



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

September 4, 2009

Mr. Bryan Bower
Project Director
Department of Energy
West Valley Demonstration Project
10282 Rock Springs Road
P.O. Box 191
West Valley, NY 14171-0191

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION WEST VALLEY
DEMONSTRATION PROJECT MONITORING VISIT 2009-001

Dear Mr. Bower:

On August 5-6, 2009, Mark Roberts of this office completed a series of routine monitoring visits at the Department of Energy's (DOE) West Valley Demonstration Project (WVDP) site to review ongoing decommissioning activities at the site. These activities are conducted and coordinated by DOE and their site contractor, West Valley Environmental Services (WVES). The purpose of the monitoring visits was to review activities associated with the north plateau strontium-90 (Sr-90) groundwater plume; the NRC-licensed disposal area; environmental monitoring (venison sampling); the WVDP tank and vault drying system; and radioactive waste characterization, handling and packaging operations. The results of these visits were discussed with you and other members of your staff at the end of each monitoring visit and summarized on August 6, 2009. Details of the NRC review are provided in the enclosed report.

Current NRC regulations are included on the NRC's website at www.nrc.gov; select **Nuclear Materials; Medical, Academic, and Industrial Uses of Nuclear Material**; then **Regulations, Guidance, and Communications**. The current NRC Enforcement Policy is included on the NRC's website at www.nrc.gov; select **About NRC; How We Regulate; Enforcement**; then **Enforcement Policy**. You may also obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-866-512-1800. The GPO is open from 7:00 a.m. to 6:30 p.m. EST, Monday through Friday (except Federal holidays).

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and the enclosed report will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS) accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

B. Bower

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Please contact Mark Roberts at (610) 337-5094 if you have any questions about this report.

Thank you for your cooperation.

Sincerely,

/RA by Kathy Modes For/

Judith Joustra, Chief
Decommissioning Branch
Division of Nuclear Materials Safety

Enclosure:
Monitoring Report No. 2009-001

cc:
Paul Bembia, Program Director, NYSERDA
State of New York
Christopher Eckert, Lead Physical Scientist, DOE, WVDP

B. Bower

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Enclosure:
Monitoring Report No. 2009-001

cc:
Paul Bembia, Program Director, NYSERDA
State of New York
Christopher Eckert, Lead Physical Scientist, DOE, WVDP

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**U.S. NUCLEAR REGULATORY COMMISSION
REGION I**

MONITORING REPORT

Monitoring Visit Number: POOM-032/2009001

Project Number: POOM-032

Location: West Valley Demonstration Project
10282 West Spring Road
West Valley, NY 14171-9799

Monitoring Visit Dates: January 22-24, 2008, August 5-6, 2008, December 3-4, 2008 and
August 5-6, 2009

Monitor: Mark Roberts, Senior Health Physicist
Decommissioning Branch
Division of Nuclear Materials Safety

Approved by: Judith Joustra, Chief
Decommissioning Branch
Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

U. S. Department of Energy (DOE)
West Valley Demonstration Project (WVDP)

NRC Monitoring Report No. 09-001

In accordance with the WVDP Act of 1980 and as implemented by a Memorandum of Understanding between the DOE and the NRC, NRC Region I staff conduct technical monitoring visits at the WVDP site to review WVDP facilities and operations. NRC technical monitors use NRC Inspection Manual Chapter 0111, "Region I Monitoring Activities for the DOE West Valley Demonstration Project" as guidance for the monitoring visits. This report summarizes the monitoring visits conducted over the periods of January 22-24, 2008, August 5-6, 2008, December 3-4, 2008, and August 5-6, 2009 at the WVDP. The purpose of the visits was to review activities associated with the north plateau strontium-90 (Sr-90) groundwater plume; the NRC-licensed disposal area; environmental monitoring (venison sampling); the WVDP tank and vault drying system; and radioactive waste characterization, handling and packaging operations.

The NRC monitor interviewed cognizant personnel, performed field observations, and examined documentation during the visit. Based on this review, the monitor noted the following:

- Staffs from the DOE and West Valley Environmental Services (WVES) are extensively characterizing a Sr-90 contaminated groundwater plume on the north plateau of the WVDP area. A preliminary plan for a vertical permeable treatment wall to intercept a portion of the contaminated groundwater plume and filter Sr-90 ions from the water has been designed, and testing of wall components is underway. A final permeable treatment wall design is expected in early 2010 with installation scheduled to be completed by the end of 2010. (Section II)
- Stakeholders raised concerns regarding groundwater and surface water infiltration through the NRC-licensed Disposal Area (NDA) and erosion of the earthen cap. The DOE, WVES and WVES contractors installed a non-permeable soil/bentonite clay wall in conjunction with a low permeable geomembrane cover that has reduced groundwater and surface water infiltration into the NDA by approximately 80 percent. (Section III)
- Staff from the New York State Energy Research and Development Authority (NYSERDA) conducted an adjunct environmental sampling and analysis program to obtain additional data regarding concentrations of cesium-137 (Cs-137) in venison samples from the WVDP site. Data from this sampling and analysis program were evaluated by the New York State Department of Health and the Department concluded that Cs-137 concentrations in venison were sufficiently low that there was no public health hazard. (Section IV)
- Liquid wastes from past and current operations are currently stored in four tanks at the west end of the WVDP site. The Department of Energy and WVES are finalizing the

design for a tank and vault drying system that is intended to eliminate the residual liquid within all four tanks, eliminate the risk of a tank leak, eliminate liquids from the tank vaults to reduce corrosion potential and prolong life, and eliminate the intrusion of groundwater into the tank vaults. Installation will commence in the fall of 2009 with major equipment to be installed in 2010. A large inventory of Cs-137 (14,000 curies) in the liquid in one of the tanks will require special planning and handling to collect and dispose of the zeolite filter media. (Section V)

- Significant quantities of radioactive waste from past operations (legacy waste) are being characterized, sorted and prepared for transportation for offsite disposal or onsite storage. The WVES staff use a specially-designed Remote Handled Waste Facility to perform operations on containers with elevated exposure rates (> 200 mR/hr). Operations for waste sorting and repackaging of waste containers with low exposure rates are typically handled directly in a separate facility. Special handling procedures are implemented if the containers contain transuranic wastes. Operations appeared to be conducted safely at each of the two facilities. (Section VI)

REPORT DETAILS

I. Introduction

This report documents NRC monitoring visits to the West Valley Demonstration Project (WVDP) site on January 22-24, 2008, August 5-6, 2008, December 3-4, 2008 and August 5-6, 2009. The purpose of the visits was to review activities associated with the north plateau strontium-90 (Sr-90) groundwater plume; the NRC-licensed disposal area; environmental monitoring (venison sampling); the WVDP tank and vault drying system; and radioactive waste characterization, handling and packaging operations.

II. North Plateau Strontium-90 Groundwater Plume

A. Inspection Scope

The NRC monitor reviewed the activities being conducted and proposed by DOE and WVES to characterize and mitigate the Sr-90 groundwater contamination plume on the WVDP north plateau. Monitoring activities consisted of reviews of documents, interviews with cognizant personnel and field observations.

B. Observations

Previous investigations and routine environmental monitoring programs at the WVDP site have identified a plume of impacted groundwater extending approximately 1000 feet in a northeasterly direction from the Main Plant Processing Building. Measurements over successive time periods confirm that the plume is spreading to the northeast. Peak concentrations in the center of the contaminated groundwater plume exceed 100,000 picocuries/liter (pCi/l) of Sr-90. In some locations at the far northeast edge of the plume, Sr-90 concentrations have been detected above background in samples from groundwater seeps at the edge of the north plateau. Some of these are beyond the border of the DOE project area and onto the NYSERDA project property. Due to concern for potential exposure to contaminated groundwater by individuals trespassing onto the NYSERDA property, in addition to "No Trespassing" signs, NYSERDA staff placed radiological warning signs at various locations on their property to warn trespassers of the environmental contamination. The monitor reviewed the content of the signs with representatives of NYSERDA and staff from the NRC's Office of Federal and State Materials and Environmental Management Programs (FSME) and concluded that the signs were informational and did not violate any of the posting or labeling requirements found in 10 CFR Part 20 Subpart J - Precautionary Procedures.

Over the past two years, WVES staff and contractors have conducted extensive sampling and analysis on the north plateau to characterize the lateral and vertical extent of the groundwater contamination. The characterization is complicated due to the presence of a construction debris landfill, ditches, and elevation changes. A draft of the characterization report is under review by WVES. Due in part to stakeholder concerns and based upon preliminary data, WVES and DOE have discussed a number of alternatives to retard the spread of the plume. The current plan is to construct a permeable treatment wall (PTW) to intercept a portion of the plume at approximately the 10,000 pCi/l isopleth. The PTW will be a buried vertical wall consisting of a soil and zeolite mixture. Zeolite is a natural mineral that has the capability of filtering out certain ions in solution (in this case the Sr-90 cations and other similarly charged ions) and allowing the groundwater to pass through the wall. Contracted laboratory studies have been underway at the University of Buffalo since February 2009 with non-radiological components, and onsite since May 2009 with contaminated groundwater to test different zeolite materials and soil/zeolite

combinations. The testing will also be used to determine the expected lifetime of the PTW. The initial phase of the zeolite testing is expected to be completed in October, 2009.

Preliminary designs for the PTW are expected by December 2009 with a final design in early 2010. Installation of the PTW is scheduled to be completed by the end of 2010. The current estimate of the size of the PTW is seven hundred feet long, three feet wide, and twenty to twenty-five feet deep. The base of the wall will sit on relatively low permeability soil.

In addition to the PTW installation for plume mitigation, alternatives for remediation of the portion of the plume downgradient of the PTW are under discussion by the DOE, WVES, NYSERDA, and the New York State Department of Environmental Conservation. Based on discussions with stakeholder representatives, a preliminary plan for a horizontal permeable treatment barrier does not appear to be a viable option to successfully mitigate the upgradient contaminated groundwater.

C. Conclusions

Staffs from the DOE and WVES are extensively characterizing a Sr-90 contaminated groundwater plume on the north plateau of the WVDP area. A preliminary plan for a vertical permeable treatment wall to intercept a portion of the contaminated groundwater plume and filter Sr-90 ions from the water has been designed and testing of wall components is underway. A final permeable treatment wall design is expected in early 2010 with installation scheduled to be completed by the end of 2010.

III. **NRC-Licensed Disposal Area**

A. Inspection Scope

The NRC monitor reviewed the actions conducted by DOE and WVES staffs to reduce groundwater and surface water infiltration through the NDA on the south plateau. Monitoring activities consisted of reviews of documents, interviews with cognizant personnel and field observations.

B. Observations

The NDA was operated from 1966 through 1986 by Nuclear Fuel Services and DOE. Approximately 360,000 cubic feet of waste containing approximately 300,000 curies of radioactive material is buried in the disposal area. The NDA lies next to the State-licensed Disposal Area (SDA) on the south plateau of the WVDP site. The SDA has been previously capped with a low permeable geomembrane cover.

Stakeholders have voiced concerns regarding groundwater and surface water infiltration through the NDA, erosion of the earthen cap on the NDA, and downgradient erosion and potential impact of radiological contamination on nearby streams. Due to these concerns, a multi-phased project was undertaken to minimize groundwater and surface water infiltration through the NDA.

In the summer of 2007, design and construction packages were completed for installation of a non-permeable soil and bentonite (clay) slurry wall upgradient (south and west sides) of the NDA and a placement of a geomembrane cover on the NDA. The design was coordinated with

NYSERDA to avoid impact on the SDA. In the summer of 2008, the three-foot thick non-permeable wall was installed by constructing a deep trench into the soil and down into the unweathered glacial till, and immediately filling the trench with a non-permeable soil/bentonite clay mixture. The wall was typically twenty to twenty-five feet deep and was keyed approximately five feet into the unweathered till so that groundwater would be diverted around the wall and bypass the buried waste in the NDA. The earthen cap on the NDA was re-graded and a seven-acre geomembrane cover was installed in the fall of 2008. Seams were heat-welded to provide a continuous barrier. Sand berms were placed on top of the cover to prevent disturbance of the cover by high winds.

Prior to the installation of the non-permeable wall and geomembrane cover, groundwater and surface water were collected in an interceptor trench downgradient of the NDA. The collected water was then pumped to the lagoons on the north plateau for treatment, radiological analysis, and controlled release through the normal discharge pathway. During the first half of 2008, prior to installation of the non-permeable wall and geomembrane cover at the NDA, 233,000 gallons of water were pumped from the interceptor trench for treatment and disposal. For that same time period in 2009, following installation of the wall and cover, 46,000 gallons of water were pumped from the interceptor trench. This is a reduction of approximately 80 percent from the previous year. The preliminary indication is that the non-permeable wall and geomembrane cover are successfully reducing water infiltration into the NDA.

C. Conclusions

Stakeholders raised concerns regarding groundwater and surface water infiltration through the NDA and erosion of the earthen cap. The DOE, WVES and WVES contractors installed a non-permeable soil/bentonite clay wall in conjunction with a low permeable geomembrane cover that has reduced groundwater and surface water infiltration into the NDA by approximately 80 percent.

IV. **Environmental Monitoring (Venison Sampling)**

A. Inspection Scope

The monitor discussed the special NYSERDA venison sampling program with NYSERDA staff and reviewed radiological analytical data generated as a result of the program. Monitoring activities consisted of reviews of documents and interviews with cognizant personnel.

B. Observations

As part of the WVDP routine radiological environmental monitoring program, deer meat (venison) samples are typically collected from three locations near the site and from three background locations (greater than ten miles from the site). Samples are typically collected from road-killed animals. Samples are analyzed by gamma spectrometry analysis in order to identify and quantify the Cs-137 concentrations in the samples. Data are reported in the annual environmental monitoring report that is available on the DOE-WVDP website. In both 2006 and 2007, one of the near-site venison samples indicated elevated concentrations of Cs-137. The highest concentration reported was 2.42 pCi/g, which would result in a radiation dose of less than five millirem to an individual consuming 90 pounds of venison in a year. This value is below

the annual public dose limit of 100 mrem/year and also much less than the typical background dose rate of approximately 300 mrem/year.

Because there is a large deer population on the NYSERDA property (approximately 3300 acres), NYSERDA coordinates a controlled, permitted deer hunt during the regular deer-hunting season. In order to get a larger amount of venison data, during the 2008 hunting season, NYSERDA requested successful hunters to provide venison samples for analysis. Hunters provided a total of fourteen samples, with samples provided from all seven permitted hunting areas surrounding the site. These samples were also analyzed for their Cs-137 concentrations. Results ranged from 0.05 to 0.78 pCi/g. An evaluation by the New York State Department of Health indicated that all results were less than five percent of the U. S. Food and Drug Administration limits for radioactivity in imported foods and concluded that venison with radioactivity at these low levels did not present a public health hazard. The data were provided to each individual hunter and summary information was provided to all permitted hunters. The data were also presented by NYSERDA at the quarterly WVDP public meeting.

C. Conclusions

Staff from NYSERDA conducted an adjunct environmental sampling and analysis program to obtain additional data regarding concentrations of Cs-137 in venison samples from the WVDP site. Data from this sampling and analysis program were evaluated by the New York State Department of Health and the Department concluded that Cs-137 concentrations in venison were sufficiently low that there was no public health hazard.

V. **WVDP Tank and Vault Drying System**

A. Inspection Scope

The monitor reviewed the proposed plans for installation of a system to eliminate residual liquids in the tanks in the WVDP tank farm and the treatment plans for handling and disposing of high concentrations of Cs-137 in the liquid in one of the tanks. Cognizant personnel presented an overview of the proposed plans. Monitoring activities consisted of reviews of documents and field observations.

B. Observations

Liquid wastes from past and current operations are currently stored in four tanks at the west end of the WVDP site. The two large carbon steel tanks, 8D1 and 8D2, (> 500,000 gallon capacity) are each located in their own tank vaults and are no longer in active service. The two smaller stainless steel tanks, 8D3 and 8D4 (14,000 gallon capacity) are located in a common tank vault and can receive liquid wastes from certain processes. Because the tanks are not scheduled for removal during the current phase of decommissioning, some stakeholders are very concerned about the potential for leakage from the tanks, in particular the two carbon steel tanks that are not as durable as the stainless steel tanks. All four tanks contain residual liquid wastes. Three of the tanks (except 8D3) contain large radioactive inventories. The two carbon steel tanks also contain significant radioactivity in solids and sludges at the bottom of each tank. Tank liquid volumes are 13,500 gallons, <1800 gallons, 1600 gallons, and 5000 gallons for 8D1, 8D2, 8D3, and 8D4, respectively. The liquid in tank 8D4 contains approximately 14,000 curies of Cs-137.

Because the tanks are below ground, groundwater infiltration into the tank vaults and potential corrosion is an additional concern.

Due to the concerns for corrosion and leakage of the two carbon steel tanks, a conceptual design for a tank and vault drying system was finalized at the end of 2008 and a single bid to complete the work was received. Initial excavating work and sealing groundwater in-leakage pathways will commence in the fall of 2009. Major equipment installation is scheduled for calendar year 2010. The installation of the tank and vault drying system is intended to eliminate the residual liquid within all four tanks, eliminate the risk of a tank leak, eliminate liquids from the tank vaults to reduce corrosion potential and prolong life, and eliminate the intrusion of groundwater into the underground tank vaults.

Treatment of the high concentration of Cs-137 (approximately 740 microcuries/milliliter) in the liquid in tank 8D1 will require special planning. Current plans are to collect the Cs-137 activity on zeolite filters. Special remote handling will be needed to handle the vessel containing the zeolite following collection of the Cs-137 activity and loading the vessel into a shielded transport cask. The contact dose rate on the vessel is expected to exceed 7000 Roentgens/hour (R/hr).

C. Conclusions

Liquid wastes from past and current operations are stored in four tanks at the west end of the WVDP site. The Department of Energy and WVES are finalizing the design for a tank and vault drying system that is intended to eliminate the residual liquid within all four tanks, eliminate the risk of a tank leak, eliminate liquids from the tank vaults to reduce corrosion potential and prolong life, and eliminate the intrusion of groundwater into the tank vaults. Installation will commence in the fall of 2009 with major equipment to be installed in 2010. A large inventory of Cs-137 (14,000 curies) in the liquid in one of the tanks will require special planning and handling to collect and dispose the zeolite filter media.

VI. **Radioactive Waste Characterization, Handling and Packaging Operations**

A. Inspection Scope

The monitor reviewed radioactive waste characterization, handling and packaging activities. DOE and contractor staffs provided an overview of activities conducted at the Remote Handled Waste Facility (RHWF) and the contact handled waste area. Monitoring activities consisted of discussions with cognizant personnel, review of documentation, and field observations.

B. Observations

WVES is involved in a significant campaign to sort legacy waste from past operations and prepare waste containers for offsite transportation for disposal. Waste from past operations had been placed in suitable containers for onsite storage, but had not been packaged in an acceptable manner for offsite transportation for disposal. In some cases, the description of the waste in the containers does not provide sufficient information to adequately complete waste shipping documents. The current campaign involves identifying and sorting the contents of waste containers, documenting the contents, and repackaging as needed for offsite transportation for disposal or onsite storage. Onsite storage of some waste containers is needed because the contents exceed certain waste acceptance criteria for the disposal sites.

Waste containers at the WVDP site are generally classified as contact handled or remote handled. Waste containers exceeding a dose rate of 200 mR/h are typically classed as remote handled and opening and sorting operations are conducted in the Remote Handled Waste Facility (RHWF). Waste containers are typically characterized using a special gamma spectrometry (Canberra ISOCS) system to aid operators in properly and safely characterizing container contents. Operators in the RHWF use remote operated manipulators to open containers, remove and sort contents, perform volume reduction activities, re-package containers, add shielding, and stabilize the contents. Waste containers that are contact handled (i.e., the containers are sorted directly by operators, may typically contain transuranic (TRU) waste (> 100 nanocuries/gram of transuranic radionuclides). An area has been set up in one of the waste storage buildings to properly handle TRU waste containers. The monitor reviewed the Radiation Work Permit (RWP) for performing work in this area and found that the RWP provided appropriate controls and protective equipment for safely working in the area.

C. Conclusions

Significant quantities of radioactive waste from past operations (legacy waste) are being characterized, sorted and prepared for transportation for offsite disposal or onsite storage. The WVES staff use a specially-designed Remote Handled Waste Facility to perform operations on containers with elevated exposure rates (> 200 mR/hr). Operations for waste sorting and repackaging of waste containers with low exposure rates are typically handled directly in a separate facility. Special handling procedures are implemented if the containers contain transuranic wastes. Operations appeared to be conducted safely at each of the two facilities.

VII. **Management Meetings**

Exit Meeting Summary

The monitor presented the results of each monitoring visit during out-briefing meetings with representatives from DOE, WVES, and NYSERDA at the conclusion of each onsite visit. Representatives from DOE, WVES, and NYSERDA acknowledged the observations presented by the monitor.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Department of Energy

Bryan Bower, Project Director
Christopher Eckert, Safety and Site Programs Team Leader
Geoff Gorsuch, Industrial Hygienist
*Craig Rieman, Deputy Director
Mark Bellis, General Engineer

NYSERDA

Tom Attridge, Program Manager
Paul Bembia, Program Director
John Kelly, Program Manager
Andrea Mellon, Project Manager
*Paul Piciulo, Program Liaison
Marty Willet, Senior Project Manager

WVES

John Chamberlain, Technical Advisor
Joseph Ebert, Engineer
*John Gerber, Manager, Environmental, Safety, Health & Quality
K. K. Gupta, Senior Fellow Engineer
Mark Hackett, Manager, High-Hazard Facilities & Site Projects
Jackie Jones, Remote-Handled Waste Facility Supervisor
*Ida Klahn, Associate Communications Specialist
Dan Meess, Chief Engineer
John Rizzo, Remote-Handled Waste Facility Manager
*Steve Warren, Deputy Project Manager

*Denotes attendance at the onsite out-briefing held on August 6, 2009.

LIST OF DOCUMENTS REVIEWED

Weekly Status Reports of WVDP Projects and Support Activities (various)

Monthly West Valley Demonstration Project Progress Reports (various)

WVDP Annual Site Environmental Reports, Calendar Years 2006 and 2007

West Valley Demonstration Project Groundwater Trend Analysis Report, 1st Quarter 2009

WVES SOP 300-7, Waste Generation, Packaging, and On-Site Transportation, Rev 51, 8/20/2008

WVES SOP 09-38, Contact Handled TRU Legacy Waste Processing, Rev 1, 10/29/2008

West Valley Demonstration Project - Characterization Plan for the Mitigation of the Leading Edge of the WVDP North Plateau Strontium-90 Plume, WVDP-489, Rev 1, 10/15/2008

WVNSCO 1st Quarter 2009 Groundwater Trend Analysis Report

Letter from T. Attridge, NYSERDA to K. McConnell, USNRC, FSME dated June 22, 2009, discussing the results of the 2008 deer hunting program

Letter from P. Bembia, NYSERDA to L. Camper, USNRC, FSME dated October 8, 2008, discussing NYSERDA trespass postings

WVDP-239, Rev. 10, Groundwater Monitoring Plan

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
CFR	Code of Federal Regulations
Cs-137	Cesium-137
DOE	Department of Energy
FSME	Office of Federal and State Materials and Environmental Management Programs
mR/hr	milliRoentgens/hour
NDA	NRC-licensed Disposal Area
NRC	Nuclear Regulatory Commission
NYSERDA	New York State Energy Research and Development Authority
pCi/l	picocuries/liter
PTW	Permeable Treatment Wall
R/hr	Roentgens/hour
RHWF	Remote Handled Waste Facility
RWP	Radiation Work Permit
SDA	State-licensed Disposal Area
Sr-90	Strontium-90
TRU	Transuranic

WVDP West Valley Demonstration Project
WVES West Valley Environmental Services, LLC