

CHAPTER FIVE SUMMARY AND CONCLUSIONS

"[A] nuclear waste repository should not be built until it can be shown, beyond the shadow of a doubt, that the facility can, in fact, do what its advocates claim - isolate radioactive materials from the biosphere for more than 10,000 years - and that construction of such a repository would be benign in its effects upon the people, the environment and the economy of the state or region within which it would be located. We owe nothing less to our state or to our nation."

In 1986, former Nevada Governor Grant Sawyer, first chairman of the Nevada Commission on Nuclear Projects, set forth these criteria as the benchmark by which DOE's proposal for a high-level nuclear waste repository at Yucca Mountain or anywhere else must be judged. Nevada's oversight and impact assessment efforts over the years have been guided and shaped by these simple, yet profound standards.

The findings from nearly two decades of intensive oversight and impact assessment research, as documented in this report, demonstrate convincingly that the effects of the Yucca Mountain project are not at all benign. In fact, the program has the potential to wreak economic and environmental devastation on the State of Nevada and on at least 43 other states, hundreds of major cities, and thousands of communities across the country through which SNF and HLW must travel en route to a Nevada facility.

A decision by the President to forge ahead with this transparently flawed project in the face of Nevada's strong, long-standing, consistent, ubiquitous, and scientifically based opposition would also have damaging consequences for the nature and shape of American federalism now and in the future, as the nation pursues solutions to other difficult problems involving hazardous facilities and controversial technologies.

What began in 1982 as a noble piece of federal legislation that promised to place science ahead of politics, and fairness, equity, and openness above congressional parochialism has degenerated into a technical and ethical quagmire, where facts are routinely twisted to serve predetermined ends and where "might makes right" has replaced "consultation, concurrence, and cooperation" as the guiding principle for the program. The shoddy and politically driven science, the heavy-handed federal approach, and the constant changing of the rules in response to "inconvenient" findings regarding site suitability have created an atmosphere of severe distrust, where the already significant impacts associated with the nuclear nature of the program are further exacerbated and amplified. The result is a massive suite of negative impacts, inextricably linked to the Yucca Mountain program, that are unprecedented in the history of federal government domestic projects.

Even the establishment and operation of the Nevada Test Site in the 1950s did not pose as great a threat to the State and the nation as Yucca Mountain does today because times were different; the severe (and, as it turned out, justified) aversion to things nuclear

had not developed; and the atmosphere of pervasive distrust and cynicism with respect to DOE [then known as the Atomic Energy Commission] did not exist.

The conclusions of this report, set forth below, present a compelling case that Yucca Mountain and its unprecedented nuclear waste shipping campaign would do irreparable harm to the State of Nevada and to the nation.

Impacts to the State of Nevada

Economic Impacts

- (1) The most serious and possibly catastrophic economic risk for Nevada stemming directly from the Yucca Mountain project is the potential for stigma impacts on the tourist and visitor industry. Such impacts could produce significant losses to an economy dominated by visitor-based revenues. Dozens of studies spanning two decades show that populations important to Nevada's economic well-being are highly sensitive to the radioactive risks associated with a repository and spent fuel/HLW transportation. These project conditions threaten the attractiveness of the State as a place to visit, move to, or invest in.
- (2) A radioactive waste accident or incident that causes Las Vegas to become even moderately associated with radioactive imagery would have major negative economic impacts for the area's visitor economy, in-migration, and economic development. Estimates of between 5 and 30 percent or larger reductions in key economic sectors are consistent with the empirical evidence gathered.
- (3) Annual losses to the Las Vegas and Nevada economy could be expected to reach \$39 billion or more in the event of a nuclear waste accident. Even without an accident, the Nevada economy stands to lose upwards of \$5.5 billion annually as a result of the stigmatizing effects of the repository and HLW shipments through the State.

Property Value Impacts

- (1) The transportation of SNF and HLW within the State of Nevada imposes significant risks to property values along nuclear waste shipping routes. In Clark County, real estate experts estimate losses to property would range from \$5.6 billion to \$8.8 billion in the event of a serious transportation accident. Even without a serious accident, property value losses would be as much as \$1.6 billion along either of the two likely HLW shipping routes.
- (2) Property value impacts would occur in other parts of the State as well. In Washoe County, residential property value losses along the I-80/Union Pacific railroad corridor are estimated between \$1.9 and \$2.2 billion in the event of a

HLW accident. In Elko County, potential losses along I-80 could reach \$129 million or more. For the State as a whole, property value impacts along Yucca Mountain shipping routes can be expected to be in the tens of billions of dollars, given the nature of the required Yucca Mountain transportation system.

Impacts to State of Nevada and Local Public Safety Agencies

- (1) The Yucca Mountain program would place an overwhelming fiscal burden on State of Nevada agencies as a result of HLW shipments within the State. Costs to agencies just to prepare for such shipments and for the first year of operations are estimated at over \$657 million. Costs for dealing with the entire four decades of shipments have not been estimated, but could likely reach several billion dollars
- (2) Local government public safety agencies would be especially hard hit by the Yucca Mountain shipping campaign. The startup cost to Clark County public safety agencies alone is projected to be almost \$360 million (in 2007 dollars). Significant additional annual costs would be incurred in response to the continued operation of a repository and the transportation of HLW. These estimates do not include the fiscal impacts to southern Nevada hospitals that are not adequately prepared in terms of training, decontamination facilities, and necessary personnel and equipment.
- (3) Startup costs to public safety agencies statewide could reach several billion dollars, given the extent and nature of the Yucca Mountain nuclear waste shipping campaign.

Impacts to Native American Communities

Because of their uniquely vulnerable circumstances, Native American communities in Nye, Clark, Lincoln, and Inyo counties could be disproportionately impacted by the Yucca Mountain project and the transportation of SNF and HLW to the facility. More than a decade of field research shows that a range of such impacts could occur, including negative consequences for economic well-being, public health, environmental health, and culture. Furthermore, any negative economic impact to Nevada's visitor economy would have a disproportionately damaging effect on Native American communities because of their socially and economically vulnerable conditions.

Impacts to Local Governments in Nevada

At least 13 of Nevada's counties will be directly impacted by the federal HLW program - by Yucca Mountain construction and operation activities, by the performance of the repository system over thousands of years, and/or by the massive and unprecedented SNF and HLW shipping campaign required to move waste through the State to the repository. The impacts involve public health, economic stability, community

development, public revenues, essential community services, and damage to the state's system of governance.

Significantly impacted localities include both of the State's major population centers, the Las Vegas metropolitan area and the Reno-Sparks metro area, as well as rural counties and communities throughout the State. Major impacts to local governments include:

- (1) The site county—Nye County—would be uniquely affected by the Yucca Mountain Project. Not only is it at “the end of the funnel” for the massive waste shipping campaign, but the Yucca Mountain Project also threatens this growing county's efforts to develop and sustain a viable economic and revenue base in the aftermath of 40 years of nuclear weapons testing on DOE's adjacent Nevada Test Site.
- (2) The magnitude of potential economic and fiscal impacts is greatest in Clark County, the state's major metropolitan area, located at the convergence point for default highway routes and on the corridor for one of the state's two mainline railroads. Over 80% of the state's dominant visitor-gaming industry is located in Clark County and concentrated in areas adjacent to prospective highway or rail shipment routes. The Las Vegas visitor-gaming industry is particularly vulnerable to stigma effects linked to the repository program and the nuclear waste transportation associated with it. The stigma impact could also negatively affect economic development, migration, and investment in southern Nevada.
- (3) Clark County property value losses associated with the Yucca Mountain program could be as large \$8.8 billion in the event of a serious accident involving a spent fuel shipment. Even without a serious accident, the stigma effects associated with radioactive waste shipments through Las Vegas could cause property values to decrease by \$236-\$463 million, with additional government service impacts (public safety related and otherwise) of several hundred million to over a billion dollars.
- (4) Rural communities in central Nevada are particularly vulnerable to the effects of an unprecedented shipment campaign for the nation's highly radioactive wastes, the modes and routes for which are uncertain. Typically in these counties, the economies are fragile, the service systems (particularly emergency and medical response services) are very limited, the road systems are inadequate for such uses, and residential and community activity is clustered closely along the prospective nuclear waste routes.
- (5) Even counties that are not “affected units of government” under the Nuclear Waste Policy Act would be negatively affected by the prospective shipment campaign. Of particular note are Washoe County, the state's second largest metro area and visitor-gaming center, and Elko County, the urban center of

northeastern Nevada. Both communities are astride an interstate highway and mainline railroad that could be used for high-level waste shipment. Washoe and Elko counties have estimated property value losses at \$1.9-\$2.2 billion and \$109-\$129 million, respectively. Other counties and cities along the routes of Interstate 80 and the Union Pacific mainline would experience comparable decreases in property values due to a Yucca Mountain shipping campaign.

- (6) Nevada's state-local revenue structure includes critical sales tax and other revenues that are distributed among localities by formula. Thus, stigma-related damage to the state's metropolitan economies (particularly the visitor-gaming economy of Clark County) would have direct fiscal consequences for local governments across the state, many of which are already in fiscal stress. Visitor spending produces 19% of the taxes for local jurisdictions, currently about \$1.3 billion per year. A 7% decline in visitor spending, projected for the no-accident scenarios, would reduce local government tax revenues by \$91 million annually.
- (7) Given the extreme differences among Nevada's local jurisdictions (in economic base, revenue resources, population and growth, federal land presence, political influence, etc.) and the highly differentiated consequences of the Yucca Mountain Project among the state's localities, the Yucca Mountain site characterization process has caused conflict among localities and in state/local relationships that has already had damaging impacts on the system of governance within the State. These impacts would be exacerbated if the Yucca Mountain project proceeds, with conflicts broadening along rural-urban and north-south lines.
- (8) Development in rural Nevada counties, such as that taking place in southern Nye County, depends upon the attractiveness of the State and these communities. Nuclear waste images would diminish the appeal of Nevada's rural communities for business investment, retirement, and job in-migration.

Transportation Impacts of the Yucca Mountain Program

Of all impacts associated with the Yucca Mountain program, none are as far-reaching and pervasive as transportation. Tens of thousands of shipments of deadly SNF and HLW would impact Nevada and 43 other states, hundreds of cities, and thousands of communities, day after day, week after week, month after month for 38 years or more. Transportation would be the principal instigator of impacts ranging from losses in property values to depressed economic activity to escalating and unfunded preparedness and response costs to social disruption and even civil unrest. The release of radioactive materials following a severe accident or terrorist incident could precipitate a human health and economic catastrophe. Among the most important impacts for Nevada and the nation are the following:

- (1) About 123 million Americans live in the 704 counties along potential highway routes to Yucca Mountain. About 106 million Americans live in counties along potential rail routes to Yucca Mountain.
- (2) The "mostly truck" scenario would send 96,000 shipments through 44 states. The mostly rail scenario would send 19,800 rail shipments through 43 states, plus 3,700 truck shipments through 23 states, and up to 2,200 barge shipments through the ports and waterways of 13 states.
- (3) Shipments to Yucca Mountain would traverse up to 58 Indian Reservations, including 14 Indian Reservations in Nevada.
- (4) Truck shipments to Yucca Mountain could be a daily occurrence in major metropolitan areas like Atlanta, Nashville, Cleveland, and San Bernardino. Chicago could experience a truck shipment every 15 hours; St. Louis, Kansas City, and Denver, every 13 hours; Des Moines and Omaha, every 10 hours; and Salt Lake City, every 7 hours.
- (5) Rail shipments to Yucca Mountain would be a daily occurrence in Nevada, Utah, Wyoming, Nebraska, Colorado, and Illinois. Every other day, rail shipments would cross Iowa, Missouri, Kansas, and Indiana. There would be at least one rail shipment per week through Alabama, Arizona, Georgia, Idaho, Kentucky, Ohio, New York, Pennsylvania, and South Carolina.
- (6) Routine radiation from shipping casks poses a clear health threat to certain transportation workers. Safety inspectors, truck drivers, and rail crews could receive cumulative doses large enough to increase their risk of cancer death by 15 percent and their risk of other serious health effects, including genetic damage to future generations, by 50 percent or more. DOE proposes to control these exposures and risks by limiting work hours and doses.
- (7) Routine radiation from shipping casks poses a potential health threat to certain members of the public. Service station attendants could receive 100-1,000 mrem doses per year. Motorists could receive 40 mrem during a traffic gridlock incident. Residents near certain routes in Nevada could receive 5-45 mrem per year from passing casks. Such exposures could increase the risk of certain health effects, such as mental retardation in unborn children.
- (8) Routine radiation from passing casks would deliver small radiation doses to members of the public within one-half mile of highway and rail routes. Nationally, 7-11 million people reside within one-half mile of a truck or rail route. Even though these dose levels are well below the established thresholds for cancer and other health effects, research shows that the mere presence of sustained numbers of such shipments through communities can devalue – and has devalued – property by as much as 4.75 percent. Applied nationally, the economic impacts of such devaluation would be devastating.

- (9) A successful terrorist attack on a truck cask involving the release of radioactive materials in an urban area could result in 6-165 latent cancer fatalities and \$3.1-20.9 billion in cleanup costs. Incidents of greater severity are credible.
- (10) In Nevada, 13 counties, including the State's major metropolitan areas, would be directly and significantly affected by Yucca Mountain-related nuclear waste transportation. At the end of the shipping 'funnel', Nevada communities would experience up to 96,000 shipments during a shipping campaign that would span four decades.
- (11) The Las Vegas metropolitan area could receive more than 2,500 truck shipments per year, an average of one truck every four hours. Under the minimum impact scenario, Las Vegas would receive 620 shipments per year, an average of one truck or rail cask every 14 hours.
- (12) In Nevada, research has shown that, in the event of an accident or incident resulting in the release of radiation, property value impacts throughout the State would be in the billions of dollars (see above). Such property value impacts would also likely occur in cities and communities throughout the country along nuclear waste shipping routes.
- (13) A severe truck accident in Las Vegas involving the release of radioactive material could contaminate up to 4.3 square miles. Acute radiation exposures during the first 24 hours could result in 2.7 latent cancer fatalities. Decontamination would cost over \$1.7 billion (exclusive of the costs of evacuations and economic disruption caused by the event). A decision not to clean up the contaminated area could result in between 200 and 1,300 cancer fatalities over 50 years. Accidents of greater severity could occur.
- (14) A severe rail accident in Las Vegas (or elsewhere) involving the release of radioactive material could contaminate up to 40 square miles. Acute radiation exposures during the first 24 hours could result in 400 latent cancer fatalities. Decontamination would cost over \$15.4 billion (exclusive of the costs of evacuations and economic disruption caused by the event). A decision not to clean up the contaminated area could result in between 6,000 and 41,000 cancer fatalities over 50 years. Accidents of greater severity could occur.

Yucca Mountain's Impact on the Federal Budget and the American Taxpayer

Because of the steadily escalating costs of the Yucca Mountain program, it is expected that the total life cycle cost of the project would leave the federal budget, and by extension the American taxpayer, with a major unfunded liability. Current estimates are that the Nuclear Waste Fund, which was originally intended to pay the largest share of

repository program costs, would generate, at most, \$41 billion. This is an extremely optimistic estimate, given the uncertainties involved with the operational capabilities and lifetimes for existing nuclear power reactors and the highly uncertain future for any new nuclear plants.

Most current estimates by DOE and, independently, by the State of Nevada have place the total cost of the repository program between \$54 (State) to \$59 billion (DOE). However, given the continued escalation in program costs over the past five years (in 1998, DOE estimated the total life cycle system cost at just over \$28 billion), the actual cost of the program would likely be considerably higher, with informal estimates now approaching as much as \$75 billion.

The Yucca Mountain program would mean an overall deficit for the federal budget in the range of \$18 to \$35 billion or more. This shortfall would occur at a time when the government's ability to assess utility companies additional fees based on nuclear electricity generation (as is currently the case) would have greatly diminished, if not disappeared altogether. If continued, it is inevitable that Yucca Mountain would become a net drain on the federal budget and a fiscal liability of enormous proportions for future generations.

This situation is compounded by the fact that, in the event of a serious SNF or HLW transportation accident, neither Congress, DOE, nor any other federal entity has considered what the costs will be nor how to pay for the negative impacts on property values, damages to ongoing economic activities, foregone opportunity costs, or the exploitation of vulnerable individuals and communities who will be directly affected. These costs would be greater than the entire repository program costs by a factor of ten or more.

Overall Conclusion

The inescapable conclusion of the findings presented in the foregoing chapters is that the Yucca Mountain program and the unprecedented nuclear waste shipping campaign associated with it cannot be implemented without incurring major, unacceptable impacts and untenable costs, and without putting people, their communities, and the environment at substantial risk throughout the country. The fact that DOE has not assessed these risks and impacts and has ignored several decades of research concerning them is reason, of itself, for the President to reject any recommendation from the Secretary of Energy to proceed with the Yucca Mountain program.

