WIPP Goes Ahead, Amid Controversy

New Mexico's governor worries less about the nuclear waste project now planned than about the one he suspects DOE may have up its sleeve

Carlsbad, New Mexico. Beneath a wind-blown, semiarid plain of scrub brush and red sands 25 miles to the east of here the U.S. Department of Energy (DOE) is now building what is expected to be the first major geologic repository for radioactive waste in the United States.* This is the $1-billion Waste Isolation Pilot Plant project, an endeavor already some 12 years in the making and widely known by its acronym, WIPP.

WIPP is controversial in New Mexico, but the concern is less about the project as now authorized than it is about the project which state officials and environmentalists suspect DOE has up its sleeve.

As authorized, WIPP will receive for permanent disposal only transuranic (or plutonium-bearing) waste from the nuclear weapons program. Consisting principally of such contaminated materials as clothing, tools, and discarded equipment, transuranic waste typically generates little heat and little penetrating gamma radiation and hence does not pose the hard-to-predict problems of waste-host rock interactions associated with high level waste or spent fuel, which is far "hotter" than transuranic waste.

Experimentation with military high level waste will be conducted in the WIPP facility, but all the waste packages will eventually be retrieved. Final disposal of high level waste could occur only if Congress chose to expand the project mission.

New Mexico's Governor Toney Anaya and the environmental activists who helped elect him in November 1982 suspect that sooner or later DOE will try to have that mission expanded. Most of the safety analyses done thus far have been based solely on the properties of transuranic waste. Whether disposal of high level waste in WIPP actually would pose a greater hazard cannot at this point be definitively answered, but if this repository were to contain high level waste it would almost certainly be harder to defend, scientifically and politically.

Although DOE disavows any intention of seeking an expanded role for WIPP, New Mexicans remember that only 5 or 6 years ago the department was seeking to have the project include a spent fuel disposal demonstration. This earlier initiative provoked a storm of criticism from state officials, including Anaya, then serving as Attorney General. They could see one thing leading to another, with WIPP in due course receiving spent fuel from all over the country.

The governor's present worry that a similar DOE initiative can be expected is not dismissed as far-fetched by politically savvy New Mexicans. They know that the nation's two principal nuclear waste problems have to do with the disposal of spent fuel and military high level waste, yet the WIPP project, expensive though it is, addresses neither of them. The transuranic waste itself could be disposed of without WIPP or any other special facility. Some repository designs have contemplated emplacing transuranic waste along with the crushed salt or rock used to backfill the tunnels in a high level waste repository.

> Billion-dollar repository, as now authorized, will receive no high level waste or spent fuel.

A particular concern of the governor's is that President Reagan or his successor may choose, under an option allowed by the Nuclear Waste Policy Act of 1982, to have the program for disposal of military high level waste remain separate from the major program aimed at disposal of commercial reactor fuel. The procedurally demanding and complex commercial program is now promising to run at least several years behind schedule, with little likelihood of a repository coming on line before the year 2000.

This in itself could give DOE reason to urge the President, first, not to merge the commercial and military programs, and, second, to seek congressional authority for disposal of military high level waste in WIPP. Under the Nuclear Waste Policy Act, even a WIPP facility exclusively for military high level and transuranic waste would be subject to a state veto that only Congress could override. But by 1987 Governor Anaya will be out of office and DOE might hope for a more sympathetic successor.

Late last spring, after DOE had declared WIPP's exploratory phase a success, Governor Anaya asked the department to delay starting project construction. There were several preconditions he wanted satisfied. Chief among these was for New Mexico to be given stronger assurances that the scope of the project was never to be changed.

To the same end, the governor also wanted WIPP made subject to a state right of veto and to licensing by the Nuclear Regulatory Commission (NRC). Fulfillment of these latter conditions would put WIPP on more nearly the same footing as the waste repository projects subject to the Nuclear Waste Policy Act. But on 1 July DOE announced that the project was to proceed and thus turned down the governor's request.

Since then, controversy over the project scarcely has abated but the work goes forward with a gathering momentum. WIPP is being mined, some 2150 feet below ground, in the 1500-foot-thick Salado bedded salt formation. The Salado was one of a series of evaporite beds laid down more than 200 million years ago in Permian time, when this entire region was covered by a shallow and increasingly salty inland sea.

In 1981 an exploratory shaft 12 feet in diameter, together with a smaller ventilation shaft, was sunk to the repository horizon. Following this, a towering 200-foot-high head frame was erected and nearly 2 miles of exploratory tunnels were mined. A continuous mining machine with a large rotating head is now extending these tunnels. In 1988 the project's 5-year pilot phase is to begin in the first of WIPP's eight major sections or "panels." When all of the sections are completed over the next 25 to 30 years the repository will constitute a maze of tunnels some 120 acres in extent.

From the extensive exploratory work done over the past 2 years New Mexico's WIPP Environmental Evaluation Group has concluded that the site is adequate for transuranic waste disposal. The staff scientists debated whether further testing to improve understanding of the regional geologic and hydrologic setting should be done before construction of the repository was started, but they

*It will for a time also be the world's only repository. The Germans have operated a repository for low and intermediate level waste in the Asse salt mine in Lower Saxony, but this facility has now been closed for several years because of licensing problems.

finally decided that, all things considered, the more reasonable course was for the testing and construction work to proceed simultaneously.

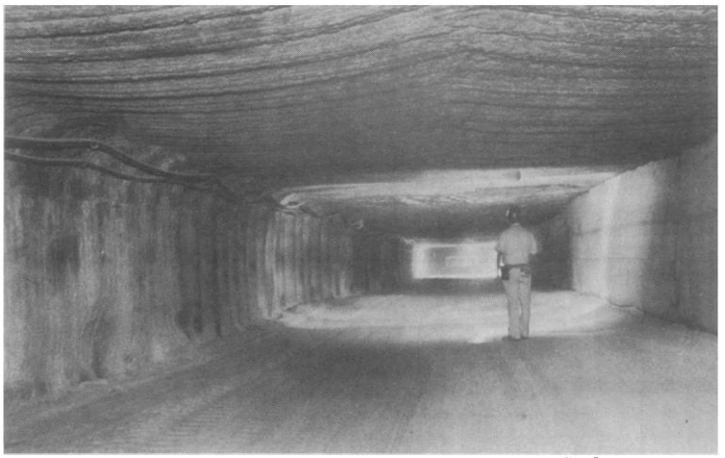
Lokesh Chaturvedi, a staff geologist, concedes that project momentum has further increased now that construction has started. But he observes: "It is overwhelmingly unlikely that we will find anything that would stop the project." DOE has agreed to do all the recommended testing, and, Chaturvedi says, the test results can be in hand before even pilot-phase waste emplacement begins.

The evaluation group, which is funded by DOE but which is answerable only to a state cabinet committee and to the legislature, has both agreed and disagreed with WIPP's principal scientific critic, Roger Y. Anderson, a professor of geology at the University of New Mexico.

Anderson has noted that much of the salt is missing from part of the lower Salado and from the Castille formation immediately below it. In his view, this is due to a poorly understood "deep dissolution" phenomenon. The evaluation group accepted this explanation as a "strong hypothesis" even though scientists at DOE's Sandia National Laboratory had rejected it. But the group concluded, contrary to Anderson's opinion, that inasmuch as the dissolution came no nearer than 15 miles to the WIPP site, it posed no threat to the repository.

The testing remaining to be done will address not only unanswered questions about deep dissolution but also about the hydrology of the Rustler formation that overlies the Salado. A Sandia scientist, Larry Barrows, has found some evidence of solution cavities through which ground water—and radionuclides—could move much more rapidly than has previously been assumed. At present the Rustler is connected to the surface environment by a few low-yielding livestock wells and by ground water discharge points at Malaga Bend on the Pecos River, some 17 miles from the WIPP site.

The DOE view, and that of Sandia's Wendell Weart, who is in charge of the scientific evaluation of the project, continues to be, however, that water movement through the Rustler is very slow. Moreover, Weart sees no hydrologic mechanism by which radionuclides from WIPP, deep in the Salado, would get up into the Rustler. He says that present data, admittedly incomplete, indicate that, if a deep drill hole were to connect the Rustler aquifers to aquifers beneath the Salado, the hydrologic gradient would be not upward but downward.



An exploratory tunnel in what eventually will be a 120-acre maze.

Jim Conklin

The presumed presence of hydrocarbons deep below the repository horizon, together with the known presence of potash in a 500-foot-thick band well above that horizon, is an invitation for future intrusions and represents the only clearly incontrovertible argument made by critics against the WIPP site. This argument relates to what in the WIPP case is another plausible mechanism besides ground water movement for radionuclide transport—movement by pressurized brine.

Someone drilling unknowingly through the repository and the Salado and encountering a pressurized brine pocket in the Castille could produce a copiously flowing brine well connected to the repository, the Rustler aquifers, and the surface environment. Twice in the WIPP investigation pressurized brine pockets have been encountered by deep drilling through the Salado. The last time was in November 1981 when DOE deepened an existing borehole about a mile north of the exploratory shaft to investigate an anomaly in the site's seismic profile.

Surprisingly, analyses done by the state evaluation group as well as by DOE contractors have indicated that, if a brine well were to flow up through WIPP, the health consequences would be slight. The explanation lies largely in the fact that the concentration of radionuclides in the transuranic waste facility would be low to start with and that the concentration reaching the human environment would be much lower still.

But Weart and Chaturvedi agree that, if WIPP contained high level waste, the health consequences from such an event would likely be different, and possibly much worse.

The fact that WIPP is being built as a billion-dollar, limited-purpose facility for military transuranic waste seems to have come about as a caprice of history and politics. First, building such a repository here seemed an acceptable and politically convenient way for the government to honor a 1970 commitment to remove from the state of Idaho transuranic waste which had been buried and stored there.

Early surveys indicated the salt formation in this region was promising. Moreover, with Carlsbad and Eddy County suffering a decline in potash mining, there was anything but a Not-in-My-Backyard reaction from local business and political leaders. They strongly supported WIPP at the project's inception in the early 1970's and still do so today.

Several proposals were made during the Carter Administration to fold the WIPP project into the larger effort to establish a comprehensive national nuclear waste disposal program. The last such initiative came in early 1980 when President Carter himself ordered WIPP as such canceled, but with the investigation of the Carlsbad site to be continued.

His decision reflected a belief that WIPP as a transuranic-waste-only repository could not be economically justified; that the merits of the WIPP site, which were already in controversy, should not be decided without comparing this site with others; and that all repositories should be licensed by the NRC.

But the Senate and House armed services committees, acting in a parochial spirit, already had pushed through legislation authorizing WIPP as strictly an unlicensed military transuranic waste facility.

Governor Anaya and his supporters on the WIPP issue are now feeling increasingly aggrieved. Sally Rodgers, formerly an environmental lobbyist in Sante Fe, is now a key aide and adviser to Governor Anaya on WIPP. She speaks of instances where DOE has failed to meet its obligation to the state. It was not long ago, she says, that the environmental evaluation group discovered that it had not been consulted about the possibility of potentially explosive levels of hydrogen gas forming by radiolysis in some transuranic waste packages.

"We really need to get clear on wheth-

er we can trust DOE to give the state necessary information," Rodgers adds.

As New Mexico's senators Pete Domenici (R) and Jeff Bingaman (D) have pointed out to Anaya, the state cannot now demand a right of veto over WIPP and NRC licensing without erasing two of the critical distinctions that set the project apart from those for commercial spent fuel. Given this Catch-22, the state is unlikely to press such demands. Anaya may have to be satisfied with whatever further assurances he can wrest from DOE that the mission of WIPP will not be changed.—**LUTHER J. CARTER**

Lots of Talk About LD_{50}

When animal rights groups protest the use of animals in experiments, one of their favorite targets is a test known as the LD_{50}. Since the late 1920's, scientists have killed millions of animals to conduct the test, which was designed to help judge the acute toxicity of drugs, pesticides, and other chemicals. But animal rights groups and scientists in general agree that the test is now outdated and has limited value. Even so, according to animal rights activists, industry continues to perform the test to meet federal requirements, unnecessarily killing millions of animals a year. The animal rights groups have raised such a ruckus that last month 16 congressmen wrote a joint letter to several federal regulatory agencies expressing concern about the test. About the same time, the Food and Drug Administration, with several other agencies, hosted a daylong workshop on the topic, which revealed that there is considerable confusion about how often the test is actually used and about federal requirements concerning the test.

LD_{50} refers to the dose of substance that kills 50 percent of a batch of test animals. This information has helped scientists and federal regulators determine what safety precautions should be taken in the manufacture, transport, use, and disposal of various substances. But in recent years there has been growing scientific agreement that the LD_{50} gives only a rough idea about a substance's toxicity and that other, newer tests provide much more information. Moreover, LD_{50} tests require a large number of animals, anywhere from 50 to 120, which are usually rodents. David Rall, director of the National Institute of Environmental Health Sciences and the National Toxicology Program, has called the LD_{50} "an anachronism."

It is not clear how many laboratories among industry, academia, and government actually conduct the traditional LD_{50} test. Henry Spira, the leading opponent of the test and head of the Coalition to Abolish the LD_{50}, alleges that 4 million animals a year are killed to conduct the test. But when asked recently about the basis for that figure, Spira said that he generated it after "talking with scientists from industry and academia" and acknowledged that "there are no good numbers on how many animals are used." At the FDA meeting, representatives from the cosmetics and pharmaceutical trade associations said they did not have any solid estimates either, but it was their impression that use of the traditional test has decreased overall. They contend companies are relying on a modifed version of the LD_{50}, in which only 10 animals are used, and on other types of tests. A small and informal survey conducted by Bristol-Myers scientist Thomas E. Hickey showed that some 50 manufacturers of chemicals, cosmetics, and drugs use about 155,000 animals annually. But a company spokeswoman cautioned against extrapolating the figure to a nationwide estimate. The Office of Technology Assessment has just begun a study on the use of animals in experiments including the LD_{50}, but its findings will not be completed for another year. Until then it is difficult to judge how many animals are used for the test.

According to Hickey's survey and the Pharmaceutical Manufacturers Association, drug companies perform the tests in the belief that they are complying with federal regulations. But at the recent meeting, officials from FDA declared repeatedly that the agency does not require the LD_{50} to meet safety standards. The FDA "does not have any regulation specifying the need for LD_{50} testing," stated Gary Flamm of the FDA's Bureau of Food. "The LD_{50} test is of limited value and we would prefer other testing" to meet FDA's rules on acute toxicity. The only agencies that do mandate the test, in a modified form, are the Environmental Protection Agency (EPA) and the Department of Transportation.

Raymond Stoll of Sandoz Pharmaceuticals, who represented the Pharmaceutical Manufacturers Association at the meeting, said later "there is considerable confusion" about FDA's requirements for acute toxicity testing. "The meeting was the first time FDA stated its position clearly," he said. The misunderstanding is so widespread that the agency is planning to publish a notice in the *Federal Register* sometime early next year to clarify its position.

Although EPA requires manufacturers of pesticides and toxic substances to test their products using the LD_{50} method, officials stressed that the agency is only interested in a rough estimate. A test using fewer animals than the traditional procedure "is often adequate," said William Burnham of EPA's Office of Toxic Substances. The agency, he said, supports the development of in vitro tests, but, as yet, no alternatives to animal testing are acceptable.

A hapless official from the Department of Transportation's Office of Hazardous Substances said his office has been beseiged with more than 1000 letters in the past year, protesting the agency's alleged requirement for LD_{50} testing. In fact, the department does not require the traditional test, but a modified version of it that generally requires only ten animals. With the information, the department determines how a substance such as a chemical should be shipped. Department scientist George Cushmac added that by the time a manufacturer applies for permission to ship, it has usually already conducted a pared-down version of the LD_{50} test for EPA. The EPA data can be recycled to the transportation department, voiding the need for additional testing, he said.

Representatives from animal rights groups were out in force at the meeting, seeking reassurances from the agencies that they would discourage the use of LD_{50} testing. Spira said he was pleased to hear that FDA does not require LD_{50} testing and that the meeting helped to clear up the confusion. It is hard to know what the hullabaloo is all about.—**MARJORIE SUN**