West Valley: The Question Is Where Does Buck Stop on Nuclear Wastes?

In 1963, when the old Atomic Energy Commission gave Nuclear Fuel Services (NFS) a permit to build the world's first commercial reprocessing plant 30 miles south of Buffalo at West Valley, New York, the entire nuclear enterprise was still enveloped in a mood and spirit of unconstrained optimism and enthusiasm. If there were major unresolved problems at a critical point in the nuclear fuel cycle—that of radioactive waste management—this was not considered cause for worry, for it was simply assumed that technology would in due time provide the solutions. Since then, only a decade and a half has rolled by, but those present for the congressional hearings held 8 and 10 March to lay bare the extraordinary difficulty and high cost associated with disposing of the small volume of "high-level" wastes generated at West Valley could look back on the early 1960's as an age of technological innocence and naiveté which now seems long past.

A Dead Venture

A string of witnesses from NFS, the General Accounting Office (GAO), and other entities such as the AEC's successor agencies, the Nuclear Regulatory Commission (NRC) and the Energy Research and Development Administration (ERDA) told of a difficult state of affairs at West Valley. The NFS reprocessing plant—which operated from 1966 until 1972, when it closed for what supposedly was to be a major modification and expansion—now represents a dead venture. It has been given up by its parent company, Getty Oil, because of uncertainty over whether recycling of plutonium will be allowed and because rebuilding the NFS facility in such a way as to meet NRC seismic safety and other standards would cost more than $600 million.

The principal legacy from this disappointing venture is the 600,000 gallons of high-level reprocessing wastes stored in a 750,000-gallon underground tank which, according to the GAO, could develop leaks at any time even though the NRC believes it to be still structurally sound. This kind of storage will not be allowed for new commercial high-level wastes and the NRC is expected eventually to demand that the NFS wastes be removed from the tank, put into solid form, and transported to a federal deep geologic repository (no such repository now exists but ERDA plans to have one ready by 1985).

Estimates of the total cost of removal, solidification, and ultimate disposal go from $58 million to as much as $567 million—and to this one can perhaps add another $30 million or more for the decommissioning of the reprocessing plant itself through entombment or dismantling. In sum, the cost of eliminating the NFS plant and its high-level wastes as potential environmental hazards could exceed $600 million, or about $1 million for every ton of spent fuel the plant reprocessed (640 tons were reprocessed altogether).

Representative Leo J. Ryan (D–Calif.), chairman of the House Government Operations Subcommittee on Conservation, Energy, and Natural Resources, opened the hearings by touching on a few details of the brief, unhappy history of NFS. The venture—begun by W. R. Grace and Company but later taken over by Getty—got under way with strong encouragement from the AEC, which was eager to see private industry get into fuel reprocessing. As witnesses pointed out, the agency supported NFS in its early years, when few commercial reactors were operating and there was little spent fuel available, by providing a "base load" of spent fuel from its big combination power-and-plutonium production reactor at Hanford. In fact, about three-fourths of all spent fuel reprocessed by NFS was to come from this source.

Moreover, the system of waste management adopted by NFS for nearly all of its high-level wastes was borrowed unchanged from the AEC. That is, as in the case of the high-level wastes generated in the production of plutonium at the AEC's Hanford and Savannah River installations, the highly acidic waste from the NFS reprocessing plant was neutralized with sodium hydroxide to protect the carbon steel tank in which it was to be stored from corrosion.

The problems associated with this system of waste storage were large and predictable, yet NFS appears somehow to have been insensitive to them. Still more unwary was the predecessor agency to what is now the New York State Energy Research and Development Authority (NYSERDA), for it agreed to assume ultimate responsibility for the wastes.

Neutralizing the high-level wastes added enormously to the difficulty and expense that would be involved in recovering them from the tank and converting them to a solid. For instance, some 30,000 gallons of sludge, containing nearly all of the long-lived fission products (such as strontium-90) and transuranic elements (such as plutonium) that were in the wastes, has formed at the bottom of the tank. If all of this sludge is to be removed, the tank may have to be dug up and dismantled. (Another hazardous excavation job may be necessary as a result of a little known but extraordinary episode that took place at West Valley in 1969: 42 ruptured spent fuel elements that could not be reprocessed were simply encased in concrete and put at the bottom of a 50-foot-deep hole.)

NFS has notified NYSERDA, as its contract with this agency plainly allows, that the state of New York must now pick up these formidable waste management burdens. The state officials, in turn, are insisting that the federal government should take over management of the wastes. They argue that it was at the AEC's urging that NFS and the state undertook the venture at West Valley, that the AEC and the NRC have been responsible for setting—and changing—the rules of waste management, and, finally, that only the federal government has both the technical and financial resources and the broad overview necessary to cope effectively with the problem. It is argued that the 600,000 gallons of high-level commercial wastes at West Valley should be dealt with by the government along with the far larger problem of disposing of the more than 70 million gallons of very similar "military" wastes stored in scores of tanks at ERDA installations (*Science*, 18 February).

The Ultimate Question

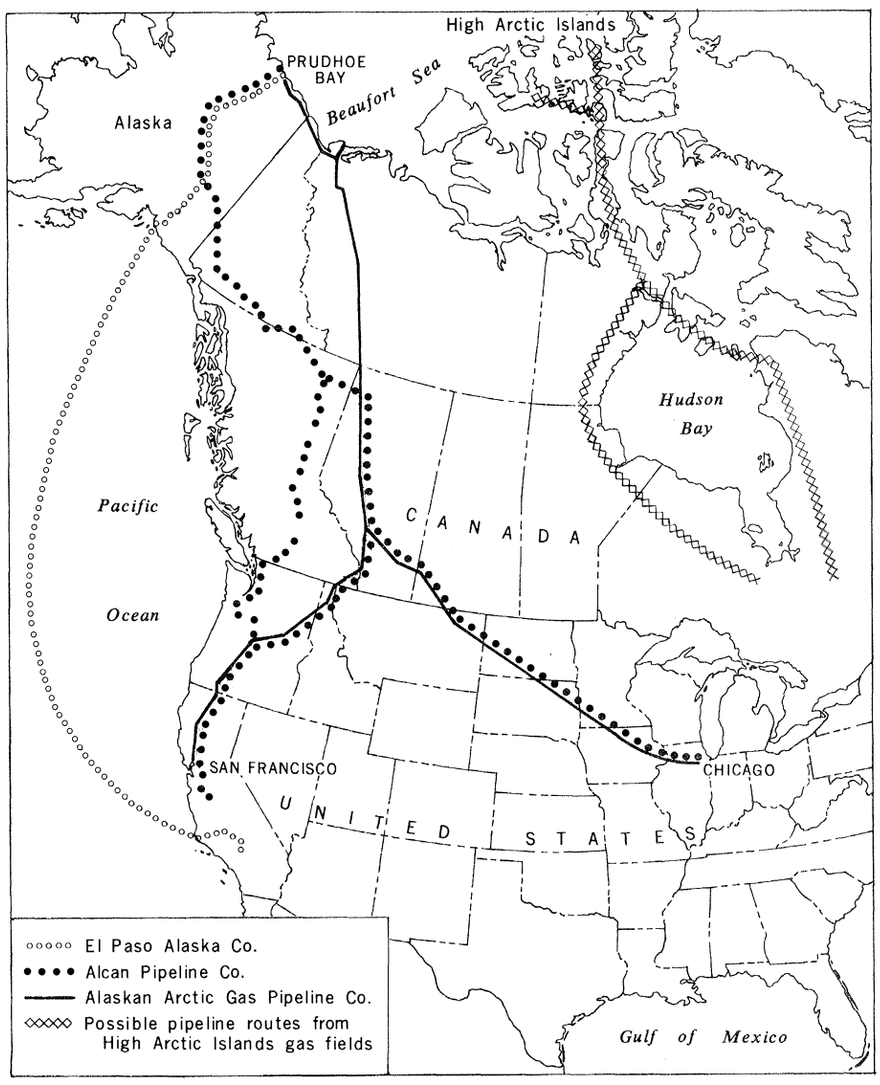
In its report to the Ryan subcommittee, the GAO did not try to answer the question of who should bear the ultimate responsibility for the wastes at West Valley, although it recommended that the government offer further technical assistance and give a high priority to establishing all necessary regulatory guidelines and standards. This question of ultimate responsibility is likely to be left for the courts. For his part, Representative Ryan, mindful that a precedent could be set that might apply to other commercial nuclear projects, told *Science* that his subcommittee will make no recommendation as to whether the federal govern-

ment should or should not assume the full burden at West Valley.

In an article to be published in the May issue of *Technology Review*, Richard K. Lester and David J. Rose, both of the Nuclear Engineering Department at the Massachusetts Institute of Technology, caution that "there is a specific job to be done at West Valley" and that it should not be lost sight of in a debate over who should bear the cost of disposing of the NFS wastes or over the broader issue of what role the federal government should play in the nuclear fuel cycle. They suggest that Congress immediately authorize ERDA to develop a set of management options for the West Valley wastes, that the NRC decide which options are to be pursued, and that Congress then appropriate the money for ERDA to act on the options selected. While this is going on, the authors say, the question of who is to pay can be resolved, either in the courts or elsewhere.—LUTHER J. CARTER

Alaskan Gas: Impact of Pipeline on Canadian North Stirs a Debate

Since 1968 public attention has focused on the 8 billion barrels of oil estimated to lie in Alaska's Prudhoe Bay reserves. But this winter's harsh weather has turned the attention of government and energy industry officials to the 26 trillion cubic feet of natural gas projected to be associated with the oil. While this gas—equal to about 10 percent of the proved reserves in the United States—is not enough to overcome the country's gas problems, it could ease some projected shortages.



Map by Eleanor Warner

At an estimated cost of from $10-to-20 billion, a Prudhoe Bay gas transportation system will be even more expensive than the Alaska oil pipeline-tanker system. But even at the current highest interstate price of about $1.50 per cubic foot, the gas is worth about $40 billion.

A congressional battle somewhat reminiscent of the trans-Alaska (oil) pipeline debate of 1973 is shaping up over gas transportation routes and technology. But this time there is an important difference—instead of playing a peripheral role in the process, Canada will have a major, if not deciding, role in choosing the route. And the route could be the single most important factor in delivery time and cost of the gas.

Three companies are competing for the right to build a gas delivery system:

▶ Arctic Gas, a consortium of 16 U.S. and Canadian gas and oil companies, wants to build a pipeline east from Prudhoe across the Arctic National Wildlife Range to Canadian gas fields in the Mackenzie delta, then south through the Mackenzie valley to southern Canada and the United States (see map). Arctic says that by combining U.S. and Canadian gas in one pipeline, consumers in both countries can share costs and keep prices down.

▶ Alcan Pipeline Co., a subsidiary of Northwest Energy, has proposed a line parallel to the trans-Alaska pipeline south of Fairbanks, Alaska, where it would turn east and follow the route of the Alcan Highway through Alaska and Canada. Supporters, including the conservation community, say this route would deliver the gas to the Midwest, where it is needed, without violating the Arctic Wildlife Range, the only stretch of Arctic coast in the United States not yet committed to hydrocarbon development.

▶ El Paso Natural Gas wants to build a trans-Alaska gas pipeline to Prince William Sound, where the gas would be liquefied and shipped aboard cryogenic tankers to California. This plan avoids Canada, is supported by the state of