



New York State

Department of Environmental Conservation

WEST VALLEY



HISTORY AND FUTURE

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Report from the Commissioner's Policy Office
New York State Department of Environmental Conservation
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Principal Author: Audrey Thier

INTRODUCTION

The Western New York Nuclear Service Center at West Valley (“West Valley”) is unique in the nation. From 1966 to 1975, it housed the only private commercial facility for reprocessing spent nuclear fuel¹ ever operated in the United States, run by Nuclear Fuel Services Inc. In addition to reprocessing – extracting uranium, plutonium, and thorium from spent fuel for potential reuse – West Valley also served as a disposal site for a variety of radioactive wastes.

When Nuclear Fuel Services Inc. ceased active operations in 1975, it left behind a legacy of radioactive contamination – multiple buildings, lagoons, disposal areas, contaminated soil, 600,000 gallons of high level radioactive waste, and a still-migrating plume of radioactive groundwater. In an otherwise rural landscape, West Valley is a blight of long-lived radioactive and hazardous waste. While there have been successes over the years in addressing certain of these wastes – most notably solidification of the liquid high level radioactive waste – progress on the majority of the cleanup has been sporadic and slow. More than thirty years after reprocessing operations ceased, the contamination remaining at West Valley is a significant and enduring hazard.

A concerted effort to accelerate and complete work at the site is long past due. All of the involved state and federal agencies have been working toward this goal, laying the groundwork through a collaboration begun in 2006, known as the Core Team Process. The Core Team’s work has proven productive, leading to new agreement on many technical issues. But on-the-ground progress is stymied by perennial funding shortfalls. In order to end the decades of delay in addressing the hazards at West Valley, the federal government must provide adequate funding to the United States Department of Energy, which has clear legal responsibility for, and authority over, a significant portion of the radioactive contamination at the site.

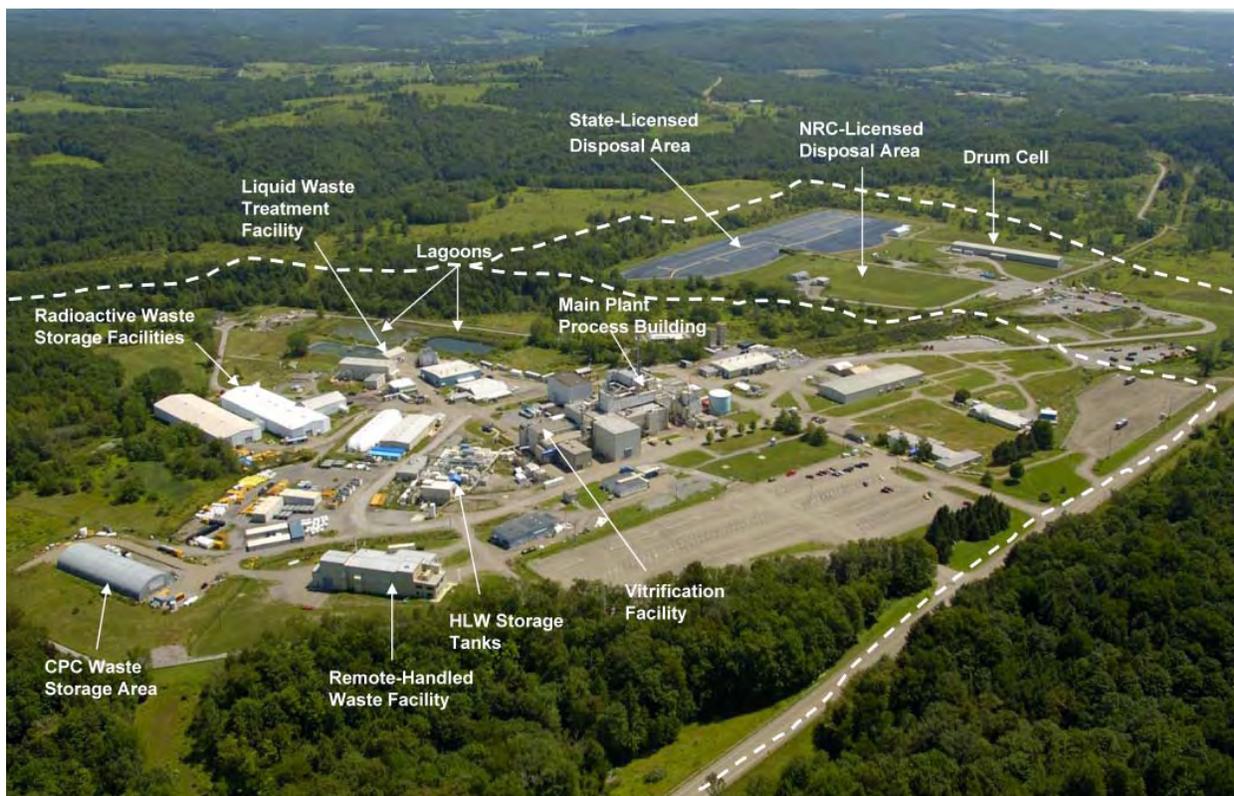
Compared to other similarly contaminated federal Department of Energy sites, the price tag for real improvements at West Valley is modest.² With a minimum federal commitment of at least \$95 million annually for roughly a decade, significant cleanup progress would be possible. Current federal budget figures, however, propose allocating only \$57.6 million, little over half the needed amount. With each passing year of underfunding and workforce reductions on the part of the federal government, the costs and potential hazards at the site increase in tandem.

New York State is therefore actively seeking to secure sufficient federal funding to responsibly address the remaining waste at West Valley. And as the actual owner of the West Valley property, and the only state that shares in the cost of cleanup at a high level radioactive waste site, New York is also seeking to ensure that it has a deciding voice in determining the most protective outcome for West Valley. For more than three decades, as a result of the federal government’s historic failure to meet its funding responsibilities, New York has had to live with both the immediate and potential hazards inherent to the site.

The following is a description of West Valley, its history and key features, and New York State’s recommendations for cleanup, both immediate and long-term.

¹ Spent fuel is nuclear fuel that has already been used in a reactor.

² For comparison purposes, the 2008 federal budget allocation for cleanup at the nuclear waste site in Hanford, Washington was just shy of \$2 billion; for Savannah River it was approximately \$1.4 billion; and for Idaho National Laboratories, \$504 million.



Aerial photo of West Valley with key features identified. “CPC Waste Storage Area” refers to the Chemical Process Cell Waste Storage Area. “HLW Storage Tanks” refers to the underground tanks for high level waste storage. Dotted lines distinguish between two areas of the site: the North and South Plateaus. (Photo: West Valley Demonstration Project modified by NYSERDA)

SITE HISTORY AND KEY FEATURES

West Valley is a 3,345-acre site, owned by the New York State Energy Research and Development Authority (NYSERDA) on behalf of New York State. It is located in the Great Lakes Region, in Cattaraugus and Erie Counties, approximately 30 miles south of Buffalo and 20 miles upstream from the Cattaraugus Reservation of the Seneca Nation. An estimated 9,200 people live within six miles of the site in what is a largely agricultural area. Several streams, which ultimately drain to Lake Erie, cross the site, and a majority of the acreage is undeveloped—a combination of open land and forest, populated by wildlife. Much of the land is subject to erosion and portions are plagued by a shallow water table. These are features that would render the site unacceptable for radioactive waste disposal under modern siting criteria, and they also make it problematic as a permanent resting place for such materials.

Approximately 200 acres of the West Valley site contain the remains of nuclear fuel reprocessing operations, which began in the early 1960s when the federal government licensed Nuclear Fuel Services Inc. to run the facility. Though the state was involved in this undertaking, it was not the driver. The fundamental impetus was a federal policy—a relic of the early nuclear age—that actively encouraged development of private nuclear facilities. The majority of spent fuel reprocessed at West Valley was derived from federal weapons facilities, and the federal government was also the recipient of most of the products from West Valley’s reprocessing operations.



Regional map of the area surrounding West Valley

(Map: Modified by NYSERDA)

Nuclear Fuel Services Inc. conducted reprocessing at West Valley between 1966 and 1972, storing the resulting liquid high level radioactive waste in underground tanks on site. In addition, Nuclear Fuel Services Inc. operated two on-site disposal areas. The first, the State-Licensed Disposal Area, accepted mostly low level radioactive waste from both commercial and federal facilities for burial in shallow trenches. The second, the Nuclear Regulatory Commission-Licensed Disposal Area, accepted high activity radioactive waste generated by reprocessing. It also contains some low level radioactive waste from later decontamination activities.

In 1975, water that had filtered through an inadequate landfill cap and seeped in through the subsurface, collected in the State-Licensed Disposal Area trenches, and caused them to overflow. Nuclear Fuel Services Inc. pumped out the accumulated leachate, treated it to reduce contamination, and then released it to

adjacent streams. This event was an early and dramatic demonstration of West Valley’s difficulties as a radioactive disposal site.

Nuclear Fuel Services, Inc. quit the site shortly thereafter, rather than invest the funds needed to bring its operations into compliance with new federal safety requirements, leaving in its wake widespread contamination that became the responsibility of New York State, as site owner. Recognizing and owning federal responsibility for the hazards its policies had engendered and its waste streams had fed, Congress enacted the West Valley Demonstration Project Act (“the Act”) in 1980. The Act charged the Department of Energy with the task of solidifying the liquid high level radioactive waste at West Valley, and decontaminating and decommissioning all of the facilities and equipment associated with the solidification effort. It further mandated that the Department of Energy cover 90 percent of the associated costs, with the state left to cover the remaining 10 percent.

In the decades following the Act’s implementation, the Department of Energy has fully achieved only one aspect of its mandate. Most of the liquid high level radioactive waste, aside from the residue that remains in the underground tanks, has been solidified by incorporating it into glass logs, a process known as vitrification. While vitrification is now complete, this singular accomplishment is a qualified success, because no current off-site disposal option for the vitrified logs exists. They remain on site, stored in the Main Process Building, which is itself a contaminated structure (underlain by a plume of radioactive groundwater described below).

There have been other steps forward over the years, including, for example, off-site shipment and disposal of a substantial amount of solidified liquid low level radioactive waste, and various containment measures in the disposal areas. But there have been grim new revelations as well. Chief among these was the discovery, in 1993, of a plume of highly radioactive groundwater containing strontium-90 and other contaminants—originating from a leak within the Main Process Building—which continues to migrate and widen today.

The spreading plume exemplifies the inherent difficulties of containing contamination at this site and the cost of delays in fully addressing them. But it is by no means the only significant hazard. In addition to strontium-90, multiple areas of the West Valley site are contaminated by other radionuclides, including tritium (hydrogen-3), cesium-137, radium-226, and plutonium-238. Like all materials that generate ionizing radiation, exposure to these can cause DNA damage, various cancers, and a range of other serious adverse health effects.

The outstanding contamination issues at the site are as follows:

Main Process Building

The Main Process Building housed Nuclear Fuel Services' reprocessing operations and, as a result, is contaminated with a wide range of radionuclides and other hazardous constituents, such as heavy metals. In addition, the strontium-90 groundwater plume, described below, originated from a leak within the building.



Stainless steel canisters containing vitrified glass logs of high level waste, stored in a "hot cell" room in the Main Process Building.

To address this dual hazard – the structure and the plume—the Main Process Building must be decontaminated, dismantled, and removed, and the underlying soil excavated to eliminate the source area of the plume. Decontamination is underway, but it cannot be completed due to the presence of the vitrified logs currently housed within the building. There is no off-site disposal option for these logs, because they are classified as high level radioactive waste. Final decontamination and removal of the Main Process Building, therefore, requires that the vitrified logs be moved to another location.



Photograph from West Valley Demonstration Project collection, modified by NYSERDA to show the approximate footprint of the plume in the summer of 2007.

(Photo: West Valley Demonstration Project and NYSERDA)

Groundwater Plume

The groundwater plume, contaminated with strontium-90 and other long-lived radioactive elements, is likely the result of one or more leaking pipes inside the Main Process Building during reprocessing operations. The plume, which currently stretches for approximately one third of a mile, continues to expand and migrate through the upper groundwater sand and gravel layer on the site's North Plateau. In places, the plume has seeped into drainage ditches, contaminating surface water that flows into the streams on site and ultimately to Lake Erie, thus threatening currently uncontaminated off-site areas.

Radioactivity levels in the plume and some of the contaminated surface waters exceed the United States Environmental Protection Agency's (EPA) drinking water standard for strontium-90 by many orders of magnitude. The concentration of strontium-90 near the Main Process Building, for example, is 20,000 times higher than the EPA standard. Although the Department of Energy has attempted to contain the plume through various measures, these have not succeeded in halting its spread. New containment measures are under consideration, although no firm timetable for installation has been offered.

Underground Storage Tanks

The underground storage tanks once held 600,000 gallons of liquid high level radioactive waste generated by reprocessing. Most of this has been removed and vitrified, but the tanks still contain approximately 20,000 residual gallons of liquid waste, more than 500 cubic feet of residual solids, and substantial contaminated material adhered to the interior surfaces of the tanks. The tanks are located in an area where the water table is high and the soils are highly permeable. Compounding the risk posed by these natural conditions, the tanks are nearing the end of their intended service life. Although they sit within larger concrete vaults (which provide secondary containment), the structural integrity of the tanks themselves is questionable. For as long as they remain in the ground, vigilant and expensive monitoring, maintenance, and groundwater infiltration controls will be required. Even such

vigilance cannot guarantee that the tanks will not, in their deteriorating state, fail.



Boxes and drums of radioactive waste stacked in the State-Licensed Disposal Area. Note the water pooled on the trench floor. Photo taken in the mid-1970s.

State-Licensed Disposal Area

The 16-acre State-Licensed Disposal Area is a series of unlined, shallow trenches containing 2.4 million cubic feet of low level radioactive waste from the federal government and various medical, commercial and industrial sources. Much of the waste in the State-Licensed Disposal Area—which is contaminated with, among other things, tritium, nickel-63, cesium-137, and plutonium-238—was disposed of in drums, cardboard boxes and crates that have since deteriorated.

Several features of the State-Licensed Disposal Area make it challenging for long-term waste containment. It is located on an elevated rise with steep, erosion-prone slopes that lead down to bordering streams. In addition,

the underlying soil is dense clay that does not allow water to readily pass through. While this has the benefit of inhibiting contamination from migrating through the bottom of the disposal area, it also creates the conditions that can lead to pooling, which caused the overflow in 1975.

Since that major failure in 1975, New York State has made several improvements to the State-Licensed Disposal Area to reduce the threat of a recurrence. A new cap and a barrier wall have been installed. As a result, the amount of water entering the trenches is currently under control. Such improvements are designed to lessen the hazards at this disposal area, but it remains an inherently problematic location—one that would not meet current siting criteria for radioactive waste disposal.

The nature of the materials stored there, and the erosion problems that characterize the area, will therefore require active ongoing monitoring and maintenance for as long as the waste remains in the ground.

Nuclear Regulatory Commission-Licensed Disposal Area

Adjacent to the State-Licensed Disposal Area is the 6-acre Nuclear Regulatory Commission-Licensed Disposal Area, which contains approximately 360,000 cubic feet of high activity radioactive waste, including ruptured spent fuel rods. This disposal area is contaminated with strontium-90, radium-226, and plutonium-241, primarily from reprocessing operations. Like the State-Licensed Disposal Area, the Nuclear Regulatory Commission-Licensed Disposal Area is subject to erosion and unlined. Despite the higher level radioactivity of its contents, however, it currently lacks adequate capping and containment.



Waste disposed of by the United States Department of Energy in trenches at the Nuclear Regulatory Agency-Licensed Disposal Area. Photo taken in the 1980s.

(Photo: West Valley Demonstration Project)

In the 1980s, the inherent risks of such poor siting and management were plainly demonstrated. Disposal holes at the Nuclear Regulatory Commission-Licensed Disposal Area filled with water and liquid wastes leaked into the groundwater. An interceptor trench was installed to collect and monitor liquid wastes, and some potential sources of wastes were removed, but decades later, the Department of Energy has not yet made the needed upgrades. Though better capping and containment are designed to lessen the hazards, the site conditions are fundamentally inappropriate for disposal of radioactive waste. As is true for the State-Licensed Disposal Area, the location of the Nuclear Regulatory Commission-Licensed Disposal Area would not be approved for such a purpose under current siting standards, and active monitoring and maintenance will be required for as long as waste remains there.

Other Buildings and General Contamination

Problems at the site are not limited to the major features described above. Numerous other buildings will also require decontamination and dismantling once they are no longer needed for decommissioning activities. Among these are the Remote-Handled Waste Facility, the Vitrification Facility, and various storage facilities. Each contains radioactive elements, or hazardous constituents, or both, depending on past use.

A contaminated water treatment facility, including several lagoons, remains on site as well. The lagoons were originally used by Nuclear Fuel Services Inc. and later by the Department of Energy, to manage waste water discharges from several activities, including reprocessing, vitrification, and decontamination of many kinds. Over their lifetime, they have contained a mixture of radioactive contaminants, heavy metals, and solvents, and monitoring has shown that some of these have migrated into the surrounding soil and groundwater.

And finally, the handling, movement, and disposal of highly radioactive materials over many years; the leaking disposal areas and lagoons; the leaking pipes inside the Main Process building; and a vent accident at the Main Process Building that deposited radioactive cesium-137 on surface soils over a distance of more than a mile (known as the “Cesium Prong”) have, all told, left numerous areas of soil and groundwater contamination that must now be actively managed, excavated, or otherwise remediated in order to stave off still wider contamination.

RECOMMENDATIONS

During the decades-long effort to push this critical cleanup forward, West Valley has been the subject of continuous discussion, disagreement, and in some cases, legal actions and orders involving NYSERDA, the Department of Energy, the United States Environmental Protection Agency, citizen groups from surrounding communities, the Seneca Nation, and the New York State Department of Environmental Conservation, which has regulatory authority over several aspects of site cleanup. A chief focal point of contention has been the still-unresolved issuance of a final Environmental Impact Statement. This document is necessary in order for crucial work, such as addressing the ultimate disposition of the underground waste tanks, to commence. Although an interim Environmental Impact Statement addressing a subset of issues has been released, the final statement has been nearly 20 years, and counting, in the crafting.

A second major point of contention has been differing interpretations of federal responsibility to cover remediation costs at the site. In December 2006, New York State and NYSERDA filed suit against both the United States and the Department of Energy, seeking to clarify the percentage of costs to be borne by each government for both ongoing actions and the chosen final remedies. As of this writing, the parties are currently engaged in a confidential mediation process in an attempt to resolve key issues in the litigation.

These intervening years have amply demonstrated the difficulties of controlling contamination at the site. The New York State Department of Environmental Conservation therefore urges immediate attention to the following actions, in order to reduce hazards on and off site and to prepare the way for more extensive work in the future. Many of these actions have been agreed to in principle as part of the collaborative Core Team Process between New York State, the Department of Energy, the United States Environmental Protection Agency, and the Nuclear Regulatory Commission. The existence of these agreements represents an important step forward in reaching an ultimate resolution at the site. But the work itself cannot proceed, and the hard-won momentum of the Core Team Process will be lost, unless the Department of Energy receives adequate funding and personnel in the federal budget.

Recommended Actions

- Construct a new, safe facility to store the vitrified logs, and then move the logs out of the contaminated Main Process Building.
- Complete decontamination of the Main Process Building and its ancillary facilities, and ready them for demolition and removal.
- Decontaminate the Remote-Handled Waste and the Vitrification Facilities once they are no longer needed for decommissioning, and ready them for demolition and removal.
- Ship all waste with current disposal options off site.
- Contain the groundwater plume by designing and installing a treatment wall and simultaneously seeking other treatment options for pilot testing.
- Empty and dry the underground waste tanks. No interim actions should be taken that would increase the difficulty of removing these tanks in the future.
- Install an updated cap and a containment system at the Nuclear Regulatory Commission-Licensed Disposal Area, comparable to those at the State-Licensed Disposal Area.

- Initiate the planning for and design of a pilot study of excavation strategies at the State-Licensed Disposal Area and Nuclear Regulatory Commission-Licensed Disposal Area, using a combination of state and federal funds.
- Accelerate design and planning for all aspects of cleanup, so that work can commence as soon as outstanding legal and regulatory issues have been resolved.

The most protective resolution for West Valley is to remove all structures and sources of contamination, ship all wastes with off-site disposal options, and store those without off-site disposal options safely so that they can no longer contaminate the general environment. There are significant technical, legal, and practical barriers to surmount in order to achieve such a vision, but actions at the site should be designed and undertaken with this goal in mind, however distant some of the specific work may be. Sufficient federal funding should be allocated to achieve both this long-term goal and the nearer-term actions outlined above. The federal government should fully honor its responsibilities at West Valley.

CONCLUSION

West Valley was born in a time before the severity, magnitude, and longevity of the hazards posed by radioactive waste were fully appreciated. It is not the only site in the nation laden with high level radioactive waste, but it is the only one that is state-owned. And as one of the smallest of such sites, it is also a place where real cleanup progress is possible with sufficient funding, a full workforce, and the concerted efforts of all parties involved. The physical size of the site should not, however, be confused with the size of its risk—West Valley poses a significant health and environmental threat, one that has persisted during years in which the federal government failed to devote the attention and resources needed for a responsible cleanup.

The federal government must therefore engage the problem of West Valley with a fresh resolve that enables the Department of Energy to meet its obligations. With adequate resources, and the cooperation and collaboration of all state and federal agencies, the legacy of radioactive waste that has plagued West Valley and the surrounding communities for decades can finally be addressed. Without adequate federal funds, however, conditions at the site will further deteriorate, the ultimate cost of cleanup will increase, and the citizens of New York will continue to shoulder this decades-old burden, the result of a now-defunct federal nuclear policy.