Environment Department.

Topics included: Comprehensive methods for compliance inspection of radiography, megacurie irradiators, oil and gas well tracing and logging, portable and stationary gauges, radionuclide production, and transportation of radioactive materials.

1998 **NORM Radiation Safety Training for Oil & Gas Workers (8 hours)**
Mitchell Davis & Associates
Baton Rouge, Louisiana

Pursuant to: Employment by the New Mexico Environment Department.

Topics included: Radiological hazards posed by NORM (naturally occurring radioactive material) constituents in the oil and gas industry. Proper methods for handling, decontamination, and mitigation. Focus on alpha, beta, and gamma radiation hazards posed by NORM contaminants.

1999 **Diagnostic and Therapeutic Nuclear Medicine Course H-304 (40 hours)**
United States Nuclear Regulatory Commission
Houston, Texas

Pursuant to: Employment by the New Mexico Environment Department in accordance with NRC requirements.

Topics included: The science of nuclear medicine. Types of radionuclides used in diagnostic and therapeutic nuclear medicine, and the application for which their radiations (alpha, beta, positron, neutron, gamma, x-ray) are employed in the healing arts.

1999 **Safety Aspects of Industrial Radiography Course**
H-305 (40 hours)
United States Nuclear Regulatory Commission
Niantic, Connecticut

Pursuant to: Employment by the New Mexico Environment Department in accordance with NRC requirements.

Topics included: The science of nondestructive testing of industrial components utilizing gamma radiation. Focus on conduct of operations pertaining to radiation safety and regulatory requirements.

1999 **Safety Aspects of Well Logging Course**
H-314 (40 hours)
United States Nuclear Regulatory Commission
Houston, Texas

Pursuant to: Employment by the New Mexico Environment Department in accordance with NRC requirements.

Topics included: The science of well logging and tracer studies. The types of radionuclides used in well studies and how their radiations (alpha, beta, positron, neutron, proton, gamma, x-ray) are effected in underground materials analysis.

2000 Inspection Procedures G-108 (40 hours)
United States Nuclear Regulatory Commission
Chattanooga, Tennessee

Pursuant to: Employment by the New Mexico Environment Department in accordance with NRC requirements.

Topics included: **Procedures for regulators to inspect radioactive material licensees. Focus on acceptable techniques for examining the processes of industrial, academic, medical, and power generation licensees.**

2000	**Inspecting for Performance – Materials Version** **G-304 (40 hours)** **United States Nuclear Regulatory Commission** **Orlando, Florida**

Pursuant to: Employment by the New Mexico Environment Department in accordance with NRC requirements.

Topics included: **Procedures for regulators to inspect radioactive material licensees. Focus on techniques for inspecting performance-based compliance programs.**

3. Certifications

The following is a list of certifications completed pursuant to health physics employment:

Year	Certification Name
1988	Department of Energy Radiological Control Technician, UMTRA
1995	Department of Energy Radiological Control Technician, Sandia National Laboratories
1995	National Registry of Radiation Protection Technologists (NRRPT)
2003	Passed ABHP Certification Exam Part One (American Board of Health Physics)
2004	Completed ABHP Certification Exam Part Two (exam results due November 2004)

PROFESSIONAL SUMMARY

This section discusses my professional history as it pertains to health physics employment and professional societies. The following details duties I performed for my employers and highlights my health physics experience. The following topics are discussed:

A. Title 1 and Title 2 UMTRA Projects
B. Sandia National Laboratories
C. New Mexico Radiation Control Bureau

I have been employed in the health physics profession for 17+ years. I started in health physics as a technician on Title 1 and Title 2 uranium mill tailings reclamation projects (UMTRA) performing occupational and environmental health physics on both Department of Energy (DOE) and commercial sites. Next I was employed by the Sandia National Laboratories (a DOE laboratory) performing operational health physics in defense and energy research applications. Currently I am a health physicist for the New Mexico Radiation Control Bureau serving as a regulator over users of radioactive materials and radiation machines.

A. TITLE 1 AND TITLE 2 UMTRA PROJECTS

1. Health Physics Supervisor and Lead Technician

Chem-Nuclear Systems, Inc.
Ambrosia Lake Uranium Mill
DOE UMTRA Site

My health physics career started as a health physics technician on this DOE UMTRA site employed by Chem-Nuclear Systems, Inc. in 1987 and 1988. It was here that I received my first health physics training and was certified as a DOE Radiological Control Technician (RCT). I was promoted to the position of Supervisor during the decommissioning stage of the project. Under the Health Physics Manager, I coordinated health physics support for field and laboratory work on this project. My tasks also included:

- Management of the health physics database. Responsible for data quality and integrity.
- Dosimetry and bioassay program implementation.
- Internal and external dose calculations.
- Soil and waste characterizations and correlations.
- Soils verification surveys and control.
- Assisted the site Industrial Hygienist in implementation of the respiratory protection program.
- QA/QC of lab and field activities.
- Air and radon sampling.
- Instrument inventory control.
- Materials release surveys.

2. Lead Health Physics Technician

Atlantic Richfield Company
ARCO Bluewater Mill
Grants, New Mexico

From 1988 through 1993 I was a lead health physics technician for the Atlantic Richfield Company (ARCO) on an extensive Title 2 uranium mill restoration project involving hundreds of construction personnel. I also served as technical consultant and assistant to the radiation safety officer (RSO). Additional training provided by ARCO included a 40-hour course taught by Paul Steinmeyer, Radiation Safety Associates, Inc. entitled "Radiation Protection at Uranium Mills" that focused on the hazards and mitigation of radiological constituents at uranium mills.

In addition to acting as assistant to the RSO, my tasks at ARCO included:

- Health physics surveillance.
- Management of the health physics databases, analytical lab, dosimetry and bioassay programs, and historical reconstructions.
- Devised protocols and an extensive database for tracking and reporting internal and external occupational radiation dosimetry. This project incorporated the approach referenced in ICRP 26 and ICRP 30, and as implemented in 10CFR§20.
- Technical procedure writer responsible for developing environmental and occupational health physics procedures.
- Primary staff member responsible for field and laboratory characterization of soil and wastes, and correlation of radiometric data to action limits to verify restoration criteria.
- Devised and implemented a database for mapping and tracking field measurements and sample data for environmental restoration.
- Radiation detection instrument maintenance and calibration.
- Radioactive materials shipping and receiving in compliance with Department of Transportation regulations.
- Radioactive waste characterization and disposal, including identification of mixed waste due to RCRA hazardous constituents.
- Successfully devised soil verification protocols for tracking, mapping, and analysis of uranium mill tailings remediation.
- Developed protocols for statistical analysis of environmental radioactivity.

B. SANDIA NATIONAL LABORATORIES

1993-1998 **Facilities Radiation Protection Coordinator**
Radiological Control Technician
Sandia National Laboratories.
Albuquerque, NM

My principal duty at Sandia Labs was to provide the primary radiation protection support and consultation for the Facilities maintenance, construction, and custodial departments. My coverage involved 1,000+ personnel. The associated tasks included:

- Radiation protection research and response on Facilities programs.

- Characterization and assessment of, and protection from radiological hazards at defense and research facilities involving the use of radionuclides with atomic numbers ranging from 1 to 102, and particle accelerators involving the use of high energy protons, electrons, and other heavy particulate.
- Developed and wrote the radiological procedure for the SNL Building Modification and Hazards Assessment program. This procedure is still in use as the primary method for determining radiological hazards affecting SNL Facilities workers. The procedure is used for Facilities projects as the primary method to communicate radiological hazards, and primary methods to control and mitigate those hazards.
- Radiation safety training for Facilities workers.
- Review and implementation of health and safety plans (HASP).
- Guidance on implementation of applicable Federal regulations (10CFR§835 and DOE Orders 5480.11 and 5400.5).
- Technical procedure writer.

C. LICENSING AND REGULATION OF RADIOACTIVE MATERIALS AND RADIATION

1998 to Present **Health Physicist**
Radiation Control Bureau
New Mexico Environment Department
Santa Fe, NM

My duty for New Mexico Environment Department is to provide regulatory oversight of the radiological activities of our licensees and registrants. The Bureau controls radioactive materials under the NRC Agreement State program. In addition, the Bureau controls the use of most radiation machines (accelerators and x-ray machines) under the statutory authority of the Environment Department. I am tasked with assuring that the radiation protection programs of our licensees and registrants are in compliance with the New Mexico Radiation Protection Regulations, applicable Federal regulations, and in accordance with proper health physics practices. This involves the oversight of the uses of radioactive material and radiation in industry, the healing arts, research, radionuclide production, waste, and transportation. Tasks include:

- Inspections and enforcement of over 1,800 licensees and registrants possessing radioactive material and radiation generating devices throughout the State.
- Review of applications for licensing and registration of radioactive material licenses and radiation generating machines.
- Interface with State attorneys and members of the New Mexico Radiation Technical Advisory Committee (RTAC) regarding regulatory issues affecting the uses of radioactive materials and radiation.
- Advise and consult licensees and registrants on technical radiation issues.

- Development and implementation of the technical qualifications criteria for registering people who provide radiological and radiation protection services in the State of New Mexico.
- Review, and amend as necessary the New Mexico Radiation Protection Regulations to maintain the effectiveness and applicability.
- Review, and amend as necessary the New Mexico Radiation Protection Regulations to maintain compatibility with the regulations of the NRC.
- Assist State and Federal agencies in determining necessary levels of response to emergencies involving radioactive material and radiation.
- Terrorist response interface with NRC, DOE, FBI, New Mexico Department of Public Safety, and the National Guard.
- Respond to queries of the citizens of New Mexico to provide information and guidance on acceptable uses of radioactive materials and radiation.

EXPERT TESTIMONY **(1994-2004)**

Depositions made at hearings before the New Mexico Environmental Improvement Board (EIB) in April 2002 and August 2004, to testify on behalf of amendments then proposed to the New Mexico Radiation Protection Regulations (20.3 NMAC). The testimony focused on the reasons for, and the criteria used in the development of, the amendments.