RAS 7785

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)	)	

REPLY IN SUPPORT OF NMED'S PETITION TO INTERVENE

Introduction

In its petition to intervene in this matter, the New Mexico Environment Department (NMED) challenges Louisiana Energy Services, L.P.'s (LES) proposal for treatment and disposal of the depleted uranium hexafloride (DUF6) that would be generated at its uranium enrichment facility. *See* NMED Pet. to Intervene, Contention 5a (Technical, Environmental). LES does not object to admission of this contention. LES Answer to NMED Pet., pp. 6-9. Staff of the Nuclear Regulatory Commission (NRC) objects to admission of this contention, arguing that NMED's petition does not comply fully with the NRC's criteria for intervention. *See* 40 C.F.R. § 2.309(f). Herein, NMED demonstrates that its contention – challenging whether LES has put forth a plausible strategy for treatment and disposal of the DU – meets the criteria for admission. Accordingly, this contention should be admitted.[1]

Regulatory Criteria

To be admitted, contentions must include (1) a specific statement of the issue of law or fact to be raised or controverted, (2) a brief explanation of the basis for the contention, (3) a

[1] NMED did not have sufficient time or resources to retain consultants to review LES's cost estimates for conversion and disposal of the DU and decommissioning of its facility. NMED may nonetheless conduct a review the cost estimates to determine their adequacy and, if determined to be inadequate, move to supplement its petition to intervene with this contention.

Template = SECY-037

SECY-02

demonstration that the issue is within the scope of the proceeding, (4) a demonstration that the issue is material to the findings the NRC must make regarding the action subject to the proceeding, (5) a concise statement of the alleged facts or expert opinions which support the contention and on which the petitioner intends to rely at hearing, including references to the specific sources and documents, and (6) sufficient information to show that a genuine dispute exists with the applicant on a material issue of law or fact. *See* 10 C.F.R. § 2.309(f).

Argument

I. NMED'S CONTENTION

NMED contends that LES does not put forth in its application to the NRC a plausible strategy for treatment and disposition of the DUF6 waste that the facility will generate. This contention is based upon the analysis and expert opinions of Robert Alvarez and George Anastas. *See curriculum vitae* of Mr. Alvarez and Mr. Anastas, attached. Mr. Alvarez is a Senior Scholar at the Institute for Policy Studies, and was a Senior Policy Advisor to the Secretary of the United States Department of Energy (DOE) from 1993 through 1999. Mr. Anastas is health physicist and environmental engineer with the Environmental Evaluation Group. After review of the LES application, it is the conclusion of these experts and NMED that a plausible strategy for the treatment and disposition of the depleted uranium has not been put forth, and that storage of the DUF6 on site for up to and exceeding thirty years would be inimical to the health and safety of the public. 10 C.F.R. § 40.32(d).

II. EXPLANATION OF BASIS OF CONTENTION, STATEMENT OF FACTS AND EXPERT OPINIONS UPON WHICH NMED INTENDS TO RELY, AND DEMONSTRATION THAT GENUINE ISSUE EXISTS

LES's proposal for treatment and disposition is that, at an unspecified time, LES will either contract with private DUF6 conversion services or DOE will assume title and disposition

responsibility of the DUF6 canisters through federal legislation. LES Environmental Report (ER), vol. 2, § 4.13.3.1.3.

The plausibility and viability of LES's proposal cannot be evaluated outside of the larger context of DOE's initial efforts to stabilize and dispose of what has become the world's largest inventory of DU that has accumulated over several decades. Approximately 732,000 metric tons of DU, the largest quantity generated in the world,[2] was produced at three uranium enrichment plants in Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio.[3] About 96 percent or 704,000 metric tons of the nation's depleted uranium inventory is stored as DUF6 at DOE's K-25 facility in Tennessee, the Paducah enrichment plant in Kentucky, and the Portsmouth enrichment plant in Ohio.

In 1998, Congress required DOE to submit a plan to build two conversion facilities at Paducah and Portsmouth.[4] In July 1999, DOE submitted the plan to Congress, which provides for a construction start date of 2004. Prior to this Congressional action, there was no viable commercial market for this material, no viable conversion options, and no viable disposal pathway for the vast inventory of depleted uranium in the United States. At present, it is estimated that it will take 25 years for DOE to stabilize the DU inventory at Paducah, Kentucky.

As support for the plausibility of private DUF6 conversion services, LES states that "discussions have recently been held with Cogema concerning a private conversion facility" and "ConverDyn, a company that engages in converting U3O8 [uranium oxide] material to UF6 for enrichment, has the technical capability to construct a depleted UF6 to depleted U3O8 facility at

---

[2] U.S. Department of Energy, Office of Nuclear Energy, Colette Brown and Allan Croff, Beneficial Uses of Depleted Uranium, Aug. 1997, Table 2, p. 4.
[3] U.S. Department of Energy, Office of Nuclear Energy, DUF6 Storage (DOE/DUF6 Storage), http://web.ead.anl.gov/uranium/mgmtuses/storage/index.cfm; U.S. Department of Energy, Office of Environmental Management, Materials in Inventory Report, Fig. 2.20 (1996), http://web.em.doe.gov/takstock/fig220.html.
[4] P. L. 105-204.

its facility in Metropolis, Illinois in the future if there is an assured market." ER, vol. 2, § 4.13.3.1.3.

LES's strategy contains strong elements of speculation and does not factor in major uncertainties surrounding the disposition of the LES-generated DUF6. Holding discussions does not constitute a commitment even to hold further discussions, let alone to license, construct and operate a facility.

Furthermore, there is no viable market at present, let alone an "assured market" for such material. At present, there are only *de minimus* commercial uses for the roughly 700,000 metric tons of DUF6 and there is little economic incentive for commercial use. For instance, assumptions that conversion costs can be off-set by recycle of DU and fluorine face significant impediments. In terms of using DU for shielding applications "it is a very high cost material ($10 per kilogram vs. 50c/kg for steel)."[5] In terms of marketing fluorine, the National Research Council noted that the primary schemes had "inherent disadvantages" because of "the need to introduce uranium into non-radioactive chemical plants, with resulting complications of licensing, radiation protection and low-level waste generation. Thus it appears that recovery of the fluorine values of DUF6 as HF (aqueous or anhydrous) in dedicated facilities would be the preferred approach."[6]

Furthermore, there is no basis to assume that new uses for DUF6 will be discovered during the life of the proposed facility. "The primary challenge to developing new uses for DU are lack of scientific understanding of its potential heath effects and public concern about its health effects. . . . Finding uses for relatively small quantities of DU will not solve DOE's

[5] National Academy of Sciences, National Research Council, Affordable for Cost Reduction in the Decontamination and Decommissioning of the Nation's Uranium Enrichment Facilities, p. 160 (1996) (NAS 1996).
[6] NAS 1996, p. 161

disposal problem, nor would a use that would result in a different problem."[7]

In light of all the economic, financial, legal, and safety barriers that must be surmounted in order to license, construct and operate such a facility, initial discussions with a company do not constitute a part of a plausible or reasonable strategy for conversion and disposition of the DU waste that LES would generate.

As for disposal of the material after private sector conversion, LES states that "[o]ne of the two ConverDyn partners, General Atomics, may have access to an exhausted uranium mine [the Cotter Mines in Colorado] where depleted U3O8 could be disposed." ER, vol. 2, § 4.13.3.1.3. LES has not addressed licensing or other hurdles that the Cotter Mine would be subject. Critically, officials at Cotter Mines have publicly denied that the mines would or could accept depleted U3O8 waste. Interview by John Fleck, Albuquerque Journal, Jan. 7, 2004. Thus, there is no plausible strategy for disposal of the waste.

Burial of U3O8 presents serious challenges that must be addressed before any disposal strategy may be characterized plausible. According to the National Academy of Sciences,

> [t]he current plans for conversion to oxide will put DU in a form that will be more stable than DUF6 for further storage. If disposal is necessary, it is not likely to be simple. The alpha activity of DU is 200 to 300 noncuries per gram. Geological disposal is required for transuranic waste with alpha activity above 100 nanocuries per gram. . . . The chemical toxicity of this very large amount of material would certainly become a problem as well. One option suggested by the U.S. Nuclear Regulatory Commission is disposal in a mined cavity or former uranium mine. Challenges for this option would include understanding the fundamental differences between uranium ore and the bulk of uranium oxide powder.[8]

Of particular concern "is to avoid mechanisms that might lead to rapid migration of uranium

[7] National Academy of Sciences, National Research Council, Improving the Scientific Basis for Managing DOE's Excess Nuclear Materials and Spent Fuel, pp. 63-65 (2003) (NAS 2003).
[8] NAS 2003, p. 65

from the disposal facility."[9] At present, LES does not have a plausible strategy for disposition of the DU waste, even if it were converted.

LES's alternate strategy for disposition assumes DOE will take title and disposition responsibility of DUF6 produced at the facility through federal legislation. To support the plausibility of this strategy, LES cites letters between NRC and DOE finding that Section 3113 of the USEC Privatization Act would present a plausible strategy if NRC determines DU to be low-level waste. ER, vol. 2, 4.13.3.1.3.

This proposal does not represent a plausible strategy. First, federal legislation is required, and such legislation, although introduced, has not been enacted. Given the uncertainties of enacting legislation at the federal level, this represents a significant step that cannot be assumed. Second, LES has not demonstrated that DOE disposition of the LES generated DUF6 would be available during the lifetime of the facility. Presumably, priority will be given to stabilizing DOE's current inventory, particularly the large numbers of canisters that are deteriorated. DOE presently estimates it will take 25 years after construction to stabilize the DU from the existing inventory at Paducah. LES will in all probability be "at the end of the line," even if the DOE were authorized to assume title and disposition responsibility. Third, for this strategy to be plausible, the NRC must determine that the DU generated by the facility is low level waste within the meaning of 10 C.F.R. Part 61. Notice of Receipt of Application for License, Environmental Issues, 1(b) (Jan. 30, 2004). However, this classification will be problematic to make because of the high radioactivity of DU (200 to 300 nanocuries per gram[10]). Fourth, another significant uncertainty if LES were to send its DUF6 to a DOE conversion facility is

[9] NAS 2003, p. 69.
[10] NAS 2003, p. 65

DOE's long history of project management difficulties.[11] In short, LES has not made a sufficient demonstration that it can stabilize and dispose of the DU waste generated through private conversion and disposal or through DOE within or even beyond the 30 year timeframe it proposes.

In the context of LES's first application to the NRC, the NRC proposed limiting the amounts of stored DUF6 at a proposed LES enrichment facility in Louisiana to 80,000 metric tons or 15 years of production, which ever comes first.[12] NMED contends that a reasonable limit on storage time or tonnage would need to be placed on LES's inventory of DUF6 waste. Such a limit is necessary because of the potential threat to the health and safety of the public posed by long-term storage of vast amounts of DUF6.

In this regard, LES's application does not demonstrate that storage of the DUF6 on site for up to 30 years or beyond will not be inimical to the health and safety of the public, as it is required to do. Notice of Receipt of Application for License, Environmental Issues, 1(b), p.11 (Jan. 30, 2004). LES indicates that the facility can generate up to 625 uranium byproduct cylinders per year containing depleted uranium. ER, Revision 1, p. 3.12-15 (Feb. 2004). LES states that "[a]ll 48-in cylinders in the Tails Take-off System comply with the requirements of ANSI N14.1 Uranium Hexafluoride Packaging for Transport, version in effect at the time of cylinder manufacture," Safety Analysis Report (SAR), Table 3.4-7. While LES represents that "[i]t is reported that even without routine treatment of localized corrosion, containers have

[11] U.S. General Accounting Office, Department of Energy: Opportunities to Improve Management of Major System Acquisitions. Report to the Chairman, Committee on Governmental Affairs, U.S. Senate GAO/RCED-97-17, Washington, D.C. (1996); National Research Council, Committee to Assess the Policies and Practices of the Department of Energy to Design, Manage, and Procure Environmental Restoration, Waste Management, and Other Construction Projects, Improving Project Management in the Department of Energy, National Academies Press, Washington D.C (1999); National Research Council, Committee for Oversight and Assessment of U.S. Department of Energy Project Management, Progress in Improving Project Management at the Department of Energy, 2001 Assessment, National Academies Press, Washington D.C., p. 4 (2003).

[12] NAS 1996, p. 167.

maintained structural integrity for more than 50 years," ER, p. 4.13-3, and "[d]epleted UF6 can be safely stored for decades in painted steel cylinders in open-air storage years," ER Revision 1, p. 4.13-4 (Feb. 2004), long term storage of DUF6 in canisters has been demonstrated to be problematic.

The DOE Defense Nuclear Facility Safety Board (DNFSB) concluded that the DOE program for storage of DUF6 was not adequate for long-term storage.[13] The DNFSB assessment was made after DOE discovered widespread valve defects and seven breached containers during the 1990-1992 timeframe. Before 1990, DOE did not routinely inspect DUF6 storage yards. Subsequent reviews done by DOE's contractors estimated that as many as 1000 canisters could breach by the year 2020.[14]

The DNFSB assessment identified different corrosion mechanisms, which include internal corrosion, which occurs when UF6 reacts with moisture to form hydrofluoric acid (HF), which can be significant and if unattended will enlarge an existing breach at a rate of one inch per year, and external corrosion, which occurs when canisters and related equipment are allowed to rust from exposure to the elements. Types of localized corrosion include ground contact, resting block corrosion, skirt corrosion and galvanic corrosion of valves, plugs and pipes.

The primary safety, health and environmental risks of DUF6 canisters stem from a breach in the cylinder wall. The inflow of air and moisture in the canister forms solid hexaflouride complexes and HF, which would be released into the environment.[15] A major leak in one of the cylinders poses acute risks. The most immediate hazard from a release would be lung injury or

[13]U.S. Department of Energy, Defense Nuclear Facility Safety Board, Integrity of Uranium Hexaflouride Cylinders, Technical Report, DNFSB/TECH-4, May 5, 1995 (DNFSB/TECH-4).
[14] B.F. Lyon, "Prediction of External Corrosion for UF6 Cylinders: Results of an Empirical Method," Oak Ridge National Laboratory, ONRL/TM-13012, June 1995.
[15] NAS 1996, p. 166.

death from inhalation of HF, a highly corrosive gas formed when UF6 reacts with moisture in air. Uranyl fluoride or UO2F2 is also formed. Uranyl fluoride once inhaled is easily absorbed into the bloodstream resulting in kidney toxicity.[16]

A potentially exacerbating factor could be the heating up of the canisters in areas of high heat and sunlight. According to the National Research Council, "[a]bove 125 degrees F, a temperature than can be exceeded in the storage yard under direct sunlight, the material converts directly from a solid to a gas (sublimes)."[17] LES's proposed storage outside in the desert of southeastern New Mexico therefore poses a threat.

Chronic exposure by uranium processing workers in the United States indicates that health consequences are found primarily in the organs of concentration: lung, kidney, and bone. Recent studies of uranium workers suggest higher mortality risks from all causes.[18] Under the Energy Employee Occupational Illness Compensation Program Act (P.L. 106-398) enacted in 2000, several cancers following exposure to uranium workers at DOE enrichment plants are compensable.

In 2003, the National Research Council identified several uncertainties associated with the handling and processing of uranium, which underscore the need for a more sound disposal strategy as well as the health and safety threat posed by the material. According to the Council, "[s]urprisingly, there are still substantive gaps in knowledge of the non-radiological health impacts of exposure to uranium and its compounds. . . . In fact, there appear to be differences in the sensitivity of different biological species to uranium toxicity, but no general picture has emerged. For humans, only very limited information is available on individual variation in

[16] DOE/DUF6, http://web.ead.anl.gov/uranium/faq/health/faq29.cfm.
[17] NAS 2003, p. 6.
[18] U.S Department of Energy, Office of Environment, Safety and Health, Inter Agency review of DOE Health Studies done for the White House National Economic Council, Jan. 2000.

uranium toxicity."[19]

LES has not sufficiently evaluated the public health consequences of potential accidents on critical segments of the population. LES does not demonstrate there will not be adverse effects on critical populations. UF6 is hygroscopic or moisture absorbing and, in contact with water, will chemically breakdown into uranyl fluoride (UO2F2) and HF. When released to the atmosphere, gaseous UF6 combines with humidity to form a cloud of UO2F2 and HF. The reaction is very fast and is dependent upon the availability of water vapor. Consequently, an inhalation of UF6 is typically an internal exposure to HF and UO2F2. In addition to any radiation dose, a worker would be subjected to two other primary toxic effects: (1) the uranium in the uranyl complex acts as a heavy metal poison that can affect the kidneys and (2) the HF can cause burns to the skin and lungs if concentrated. ER, p. 4.12-3.

"[The Occupational Safety and Hazards Act (OSHA)] has set a limit of 2.0 mg/m^3 for HF for an 8-hour work shift, while the [National Institutes of Occupational Safety and Health (NIOSH)] recommendation is 2.5 mg/m^3. NIOSH, 2001. As with most toxicological information and health exposure regulations, limits have been based upon past exposures, biological tests, accident scenarios and lessons learned, as well as industrial hygiene data that is continuously collected and researched in occupational environments. The State of California (CAO, 2002) has proposed a much more conservative limit of 30 $\mu gm/m^3$ for an 8 hour work shift." ER, p. 3.11-7.

For releases of airborne HF from accidents, upset conditions, abnormal events and routine operations, critical segments of the offsite population include the young adult, the infant and the embryo fetus. The OSHA limit and NIOSH recommendation, however, are only

[19] NAS 2003, p. 63.

applicable to industrial settings, and not to protect the public health. LES has not identified either the short term or the annual average HF limit or HF recommendation for the critical segments of the population. Nor has LES taken into account the potential for cylinder breaches. *See* discussion above regarding DNFSB report. It is prudent to assume that during the unknown period of time that the cylinders of waste would be stored on site, a cylinder of waste will leak and/or there will be a release of UF6 from a foreseeable or unforeseen sequence of events, including the possibility of a breakdown in the safety systems in place.

The NRC staff in NUREG-1140, Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees, Final Report, Jan. 1988, list accidents involving UF6 releases through 1986. More recently, there was a substantial release of UF6 at Honeywell, International in Metropolis, Illinois on December 22, 2003. The cause of the accident was reported as "the assistant fluorine operator's failure to configure valves correctly" and "the operator not having a procedure or checklist to designate the proper valve positions, no oversight nor review to ensure proper valve position, and the infrequent nature of this task." NMSS Licensee Newsletter, Office of Nuclear Material Safety and Safeguards, NUREG/BR-0117, No. 04-01, Mar. 2004.

LES acknowledges that releases at other facilities have occurred, stating that "Urenco stated to the NRC (NRC, 2002d) that there were two releases to the environment at the Almelo facility in 1998 and 1999. During the releases, concentrations were measured to be 0.8 Bq/m^3 (2.2×10^{-11} μCi/mL) and 1.1 Bq/m^3 (3.0×10^{-11} μCi/mL), respectively, for less than one hour. The total release was less than the 24-hour release limit and much less than the annual release limit. The Dutch release limit is 0.5 Bq/m^3 (1.3×10^{-11} μCi/mL) in one hour." ER, p. 3.11-6. LES, however, does not provide the quantity of radioactivity released nor does it provide the

quantity or concentration of HF measured downwind or the dose of HF to a member of the public. Moreover, LES does not indicate the cumulative radiation dose to a member of the public or the cumulative HF exposure to a member of the public.

Related to the requirement that LES demonstrate that storage of the depleted uranium is not inimical to safety and health is LES' provision for an Emergency Plan. *See also* 10 C.F.R. § 70.22(i) and 10 C.F.R. § 40.31(j). The emergency response planning in LES's application relating to offsite support is not adequate. NRC Regulatory Guide 3.67 Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities provides, in part:

> 4.3 Local Offsite Assistance to Facility
>
> Describe provisions and arrangements for assistance to onsite personnel during and after an emergency. Indicate the location of local assistance with respect to the facility if not previously stated. Ensure that exposure guidelines are clearly communicated to offsite emergency response personnel. Identify the services to be performed, means of communication and notification, and type of agreements that are in place for the following:
>
> - Medical treatment facilities
> - First aid personnel
> - Fire fighters
> - Law enforcement assistance
> - Ambulance service
>
> Describe the measures that will be taken to ensure that offsite agencies maintain an awareness of their respective roles in an emergency and have the necessary periodic training, equipment, and supplies to carry out their emergency response functions. Discuss any provisions to suspend security or safeguards measures for site access during an emergency.
>
> 4.4 Coordination with Participating Government Agencies
>
> Identify the principal State agency and other government (local, county, State, and Federal) agencies or organizations having responsibilities for radiological or other hazardous material emergencies at the facility. For each agency or organization, describe:
>
> - Its authority and responsibility in a radiological or hazardous material

emergency and its interface with others, if any;

- Its specific response capabilities in terms of personnel and resources available;
- Its location with respect to the facility;
- The rumor control arrangements that have been made with the agency or organization. (The emergency plan should describe where the public and media can obtain information during an emergency.)

Typical agencies to be included are the local emergency planning committee established under the Emergency Planning and Community Right-To-Know Act of 1986; State departments of health, environmental protection, and emergency or disaster control; and local fire and police departments. Ensure that the licensee will meet at least annually with each offsite response organization to review items of mutual interest, including relevant changes in the licensee's emergency preparedness program. The licensee should discuss the emergency action level scheme, notification procedures, and overall response coordination process during these meetings.

Section 7.7 of LES's Emergency Plan titled "Letters of Agreement" refers to "Memoranda of Understanding" signed by the New Mexico Department of Public Safety, Eunice Fire and Rescue, Eunice Police Department, City of Hobbs Fire Department, Lea County, Lea Country Sheriff's Office and the Lea Regional Medical Center. The description of the available offsite resources presented in the Emergency Plan is not adequate. The equipment available to the Eunice Central Fire Dispatch is described in the Emergency Plan at section 4.3.2 on page 4.3-2. The application does not identify the number of personnel available at various times and has not shown that the responders have the requisite training to understand and manage the radioactive and hazardous materials they may come in contact with in assisting LES in the event of any emergency situation. Similarly, section 4.3.3 indicates that the Eunice Police Department has five officers on staff and that an unidentified number of staff from the Lea County Sheriff's Department and the State of New Mexico maintain officers in the area. However, the application does not demonstrate that such staff, given the need to cover three shifts and the time for vacations, holidays, time in court and sick leave, is adequate.

Section 4.34 indicates that the Lea Regional Medical Center would be used for treatment of personnel. The application states that physicians at the Medical Center will be informed in advance of the associated chemical and radiological hazards that may complicate injuries when the facility begins enrichment activities. The Emergency Plan, however, should describe in detail the offsite services that support emergency response for decontamination facilities, especially decontamination from chemical and radiological exposure, and medical treatment facilities and ambulance services, especially for injuries involving hydrogen fluoride, other noxious chemicals and radioactive materials.

III. DEMONSTRATION THAT CONTENTION IS WITHIN SCOPE OF PROCEEDING AND MATERIAL TO NRC'S FINDINGS

NMED's contention – that LES has not proposed a plausible strategy for treatment and disposition of the DUF6 and that LES has not shown that long term storage of the DU will not be inimical to health and safety – falls squarely within the scope of these proceedings as defined in the NRC's initial order and is plainly material to the findings the NRC must make in this proceeding in order to issue a license to LES. *See* Notice of Receipt of Application for License, Environmental Issues, 1(b), p. 11 (Jan. 30, 2004).

Conclusion

For the reasons set forth above, NMED requests the NRC to admit NMED Contention 5a (Technical, Environmental), that LES has not demonstrated a plausible strategy for disposition of the DU waste it will generate from its uranium enrichment facility and that it has not demonstrated that long term storage of the DU will not be inimical to health and safety. 10 C.F.R. § 40.32(d).

Respectfully submitted,

NEW MEXICO ENVIRONMENT DEPARTMENT

Claybourne Clarke
Assistant General Counsel
Tannis L. Fox
Deputy General Counsel
Office of General Counsel
1190 St. Francis Drive
Santa Fe, New Mexico 87502-6110
Telephone (505) 827-2855
Facsimile (505) 827-1628
E-mail clay_Clarke@nmenv.state.nm.us
Tannis_fox@nmenv.state.nm.us

Certificate of Service

I certify that a copy of the foregoing pleading was served by mail and as indicated by an asterisk (*) by electronic mail on this 10th day of May, 2004.

Administrative Judge*
Paul Bollwerk
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Mail Stop: T-3F23
Washington, D.C. 20555
Email: gpb@nrc.gov

Administrative Judge*
Charles Kelber
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Mail Stop: T-3F23
Washington, D.C. 20555
Email: cnk@nrc.gov

Administrative Judge*
Paul Abramson
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Mail Stop: T-3F23
Washington, D.C. 20555
Email: pba@nrc.gov

Office of the Secretary*
Attn: Rulemakings and Adjudication Staff
U.S. Nuclear Regulatory Commission
Mail Stop: O-16C1
Washington, D.C. 20555
Email: hearingdocket@nrc.gov

Office of Commission Appellate Adjudication
U.S. Nuclear Regulatory Commission
Mail Stop: O-16C1
Washington, D.C. 20555

Rod Krich, Vice President
Licensing, Safety and Nuclear Engineering
Louisiana Energy Services, L.P.
2600 Virginia Avenue, N.W., Suite 610
Washington, D.C. 20037

Patricia A. Madrid, Attorney General*
Glenn Smith, Deputy Attorney General
Stephen R. Farris, Assistant Attorney General
David Pato, Assistant Attorney General
Assistant Santa Fe, New Mexico 87504
Office of the Attorney General
P.O. Box 1508
Santa Fe, New Mexico 87504-1508
Facsimile: 505-827-4440
Email: gsmith@ago.state.nm.us
sfarris@ago.state.nm.us
dpato@ago.state.nm.us

Lisa B. Clark*
Angela B. Coggins
Office of General Counsel
U.S. Nuclear Regulatory Commission
Mail Stop: O 15-D21
Washington, D.C. 20555
Email: lbc@nrc.gov
Abc1@nrc.gov

Lindsay A. Lovejoy, Jr.*
618 Paseo de Peralta, Unit B
Santa Fe, New Mexico 87501
Email: lindsay@lindsaylovejoy.com

James R. Curtiss*
Winston & Strawn
1400 L Street, N.W.
Washington, D.C. 20005
Email: jcurtiss@winston.com

Tannis L. Fox
Claybourne Clarke
Attorneys for NMED

ROBERT ALVAREZ

615 Kennebec Avenue - Takoma Park, Maryland 20912
Phone: 301-585-7672. Fax: 301-585- 9474 E-mail: kitbob@erols.com

CURRENT POSITIONS

SENIOR SCHOLAR, INSTITUTE FOR POLICY STUDIES, WASHINGTON, D.C.

PRESIDENT, ALVAREZ AND ASSOCIATES, INC.

PREVIOUS EMPLOYMENT

SENIOR POLICY ADVISOR TO THE SECRETARY
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

Years Employed: 1993 - 1999

Responsibilities:

- Reviewed and developed policies relative to nuclear materials, nuclear non-proliferation, nuclear material management, environmental cleanup, safety, health and asset management.

- Analyzed energy supply emergency issues for the Department.

- Coordinated international bi-lateral and multi-lateral activities for Department.

Accomplishments:

- Led DOE expert teams in a sensitive U.S. Nuclear nonproliferation project to safely secure plutonium-bearing spent fuel at the Yongbyon, nuclear weapons site in North Korea - as part of Agreed Framework between the United States and the Democratic Peoples Republic of Korea

- Developed first DOE-wide strategic "Roadmap" for strategic management of the agency's nuclear materials.

- Developed Administration effort to establish a federal compensation program for Department of Energy nuclear weapons workers with occupational diseases.

- Established the first Department-wide Asset Inventory and Management program that generated some $60 million in revenues.

- Established a medical monitoring program for former DOE nuclear weapons workers.

- Performed technical and policy analyses for the Secretary regarding commercial nuclear energy, strategic management of nuclear materials, nuclear fuel cycle approaches to nuclear arms reductions with Russia and DOE corporate management issues.

SENIOR INVESTIGATOR
COMMITTEE ON GOVERNMENTAL AFFAIRS
U.S. SENATE, WASHINGTON, D.C.

Years Employed: 1988-93

Responsibilities:

- Prepared and reviewed legislation for the Chairman relative to energy, labor, environment, safety, health, and nuclear weapons issues.
- Oversight, investigations, studies and audits of the U.S. Department's of Energy, Defense, and Interior, Food and Drug Administration, Nuclear Regulatory Commission, National Aeronautic and Space Administration, and Environmental Protection Agency.
- Produced reports, preparing Committee hearings and speech writing for the Chairman.

Accomplishments:

- Drafted and helped enacted several pieces of legislation including: the creation of the Defense Nuclear Facility Safety Board (1988); control of radioactive emissions under the Clean Air Act (1990); establishment of a hazards material worker training program for the Department of Energy (1991); a workforce restructuring and community transition program for shutdown nuclear weapons facilities. (1992); and the termination of the U.S. atmospheric nuclear weapons test readiness program (1993).
- Helped create and foster the Department of Energy's Office of Environmental Restoration and Waste Management Program. (1988-89)
- Organized over 25 Committee hearings on a wide array of subjects.

DIRECTOR, FOUNDER, AND MEMBER OF THE BOARD OF DIRECTORS
ENVIRONMENTAL POLICY INSTITUTE
WASHINGTON, D.C. Years Employed: 1975-88

Responsibilities:

- Managed the Institute's research, Congressional communications, and citizen involvement efforts relative to energy, environmental, health and military nuclear issues.

- Public speaking and lobbying.
- Fund-raising for a $1.5 million annual budget to help meet a payroll for 20 people.

Accomplishments:

- Provided the first credible independent technical research on the environmental, safety and health risks and legacies associated with the U.S. nuclear weapons program.
- Helped enact environmental legislation including the 1977 Clean Air Act, The Resource Conservation and Recovery Act amendments of 1986-92, The 1986 Superfund Act; as well as legislation dean up and dispose of nuclear wastes (The Uranium Mill Tailings Radiation Control Act, 1978, The Nuclear Waste Policy Act, 1982, the Low-Level Waste Policy Act, 1987); and legislation to prevent the spread of nuclear weapons.
- Led the national environmental effort to strengthen radiation protection standards and provide compensation for radiation victims.
- Helped organize a Congressional investigation and successful lawsuit on behalf of the parents and children of Karen Silkwood, a deceased nuclear "whistle blower." In 1984 the Supreme Court upheld the jury verdict against the company that employed Ms. Silkwood.
- Helped organize diverse political coalitions around the country.
- Organized several scientific conferences and sponsored scientific and medical research published in peer-reviewed journals.

LEGISLATIVE AIDE
U.S. SENATOR JAMES ABOUREZK (D-SD), Washington D.C.
Years Employed: 1973-75

Responsibilities:

- Indian affairs, environment, and energy issues.

Accomplishments:

- Helped enact the Indian health care Improvement Act.
- Defended Indian water rights in the Upper Colorado River Basin against large water diversions for environmentally destructive coal gasification plants.
- Uncovered a systematic effort, over a period of several years, by the Bureau of Indian Affairs and the US Public Health Service to have Indian women sterilized without their knowledge and Indian children serve as experimental subjects for drugs without proper informed consent.

AWARDS AND SPECIAL RECOGNITION

- Awarded two Secretarial Gold Medals, the highest honors bestowed by the Department of Energy.
- The John Barlow Martin Prize for Public Interest Journalism, Medill School of Journalism, Northwestern University, in 1989.
- Featured in National Public Television's Nova documentary - Hanford: the Nuclear Legacy- broadcast in February and August of 1990.
- Featured on CBS 60 Minutes story regarding my efforts to uncover military human radiation experiments -- broadcast in March 1994 and August 1995.
- Featured in an October 16, 1999 New York Times article regarding DOE high-level radioactive wastes.
- Featured on the History Channel program, "History's Mysteries" regarding the Karen Silkwood case (November 1999)
- Featured in a January 29, 2000 New York Times article regarding radiation risks to U.S. nuclear weapons workers.
- Featured in a January 30, 2000 Washington Post Article regarding health risks of nuclear weapons workers.
- Featured in the New York Times on April 30, 2000 and on National Public Radio's All Things Considered on May 8, 2000 regarding my experiences in the U.S. Department of Energy.
- Featured on CBS 60 Minutes on March 17, 2002 regarding Defense High-Level Radioactive Wastes.

EDUCATION

Attended the Dana School of Music in Youngstown, Ohio 1964-68, Majored in music theory and composition.

REFERENCES UPON REQUEST

PUBLICATIONS

Articles

The Mancuso Affair, (letter) Bulletin of Atomic Scientists, January 1980.
Radiation Exposure Standards, (letter) Bulletin of Atomic Scientists, November 1980.
The AAAS Symposium on Radiation, (letter) Science, March 1982.
Plowshares into Swords, Journal for German and International Politics, June 1983, Pahl-Rugenstein Verlag, K61.
Radiation Standards and A-Bomb Survivors, Bulletin of Atomic Scientists, October 1984.
U.S. to Resume Uranium Production for Weapons, Bulletin of Atomic Scientists, April 1985.

Environmental Exposures to Gamma Radiation from the Savannah River Plant, Proceedings, Mid-Year Topical Symposium, Health Physics Society, January 1985.
External Gamma Radiation Around the Savannah River Plant, Ambio - Journal of the Swedish Royal Academy of Science, Vol. 14" No. 2, 1985 (co-authored with Bernd Franke)
NRC Goes in Reverse on Radiation Standards, Philadelphia Inquirer, January 17, 1986.
Radiation Workers: The Dark Side of romancing the Atom, Science for the People, April/May 1986. *The Bomb at Home,* Nuclear Times, June/July 1986.
Managing Nuclear Wastes at the Savannah River Plant, Atlanta Constitution/Journal August 15, 1986.
A Win at the Nuclear Starting Gate, Science for the People, April/May 1987.
The Dragon's Tail. An Official History of Radiation Protection During the Manhattan Project (Book Review), Bulletin of Atomic Scientists, December 1987.
Radioactive Legacy of the Nuclear Arms Race, Technology Review, August/September 1988 (co-authored with Arjun Makhijani)
Nuclear Waste: The $ 100 Billion Mess, Washington Post -- Outlook Section, September 6, 1988 (coauthored with Arjun Makhijani).
Reactor Restart at the Savannah River Plant, Atlanta Constitution/Journal, September 14, 1988.
America's Cold War Casualties, Salon. Com Internet Magazine, April 24, 2000
Energy in Decay, Bulletin of Atomic Scientists, May/June 2000.
Nuclear Wildfires, The Nation, September 18, 2000.
Aid for Nuclear Workers, The Nation, October 19, 2000.
The Long Season of Discontent, Bulletin of Atomic Scientists, January/February 2001.
The Legacy of Depleted Uranium, The Nation, November, 2000.
Making it Work, Bulletin of Atomic Scientists, May/June 2001.
What About Spent Fuel, Bulletin of Atomic Scientists, January/February 2002.
Reducing the Hazards from Stored Spent Power-Reactor Fuel, (coauthored with Jan Beyea, Klaus Jansberg, Jungmin Kang, Ed Lyman, Allison MacFarlane, Gordon Thompson and Frank Von Hippel, Global Science and Security (Princeton University), May 2003.
No bygones in Yonbyon, Bulletin of Atomic Scientists, June/July 2003.
The Legacy of Hanford, The Nation, August 18, 2003.

Reports

Water for Energy Use in the Upper Missouri River Basin, Environmental Policy Institute, February 1976.
All Electric Kitchens and Starvation: An assessment of nuclear energy in Less Developed Countries, Environmental Policy Institute, October 1976.
Radiation Monitoring Around Nuclear Power Plants, Environmental Policy Institute, Washington, D.C., 1979.

Plowshares into Swords: Mining Plutonium from Commercial Nuclear Power Spent Fuel, (Co-authored with David Albright and Elli Walters), Environmental Policy Institute, Washington D.C." April 1981.
An Assessment of health and Mortality Studies of federal Nuclear Workers in the United States, Environmental Policy Institute, Washington, D.C., June 1985
Deadly Crop in the Tank Farm: An Assessment of the Management of High-Level Radioactive Wastes at the Department of Energy's Savannah River Plant, (co-authored with Arjun Makhijani and Brent Blackwelder), Environmental Policy' Policy Institute, Washington, D.C., July 1986.
Cut-Rate Cleanup: An Assessment of the U.S. Department of the U.S. Department of Energy's Fiscal Year 1987 Budget for Nuclear Weapons Production, Environmental Policy Institute, Washington, D.C., March 1987.
Evading the Deadly Issues: An Reply to Recent Criticisms by the DuPont Corporation regarding High-level Radioactive Waste Management at the Savannah River Plant, (co-authored with Arjun Makhijani and Brent Blackwelder), Environmental Policy Institute, Washington, D.C. September 1987.
Early Health Problems of the U. S. Nuclear Weapons Program, Report, U. S. Senate Committee on Governmental Affairs, December 1989.
A accident and Explosion Risks at U. S. Department of Energy High-Level Nuclear Waste Sites, Report, U.S. Senate Committee on Governmental Affairs, July 1990.
Downsizing the U. S. Nuclear Weapon's Complex and Managing Excess Fissile Material, Report of the U. S. Senate Committee on Governmental Affairs, February 1991.
Radiological Contamination in the United States, Report, Committee on Governmental Affairs, April 1992.
Regulation of Medical Radiation Uses, Report, Committee on Governmental Affairs, May 1993.
The U.S Department of Interior - Environmental Issues, Report, U.S. Senate Committee on Governmental Affairs.
Budgeting, Management and Regulation of U.S. Government-Wide Environmental Cleanup Programs, Report, U.S. Committee on Governmental Affairs, September 1993.
The Nuclear Program of the Democratic People Republic Of Korea, November 1994, White Paper (Secret).
Options for Closing or Converting Plutonium Production Reactors in Russia, December 1994, White Paper (Official Use Only).
The Baseline Asset Inventory Report to the Secretary, U.S. Department of Energy, Office of Policy, November 1995. (Official Use Only)
Overhead Costs Associated with Excess Fixed Assets, May 1996, (Official Use Only).
Rethinking the Challenge: The Stewardship of Radioactive Materials, Proceedings of the Nuclear Materials Policy Review Workshop, October 28-29, 1996, U.S. Department of Energy.

U.S. Department of Energy, Corporate Management Issues, White Paper (Official Use Only), February 1997
Rethinking the Challenge of High-Level Nuclear Wastes, May 1997, White Paper, (Official Use Only)
Strategic Management of Nuclear Materials, Proceedings of the Second Nuclear Materials Policy Review Workshop, U.S. Department of Energy, January 14-15, 1998.
The Hanford Vadose Zone: A Proposed approach to Characterizing Subsurface Hanford contaminants and their impacts on the Columbia River and Biota, January 15, 1998 (Official Use Only)
Nuclear Fuel Cycle Implications on Nuclear Arms Reduction Agreements with Russia, White Paper, April 1998 (Official Use Only).
Nuclear Material Safety in the United States, A report Prepared for the Safety Energy Communication Council, October 19, 1999.
Incinerating Plutonium in Idaho: A Review of the Advanced Mixed Waste Treatment Project, a report prepared for the Government Accountability Project, December 10, 1999.
The Risks of Making Nuclear Weapons: A Review of the Health and Mortality Experience of Department of Energy Workers, a report prepared for the Government Accountability Project, January 2000.

Book

Killing Our Own: America's Disastrous Experience with Atomic Radiation, Dell Publishing, New York, (Co-authored with Harvey Wasserman, Norman Solomon and Elli Walters) 1982

Curriculum Vitae

George Anastas, M.P.H., P.E., C.H.P., DEE
11021 HighPointe NE, Albuquerque, NM 87111
Home Telephone 505/797-5452
ganastas5@comcast.net
U.S. Citizenship

Summary: Environmental Engineer, Health Physicist, Nuclear Engineer, and Safety Professional with more than 25 years of experience in operational radiation safety, dose calculations, nuclear power plant operations, procedure preparation, emergency response planning and emergency response, occupational safety, industrial hygiene, environmental assessment, engineering and project management.

Education:

University of Minnesota, Master of Public Health (Environmental/Radiological Health)

State University of New York at Albany, Albany, New York, Bachelor of Science, Major Physics, Minor Science

Other University Training:

Rensselaer Polytechnic Institute, Troy, New York, graduate study in Nuclear and Environmental Engineering, 1972-1975.

Membership and Leadership in Professional Organizations:

American Academy of Environmental Engineers
American Academy of Health Physics
American Nuclear Society
American Society of Safety Engineers, Number 243490
American Conference of Governmental Industrial Hygienists
Australasian Radiation Protection Society

Health Physics Society (National), President-Elect June 2000-June 2001, President June 2001-2002, elected to the Board of Directors in 1997, selected as a member of the Strategic Planning Committee 1995

Elected Fellow, Health Physics Society, June 2002

President Northeastern New York Chapter (1972), San Diego Chapter (1982) and Sierra Nevada Chapter (1994) of the Health Physics Society

Current Certifications:

Professional Nuclear Engineer, California Registration, Certificate Number 1654
Certified Health Physicist
Diplomate, American Academy of Environmental Engineers, Radiation Protection

Employment History:

May 2001-May 2004: Health Physicist and Nuclear Engineer, Environmental Evaluation Group (EEG), Albuquerque, New Mexico. Lead staff for review of operational radiation safety relating to the placement of Remote Handled Transuranic waste at WIPP and for the evaluation

of the DOE plans to bring Hanford tank waste to the WIPP. Serve as EEG Radiation Safety officer. Assisted New Mexico Office of Emergency Management in the Homeland defense Equipment Reuse (HDER) Program. Serve on a Department of Homeland Security HDER Advisory Committee.

1993 to May 2001: Consultant to a number of bio-technology firms, universities and analytical laboratories in the areas of operational radiation safety, emergency response planning and exercises, licensing, inspection/auditing and waste disposal.

1999-2001: University of California San Diego.

1993-2001: SYNTEX Research, USA, Palo Alto, CA (since acquired by Roche Bioscience, Basil, Switzerland).

1994-2001: ALZA Corporation, Palo Alto, CA.

1994-2000: Behring Diagnostics, Inc., Cupertino, CA.

1994: Salk Institute for Biological Studies, San Diego, CA.

1996: University of Nevada, Reno, Reno, NV.

1993: National Academy of Sciences (NAS). Safety and Radiation Safety Officer for a National Academy of Sciences team (Young Investigator Program on Nuclear Accidents and Radioactive Contamination) in Ukraine and Belarus.

November 1990 to January 2000: Director, Environmental Health and Safety, University Radiation Safety Officer and University Biosafety Officer, California State University, Sacramento (CSUS), Sacramento, California. Assembled and led the team that developed, revised and implemented a variety of programs including: emergency response, radiation safety, accident prevention, industrial hygiene and occupational safety, chemical hygiene, hazardous waste management and disposal, medical monitoring, confined space entry, fire protection and biosafety. Designed and had installed shielding for a number of sealed sources, including several PuBe neutron sources and provided initial and refresher radiation safety training to faculty and staff. Provided Radiation Safety Program Reviews (audits) for the 21 campus California State University System and provided assistance in resolving radioactive materials licensing, emergency response planning, waste disposal and environmental surveillance issues with regulatory agencies. Worked with CSUS Public Safety and First Responders in the Sacramento area in preparing for the US Track and Field Trials at the University. This effort involved both a WMD planning exercise and a field exercise at the University.

August 1986-November 1990: Director, Technology Assessments, Resource Management International, Inc., Sacramento, CA. Provided engineering and operational safety evaluations for electric utilities. Evaluated forced outage rates and preventive maintenance for two nuclear power plants.

1976-1986: San Diego Gas and Electric Company, San Diego, CA. Senior Nuclear Engineer, Chairman of the ALARA Committee, Alternate Radiation Safety Officer, Environmental Programs Supervisor, Geothermal Program Manager, Manager of the Engineering Department and Chairman of the Research Committee. Responsible for preparation of portions (accident analysis, radiation protection, emergency response planning) of the PSAR and the ER for a two unit proposed nuclear power plant. Lead the Generating Engineering

Department which provided services to several oil and gas fired power plants. Served as primary contact with the Electric Power Research Institute (EPRI) and the Gas Research Institute and served as Chairman of several EPRI Task Forces. Coordinated and closely monitored an annual research budget of several millions of dollars. Testified before the California Public Utilities Commission, the California Energy Commission and Joint Legislative Committees.

1972-1976: New York State Public Service Commission, Albany, NY. Nuclear Power System Planner. Prepared technical evaluations relating to operating and proposed nuclear power plants, including Indian Point 2, Nine Mile Point 1, and R.E. Ginna. Assisted in the development of the New York State Emergency Response Plan for Radiation Emergencies and worked with the State Department of Health in implementation. Designed and carried out several nuclear incident exercises for State agencies. Testified before the Commission and the New York State Board on Generating Siting and the Environment.

1971: New York State Atomic and Space Development Authority, Malta Test Station, Malta, NY and Western New York Nuclear Service Center, West Valley, NY. Served as Radiation Safety Officer for the 500,000 curie Co-60 Malta irradiation facility and served as the Radiation Safety Officer and criticality control engineer for the Authority's plutonium storage facility at West Valley, New York.

1969-1971: New York State Department of Commerce, Division of Industrial Sciences and Technologies, Albany, NY. Served as Secretary to the Committee on Licensing of the New York State Atomic Energy Council. Provided regulatory coordination between State agencies and the U.S. Atomic Energy Commission (US AEC) relating to the licensing of radioactive materials and operation of US AEC licensed facilities. Advisor to the New York State Thruway Authority on the transportation of radioactive materials and accident response.

June 1967 to December 1968: Graduate school at the University of Minnesota, US Public Health Fellowship in Environmental/Radiological Health