

# West Valley Demonstration Project

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## NORTH PLATEAU PERMEABLE TREATMENT WALL PROTECTION AND BEST MANAGEMENT PLAN

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## 1.0 INTRODUCTION

The West Valley Demonstration Project (WVDP) site contractor was directed by the U.S. Department of Energy to mitigate the spread of Strontium-90 (Sr-90) affected groundwater beneath the North Plateau at the WVDP located in West Valley, New York. A permeable treatment wall (PTW) was selected to mitigate the migration of Sr-90 affected groundwater along an alignment located north of the main plant facility and hydraulically downgradient of the area of greatest groundwater impact. This PTW Protection and Best Management Plan (Plan) addresses:

1. Measures that were implemented during construction of the PTW to protect the physical integrity of the PTW and a program for monitoring and maintaining those protection measures over the operational lifetime of the PTW; and
2. Best management practices intended to increase the longevity and effectiveness of the PTW system.

## 2.0 BACKGROUND

The groundwater remediation system selected to mitigate the migration of Sr-90 affected groundwater consists of an approximately 860-foot (ft) long hydraulically passive PTW composed of granular zeolite. The alignment selected for the PTW is located north of the main plant facility and hydraulically downgradient of the area of greatest groundwater impact by Sr-90. The functionality of the PTW system is based on the capacity of the zeolite to preferentially sorb Sr-90 cations, displacing other cations on the molecular structure of the mineral through an ion exchange process. Although Sr-90 (a divalent cation) in site groundwater will be exchanged for monovalent cations (such as sodium and potassium) within the zeolite structure, naturally occurring divalent cations (such as calcium and magnesium) also will compete for these sites.

The PTW was constructed primarily along the previous North Lagoon Access Road. Sections of the PTW alignment that did not follow the road were filled and improved to maintain the PTW design grades. The platform that follows the PTW alignment is referred to as the 'installation platform'. After construction of the PTW, the installation platform remains in place; however, it is no longer accessed by normal site vehicle traffic. Maintenance of the installation platform following construction serves as an added protection measure for the PTW. A new road was constructed south of the PTW to facilitate PTW installation. This road remains in place and is subject to the restrictions identified herein.

During the PTW installation, the excavated soils were placed inside an engineered container constructed of wood, steel, and concrete called the "Soil Containment Structure" installed to the south of the PTW alignment along its entire length. In 2021, the structure and the soils inside it were removed, packaged in intermodals, and shipped by rail off-site for permanent disposal. The depression remaining under the footprint of the structure was filled in to the surrounding grade with clean noncalcareous fill.

## 3.0 PROTECTION MEASURES

### 3.1 Storm Water Management

During the PTW design process, the storm water drainage system for the facility was reviewed to evaluate the potential for non-target loading of the PTW with infiltrating storm water runoff. Infiltration of storm water runoff upgradient of the PTW could lead to increased mass loading of competing cations (magnesium, calcium) that could reduce the effectiveness of the PTW for treating Sr-90. The area chosen for construction of the PTW also is characterized by high groundwater levels close to the ground surface (i.e., 1 to 3 feet below ground surface). Routing of storm water runoff away from the PTW area decreased the likelihood of non-target cation loading and flooding in the PTW area. Improved storm water management in the vicinity of the PTW substantially reduces the potential for erosion of the installation platform to a degree that could negatively impact PTW performance. As such, a lined storm water swale (Smart-Ditch™) was constructed south of the PTW to intercept storm water from upland portions of the site prior to reaching the PTW area and routing it towards Franks Creek. Additional details related to water management and associated improvements were included in the final design package and WVDP-521, *North Plateau Permeable Treatment Wall Installation Report*. Final as-built drawings are also included in WVDP-521.

These surface water runoff controls are not designed to divert all site runoff away from the plume. In the winter of 2020-2021 it was observed that surface water runoff from much further upgradient of the plume may also affect PTW performance. This is further discussed in Section 4.0.

### 3.2 Physical Protection

Physical protection measures were implemented during PTW construction with the intent of eliminating or making negligible the potential for inadvertent excavation into the PTW at a future date. Protection of the installation platform following construction of the PTW serves as an added protection measure for the PTW. The following physical protection measures were implemented:

- Buried warning tape was overlain on top of the PTW at a depth of one to two feet below grade. The warning tape will alert construction workers to the presence of the PTW in the event that excavation activities are initiated in the vicinity of the PTW at a later date.
- Signage was installed in the vicinity of the PTW as an additional means of alerting construction workers to the presence of the PTW.

A network of performance monitoring wells was installed on the installation platform following construction of the PTW (see WVDP-512, *North Plateau Permeable Treatment Wall Performance Monitoring Plan*, for well locations). Wells were completed with visible “stick-up” casings so the wells can be more easily located during the winter months. The stick-up casings will inhibit vehicle traffic on the installation platform, other than for sampling, and serve as an additional warning mechanism for inadvertent excavation into the installation platform.

## 4.0 BEST MANAGEMENT PRACTICES

The following best management practices are intended to prevent reductions in PTW longevity and effectiveness resulting from ordinary site practices:

- The use of road salt in the vicinity of the PTW will be eliminated or substantially restricted in its application. The infiltration of road salt components could result in an increase in dissolved non-target cations in groundwater that could compete for sorption sites with Sr-90, potentially reducing the long-term effectiveness of the PTW. Restricting the use of road salt in the vicinity of the PTW minimizes the potential for introducing non-target cations to the groundwater upgradient of the PTW. Figure 1 identifies the area in which road salt will not be used, unless in the case of an emergency. Included in the road salt exclusion zone is the new access road constructed upgradient/south of the PTW. Signs will be maintained at access points to identify that road salt should not be used in the exclusion zone.
- Calcareous road base or fill (composed of, containing, or characteristic of calcium carbonate, calcium, or limestone; chalky) will not be placed in the vicinity of the PTW. Placement of calcareous materials in the vicinity of the PTW (Figure 1) could lead to the introduction of non-target cations to groundwater. These non-target cations could compete for sorption sites with Sr-90, potentially reducing the long-term effectiveness of the PTW. Signs will be maintained at the exclusion zone boundary to identify that calcareous road base or fill should not be used in the area.
- Detailed As-Builts of the PTW system are maintained onsite. Referencing these As-Builts in the event that subsurface excavations are conducted in the vicinity of the PTW at a future date will help minimize the potential for inadvertently excavating into the PTW.
- During 2020 and 2021, elevated levels of sodium and chloride (from road salt) were noted in surface water and groundwater samples from various locations around the site's north plateau. This excess salt was believed to be affecting the groundwater by increasing the solubility of ions such as calcium and strontium which also migrate toward the PTW. An Integrated Project Team (IPT) was assembled to investigate the issue and they determined that the most probable source was the switch to using 100% sodium chloride during the winter of 2019-2020 in the parking lots and on the site's interior roadways and pedestrian paths.

- To minimize the impact to surface water and groundwater chemistry from over-application of road salt across the site, an employee briefing was distributed in early 2021 describing optimal de-icer usage and encouraging more conscientious use and spreading of the de-icer to reduce the total quantity used while not compromising site safety.
- The decision was made to revert to the previous product, an approximate 3:1 sand/salt mixture, starting during the 2021-2022 winter season, for the site's road salting needs.
- To reduce the need to apply the sand/salt mix to all of the north parking lot, which is directly upgradient of the north plateau, preparations are being made to reopen the south parking lot in early 2022.

## 5.0 INSPECTION AND MAINTENANCE

Visual inspections of the PTW system, including storm water infrastructure and installation platform protection measures, will be conducted during performance monitoring events and in accordance with WVDP-520, *North Plateau Permeable Treatment Wall and Ancillary Units Operations and Maintenance Plan*. Inspection results and any repairs or maintenance conducted as a result of the inspections will be documented on inspection reports which are included in the PTW annual monitoring reports.

## 6.0 REFERENCES

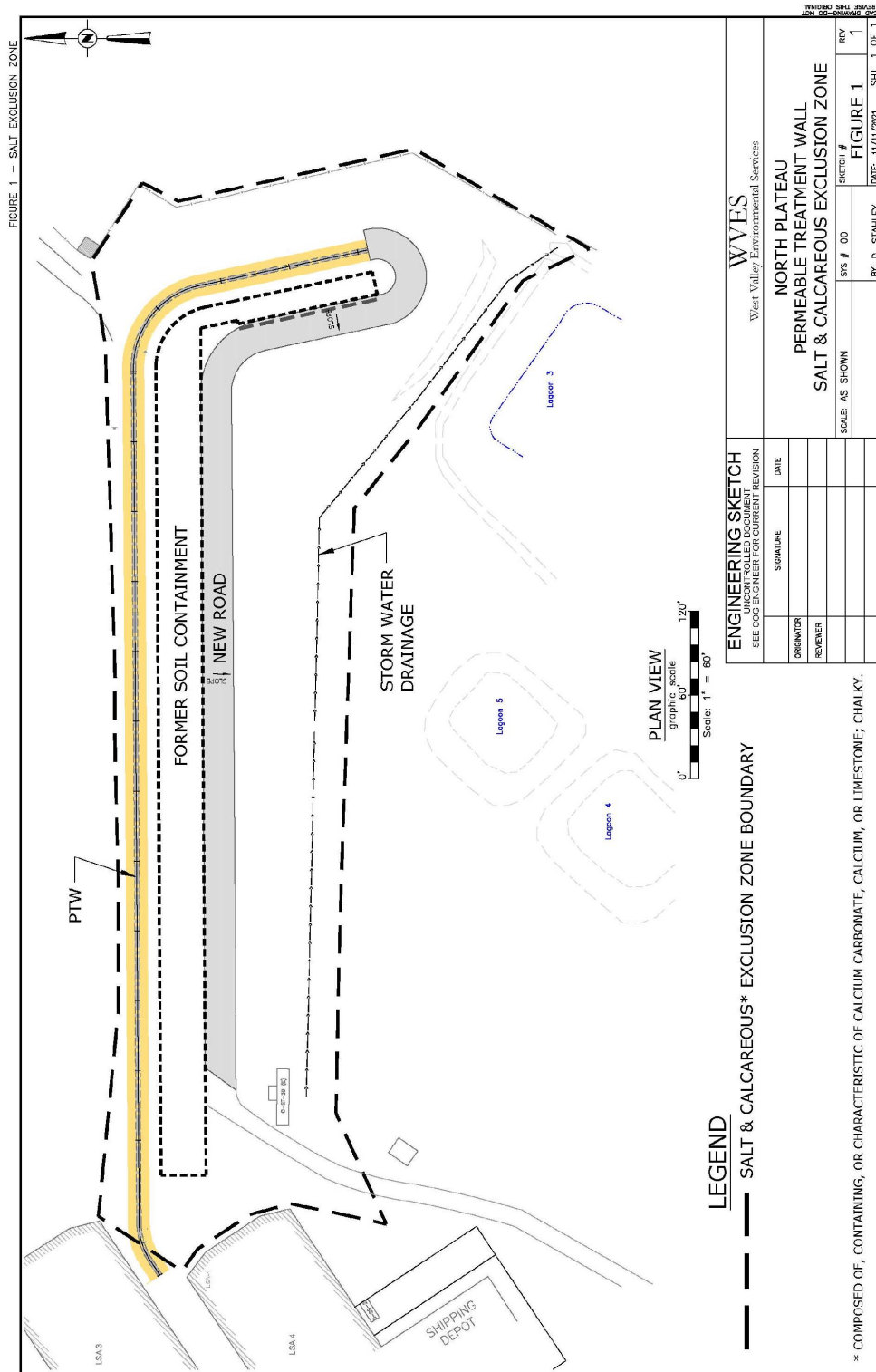
AMEC Geomatrix, Inc. (AMEC), 2010, Final Design Submittal, North Plateau Permeable Treatment Wall, prepared for West Valley Environmental Services, LLC, May 2010.

CH2M HILL BWXT West Valley, LLC, North Plateau Permeable Treatment Wall Performance Monitoring Plan, WVDP-512 (most recent revision).

\_\_\_\_\_, North Plateau Permeable Treatment Wall and Ancillary Units Operations and Maintenance Plan, WVDP-520 (most recent revision).

\_\_\_\_\_, North Plateau Permeable Treatment Wall Installation Report, WVDP-521 (most recent revision).

Figure 1. North Plateau Permeable Treatment Wall Salt & Calcareous Exclusion Zone



WVDP RECORD OF REVISION

| Rev. No. | Description of Changes   | Revision On Page(s)       | Dated      |
|----------|--|---------------------------|------------|
| 0        | Original Issue   | All                       | 09/14/10   |
| 1        | General revision to update company name and update text to indicate that the PTW has been installed. Updated and added references.<br><br>These administrative changes do not affect any departments.  | All<br>4                  | 09/01/15   |
| 2        | General revision- Minor changes to update manager's name and change "outer casings" to "casings" in section 3.2. These administrative changes affect Regulatory Strategy.  | All                       | 10/25/18   |
| 3        | General Revision - Major changes.<br>Inserted a paragraph in Section 2 to describe the installation and subsequent removal of the Soil Containment Structure.<br>Added a paragraph in Section 3.1 to discuss the impact of upgradient runoff.<br>Section 4, added four bullets about the recent effects of road salt use and response actions.<br>Updated Figure 1 to add the word "Former" to the Soil Containment Structure label since it was removed in 2021.<br>These changes affect Regulatory Strategy. | All<br>3<br>4<br>4-5<br>6 | 11/22/2021 |