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Is 'Trust Us, We're the Government' Really A Guarantee? A Review of Financial Assurance Options for Long-Term Stewardship at the Mixed Waste Landfill, Sandia National Laboratories

Citizen Action (through New Mexico Community Foundation)

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Is ‘Trust Us, We’re the Government’ Really A Guarantee? A Review of Financial Assurance Options for Long-Term Stewardship at the Mixed Waste Landfill, Sandia National Laboratories

By W. Paul Robinson, Research Director, Southwest Research and Information Center

The following report was made possible with a grant from the Monitoring and Technical Assessment Fund (MTA) to assist in performing independent technical studies of the Mixed Waste Landfill (MWL), a hazardous waste site containing radioactive and chemical legacy wastes located at Sandia National Laboratories (SNL). The funding, established as a part of a \$6.25 million court settlement between the U.S. Department of Energy (DOE) and 39 nonprofit and environmental groups, assists tribes and other non-governmental organizations in conducting their own independent technical studies of sites at DOE facilities.

Citizen Action commissioned William Paul Robinson, Research Director for the Southwest Research and Information Center, Albuquerque, New Mexico, to identify and evaluate options for financial assurance that may apply to the MWL site. The establishment of a financial assurance mechanism helps to ensure that various post closure activities associated with long-term monitoring and maintenance of a specific site will continue over time unhampered by a potential lack of funding. A copy of Mr. Robinson’s curriculum vitae, and a list of his published papers and community accomplishments are included with this report.

“The old boy scout adage to “leave a place as clean or cleaner than you found it” reflects a degree of land stewardship that many people outside DOE recognize as a common sense version of an effective clean up standard for waste sites.”

- W. Paul Robinson

Is 'Trust Us, We're the Government' Really a Guarantee?

**A Review of Financial Assurance Options for Long-Term Stewardship at the
Mixed Waste Landfill, Sandia National Laboratories, Albuquerque, New
Mexico, USA**

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FINAL REPORT

June 18, 2002

Executive Summary

Citizen Action commissioned this study to identify and evaluate options for financial assurance that may apply to the Mixed Waste Landfill (MWL) at the Department of Energy's Sandia National Laboratories (SNL) at Albuquerque, New Mexico. The report reviews legal aspects of this subject and evolving Department of Energy (DOE) policy on long-term management of waste sites, as well as specific examples of trust funds, DOE-contractor agreements and other state-based approaches to financial assurance at sites with similarities to Sandia's Mixed Waste Landfill. This research has been supported by a grant from the Citizens' Monitoring and Technical Assessment Fund administered by RESOLVE, Inc. Washington, DC.

This review identifies four options for financial assurance to guarantee of the performance of long-term care at waste disposal sites as required by the Resource Conservation and Recovery Act (RCRA), (42 USC 6901 *et seq.*) and US Environmental Protection Agency (EPA) regulations (40 CFR 260 *et seq.*) pursuant to that Act. RCRA is a federal law that regulates solid and hazardous waste from generation through disposal referred to as a "cradle-to-grave" control program. This review focuses on the "grave" portion of the RCRA process, the requirements for closure and post-closure plans at waste disposal sites.

RCRA "cradle-to-grave" scope establishes a nationwide system for management and disposal of solid wastes, hazardous wastes and radioactive wastes when mixed with hazardous waste. Detailed written closure and post-closure plans are required to establish these long-term controls by regulation at 40 CFR 264.112, which must be underwritten by financially-binding and fully-funded guarantees as required by 40 CFR 140 - 151 that insure that all necessary long-term measures will be implemented at sites around the nation. A critical exception to this requirement in EPA regulation 40 CFR 264.140(c) for "State and Federal Government" operations allows this category of waste disposal sites to avoid guarantees that private owners and operators of hazardous and mixed waste sites have been responsible for, and have provided, for many years. This exception does not exempt that category of sites from providing the closure and post-closure plans required in the RCRA regulations at 40 CFR 264.112.

Examples of financial assurance mechanisms that have been developed within the RCRA context for federal waste sites include:

- 1) Trust Funds as used at closed uranium mill tailings disposal sites – as implemented under authority of the Uranium Mill Tailings Radiation Control Act of 1978 by the Nuclear Regulatory Commission (NRC);
- 2) Trust Funds for long-term monitoring and maintenance - implemented to address RCRA closure and post-closure plans by Tennessee Department of Environment and Conservation for a mixed waste landfill at Oak Ridge, Tennessee;
- 3) Private operators financial assurance – as initially implemented, and subsequently withdrawn due to pre-emptive legislation, in a RCRA permit issued by the New Mexico Environment Department (NMED) for the Waste Isolation Pilot Plant (WIPP) site in New Mexico; and

- 4) Private operator corporate insurance – as implemented by Oregon Department of Environmental Quality in a RCRA permit for the Umatilla Chemical Weapons Depot near in northeastern Oregon.

Sandia National Laboratories covers a sprawling area of more than 8,800 acres on the south side of Albuquerque, New Mexico. Founded in 1943 as part of the Manhattan Project, SNL is currently operated by Lockheed-Martin through its subsidiary, Sandia Corporation, for DOE and continues to be a major center for nuclear weapons research and engineering. The Mixed Waste Landfill encompasses an area of 2.6 acres of unlined pits and trenches that received a wide variety of radioactive and hazardous wastes between 1959 and 1988.

Hazardous and mixed waste at SNL is managed under a permit issued by the New Mexico Environment Department within the scope of requirements that conform, almost word for word, with the requirements of EPA's RCRA regulations. The permit lists the DOE Albuquerque Office as "owner" and Sandia Corporation as "operator" and addresses a wide variety of waste management units. The facility is currently treated as exempt from requirements to provide financial assurance associated with its closure and post-closure requirements based on the application of the 40 CFR 264.140(c) exemption.

Rather than proposing a comprehensive clean-up at the Sandia Mixed Waste Landfill using waste removal or encapsulation technologies, DOE has chosen to recommend an experimental "evapotranspiration" (ET) cap without the financial guarantees necessary to assure implementation of all necessary closure and post-closure plans. The NMED has indicated that required closure and post-closure plans must, at a minimum, include:

- 1) Comprehensive future reviews of the interim cap;
- 2) Comprehensive closure and post-closure plans to be implemented if the cap is not fully effective; and
- 3) Monitoring and maintenance measures necessary to demonstrate the success of any waste disposal remedy throughout the long-term period during which risks may be presented by materials disposed of at the site (NMED, 2001a).

Recent DOE policy initiatives such as the "Top-To-Bottom Review" and subsequent policy considerations do not provide a clear path to resolve the Long-Term Stewardship (LTS) dilemma. Suggestions that closure and post-closure care for sites be transferred from DOE to other federal agencies, such as the Bureau of Land Management, US Army Corps of Engineers, Fish and Wildlife Service or NRC, fail to address how to guarantee that LTS will be funded and implemented. While that policy approach may eliminate such sites from the DOE jurisdiction, the sites would become the responsibility of any Federal, State or private entity to which they were transferred. Such an approach would do little to address questions about potential long-term risks associated with specific sites and the need for financially guaranteed LTS at nuclear legacy waste sites across the nation.

Due to a requirement issued by the NMED (NMED 2001b), Sandia National Laboratories is currently conducting a Corrective Measure Study (CMS) for the MWL. The specific direction provided by NMED to Sandia in NMED 2001b requires consideration of a full range of feasible

remedies for the Mixed Waste Landfill. The CMS provides an opportunity for formal consideration of each of the financial assurance mechanisms identified in this report related to LTS needs at the MWL. The CMS should consider:

- 1) Full remediation of the MWL by excavation and containment sufficient to minimize or eliminate long-term stewardship requirements;
- 2) Identification of the full cost of closure and post-closure plans, including periodic evaluation of the effectiveness of the proposed cap, monitoring, maintenance, and repair of the cap on a perpetual basis; and
- 3) Identification of financial assurance models including those presented in this report - the Oak Ridge MWL Trust Fund, UMTRCA Trust Fund, financial assurance provided by private operator of federal facilities, and the Umatilla Chemical Depot-type contractor guarantee – as options to guarantee that the full cost of long-term stewardship at the Sandia MWL will be available when needed.

TABLE OF CONTENTS

Executive Summary	1
I. Purpose and Scope	5
II. A. Overview of DOE Policy on Cleanup and Long-Term Stewardship of the Nuclear Weapons Waste Legacy	9
II. B. What do “Cleanup” and “Long-Term Stewardship” Mean?	10
II. C. DOE Policy in the Context of other Federal Waste Management Responsibilities	11
II. D. Need for Long-Term Stewardship	12
II. E. DOE’s Approach to Long-Term Stewardship in 2002	13
III. Overview of Sandia National Laboratories’ Mixed Waste Landfill	16
IV. A. Options for Guaranteeing Long-Term Stewardship at Federal RCRA sites	19
IV. B. The Trust Fund as a Model for Guaranteeing Federal Long-Term Stewardship Commitments.....	20
IV. C. Financial Assurance Through a State-Administered Trust Fund: Mixed Waste Landfill at Oak Ridge Reservation, Tennessee	23
IV. D. Long-Term Stewardship through Financial Guarantees by Private Operators of Federal Facilities	27
IV. E. Financial Assurance Established by a Federal Facility Contractor’s Financial and Performance Guarantee Insurance Policies.....	30
V. Conclusions and Recommendations Related to the Sandia Mixed Waste Landfill.....	32
VI. References	34

I. Purpose and Scope

Citizen Action commissioned this study to identify and evaluate options for financial assurance that may apply to the Mixed Waste Landfill (MWL) at the Department of Energy's Sandia National Laboratories at Albuquerque, New Mexico. The report summarizes legal aspects of this question and evolving Department of Energy (DOE) policy on long-term management of waste sites, as well as examples of trusts funds, DOE-contractor agreements and other state-based approaches to financial assurance at sites with similarities to the Sandia MWL. The concluding section provides opportunities and recommendations for further action based information presented on the report.

The report has been prepared to inform *Citizen Action's* membership, the public, DOE, SNL, and the New Mexico Environment Department (NMED), the state agency responsible for issuing hazardous and mixed waste permits, about financial assurance mechanisms that could be used to guarantee MWL closure and post-closure plans. This research has been supported by a grant from the Citizens' Monitoring and Technical Assessment Fund administered by RESOLVE, Inc. Washington, DC.

Many people consider the elimination of contaminant releases and guaranteed long-term safety to be fundamental goals for cleanup programs at nuclear waste sites, hazardous waste sites, and other contaminated materials disposal projects. These performance standards are applied to most site owners and operators whether public or private, through the spectrum of environmental legislation applicable across the United States and in the State of New Mexico. This standard of performance is also a concept understood by many interests among the public. The old boy scout campsite adage to "leave a place as clean or cleaner than you found it" reflects a degree of land stewardship that many people outside DOE recognize as a common sense version of an effective cleanup standard for waste sites. Within the existing legal framework though, critical exceptions provide opportunities to avoid, weaken, or ignore attainment of these fundamental objectives.

A significant public policy debate has emerged regarding the commitment of DOE and SNL to eliminate releases, guarantee long-term safety, and provide effective financial assurance to maintain long-term safety in perpetuity at the Sandia MWL. Concerns expressed in public meetings and written comments to regulatory agencies include the failure of SNL and DOE to demonstrate serious consideration of a cleanup proposal for the MWL that will:

- 1) Result in removal of radioactive and hazardous waste from the landfill;
- 2) Guarantee monitoring for, and elimination of, contaminant releases from the site in perpetuity; and
- 3) Protect public health in perpetuity considering its location in a growing urban area.

This report has been prepared in response to these concerns in order to present practical options for long-term safety guarantees at the MWL. These options are presented in the following introductory sections that provide:

- 1) An overview of legal and regulatory materials related to guarantees of long-term management of DOE nuclear waste legacy sites;
- 2) A review of recent DOE policy developments involving long-term controls at waste sites under its jurisdiction; and
- 3) An introduction to the Mixed Waste Landfill, SNL.

The primary focus of this review is the identification of financial assurance mechanisms that can assure long-term safety at waste disposal sites as required by the Resource Conservation and Recovery Act (RCRA), (42 USC 6901 *et seq.*) and the regulations (40 CFR 260 *et seq.*) adopted by the US Environmental Protection Agency (EPA) pursuant to that Act. RCRA is a federal law that regulates solid and hazardous waste from generation through disposal referred to as a “cradle-to-grave” control program.

The RCRA regulations, at 40 CFR 264.111, establishes a closure standard that states:

“The owner or operator must close that facility in a manner that:

- 1) Minimizes the need for further maintenance; and
- 2) Controls, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run off, or hazardous waste composition products to the ground or surface waters or to the atmosphere....”

Financial assurance requirements to guarantee that these standards are attained apply to all “owners and operators of all hazardous waste facilities” (40 CFR 264.140(a)) except for “disposal facilities and piles and surface impoundments from which the owner or operator intends to remove the wastes at closure...” (40 CFR 264.140(b)(1 & 2)). Of prime significance for the subject of this report, “States and the Federal Government are exempt” from the financial assurance requirements of the RCRA regulations (40 CFR 264.140(c)).

While RCRA and its implementing rules are a very complex set of materials, these two brief sections demonstrate that a loophole has been afforded solely to “States and the Federal Government” that provides relief from the very important financial assurance provisions of RCRA. This exception however, does not appear to relieve “States and Federal Government” RCRA site from the requirement to attain the closure performance standard that site cleanup “minimizes the need for further maintenance; and [c]ontrols, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, ...” found in 40 CFR 264.111.

The RCRA “cradle-to-grave” scope establishes a nationwide system for management and disposal of solid wastes, hazardous wastes and some radioactive wastes when mixed with hazardous waste. The RCRA hazardous waste program implements Subtitle C of the Act, which provides the legal basis for the regulation of hazardous waste storage, treatment and disposal facilities around the nation. Detailed written closure and post-closure plans are required to establish these long-term controls in 40 CFR 264.112, underwritten by financially-binding and fully-funded guarantees insuring that all long-term measures will be implemented at sites around the nation. Though EPA rule 40 CFR 264.140(c) may give state and federal sites the opportunity to avoid financial guarantees that private owners and operators of hazardous and mixed waste facilities have been responsible for, and have provided for many years. It does not exempt the state and federal agencies responsible for those sites from providing the closure and post-closure plans required in the RCRA regulations at 40 CFR 264.112.

Many statutes other than RCRA come into play at individual waste sites. However, where RCRA provides the leading environmental authority, the 264.140(c) exception can be used, and has been used, by the federal government to avoid the financial assurance requirement associated with closure and post-closure care necessary for facilities at which wastes are left in place. The Mixed Waste Landfill at Sandia is one of these sites.

Citizens in New Mexico have expressed concern about the situation at the Sandia MWL to NMED consistently for several years. They have sought remedies which insure that detailed, enforceable closure and post-closure plans will be required at the MWL and that those plans comply with RCRA for surveillance, monitoring and maintenance for a period of at least 30 years following completion of all final closure measures at the site. These concerns arise due to the risk that the exemption may lead to in issuance of waste disposal permits that do not contain enforceable guarantees to insure that closure and post-closure plans are fully defined and fully implemented. Such a policy approach, in which conceptual rather than detailed closure and post-closure plans are presented to regulators, has been used repeatedly by DOE related to wastes created during the post-World War II nuclear weapons program at sites such as the Mixed Waste Landfill at Sandia.

Sandia National Laboratories, which has been called a “crown jewel” of the DOE national laboratory system by some, covers a sprawling area of more than 8,800 acres on the south side of Albuquerque, New Mexico. Founded in 1943 as part of the Manhattan Project, Sandia Labs is currently operated by Lockheed-Martin through its subsidiary, Sandia Corporation, for DOE and

continues to be a major center for nuclear weapons research and engineering. The Mixed Waste Landfill encompasses an area of 2.6 acres received a wide variety, or “mix”, of radioactive and hazardous wastes between 1959 and 1988.

Hazardous and mixed waste at Sandia Labs is managed under a permit issued by the New Mexico Environment Department within the scope of requirements that conform, almost word for word, with the requirements of EPA’s RCRA regulations. The permit lists the DOE Albuquerque Office as “owner” and Sandia Corporation as “operator” and covers addresses a wide variety of waste management units. The facility is currently treated as exempt from requirements to provide financial assurance associated with its closure and post-closure requirements based on the application of the 40 CFR 264.140(c) exemption.

One significant result of DOE use of the 40 CFR 264.140(c) loophole is a waste management policy that defers costly site closure and post-closure work to an uncertain time in the future without providing any enforceable guarantee that the deferred actions will be implemented. This type of indefinite deferral is not available to private waste site operators.

Rather than cleaning up the Sandia Mixed Waste Landfill comprehensively by removing or fully encapsulating the waste, DOE has chosen to propose an experimental “evapotranspiration” (ET) cap without the financial guarantees necessary to assure implementation of all necessary closure and post-closure plans. NMED has indicated that required closure and post-closure plans must, at a minimum, include:

- Comprehensive future reviews of the interim cap;
- Comprehensive closure and post-closure plans to be implemented if the cap is not fully effective; and
- Monitoring and maintenance measures necessary to demonstrate the success of any waste disposal remedy are carried out throughout the long-term period during which risks may be presented by materials disposed of at the site (NMED, 2001a).

Overcoming the lack of a DOE-commitment to either remove hazardous and mixed waste from the MWL or guarantee implementation of full scope of RCRA-based closure and post-closure plans at the site have been high priority concerns for *Citizen Action* since it was formed. *Citizen Action* commissioned this report to provide support for effective resolution of these concerns. As a result, this study identifies both:

- 1) Limitations in DOE commitments to guarantee the long-term safety of nuclear legacy waste sites nationwide, as well as the Mixed Waste Landfill; and
- 2) Financial assurance models implemented at federal facilities that effectively guarantee that each site has an enforceable cleanup plan that “controls, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste,” as set out in 40 CFR 264.111 and 40 CFR 264.112, at least thorough as that required of a private owner or operator, not just to a level that is “good enough for government work.”

II.A. Overview of DOE Policy on Clean-Up and Long-Term Stewardship (LTS) of the Nuclear Weapons Waste Legacy

Radioactive and hazardous waste dumps, leaks and spills at DOE nuclear weapons facilities have created an environmental legacy that may cost \$200 billion or more to clean up, plus additional funds to support permanent monitoring and maintenance programs at many of DOE sites (Werner, 2000). These sites are distributed widely across the United States, clustered at the many national laboratories and industrial facilities used in research, development and testing of nuclear weapons since the 1940s. The nature and number of these sites have been described in a series of official reports, including DOE, 1999 and DOE, 2001 listed in the references section at the end of this report. Those documents chronicle the dirty side of nuclear weapons research that was either hidden or ignored during the first three decades of the Cold War.

Each site has its own unique set of characteristics specific to the waste type, location, risk, operating history and jurisdiction that define the framework for cleanup of an individual site. Some of the sites are subject to the cleanup programs that are among the most expensive and complex ever attempted; others are relatively small sites in prominent locations from either an environmental or land use perspective. Some sites have already caused identifiable environmental and human impacts both on and off facility property. Other sites have the potential to generate major impacts if effective containment of the waste materials is not assured for thousands of years (DOE, 1999 and DOE, 2001).

DOE policy regarding cleanup and long-term control of waste from the nuclear weapons complex as been in evolution for many years, often changing focus with the change of leadership at DOE or change of administrations. Recognizing these fluctuations, this section provides background information and a general introduction regarding DOE policy related to its nuclear legacy sites as recent as February 2002. This background provides a context for the consideration of a range of specific long-term stewardship options that could be applied by DOE as a complex-wide matter and specifically at the Sandia MWL.

Following the election of President George W. Bush in 2000, major changes have been implemented in many areas of DOE, changes which constitute a new round of commitments to finding “faster, cheaper and better” ways to clean up wastes at DOE facilities. The current administration’s policy is presented in the DOE Review of the Environmental Management Program Presented to the Assistant Secretary for Environmental Management by the Top-to-Bottom Review Team (“Top-to-Bottom Review”) distributed February 4, 2002. The Top-to-Bottom Review provides a very recent, and comprehensive, waste management policy statement and includes a brief section addressing long-term stewardship matters.

II. B. What do “Cleanup” and “Long-Term Stewardship” Mean?

The phrase “long-term stewardship” (LTS) has used by DOE to describe several aspects of its responsibility at waste sites. The term has been used to refer to both:

- 1) technical activities and programs at a waste site that are conducted or required following completion of clean-up activities; and
- 2) DOE policy regarding its responsibilities during the closure and post-closure period after the completion of cleanup activities.

A useful set of working definitions to clarify the meaning of key terms and concepts related to this study can be found in From Cleanup to Stewardship, a October 1999 publication of the Department of Energy’s Office of Environmental Management (DOE, 1999). From Cleanup to Stewardship provides a recent summary of many of the problems related to DOE demonstration of assured long-term monitoring and maintenance programs at its nuclear waste legacy sites.

In From Cleanup to Stewardship, “cleanup” is defined as:

“[T]he process of addressing contaminated land, facilities and materials in accordance with applicable requirements. Cleanup does not imply that all hazards are removed from the sites. The term “remediation” is often used synonymously with “cleanup.”

To define the physical state of a site after cleanup activities have been completed, From Cleanup to Stewardship uses the term “end state.”

The term “long-term stewardship” (LTS) is defined as:

“All activities required to protect human health and the environment from hazards remaining after cleanup is complete” (DOE, 1999, p. 9).

The language used in these brief definitions for “cleanup” and “long-term stewardship” is repeated in the longer definitions provided for these terms in DOE 2001, A Report to Congress on Long-Term Stewardship, DOE/EM-0466.

Using these definitions, the “end state” at a waste site refers to the physical characteristics at the site following completion of “cleanup.” Cleanup programs resulting in “end state” conditions that leave “hazards remaining [at the site] after cleanup” can be understood to require more extensive LTS activities than sites that reach “end state” conditions where all hazards are removed. Where waste is left in place, LTS efforts are necessary to protect human health and the environment from long-term risks due to hazardous and radioactive materials that will remain at the site.

II. C. DOE Policy in the Context of other Federal Waste Management Responsibilities

DOE represents From Cleanup to Stewardship as a first attempt to quantify the likely scope of its stewardship activities. DOE recognizes that the concern for LTS and the available mechanisms to guarantee that LTS is successfully implemented at hazardous and radioactive waste sites is not unique to DOE. The EPA, for example, is responsible for cleanup of solid and hazardous waste sites through RCRA and other authorities. The Department of Defense (DOD) is responsible for cleanup on DOD lands. The Department of the Interior (DOI) is responsible for cleanup of many mines and other disturbed lands. The Nuclear Regulatory Commission (NRC) is responsible for cleanup of a wide variety of radioactive waste sites. All these agencies are involved with sites where potentially hazardous materials will remain in place and post-cleanup monitoring and maintenance are necessary. While the array of hazardous and radioactive materials found at DOE sites is unique to that agency, the problems associated with hazards that persist for very long periods of time at sites under the jurisdiction of other federal agencies are similar to those facing DOE at its nuclear legacy sites.

The closure and post-closure care programs applied by these federal agencies are very extensive and are currently being implemented at thousands of sites, including sites where responsible parties include other federal agencies. The EPA's responsibilities include defining post-closure requirements for sites within the scope of the two main federal hazardous and solid waste laws. These are:

- 1) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, or "Superfund" (42 USC 9601, *et seq.*), and
- 2) Resource Conservation and Recovery Act (RCRA) of 1976 as amended, (42USC 6901, *et seq.*)

Through the programs established through these laws, EPA's responsibility encompasses tens of thousands of sites nationwide.

The DOD's cleanup programs alone cover more than 10,000 sites through the Defense Environmental Restoration Program (DERP). The DOI has responsibility for more than 13,000 inactive or abandoned mining sites on lands administered by the Bureau of Land Management (BLM) and National Park Service (NPS). The NRC has responsibility for some of the largest radioactive waste sites on the planet, the uranium mill tailings piles leftover from the production of uranium oxide – "yellowcake" - for nuclear weapons and nuclear power applications. Many of the uranium mill tailings remediation projects that the NRC has issued licenses for are sites under the jurisdiction of DOE (DOE, 1999, p. 18 – 22).

II.D. Need for Long-Term Stewardship

Demonstration of effective long-term stewardship (LTS) across the DOE nuclear weapons complex is a current national policy concern and is likely to dominate the agency's responsibilities for decades to come. From Cleanup to Stewardship (DOE, 1999), states that active stewardship will be necessary at more than 70% of DOE sites by the year 2050 when DOE has projected that all clean-up activities currently identified will be complete. Active stewardship was already in place at approximately 25% of the DOE sites by 1998. The recognition that most DOE sites will require active LTS is demonstrated by a projection of rapid growth in the number of active stewardship sites. DOE projected that 50% of its nuclear legacy sites will be engaged in active stewardship by the year 2006 (DOE, 1999, p. 40) even before the accelerated cleanup approach associated with the "Top-to-Bottom Review" (DOE, 2002) was announced. These projections mean that in 2050, 103 of the total of 144 DOE nuclear legacy sites identified in 1999 will require active stewardship, six sites will require passive stewardship and only 35 sites, or 25%, will not require active stewardship activities.

Surprisingly, DOE's projection shows that the number of sites where cleanup has been complete enough so that no active stewardship will be needed will remain relatively constant between 1998 and 2050, when all cleanup activities are to have been completed. These projections demonstrate that LTS will play an increasing significant role for the foreseeable future at the vast majority of DOE waste sites.

Acknowledging the close relationship between future land uses, clean up methods and LTS, From Cleanup to Stewardship considered the current lack of information in these areas to be an important focus for future research and public policy dialogue. Though DOE found that LTS activities will be required at most of its sites, it was unable to determine the overall cost of LTS needed in 1999, due to the uncertainty associated with site-specific future land use policy and the evolution of waste management technology (DOE, 1999, p. 53). Future land use considerations include establishing policy about site access following cleanup such as whether a site will be released to unrestricted use, remain public land with restricted use, remain public land but be closed to entry, or restricted in some other manner.

In summary, From Cleanup to Stewardship shows that only a quarter of DOE waste sites, 35 sites out of total of 144, are projected to achieve complete cleanup without associated LTS. Complete cleanup in this context is likely to require removal of all radioactive and hazardous constituents as necessary to attain release from RCRA-type LTS responsibility after closure. Comprehensive removal, or a technology capable to ensuring encapsulation of all constituents of concern on site, is a precondition for DOE to manage a site without active LTS measures such as land use restrictions or periodic maintenance, monitoring and repair of containment systems. This relationship is the core of the problem at the Sandia MWL. If comprehensive removal of the hazardous and radioactive waste is not proposed at the MWL, active LTS becomes the primary focus of both regulatory and public concern.

II.E. DOE's Approach to Long-Term Stewardship in 2002

In February 2002, the George W. Bush Administration's DOE provided a wide-ranging policy statement designed to improve its environmental management program, including LTS aspects of that program. This document, A Review of the Environmental Management (EM) Program Presented to the Assistant Secretary for Environmental Management by the Top-to-Bottom Review Team, ("Top-to-Bottom Review", DOE, 2002) declares the primary LTS issue facing the Department is building the capacity to:

“[P]lan adequately for a long-term stewardship program at sites where cleanup has been completed to ensure protection of public health and the environment” (DOE, 2002, p. V-14 – V-15).

The DOE is faced with this problem at many sites around the country. The Top-to-Bottom Review (TTBR) advocates for a more effective approach to LTS as a result of the determination that as DOE “completes cleanup at sites for which it is responsible, certain limitations will preclude remediation to pre-existing or residential standards.” The phrase “pre-existing or residential standards” appears to be used to represent cleanup to a degree of completeness that no LTS programs are necessary, similar to the condition of a RCRA site where all hazardous constituents are removed or encapsulated.

DOE, 2002, identifies the major barriers to total and complete cleanup on a site-by-site basis as: technical limitations, economic limitations, worker health and safety issues, and ecological damage. The combination of scientific, engineering and policy challenges prevents DOE from projecting that it can complete “removal-type” cleanup at all waste sites, or even most waste sites. These obstacles remain insurmountable after more than a decade of major policy on accelerating innovation by the Department, other agencies and different interests in the public to encourage innovative and cost effective environmental remedies.

DOE also recognizes that LTS is necessary as part of its responsibilities under state or federal regulatory controls. DOE, 2002, states that “agreed-upon cleanup strategies and standards that protect health and the environment often result in some residual contamination remaining in the environment which requires some degree of long-term stewardship.” The TTBR demonstrates that DOE is faced with a need to invest in LTS in perpetuity since it will be required at all landfills and other engineered disposal facilities where hazardous or radioactive wastes remain on-site.

Referring to DOE's legal responsibilities to establish LTS programs, TTBR identifies the complexity and uncertainty inherent in maintaining waste site activities that comply with enforceable permits. DOE, 2002, states that:

“[F]or the most part, under CERCLA and RCRA authorities, these laws and their implementing regulations do not prescribe a process for post-closure/remedial operation,

maintenance, and monitoring (i.e. long-term stewardship). In addition, each site is characterized by unique circumstances, such as selected remedies, end states, and future land uses that can influence long-term planning. As a result there is no single cohesive set of guidelines for LTS.”

These statements support a conclusion that the combination of: 1) a lack of a strict “prescription” for LTS programs in existing legislation and regulations; and 2) the unique attributes of each site, means LTS programs will have to be very site-specific and will vary widely across the nation.

DOE has commissioned detailed studies of LTS in recent years, leading to the publication of a large body of literature, such as:

- National Academy of Sciences, “Long-Term Institutional Management of the U.S. Department of Energy Legacy Waste Sites,” (NAS, 2001) at www.nap.edu/openbook/030907181X/R1.html; and
- USDOE Office of Environmental Management, “A Report to Congress on Long-Term Stewardship: Volume I – Summary Report and Volume II- Site Summaries”, January 2001 (DOE, 2001) at <http://lts.apps.em.doe.gov/center/ndaareport.html>; among others.

The process of LTS research and development is not over by any means, however. The TTBR recognizes that in 2002, DOE still suffers from both the “lack of a program strategy,” and the lack of “a prescribed long-term stewardship process, [a condition] ... resulting in uncertainty in the Environmental Management (EM) program and plans that are excessive and other than risk-based.” The TTBR indicated:

- 1) A clear lack of support for the range of LTS programs that have emerged to address these concerns within DOE in recent years;
- 2) A variety of problems with recent agency practices; and
- 3) Past experience provides few positive models of effective long-term management to emulate.

Searching for a viable model applicable to LTS, DOE identifies the post-closure program created under the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978. This recommendation is based on TTBR assertion that “mill tailings program’s monitoring and surveillance [are] being performed under NRC license at 26 Title I sites for \$5 million annually.” UMTRCA Title I sites are uranium mill tailings sites which produced uranium primarily for nuclear weapons-related uses that operated prior to 1970.

The TTBR states that DOE needs to establish a LTS strategy and develop policy and guidance that will result in “consistent, predictable, risk-based implementation... in accordance with the goals of RCRA and CERCLA and should be rooted in the programmatic strategy for accelerated

site closure.” Calling “the UMTRCA process ... a model, [and] recognizing that risk should be used as an end-point determinant,” the TTBR recommends that “policy should be formalized that assigns... responsibility [within DOE] for long-term stewardship once cleanup has been completed at DOE-owned sites” (DOE, 2002, p. 15).

In summary, the TTBR identifies an urgent need for effective LTS at DOE waste sites similar to that of the previous Administration outlined in From Cleanup to Stewardship. This need, the basis for a “Call to Action” in the TTBR, will lead to a new round of LTS proposals for DOE sites at which:

- 1) Complete removal of contaminants is not considered technically or economically possible; and
- 2) The restoration of unrestricted land use following closure is not possible due to risk-based concerns.

The set of DOE sites with this combination of attributes includes the MWL as well as all other sites at Sandia National Laboratories that are not projected to be either cleaned up by complete removal of all hazardous and radioactive contaminants or opened to unrestricted land use following closure.

III. Overview of Sandia National Laboratories' Mixed Waste Landfill

A substantial record of documentation has been developed regarding the Mixed Waste Landfill at Sandia National Laboratories resulting from investigations by DOE and SNL staff and contractors as well as investigations resulting from the application of regulatory authority at Sandia by New Mexico Environment Department (NMED). The NMED regulates the site through authority established by the New Mexico Hazardous Waste Act which authorizes New Mexico to adopt and implement regulations equivalent to but no more stringent than EPA's RCRA program. While NMED has asserted regulatory authority regarding mixed waste through this program, NMED and DOE do not agree fully on the relationship between the state's authority over mixed waste and DOE authority regarding jurisdiction over radioactive wastes that does not contain non-radioactive hazardous constituents. The NMED maintains a DOE Oversight Division within its Hazardous and Radioactive Waste Bureau with responsibility for sites at DOE facilities in the state, including Sandia's MWL.

Key aspects of the MWL are summarized in a NMED "Fact Sheet" (NMED, 2001a). The Mixed Waste Landfill is composed of unlined, waste-filled pits and trenches inside perimeter fencing on a gently sloping mesa 6 – 7 miles east of the Rio Grande southeast side of downtown Albuquerque, New Mexico. The MWL is located in Tech Area III of Sandia National Laboratories' Albuquerque, NM, complex. This complex is operated by Sandia Corporation, a unit of Lockheed-Martin Corp, for the Department of Energy's Albuquerque Operations Office within the boundaries of Kirtland Air Force Base, where both Sandia National Laboratories and DOE's Albuquerque Operations Office are tenants. Hazardous waste on the DOD-operated portion of Kirtland Air Force Base is regulated through a separate NMED permit from the permit issued to SNL, Kirtland's largest tenant.

The Mixed Waste Landfill received waste between 1959 and 1988 that was disposed in roughly 50 unlined pits and trenches dug 15 – 25 feet into the soil across a 2.6-acre area, a 0.6-acre portion of which was operated as a "classified waste landfill." Based on data available to NMED in 2001, the MWL contains approximately 100,000 cubic feet of radioactive and hazardous waste estimated to have contained more than 6300 curies of radioactivity at the time of disposal. Hazardous constituents at the MWL include organic chemicals such as trichloroethylene (TCE) and carbon tetrachloride; heavy metals such as lead and cadmium; more than 40 radioactive constituents that include tritium, cobalt-60, strontium-90, iodine-129, and cesium-137, as well as depleted uranium and plutonium. SNL presented its summary of MWL waste characteristics as a part of its RCRA-related documentation; however, recently available information disclosed in response to a Freedom of Information Act request by *Citizen Action* shows substantially more uncertainty about wastes buried at the MWL than acknowledged by DOE and SNL. An independent review of SNL's risk assessment for the MWL by Dr. Marvin Resnikoff commissioned by *Citizen Action* also determined that the wastes at the MWL have not been fully or accurately characterized (Resnikoff, 2001). See the websites mentioned at the end of this section for more information about the MWL.

The depth to groundwater at the site is 460 feet. The water resource encountered at that depth is the upper surface of an Albuquerque Basin regional aquifer that supplies drinking water to more than 500,000 people in the Middle Rio Grande Valley. NMED, 2001a, indicates that no contamination of groundwater resulting from the MWL has been detected.

The NMED reports that some vadose zone contamination has been detected at the site above the aquifer. The vadose zone is the portion of the subsurface of the earth found between the land surface and an aquifer where water may exist in unsaturated conditions. Vadose zone contamination detected as of January 2001 includes:

- 1) “low levels of tritium... the higher tritium levels have been measured in samples from the Classified Area (maximum soil sample 1100 pCi/g [picoCuries per gram]; maximum subsurface soil sample 206.7 pCi/g)” and
- 2) “low levels of cadmium ... in the vadose zone ... along the west side of the Unclassified Area (highest level 2 mg/kg).”

Regarding these contaminants, NMED stated that “the low levels of tritium and cadmium contamination detected in the vadose zone do not pose a significant threat to human health and the environment.”

Cleanup, or more formally “Corrective Action,” activities at the MWL are regulated by the NMED pursuant to the New Mexico Hazardous Waste Regulations that incorporate the Hazardous and Solid Waste Amendments (HSWA) to RCRA. These HSWA amendments address waste disposal facilities in operation prior to issuance of RCRA permits for those sites, such as the Sandia MWL. The NMED permit for Sandia National Laboratories is permit HWB-SNL-01-025 -- EPA ID NO. NM 58990110518. It identifies DOE as “facility owner” and Sandia Corporation as “facility operator.” The New Mexico Hazardous Waste Regulations that govern the permitting process incorporate EPA’s RCRA regulations word-for-word in almost all instances as they reflect a statutory limitation on New Mexico’s hazardous waste program to authority “equal to but no more stringent than” EPA’s RCRA program.

As of January 2001, DOE/SNL’s proposed cleanup plan for the MWL was described by the NMED as an “interim measure” (rather than a final cleanup plan) that would provide for “a 3-ft thick monolithic soil cover and [the] monitoring of ground water and the vadose zone for any potential contaminant migration.”

Significantly, from a LTS perspective, NMED asserted that:

“[S]hould a cover be approved the NMED would require evaluation of the effectiveness of the cover at specified time intervals. Should monitoring reveal a significant problem, other remedial alternatives, including excavation and removal of the landfill contents would be considered” (NMED, 2001a).

The NMED indicates that the RCRA permit for Sandia requires closure and post-closure plans that provide for:

- “evaluation of the effectiveness of the cover at specified time intervals,
- monitoring, and
- should monitoring reveal a significant problem, other remedial measures, including excavation and removal of the landfill contents” (NMED, 2001a).

Were the MWL permitted under regulations applicable to a private facility due to its operation by privately-owned Sandia Corporation, the activities referred to above would be both: 1) specified in closure and post-closure plans; and 2) guaranteed through a financial assurance mechanism acceptable to NMED.

On October 11, 2001, the NMED issued a letter requiring the Sandia permittees immediately to begin a Corrective Measures Study (CMS) to comply with the requirements of the Hazardous and Solid Waste Act of 1980 (HSWA) portion of RCRA, specifically Permit Module IV, Sections N, O, P, Q, and S (NMED, 2001b). The NMED letter ordered that the CMS Final Report provide:

“[T]he results of each remedy studied and a proposed corrective action program that will attain compliance with the corrective action objectives, control sources, meet acceptable waste management requirements, ... protect human health and the environment” and “recommend any interim measures that are necessary to protect human health and the environment” (NMED, 2001b, p. 2).

The MWL has been the focus of considerable public involvement, including two public meetings hosted by the NMED in January, 2001, attended by more than 150 people at each meeting, in addition to many other public meetings and outreach activities by members of *Citizen Action*. This extensive pattern of public interest was acknowledged by NMED as a part of the basis for the issuance of the CMS requirement in October, 2001.

In summary then, unless DOE/SNL radically changes their proposed cleanup plan at the MWL, the CMS will evaluate the implementation of its currently preferred alternative. That plan proposes covering the MWL with “a 3-ft thick monolithic soil cover” and monitoring the surface and subsurface at and around it for hazardous and radioactive contaminants. The DOE’s currently proposed clean up plan for the MWL would leave all radioactive and hazardous constituents at the site. Therefore, closure and post-closure plans that provide: 1) long-term monitoring; 2) repair and maintenance of the cover and the monitoring systems; and 3) the capacity to consider and implement excavation of the wastes, are all likely to be required by NMED at the MWL. All three concerns are necessary to establish an effective set of LTS procedures for the MWL.

Substantially more detail is currently available regarding the condition, content, and management of the MWL. Sources on the Web include:

- Sandia’s MWL website: <http://www.sandia.gov/ltscenter/mwl.html> and
- *Citizen Action*’s website at: <http://www.radfreeenm.org>.

IV.A. Options for Guaranteeing Long-Term Stewardship at Federal RCRA sites

DOE has utilized the RCRA exception at 40 CFR 2640.140(c) to avoid providing financial assurance for its closure and post-closure plans at many sites, including the Sandia MWL. That policy raises questions about trust and confidence in DOE among the range of interests in society that are affected by waste-related decisions. A fundamental concern in this regard is whether DOE's long-term stewardship policy is perceived of as either credible or reliable without supporting long-term financial assurance guarantees.

At private RCRA sites detailed closure and post-closure plans underwritten by enforceable financial assurance agreements, often payable to the regulatory agency issuing the permit either state or federal, guarantee that those plans will be implemented if responsible parties are unable to complete the job. Where RCRA sites are considered "State and Federal Government" sites they have generally been exempt from the same financial assurance requirement. While this exemption exists, DOE, DOD and other federal agencies have not been routinely required to meet the financial assurance requirements set for private waste sites. Nevertheless, public policy analysts with widely differing viewpoints have observed that the exemption does not resolve or eliminate the need for guaranteed LTS. Indeed, it may heighten the need for states and the federal government to demonstrate guaranteed financial commitments to LTS activities.

Among other efforts, DOE has convened seminars and workshops to support development of LTS at which opinion leaders and experts have provided their analysis of the challenges facing the DOE related to demonstrating credible, LTS at waste sites where wastes are left in the ground. The papers presented at several of these seminars are available on line including:

- "DOE's Long-Term Stewardship Workshop," July 2001 at : <http://www.gjo.doe.gov/program/lstm/general/events/index.html> ; and
- The "Resources for the Future Workshop on Long-Term Stewardship at Contaminated Sites: Innovative Funding and Oversight," December, 2000 at: http://www.rff.org/nuclearcleanup/Conf_Lect/rff_presentations.htm.

IV.B. The Trust Fund as a Model for Guaranteeing Federal Long-Term Stewardship Commitments

A Trust Fund is a financial management instrument that provides a lawful way for funds to be set aside in a secure account or institution for a specific set of purposes. Trust Funds are financial management strategies authorized by a range of state and federal statutes that address long-term responsibility at waste sites. As a result, Trust Funds have been a focus of numerous investigations related to DOE exploration of solutions to its dilemma related to guaranteeing LTS activities at waste sites. This section provides a summary of Trust Funds, as one of the available options for guaranteeing LTS.

A recent -- post-2000 election, but pre-September 11, 2001 -- overview of the trust fund option was presented by Anthony J. Thompson, Esq. at a “Long-Term Stewardship Workshop” on July 31, 2001 (Thompson 2001). Mr. Thompson’s law firm has represented Nuclear Regulatory Commission licensees with long-term safety concerns such as in-situ mine uranium mine operators, addressed “Trusts and Long Term Stewardship (LTS) at Decommissioned Nuclear Facilities.”

Thompson’s basic “premise is [that] financial assurance is a critical component of successful LTS oversight...” because the cost of treatment technology for complete clean up is very high and rising rapidly at many sites. He asserts that “reality sets in [as the] questionable effectiveness of treatment often collides with extremely high costs of treatment (i. e., pump and treat) [and] highly contaminated sites (i. e., complex contaminant profiles, large volumes, groundwater problems) can demand consideration of other options” (Thompson 2001).

These conditions lead to considerations of “in situ remediation with or without some treatment, with or without some removal in conjunction with: engineered barriers, site use restrictions, informational devices, [including] combinations thereof (i. e., layering) and, LTS (long-term stewardship).” Thompson states that “questions about [the] continuing viability of LTS [include]:

- 1) Appropriate Entities (e. g. Corporations versus Governmental Entities) [to provide LTS];
- 2) Long Time Frames (e. g. 1,000 years) [are needed at many sites with LTS needs]; and
- 3) Fundamental Purposes Differ [in site-specific conditions].”

Noting that “governmental entities [are] preferred [as Trustees in many cases], major questions arise regarding financial assurance for governmental entities [including] “Long Time Frames (i. e., sustainability); [and] Political and Legislative Obstacles (i. e., appropriations).”

The basis for the political and legislative obstacles at the federal level is that “governmental entities generally must have funding authorized and appropriated” by Congress. For the Federal Government, guiding authorities include:

- 1) Anti- Deficiency Act (31 USC 1341) [that] “Prevents Any Federal Agency From Spending Money In Excess Of Funds Appropriated By Congress;” [and]

- 2) U. S. Constitution: Article I, Section 9, Clause 3 [that] States: “No Money Shall Be Drawn From The Treasury, But In Consequence Of Appropriations Made By Law.”

Because Congress is unlikely to change these bases for its funding of Federal Government operations which is at the core of its key political role as the authorizer and appropriator of federal funds, the financial mechanism of a “Trust” has been identified as a possible alternative solution.

Thompson states that a Trust is a “legal instrument which conveys property to use and manage for the benefit of the beneficiary. [The] trustee has [the] responsibility to manage trust assets for purposes of trust. Trust purposes must be legal but there is much flexibility in trust construction. [A] Trustee [is] held to highest legal standards to manage trust assets [and the] potential fiduciary liability for mismanagement by [a] Trustee provides [a] strong check on irresponsible actions.”

Thompson asserts that Trusts may be a viable method for providing “LTS that is financially sustainable and properly accountable so that in situ [decommissioning and disposal/ remediation (including site use restrictions) [can be] a viable option.”

He lists the beneficial attributes of Trusts as including the recognition that: “Trusts are flexible and there are strong legal bases for assuring that Trust purposes are fulfilled by [a] Trustee [as they:] can hold assets for [the] long time frames involved; can earmark funds for Trust (i. e., LTS) purposes; can avoid ... [the] appropriation process; [and] substitute ... substantial legal certainty for potential political uncertainty.”

Thompson’s primary model for a Trust Fund is the system established to support long-term monitoring and maintenance at uranium mill tailings sites following closure as provided for by the US Nuclear Regulatory Commission (NRC). This is the same model that is identified in DOE EM’s “Top-to-Bottom Review.”

Thompson describes the NRC’s uranium mill tailings Trust Fund approach, established under authority of the Uranium Mill Tailings Radiation Control Act (MTRCA) of 1978, briefly. NRC has established regulations which require “[l]icensees at NRC approved sites fund annual surveillance and maintenance if necessary through Financial Assurance Mechanisms such as bonds, letter of credit and other allowable surety instruments” (10 CFR 20 Appendix A, Criterion 9). These surety instruments provide funding for both post closure surveillance and passive maintenance and “additional [funds]... for active maintenance” is required of licensees through the funding trusts to provide long-term activities through a NRC UMTRCA regulation at 10 CFR 20 Appendix A, Criterion 10.

The UMTRCA trust model is the only specific example provided by Thompson, however, and it would not be directly applicable to the Sandia Mixed Waste Landfill without modification. Among the notable differences are:

- 1) The wastes at the MWL do not fit the criteria for wastes covered by UMTRCA authority; and
- 2) Neither NRC nor any other federal agency is readily identifiable as Trustee for a Mixed Waste Landfill Trust Fund, other than DOE itself.

An important option for consideration at the Sandia MWL would be for the State of New Mexico to serve as the Trustee. The NMED serves as the designated recipient of funds from financial assurance instruments, a role very similar to that of a “Trustee” for a trust fund, at many sites pursuant to a variety of New Mexico statutes including the New Mexico Hazardous Waste Act, the New Mexico Solid Waste Act, the New Mexico Mining Act and the New Mexico Water Quality Act.

In summary, the UMTRCA model identified by both DOE in the “Top-to-Bottom-Review” and by Thompson provides a useful option for New Mexico and DOE to consider funding for a LTS financial assurance mechanism for the MWL. In the UMTRCA model as well as financial assurance instruments approved under New Mexico statutes for mining operations, groundwater discharge permittees, solid waste facility owners and hazardous waste facilities owners, the permittee is responsible for endowing the Trust Fund for which the NRC is the Trustee. In the late 1970s and early 1980s, New Mexico required “continued care funds” to endow post-closure activities at uranium mill tailings site around the state under regulations adopted by the Environmental Improvement Board, the same board which has adopted the New Mexico Hazardous Waste Regulations.

Since the facility operator retains significant responsibility under RCRA as a permittee, the operator of Sandia National Laboratories, Lockheed-Martin Corp., rather than the federal government, may be an appropriate party to establish a Trust Fund for any post-closure activities required at the MWL. Because uranium mill tailings contain a mix of hazardous and radioactive constituents with known health risks if poorly controlled, the UMTRCA trust fund model addresses activities very similar to those found in closure and post-closure plans guaranteed by RCRA-type financial assurance mechanisms. As Trust Funds can be financed by interest earned on an endowment or funds held as principal, they can be initiated by appropriations that may not require periodic reallocations of federal funds if the Trust Fund cost does not exceed projected maximum levels.

IV.C. Financial Assurance Through a State-Administered Trust Fund: Mixed Waste Landfill at Oak Ridge Reservation, Tennessee

The Trust Fund model has been applied in at least one case for a DOE facility other than a uranium mill tailings pile, though that example is not identified as a model in the TTBR or by Thompson and his fellow presenters at the 2001 “Long-Term Stewardship Workshop.” A trust fund has been established through agreements between DOE and the State of Tennessee for financial assurance for closure and post-closure activities at a mixed waste landfill at the Oak Ridge Reservation. This trust fund was established in 1999, when DOE, as part of its clean-up responsibilities at the “Y-12” plant at Oak Ridge, agreed to pay \$14 million to the State of Tennessee during a 14-year period to endow post-closure activities at a mixed waste landfill. The state is authorized to use the interest earned on the money placed in the trust fund for closure and post-closure activities. The principal placed in the fund therefore provides a permanent endowment to conduct post-closure monitoring and maintenance at the mixed waste landfill, projected to contain 43 million pounds of waste (Oak Ridger, 1999).

A leading nuclear weapons research laboratory during the Cold War Era, DOE’s 37,000 acre Oak Ridge Reservation (ORR) includes three major facilities at what is now called “East Tennessee Technology Park”- the K-25 Gaseous Diffusion Uranium Enrichment Plant; Oak Ridge National Laboratory, and the Y-12 Plant. Listed in the EPA’s National Priorities List under CERCLA (“Superfund”) in 1989, ORR is subject to a “Federal Facility Agreement (FFA) for the Oak Ridge Reservation” signed by DOE, EPA and Tennessee Department of Environment and Conservation (TDEC) in 1992. A mixed waste landfill at ORR is designated as the final repository for a portion of the hazardous and radioactive waste resulting from CERCLA activities. This Oak Ridge Mixed Waste Landfill has been permitted through a RCRA-type regulatory system implemented by the State of Tennessee creating a number of parallels to the Sandia Mixed Waste Landfill.

Pursuant to the FFA, a “Proposed Plan for the Disposal of Oak Ridge Reservation CERCLA [Waste]” ((DOE/OR/02-1652&D3) was drafted and distributed for public comment in January 1999. The selected plan submitted to TDEC was provided in a “Record of Decision for the Disposal of ORR CERCLA Waste, Oak Ridge Tennessee” (ROD, 1999). The remedy selected includes “the construction and operation of an engineered, above grade, earthen disposal cell and supporting facilities” within ORR to dispose of “contaminated media and radioactive and hazardous mixed wastes.” Though the remedy is established under the authority of CERCLA, the substances to be disposed of include hazardous waste as defined by Tennessee State law (TCA Section 68-212-101 *et Seq.*). The remedy includes closure of the disposal cell with a “RCRA-compliant cap” and “post-closure surveillance and maintenance, institutional controls and media monitoring that will continue indefinitely” (Commissioner’s Order, 1999).

The Oak Ridge on-site disposal cell was designed to be “RCRA-compliant” and include the closure and post-closure plans required by the state-implemented hazardous waste program in order to attain RCRA standards. This framework is very similar to the situation at the Sandia Mixed Waste Landfill. A potential significant difference between the two landfills may be that the Oak Ridge MWL has been permitted as a fully engineered disposal cell while the Sandia

MWL design involves only capping of the disposal area, not placement of wastes in a fully lined engineered disposal unit.

The closure and post-closure requirements of the permit issued by TDEC are addressed through orders establishing a Trust Fund as the mechanism to finance anticipated maintenance and repair efforts on a permanent basis. This trust fund for the Oak Ridge mixed waste disposal cell is established through:

- 1) A Consent Order, signed by the Chairman of the Tennessee Solid Waste Control Board, including a Notice of Waiver of Rights to Appeal signed on behalf of DOE; (Consent Order, 1999) and
- 2) A Commissioner's Order, signed by the Commissioner of the Tennessee Department of Environment and Conservation (Commissioner's Order, 1999).

The Consent Order provides the framework for implementation of the fund, and states:

“In settlement of the current controversy, DOE shall pay TDEC the sum of Fourteen million dollars. This sum shall be payable in fourteen (14) installments, with each installment to be paid before September 30 of each year, with the first installment due by September 30, 2000 and the last installment due by September 30, 2013.”

The Consent Order provides that the DOE Group Leader, ORR Remediation Management Group and the TDEC Director of the DOE Oversight Division may modify the schedule and amounts of the installments required by that paragraph by written agreement. The TDEC's responsibility to manage the fund in keeping with its stated purpose is clearly defined. The TDEC is required to deposit payments in a state “pooled investment fund” according to investment and policy guidelines established by state law and use a site specific “Fund Implementation Plan” to guide allocations.

In the Consent Order, the policy positions of both the State of Tennessee and DOE are stated. The DOE position reflects its perceived inability to take responsibility for allocation of funds not authorized by appropriations from Congress as such an allocation is unlawful. The Order states:

“DOE's position [is] that any requirement for the payment or obligation of funds by DOE ...in ... this Consent Order including the Fund Implementation Plan is subject to the availability of appropriated funds and that no provision of the Consent Order, including the Fund Implementation Plan, should be interpreted to require the obligation or payment of funds in violation of the Anti-Deficiency Act at 31 USC 1341, as amended.”

In contrast, TDEC [Tennessee]'s position is that the federal Anti-Deficiency Act does not apply to any obligations set forth in the Consent Order or the Fund Implementation Plan.

In the event appropriated funds are not available to fulfill DOE obligations under the Consent Order and the Fund Implementation Plan, DOE agreed to meet promptly with TDEC

representatives to discuss whether the parties can reach an accommodation on adjustments to requirements involving scheduled payments and required activities at the site. The Consent Order also states that:

“if no agreement can be reached, then TDEC and DOE agree that, in an action by the TDEC to enforce any provision of this Consent Order, including the Fund Implementation Plan, the DOE may raise as a defense that its failure or delay was caused by the unavailability of appropriated funds.”

The Consent Order states that TDEC disagrees that the lack of appropriations or funding is a valid defense for DOE. However, it concludes that TDEC and DOE agree and stipulate that it is premature at this time to raise and adjudicate the existence of such defense. In addition to the Fund Implementation Plan, attachments to the Consent Order include a “Notice and Waiver of Rights to Appeal” that concludes: “DOE understands the aforementioned rights and knowingly and voluntarily waives these rights as to this Consent Order.”

The Commissioner’s Order provides the legal and regulatory basis for the Consent Order. It states that, according to Tennessee statute TCA Section 68-212-108c(2), “the Commissioner has the authority to require the payment of sums to a statutorily created fund called the “Perpetual Care Trust Fund.” Such a fund is authorized by statute if the Commissioner determines that there is a reasonable probability that a site:

“[W]ill eventually cease to operate while containing, storing, or otherwise treating hazardous waste on the premises which will require continuing and perpetual care or surveillance over the site to protect the public health, safety or welfare.”

Specifically in relation to the requirement to pay specific sums of money into that Trust Fund, the statute requires that the Commissioner:

“[S]hall give due consideration to the nature of the hazardous waste material, the size and type of facility or site to be decommissioned, and the anticipated expense of perpetual care and surveillance.”

Pursuant to state law and “after proper consideration of ROD-1999,” the Commissioner determined:

“[T]hat there is a reasonable probability that DOE-ORR will eventually cease to operate while containing, storing, or otherwise treating hazardous waste on the premises which will require continuing perpetual care or surveillance over the site to protect the public health, safety and welfare” (Commissioner’s Order, 1999).

After considering the nature of the hazardous waste material resulting from the remediation under CERCLA of the DOE-ORR site, the size and type of the DOE-ORR site to be

decommissioned, and the anticipated expense of perpetual care and surveillance, the Commissioner ordered that:

- 1) “The Respondent [DOE] shall provide the sum of ONE MILLION DOLLARS (\$1,000,000.00) per year for the next fourteen (14) consecutive years;
- 2) The Respondent shall make the first payment of \$1,000,000.00 within NINETY (90) DAYS of the receipt of this ORDER;
- 3) The payments shall be paid into the Perpetual Care Trust Fund established for the DOE-ORR facility by the State of Tennessee within NINETY (90) DAYS of approval of ROD-1999; and
- 4) Subsequent annual payments shall be due in the consecutive years of the same date (month and day) as the initial payment.”

The Order requires that the DOE-ORR Perpetual Care Trust Fund be maintained in the Treasury of the State of Tennessee. Both the principal and interest will be retained in the Fund provided that “the interest generated by the investments may be spent in the perpetual care and surveillance of the DOE-ORR site” (Commissioner’s Order, 1999).

As is the case with the Sandia MWL and other sites discussed in this report, the relevant technical and legal documentation is vastly larger than that identified in this summary of the Trust Fund developed for the Oak Ridge MWL. Based on the documents summarized, however, the Oak Ridge example is a strong candidate as a model for NMED establishment of Trust Funds for waste repositories associated with operation at facilities owned by the Department of Energy.

In summary, the DOE has agreed to the establishment of a perpetual care trust fund to endow closure and post-closure activities for the Oak Ridge Mixed Waste Landfill. That fund is held by the State of Tennessee specifically and solely for closure and post-closure activities at the Oak Ridge MWL. While DOE registered its concern that funds for disbursement to the trust fund may not be appropriated by Congress in the future, the DOE agreed to defer any appeal of matters related to the fund and allowed the fund to be established. As a result, the DOE has consented to the establishment of the trust fund through a sequence of periodic appropriations and Tennessee has agreed that if the appropriations are not provided, DOE has the option of seeking legal or administrative remedies. The mechanism established for the Oak Ridge MWL is directly applicable to the Sandia MWL, though the basis for the trust fund would be as defined under New Mexico state law. As mentioned above, the State of New Mexico has an extensive record of responsibly maintaining financial assurance for closure and post-closure activities at many waste sites under existing state authority.

A collaborative relationship with states, like that demonstrated in the Consent Order signed by both the DOE and the State of Tennessee establishing the trust fund for the Oak Ridge MWL, is fundamental to the DOE’s commitment to guaranteeing LTS programs at sites in other states. No information has been identified to date regarding the active consideration of this model for the Sandia MWL, or other DOE sites regulated by the New Mexico Environment Department.

IV.D. Long-Term Stewardship through Financial Guarantees by Private Operators of Federal Facilities

When a federally-owned facility is operated by a private party, that private entity rather than the federal government may be a reasonable and appropriate institution to establish financial assurance guarantees associated with RCRA-based closure and post-closure requirements at the site they operate. This conceptual approach served as the basis for a financial assurance requirement proposed for the hazardous waste permit issued by NMED covering operations at the Waste Isolation Pilot Plant (WIPP) in southeastern New Mexico.

In the WIPP permit, DOE is designated as owner and operator, and Westinghouse Corporation's Waste Isolation Division (WID) is designated as co-operator. A financial assurance requirement was provided by NMED in the permit on the basis of its determination that an enforceable guarantee was necessary to insure that the closure and post-closure portions of RCRA permit for WIPP would be met (NMED, 1999a and NMED, 1999b). When the financial assurance requirements for Westinghouse's WID unit were established in provisions of a hazardous waste permit issued by NMED, DOE filed a lawsuit to appeal those specific portions of the permit (USA, 1999). Prior to a decision in that legal matter, federal legislation was enacted that prohibited the specific approach to financial responsibility established by the State from being applied at WIPP. This process is summarized briefly below.

In 1999, following a public comment period and a lengthy public hearing, NMED issued Permit NM 4890139088 for regulated activities at WIPP which included Financial Assurance requirements (in Permit Modules II.N, II.O, II.P, and II.Q). Module II.N.1, for example, required that, "WID shall implement financial assurance in the amount of the most recent closure and post-closure cost estimates prepared in accordance with [applicable New Mexico regulations] 20 NMAC 4.1.500 incorporating 40CFR264.142 and 264.144." Recognizing the RCRA exemption of "states and the federal government from the requirement of providing financial assurance" in state and federal regulations, at 20 NMAC 4.1.500 and 40 CFR 264.140 (c) respectively, New Mexico cited several reasons for its inclusion of financial assurance requirements in the WIPP permit (NMED, 1999a and NMED, 1999b).

The NMED asserted, in its "Proposed Findings of Fact and Conclusions of Law" regarding the proposed WIPP Permit that:

"WID is required to comply with the financial assurance requirements under 20 NMAC 4.1.500 ... for the following reasons: as a private contractor, WID is not exempt from financial assurance requirements; Westinghouse's (owner of WID) history of noncompliance revealed substantial and significant evidence of past environmental violations; and the fact that DOE has relied upon inadequacy of funding as a defense to liability under environmental laws" (NMED, 1999b).

The NMED also asserted, based on the record in the WIPP Permit Hearing, that:

“DOE is not obligated to enter into an agreement to reimburse WID...[for closure and post-closure care financial assurance costs]. The fact that WID and DOE have an agreement that DOE will compensate WID for the cost of compliance in no way exempts WID from the regulation’s requirement of providing financial assurance... [g]iven the substantial problems that states have had in obtaining funding from DOE for closure costs at existing federal facilities, NMED has little confidence that DOE will adequately fund clean-up obligations for proposed closure of WIPP” (NMED, 1999b).

Upon issuance of the WIPP RCRA permit by New Mexico that included financial assurance requirements of co-operator WID, DOE promptly filed an appeal in the US District Court, “USA v. State of New Mexico, et. al. In the US District Court for the District of New Mexico CIV No. 99-1280M/RLP” (USA, 1999). In its appeal, DOE asserted that:

“Under its contract with Westinghouse, DOE must reimburse Westinghouse for the costs of providing financial assurances under the Final [RCRA] Permit. These assurances would be in the form of insurance policy, bond, or trust fund that would pay for the closure and monitoring of WIPP when the facility ceases disposal operations, in about 30 to 40 years. The cost of providing such assurances is estimated to be up to \$20 million annually over the next five years. Under federal law, the United States is required to pay for the closure and monitoring of WIPP, and therefore the assurances provided by Westinghouse would only become effective in the very unlikely event that the United States failed to meet its obligation.”

Prior to disposition of the WIPP Permit Appeal, Congress passed and President Clinton signed the “Military Construction Appropriations Act, 2001” (Public Law 106-246, 114 Stat. 511 (2000)). That legislation contains language that specifically prevents the enforcement of financial assurance provisions of the WIPP hazardous waste permit. The Act states, in Section 201:

“Funds appropriated in this or any other Act hereafter may not be used to pay on behalf of the United States or a contractor or subcontractor of the United States for posting a bond or fulfilling any other financial responsibility requirement related to closure or post-closure care and monitoring of the Waste Isolation Pilot Plant. The State of New Mexico or any other entity may not enforce against the United States or a contractor or subcontractor of the United States, in this or any other fiscal year, a requirement to post bond or any other financial responsibility requirement relating to closure or post-closure care and monitoring of the Waste Isolation Pilot Plant. Any financial responsibility requirement in a permit or license for the Waste Isolation Pilot Plant on the date of the enactment of this section may not be enforced against the United States or its contractors or subcontractors at the Plant.”

Without addressing whether this legislation would be enforceable, NMED Secretary Peter Maggiore modified the WIPP permit in response to the legislation’s enactment. The Secretary

informed DOE that as a result of the legislation, "financial assurance requirements set forth in Modules II.N, II.O, II.P, and II.Q [of the WIPP Hazardous Waste permit] may not be enforced, are no longer effective, and are hereby withdrawn." While informing DOE of this position, the Secretary also stated, "[h]owever, this change in the law does not effect or alter DOE's or any of its contractor's responsibility for closure, post-closure care and monitoring of the WIPP pursuant to the terms of the Permit" (NMED, 2000).

In summary, the response of DOE and Congress to the financial assurance approach attempted by New Mexico at WIPP contrasts very sharply with the DOE-State agreements establishing the Oak Ridge Trust Fund. No information has been identified at this time that indicates that a Trust Fund model is being developed for the WIPP facility.

IV. E. Financial Assurance Established By a Federal Facility Contractor's Financial and Performance Guarantee Insurance Policies

The financial assurance approach currently established in the RCRA permit for the Umatilla Chemical Depot near Hermiston in northeastern Oregon provides another working model for financial assurance at a federal waste disposal site involving a private contractor. At that site, chemical weapons are being destroyed and wastes disposed of in conformance with a RCRA-based hazardous waste storage and treatment permit issued by the Oregon Department of Environmental Quality (ODEQ) to the US Army and its contractor, Washington Group International/Washington Demilitarization Company (WGI/WDC). The permit -- ID. NO. ORQ 000 009 431 -- has been issued by ODEQ and the Oregon Environmental Quality Commission (OEQC). The mechanism Oregon is applying to the Umatilla Chemical Depot is also a "RCRA-compliant" approach, reflecting a regulatory environment similar to both the Oak Ridge Mixed Waste Landfill and the Sandia Mixed Waste Landfill.

OEQC is required by law (Oregon R.S. 446.060) to satisfy itself that the contractor retains requisite financial capability in order to remain in compliance with the hazardous waste permit. This requirement has been achieved using a pair of agreements involving the US Army, its contractor, and the Oregon agencies. In one agreement, WGI/WDC provides a "Financial and Performance Guarantee" signed by the Company's Chief Financial Officer wherein WGI "guarantees payment of all debts and the faithful performance of all obligations of Contract to the [O]DEQ and/or the State of Oregon..." (Army 2000, Enclosure 2) In the second agreement, US Army and WGI "enter into an advance Agreement that clarifies the [inclusion] of reasonable, necessary and allowable costs which [WGI] may incur in performance of [its contract with US Army to conduct chemical weapons destruction]." (ODEQ, p. 2)

These guarantees are reflected in several portions of the Umatilla Chemical Depot RCRA Permit. The permit references the required array of insurance policies covered by the "Financial and Performance Guarantee" as a "Liability Requirement" (section 11.M of the permit) rather than as a "Financial Assurance for Facility Closure" (section II.K) mechanism. The "Liability Requirement" states that:

"[T]he Co-Permittee or its parent company, shall maintain and keep current liability policies of comprehensive general liability (CGL), umbrella liability and following form excess liability, architects and engineers professional liability and contractor's pollution policy and following form excess liability, first catastrophic excess liability, and second catastrophic insurance" (ODEQ, 2001, Module II, p. 15).

The Umatilla Depot RCRA Permit, in Module I "Standard Permit Conditions," - Section I.I "Obligations for Corrective Action" requires:

"Owners or operators of Hazardous Waste Management Units must have all necessary permits during the active life (and the closure periods) of the unit, and for any period necessary to comply with the corrective action requirements (see Module VIII) of this Permit. The corrective action obligations required by this Permit will continue regardless of whether the facility continues to operate or ceases operation and closes. The facility is

obligated to complete facility-wide corrective action regardless of the operational status of the facility... [as is the case with all RCRA-based permits].”

In summary, the financial assurance model used in the Umatilla Chemical Depot RCRA permit requires the private contractor conducting work for the federal agency responsible for the site to provide guarantees through the maintenance of a set of conventional insurance policies. The types of insurance policies required to guarantee that closure and post-closure plans will be performed are listed in the waste site permit.

V. Conclusions and Recommendations Related to the Sandia Mixed Waste Landfill and other Sites

Citizen Action commissioned this study to provide information to the organization's membership, the public, DOE, SNL, and the NMED regarding financial assurance options available to guarantee implementation of closure and post-closure plans, were NMED to approve SNL's proposal to cap the MWL with its wastes in place and not require waste removal as the primary long-term remediation method at the site.

The need for DOE to demonstrate that it can assure long-term evaluation of its waste repositories, including all necessary monitoring, maintenance, and repair, has been recognized for many years, and acknowledged in the "Call to Action" for effective LTS in TTBR. The DOE's responsibility for LTS at waste sites that present potential risks to human health and the environment is necessary to the same degree and extent that such a responsibility has been required of private waste site owners and operators for many years (DOE, 1999).

The exemption for "State and Federal Governments" from financial responsibility in RCRA addresses the above concern, but does not extinguish the concern from either a public policy or a long-term waste site operations perspective. Until public policy and site technology issues are resolved, the need for an effective mechanism for demonstrating financial assurance at DOE waste sites will continue unabated.

The public policy attention focused on financial assurance guarantees for the Sandia National Laboratories' Mixed Waste Landfill is only one of many examples of DOE sites where LTS and guaranteed closure and post-closure care are both regulatory and public policy issues. To date, the DOE has relied heavily on the RCRA exemption to avoid identifying or guaranteeing the financial responsibility for the full range of closure and post-closure measures necessary for full clean-up and long-term stewardship at the Sandia MWL.

Were DOE to propose a more comprehensive remedy to cleanup at the Sandia MWL – such as excavation, encapsulation, or placement in an engineered containment cell – the existing concern for financial responsibility to endow closure and post-closure care needs would be significantly reduced. When an excavation and containment proposal remains a potential alternative clean-up remedy, financial assurance requirements are likely to remain very high in order to provide funding to cover a specific worst-case contingency. Such is currently the case at Sandia's Mixed Waste Landfill where the NMED has indicated that "[s]hould monitoring reveal a significant problem, other remedial alternatives, including excavation and removal of the landfill contents would be considered" (NMED, 2001a).

In recognition of the trust fund model provided for closure and post-closure activities at the Oak Ridge MWL, the NMED and DOE should fully evaluate the opportunity to implement a similar approach for the Sandia MWL.

The State of New Mexico should also consider requiring financial assurance at the Sandia MWL using either a DOE-endowed trust fund based on the Oak Ridge example, or corporate liability insurance provided by SNL operator Sandia Corporation, a Lockheed-Martin subsidiary, based on the Umatilla model.

Implementation of this approach appears to be appropriate and lawful at the Sandia MWL as Congress' legislative prohibition in response to the WIPP permit is focussed narrowly on the WIPP as a result of its national significance and/or the high cost of financial assurance instituted by NMED.

Recent DOE policy initiatives such as the "Top-To-Bottom Review" and subsequent policy considerations do not provide a clear path to resolve the LTS dilemma presented by DOE's proposal to cap the Sandia MWL in place. Suggestions that closure and post-closure care for sites be transferred from DOE to other federal agencies, such as the Bureau of Land Management, US Army Corps of Engineers, Fish and Wildlife Service or NRC, fail to address how LTS funding would assured. While that policy approach may eliminate such sites from the DOE list of waste sites, the sites will remain a federal responsibility. Such an approach does little to address either concerns about potential long-term risks associated with the sites or the need for financially guaranteed LTS at nuclear legacy waste sites across the nation.

Due to a requirement issued by the NMED, Sandia National Laboratories is currently conducting a Corrective Measure Study (CMS) related to the MWL (NMED 2001b). The specific direction provided by NMED to Sandia regarding the CMS requires consideration of a full range of the remedies available for the MWL. The CMS provides a framework for consideration of each of the financial assurance mechanisms identified in this report related to LTS needs at the MWL. Therefore, remedies addressed in the CMS should include:

- 1) Full remediation by excavation and containment sufficient to minimize or eliminate long-term stewardship requirements;
- 2) Identification of the full cost of closure and post-closure plans, including periodic evaluation of the effectiveness of the proposed cap, monitoring, maintenance, and repair of the cap on a perpetual basis; and the
- 3) Evaluation of the financial assurance models presented in this report – including: the Oak Ridge MWL Trust Fund, UMTRCA Trust Fund, financial assurance provided by private operator of federal facilities, and the Umatilla Chemical Depot-type contractor insurance-based guarantee – as options to guarantee that the full cost of long-term stewardship at the Sandia MWL will be available to complete all necessary closure and post-closure activities.

VI. References

- Army, 2000 “Umatilla Chemical Agent Disposal Facility (UMCDF) Hazardous Waste Permit (ORQ 000 009 431) – Supplemental Submittal for Class I Modification Request UMKCDF 00-020-MISC(1R)”, From Department of the Army Project Manager for Chemical Stockpile Disposal T. F. Woloszyn to Wayne C. Thomas ODEQ, September 11, 2000, ENV-00-0229, DEQ Item No. 00-1251.
- Commissioner’s Order, 1999 State of Tennessee Department of Environment and Conservation, “Commissioner’s Order in the Matter of Division of Solid Waste Management Docket No. 99-0438, US DOE Respondent, October 29, 1999.
- Consent Order, 1999 State of Tennessee Department of Environment and Conservation, “Consent Order in the Matter of Division of Solid Waste Management Docket No. 99-0438, US DOE Respondent, 1999. On the Web at: <http://lts.apps.em.doe.gov/center/reports/pdf/doc196.pdf>.
- DOE, 1999 USDOE Office of Environmental Management, From Cleanup to Stewardship, DOE/EM-0466, Washington, DC, October 1999. Available from the Environmental Management Information Center, 1-800-736-3282 or www.doe.em.gov/lts.
- DOE, 2001 USDOE Office of Environmental Management, A Report to Congress on Long-Term Stewardship: Volume I – Summary Report and Volume II - Site Summaries, DOE/EM-0563, January, 2001. On the web at: <http://lts.apps.em.doe.gov/center/ndaareport.html>.
- DOE, 2002 USDOE, A Review of the Environmental Management Program Presented to the Assistant Secretary for Environmental Management by the Top-to-Bottom Review Team (“Top-to-Bottom Review”), Germantown, MD, February 4, 2002. On the Web at: <http://www.em.doe.gov/ttbr.html>.
- NAS, 2001 Long-Term Institutional Management of the U.S. Department of Energy Legacy Waste Sites, National Academy of Sciences, Washington, DC, 2001: available c/o: 1-800-624-6242 or on the web at: www.nap.edu/openbook/030907181X/R1.html.

- NM, 1999a “Transcript of Public Hearing in the Matter of the Final Permit Issued to the United States Department of Energy and Westinghouse Electric Company Waste Isolation Division for a Hazardous Waste Act Permit for the Waste Isolation Pilot Plant; USEPA no. NM 4890139088”, Docket no. HRM 98-04(P), p. 2414-2416. See: <http://www.nmenv.state.nm.us/wipp/index.html> for copy of WIPP Hazardous Waste Permit and other materials. See: www.sric.org for other WIPP documents.
- NM, 1999b “Report of the Hearing Officer – Statement of the Case Issue, Findings of Fact, Discussion, Conclusions of Law, Recommended Decision and Proposed Final Order,” in the Matter of the Final Permit Issued to the United States Department of Energy and Westinghouse Electric Company Waste Isolation Division for a Hazardous Waste Act Permit for the Waste Isolation Pilot Plant; USEPA No. NM 4890139088, Docket No. HRM 98-04(P), Santa Fe, NM, 1999.
- NMED, 2000 Letter - NMED Secretary Peter Maggiore to DOE Carlsbad Area Offices Dr. Inez Triay and Westinghouse Waste Isolation Division’s Joel Epstein, Santa Fe, NM, August 9, 2000.
- NMED, 2001a Fact Sheet – US Department of Energy (DOE)/Sandia National Laboratories (SNL) Mixed Waste Landfill (MWL), Santa Fe, NM, January 18, 2001
- NMED, 2001b Letter “RE: Corrective Measures Study, Mixed Waste Landfill, EPA ID NO. NM589011518, Sandia National Laboratories HWB-SNL-01-025” to Michael Zamorski, Area Office Manager, USDOE and Peter Davies, Director, Division 6100, Sandia Corporation, October 11, 2001.
- ODEQ, 2000 Oregon Department of Environmental Quality (ODEQ), “Review Report – Class I Permit Modification Request No. UMCDF-00-02-MISC(R) – Change in Ownership, Insurance, Financial and Performance Guarantees Umatilla Chemical Agent Disposal Facility”, from Ken Chapin, Environmental Engineer to Wayne C. Thomas, Administrator, December 15, 2000, DEQ Item NO. 00-1532(17). Umatilla Chemical Depot regulatory documents may be accessible directly from ODEQ, Hermiston, OR office c/o OLIVER.Sue@deq.state.or.us.
- Oak Ridger, 1999 “Larisa Brass, “State, DOE sign cleanup pact”, The Oak Ridger Online, Oak Ridge, Tennessee, November 2, 1999 at: http://www.oakridger.com/stories/110299/new_1102990023.html
- Resnikoff, 2001 Marvin Resnikoff, Ph. D., “Review of the Risk Screening Assessment for the Mixed Waste Landfill, SWMU 76, ” commissioned by Citizen Action, Albuquerque, NM, 2001. Available at the Citizen Action web site <http://www.radfreenm.org>.

- ROD, 1999 “Record of Decision for the Disposal of ORR CERCLA Waste, Oak Ridge Tennessee,” Document No.DOE/OR/01/1791&D1 DOE, 1999.
- Thompson, 2001 Thompson, Anthony J., “Trusts and Long Term Stewardship (LTS) at Decommissioned Nuclear Facilities,” presented at “DOE Long Term Stewardship Workshop”, July 31, 2001. On the web at: www.gjo.doe.gov/programs/ltsm/general/events/01worksh/LTSMpres/HotTopics/Thompson.pdf. Accessible through DOE Grand Junction Office web site at: www.gjo.doe.gov; Long Term Surveillance and Maintenance Program page at: www.gjo.doe.gov/program/ltsm/index.htm; Long Term Stewardship Workshop page at: www.gjo.doe.gov/program/ltsm/general/events/index.htm includes all presentations at Workshop.
- USA, 1999 “First Amended Complaints in the Matter of USA vs. State of New Mexico, New Mexico Environment Department, et. al.”, US District Court for the District of New Mexico, Civil Docket No. 99-1280M/RLP, December, 1999.
- Werner, 2000 Werner, Jim, Director of Long Term Stewardship, Office of Environmental Management, DOE, “Funding Long Term Stewardship” Presented at “Resources for the Future Workshop on Long Term Stewardship at Contaminated sites: Innovative Funding and Oversight”, December 2000. On the web at: www.rff.org/nuclearcleanup/Conf_Lect/jimwerner.ppt. See: www.rff.org/nuclearcleanup/Conf_Lect/rff_presentations.htm for all presentations at the Workshop.

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EDUCATION

Master of Community and Regional Planning, University of New Mexico, 1992, "with distinction". Professional Project - "Planning for Reclamation of Uranium Waste Sites in Germany". Course work included analysis of natural and modified water systems, including irrigation diversions, watershed analysis, urban flood reduction, and geology.

Graduate Study in Environmental Engineering, Johns Hopkins University, Baltimore, MD, 1974-5. Course work included water pollution chemistry and water resource engineering.

Bachelor of Arts, Technology and Human Affairs Program, Washington University, St. Louis, MO, 1971-4. Course work included classes from anthropology, geology, and ecology programs.

EMPLOYMENT

RESEARCH DIRECTOR - Southwest Research and Information Center, PO Box, 4524, Albuquerque, NM 87106-4524, USA. Coordinate and prepare research reports and technical analyses of mineral, water and other natural resource development projects for non-profit scientific and educational organization and contract clients. With Southwest Research continuously July 1976 - present.

ADJUNCT PROFESSOR - 1980 - 1997, as appointed, University of New Mexico, Albuquerque, NM. Courses taught have included Natural Resource Planning Methods, Introduction to Environmental Problems, Environmental Evaluation of Water Resource Projects and other undergraduate and graduate courses in the Community and Regional Planning Program.

ENVIRONMENTAL ASSESSMENT CONSULTANT - Since 1980, clients have included:

Western Governors' Association, Okanagon Highlands Alliance, Acoma Pueblo, Zuni Legal Services, DNA (Navajo) Legal Services, Albuquerque District Attorney's Office, Centex American Gypsum Company, United Transportation Union, Local 1181 - Gallup (NM), New Mexico Environmental Law Center, Laguna Pueblo, International Physicians for Prevention of Nuclear War-German Chapter, Asociación Interamericana para la Defensa del Medio Ambiente(AIDA), Colorado Center for Environmental Management, Lower Saxony (Germany) Environment Ministry, Nordhaus Law Firm, La Gente del Rio Pecos (Pecos, New Mexico), Great Lakes Natural Resources Center (MI), Office of Navajo and Hopi Indian Relocation, Innu Nation (Labrador, Canada), Northwatch (Ontario, Canada), Center for Science in Public Participation (MT), Water Information Network (NM), Amigos Bravos (NM), Kensington Coalition (AK), City of Yakutat (AK), Baikalwatch/Earth Island Institute (CA), Pacific Environment (CA), United Steelworkers of America Local 890 (Silver City, NM), Americans for Indian Opportunity, Northern New Mexico Legal Services, Natural Resources Defense Council, Twinings (NM) Water and Sanitation District, National Wildlife Federation, Minnesota Interim Legislative Committee on Uranium Exploration, Wisconsin Center for Alternative Mining Development Policy, Montana Environmental Information Center, Save the Jemez, South Dakota FARM, Black Hills Alliance, Piedmont Environmental Council (VA), Atomic Industrial Forum, National Council of State Legislators, Huerfano Valley Citizen's Alliance, Five Sandoval Pueblos, Inc., Steadman and Hector Attorneys-at-Law, Monticello (subdivision, NM) Residents Committee, Residents of Tucumcari NM, Environmental Defense Fund (CO), Western Nebraska Resource Council, Santa Ana Pueblo, Los Herederos del Pueblo de San Mateo (NM), Board of the Cebolleta Land Grant, Mathis and Reisel, Attorneys-at-Law, Concerned Citizens of Questa (NM).

PROJECT COORDINATOR - CITIZENS' MINING INFORMATION NETWORK - Southwest Research and Information Center. Project provides current technical and policy-related information on mining to citizens and

community organizations across the US. This Project funded by United States Environmental Protection Agency and private donors, 1991 - 1996.

WATER RESOURCE SPECIALIST - NORTHERN NEW MEXICO WATER PROJECT - Southwest Research and Information Center. Project provided technical support for community and governmental organizations in northern New Mexico. This project funded by the Ford Foundation. June 1984 - June 1990.

SELECTED PUBLICATIONS

- "Comments on "Environmental Assessment Screening Report: Possession and Management of Waste Nuclear Substances Situated at the Spanish American, Milliken, Lacnor, Nordic/Buckles, and Pronto Historical Properties in the Elliot Lake Area, Ontario: A Report of the Canadian Nuclear Safety Commission, May 2001," Prepared on behalf of Miningwatch, Ottawa, Ontario, Canada, February 14, 2002.
- "Review of the Khiagda Uranium Mine Investment Rational and OVOS/Environmental Impact Assessment: Observations and Suggestions," Prepared on behalf of Buryat Regional Center on Baikal, Ulan-Ude, Buryat Republic, Russian Federation, January 28, 2002.
- "Technical Testimony in the Matter of the Draft Final Permit for the Triassic Park Waste Disposal Facility, US EPA No. NM0001002484" before the New Mexico Environment Department, Case No. HRM 01-02(P), on behalf of Citizens United for a Rationale Environment, Roswell, New Mexico, October 11, 2001.
- "Identification of Potential Water Quality Risks to Lake Baikal's Largest Tributary, the Selenga River, from Mining and other sources: A Preliminary Investigation," Prepared under contract to Baikalwatch, Earth Island Institute, San Francisco, CA, USA, September 20, 2001.
- "Comments on Molycorp Work Plans - I and II, with attachments, prepared under contract to Center for Science in Public Participation, Bozeman MT on behalf of Amigos Bravos, NM, February 22, 2000 and March 29, 2000.
- "L-Bar Uranium Mill Tailings Site Review: Analysis of Kennecott's Recent Activities and Current Proposals", prepared under contract to Cebolleta Land Grant Board, August, 1999.
- "Evaluation of Environmental Technology Changes Proposed for La Oroya Smelter Complex in Central Peru: Final Report" February 1, 1999, on behalf of Sociedad Peruana de Derechos Ambientales (SPDA), Lima, Peru and Asociación Interamericana para la Defensa del Medio Ambiente(AIDA), San Francisco CA, February 1999.
- "Groundwater Restoration Long Beyond Closure at the Homestake-Milan and United Nuclear-Church Rock Uranium Mill Tailings Piles, New Mexico, USA: Full-Scale Programs Requiring More Than 20 Years of Active Treatment", in Uranium Mining and Hydrogeology II, Freiberg Mining Academy, Freiberg Saxony, Germany, September 1998.
- "In Situ Leach Uranium Mining without Aquifer Restoration?: Preliminary Comments on Heathgate Resources' Beverley Uranium Mine Environmental Impact Statement - Main Report", prepared for Australian Conservation Foundation and Friends of the Earth (Fitzroy), July 1998.
- "A Model Mine Shows its Cracks: An Independent Report on Environmental Problems at the Kubaka Gold Mine in the Russian Far East", by Julie Edlund, David Gordon and Wm. Paul Robinson, Pacific Environment and Resources Center, Sausalito, CA, April 1998.
- "Comments on Air Quality Aspects of the Proposed Voisey's Bay Mine and Mill Project Environmental Impact Statement", prepared under contract to Center for Science in Public Participation on behalf of the Innu Nation, Labrador, Newfoundland, Canada, February 1998.

- "Chino Mines Existing Mine Permit Application Documents: 1) An Annotated Chronology and 2) Matrix of Chino Existing and New Units", research memoranda prepared under contract to United Steelworkers of America Local 890 and Good Neighbor Project, February, 1998 - available from Southwest Research with permission of contractors.
- "Environmental Issues and Concerns associated with the Proposed Dybycksa Gold Mine in the Alkhanai Area of Aginskoe Buryat Autonomous Region of the Russian Far East", prepared under contract to Pacific Environment and Resources Center, Sausalito, CA, December 1997.
- "Report on Chino Mines' Proposed Santa Rita Pit Expansion in Relation to the Kneeling Nun Natural Landmark", prepared under contract to United Steelworkers of America Local 890 and Good Neighbor Project, October 1997 - available from Southwest Research with permission of contractors.
- "Environmental Damage and Policy Issues in the Uranium and Gold Mining Districts of Chita Oblast in the Russian Far East: A Report on Existing Problems at Baley and Krasnokamensk and Policy Needs in the Region", prepared under contract to Baikalwatch/Earth Island Institute, November 1996.
- "Navajo Land Selection Project, Phase II - Final Report", with Chris Shuey, under contract to Office of Navajo and Hopi Indian Relocation, US Department of Interior, July 1996.
- "Review of Recent Uranium Production and Market Trends" submitted to Canadian Joint Federal Provincial Panel on Uranium Mining in Northern Saskatchewan, on behalf of Saskatchewan Uranium Committee, June, 1996.
- "Review of Innovative Approaches to Environmental Remediation at Inactive Mining Sites with Multiple Implementation Barriers", Report to Western Governors' Association under contract to Mine Waste Working Group/ Advisory Committee to Develop-On site Innovative Technologies, June 1996.
- "Comments and Recommendations Submitted to Environmental Assessment Panel Reviewing Decommissioning Proposals for the Elliot Lake Uranium Mine Tailings Management Areas" before Canadian Environmental Assessment Agency Panel, Elliot Lake Ontario, Canada, on behalf of Northwatch, November 1995.
- "Groundwater Contamination at Uranium Mill Tailings Sites in the United States Reclaimed by the DOE (Department of Energy) Uranium Mill Tailings Remedial Action Program (UMTRAP)" in Proceedings of Uranium-Mining and Hydrogeology International Conference and Workshop, Freiberg, Saxony, Germany, October 1995.
- "Handling of radium and uranium contaminated waste piles and other wastes from phosphate ore processing - Final Report, with Gerhard Schmidt and Christian Kueppers, Oeko Institut/Darmstadt, annex by Wm. Paul Robinson, European Commission Nuclear Science and Technology Report EUR 15448 EN (ISSN 1018-5593), Brussels, 1995.
- "Review of Tailings Management, Disposal and Reclamation Aspects of the Crown Jewel Mine Draft Environmental Impact Statement, submitted to Washington State Department of Ecology on behalf of Okanagon Highlands Alliance, August 1995.
- "Innovative Administrative, Technical, and Public Involvement Approaches to Environmental Restoration at an Inactive Lead-Zinc Mining and Milling Complex Near Pecos, New Mexico", in Proceedings of Waste Management '95 (proceedings available on CD-ROM), University of Arizona, Tucson, Arizona, March 1995.
- "Public Stakeholder Concerns and Recommendations related to Innovative Technology Development: Final Report", prepared under contract to Western Governors' Association for the Mixed Waste Working Group, Demonstration of On-site Innovative Technologies (DOIT) Federal Advisory Committee, Denver, Colorado, September, 1994.

- "Final Subcontractor Report - Navajo Land Selection Project: Evaluation of the Revenue- Generating Potential of Certain Mineral-Bearing Lands in the San Juan Basin of Northwestern New Mexico..." with Shuey, C. S., submitted to Office of Navajo and Hopi Indian Relocation, Flagstaff, AZ (ONHIR Contract 6198-930672), May, 1994 - available from ONHIR.
- "Pollution Prevention Strategies: Policies, Opportunities and Examples for Mining Operations", in Proceedings of 1994 New Mexico Conference on the Environment, convened by New Mexico Environment Department, Albuquerque, NM, April, 1994.
- "Pollution Prevention, Mining and Mineral Processing, and Citizen Involvement: Policy Concepts and Potential Benefits", invited paper presented at International Conference on Pollution Prevention in Mining and Mineral Processing, convened by Colorado School of Mines, Snowmass, Colorado, August , 1993.
- "How Permanent is the Permanent Solution II: Supplemental Comments Regarding the El Molino [mill tailings from Pecos lead-zinc mine and mill sites] Decision Document and Supporting Documents", submitted to New Mexico Environment Department, Santa Fe, NM, July, 1993, prepared on behalf of La Gente del Rio, Pecos, New Mexico.
- "How Permanent is the Permanent Solution: Review and Initial Comments on Pecos/El Molino Cleanup Project, San Miguel County, New Mexico", prepared on behalf of La Gente del Rio, Pecos, New Mexico, submitted to New Mexico Environmental Department, Santa Fe, NM, June 1993.
- "Windy Craggy [Proposed Copper/Gold Mine in British Columbia] Project Issue Overview", Prepared on Behalf of City of Yakutat, Alaska, September 1992.
- "Mined Land Reclamation Requirements in Western States: Implications for a New Mexico Mining Law", with Janna Rolland, invited paper for 1992 New Mexico Environment Conference, New Mexico Environment Department, Santa Fe, NM, September 1992.
- "Experiences with the Reclamation of Uranium Mining Areas in the USA and Their Transfer to the Situation at Selected Sites in the South of the Former German Democratic Republic", with Gerhard Schmidt, Oeko Institut, Darmstadt, Germany, December 1991.
- "Mine Waste Problems Require Prompt Federal Legislative and Regulatory Action", Testimony before US House of Representatives, Subcommittee on Transportation and Hazardous Materials, Committee on Energy and Commerce, Washington, DC, September, 1991.
- "Design Criteria and Standards for Uranium Mill Waste Management in the United States of America", presented at Geology and Tectonics of the Gera-Jachymov Fault Zone and Its Relationship to Regional Uranium Resources, Institute for Physics of the Earth, Gera, Germany, August, 1991.
- "An Introduction to the Giant Uranium Facilities of Eastern German: A Report of Observations of the Uranium Mines and Mills Operated by Wismut AG in Saxony and Thuringia in the Former German Democratic Republic", prepared for International Physicians for Prevention of Nuclear War/German Chapter, Heidesheim, Germany, June 1991.
- "Solid Waste, Waste Reduction, and Public Policy", New Mexico Law Review, University of New Mexico, Winter 1990.
- "Recommendations to the Albuquerque City Council/Albuquerque Mayor's Office of the City of Albuquerque Solid Waste Recycling Advisory Committee," Paul Robinson, Chair, et.al., Albuquerque, NM, December 1990.
- "Final Report - Water Action Campaign: The Public Involvement Program of the Southwest Valley Service Option Evaluation", with Julie Stephens, Fred Griego, and Jaime Chavez, a Project funded by the New Mexico Legislature

and Managed by the City of Albuquerque, Rio Grande Community Development Corporation, Albuquerque, NM, December 1991.

- "In the Hands of the People: Establishing Planning Power for a Community", with Kathy Newton and Julie Stephens, The Workbook, Southwest Research and Information Center, Albuquerque, NM, Vol. 15, No. 4, Winter, 1990.

- "Molybdenum Mining and the People of Northern New Mexico", The Workbook, Southwest Research and Information Center, Albuquerque, NM, Vol. 15, No. 2, Summer, 1990.

- "Deficiencies in the Molycorp Guadalupe Mountain Tailings Proposal", for Northern New Mexico Legal Services on behalf of Concerned Citizen del Norte, May 1, 1990.

- "Uranium Production and Its Effects on Navajo Communities Along the Rio Puerco in Western New Mexico", invited paper published in Proceedings of Conference on Race and the Incidence of Environmental Hazards, University of Michigan, Ann Arbor, Michigan, January, 1990.

- "Proposal for Long-Term Isolation of the Uranium Mill Tailings at Ellweiler, Kreis Birkenfeld", prepared for Kries Birkenfeld (County Administrator) Landrat Dr. Ernst Theilen, Birkenfeld, Rheinland-Pfalz, West Germany, November, 1989.

- "An Overview of Uranium Cleanup Standards and Experience in the USA", invited paper published in Proceedings of Conference on Neidrigdosisstrahlung und Gesundheit (Low Level Radiation and Health), in Birkenfeld, Rheinland-Pfalz, West Germany, November, 1989.

- "The Interstate Waste Dilemma", invited statement before the New Mexico Legislative Interim Environment, Land Use and Solid Waste Committee, Lordsburg, NM, June 29, 1989.

- "Landfill Design and Operation Improvements for the Proposed Cerro Colorado Landfill", submitted to the Bernalillo County, NM, Planning Commission, Albuquerque, NM, May, 12, 1989.

- "Statement for the Public Record on Proposed New Mexico Solid Waste Management Regulations", Santa Fe, NM, November 15 - 17, 1988, on behalf of Southwest Research and Information Center, New Mexico Public Interest Research Group and New Mexico Environmental Law Center, with Kevin Bean, Chris Shuey, Doug Meiklejohn and James Tarr.

- "Winslow, Arizona: An Environmental Evaluation with Emphasis on Water Resources", prepared under contract to United Transportation Union Local 1181, Gallup, NM, August, 1988

- "Statement before the United States House of Representatives, Committee on Interior and Insular Affairs, Concerning Uranium Mill Tailings", Washington, DC, June, 28, 1988.

- "Ground Water Problems in Albuquerque's South Valley: Identification, Clean Up and Alternative Water Supply Options," Statement Before U. S. House of Representative, Subcommittee on Natural Resources, Agricultural Research and Environment, Albuquerque, NM, November 1987.

- "Statement before Mining Task Force of South Dakota Department of Water and Natural Resources concerning Mine Reclamation and Hydrology", oral testimony in Rapid City, SD under contract to South Dakota Department of Water and Natural Resources, Rapid City, South Dakota, August 18-19, 1987.

- "Reclamation and Water Supply Issues Ten Years After the Passage of the Surface Mining Control and Reclamation Act of 1987", Statement Before the United States House of Representatives, Committee on Interior and Insular Affairs, Washington, DC, August 3, 1987.

- "Draft Environmental Assessment for Proposed Santa Ana Pueblo [NM] Sublease of a 50-Acre Site for use as a Wallboard Factory", prepared under contract to Centex American Gypsum Company, June, 1987.
- "Changing Forest Plans: A Way to Do It Outside the Courts", in The Workbook, January - March 1987, Southwest Research and Information Center, reprinted as "Changing Forest Plans Outside the Courts" in Forest Watch, Eugene, Oregon, July 1987 and Technology Review, Cambridge, Massachusetts, November, 1987.
- "Report Evaluating Environmental Issues and Concerns Related to the Centex Wallboard Facility Proposed for Santa Ana Pueblo", prepared under contract to Centex American Gypsum Company, December, 1986.
- "Groundwater Monitoring Needs at the L-Bar Tailings Site", prepared for the Cebolleta Land Grant Council, June, 1986.
- "Crow Butte Uranium In Situ Pilot Project Comments", prepared on behalf of Western Nebraska Resources Council, June, 1986.
- "Ground Water Contamination from Seepage of Wastewater from the Sohio (Kennebecott Minerals) L-Bar Uranium Mill Tailings Impoundment (II): April 1986 Updated Report", prepared for Cebolleta Land Grant Council, May, 1986.
- "Progress Report of the Puerco River Education Project", presented to the Policy Committee of the Puerco River Working Group (including New Mexico, Arizona and US Environmental Protection Agency), with Chris Shuey and Raymond Morgan, updated May, 1986.
- "Source Document for Information on Water Quality and Air Quality of the Navajo Reservation in New Mexico and Arizona", with Chris Shuey, for Navajo Tribe Division of Resources, January, 1986.
- "Comments on the Draft Environmental Impact Statement for Reclamation of the Jackpile-Paguete Uranium Mine, Laguna Reservation, New Mexico, with Chris Shuey and Hollis Whitson, Esq., October, 1985.
- Better Ways to Use Water: A Handbook on Technologies to Improve Rural Water Use in Northern New Mexico, Northern New Mexico Water Project, Albuquerque, NM, October 1985.
- "South Valley Toxics Overview: Ground Water Contamination in a Poor and Minority Community: The South Valley of Albuquerque, New Mexico" under contract to Commission on Racial Justice, United Church of Christ, August, 1985.
- "Statement of Wm. Paul Robinson before a Joint Session of the [US] Senate Energy and Natural Resources Committee and House Interior and Insular Affairs Committee" regarding Uranium Mill Tailings Legislation, July, 1985.
- "Comments on Water and Reclamation Aspects of the Federal Coal Management Program Draft Environmental Impact Statement", March 1985.
- "Water Quality Effects of the Sohio Uranium Operations on the Cebolleta Land Grant - Information to Document the Problem", under Contract to Simms and Garcia, attorneys for Cebolleta Land Grant, March, 1985, available from contractor or with contractor permission.
- "The Need for Non-Coal Mine Reclamation Study in New Mexico: A Statement Concerning HB168", Testimony before New Mexico House of Representatives Committee on Energy and Natural Resources, Santa Fe, NM, February 11, 1985.
- "Summary of New Mexico Coal Transportation Study by Coal Transportation Task Force", January 1985.

- "Statement for the Public Record for the Ground Water Discharge Plan for Grain Power-Tucumcari Ltd." with Chris Shuey, October 2, 1984.
- "Characterization of Ground Water Quality near a Uranium Mill Tailings Facility, and Comparison to Background Levels and New Mexico Standards", In Selected Papers on Water Quality and Pollution in New Mexico, New Mexico Bureau of Mines and Mineral Resources Hydrologic Publication 7, Socorro, New Mexico, 1984, presented April 12, 1984.
- "Environmental Cleanup: Employment Opportunities in New Mexico", with Chris Shuey, April, 1984.
- "Findings and Conclusions in the Matter of the Homestake Mining Company Uranium Mill at Milan, NM, Discharge Plan", March, 1984.
- "Water and Soil Issues...in the Santa Fe National Forest Plan Environmental Impact Statement (and Record of Decision)", for Save the Jemez, December, 1983.
- "Comments on Proposed Rules Regulating Drilled or Mined Shafts", with Don Hancock and Alice Hector, submitted to Texas Department of Water Resources for Serious Texans Against Nuclear Dumping (STAND), December, 1983.
- "Southwest Resource Council Comments on Phase II Report -- Environmental Assessment Arizona Strip District Uranium Development", with Chris Shuey, for Southwest Resource Council, October, 1983.
- "Comments on New Mexico Interim Hazardous Waste Regulation Program", with Michael Sousa, Testimony at EPA Hearing, August 24, 1984.
- "The State of the Environment: A New Mexico Perspective, A Southwest Research and Information Center Perspective", Testimony Before the US Senate Committee on Environment and Public Works, Albuquerque, July 6, 1983.
- "First, Second (and) Third Statement(s) and Findings of Fact and Conclusions for the Public Record in the Matter of the Radiation Protection Regulations Violation of United Nuclear Corporation", with Chris Shuey, February - April, 1983, Several Statements for the record.
- "Comments on San Miguel Project Post Reclamation Annual Monitoring and Maintenance Program", For National Wildlife Federation, Boulder, Colorado, April 7, 1982.
- "Water Quality Training Program - Final Report", for Five Sandoval Pueblos, Inc., Southwest Research and Information Center, March, 1982.
- "Statement for the Public Record of the New Mexico Water Quality Control Commission Regulation Hearing on March 3, 1982" concerning underground injection control regulation, March, 1982.
- "Geology and Water Supply of the Zuni Reservation", in Appeal of Finding of the Area Director that Opening the Zuni Reservation to Oil and Gas Exploration and/or Development will have No Significant Effect on the Human Environment....., Zuni Pueblo Legal Services, Zuni, New Mexico, January, 1982.
- "Statement for the Public Record of the Water Quality Control Commission Hearing on December 3, 1981" concerning water quality classification of the Rio San Jose in Cibola and Valencia Counties, New Mexico, Acoma Pueblo, Acoma, New Mexico, December, 1981.
- "Statement Before U.S. Senate Committee on Environment and Public Works Subcommittee on Nuclear Regulation Concerning the Implementation of the Uranium Mill Tailings Radiation Control Act, Public Law 95-604", Washington, DC, June 16, 1981.

- "Statement for the Public Record on the Proposed Amendments to the Radiation Protection Regulations, June 11, 1981 Before Environmental Improvement Board, George H. Hensley, Chairman", Albuquerque, New Mexico, June, 1981.
- "Impacts of Uranium Exploration and Methods for Regulation", Transcript of Testimony before Virginia Coal and Energy Commission, Richmond, Virginia, June 1, 1981.
- "Environmental Overview of the Four Corners Area", University of New Mexico Medical School Symposium on Reproductive Effects of Uranium Mining in the Four Corners Area, Albuquerque, NM, April, 1981.
- "Radon and Radon Daughters from Uranium Mines: Source, Impacts and Controls", Third Symposium on Uranium Mill Tailings Management, Colorado State University, Fort Collins, CO, November 24-25, 1980.
- "Statement on National Materials Policy before U.S. Senate Committee on Commerce, Science and Transportation Subcommittee on Science, Technology and Space", Washington, DC, Senate Hearing 96-112, July 1, 1980.
- "Responsible Uranium Mining and Milling: An Overview", Proceedings of First International Conference on Uranium Mine Waste Disposal, Vancouver, BC, Canada, May, 1980.
- "An Analysis of the Draft EPA Ore Mining and Dressing Best Available Technology Effluent Limitation Guideline Development Document", prepared under contract to Natural Resources Defense Council, Washington, DC, March, 1980.
- "Testimony before the House of Representatives Committee on Interior and Insular Affairs, Subcommittee and the Environment, Hearing on the Causes and Implications of the United Nuclear-Churchrock Tailings Dam Failure", Washington, DC, October 22, 1979,
- "Comments on the Generic Environmental Statement on Uranium Milling, NUREG-0511", October, 1979.
- "Testimony before the House of Representatives Committee on Interior and Insular Affairs, Subcommittee on Energy and the Environment, Hearings on the Nuclear Regulatory Commission's State Programs", Washington, DC, July, 19, 1979.
- "Summary of Recent Uranium Exploration Work in North Central New Mexico", March, 1979.
- "Comments on the Federal Coal Management Program Draft Environmental Statement", February, 1979.
- "Comments on the Star Lake-Bisti Coal Region Draft Environmental Statement", November, 1978.
- "Bokum Uranium Mill License Application Comments", September, 1978.
- "Analysis of Mobil/TVA's Interim Mining and Reclamation Plan for Pilot In situ Leaching at Crownpoint, McKinley County, New Mexico, May 1978", June, 1978.
- "Temporal Change in the San Mateo Creek Drainage, Part of the Grants Mineral Belt, New Mexico", an Independent Research project at Technology Applications Center, University of New Mexico, May, 1978.
- "New Mexico Uranium Inventory, 1978", Southwest Research and Information Center, P. O. Box 4524, Albuquerque, NM, May, 1978.
- "Statement for the Public Record of the Radiation Protection Regulation Hearing of January 20, 1978", January, 1978.

- "New Mexico Uranium Slide Shows": 1- Overview of technology and environmental impacts, 1977; 2- Development on Indian Land - aerial views, 1978; 3- Impacts of mines and mills - aerial views, 1979; and 4- United Nuclear - Churchrock tailings dam break, 1979. Slides and scripts by Wm. Paul Robinson.
- "Statement for the Public Record Regarding the Priority List for Wastewater Treatment Works Construction Grants", September 7, 1977.
- "Comments on Albuquerque Wastewater Treatment Facilities Draft Environmental Impact Statement", August, 1977.
- "Problems and Alternatives for the Navajo Indian Irrigation Project", Testimony before U.S. Senate Committee on Environment and Public Works, Subcommittee on Water Resources, April, 1977.
- "Alternatives for Confined Livestock Operations in the South Valley-Answers to a Community Problem", January, 1977.
- "Application of the Dynamic Method of Flood Plain Mapping to Selected Developing Nations", ECOsystems International, P.O. Box 225, Gambrills, MD, 21054, June, 1975.
- "User Requirements and User Acceptance of Current and Next Generation Satellite Mission and Sensor Component, Oriented toward the Monitoring of Water Resources", ECOsystems International, June, 1975.
- "Impact of Remote Sensing upon the Planning, Management and Development of Water Resources," ECOsystems International, June, 1975.
- "Summary and Projection of Septic System Requirements and Problems for Anne Arundel County, MD", ECOsystems International, March, 1975.
- "Technology Assessment of Large Scale Organic Farming in the U.S.", Technology and Human Affairs Program, Washington University, St. Louis, Missouri, May, 1974.

SELECTED ORAL TESTIMONY OR PRESENTATIONS

- "Testimony in the Matter of the Application of Molycorp, Inc for a Groundwater Discharge Permit for its Questa Molybdenum Mine (DP-1055)," before New Mexico Environment Department, Questa New Mexico, May - June 2000
- "Testimony in the Matter of the Application of Southwest Landfill, Inc. for a Solid Waste Facility Permit in Bernalillo County" before the New Mexico Environment Department Secretary, Albuquerque, NM, December 1996 and January 1997
- "Testimony in the Matter of the of the Application of Molycorp, Inc. for a Groundwater Discharge Permit for its Molybdenum Mill and Tailings Ponds" before the New Mexico Environment Department Secretary, Questa, NM, December 1996
- "Testimony in the Matter of Regulations Pursuant to the New Mexico Mining Act", Before New Mexico Mining Commission, Santa Fe, NM, May 1994
- "Current Activities in Problem Scoping", in Proceedings of Inactive and Abandoned Mine Waste Cleanup: A Challenge for the 90s, convened by Colorado Center for Environmental Management, Salt Lake City, Utah, November, 1993.
- "Citizen Involvement and Pollution Prevention" in International Conference on Pollution Prevention in Mining and Mineral Processing", convened by Colorado School of Mines, Snowmass, Colorado, August, 1993.

- "Statement at the Public Hearing on the Resource Conservation and Recovery Act Permit proposed for Los Alamos National Laboratory", Before New Mexico Environmental Improvement Division and United States Environmental Protection Agency, Santa Fe, New Mexico, July 17, 18 and August 7, 1989.
- "Statement at the Public Hearing on the matter of the Municipal Solid Waste Incinerator proposed by Los Alamos, NM", before New Mexico Environmental Improvement Division, Santa Fe, NM, June, 1988.
- "Water Related Development Opportunities in the Eastern Navajo area", Workshop on Economic Development in Eastern Navajo Agency sponsored by New Mexico Office of Indian Affairs, June, 1985.
- "Toxic Contamination Sites in New Mexico", in the Conference on Water Contamination and Toxic Pollution in New Mexico, Albuquerque, NM, December, 1984
- "In the Matter of the Groundwater Discharge Plan for Grain Power-Tucumcari Ltd.", Tucumcari, NM, October, 1984.
- "In The Matter of the Permit for Underground Injection and Mineral Production Wells for Wyoming Fuels' Crow Butte Project", before the Nebraska Department of Environmental Quality, Crawford NB, July, 1984
- "In The Matter of the Nuclear Regulatory Commission Environmental Impact Appraisal ... of the Source Material License for the Wyoming Fuels' Crow Butte ISL Project... Docket No. 40-8829", before the NRC Hearing Officer, Crawford, NB, July 1984.
- "In the Matter of the Discharge Plan for the Homestake Mining Company Uranium Mill at Milan, NM", Grants, NM, February, 1984.
- "Prioritizing Mineral Resources, Environmental and Conservation Needs", in Governmental Affairs Session, Society of Exploration Geophysicists Annual Meeting, Las Vegas, NV, September, 1983.
- "Mineral and Energy Development Projects on New Mexico's National Forests", at Citizen's Workshop on the Future of New Mexico's National Forests, Albuquerque, NM, September, 1983.
- "Concerns of the Environmental Community About Impacts from Uranium Operations on Federal and Indian Lands", at National Research Council/National Academy of Sciences Workshop on Research Needs for Optimizing Economic and Environmental Aspects of Uranium Production from Leased Federal and Indian Lands, Albuquerque, NM, December, 1982.
- "Summary of Recent Observations at Uranium Operations in the Northern Territory, Australia", Australian Institute of Aboriginal Studies, Canberra, ACT, July, 1982.
- Before South Dakota State Conservation Commission Concerning Exploration Permit Renewal for Silver King Mines, EX-5, Custer, South Dakota, February, 18, 1981.
- Before South Dakota State Conservation Commission Concerning Exploration Permit Renewal for Union Carbide Corporation, EX-31, Pierre, South Dakota, December 12, 1981.

- Before Colorado Water Quality Control Commission Concerning Reclamation Plan for Homestake - Pitch Project, Saguache County, Colorado, Gunnison, Colorado, December 10, 1981.
- Before the New Mexico Radiation Technical Advisory Council regarding Amendments to the New Mexico Radiation Protection Regulations, Santa Fe, NM, May, 1981.
- Before the Virginia Coal and Energy Commission regarding Regulation of Uranium Exploration, Richmond, VA, June 1, 1981.
- Before Montana House and Senate Committees on Natural Resources regarding Uranium Mining and Milling Legislation, Helena, Montana, February and March, 1981.
- Before New Mexico House and Senate Committees on Natural Resources regarding Uranium Severance Taxes, Santa Fe, NM, February, 1981.
- "In the Matter of the Radioactive Materials License and Groundwater Discharge Plan for the Gulf - Mount Taylor Uranium Complex", Santa Fe, New Mexico, January, 1981.
- In "State of Mexico vs. City of Albuquerque", in the Bernalillo County District Court, No. CU-80-04500, a nuisance complaint concerning odors from an Albuquerque sewage treatment plant, Albuquerque, NM, July, 1980.
- "In the Matter of the Groundwater Discharge Plan for the Ski and Tennis Ranch of Taos", Taos, NM, July, 1979. Resumed January, 1980.
- "In the Matter of the Groundwater Discharge Plan for the Bokum - Marquez Uranium Mill (DP-100)", Santa Fe, NM, January, 1980.
- Before Minnesota House of Representatives Committee on Environment and Natural Resources Informational Briefing on Uranium Mining and Processing, St. Paul, MN, December, 1979.
- "In the Matter of National Pollutant Discharge Elimination System (NPDES) Permit for Bokum Resources Corporation, NPDES No. NM0028215", Santa Fe, NM, December, 1979.
- "In the Matter of NPDES Permit for Phillips Uranium Corporation, No. NM0028274", Santa Fe, NM, December, 1979.
- Before Royal Commission of Inquiry on Uranium Mining regarding Health and Environmental Protection, Vancouver, BC, Canada, December, 1979.
- Before New Mexico Water Quality Control Commission in Hearing regarding Selenium Standards, Part 3-103A, New Mexico Groundwater Regulations, Santa Fe, New Mexico, September 20, 1979.
- "In the Matter of Groundwater Discharge Plan for the Bokum - Marquez Uranium Mill (DP-43)", Santa Fe, NM, May, 1979.
- "In the Matter of Amendments to New Mexico Radiation Protection Regulations", Santa Fe, NM, May, 1979.
- "In the Matter of NPDES Permit for Ranchers Exploration and Development Corporation, NPDES No. NM0026573", Santa Fe, NM, September, 1978.
- "In the Matter of NPDES Permit for Kerr-McGee Nuclear Corporation, NPDES No. NM0020532", Santa Fe, NM, May, 1978.

