WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

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GRACE ROBINSON HYDE
Chief Engineer and General Manager

January 11, 2019

Mr. Daniel K. Zogaib, Project Manager
Brownfields and Environmental Restoration Program
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Dear Mr. Zogaib:

Workplan for the Third Five-Year Review
of the Palos Verdes Landfill

Enclosed for your review, please find the *Workplan for the Third Five-Year Review of the Palos Verdes Landfill*. This workplan was prepared pursuant to the Operation and Maintenance Agreement dated December 23, 1998 between the County Sanitation Districts of Los Angeles County and the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC).

This workplan has been prepared in accordance with the United States Environmental Protection Agency's (USEPA) Comprehensive Five-Year Review Guidance. If you have any questions regarding this transmittal, please contact the undersigned at (562) 908-4288, extension 2826.

Very truly yours,

Kristen M. Ruffell
Project Coordinator and Project Engineer
Technical Services Department

KMR:RC:ch
Enclosure

cc: Mr. Emad Yemut, DTSC

DOC# 4848062

Workplan for the Third Five-Year Review of the Palos Verdes Landfill Rolling Hills Estates, California

January 2019

Prepared by:

County Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601

DOC# 4848062

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1. INTRODUCTION

The Operation and Maintenance (O&M) Agreement (DTSC, 1998) between the County Sanitation Districts of Los Angeles County (Sanitation Districts) and the Department of Toxics Substances (DTSC) for the Palos Verdes Landfill (site, PVLF) requires the Sanitation Districts conduct a review and reevaluation of the remedial actions at the site every five years. The requirement is consistent with Section 121 of the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), which subject remedial actions that result in hazardous substances, pollutants, or contaminants remaining at a site to a Five-Year Review. DTSC is the primary regulatory agency overseeing the implementation and the performance review of these remedial activities at the PVLF.

While the PVLF is not regulated under CERCLA and is not a Superfund site, five-year reviews for the site are performed in general accordance with provisions of CERCLA and the National Contingency Plan (NCP) at the direction of the DTSC. The first Five-Year Review for the PVLF was completed and approved by DTSC on November 4, 2009 (DTSC, 2009). The second Five-Year Review for the site was completed and approved by DTSC on January 6, 2015 (DTSC, 2015). In 2019, the Sanitation Districts will perform a third Five-Year Review of the site. The review will be conducted based on the United States Environmental Protection Agency's (USEPA) Comprehensive Five-Year Review Guidance (USEPA, 2001).

In accordance with the review guidance, the purpose of the Five-Year Review is to evaluate the implementation and performance of remedial actions at the PVLF to determine if the implemented remedy continues to be protective of human health and the environment and whether remedial action objectives are being fulfilled.

2. FACILITY OVERVIEW

The PVLF is located at 25706 Hawthorne Boulevard, Rolling Hills Estates, Los Angeles County, California (Figure 1) and covers approximately 291 acres. About 83 acres of the site are operated by the County of Los Angeles Department of Parks and Recreation as the South Coast Botanic Garden; 35 acres are operated by the City of Rolling Hills Estates as Ernie Howlett Park; and the remaining 173 acres, referred to as the Main Site, are operated by the Sanitation Districts with limited access to the public (Figure 2).

From the early 1900s until the 1950s, much of the area covered by the PVLF was operated as a diatomite mine. In 1952, Ben K. Kazarian and Sons (BKK) began landfill operations in the area now developed into the South Coast Botanic Garden. In May 1957, the Sanitation Districts acquired the landfill from BKK and assumed landfill operations. The Sanitation Districts expanded the landfill and operated the facility until December 1980 when the landfill reached design capacity. A portion of the facility was permitted to receive hazardous waste and approximately 3 to 4 percent of the waste received at the landfill was considered hazardous. The types of hazardous waste accepted

were primarily liquid wastes that included: acid wastes, solvents, alkaline wastes, tetraethyl lead sludge, chemical toilet wastes, hazardous tank bottoms, contaminated soil and sand, brine, pesticides, and other hazardous wastes (primarily refinery, oil field, and oil terminal wastes) (Sanitation Districts, 1997).

The Sanitation Districts have been performing groundwater monitoring and reporting analytical results since 1964. Groundwater contamination was first discovered in the northern corner of the Main Site in 1984. A remedial investigation and feasibility study (Sanitation Districts, 1995a and 1995b, respectively) were performed and identified affected groundwater onsite and offsite along Hawthorne and Crenshaw Boulevards. The remedial investigation report concluded that the constituents of concern in groundwater were arsenic and landfill-related volatile organic compounds. In an effort to control groundwater contamination, the Sanitation Districts operate groundwater extraction wells and treatment systems to mitigate affected groundwater. Currently, a total of 18 extraction wells have been installed to pump affected groundwater (Figure 3) from the PVLF. Extraction wells E01 through E13, E17, and E18 are part of a subsurface cement-bentonite barrier system installed to control affected groundwater near Hawthorne Boulevard. Extraction wells E14, E15, and E16 were installed to control affected groundwater near Crenshaw Boulevard.

The first Five-Year Review of the remedial actions for the PVLF was completed and approved by DTSC on November 4, 2009. The review found that the environmental control systems in place (landfill soil cover, gas collection/control system for surface air and subsurface gas, groundwater containment system, industrial wastewater, and stormwater, etc.) are effective and that the site is safe and well maintained. A second Five-Year Review of the site, which was completed and approved by DTSC on January 6, 2015, found that environmental control systems continue to be protective of human health and the environment. As a result, no additional remedial measures were recommended.

3. FIVE-YEAR REVIEW PROCESS

The third Five-Year Review for the PVLF will be conducted based on the guidelines provided by the USEPA Comprehensive Five-Year Review Guidance, report number EPA 540-R-01-007. The Five-Year Review Inspection Checklist and Review Summary Form, as provided in the Comprehensive Five-Year Review Guidance and presented in Appendices A and B, will guide the review process to ensure that all pertinent information is gathered for evaluation.

In accordance with the guidelines, the purpose of this Five-Year Review is to evaluate the implementation and performance of remedial actions at the PVLF in order to determine if the implemented remedy is protective of human health and the environment and whether remedial action objectives are being fulfilled since the last Five-Year Review. This Five-Year Review will include the review of all relevant site O&M data and documents, interviews with site staff, and a thorough inspection of the environmental control systems. The findings and conclusions of the Five-Year Review, including

recommendations, follow-up actions to address any issues identified, and protectiveness determinations, will be presented in a report with all data and information necessary to support the findings and conclusions. The draft report for the third Five-Year Review will be submitted to DTSC approximately 90 days from workplan approval.

4. REFERENCE DOCUMENTS

Routine sampling and monitoring data for groundwater, surface air, subsurface gas, stormwater, and industrial wastewater will be compiled for review and reevaluation. These include: groundwater monitoring reports submitted to DTSC, routine reports for surface air and subsurface gas submitted to the South Coast Air Quality Management District; quarterly and annual site inspection reports performed in accordance with the site's Storm Water Pollution Prevention Plan; annual stormwater reports submitted to the Regional Water Quality Control Board; and industrial wastewater monitoring reports submitted in accordance with the Sanitation Districts' discharge requirements will be used to aid the Five-Year Review process by providing a basis for drawing conclusions about the success of the implemented remediation techniques. It should be noted that the Regional Water Quality Control Board approved the Notice of Termination of coverage under the General Permit for Stormwater Discharges Associated with Industrial Activity for the site on July 24, 2015. Therefore, sampling and monitoring data for stormwater will not extend beyond that date. The Sanitation Districts have most sampling and monitoring data available in electronic format in a database. This database will be queried to extract the pertinent data for this review.

The second Five-Year Review for the PVLF reviewed monitoring data through December 2013. This third Five-Year review will evaluate all relevant site operation and maintenance information including sampling and monitoring data collected since the last Five-Year review (between January 2014 and December 2018).

5. SUMMARY

The Sanitation Districts have prepared this workplan for the upcoming Five-Year Review that will review and reevaluate the implementation and performance of remedial actions at the PVLF. Guidance provided by the USEPA in the Five-Year Review's Site Inspection Checklist (Appendix A) and Review Summary (Appendix B) will be followed to complete the Five-Year Review. The draft Five-Year Review Report will be submitted to the DTSC approximately 90 days from workplan approval.

6. REFERENCES

Department of Toxic Substances Control, 1998, Operation and Maintenance Agreement, Palos Verdes Landfill Main Site, Rolling Hills Estates, California, December (DTSC, 1998).

Department of Toxic Substances Control, 2009, Palos Verdes Landfill Five-Year Review, November (DTSC, 2009).

Department of Toxic Substances Control, 2015, Palos Verdes Landfill Second Five-Year Review, January (DTSC, 2015).

U.S. Environmental Protection Agency, 2001, Comprehensive Five-Year Review Guidance, June (USEPA, 2001)

County Sanitation Districts of Los Angeles County, 1997, Operation and Maintenance Plan for Remedial Action, Palos Verdes Landfill, April (Sanitation Districts, 1997).

County Sanitation Districts of Los Angeles County, 1995, Remedial Investigation Report for the Palos Verdes Landfill, June (Sanitation Districts, 1995a).

County Sanitation Districts of Los Angeles County, 1995, Feasibility Study Report for the Palos Verdes Landfill, June (Sanitation Districts, 1995b).

FIGURES

N

1.5 0.75 0 1.5

Miles

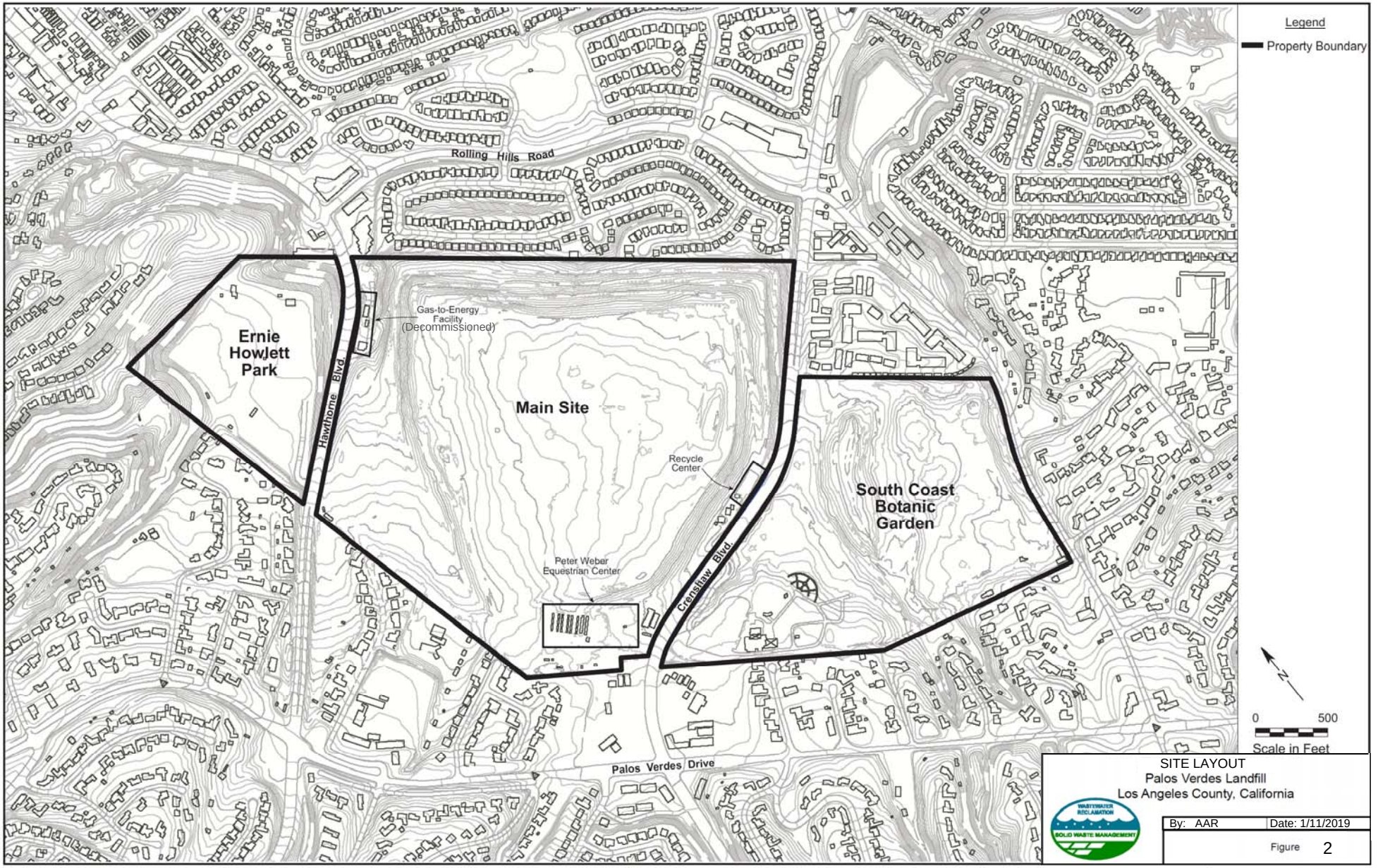
Note: Base map from ESRI Streetmap (2002).

SITE LOCATION MAP
Palos Verdes Landfill
Los Angeles County, California

WASTEWATER RECLAMATION
SOLID WASTE MANAGEMENT

By: AAR	Date: 1/11/2019

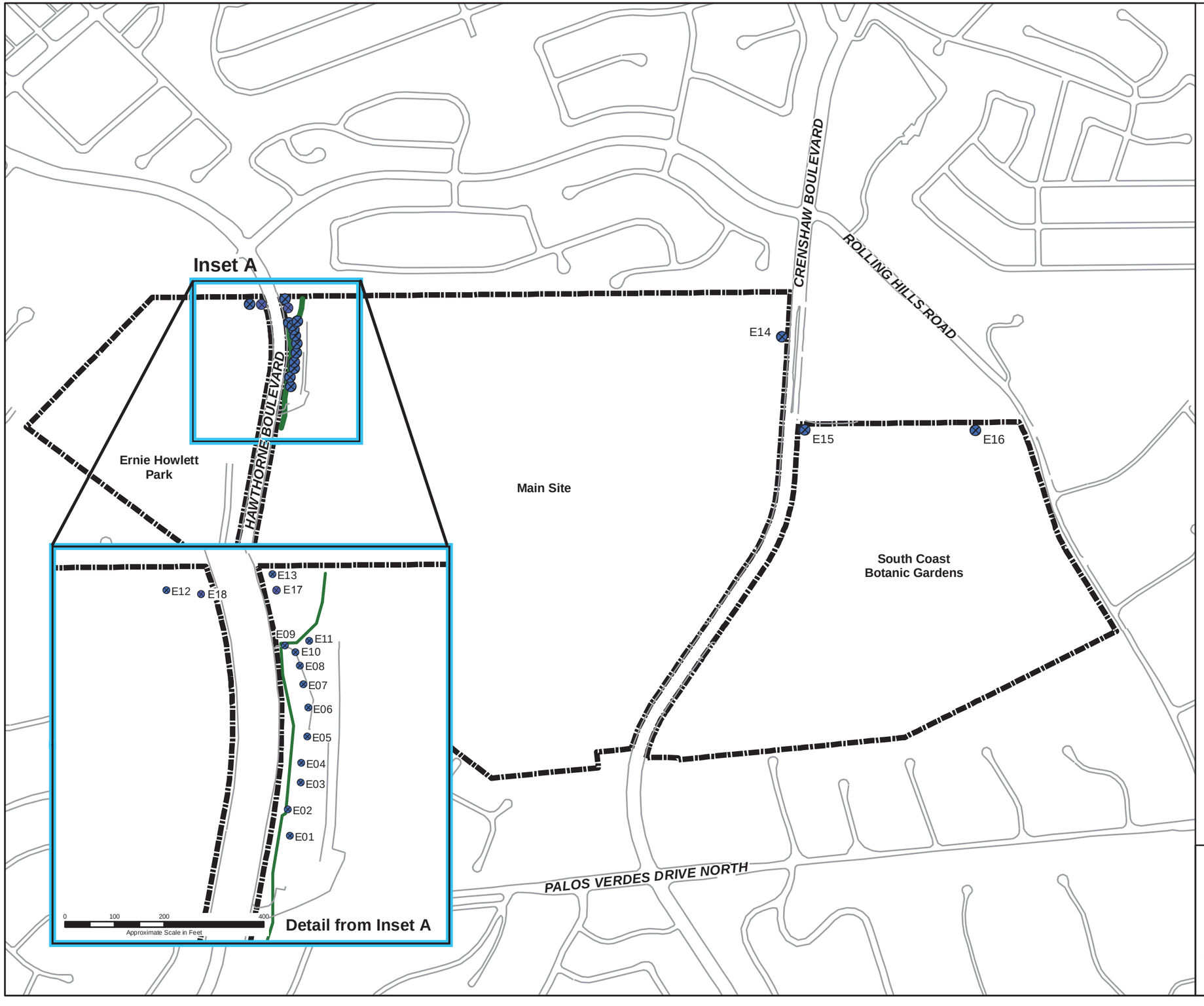
Figure 1



SITE LAYOUT
Palos Verdes Landfill
Los Angeles County, California

By: AAR | Date: 1/11/2019

Figure 2



Explanation

- Extraction well
- Subsurface barrier
- Property boundary

600 300 0 600

Approximate Scale in Feet

Base map provided by County Sanitation Districts of Los Angeles County (2pv100802.dgn).

LOCATION OF GROUNDWATER EXTRACTION WELLS
Palos Verdes Landfill
Los Angeles County, California

WASTEWATER RECLAMATION
SOLID WASTE MANAGEMENT

By: AAR | Date: 1/11/2019

Figure **3**

APPENDIX A
FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name:	**Date of inspection:**
Location and Region:	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:**

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
☐ Access controls
☐ Institutional controls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
☐ Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Other_____

_____

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ As-built drawings — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Maintenance logs — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Contingency plan/emergency response plan — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Other permits_____ — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

7. **Groundwater Monitoring Records** — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

10. **Daily Access/Security Logs** — ☐ Readily available — ☐ Up to date — ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks_____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ☐ N/A
Other problems or suggestions: ☐ Report attached

_____
_____
_____
_____

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks_____
_____
_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☐ No vandalism evident
Remarks_____
_____

2. **Land use changes on site** ☐ N/A
Remarks_____
_____

3. **Land use changes off site** ☐ N/A
Remarks_____
_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A
Remarks_____
_____

B. Other Site Conditions

Remarks_____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks_____
_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____
_____

B. Benches ☐ Applicable ☐ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

C. Letdown Channels ☐ Applicable ☐ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____
   _____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☐ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

_____
_____
_____
_____
_____
_____
_____
_____
_____

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

APPENDIX B
FIVE-YEAR REVIEW SUMMARY FORM

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name:		
EPA ID: Click here to enter text.		
Region: Choose an item.	**State:** Enter state abbreviation.	**City/County:** Enter City/County

SITE STATUS	
NPL Status: Choose an item.	
Multiple OUs? Choose an item.	**Has the site achieved construction completion?** Choose an item.

REVIEW STATUS
Lead agency: Choose an item. **If "Other Federal Agency" was selected above, enter Agency name:** Click here to enter text.
Author name (Federal or State Project Manager): Click here to enter text.
Author affiliation: Click here to enter text.
Review period: Click here to enter start date. - Click here to enter end date.
Date of site inspection:
Type of review: Choose an item.
Review number: Choose an item.
Triggering action date: Click here to enter date.
Due date *(five years after triggering action date)*: Click here to enter date.

Five-Year Review Summary Form (continued)

The table below is for the purpose of the summary form and associated data entry and does not replace the two tables required in Section VIII and IX by the FYR guidance. Instead, data entry in this section should match information in Section VII and IX of the FYR report.

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
Click here to enter text.

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): Click here to enter text.	**Issue Category:** Choose an item.			
	Issue: Click here to enter text.			
	Recommendation: Click here to enter text.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Choose an item.	Choose an item.	Choose an item.	Choose an item.	Enter date.

To add additional issues/recommendations here, copy and paste the above table as many times as necessary to document all issues/recommendations identified in the FYR report.

Protectiveness Statement(s)
Include each individual OU protectiveness determination and statement. If you need to add more protectiveness determinations and statements for additional OUs, copy and paste the table below as many times as necessary to complete for each OU evaluated in the FYR report.

Operable Unit: Click here to enter text.	*Protectiveness Determination:* Choose an item.	*Addendum Due Date (if applicable):* Click here to enter date.
Protectiveness Statement: Click here to enter text.		

Sitewide Protectiveness Statement (if applicable)	
For sites that have achieved construction completion, enter a sitewide protectiveness determination and statement.	
Protectiveness Determination: Choose an item.	*Addendum Due Date (if applicable):* Click here to enter date.
Protectiveness Statement: Click here to enter text.	