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**MONITORED RETRIEVABLE STORAGE  
OF SPENT NUCLEAR FUEL IN INDIAN COUNTRY:  
Liability, Sovereignty, and Socioeconomics**

**by**

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**ABSTRACT**

*Federal nuclear spent fuel policy has evolved into soliciting Indian Tribal and State units of government to volunteer for hosting temporary waste storage, Monitored Retrievable Storage (MRS). Through the U. S. Office of the Nuclear Waste Negotiator (NWN), feasibility study grants have been awarded almost exclusively to Native American Indian tribes. In the authors' view, the voluntary host process relies on Indian sovereign rights, a lack of technical qualifications, and the depressed economic position of Indian country populations. The paper begins with a short history of policy evolution, outlines the legal nature and appeal of sovereignty in siting waste storage or radioactive activities, describes the socioeconomic influences on sovereign tribal council decisions, and concludes that MRS in general is undesirable and the potential result of the voluntary siting process is dangerous and unethical.*

"The words of Chief Seattle embrace a timeless wisdom about man and culture, and the use of land. ... [With] radioactive materials with half-lives of thousands of years, it is the native American culture and perspective that is best designed to correctly consider and balance the benefits and burdens of these proposals."

- David H. Leroy, U.S. Nuclear Waste Negotiator,  
speaking to the National Congress of American Indians.<sup>1</sup>

## SPENT FUEL POLICY EVOLUTION

On December 20, 1951, an experimental reactor produced the first electric power from the atom, lighting four lightbulbs. Nearly six years later, on December 2, 1957, the first full-scale nuclear power plant at Shippingport, Pennsylvania, went into service. Today, nearly all of the U.S. civilian nuclear reactors constructed in the late '50s and early '60s have been closed, including the first Shippingport unit. However, the legacy of their atomic power, and that of the 109 units currently operating, remains in the form of spent, or used up, radioactive fuel.<sup>2</sup>

The national spent fuel inventory has grown to over 23,681 MT (metric tons) of uranium, plutonium, and other radioactive by-products. Figure 1 shows U.S. Department of Energy (DOE) estimates for cumulative spent fuel in a No New Orders Case and a Lower Reference Case.<sup>3</sup> Nearly 97% of the current inventory is

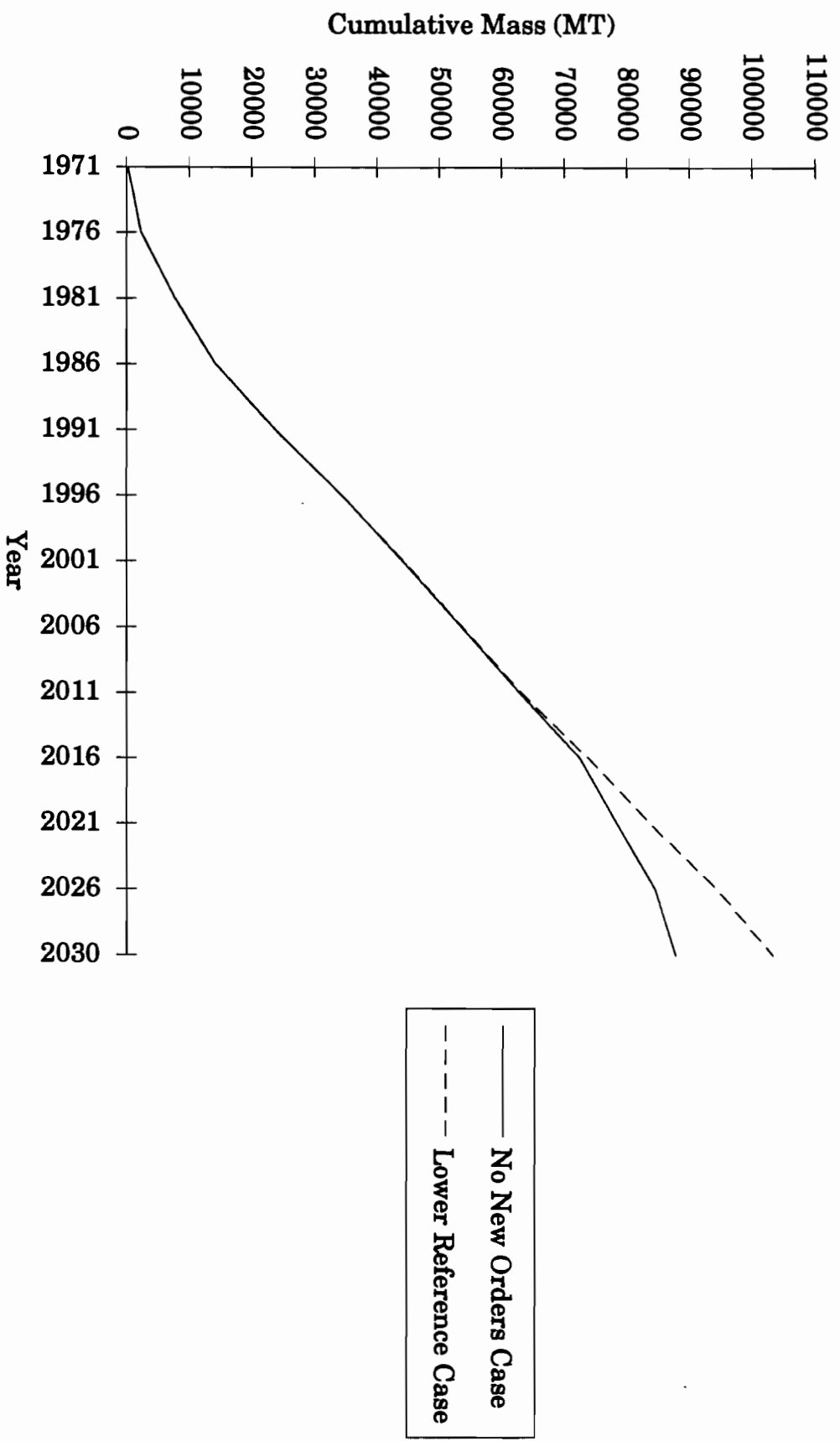
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<sup>1</sup> D.H. Leroy, "Federalism on Your Terms: An Invitation for Dialogue, Government to Government," prepared remarks by the U.S. Nuclear Waste Negotiator to the National Congress of American Indians, San Francisco, December 4, 1991, pp. 2, 9.

<sup>2</sup> U.S. Council for Energy Awareness, Nuclear Technology Milestones 1942-1992, USCEA, Washington, D.C.

<sup>3</sup> The No New Orders Case assumes a 40-year reactor operating life, with 30% of the reactors having an extended 60-year operating life. The Lower Reference Case assumes that 70% of the reactors will have an extended 60-year operating life.

**FIGURE 1. Historical and Projected Spent Fuel**



Source: Oak Ridge National Laboratory, Integrated Data Base for 1992: U.S. Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics, U.S. Department of Energy, Washington, D.C. DOE/RW-0006, Rev. 8 (1992).

stored at reactor sites, mainly in the eastern half of the U.S. The remaining 3% is stored at the West Valley Demonstration Project (27 MT) in West Valley, N.Y., at the Midwest Fuel Recovery Plant (674 MT) in Morris, Illinois, and at the Idaho National Engineering Laboratory (43 MT) in Idaho Falls, Idaho. The majority of spent fuel is currently stored in pools of water, although dry cask storage is emerging as the preferred medium of storage.

Of the total estimated inventories of commercial and DOE radioactive wastes, spent fuel accounts for 95.8% of total radioactivity at only 0.19% of total volume.<sup>4</sup> This level of radioactivity is of incomparable magnitude and danger. It has been estimated that one ten-thousandth of a gram of Plutonium-239 contained in spent fuel has a 50% probability of causing lung cancer if inhaled. At a half-life of 24,000 years, 100 kg of Pu-239 would require approximately 700,000 years to decay to this level of radioactivity.<sup>5</sup> Safe storage of such highly radioactive material, for a time period that is, literally, eternity is the challenge being presented to Native American Nations by the U.S. Government.

### **Yucca Mountain Repository**

Since the adoption of the Nuclear Waste Policy Act of 1982 (NWPA),<sup>6</sup> the DOE and the nuclear power industry have been attempting to move away from at-reactor storage toward a federally operated system of containerization, transportation, temporary storage, and permanent centralized disposal. The NWPA formalized national waste management and authorized the DOE<sup>7</sup> to study

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<sup>4</sup> Oak Ridge National Laboratory, Integrated Data Base for 1992: U.S. Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics, U.S. Department of Energy, Washington, D.C., DOE/RW-0006, Rev. 8 (1992).

<sup>5</sup> D. Chapman, Energy Resources and Energy Corporations (Cornell University Press, Ithaca, N.Y., 1983).

<sup>6</sup> Nuclear Waste Policy Act of 1982, Public Law 97-425, 42 U.S.C. 10101-10226 (1983).

<sup>7</sup> Specifically, the Office of Civilian Radioactive Waste Management (OCRWM).



and site both a repository for permanent disposal and a Monitored Retrievable Storage (MRS) facility for the purpose of temporary storage, consolidation, and repackaging of waste. The Act provided for funding through the Nuclear Waste Fund, generated by collecting one-tenth of a cent (one mill) per kilowatt-hour from utility companies for nuclear-generated electricity. Upon opening an MRS or repository, the DOE relieves utilities from legal title, management responsibility, and liability to all spent fuel accepted.

Despite the 1982 legislation, centralized spent fuel storage has yet to be sited. After considering various locations for a repository, the 1987 Amendments to the NWPA directed the DOE to exclusively study the site at Yucca Mountain, Nevada.<sup>8</sup> Shortly after the Amendments, the original goal of operating a repository by 1998 was pushed back to 2003. The DOE now estimates that its scientific investigation of the site will conclude by 2001, at a cost of \$6.3 billion (year-of-expenditure dollars) and, if the site proves suitable, a repository could be open by 2010. The U.S. General Accounting Office (GAO), however, concludes that at its present pace the investigation of Yucca Mountain will take 5 to 13 years longer than planned, and cost more than DOE projections.<sup>9</sup>

Despite significant delays in the development of a repository, the DOE has entered into contracts with nuclear utilities to take possession of spent nuclear fuel by 1998. Consequently, considerable emphasis has been placed on siting above-ground temporary storage. In fiscal year 1992, of the \$275 million appropriated for the disposal program, the DOE allotted \$109 million (40%) to non-

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<sup>8</sup> Nuclear Waste Policy Act Amendments of 1987, P.L. 100-203, 42 U.S.C. 10101 note (1987) (specifically Title I of the NWPA of 1982 was amended by adding at the end the new Subtitle E (Redirection of the Nuclear Waste Program), sections 160 & 161).

<sup>9</sup> U.S. General Accounting Office, Resources, Community, and Economic Development Division, Nuclear Waste: Yucca Mountain Project Behind Schedule and Facing Major Scientific Uncertainties, Report to the Chairman, Subcommittee on Clean Air and Nuclear Regulation, Senate Committee on Environment and Public Works, GAO/RCED-93-124 (1993).

Yucca Mountain activities. Thus, Yucca Mountain funds were competing with funds for the MRS and nuclear waste transportation programs that support the DOE's 1998 goal to accept spent fuel. Of the \$166 million remaining for the Yucca Mountain project, \$106 million was allotted to "infrastructure activities," leaving only \$60 million for activities directly related to repository site investigation.<sup>10</sup>

It would seem that the chief objective to meeting the goal of accepting spent fuel, and relieving states and utilities from liability and responsibility, is to site, license, and construct temporary, above-ground storage - an MRS facility.

### **The First MRS Siting Attempt**

The history of the first attempt at siting an MRS facility provides a telling contrast with the current voluntary host process.

The NWPA did not define the role of MRS facilities, nor did it clearly authorize their construction. Rather, the original Act directed the DOE to study the need for and feasibility of MRS, and to submit to Congress a proposal for constructing one or more facilities.<sup>11</sup> After dismissing the options of no-MRS or an MRS just for backup storage, in 1985 the DOE recommended the need for an *integral* MRS facility to improve the management and control of transportation, facilitate spent-fuel consolidation and packaging to simplify the repository facility, and provide a backup in the event of significant delays in constructing the repository.<sup>12</sup>

The DOE's main siting criteria for an MRS during this period included (1) limiting MRS candidacy to federal lands (preferably DOE and Nuclear Regulatory

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<sup>10</sup> *Id.*

<sup>11</sup> *Supra* note 6, § 141, 42 U.S.C. 10161 (Title I, Subtitle C - Monitored Retrievable Storage).

<sup>12</sup> U. S. Department of Energy, Office of Civilian Radioactive Waste Management, *The Need for and Feasibility of Monitored Retrievable Storage -- A Preliminary Analysis*, DOE/RW-0022 (1985).

Commission (NRC) docketed sites), (2) siting within the east-central region of the U.S. to limit transportation impacts, and (3) narrowing the choice to sites with 1100 available acres without known use conflicts (i.e. operating reactors).<sup>13</sup> Eleven sites were identified within the preferred geographic region, of which three sites in Tennessee were selected for further study. The Clinch River Breeder Reactor site, owned by the Tennessee Valley Authority, was identified as the preferred candidate. Preference was given because of its proximity to the DOE's Oak Ridge Reservation where nuclear activities were compatible with present land usage, an extensive base of environmental data on the site was available, and experienced technical personnel were in supply from the local community.<sup>14</sup>

Questions about the general need for an MRS facility were raised by the General Accounting Office (GAO), the State of Tennessee, and various citizen groups. The Governor of Tennessee utilized his Safe Growth Cabinet Council (SGCC) to organize a multiagency review of the MRS proposal, and perform an independent technical assessment of DOE's program assumptions. Ultimately, the Governor concluded that the MRS, "could be operated safely, but the U.S. doesn't really need it," and that he would veto any plans to build an MRS facility in Tennessee (subject to Congressional override).<sup>15</sup>

After more than a year of legal action in the federal courts, and considerable influence from local community concerns, in March of 1987, the DOE submitted its final proposal to Congress for the construction of an MRS facility at the Clinch River site in Oak Ridge, Tennessee. The estimated opening

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<sup>13</sup> U. S. Department of Energy, Office of Civilian Radioactive Waste Management, Screening and Identification of Sites for a Proposed Monitored Retrievable Storage Facility, DOE/RW-0023 (1985).

<sup>14</sup> U. S. Department of Energy, Office of Civilian Radioactive Waste Management, Monitored Retrievable Storage Submission to Congress, Vol. 1, The Proposal, DOE/RW-0035/1-Rev 1 (1987).

<sup>15</sup> M. R. Fitzgerald & A. S. McCabe, The U.S. Department of Energy's Attempt to Site the Monitored Retrievable Storage Facility in Tennessee, 1985-1987 (Energy, Environment, and Resources Center, University of Tennessee, Knoxville, 1988).

date was 1998, with a storage capacity of 15,000 metric tons of uranium (MTU), and its schedule of construction and operation linked to the successful licensing and operation of a permanent repository.<sup>16</sup>

Despite the DOE's attempts to discount the various independent studies, considerable public and intergovernmental pressure led to the adoption of the NWPA Amendments of 1987 and Congress "annulled and revoked" MRS plans for all of the proposed sites in Tennessee.<sup>17</sup> MRS had been defeated in potentially the most technically and geographically qualified site in the nation.

MRS, however, remained a storage option, tied to the timetable for construction and operation of a repository. The '87 Amendments required an independent assessment of the need for an MRS facility by a Congressional MRS Review Commission before the DOE could begin survey and evaluation of new sites.<sup>18</sup> Most significantly, a new avenue for siting an MRS facility was created with authorization to establish the Office of the Nuclear Waste Negotiator (NWN), a federal agency working closely with the DOE, accountable only to the President and Congress.<sup>19</sup>

### **The Current MRS Siting Attempt**

The report of the MRS Review Commission was issued in November of 1989 and favored an MRS only if the capacity and schedule of its operation could be de-linked from that of the permanent geological repository.<sup>20</sup> Congress, however, remained concerned that an unlinked MRS might be regarded as a "de facto repository" and reduce motivation to continue studying permanent geological

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<sup>16</sup> See U.S. DOE, *supra* note 14.

<sup>17</sup> *Supra* note 8, § 142(a), 42 U.S.C. 10162 (Subtitle C of NWPA of 1982 amended).

<sup>18</sup> *Id.*, § 143, 42 U.S.C. 10163 (Subtitle C of NWPA of 1982 amended).

<sup>19</sup> *Id.*, § 5041, 42 U.S.C. 10241-10251 (NWPA of 1982 amended by adding Title IV).

<sup>20</sup> Monitored Retrievable Storage Review Commission, *Nuclear Waste: Is There a Need for Federal Interim Storage?* (1989).

disposal. As the amended NWPA stood, construction on one MRS could commence only if a repository was licensed, and the MRS could store a maximum of 10,000 MTU until a repository was open. The report also recommended construction of a 2,000 MTU Federal Emergency Storage Facility and a 5,000 MTU User-Funded Interim Storage facility. Since the report concluded that "no single factor would favor an MRS over the no-MRS option," the DOE renewed efforts to site an MRS with remaining statutory links to the repository's construction and operation.

David H. Leroy, former Idaho attorney general and lieutenant governor, was confirmed as the first U.S. NWN and the Office commenced operation in August 1990. The Office was headquartered in Boise, Idaho, to promote an image of separatism from Washington politics and past DOE practices. The DOE's siting criteria and procedures changed dramatically, now preferring the approach of the NWN: to solicit a voluntary MRS host through negotiation with a State or Native American Nation. The DOE took the position, from experience with "comparable facilities," that many places within the contiguous United States would be technically feasible.<sup>21</sup> Furthermore, a *negotiated* agreement could include terms that differ from the current statutory linkages to the repository.<sup>22</sup> Thus, the DOE abandoned eastern U.S. location and federal land preference criteria, de-emphasized technical qualification concerns, relinquished sole responsibility for siting an MRS facility, and suggested an avenue for de-linking MRS from the schedule of a troubled repository siting.

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<sup>21</sup> U. S. Department of Energy, Office of Civilian Radioactive Waste Management, Preliminary Site Requirements and Considerations for a Monitored Retrievable Storage Facility, DOE/RW-0315P (1991).

<sup>22</sup> U. S. Department of Energy, Office of Civilian Radioactive Waste Management, Annual Report to Congress, DOE/RW-0335P (1992).

The office of the NWN was originally to be terminated in January of 1993,<sup>23</sup> leaving less than two years to present a voluntary host to Congress. In May of 1991, the NWN sent a letter of introduction to all state and territorial governors and the governors, Tribal and Business Council chairpersons, and presidents of Pueblos and Native American Nations (both federally recognized and unrecognized). In June, feasibility assessment grants from the Nuclear Waste Fund were authorized through the DOE. In October, the NWN invited governors and tribal leaders to apply for grants for the purpose of independent MRS host studies. On October 17th, six days after applying, the Mescalero Apache tribe of New Mexico took the distinction of receiving the first Phase I grant of \$100,000.<sup>24</sup> Twenty Phase I applications followed (See Table 1). The expressed purpose of the grants is to provide financial resources to make a credible decision without having to rely on the federal government for information.

Grant amounts are substantial by tribal standards. Phase II-A adds \$200,000 for continued education and feasibility studies. Nine Indian tribes applied and, as of this writing, three tribes have been awarded grants and three have withdrawn their applications (see Table 1). Phase II-B offers up to \$2.8 million to continue feasibility studies and education outreach, enter formal negotiations, identify potential sites, and commence an environmental assessment. The Mescalero Apache of New Mexico and the Skull Valley Goshute of Utah have both applied at this level and plan to enter into formal siting negotiations.<sup>25</sup> Over \$3 million per applicant can be spent before the technical feasibility of a site is determined or any formal agreement is made. A volunteer can drop from the process at any time, for no reason, before Congress approves an

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<sup>23</sup> *Supra* note 8, § 410, 42 U.S.C. 10250.

<sup>24</sup> Office of the U. S. Nuclear Waste Negotiator, 1992 Annual Report to Congress (1992).

<sup>25</sup> MRS Newsletter, Vol. 2, Issue 21, August (1993).

TABLE 1. MRS Grant Status as of November 8, 1993

Phase I Grants - \$100,000 each			Phase I Continued ...		
Applicant	Date Submitted	Status	Applicant	Date Submitted	Status
1. Mescalero Apache Tribe Mescalero, NM	Oct. 11, 1991	Awarded Oct. 17, 1991	15. Apache County, AZ	Mar. 18, 1992	Denied Oct., 1992
2. Grant County, ND	Nov. 18, 1991	Phase I completed Awarded Nov. 26, 1991	16. Tetlin Village Council, AK	Mar. 30, 1992	Gov.'s office objected in 4/3/92 telephone conv. Denied June 26, 1992
3. Chickasaw Indian Nation Ada, OK	Dec. 26, 1991	Commissioners defeated in 3/10/92 recall Awarded Feb. 14, 1992	17. Akhlok-Kagyak Inc./ Akhlok Council, Anch., AK	Mar. 30, 1992	Denied June 26, 1992
4. Fremont County, WY	Dec. 30, 1991	Withdrawn, 3/31/93, under tribal opposition	18. Apache Devel. Authority Anadarko, OK	Mar. 31, 1992	Denied Oct. 28, 1992
5. Prairie Island Indian Comm. Walch, MN	Dec. 30, 1991	Awarded Jan. 23, 1992; Phase I completed	19. Fifield Develop. Corp. Fifield, Wisconsin	Mar. 1991	Denied, not an eligible unit of government
6. The Sac and Fox Nation Skard, OK	Dec. 30, 1991	Governor denied Phase II-A application, 8/21	20. Absentee Shawnee, OK	Mar. 31, 1992	Withdrawn by letter dated 6/9/92
7. Yakima Indian Nation Toppenh, WA	Dec. 30, 1991	Awarded Mar. 18, 1992	21. Caddo Tribe Binger, OK	Apr. 17, 1992	Withdrawn by letter dated 7/16/92
8. Skull Valley Goshute Indians Grantsville, UT	Mar. 19, 1992	Grant expired, 7/23/92, grant money returned	Phase II-A Grants - \$200,000 each		
9. Alabama/Quassarte Tribe Eufaula, OK	Mar. 26, 1992	Awarded Apr. 17, 1992	1. Mescalero Apache Tribe Mescalero, NM	Mar. 13, 1992	Status Awarded April 21, 1992
10. Eastern Shawnee Tribe Ottawa County, OK	Mar. 26, 1992	Phase I completed	2. Skull Valley Goshute, UT	Oct. 28, 1992	Request for additional II-A funding denied
11. Lower Brule Sioux Tribe Lower Brule, SD	Mar. 30, 1992	Withdrawn August 13, 1993	3. Ft. McDermitt Tribe, OR/NV	Feb. 22, 1993	Awarded Jan. 27, 1993
12. San Juan County, UT	Apr. 3, 1992	Awarded Sep. 9, 1992	4. Ponca Industrial Corp., TX Tonkawa Tribe of OK	Mar. 31, 1993	Awarded June 1, 1993
13. Ponca Tribe Kay Co., OK	Apr. 6, 1992	Phase I completed	5. Eastern Shawnee Tribe, OK	Mar. 24, 1993	Under final phase of review
14. Ft. McDermitt Paiute Tribe Shoshone, Humboldt Co., NV	May. 30, 1992	Denied Feb., 1993	6. Prairie Island Indians, MN	Mar. 30, 1993	Denied Sep. 1, 1993
		Awarded May 4, 1992	7. Ute Mtn. Ute Tribe, CO	Mar. 30, 1993	Denied June 9, 1993
		Governor denied Phase II-A application, 1/10/93	8. Miami Tribe, OK	Mar. 30, 1993	Withdrawn Aug. 5, 1993
		Awarded May 4, 1992	9. Northern Arapahoe Economic Development Comm., WY	Mar. 26, 1993	Withdrawn June 8, 1993
		Phase I completed			
		Awarded July 15, 1992			
		Phase I completed			

Phase II-B Grants - \$2.8 million each

Applicant	Date Submitted	Status
1. Mescalero Apache Tribe, NM	Aug. 4, 1993	Under review
2. Ft. McDermitt Tribe, OR/NV	Aug. 9, 1993	Under review

Source: Office of the Nuclear Waste Negotiator, Boise, Idaho.

agreement and the Nuclear Regulatory Commission (NRC) authorizes construction.

In negotiating an agreement, an MRS host is allowed compensation in the form of cash payments and benefits. Benefits outlined in a statutory schedule include \$5 million annually until an MRS was opened and \$10 million per year from opening to closure.<sup>26</sup> In addition, the NWN has reminded volunteers that the history of the NWPA, MRS siting negotiations in Tennessee, and the Waste Isolation Pilot Project (WIPP) in New Mexico, all demonstrate possible benefits involving many hundreds of millions of dollars.<sup>27</sup> Additional benefits to offset "potential impacts" include facilities and personnel for any public service or infrastructure addition or improvement.<sup>28</sup> However, amended statutory language requires any benefits agreement negotiated with an Indian host to provide a waiver of rights to sue the government in the event of an accident.<sup>29</sup>

January 1993, the date of termination for the office of the NWN, was approaching and an MRS site had not yet been presented to Congress. However, on October 24, 1992, President Bush signed into law the Energy Policy Act of 1992.<sup>30</sup> Six of the Act's 30 titles dealt with nuclear energy issues. Most significantly for MRS, the Act extended the Office of the NWN to January of 1995,<sup>31</sup> keeping the voluntary host process alive and well.

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<sup>26</sup> *Supra* note 8, § 171(a), 42 U.S.C. 10173a.

<sup>27</sup> *See* Office of the NWN, *supra* note 24.

<sup>28</sup> *Supra* note 8, § 175(b), 42 U.S.C. 10174a.

<sup>29</sup> *Supra* note 8, § 171(b)(5), 42 U.S.C. 10173a (referring to §§ 116(c)(1)(B)(ii), 116(c)(2), 118(b)(2)(A)(ii), and 118(b)(3) of the NWPA of 1982).

<sup>30</sup> Energy Policy Act of 1992, P.L. 102-486, 42 U.S.C. 13201 note.

<sup>31</sup> *Id.*, § 802(a), 42 U.S.C. 10141 note (specifically, § 410 of the NWPA of 1982 was amended by striking "5 years" and inserting "7 years").



## SOVEREIGN VOLUNTEERS

Nine of the twelve Phase I grants were awarded to Native American Nations, all in the western half of the U.S. All nine of the Phase IIA and both Phase IIB applications were submitted by Native American Nations. After two extensions, the deadline for applying for feasibility grants expired in March 1993, and no current extension exists; therefore, if an MRS is to be sited it will be on an Indian reservation.

An introduction to the history of colonialism, racism, exploitation, and the near genocide of the Native American Nations is too lengthy for this discussion.<sup>32</sup> However, the DOE's current MRS initiative builds on a long history of radioactive activities in Indian country and the loophole of tribal sovereignty. In addition, the current reasons for singling out this sovereign unit of the U.S. federal government as a host for waste that not one of 50 States is willing to accept is based on past and current federal Indian policy and the socioeconomic conditions of the reservation system.

### **Federally Defined Sovereignty**

Unless authorized by Federal law or affected, altered, or diminished by Tribal law, Native American Nations (or American Indian tribes) retain their sovereign powers, thus States lack civil or criminal jurisdiction over Indians within "Indian country."<sup>33</sup>

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<sup>32</sup> For a history of Native American events leading up to the massacre at Wounded Knee in 1890, see D. Brown, *Bury My Heart at Wounded Knee* (Henry Holt & Company, Inc., New York, 1970). For an account of the American Indian Movement of the '60s and '70s see P. Matthiessen, *In the Spirit of Crazy Horse* (The Viking Press, NY, 1983). For a current account of Native American issues see W. Churchill (Ed.), *Critical Issues in Native North America*, V.1-2 (International Work Group for Indigenous Affairs, Copenhagen, Vol.1-1989, Vol.2-1991).

<sup>33</sup> See Title 18, U.S.C. section 1151 (defines "Indian country").

Native American Nations have long been held by the United States Supreme Court<sup>34</sup> and international law experts<sup>35</sup> as separate sovereigns. Because the United States Constitution and state constitutions are designed to limit those governments, they do not apply to Native American Nations or their governing bodies.<sup>36</sup>

The Fort McDermitt Paiute-Shoshone Tribe of Oregon and Nevada (Fort McDermitt Tribe; third tribe to enter Phase II-A), State of Oregon, and the United States provide an example of the interplay between state, tribal, and federal jurisdiction (or lack thereof) with regard to a nuclear waste MRS facility.

The people that originally inhabited the lands of the current Fort McDermitt Indian Reservation were a Band of the Northern Paiute Nation.<sup>37</sup> The

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<sup>34</sup> *Johnson v. M'Intosh*, 21 U.S. (8 Wheat.) 543 (1823) (discovery by the European nations did not extinguish the natives' sovereignty but did necessarily diminish it); *Cherokee Nation v. Georgia*, 30 U.S. (5 Pet.) 1 (1831) (calling tribes "domestic dependent nations," and "distinct community . . . in which the laws of Georgia can have no force . . . but with the assent of the Cherokees themselves, or in conformity with treaties, and with the acts of Congress."); *Ex parte Crow Dog*, 109 U.S. 556 (1883) (Treaty provision subjecting Indians to traditional dispute resolution for criminal acts prevented federal court jurisdiction where no other federal law directed otherwise); *Talton v. Mayes*, 163 U.S. 376 (1896) (because the Cherokee Nation existed prior to the adoption of the U.S. constitution, the Fifth Amendment's grand jury indictment requirement does not apply to the Cherokee Nation); *Williams v. Lee*, 358 U.S. 217 (1959) (despite transitory nature of clauses of action resulting from contractual relations, Tribal Courts have exclusive jurisdiction when contract entered into on reservation); *United States v. Wheeler*, 435 U.S. 313 (1978) (Double Jeopardy Clause of U.S. Constitution does not bar criminal prosecution in Tribal and Federal courts because the tribe is a distinct sovereign); *Oliphant v. Suquamish Indian Tribe*, 435 U.S. 191 (1978) (tribal jurisdiction to try non-Indian criminal defendants necessarily was terminated by the dependent relationship created by tribe's incorporation into the United States); *Washington v. Confederated Tribes of Colville Indian Reservation*, 447 U.S. 134 (1980) (tribes retain civil jurisdiction to tax non-Indians on reservation lands); *Montana v. United States*, 450 U.S. 544 (1981) (tribe lacked inherent civil authority to regulate fishing by non-Indians on non-Indian lands within reservation boundaries when no important tribal interests were directly affected); and, *National Farmers Insurance Co. v. Crow Tribe of Indians*, 471 U.S. 845 (1985) (Tribal Courts can exercise personal and subject matter jurisdiction over non-Indians for acts on reservation lands).

<sup>35</sup> See Nys, Introduction to *F. Victoria, De Indis et de Ive Belli Reflectiones* (J. Bate trans.) (Carnegie Institution, Washington, 1917) (detailed treatment of Victoria and the events leading to the Spanish Emperor's request for advice on the American aborigines).

<sup>36</sup> *United States v. Wheeler*, 435 U.S. 313, 323-24 (1978).

<sup>37</sup> See O. Stewart, *The Northern Paiute Bands*, 2:3 *Anthropological Records* at 136 (University of California Press, 1939). The traditional name of the Fort McDermitt people was either *Atsaküdökwa* (Red Mountain dwellers) or *Kwina riba nomo* (Quinn River people).

governing body of that Band, with the influence of other Band leaders, exercised unlimited civil and criminal jurisdiction over the Band's territory.<sup>38</sup> However, in 1934 Congress enacted the Indian Reorganization Act (IRA).<sup>39</sup> The IRA was part of John Collier's<sup>40</sup> attempt to encourage economic development, self-determination, cultural plurality, and the revival of tribalism. The IRA was intended to provide a mechanism for the tribe, as a government unit, to interact with and adapt to modern society.<sup>41</sup>

As a result of the IRA, the members of the Atsaküdökwa or Kwina riba nomo Band of the Northern Paiute Nation voted to adopt a Constitution<sup>42</sup> and Federal Corporate Charter,<sup>43</sup> thereby becoming the federally recognized Fort McDermitt Paiute-Shoshone Tribe. The Tribe (a voluntary member of the Inter-Tribal Council of Nevada, Inc.) has land holdings in both Nevada and Oregon held in trust by the United States (tribal lands).<sup>44</sup>

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<sup>38</sup> Atsaküdökwa or Kwina riba nomo territory was about 27,000 square miles in what is now the State of Nevada and Oregon. *Id.*

<sup>39</sup> Ch. 576, 48 Stat. 984 (codified at 25 U.S.C. §§ 461, 462, 463, 465, 466-470, 471-473, 474, 475, 476-478, 479).

<sup>40</sup> Active in the reform movement since 1922, was appointed Commissioner of Indian Affairs by President Franklin Roosevelt. See F. S. Cohen, *Handbook of Federal Indian Law* (Michie Pub. Co., 1982 ed.) at 146-47.

<sup>41</sup> See Cohen, *id.* at 147.

<sup>42</sup> Approved by the Secretary of the U.S. Department of the Interior on July 2, 1936.

<sup>43</sup> Approved by the Secretary of the U.S. Department of the Interior on November 3, 1936.

<sup>44</sup> See R. Johnny, *Can Indian Tribes Afford to let the Bureau of Indian Affairs Continue to Negotiate Permits and Leases of their Resources?* 16 *American Indian Law Review* 203, 204 (1991). Individual Indians, some not members of the Fort McDermitt Tribe, own fractionated interests in lands owned by Indians also held in trust by the United States (allotted Indian lands). Other Indians have life estates on tribal lands assigned to their tribal member spouses either because the spouse is deceased or by operation of a Tribal Court divorce decree or other order.

The governing body of the Fort McDermitt Tribe is its Tribal Council.<sup>45</sup> The Council's authority is restricted by both Tribal law<sup>46</sup> and Federal law.<sup>47</sup> The Tribe exercises civil and criminal jurisdiction over its Nevada lands,<sup>48</sup> as set forth in its Constitution<sup>49</sup> and Law & Order Code (1988-89).<sup>50</sup> However, the State of Oregon, through Public Law 280, exercises criminal and limited civil jurisdiction<sup>51</sup> over

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<sup>45</sup> See Fort McDermitt Const., art. III, § 1.

<sup>46</sup> *Id.*, art. VI (powers and duties of the Tribal Council) § 1 (enumerated powers and duties); *Id.*, art. § 2 (method by which future powers may be secured by the Tribal Council) and §3 (reserving powers to tribal members). See also Corporate Charter of the Fort McDermitt Paiute and Shoshone Tribe of the Fort McDermitt Indian Reservation, § 5(1) (prohibiting Tribal Council from selling or mortgaging Tribal land), (2) (restricting Tribal Council to leasing or permitting Tribal land for terms no longer than 5 years), (3) (prohibits Tribal Council from taking any action which "in any way operates to destroy or injure the tribal grazing lands or other natural resources of the Fort McDermitt Indian Reservation").

<sup>47</sup> For example, the Indian Civil Rights Act of 1968, codified at 25 U.S.C. § 1302, requires that the Tribe provide most of the rights afforded United States Citizens by the U.S. Constitution and its amendments. The Major Crimes Act, codified at 18 U.S.C. §§ 1153, 3242, allows the federal government to prosecute Indians in federal court for any of the 17 enumerated crimes (murder, rape, incest, child abuse, burglary, etc.).

<sup>48</sup> In 1953, Congress enacted a law that allowed states, like Oregon and Nevada, to exercise criminal and limited civil jurisdiction in "Indian country." See Act of Aug. 15, 1953, ch. 505, 67 Stat. 588 (section 7 repealed and reenacted as amended 1968) (codified as amended at 18 U.S.C. § 1162, 25 U.S.C. §§ 13221-1326, 28 U.S.C. §§ 1360, 1360 note). The popular name of this Act, Public Law 280, is applied generally to the statutory scheme for federal delegation to the states of jurisdiction over Indian lands that evolved from this Act and subsequent amendments, repeals, and reenactments. See Cohen, *supra* note 40, at 175, 175 n.254.

In May 1974, Nevada retroceded jurisdiction over 13 of the 14 tribes Public Law 280 authorized. In 1989, the State of Nevada retroceded jurisdiction over the last Indian Colony in the state.

<sup>49</sup> Fort McDermitt Const., art. I.

<sup>50</sup> Chapter 3, § 1 (criminal jurisdiction of Tribal Court); Chapter 4, § 1 (civil jurisdiction of Tribal Court); and Chapter 22, § 7 (tribal chairperson's authority).

<sup>51</sup> Where applicable, Public Law 280 grants states "jurisdiction over offenses" and "civil causes of action" and provides that state "criminal laws" and "civil laws . . . that are of general application" shall have the same force and effect in Indian country as they have elsewhere within the state. However, there are sufficient areas not delegated to the states by the statute, particularly regulatory and tax fields. See Cohen, *supra* note 40, at 363.

The Act includes specific exceptions of state taxing and certain other jurisdiction over trust and restricted Indian property and of jurisdiction over Indian hunting and fishing. (see 18 USC §1162(b); 25 USC §§ 1321(b), 1322(b); 28 USC § 1360(b)). A possible inference from these exceptions and from the general terms of the Act quoted above was that all other jurisdiction is delegated by the Act. But in *Bryan v. Itasca County*, 426 US 373 (1976), the Supreme Court rejected this construction and invalidated a state property tax on unrestricted Indian property located in Public Law 280 Indian country. See Cohen, *supra* note 40.

the Tribe's Oregon lands because it has not yet retroceded such jurisdiction to the Tribe and United States.

For many tribes, like the Fort McDermitt Paiute-Shoshone Tribe, the effect of the IRA, by adopting an IRA Constitution and Corporate Charter, was to terminate the Tribe's traditional form of government and dispute resolution. It also established a republican form of government and court system negligently conceived; provided self-determination for those families who could elect their family members into office; stifled economic development; and allowed the federal government more authority in intra- and inter-tribal affairs. The IRA also imposed Tribal laws codified in the Tribe's constitution and federal Corporate Charter, that tribal and federal officials neither consider in their deliberations nor abide by.<sup>52</sup>

While constitutions, corporate charters, and law codes vary widely among tribes, the sovereign system of Indian Nations as a whole, shaped through years of court cases and Federal law, has effectively provided a loophole for studying, and possibly siting, MRS in Indian Country. Activities of the three County MRS grants were discontinued either by a state governor's or county commission's denial (see Table 1). Although governors and state and federal legislators in states with tribes in Phase II-A have opposed an MRS, at this time they have no legal power to stop the studies or, possibly, a siting. The NWPA, in fact, proclaims that the authority of the governor and legislature of each state shall not be applicable with respect to any site located on a reservation.<sup>53</sup>

This avenue of avoiding state, local, and, at times, federal jurisdiction, laws, and environmental quality control has historically been used to the

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<sup>52</sup> See Johnny, *The Problems of a Small, Rural, Indian Tribe* (1988) (can be obtained from the author); see also R. Johnny, *supra* note 44.

<sup>53</sup> *Supra* note 6, § 135(d)(6)(C), 42 U.S.C. 10155.

advantage of the solid and hazardous waste industry. Sovereign land offers a minimal permit application process, scant public input or review, little or no government regulatory oversight, exemption from state and local laws, and distance from colonial America. The BIA, an agency with little expertise in environmental analysis, issues permits for waste facilities.<sup>54</sup> Only a handful of tribes have any environmental laws, and these are basically from their own initiative and financing as the U. S. Environmental Protection Agency has provided limited funding and direction for environmental services on Indian lands.<sup>55</sup>

### **Historically Imposed Economic Vulnerability**

The social and economic conditions of Indian country stem from the federally defined sovereignty of Indian Nations. These conditions contribute to the willingness of some Indian tribes to study MRS while not one of 50 states will. In 1976, North American Indian populations suffered from the "highest rate of infant mortality on the continent, the shortest life expectancy, the greatest incidence of malnutrition, the highest rate of death by exposure, the highest unemployment, the lowest per capita income, the highest rate of communicable or plague diseases, the lowest level of formal educational attainment."<sup>56</sup>

While some strides have been made, much of the Native population, particularly on reservation and trust lands, remains young, poor, uneducated,

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<sup>54</sup> Akwesasne Notes, *Waste Companies Exploit and Threaten Sovereignty*, 23#3: 11, Midwinter (1992).

<sup>55</sup> See Hearing on the Indian Tribal Government Waste Management Act of 1991 (S. 1687) before the Select Committee on Indian Affairs, U.S. Senate, One Hundred Second Congress, First Session, Oct. 17 (1991).

<sup>56</sup> W. Churchill & W. LaDuke, *Native America: The Political Economy of Radioactive Colonialism*, in W. Churchill (Ed.), *Critical Issues in Native North America - Volume II*, International Work Group for Indigenous Affairs, Copenhagen (1991). Based on A Statistical Portrait of the American Indian, DHEW/U.S. Bureau of the Census (1976).

and unemployed. Table 2 summarizes selected statistics from the 1990 U.S. Census for the American Indian, Eskimo, and Aleut population, and the most recent data on the Indian Health Service population; both compared to all races in the U.S. taken as a whole. In the Census, some reservations had per capita incomes as low as \$1,325 and civilian unemployment rates and poverty levels as high as 100%. Of the reservations that also have trust lands, accounting for over one-half of Native American populations on reservations and trust lands, average per capita income was just under \$5,000, compared to \$14,420 for all U.S. citizens.<sup>57</sup>

The BIA supports any economic development opportunities, and to some tribal councils an MRS facility may be viewed as nothing more than fast cash and jobs. However, the history of radioactivity in Indian country suggests that the hazards and permanence of nuclear waste will likely remain long after the benefits are gone.

### **Native America and the Nuclear Era<sup>58</sup>**

Over one-half of all U.S. uranium deposits lie under reservation land. In the past, the Secretary of Interior was authorized to lease tribal mineral resources for national defense purposes.<sup>59</sup> In return for mining rights, the large energy consortiums have historically paid royalty fees and employed Indians in sub-standard working conditions. By 1980, the sovereign Navajo nation had 42 uranium mines and 7 mills located on or adjacent to reservation or trust land.<sup>60</sup>

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<sup>57</sup> Census 1990, U.S. Department of Commerce, Bureau of the Census.

<sup>58</sup> For a more detailed discussion of this section see J. D. Erickson & D. Chapman, *Sovereignty for Sale: Nuclear Waste in Indian Country*, 10(3) *Akwe:kon* 3 (Fall 1993).

<sup>59</sup> See J. Redhouse, *An Overview of Uranium and Nuclear Development on Indian Lands in the Southwest*, Redhouse/Wright Productions, Albuquerque, N.M.; available from the Southwest Research and Information Center, Albuquerque, N.M.

<sup>60</sup> See Churchill and LaDuke, *supra* note 56.

**TABLE 2. Socioeconomic Data**

Category	American Indians, Eskimo, & Aleut	U.S. All Races
<i>U.S. Census (1990)</i>		
Total Population	1,959,234	248,709,873
Reserv/Trust Land Population	437,358	807,817
Median Age	22.3	32.9
High School or Higher (25 age +)	65.5%	75.2%
Bachelor's or Higher (25 age +)	9.3%	20.3%
Males (16 age +)		
Unemployed - Civilian	15.4%	6.4%
Not in Labor Force	30.6%	25.6%
Females (16 age +)		
Unemployed - Civilian	13.1%	6.2%
Not in Labor Force	44.9%	43.2%
Median Household Income-1989\$	\$20,025	\$30,056
Below Poverty Level - all ages	30.9%	13.1%
- under 5 years old	44.4%	20.1%
<i>Indian Health Service Population (1986-1988)</i>		
Birth Rate (per 1,000)	28	15.7
Infant Mortality Rate (per 1,000)	9.7	10.1
Age-adjusted Mortality Rates, Percent Higher than All Races:		
Alcoholism	438%	
Tuberculosis	400%	
Diabetes Mellitus	155%	
Accidents	131%	
Homicide	57%	
Pneumonia and influenza	32%	
Suicide	27%	

Sources: U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, Census 1990; U.S. Department of Health and Human Services, Public Health Service, Indian Health Service, Trends in Indian Health 1991.



In the Four Corners area (the corners of Arizona, Colorado, New Mexico, and Utah) there were approximately 2,500 mines, with as many as 3,000 Navajo men employed during the uranium boom of the late 1940s through the 1970s.<sup>61</sup> As of 1979, some 5,163 uranium claims were held in the Black Hills in South Dakota/Wyoming, sacred lands to the Lakotas and bordering current reservation populations; 214,747 acres of private land in the area are also under mining leases.<sup>62</sup>

The environmental consequences of uranium mining, atomic bomb testing and production, and radioactive waste disposal on or near reservation lands have often been disastrous. Estimates conclude that over 22,000,000 tons of mine tailings, or waste by-products, have been left at 24 locations in nine western states since the 1950s, and that 220 acres of tailings have contaminated the Four Corners region alone.<sup>63</sup>

Tailings, retaining 85% of the original ore radioactivity, often found their way either directly or indirectly into major Indian water resources. The Kerr-McGee Churchrock mine on the Navajo reservation discharged some 80,000 gallons of radioactive water per day from its primary shaft during the early '80s, directly contaminating local and downstream potable water supplies. In June of 1980, 18 years after 200 tons of radioactive mill tailings washed into the Cheyenne River, an indirect source of potable water for the Pine Ridge Reservation in South Dakota, the Indian Health Service tested gross alpha levels in reservation well water as high as fourteen times the national standard.<sup>64</sup> The largest spill of radioactivity in U.S. nuclear industry history occurred on July 16, 1979, when the

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<sup>61</sup> S. E. Dawson, *Navajo Uranium Workers and the Effects of Occupational Illnesses: A Case Study*, 51:4 Human Organization (1992).

<sup>62</sup> See Churchill and LaDuke, *supra* note 56.

<sup>63</sup> See Dawson, *supra* note 61; Dawson refers to C. McLeod, *Uranium Mines and Mills Have Caused Birth Defects among Navajo Indians*, 12 Energy Resources 49 (1985).

<sup>64</sup> See Churchill and LaDuke, *supra* note 56.

United Nuclear uranium mill tailings dam broke, releasing more than 96,000,000 gallons of tailings liquids into the Rio Puerco, a major water source for Navajos and their livestock. The acidic tailings (pH of 1) and 1,100 tons of tailings solids contaminated the river some 40 miles beyond the dam, staining the streambed with yellow and green chemical salts.<sup>65</sup> The nuclear impact on Indian populations also includes effects from weapons testing and storage,<sup>66</sup> and much speculation of military nuclear waste dumping on federally seized Indian lands.<sup>67</sup>

For the Navajo and other affected tribes the health effects have been more than coincidental. Despite epidemiological evidence linking uranium mining with occupational illnesses<sup>68</sup> and correspondingly high rates of death, cancer, and birth defects, decades of lawsuits have proven unsuccessful in gaining compensation for Navajo miners. Inability to prove the causal relationship between uranium exposure and disease, which often occurs years after the initial exposure, has been the major holdup.<sup>69</sup>

Congress has recently issued a formal apology and promised compensation to the families of killed and injured uranium miners, and victims of downwind

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<sup>65</sup> W. P. Robinson, *Uranium Production and its Effects on Navajo Communities Along the Rio Puerco in Western New Mexico*, In B. Bryant and P. Mohai (Eds.), *The Proceedings of the Michigan Conference on Race and the Incidence of Environmental Hazards* (University of Michigan School of Natural Resources, Ann Arbor, 1990).

<sup>66</sup> B. Nietschman & W. LaBon, *Nuclearization of the Western Shoshone Nation*, in W. Churchill (Ed.), *Critical Issues in Native North America -Volume I* (International Work Group for Indigenous Affairs, Copenhagen, 1989).

<sup>67</sup> P. Matthiessen, *In the Spirit of Crazy Horse* (The Viking Press, NY, 1983).

<sup>68</sup> See Dawson, *supra* note 61. Dawson references: C. Butler, J.M. Samet, W.C. Black, C.R. Key, and D.M. Kutvirt, *Histopathologic Findings of Lung Cancer in Navajo Men: Relationship to U Mining*, 51 *Health Physics* 51 (1986); L.S. Gottlieb and L.A. Husen, *Lung Cancer among Navajo Uranium Miners*, 81 *Chest* 449 (1982); National Institute of Environmental Health Sciences and NIOSH, *Radon Daughter Exposure and Respiratory Cancer Quantitative and Temporal Aspects* (National Technical Information Services, Springfield, VA, 1971); C. McLeod, *Uranium Mines and Mills May Have Caused Birth Defects among Navajo Indians*, 12 *Energy Resources* 49 (1985); among others.

<sup>69</sup> See Dawson, *supra* note 61.

exposure. The 1990 Radiation Exposure Compensation Act<sup>70</sup> appropriated \$100 million for partial restitution to individuals who developed lung cancer or other respiratory diseases as a result of open air testing in Nevada or uranium mining. Miners or, if deceased, their surviving family member(s) are eligible for \$100,000 payments, and thus far 1,112 miners or their families have filed; 328 approved, 121 denied, and 663 pending. According to the Office of Navajo Uranium Claims, only 54 of the approved claims were for Navajos, and Navajos are again facing bureaucratic and legal difficulties in filing claims.<sup>71</sup>

## **COUNCIL SOLIDARITY AND EXTERNAL INFLUENCE:**

### **The Case of the Mescalero Apache**

Despite the apparent economic vulnerability of many Native American Nations, the majority of tribes have not looked favorably upon accepting waste. The Western Governors' Association reported that, "half of surveyed tribes had been approached to host (solid waste) facilities and all but four rejected these offers almost immediately."<sup>72</sup> The NWN solicited responses from 573 tribal leaders and received only 19 applications. Seven of these applicants withdrew under tribal opposition: two before the grant was awarded, two returned the \$100,000 grant, and three during Phase II. In New Mexico, out of 22 tribes, only the Mescalero Apache applied, taking the distinction of being the first Phase I, II-

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<sup>70</sup> Radiation Exposure Compensation Act, P.L. 101-426, 42 USC 2210 note (1990).

<sup>71</sup> K. Schneider, *Valley of Death: Late Rewards for Navajo Miners*, The New York Times, May 3 (1993).

<sup>72</sup> From opening remarks of Senator John McCain (AZ), Vice Chairman of the U.S. Senate Select Committee on Indian Affairs, at hearing on the Indian Tribal Government Waste Management Act of 1991, Oct. 17 (1991).

A, and II-B applicant. Investigation into internal and external influences on the Mescalero's decisions can lend insight into the voluntary host process.

The decision to study MRS, pursue a negotiated agreement, and allocate grant and benefits package money is ultimately at the discretion of the Mescalero tribal council and, in particular, subject to the long-standing reign (over 35 years) and influence of tribal council president, Wendell Chino. Whether Chino's unmarred election record is legitimate has been subject to tribal debate. Elections are coordinated by an election committee appointed by Chino, and votes have always been counted in secrecy, despite tribal opposition.<sup>73</sup> His power as president is also deeply rooted in the tribe's BIA approved constitution.<sup>74</sup> The president serves in the legislative and executive departments, appoints judiciary members, and heads the court of appeals. In particular, the president establishes committees, acts as contracting officer, holds veto power, grants pardons, and directs the tribal police. A referendum on a council decision is possible with a petition signed by 30% of the voters, but it can't affect contracts or agreements with third parties who are not members of the tribe, such as the DOE. A recall of any member of the tribal council or an amendment to the constitution are possible, but at Chino's discretion due to his immense constitutional duties and powers. The few tribe members who initially spoke out publicly against the tribe's MRS studies have all since been fired from their reservation jobs, some of which were federal positions with the BIA.<sup>75</sup>

In a letter from Wendell Chino to David Leroy, the NWN, the tribe's president describes their motives to study MRS as, "first, because we were asked

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<sup>73</sup> Personal communication with Francine Magoosh, Mescalero tribe member, June 1993.

<sup>74</sup> Based on the Revised Constitution of the Apache Tribe on the Mescalero Indian Reservation, approved Mar. 25, 1939, revised Jan. 12, 1965 (the year Chino officially came to power), U.S. Dept. of the Interior, Office of Indian Affairs.

<sup>75</sup> See Magoosh, *supra* note 73.

to consider it by the United States Government; second, because there appears to be an opportunity to operate an MRS facility on a sound commercial basis; and, third, because we can bring to such a program our strong traditional values that favor protecting the earth." At a December 1991 meeting of the National Congress of American Indians, David Leroy referred to the "timeless wisdom" and the "native American culture and perspective" that made Indians the best candidate for spent fuel storage.<sup>76</sup> In contrast, Francine Magoosh, and other tribe members, estimate that as much as 95% of the tribe opposes the MRS studies, and she expresses shame over her tribe's actions, not patriotic duty or reverence for nature.<sup>77</sup>

Donalyn Torres, at a Chaves County Commission meeting, outlined the tribe's apprehensions about speaking out as fear of job sanctions or attacks on relatives.<sup>78</sup> In an August "MRS Newsletter" from the Mescalero Council, the Council reported that any agreement entered into between the tribe and the DOE will be, "submitted to the membership of the Mescalero Apache Tribe for ratification." This is a welcome change but likely to be too little, too late.

The nuclear power industry has been particularly influential in tipping Chino's decision in their favor. The Mescalero council's main consultant, Pacific Nuclear of Federal Way, Washington, designs and constructs storage containers for spent fuel. It is unclear whether consultants initiated the current Native American involvement, and how the Phase I and II funds are divided between consultants, tribal leadership, and the education of tribe members.<sup>79</sup>

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<sup>76</sup> See Leroy, *supra* note 1.

<sup>77</sup> See Magoosh, *supra* note 73.

<sup>78</sup> Albuquerque Journal Staff, *Skeen Against Mescaleros Study in N-Waste Site*, Albuquerque Journal, Jan. 25 (1992).

<sup>79</sup> For example, the Ponca Industrial Corporation (PIC) recently applied on behalf of the Tonkawa tribe of Oklahoma after losing their Ponca tribe client (S. Davis, *Ponca want accounting for MRS \$\$\$*, News From Indian Country, May (1993); *Tribe Applies for Grant for Nuclear Waste Study*, Tulsa World, April 4 (1993)).

The U.S. Council for Energy Awareness and the Edison Electric Institute, both pro-nuclear Washington lobbyists, have also assisted the Mescalero council with informational and financial resources. Two trips were financed to nuclear plants and spent fuel dry storage facilities at the Oconee plant in South Carolina, the Surry plant in Virginia, and the spent fuel railroad transportation facility of the H. P. Robertson plant in South Carolina. The first trip was for the tribal council and the second for officials from surrounding communities and local press.<sup>80</sup> No trip was taken to a spent fuel dry consolidation facility because a commercial facility does not exist in the U.S.

Besides negotiating a benefits package, the federal government has a particular influence that could dramatically affect an outcome: adjacent federal land. Of the three sites suggested as possible MRS candidates in Mescalero territory, two are on non-Indian land and one straddles the reservation border.<sup>81</sup> One site is adjacent to the federal property of White Sands Missile Range. As part of a negotiated agreement, land could be given to the tribe to be held in trust for the purpose of an MRS facility. In addition, in the event that a voluntary host is not found, the Mescalero's tenure with the MRS initiative could in effect ease a forced siting on adjacent federal land.

The DOE has also funded Indian organizations and consultants to educate the Mescalero and other tribes about radioactive waste. As a result of an agreement dating back to 1984, the National Congress of American Indians (NCAI) has received hundreds of thousands of dollars in DOE grants to "assist tribes in the program study of nuclear waste sites." In 1989, the DOE was the NCAI's largest contributor, with grants totaling \$355,000. The Council of Energy

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<sup>80</sup> Personal communication with Felix Killar, Director of Nuclear Waste Program, U. S. Council on Energy Awareness, March 1993.

<sup>81</sup> T. Davis, *Indians' N-dump proposal scares Ruidoso tourist-woolers*, Albuquerque Journal, Jan. 2 (1992).

Resource Tribes (CERT), funded by the Federal Administration for Native Americans, has held conferences with government and industry promoters of nuclear waste storage in an effort to "pinpoint tribal traditions that would help build 'consent' on nuclear waste storage."<sup>82</sup>

Despite the description of MRS as temporary storage, the history of 'temporary' radioactivity supports the likely case of permanent radioactivity. Nuclear reactors were originally planned to be decommissioned at the end of their useful lives. Decommissioning plans included disassembly, decontamination, and restoration of the reactor site. Of the 16 commercial nuclear power plants permanently shutdown to date, only one has been decontaminated (see Table 3). The others store reactors on site, and will remain radioactive for hundreds of thousands of years if not decommissioned. As stated previously, a negotiated agreement could effectively break the statutory linkages of an MRS approval to a repository licensing - allowing the possibility of permanent MRS storage.

In addition, the number of jobs that would be available to tribe members remains unclear. Construction and control of an MRS would fall strictly under DOE jurisdiction. Past DOE estimates of the employment skill mix of an MRS facility concluded "an approximately even mix of professional white collar and skilled blue collar and craft employees."<sup>83</sup>

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<sup>82</sup> J. A. A. Hernandez, *How the Feds Push Nuclear Waste onto Indian Lands*, 11(30) SF Weekly, September 23 (1992).

<sup>83</sup> Described in the DOE answers to questions posed in the Clinch River MRS Task Force Memorandum No. 11, August 19, 1985.

## NUCLEAR ECONOMICS AND NATIONAL SAFETY

The economic and safety justifications of an MRS over a no-MRS option are of concern not only to a directly affected Indian reservation, such as the Mescalero or Fort McDermitt Tribe, but to the nation as a whole.

The most significant factor in the economics of storage is the declining nature of the nuclear power industry. No new orders for reactors have been placed in nearly 15 years, and of the 139 orders placed between 1971 and 1978, 107 were canceled.<sup>84</sup> As more plants age and come off-line, a declining nuclear power capacity must be reconciled with a resulting decline in expected waste accumulation. Under the DOE's No New Orders Case, graphed in Figure 1, the cumulative spent fuel inventory begins to flatten by the year 2030. The amount of future waste will affect the economics of central storage compared to at-reactor storage. The possibility of premature reactor shutdowns also affects future waste totals. Fifteen of the 16 permanent reactor shutdowns occurred without attaining the expected 30 years of full service (see Table 3), significantly reducing cumulative waste totals. The DOE No New Orders Case assumes all remaining reactors will achieve at least 40 years of operation, and 30% will have extended lifetimes to 60 years. These assumptions may be optimistic given the high incidence of premature shutdowns. Furthermore, if projected reactor efficiency improvements occur, less waste will result for given levels of electricity generation, or vice versa.

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<sup>84</sup> U.S. Council for Energy Awareness, Historical Profile of U.S. Nuclear Power Development - 1992 Edition, Energy Update, Washington, D.C.



**TABLE 3**  
Status of Shutdown Reactors with Commercial Energy Production

Reactor Name	Capacity	Generation History			Apparent Shutdown Mode	Decommissioning Status
		First Year	Last Year	Duration Years		
Shippingport	72 MWe	1957	1982	25	Depreciation, High Production Cost	Decontamination
Dresden 1	220 MWe	1960	1978	18	Maintenance Economics	Storage
Yankee Rowe	167 MWe	1961	1991	30	Maintenance Economics	Storage
Indian Point 1	275 MWe	1962	1974	12	Safety Economics; No ECCS	Storage
Humboldt Bay	65 MWe	1963	1976	13	Safety Economics; Earthquake Protection	Storage
Hallam	76 MWe	1963	1964	1	Maintenance Economics	Entombment
Pathfinder	58 MWe	1966	1967	1	Maintenance Economics	Storage
Fermi 1	61 MWe	1966	1971	5	Severe Accident	Storage
Hanford-N	860 MWe	1966	1988	22	Reduced need for nuclear weapons	Storage
San Onofre-1	436 MWe	1968	1992	24	Unwilling to Invest in Upgrade	Storage
La Crosse	51 MWe	1969	1987	18	Safety Economics	Storage
Rancho Seco	913 MWe	1975	1989	14	Maintenance Economics; Closed by Utility Election	Storage
Trojan	1095 MWe	1976	1992	16	Maintenance and Regulatory Economics	Storage
Three Mile Island 2	961 MWe	1978	1979	1	Severe Accident	Storage
Fort St. Vrain	330 MWe	1979	1989	10	Maintenance Economics	Storage
Shoreham	809 MWe	1986	1988	2	No Evacuation Plan	Storage

Note: ECCS = emergency core cooling system.

MWe = megawatt-electric capacity.

Considers only reactors with at least 50 MWe capacity for civilian nuclear power. The Shoreham unit achieved criticality and produced power, but closed before it could begin commercial operation.

The Hanford Unit was used for defense material production, but the by-product steam was used to produce commercial electricity. Formal shutdown status may occur several years after last generation.

Capacity shown is installed when unit first generates electricity.

Sources: D. Chapman, *The Eternity Problem: Nuclear Power Waste Storage*, Contemporary Policy Issues 8 (1990); Nuclear News, March (1993); Niagara Mohawk Power Corporation, *Decommissioning Cost Estimating and Training*, Feb. (1993); U.S. DOE, Energy Information Administration, *Monthly Energy Review*, January (1993); personal communications.

Previous research by Chapman<sup>85</sup> compared the economics of spent fuel storage for a No New Orders Case with an Expansion Case.<sup>86</sup> Under the No New Orders Case, the end of the nuclear era occurs with the shutdown of the last reactor (assuming 30 year lifetimes, rather than 40), with a national cumulative waste total of 87,449 MTU. The Expansion Case reaches 126,642 MTU of waste by 2020, with both nuclear plant operations and waste production accelerating beyond the 30 year time frame. Using DOE and industry cost estimates, centralized and at-reactor *dry* storage are compared (see Figure 2). Given the no-new-orders status quo, at-reactor storage is significantly less costly than centralized storage. Even with the expansion case, the cost of the two options are about the same. In addition, the current charge to customers of 1 mill/kWh seems appropriate.

Although this analysis was tailored to a repository, by default an *integrated* MRS is also uneconomical. In addition, if the millions of dollars already spent on siting efforts are included in the cost of centralized storage, at-reactor storage becomes even more favorable.

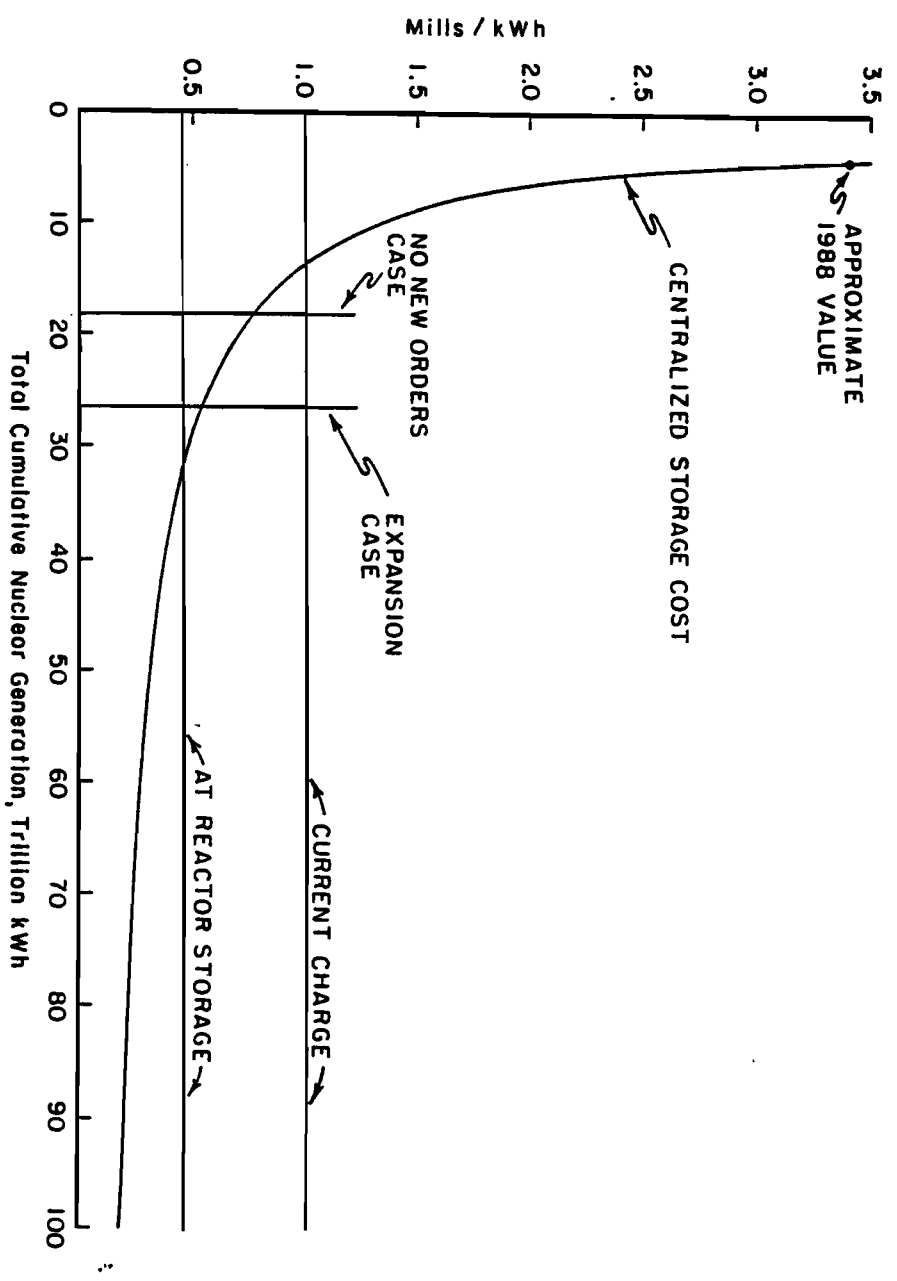
A second factor works in the favor of at-reactor storage. To date, only 1 of the 16 shutdown commercial reactors has been decontaminated (see Table 3). Barring dismantlement or decontamination of reactors, continued on-site storage renders such areas radioactive for hundreds of thousands of years. Storing radioactive spent fuel on already radioactive sites seems more logical than contaminating another site and increasing the probability of transportation exposure. Furthermore, if a permanent repository does open, waste from at-reactor sites would be transported only once, rather than twice.

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<sup>85</sup> D. Chapman, *The Eternity Problem: Nuclear Power Waste Storage*, 8 Contemporary Policy Issues 80 (1990).

<sup>86</sup> Cases based on U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Life Cycle Cost* (1987) at 16.

FIGURE 2. COMPARISON: CENTRALIZED AND AT REACTOR STORAGE



Source: D. Chapman, 'The Eternity Problem: Nuclear Power Waste Storage, 8 Contemporary Policy Issues 80 (1990).'

A major concern voiced by utilities is the expense of maintaining and adding additional wet storage facilities. Cost estimates for maintaining current spent fuel storage pools range from \$2 to \$8 million per year per facility.<sup>87</sup> However, what these estimates fail to capture is the projected use of current dry storage technologies in place of wet storage. Dry Cask Storage Technology (DCST) is emerging as the preferred method of on-site spent fuel storage for utilities that exhaust existing storage capacity. DCST is currently used commercially at Virginia Power Company (Surry), Carolina Power and Light (Robinson), Duke Power (Oconee), and Colorado Public Service Co. (Ft. St. Vrain). Compared to pool storage, DCST is considered equally safe, more economical, simpler and easier to maintain, and more flexible. Over 70% of all nuclear utilities are studying or planning to use DCST.<sup>88</sup>

A full scale discussion of safety issues is beyond the scope of this paper. However, original plans for an integrated MRS facility included the repackaging and consolidation of spent fuel in a dry environment. The only U.S. experience with anything beyond storage in a dry environment has been in research and development (i.e. the Dry Rod Consolidation Technology Project at the Idaho National Engineering Laboratory (INEL)).<sup>89</sup> It is unclear if an MRS facility would be responsible for consolidation and repackaging before final disposal, but such processes are dissimilar from the dry storage facilities that the Mescalero and other tribes toured. They pose significantly higher risks by increasing handling and possibility of exposure to radioactive materials.

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<sup>87</sup> Summarized in a letter to J. D. Perch, Assistant Comptroller General, General Accounting Office, from Steven P. Kraft, Director of Nuclear Waste and Transportation, Edison Electric Institute, Dec. 23 (1991).

<sup>88</sup> D. L. Feldman, *On-Site Storage of Spent Nuclear Fuel: Emerging Public Issues*, in High Level Radioactive Waste Management, Proceedings of the Third International Conference, Las Vegas, NV, April 12-16 (1992).

<sup>89</sup> International Atomic Energy Agency, *Concepts for the Conditioning of Spent Nuclear Fuel for Final Waste Disposal*, Technical Report Series No. 345, Vienna (1992).

In addition, although no major transportation accidents with spent fuel have occurred to date, the siting of a temporary storage facility in a Western state will increase transportation significantly, and also make a second trip necessary before long-term disposal. Only 4 of the country's operating commercial nuclear reactor sites are located west of Dallas, Texas.<sup>90</sup>

### **THE NEW ADMINISTRATION VS. STATE AND INDIAN OPPOSITION**

To complicate the apparent rush for an MRS site, a new federal administration entered the picture with Hazel O'Leary as the new Secretary of Energy. In testimony before Congress she has asserted the need for MRS or a permanent repository, and has argued for taking the Nuclear Waste Fund off-budget to shield it from being used to help reduce the federal budget deficit.<sup>91</sup> O'Leary, in a meeting with representatives of the National Association of Regulatory Utility Commissioners, expressed the need to quickly get an understanding with a sovereign entity, and felt that problems could arise.<sup>92</sup> Most recently, Richard Stallings, former Congressman from Idaho, was nominated for NWN by the Clinton administration. Negotiations with the Mescalero Apache have resumed as the tribe begins its move into Phase II-B. According to the Mescalero's chief consultant, the tribe has every intention of reaching an agreement with the new NWN about siting an MRS.<sup>93</sup>

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<sup>90</sup> Calculated from *World List of Nuclear Power Plants*, Nuclear News, March (1993).

<sup>91</sup> *Clinton picks NSP's Hazel O'Leary to head DOE*, Nuclear News, Feb. (1993).

<sup>92</sup> E. Lane, *O'Leary's Nuclear Waste Plans Becoming Clearer*, The Energy Daily, Mar. 5 (1993).

<sup>93</sup> Personal communication with Miller Hudson, chief MRS consultant to the Mescalero Apache, June 1993.

As in Tennessee during the mid '80s, opposition to spent fuel storage has amassed in New Mexico. Governor King opposed the MRS studies from the outset, contesting that New Mexico has done more than its share in helping with the nation's nuclear waste problem with the state's Waste Isolation Pilot Project (WIPP). Under the NWPA Amendments of 1987, the Secretary of Energy, in evaluating a potential MRS site, is directed to consider the extent to which an MRS facility would "unduly burden a State in which significant volumes of high-level radioactive waste resulting from atomic energy defense activities are stored."<sup>94</sup> The WIPP is currently expected to start a several year "test phase" in which up to 4,250 55-gallon drums of transuranic (TRU) nuclear waste will be accepted.<sup>95</sup> WIPP's design capacity is 6.2 million cubic feet of contact-handled TRU and 0.25 million cubic feet of remote-handled TRU, quantities seemingly sufficient to "unduly burden" New Mexico with additional waste at an MRS.

Most communities neighboring the Mescalero tribe have adopted formal resolutions against an MRS siting and have gathered thousands of signatures on petitions. The Village of Ruidoso, a neighboring tourist community, has requested a Congressional hearing and investigation of the DOE's nuclear waste management program.<sup>96</sup> U.S. Senators Domenici (R-NM) and Bingaman (D-NM) have co-sponsored a bill that would require the NWN to be accountable for the value of all spending in connection with siting an MRS,<sup>97</sup> which could significantly delay the process. Despite such widespread opposition, the presence of the WIPP, and the Governor's assurance from the former NWN that the siting

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<sup>94</sup> *Supra* note 8, § 144 (7), 42 U.S.C. 10164.

<sup>95</sup> D. Hancock, WIPP Decision Coming in 1993, Southwest Research and Information Center, Albuquerque, N.M.

<sup>96</sup> Village of Ruidoso Resolution 92-37, approved Dec. 15 (1992).

<sup>97</sup> C. McCutcheon, *Bill Could Hurt Waste-Dump Search, Official Says*, Albuquerque Journal, July 31 (1992).

process would halt if the State opposed,<sup>98</sup> the Mescalero Apaches are the furthest along in the MRS siting process.

At the tribal level, opposition has been very effective when the people's voice has been allowed to be heard, as evident by the seven tribal MRS study cancellations. In a case similar to the Mescalero's, on-reservation opposition of the Fort McDermitt Tribe has been quieted through job, social service, and physical threats. The current tribal council and hired consultants also intend to reach an agreement with the NWN. The Fort McDermitt Tribal Council, in its Phase I application, advised the DOE that one of its Phase I objectives was to put the issue of siting MRS on tribal lands to a vote of the people.<sup>99</sup> However, after receiving Phases I and II-A funding (a total of \$300,000), the Fort McDermitt Council has decided to wait until after it receives the \$2.8 million in Phase II-B funding before allowing tribal members to vote on siting an MRS facility on Tribal lands.<sup>100</sup>

Fifty-four of the Fort McDermitt Tribe's members (a substantial number, considering that about 60 votes put the current chairman into office) have approached Johnny about how to keep MRS off the Fort McDermitt reservation. One of two avenues would seem sufficient.

As provided by the NWPA Amendments of 1987, the tribe cannot use its Nevada lands for an MRS facility.<sup>101</sup> Overruling MRS on Oregon land hinges on the fact that Oregon has yet to retrocede its limited jurisdiction over the Tribe, under Public Law 280 (see Federally Defined Sovereignty section of paper). State

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<sup>98</sup> Personal communication with Ray Powell, environmental advisor to Governor King of New Mexico, March 1992.

<sup>99</sup> See Attachment A (Application Narrative, Project Description), Notice of Financial Assistance Award, U.S. Department of Energy, to Fort McDermitt Tribe, at 2.

<sup>100</sup> See S. Brockus, *Board hears details of nuclear waste storage plan*, 22:50 *The Humboldt Sun*, June 18 (1993) at 3 (quoting Fort McDermitt MRS project director Ernestine Coble).

<sup>101</sup> *Supra* note 8, § 145(g), 42 USC 10165 (no MRS facility may be constructed in the State of Nevada).

courts hearing civil causes of action under Public Law 280 are required to apply Tribal laws, including customary laws, wherever they are "not consistent with any applicable civil laws of the State."<sup>102</sup> The importance of this section depends in part on whether the statute applies the laws of the cities, counties, or other state subdivisions. The Act provides that those civil laws of the state "that are of general application to private persons or private property shall have the same force and effect within such Indian country as they have elsewhere within the State."<sup>103</sup> Since Tribal law does not regulate the storage of nuclear waste on a temporary or permanent basis (see generally Fort McDermitt Law & Order Code), it seems plausible that any laws of the State of Oregon regulating such activity, through Public Law 280, would be applied if an MRS facility were to be built on the Oregon lands of the Fort McDermitt Tribe.<sup>104</sup> Thus Oregon law relating to the MRS application process, public input, and review and oversight would apply.

A second avenue for opposing MRS at Fort McDermitt dates back to the adoption of an IRA Constitution and Federal Corporate Charter by tribal members in 1936. These Organic documents place stringent limitations on the authority of the Fort McDermitt Tribal Council, prohibiting them from selling or mortgaging tribal lands,<sup>105</sup> leasing or permitting tribal lands for longer than 5 years,<sup>106</sup> or taking any action "which in any way operates to destroy or injure the tribal grazing lands or other natural resources of the Fort McDermitt Indian Reservation."<sup>107</sup> The Fort McDermitt Law & Order Code (1988-89) also places

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<sup>102</sup> See 25 U.S.C. § 1322(c); 28 U.S.C. § 1360(c).

<sup>103</sup> See 25 U.S.C. § 1322 (a); 28 U.S.C. § 1360(a); see Cohen, *supra* note 40, at 366.

<sup>104</sup> See Goldberg, *Public Law 280: The Limits of State Jurisdiction Over Reservation Indians*, 22 U.C.L.A. L. Rev. 535 (1975).

<sup>105</sup> See Fort McDermitt Const., art. VII, sec. 2; Corporate Charter of the Fort McDermitt Indian Reservation, sec. 5(b)(1).

<sup>106</sup> Corporate Charter of the Fort McDermitt Indian Reservation, § 5(b)(2).

<sup>107</sup> *Id.*, § 5(b)(3).



limits on the authority of the Tribal Council.<sup>108</sup> Simply put, Fort McDermitt law would seem to preclude the siting of a 450 acre MRS facility in Fort McDermitt Indian country. Federal officials are not only participating in a waste of valuable resources by allowing the Tribe to continue its MRS studies, but are attempting, by active participation, to circumvent the will of the Fort McDermitt people as set forth in their Constitution and Federal Corporate Charter.

Assuming that Oregon does not retrocede its Public Law 280 jurisdiction and tribal members do not amend their organic documents, members who oppose the MRS project would likely have a stronger case in the Fort McDermitt Tribal Court to stop the MRS studies. Financially, a civil action in the Fort McDermitt Tribal Court would be quicker and cheaper.

Although attention has been paid to the Mescalero Apache and Fort McDermitt Tribes, other tribes remaining in the process, many of which are also serious about negotiating an MRS agreement, shouldn't be ignored. For instance, at the Skull Valley Goshute reservation (the only other tribe to apply for Phase II-B funding), the site being considered is bordered by a hazardous and toxic waste incinerator, a nerve gas plant, and a magnesium mine, and the uninhabited land is currently leased as a rocket motor testing ground. The Goshute, after touring various nuclear facilities in Japan, France, Great Britain, and Sweden, as well as the typical U.S. stops, feel that an MRS facility is an ideal candidate to replace the tribe's current lease (90% of the tribe's economic base) which expires in 1995.<sup>109</sup>

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<sup>108</sup> See Fort McDermitt Law & Order Code (1988-89) (Chairman Ronald Johnny, Editor), Chapter 22, section 7 (setting specific limits on Tribal Chairperson's authority).

<sup>109</sup> Personal communication with Danny Quintanna, MRS Director for the Skull Valley Goshutes, June 1993.

## CONCLUSIONS

The 1987 Amendments to the Nuclear Waste Policy Act terminated plans for a Monitored Retrievable Storage (MRS) facility for spent nuclear fuel at Oak Ridge, Tennessee. Oak Ridge was arguably the most technically and geographically qualified location in the United States. A major factor in the decision to revoke plans was opposition by the State of Tennessee. The current program to site an MRS on an American Indian Reservation, however, lies outside of the jurisdiction of state and local governments because of the sovereign rights of reservation tribal councils.

The Indian Nation voluntary host program fails to justify its purpose in enhancing the safety and cost effectiveness of spent fuel storage and management. The following observations are offered:

- (1) The need for an MRS over a no-MRS strategy is still lacking. Centralized storage in general is uneconomical compared to at-reactor storage (given the No New Orders status of nuclear power and application of at-reactor Dry Cask Storage Technology), and is illogical as at-reactor sites will most likely remain contaminated.
- (2) The site selection process is flawed, affecting an economically disadvantaged population, and taking advantage of their sovereign environmental planning rights and lack of technical qualifications.
- (3) While Dry Cask Storage Technology is proving to be safe and economical, the feasibility of dry fuel rod consolidation has yet to be demonstrated on a commercial basis in the U.S.
- (4) A negotiated agreement with an Indian tribe could result in substantial cash and social program benefits to the tribe. However, the extent of tribal job

opportunities is unclear and the indirect effects on the tribal and the surrounding industries could be excessive.<sup>110</sup>

- (5) Public opposition is widespread in states where tribes are considering MRS. In the State of New Mexico alone, the Governor, numerous Congresspeople, local governments, residents, businesses, and many of the Mescalero Apache themselves, are opposed to an MRS facility.
- (6) While the storage risks between an MRS and a No-MRS scenario may remain similar, the fact that the current siting attempts are all in the western half of the U.S. considerably magnifies the transportation risk due to the eastern location of the majority of commercial reactors. In addition, a negotiated agreement could result in a permanent MRS in Indian country, a prospect not intended by Congress or being conveyed to current Indian volunteers.
- (7) In some cases, Tribal Organic documents, limitations expressed on Tribal Council authority, and current Tribal laws may limit the Tribal governing body's constitutional authority to apply for and receive MRS study funding and/or authorize the siting of an MRS facility on Tribal lands.

The siting of an MRS on an Indian Reservation is unethical and dangerous. MRS may possibly be defeated on a case by case basis at each reservation in the program, however, a change in National policy would be most effective. An amendment to the Nuclear Waste Policy Act of 1982 is recommended that revokes the voluntary siting process, terminates the Office of the Nuclear Waste Negotiator, and supports the continuance of safe storage, responsibility, liability, and dry cask development at utility reactor sites. This should be an

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<sup>110</sup> The public's perception of nuclear waste has caused a backlash from the tourist and real estate industries for the Mescalero. The Mescalero themselves own and operate a \$30 million ski area, a \$20 million luxury resort complex, and two fishing lakes; see Davis, *supra* note 81.

interim policy, until a comprehensive federal nuclear waste program is developed for all related nuclear waste forms: military, reactor decommissioning, spent fuel, hospital, and other waste.<sup>111</sup>

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<sup>111</sup> See D. Chapman, *Decommissioning and Nuclear Waste Policy: Comprehensive or Separable?* 12 *Energy Journal* 247, Special Issue - Nuclear Decommissioning Economics (1991).

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