U.S. Department of Energy
Hanford Site

October 7, 2020

20-TF-0095

Mr. Jeffrey J. Lyon, Tank Systems Operations
and Closure Project Manager
Nuclear Waste Program
Washington State
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99354

Dear Mr. Lyon:

THE U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION, TRANSMITTAL OF RPP-RPT-62684, FISCAL YEAR 2019 ANNUAL INTERIM SURFACE BARRIER MONITORING REPORT, REV. 0, TO MEET HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER MILESTONE M-045-92AD.

The purpose of this letter is to transmit RPP-RPT-62684, *FY2019 Annual Interim Surface Barrier Monitoring Report*, Rev. 0. Submittal of this report to the Washington State Department of Ecology fulfills Hanford Federal Facility Agreement and Consent Order Milestone M-045-92AD, "Submit yearly reports summarizing the results of maintenance and performance monitoring activities for the previous year, and research completed to evaluate new technologies." M-045-92AD requires the submittal of a yearly report summarizing the results of interim surface barrier maintenance and performance monitoring activities by October 31, 2020. The attached report summarizes the results of barrier maintenance and performance-monitoring activities performed during Fiscal Year 2019, as outlined in RPP-RPT-61684, *Annual Maintenance and Performance Monitoring Plan for Interim Barriers*.

If you have any questions, please contact Becky Blackwell, Closure Project Manager, Tank Farms Program Division, Office of River Protection, on (509) 376-0058.

Sincerely,

Brian A. Harkins

Digitally signed by Brian A. Harkins
Date: 2020.10.07 11:03:33 -07'00'

Brian A. Harkins, Deputy Assistant Manager
Tank Farms Project
Office of River Protection

TF:RIB

Attachment and cc: See page 2

Attachment:
RPP-RPT-62684

cc w/attach:
J. Alzheimer, Ecology
M. Barnes, Ecology
J. Bell, NPT
R. Buck, Jr., Wanapum
L. Contreras, YN
D. Einan, EPA
M. Johnson, CTUIR
M. E. Lamothe, WRPS
S. Leckband, HAB
N. Menard, Ecology
M. Murphy, CTUIR
J. Perry, MSA
K. Rucker, Ecology
P. L. Rutland, WRPS
D. Silva, Ecology
M. Skorska, Ecology
A. K. Smith, Ecology
E. Van Mason, WRPS
M. Woods, ODOE
Administrative Record
Environmental Portal
WRPS Correspondence

20-TF-0095
Attachment

65 Pages
Excluding Cover Sheet

RPP-RPT-62684

DOCUMENT RELEASE AND CHANGE FORM

Prepared For the U.S. Department of Energy, Assistant Secretary for Environmental Management
By Washington River Protection Solutions, LLC., PO Box 850, Richland, WA 99352
Contractor For U.S. Department of Energy, Office of River Protection, under Contract DE-AC27-08RV14800

Release Stamp

DATE: Sep 17,2020 HANFORD RELEASE

1. **Doc No:** RPP-RPT-62684 **Rev.** 00

2. **Title:**
FY2019 Annual Interim Surface Barrier Monitoring Report

3. **Project Number:** ☒N/A

4. **Design Verification Required:** ☐Yes ☒No

5. **USQ Number:** ☒ N/A RPP-27195

6. **PrHA Number** **Rev.** ☒ N/A

Clearance Review Restriction Type: public

7. **Approvals**

Title	Name	Signature	Date
Checker	Singleton, Kristin M	*Singleton, Kristin M*	09/14/2020
Clearance Review	Aardal, Janis D	*Aardal, Janis D*	09/17/2020
Document Control Approval	Alvarez, Efren	*Alvarez, Efren*	09/17/2020
Originator	Lamothe, Margaret E	*Lamothe, Margaret E*	09/08/2020
Other Approver	Parker, Dan	*Parker, Dan*	09/14/2020
Responsible Manager	Rutland, Paul L	*Rutland, Paul L*	09/08/2020

8. **Description of Change and Justification**

Rev 00 - Initial issue

9. **TBDs or Holds** ☒N/A

10. **Related Structures, Systems, and Components**

a. **Related Building/Facilities** ☒N/A	b. **Related Systems** ☒N/A	c. **Related Equipment ID Nos. (EIN)** ☒N/A

11. **Impacted Documents – Engineering** ☒N/A

Document Number	Rev.	Title

12. **Impacted Documents (Outside SPF):**

N/A

13. **Related Documents** ☐N/A

Document Number	Rev.	Title
RPP-ENV-58420	00	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY14
RPP-RPT-57541	00	T-TY Tank Farm Interim Surface Barrier Demonstration – Vadose Zone Monitoring FY13
RPP-RPT-59411	00	T-TY Tank Farm Interim Surface Barrier Demonstration – Vadose Zone Monitoring FY15
RPP-RPT-60134	00	T-TY Tank Farm Interim Surface Barrier Demonstration – Vadose Zone Monitoring FY16
RPP-RPT-60833	00	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY17
RPP-RPT-61684	01	Maintenance and Performance Monitoring Plan for the Interim Barriers Program

14. **Distribution**

Name	Organization
Blackwell, Becky	TF PROGRAMS DIVISION
Lamothe, Margaret E	CLOSURE & INTERIM MEASURES
Pappas, Alexander D	TECH MGMT & FIELD SOLUTIONS
Parker, Dan	CLOSURE & INTERIM MEASURES
Rutland, Paul L	CLOSURE & INTERIM MEASURES

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part I: Background Information

Title: FY2019 Annual Interim Surface Barrier Monitoring Report

Information Category:
☐ Abstract ☐ Journal Article ☐ Summary
☐ Internet ☐ Visual Aid ☐ Software
☐ Full Paper ☑ Report ☐ Other

Publish to OSTI? ☐ Yes ☑ No

Trademark/Copyright "Right to Use" Information or Permission Documentation	Yes ☐	NA ☑

Document Number: RPP-RPT-62684 Revision 00 Date: September 2020

Author: Lamothe, Margaret E

Part II: External/Public Presentation Information

Conference Name:

Sponsoring Organization(s): DOE-ORP

Date of Conference: Conference Location:

Will Material be Handed Out? ☐ Yes ☑ No Will Information be Published? ☐ Yes ☑ No *(If Yes, attach copy of Conference format instructions/guidance.)*

Part III: WRPS Document Originator Checklist

Description	*Yes*	*N/A*	*Print/Sign/Date*
Information Product meets requirements in TFC-BSM-AD-C-01?	☐	☑	
Document Release Criteria in TFC-ENG-DESIGN-C-25 completed? (Attach checklist)	☑	☐	Lamothe, Margaret E IDMS workflow data attached
If product contains pictures, safety review completed?	☑	☐	Roberts, Sheryl K IDMS workflow data attached

Part IV: WRPS Internal Review

Function	*Organization*	*Date*	*Print Name/Signature/Date*
Subject Matter Expert	WRPS	08/27/2020	Lamothe, Margaret E Workflow data attached
Responsible Manager	WRPS	08/03/2020	Rutland, Paul L Workflow data attached
Other:			

Part V: IRM Clearance Services Review

Description	*Yes*	*No*	*Print Name/Signature*
Document Contains Classified Information?	☐	☒	If Answer is "Yes," ADC Approval Required Print Name/Signature/Date
Document Contains Information Restricted by DOE Operational Security Guidelines?	☐	☒	Reviewer Signature: Print Name/Signature/Date
Document is Subject to Release Restrictions? *If the answer is "Yes," please mark category at right and describe limitation or responsible organization below:*	☐	☒	Document contains: ☐ Applied Technology ☐ Protected CRADA ☐ Personal/Private ☐ Export Controlled ☐ Proprietary ☐ Procurement – Sensitive ☐ Patentable Info. ☐ OUO ☐ Predecisional Info. ☐ UCNI ☐ Restricted by Operational Security Guidelines ☐ Other (Specify)
Additional Comments from Information Clearance Specialist Review?	☐	☒	Information Clearance Specialist Approval Print Name/Signature/Date

When IRM Clearance Review is Complete – Return to WRPS Originator for Final Signature Routing (Part VI)

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part VI: Final Review and Approvals

Description	*Approved for Release*		*Print Name/Signature*
	Yes	*N/A*	
WRPS External Affairs	☒	☐	McCune, Hal C - IDMS workflow data attached
WRPS Office of Chief Counsel	☒	☐	Peters, Amber D - IDMS workflow data attached
DOE – ORP Public Affairs/Communications	☒	☐	Tyree, Geoff - IDMS workflow data attached
Other: DOE OCC	☒	☐	King, Grace - IDMS workflow data attached
Other: DOE ORP SME	☒	☐	Lobos, Rod & Blackwell, Rebecca - Workflow data attached

Comments Required for WRPS-Indicate Purpose of Document:

Annual report on visual barrier inspections and barrier performance. Document is required per Milestone M-045-92.

Approved for Public Release; Further Dissemination Unlimited

Information Release Station

Was/Is Information Product Approved for Release? ☒ Yes ☐ No

If Yes, what is the Level of Releaser? ☑ Public/Unrestricted ☐ Other (Specify) _____

Date Information Product Stamped/Marked for Release: 08/31/2020

Was/Is Information Product Transferred to OSTI? ☐ Yes ☒ No

Forward Copies of Completed Form to WRPS Originator

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RPP-RPT-62684
Revision 00

FY2019 Annual Interim Surface Barrier Monitoring Report

Prepared by

Margaret LaMothe
Washington River Protection Solutions LLC

Date Published
October 2020

Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-08RV14800

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Abbreviations and Acronyms

bgs	below ground surface
DOE	U.S. Department of Energy
FY	fiscal year
HFFACO	*Hanford Federal Facility Agreement and Consent Order*
HDU	heat dissipation unit
IDMS	Integrated Document Management System
ORP	Office of River Protection
SST	single-shell tank

Units

cm	centimeter
ft	foot
ft^2	square feet
gal	gallon
in.	inch
L	liter
m	meter
vol%	volume percent

1.0 OBJECTIVES AND SCOPE

The U.S. Department of Energy (DOE) Office of River Protection (ORP) has constructed interim surface barriers over portions of the T, TY, and SX Tank Farms.[1] The barriers divert meteoric water away from contaminated vadose zone soils within the tank farms. Infiltration of water into subsurface soils with pre-existing contamination can accelerate mobilization of contaminants towards groundwater. The interim surface barrier at T Tank Farm was completed in 2008, the interim surface barrier at TY Tank Farm was completed in 2010, and the interim surface barriers at SX Tank Farm were completed in 2019. An overall reduction in moisture content is expected over the lifetime of the interim surface barriers.

The purpose of this report is to meet Milestone M-045-92AD and publish results gathered during fiscal year 2019 as outlined in RPP-RPT-61684, *Annual Maintenance and Performance Monitoring Plan for Interim Barriers*. Data is gathered throughout the year from interim measures inspections, quarterly visual surveillance and maintenance inspections, and quarterly data downloads of select barrier performance data as described in PNNL-16538, *T Tank Farm Interim Surface Barrier Demonstration – Vadose Zone Monitoring Plan,* and PNNL-19772, *T-TY Tank Farm Interim Surface Barrier Demonstration – Vadose Zone Monitoring Plan*. Due to the recent completion of the SX Tank Farm interim surface barrier, the analysis and results including inspections and subsurface monitoring, have not established a historical data trend for the SX Tank Farm.

Past barrier monitoring data can be found as far back as 2007. Table 1. Previous Reports Evaluating Barrier Monitoring Data lists these annual data reports chronologically.

Table 1. Previous Reports Evaluating Barrier Monitoring Data

Fiscal Year	Document Number	Title
2007	PNNL-17306	T Tank Farm Interim Surface Barrier Demonstration – Vadose Zone Monitoring FY07 Report
2008	PNNL-18083	T Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY08 Report
2009	PNNL-19123	T Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY09 Report
2010	PNNL-19772	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring Plan
2010	PNNL-20144	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY10 Report
2011	RPP-RPT-53570	Technical Basis for Soil Moisture and Soil Pore Pressure Head Measurement Frequency Reduction at T and TY Farm Interim Surface Barriers

[1] Hanford tank farms, tanks, and equipment all begin with designated prefix ‘241-.’ That prefix is omitted in this document to aid readability.

2012	RPP-RPT-55143	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY12
2013	RPP-RPT-57541	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY13
2014	RPP-ENV-58420	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY14
2015	RPP-RPT-59411	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY15
2016	RPP-RPT-60134	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY16
2017	RPP-RPT-60833	T-TY Tank Farm Interim Surface Barrier Demonstration - Vadose Zone Monitoring FY17
2018	RPP-RPT-61684	Maintenance and Performance Monitoring Plan for the Interim Barriers Program

1.1 HANFORD TANK FARM BARRIERS

The Hanford Site, located in southeastern Washington State, has 149 underground single-shell tanks (SST) that store chemical and radioactive waste. Barriers have been constructed over the T, TY, and SX Tank Farms. Each tank farm has a number of tanks that are classified as "assumed leakers." Further information on these tanks and their related infrastructure can be found in the following reports:

- RPP-RPT-55084, *Hanford 241-T Farm Leak Inventory Assessment Report*
- RPP-RPT-42296, *Hanford TY-Farm Leak Assessment Report*
- RPP-ENV-39658, *Hanford SX-Farm Leak Assessments Report*.

Interim surface barriers were constructed at the T and TY Tank Farms as part of the Interim Surface Barrier Demonstration Project outlined in PNNL-16538 and PNNL-19772. The SX Tank Farm barrier was constructed as part of Ecology et al. 1989, *Hanford Federal Facility Agreement and Consent Order* (HFFACO) Milestone M-45-92. The barrier technology used in T Tank Farm is a spray polyurea liner on top of geotextile material above a layer of compacted soil. The barrier technology used in the TY and SX Tank Farms is a modified asphalt layer above a layer of compacted soil.

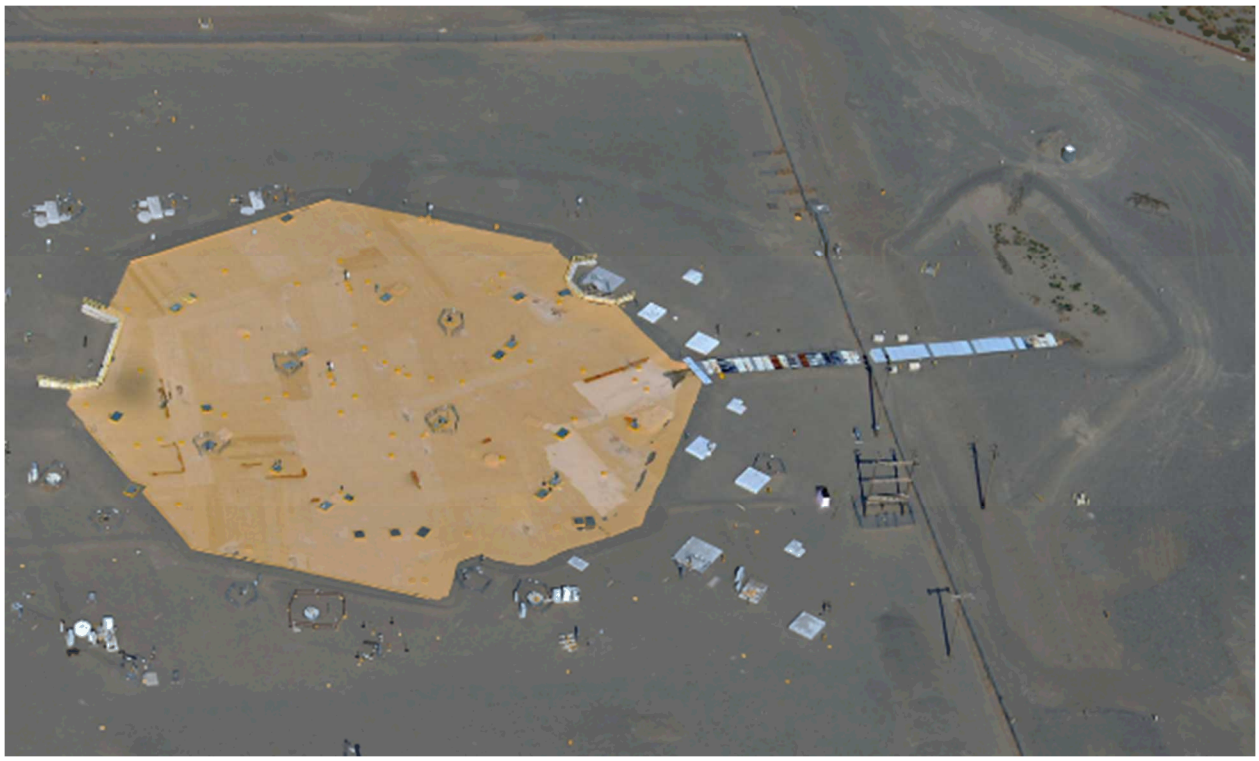
The vadose zone, over which the barriers are constructed, is comprised of a portion of the thick, relatively coarse-grained sediments of the middle-designated Ringold Formation overlain by the finer-grained sediments of the upper Ringold Formation and the Plio-Pleistocene unit (also called the Cold Creek Unit), overlain by the coarser-grained sands and gravels of the Hanford formation, which are exposed at the surface. The upper 12 m (40 ft) of the Hanford formation were locally excavated and backfilled with gravelly sand when the SSTs were installed.

1.1.1 T Tank Farm

The T Tank Farm was built from 1943 to 1944 (RPP-23752, *Field Investigation Report for Waste Management Areas T and TX-TY*). It is comprised of 12 SSTs, each with a diameter of 23 m (75 ft) and a capacity of 2,006,050 L (530,000 gal); four SSTs with diameters of 6.1 m (20.0 ft) and capacities of 208,175 L (55,000 gal); waste-transfer lines; leak detection systems; and tank ancillary equipment.

Construction of the T Tank Farm interim surface barrier (Figure 1) began in October 2007 and was completed in April 2008. Approximately 0.3-m (1-ft)-thick compacted soil was added to the original ground surface before the barrier was emplaced. Above the compacted soil is a 0.6-cm (0.25-in.)-thick polyurea/geotextile as the impermeable barrier. The barrier dips slightly to the north to enable precipitation to drain along a lined runoff ditch to a runoff infiltration area.

Figure 1. T Tank Farm Interim Surface Barrier.



1.1.2 TY Tank Farm

The TY Tank Farm was built from 1951 through 1952 and is comprised of six SSTs, each with a diameter of 23 m (75 ft) and a capacity of 2,870,000 L (758,000 gal); waste-transfer lines; leak detection systems; and tank ancillary equipment (RPP-23752).

Construction of the TY Tank Farm interim surface barrier started in February 2010 and was completed in September 2010. Figure 2 shows the barrier. A 10-cm (4-in.)-thick modified asphalt layer – developed by the Wilder Construction Company of Everett, Washington, as MatCon – was used. The barrier is sloped to the west to enable precipitation to drain into an evapotranspiration basin.

Figure 2. TY Tank Farm Interim Surface Barrier.

1.1.3 SX Tank Farm

The SX Tank Farm interim surface barrier was completed in the summer of 2019. An aerial photo of the SX Tank Farm after installation of the barrier is shown in Figure 3. Two monitoring nest systems were also installed. The heat dissipation unit (HDU) probes were installed in 2018 and began collecting data in 2019. The SX barrier is composed of three barriers: south, north, and expansion. The south and north panels each have a monitoring nest. The south panel nest consists of two HDU monitoring installations, one HDU installed to 5 m (16 ft) in depth and one HDU installed to 20 m (66 ft) in depth. The 5-m-deep HDU array installation includes HDU probes installed at depths of approximately 1 m (3 ft), 2 m (7 ft), 3 m (10 ft), and 5m (16 ft). The 20-m (66 ft) HDU array installation includes probes installed at depths of approximately 10 m (33 ft), 15 m (49 ft), and 20 m (66 ft). The north panel monitoring nest has a 10-m (33-ft) HDU array with HDUs located at depths of approximately 1 m (3 ft), 3 m (10 ft), 5 m (16 ft), and 10 m (33 ft). As with data from the T and TY Tank Farms monitoring nests, data from the SX Tank Farm nests are downloaded on a quarterly basis.

In addition to the HDUs at the monitoring nests, the following drywells are neutron logged on a semi-annual basis: 41-05-07, 41-05-08, and 41-06-05 on the north panel; and 41-11-05, 41-11-06, and 41-14-02 on the south panel. New monitoring system plans for the south and north panels are found in RPP-PLAN-48439, *241-SX Tank Farm South Interim Surface Barrier Monitoring Plan*, and RPP-PLAN-49187, *241-SX Tank Farm North Interim Surface Barrier Monitoring Plan*.

Figure 3. SX Tank Farm Interim Surface Barrier.

2.0 QUARTERLY VISUAL INSPECTIONS

The Tank Operations Contractor completes surveillance and maintenance of interim measure controls as part of their operational procedures. The goals of field inspections are to protect the worker, the general public, and the environment. Additionally, visual inspections help to prevent malfunctions and deterioration, operator errors, and discharges, which may cause or lead to the release of dangerous waste constituents. Inspection, repair, and maintenance is an important component to ensure safe, compliant operation of tank farm facilities, such that the objectives of these interim measures function as intended.

2.1 INTERIM BARRIER VISUAL INSPECTIONS

The purpose of the surveillance and a maintenance program is to maintain components to reduce the infiltration of precipitation into contaminated soils. Inspections of barriers installed within the tank farms are performed using the Planner Review Checklist (Site Form A-6006-345). Fiscal year (FY) 2019 completed check sheets can be viewed in Appendix A of this report or searched in integrated document management system (IDMS) by their work order numbers: T barrier: 507775, 519953, 535668, and 559667; TY barrier: 503677, 519950, 535667, and 559664; and SX barrier: 584500 and 569421.

2.2 RESULTS

The quarterly interim surface barrier inspections use a “meet criteria” versus “does not meet criteria” system for reporting the status of the barriers during inspection. A full list of the inspection criteria is found in their respective reports.

Table 2 lists the FY 2019 barrier inspection findings and calls out areas that did not meet the inspection criteria.

Table 2. Fiscal Year 2019 Interim Surface Barrier Inspection Findings.

Barrier	FY	Quarter	Date	Significant Findings*
T	2019	First	01/30/2019	Poly liner not in good condition, linear horizontal to vertical seals damaged, seals between linear and walls damaged, drainage ditch inlet obstructed by debris.
T	2019	Second	04/29/2019	Poly liner not in good condition, seals between linear and walls damaged, drainage ditch inlet and drainage ditch obstructed by debris.
T	2019	Third	07/18/2019	Poly liner not in good condition, linear horizontal to vertical seals damaged, seals between linear and walls damaged.
T	2019	Fourth	10/02/2019	Poly liner not in good condition, linear horizontal to vertical seals damaged, seals between linear and walls damaged.
TY	2019	First	01/30/2019	No issues noted
TY	2019	Second	04/29/2019	No issues noted
TY	2019	Third	07/18/2019	No issues noted
TY	2019	Fourth	10/02/2019	No issues noted
SX	2019	Third	08/22/2019	Stabilization rock on the side slopes of basin show signs of erosion.
SX	2019	Fourth	10/31/2019	Stabilization rock on the side slopes of basin show signs of erosion.

*As indicated in inspection reports conducted under work orders 503677, 519950, 535667, and 559664 for TY Tank Farm, work orders 507775, 519953, 535668, and 559667 for T Tank Farm, and work orders 543682 and 584500 for SX Tank Farm.

2.3 LOOKING FORWARD

Performance of quarterly field inspections for surveillance and maintenance are planned for FY 2020.

3.0 INTERIM MEASURES MONITORING

In addition, interim measures monitoring is conducted annually to inspect interim measures components that have been installed to reduce the infiltration of precipitation into contaminated soils. These controls minimize the spread/transfer of contamination. These activities are captured on the Annual Environmental Interim Measures Maintenance Plan (IMMP) Inspection form (Site Form A-6007-352).

3.1 RESULTS

The 2019 Annual Environmental Interim Measures Maintenance Plan Inspection was completed on June 28, 2019. The inspection report (WRPS-MOP-2019-0932) included all farms with interim engineering controls. A brief summary of key findings of barrier farm issues are discussed in this report. Please note, that TY Tank Farm was inaccessible to the assessment team during this time period due to access restraints around the Plutonium Finishing Plant. This restraint also limited access to the T Tank Farm barrier as well. The only significant observation made during the routine inspection that applied to farms with interim barriers was the following:

> T Tank Farm: Culvert that crosses 23rd Street is 50 percent blocked with tumbleweed fragments and blow sand; rip-rap inside Plutonium Finishing Plant radiological buffer area (RBA) boundary is more than 50 percent silted in, and requires cleaning and repair to ensure continuing, adequate drainage capacity. The culvert leading into the evaporation basin has a partially blocked opening into the basin, silt and tumbleweeds need to be removed.

The full results of the 2019 inspection can be viewed in Appendix A or searched electronically on the IDMS using WRPS-MOP-2019-0932.

3.2 FOLLOW-UP

Following the annual interim measures monitoring inspection, submittal actions were taken to clear the culvert at T Farm.

3.3 LOOKING FORWARD

DOE is continuing with the following planned actions in FY 2020:

- Performance of an annual environmental interim measures maintenance plan inspection to occur in 2020 per TFC-PLN-14.
- Performance of in-tank and ex-tank leak detection and monitoring per RPP-9937, *Single-Shell Tank System Leak Detection and Monitoring Functions and Requirements Document*.

4.0 SUBSURFACE MONITORING

This section is for activities related to the capture of additional subsurface monitoring beneath the interim surface barriers (e.g., resistivity surveys, drywell gamma logging, borehole drilling/sampling). Leak assessments for the following tanks were performed during FY 2019: T-101 and T-103 (T-103 report published October 2019).

4.1 RESULTS

The leak assessment for tank T-101 successfully changed the status of the tank from "assumed leaker" to "sound" upon completion of this evaluation, RPP-ASMT-62935, *Leak Assessment Report for Tank 241-T-101*. The results of the leak assessment for tank T-103 were concluded to be "sound" below 67 in., which was not a change in status. Above 67 in. there was uncertainty of the integrity of the tank. Therefore, tank T-103 has a limited working volume of less than 67 in. (RPP-ASMT-63257, *Leak Assessment Report for Tank 241-T-103*).

4.2 FUTURE PLANNED ACTIVITIES

Leak assessments are planned for tanks SX-104 and T-109.

4.3 LOOKING FORWARD

Current plans for additional subsurface monitoring are frequently a result of anomalous data from the in-tank monitoring program published in RPP-9937. Anomalous data cannot be predicted thus nothing has been planned for additional subsurface monitoring activities.

5.0 BARRIER MOISTURE MONITORING

The monitoring instruments in T Tank Farm are grouped into four nests (TA, TB, TC, TD). Those in TY Tank Farm are grouped into two nests (TYA, TYB). At the SX Farm two monitoring nests were installed (SX1 and SX2). Each nest includes a neutron probe access tube, a capacitance probe with five sensors, and four HDUs.

Nests TA and TYA were placed in the area outside of the interim surface barriers and serve as controls. Control nests needed to be at least 5 m (16 ft) away from the closest edge of the surface cover to prevent measurable impacts from the cover. Nest TB is at the edge of the barrier to monitor the edge effect of the barrier on the soil-water regime. Nests TC and TD are duplicates and are located inside the covered area in the T Tank Farm; nest TYB is located in the covered area in TY Tank Farm. The nests under the barriers need to be at least 5 m (16 ft) from the closest edge of the interim surface barrier and between two or more tanks where the largest change of soil water content (θ), and hence water flux, is expected after the emplacement of the interim surface barrier.

Moisture monitoring at SX Farm consists of a south and north panel nest station that started collecting data in August of 2019. The south panel nest contains two HDU monitoring installations - one HDU installed to a depth of 5 m (16 ft) and another HDU installed to 20 m (66 ft) in depth. The 5-m-deep HDU array installation includes HDU probes installed at depths of approximately 1 m (3 ft), 2 m (7 ft), 3 m (10 ft), and 5m (16 ft). The 20 m (66 ft) HDU array installation includes probes installed at depths of approximately 10 m (33 ft), 15 m (49 ft), and 20 m (66 ft). The north panel monitoring nest has a 10-m (33-ft) HDU array with HDUs located at depths of approximately 1 m (3 ft), 3 m (10 ft), 5 m (16 ft), and 10 m (33 ft).

Vertically, the monitoring depths of the nests extend to 20 m (66 ft) below ground surface (bgs). Considering that upon the emplacement of the interim surface barrier the changes of soil moisture are more significant in shallower depths, more intensive and frequent measurements are taken at shallow depths. Monitoring nests lie within backfill material, and the deeper ones are installed in the undisturbed Hanford formation below the tanks. Nests TA and TB were installed in late FY 2006, and monitoring was initiated in September 2006. Nests TC and TD were installed in FY 2007, and monitoring was initiated in May 2008. Nests TYA and TYB were installed in FY 2010, and monitoring was initiated in March 2010. Two nests were installed at SX Tank Farm under the barrier in 2018 (RPP-PLAN-48439 and RPP-PLAN-49187).

Soil moisture conditions were monitored with an array of monitoring nests and neutron probe access tubes located beneath and outside of the interim surface barriers. The principal variables monitored for this purpose are soil-water content (θ) and soil-water pressure (ψ) (based on the FY 2007 monitoring results and the recommendation from PNNL-17306, *T Tank Farm Interim Surface Barrier Demonstration—Vadose Zone Monitoring FY07 Report*). (Note: the rain gauges have not been used to monitor soil-water flux since FY 2008.) Each variable reflects one aspect of the soil-moisture regime, and their variation is different under different wetness conditions. Measuring two different variables also serves as a redundancy of monitoring. Secondary variables monitored include soil temperature and meteorological conditions, including precipitation and air temperature. The soil temperature is used to correct the temperature impact on soil-water content and soil-water pressure, and along with air temperature, to assess system functionality.

PNNL-19772 presents the criteria used to select the various measurement methods, the principles of selected methods, part of the instrument calibrations, instrument layout and installation, and

measurement procedures and frequencies. PNNL-20144, *T-TY Tank Farm Interim Surface Barrier Demonstration—Vadose Zone Monitoring FY10 Report*, provides a more detailed discussion of the monitoring instruments, pertinent calibration information, instrument installation methods, and data-analysis methodology. Work plans RPP-PLAN-48439 and RPP-PLAN-49187 describe the instruments and monitoring locations/depths at the SX Farm interim barrier nests.

Each monitoring location has neutron logging and HDUs to measure soil-moisture variation; each is evaluated annually. Capacitance probes are installed, but only at T and TY Farms. These monitoring locations represent variations in background conditions not influenced by the presence of a barrier. Since FY 2017, no data from capacitance probe nests is being utilized. The capacitance probe data is not presented in this report and the data are not used in the analysis. This data is incomplete, not recorded, or not reliable.

To date, the monitoring data indicates that the interim surface barriers are continuing to curtail recharge of water to the vadose zone and reduce the impact of meteoric water on soil-moisture conditions. The data obtained from the HDUs indicate that the soil beneath the barrier became drier at monitored depths: 1 m (3 ft), 2 m (7 ft), 5 m (16 ft), and 10 m (33 ft). To date, the changes in soil-water pressure (ψ) at the 10-m depth were relatively small because the drainage water from shallower depths continues to move into the soil at this depth. Based off the neutron logging, which takes readings from the ground surface to 15.2-m (50-ft) bgs, water content under the interim surface barrier decreased.

5.1 PLANNED ACTIVITIES

The monitoring approach uses the nests and the Hanford Meteorological Station to document the vadose zone response to the placement of the interim surface barriers in the T and TY Tank Farms. PNNL-19772 summarizes the six variables monitored, the monitoring methods, and the monitoring frequency. Table 3 shows the revised monitoring frequency established and approved in RPP-RPT-53570, *Technical Basis for Soil Moisture and Soil Pore Pressure Head Measurement Frequency Reduction at T and TY Farm Interim Surface Barriers*. SX Tank Farm interim surface barrier, built in 2019,follows the same monitoring frequencies as T and TY Farms.

Neutron-moisture-probe measurements are performed manually at 0.3-m (1-ft) intervals to the depths of the access tubes following the neutron probe measurement procedure documented in TO-320-022, *Operate Model 503DR Ml HP-2 or Ml HP-3 Hydroprobe Neutron Moisture Gauge*. The monitoring nest data logger controls and stores the measurement data of moisture content from capacitance sensors, soil-water pressure and soil temperature from HDUs, precipitation from the rain gauge, and air temperature from the thermistor.

Data collected will be reviewed to determine the best path forward for the interim barriers scheduled to be built at TX and U Tank Farms.

5.2 RESULTS

The monitoring data continue to indicate that the barriers are reducing the impact of meteoric water on the surface soil-moisture conditions. The data obtained from the HDUs demonstrated a reduction in the soil-retained moisture. The data from neutron logging indicate a reduction in the magnitude of variability caused by seasonal increases in precipitation, although the data are not

showing a significant reduction in average annual soil moisture conditions, reflecting measurement limits of the instruments.

Table 3. Data Collection Methods and Approximate Frequency Under Normal Working Conditions.

Monitoring Variable	Monitoring Method[a]	Monitoring Frequency	Data Logger Download Frequency[b]
Soil-Water Content	Neutron Moisture Probe	Twice Annually	Not applicable
Soil-Water Content	Capacitance Probe[c]	Twice Daily	Quarterly
Soil-Water Pressure and Soil Temperature	Heat Dissipation Unit	Daily	
Soil-Water Potential	Soil Water Potential Sensor	Daily	
Air Temperature	Thermistor	Hourly	
Precipitation	Rain Gauge	Hourly	

a) All measurements except the neutron probe are controlled by data loggers and taken automatically.
b) Based on RPP-RPT-53570.
c) Capacitance probes are not functional and are no longer being used.

The age of the monitoring system often results in anomalous data, and this data cannot be used for analysis (e.g., HDUs for nests TA and TYB). The causes for anomalous data for capacitance probe, HDUs, and soil water potential were: interruptions of the system; other operations (e.g., barrier activity); poor wire connection (e.g., due to corrosion occurrence); low-battery voltage; instrument failure; and/or data logger overload. Table 4 shows the status of instrument functionality. There are currently no plans to replace malfunctioning instruments or install new monitoring nests.

Table 4. Instrument Functionality.

Tank Farm	Nest	Capacitance Probes	Heat Dissipation Units	Thermistor	Soil-Water Potential
T	TA	No Functionality	No Functionality	No Functionality	n/a
	TB	Full Functionality	Full Functionality	Full Functionality	n/a
	TC	Partial Functionality	Full Functionality	Full Functionality	n/a
	TD	Partial Functionality	Full Functionality	Full Functionality	n/a
TY	TYA	Partial Functionality	Partial Functionality	Full Functionality	n/a
	TYB	No Functionality	No Functionality	No Functionality	n/a
SX	SX1	n/a	Full Functionality	Full Functionality	No Functionality
	SX2	n/a	Full Functionality	Full Functionality	No Functionality

5.2.1 Neutron Moisture Geophysics Results

To assess the barrier impact on soil-water conditions based on the neutron probe measurements, the soil-water content was averaged over 3.1-m (10.2-ft) intervals and also over the whole profile. The changes in soil water content (θ), between FY 2008 and FY 2019 for T Tank Farm barrier nests, changes between FY 2010 and FY 2019 for TY Tank Farm barrier nests, and changes for FY 2019 for SX barrier nests are shown in Figure 4 and Table 5. Outside the barrier at nest TYA over the whole profile (from ground surface to depth 15.2 m [49.9 ft]), the change in soil-water content was positive, indicating the soil moisture increased. The changes for the remainder of the nests under the barrier were almost all negative, meaning that the soil became drier during this period. On average, over the whole profile (from ground surface to 15.2 m [49.9 ft] bgs), the negative change under the barriers was approximately 1 vol% in nests TC, TD, and TYB. The negative change on the edge of the barrier and outside the barrier at nests TB and TA over the whole profile was approximately 0.5 vol%. The remainder of the nest data locations do not show much of a trend due to their recent activation in 2019. An exception to this is the SXE nest which shows the most significant change of all with an average water percent decrease of 2.5%. It is suspected that the SXE values are the result of a lack of historical data and will equilibrate over time.

Figure 4. Depth-Averaged Neutron Probe-Measured Soil-Water Content Changes.

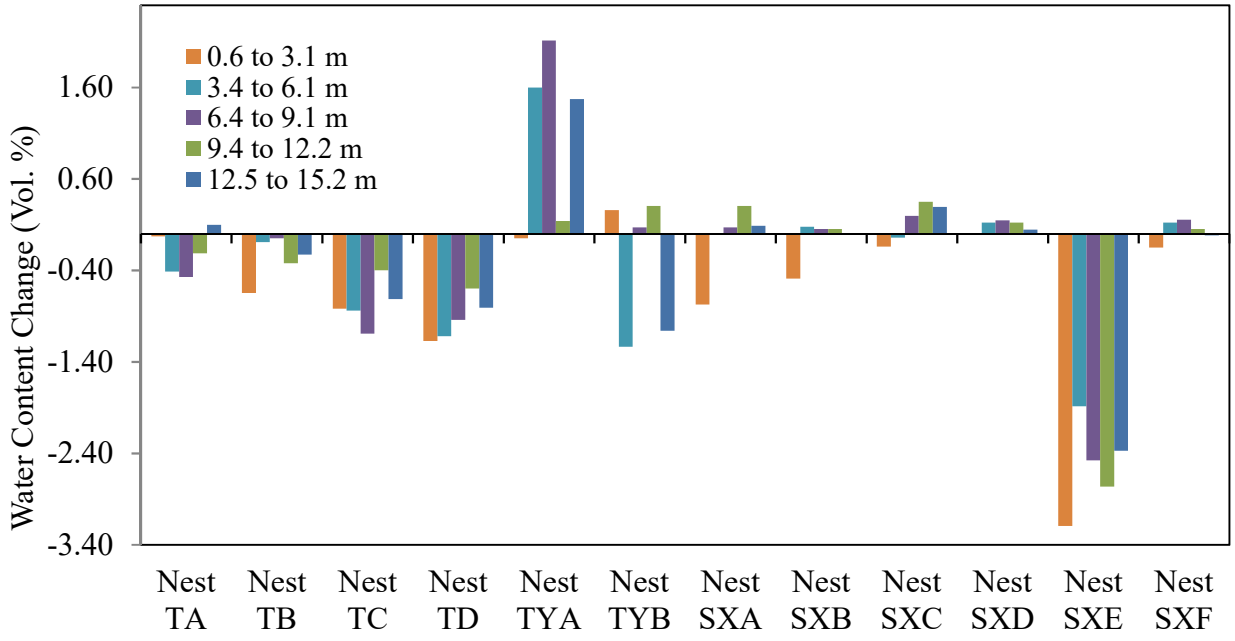


Table 5. Depth-Average Neutron Probe-Measure Soil-Water Content Changes.

Tank Farm	Monitoring Nest	Water Content Change (Vol. %)					
		0.6 to 3.1 m	3.4 to 6.1 m	6.4 to 9.1 m	9.4 to 12.2 m	12.5 to 15.2 m	0.6 to 15.2 m
241-T	TA	-0.03	-0.41	-0.47	-0.21	0.10	-0.21
	TB	-0.65	-0.09	-0.05	-0.32	-0.23	-0.26
	TC	-0.82	-0.84	-1.09	-0.40	-0.71	-0.77
	TD	-1.17	-1.12	-0.94	-0.60	-0.81	-0.92
241-TY	TYA	-0.05	1.60	2.11	0.14	1.47	1.08
	TYB	0.26	-1.24	0.07	0.30	-1.06	-0.67
241-SX	SXA	-0.77	0.00	0.07	0.30	0.09	-0.05
	SXB	-0.49	0.07	0.05	0.05	-0.01	-0.05
	SXC	-0.14	-0.04	0.20	0.35	0.29	0.14
	SXD	-0.58	0.06	0.11	-0.02	-0.05	-0.09
	SXE	-3.20	-1.89	-2.48	-2.76	-2.37	-2.53
	SXF	-0.15	0.12	0.15	0.05	-0.02	0.04

The analysis represented in Figure 4 and Table 5 was generated from two pairs of neutron logging events carried out per the monitoring plan (PNNL-16538; PNNL-19772); each event pair consisted of one event in T Tank Farm, one event in TY Tank Farm, and one event in SX Farm. Figure 5 through Figure 16 show the measured soil-water content. For all nests, there was little variation of the soil-water content observed between each logging event. For the 2019 sampling events, some data points were collected in October 2019 so the Calendar Year (CY) acronym is used to incorporate this difference.

Figure 5. Monitoring Nest TA (left) Historical Changes and (right) Fiscal Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

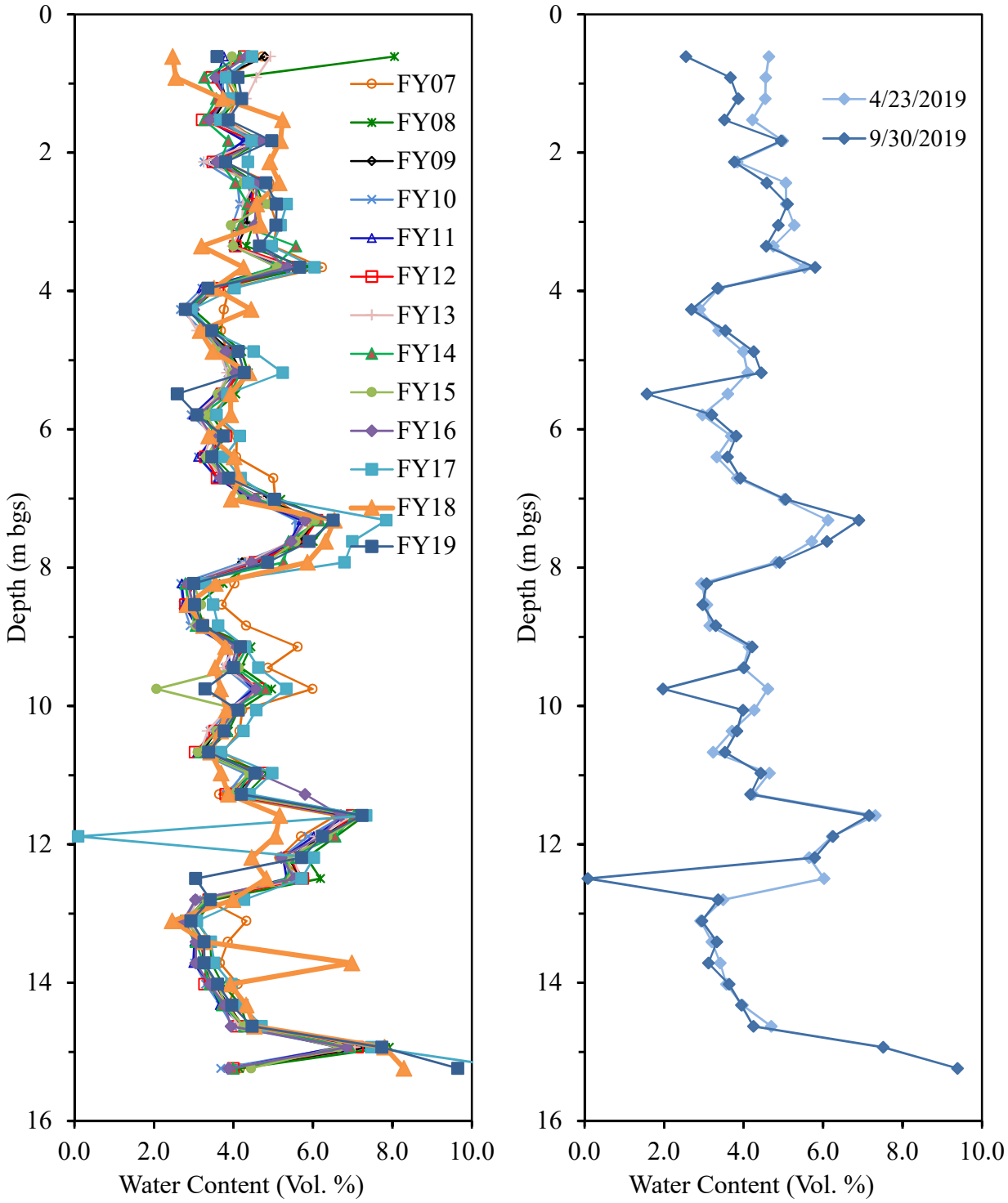


Figure 6. Monitoring Nest TB (left) Historical Changes and (right) Fiscal Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

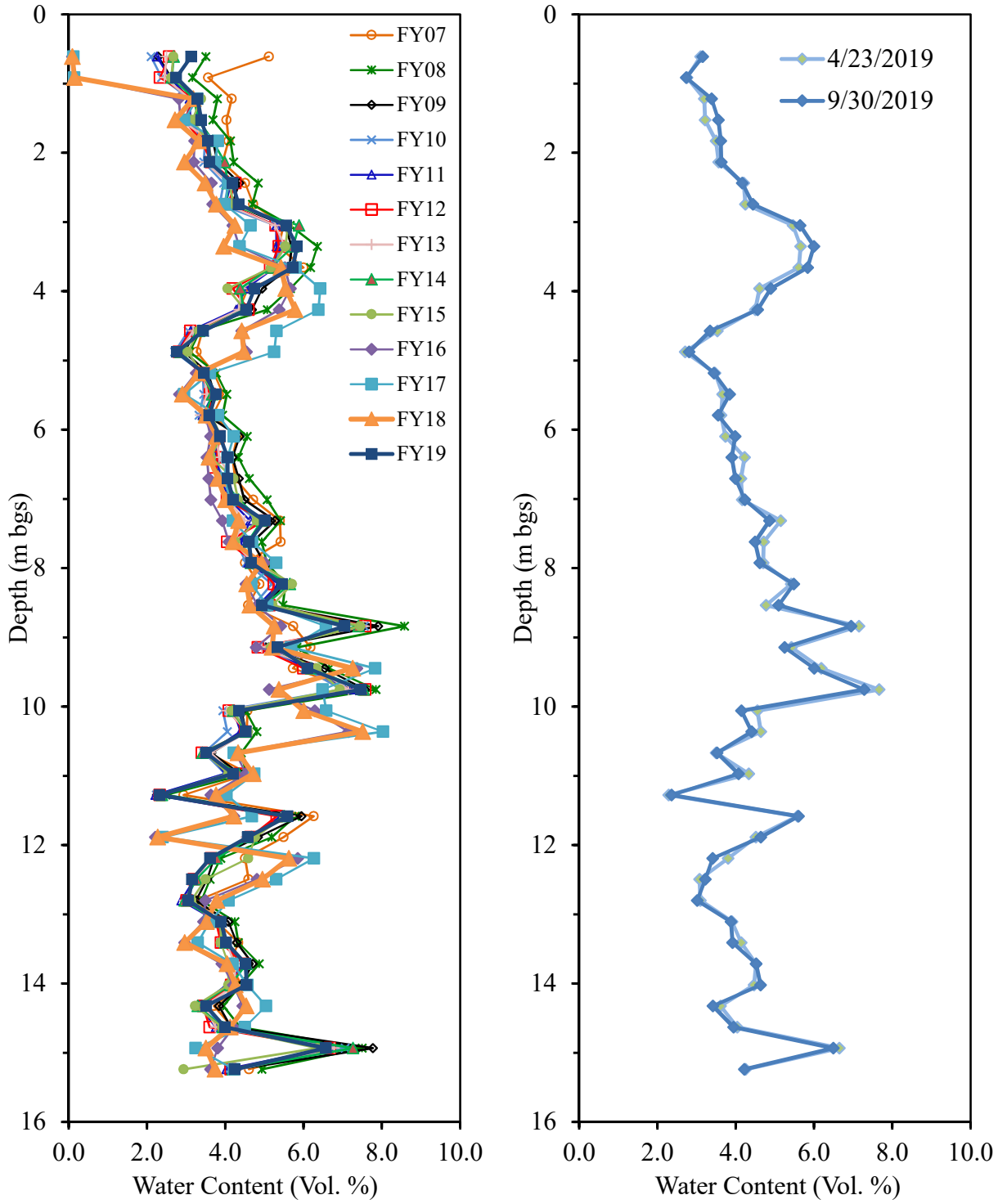


Figure 7. Monitoring Nest TC (left) Historical Changes and (right) Fiscal Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

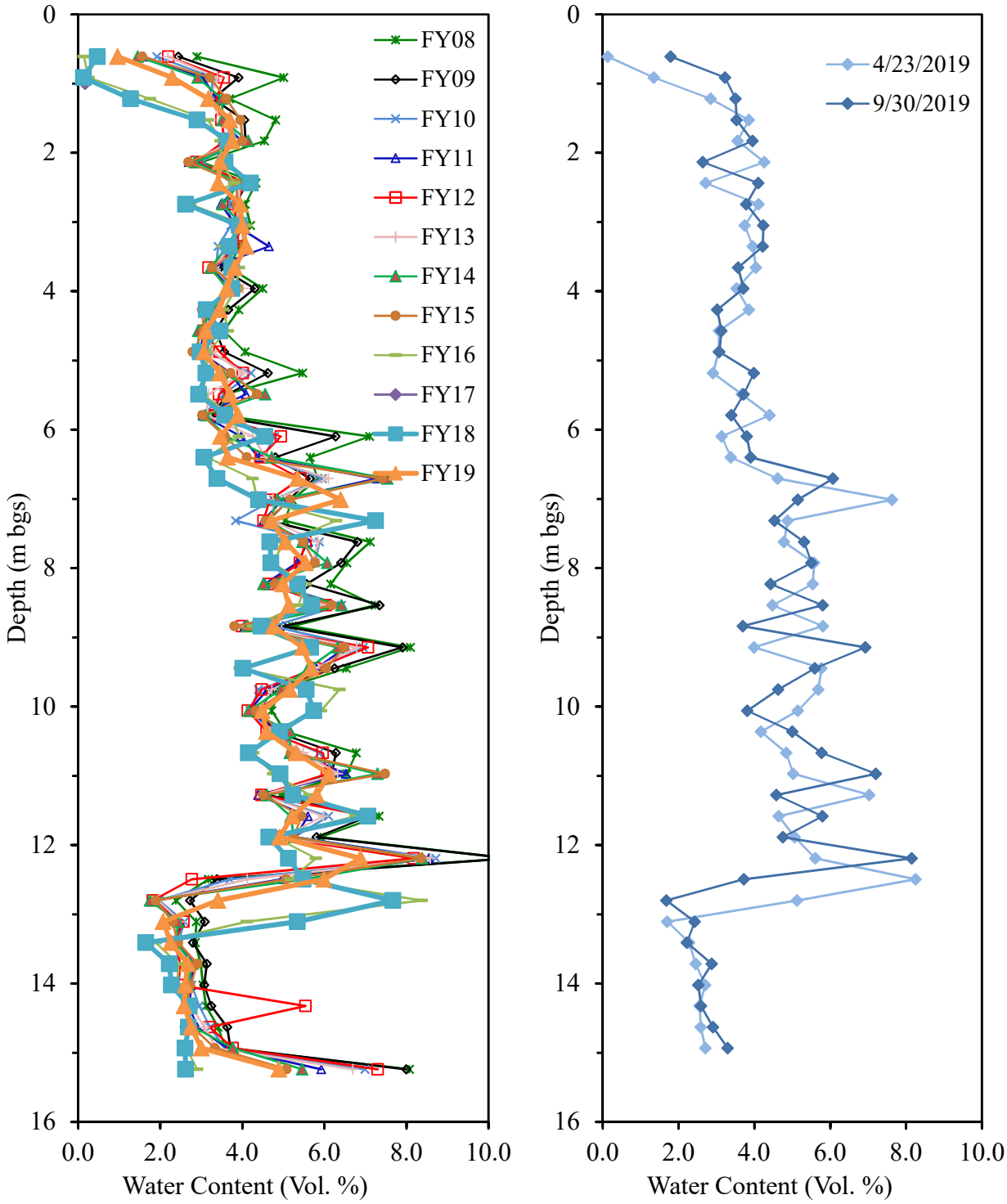


Figure 8. Monitoring Nest TD (left) Historical Changes and (right) Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

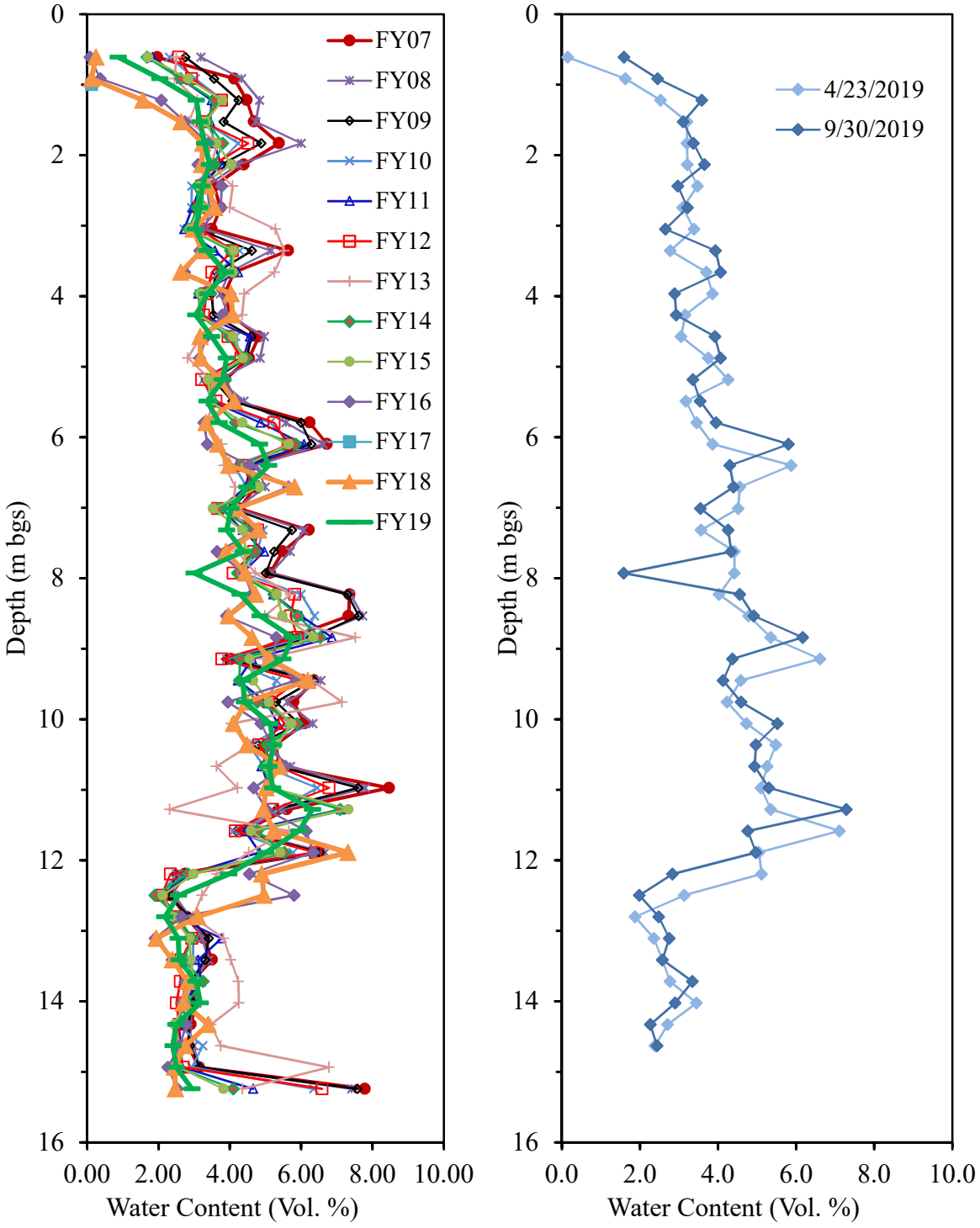


Figure 9. Monitoring Nest TYA (left) Historical Changes and (right) Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

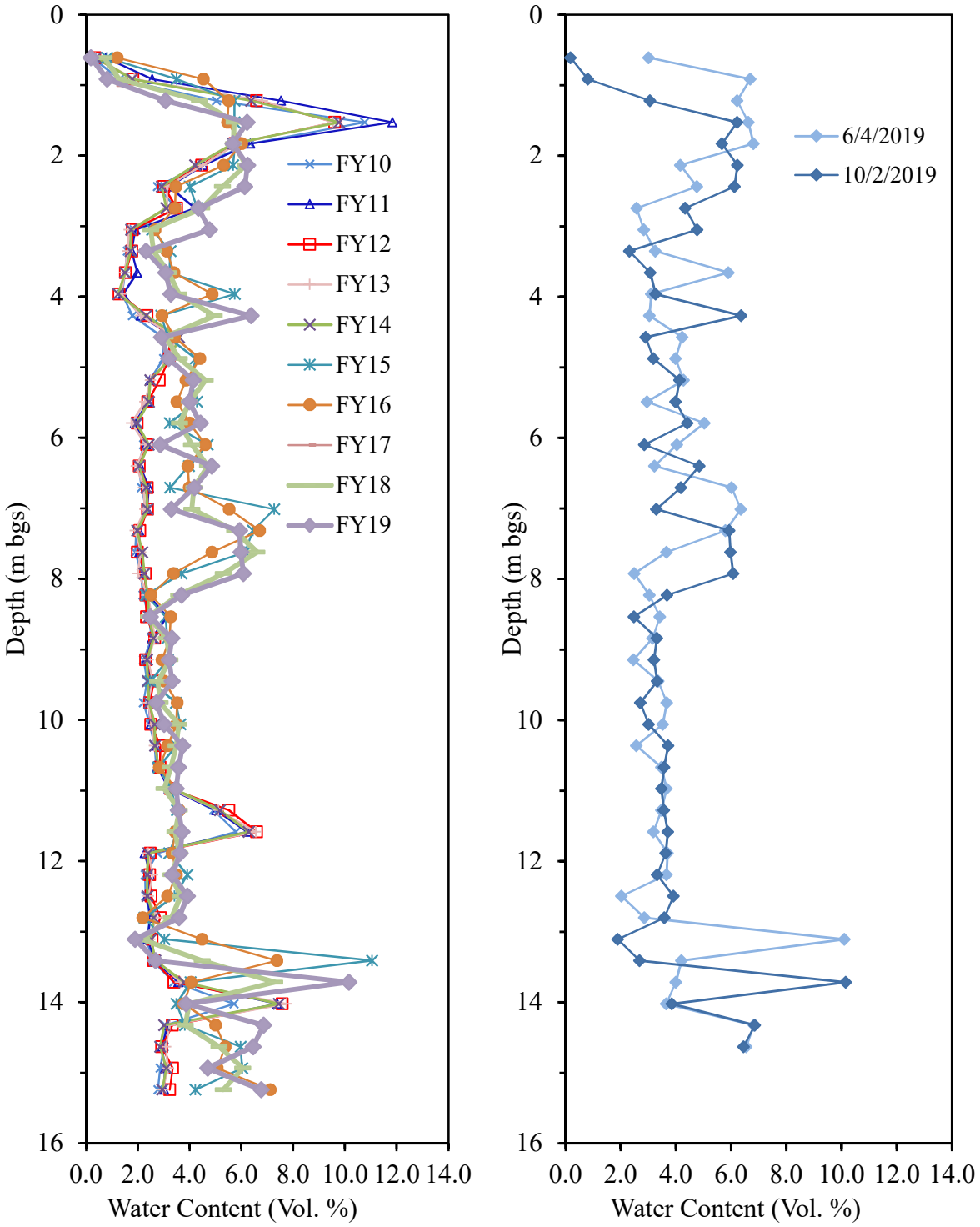


Figure 10. Monitoring Nest TYB (left) Historical Changes and (right) Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

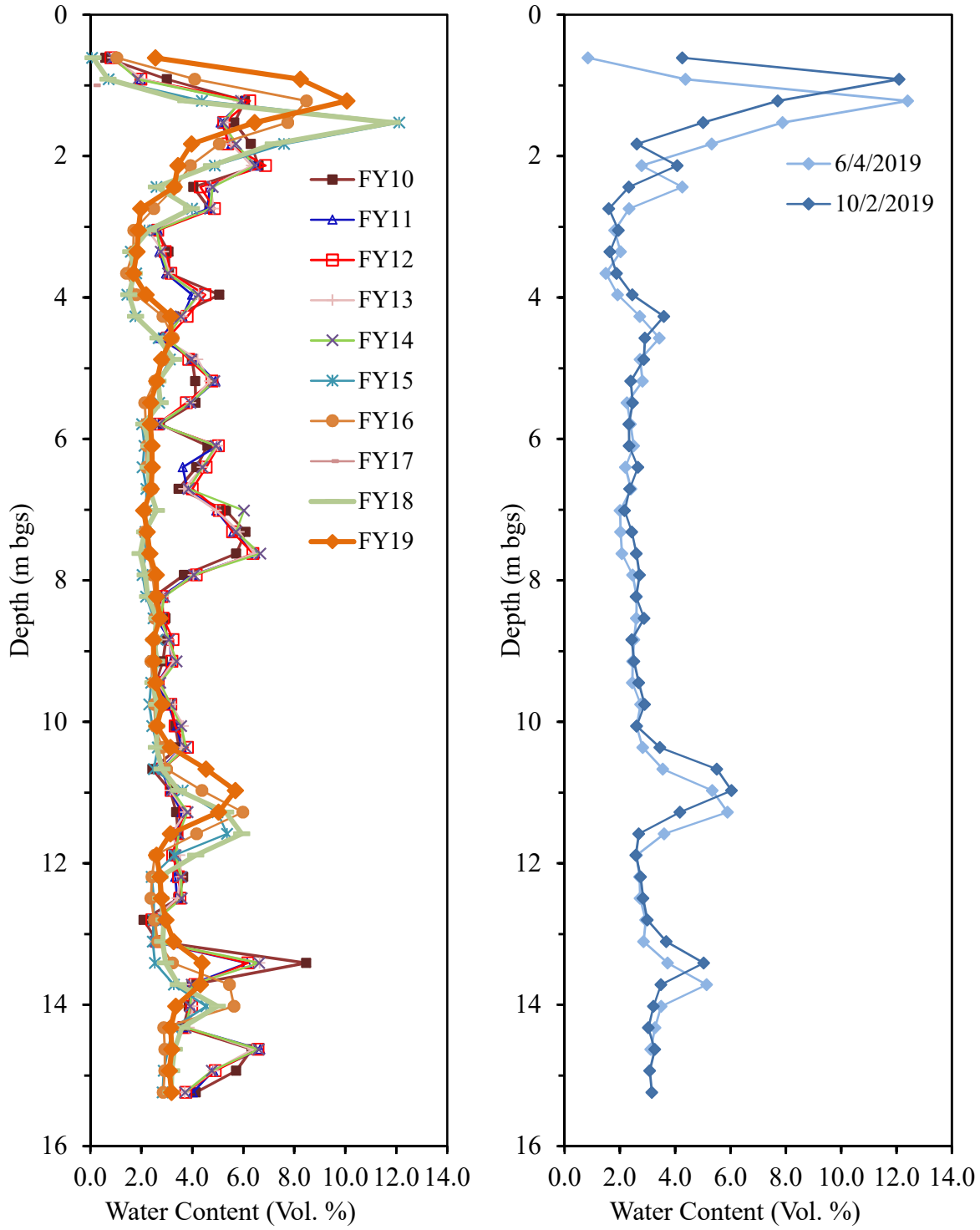


Figure 11. Monitoring Nest SXA for Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

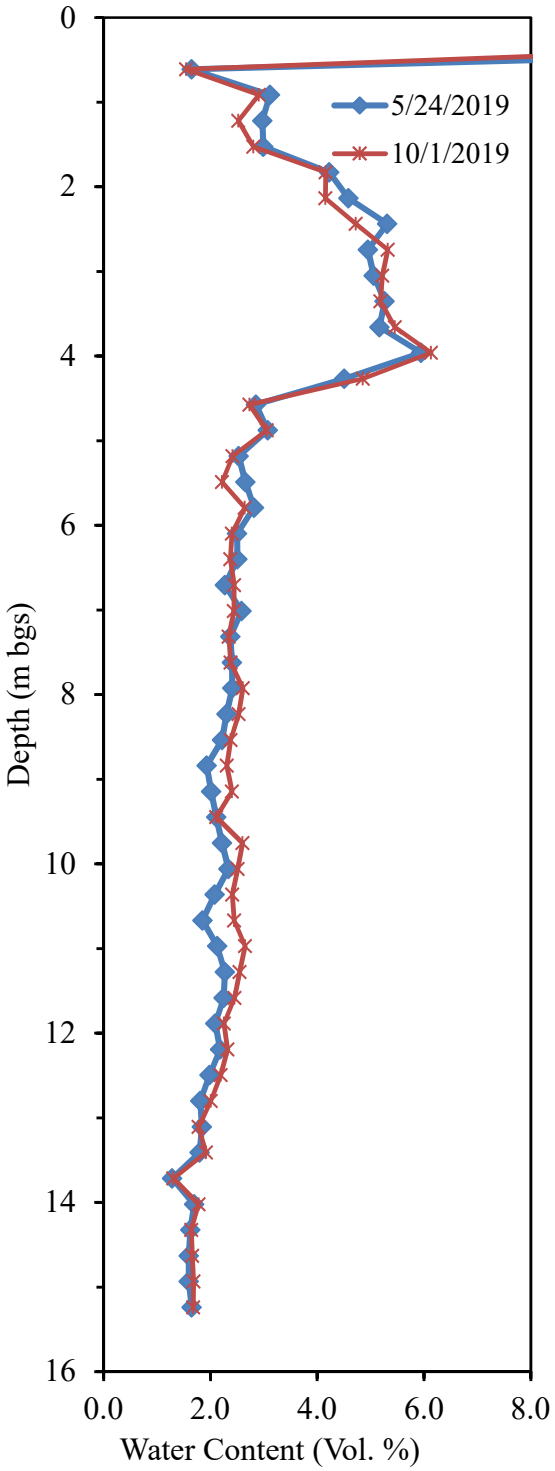


Figure 12. Monitoring Nest SXB for Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

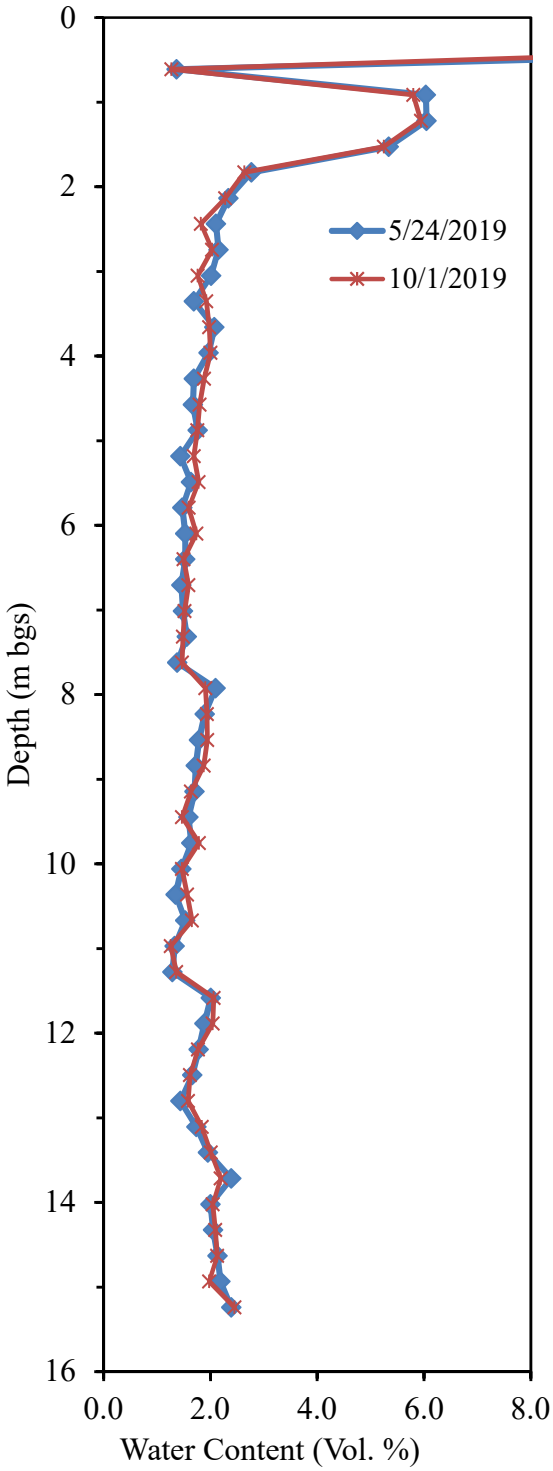


Figure 13. Monitoring Nest SXC for Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

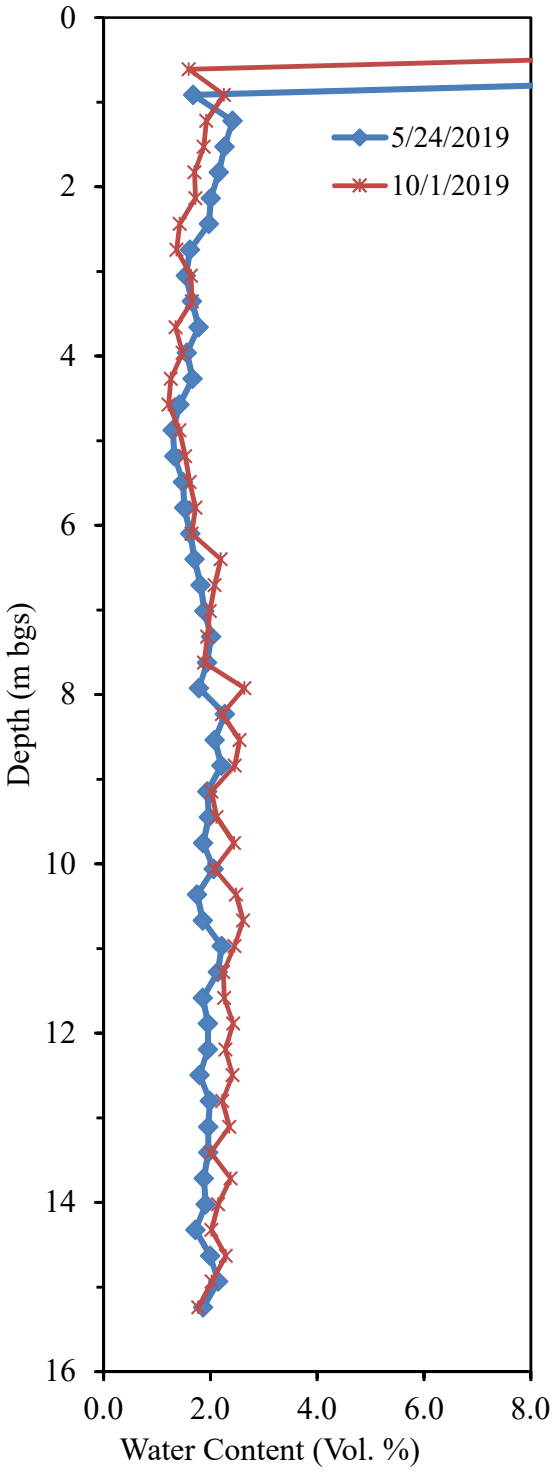


Figure 14. Monitoring Nest SXD for Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

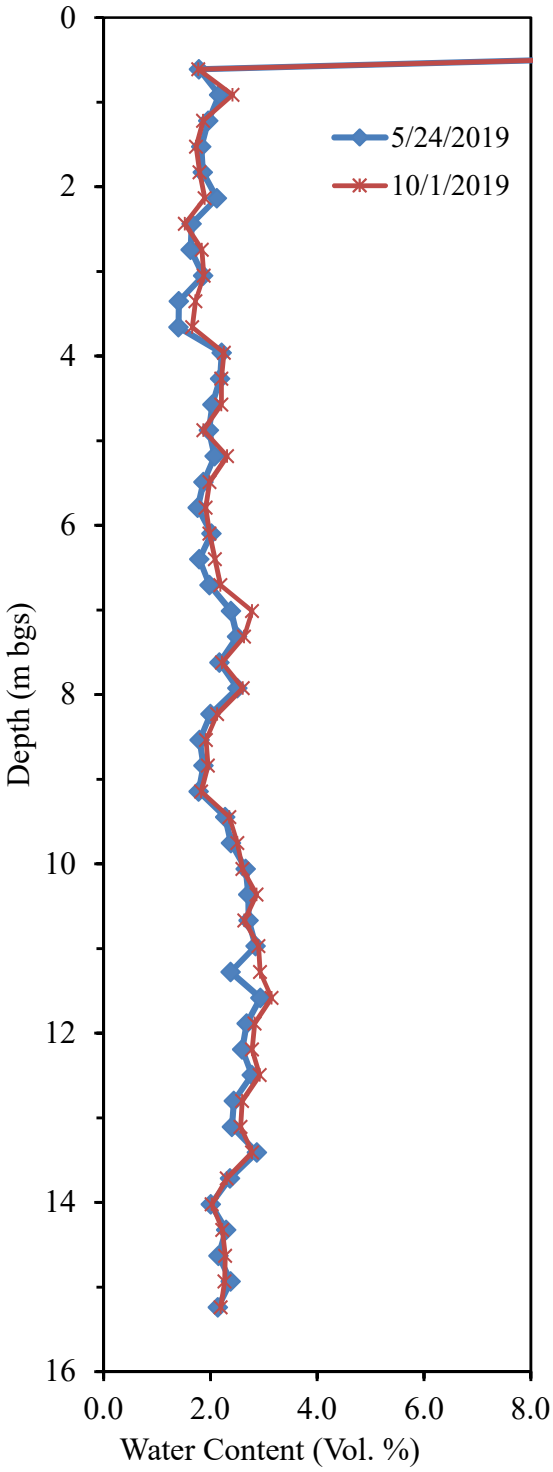


Figure 15. Monitoring Nest SXE for Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.

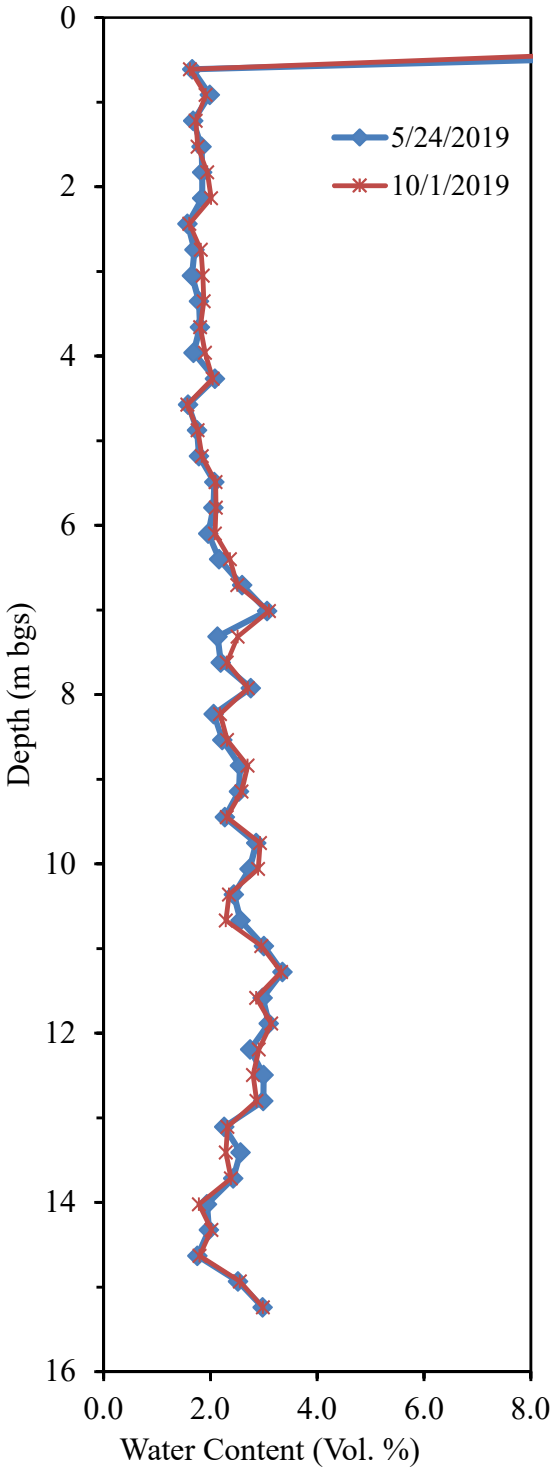
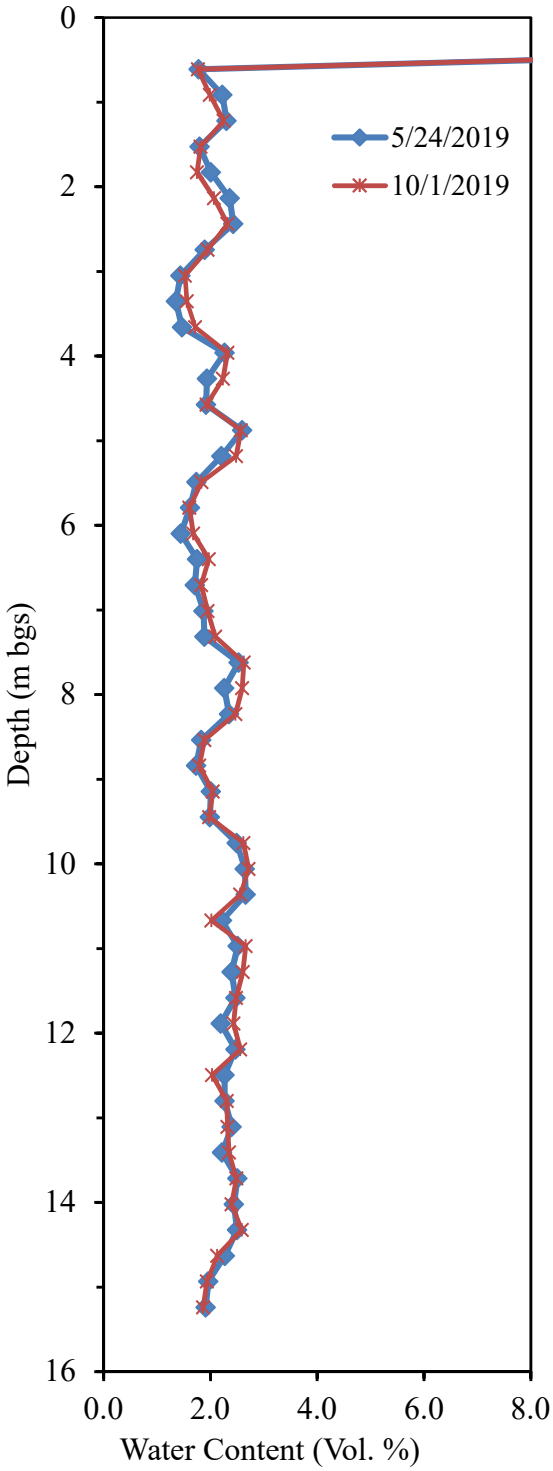


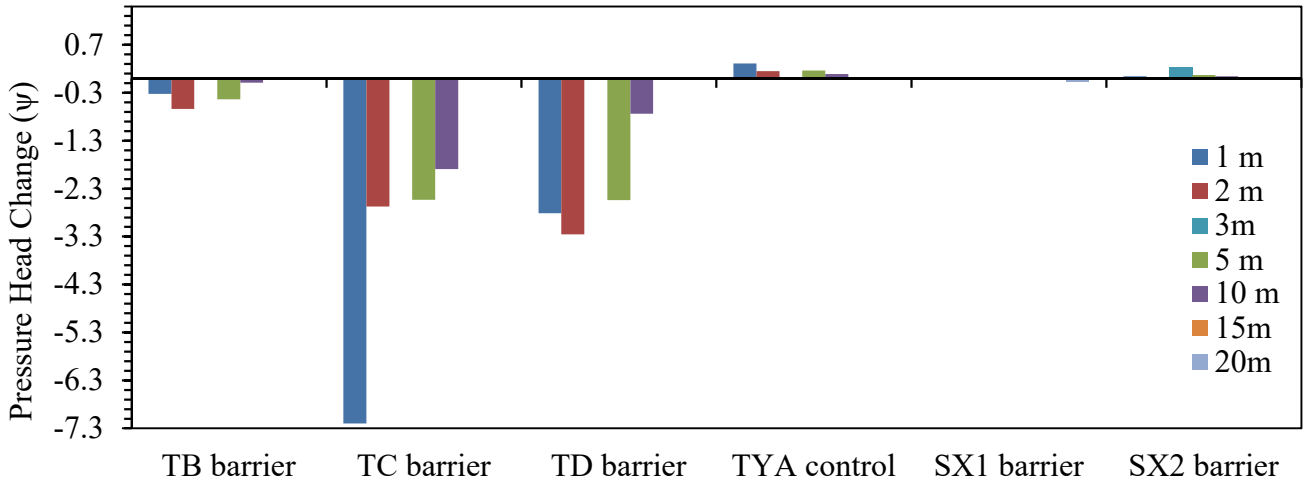
Figure 16. Monitoring Nest SXF for Calendar Year 2019 Neutron Probe Measured Soil-Water Content at Different Depths.



5.2.2 Heat Dissipation Unit Probe Results

Figure 17 shows the soil-water pressure measured by the HDUs at nests TB, TC, TD, TYA, SX1, and SX2 after temperature correction. The soil-water pressure head data at the interim surface barrier demonstrates the ability of the barrier to reduce soil moisture by limiting recharge. In areas where the barrier has little effect, such as TB where the probe was installed to monitor edge effects and TYA where the probe was not installed under the barrier, the nest site serves as an environmental control. At these locations the results are best approximated by a net annual slope of zero. However, nests TC and TD, which are both directly under the barrier, demonstrate a net negative trend that continues with time, indicating a continued reduction in moisture within the pore space of the vadose zone. Finally, nest TA and TYB stopped collecting data in 2017. Comparisons between areas under the barrier and areas outside the barrier are difficult to assess when one of the two probes stops working (such as TYB) or when the probe outside the barrier is no longer functioning (such as TA). Overall, it does appear that the data collected from beneath the interim surface barriers still indicates decreasing moisture year to year. Probe TYA (control) indicates that the moisture concentrations fluctuate with seasonal precipitation events. SX1 and SX2 were recently installed and have not had time to establish a visible trend.

Figure 17. Heat Dissipation Unit-Measured Soil-Water Pressure Head Change.



The annual average soil-water pressure changes from FY 2008 to FY 2019 at nests TB, TC, and TD located in T Tank Farm; FY 2010 to FY 2019 at TYA located in TY Tank Farm; and FY 2019 data for SX1 and SX2 nests located at SX Farm are shown in Figure 17. No data is available for nests TA and TYB due to instrument failure. For nests TB, TC, and TD, the soil-water pressure at the 1-m (3-ft), 2-m (7-ft), and 5-m (16-ft) depths decreased, indicating that the soil beneath the barrier became drier at these depths; the changes in soil-water pressure (ψ) at the 10-m (33-ft) depth were relatively small because the drainage water from shallower depths continues to move into the soil at this depth. Nest TB represents drying out below a barrier edge. The changes at TB are not as significant as TC and TD locations, which are directly under the barrier. Nest TYA (control) only shows a minor increase that is expected outside the barrier cover. Nest locations SX1 and SX2 are located directly under the barrier but will need time to establish a visible HDU data trend.

5.3 LOOKING FORWARD

In FY 2021, ORP will continue with the revised monitoring frequency established and approved in RPP-RPT-53570, as indicated in Table 3. In FY 2021, these monitoring actions will include a more historic dataset for the SX Tank Farm interim surface barrier monitoring nests; the data collected for this FY 2020 report was limited due to instrument activation in summer 2019.

6.0 NEW BARRIER ELEMENTS

6.1 TX TANK FARM

Per HFFACO Milestone M-45-92W, DOE completed and submitted to the Department of Ecology the design for a TX Tank Farm interim surface barrier. The design is approximately 215,000 ft^2 in area and will cover all 18 tanks in TX Farm. The Department of Ecology approved the TX Farm barrier design construction in 2019, which completed Milestone M-045-92X. Work on installation of this surface barrier and evapotranspiration has started. Progress on the barrier is scheduled to complete by October 31st 2021.

6.2 U- TANK FARM

Designing the U Farm barrier will begin in FY2021.

6.3 NEW BARRIER TECHNOLOGIES

No research was performed in FY 2019 to evaluate new barrier technologies.

7.0 CONCLUSION

Field monitoring inspections and the performance monitoring data collected were all performed as expected for FY 2019. The data on all interim barriers shows that they are functioning as good as or better than expected. Most barrier locations show an average soil-drying rate of negative 0.2% up to a negative 1.0%. An exception to this rate was the recently logged SXE drywell. At this particular well, the percent moisture decreased by almost 2.5%.

Planned future activities for the next year are to continue monitoring moisture data at interim barrier farms, complete construction on the TX evapotranspiration basin and the barrier, and design the U Farm basin and interim surface barrier.

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APPENDIX A

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A1.0 QUARTERLY INSPECTIONS

A1.1 T-FARM INSPECTIONS

T Farm First Quarter Inspection, 1-30-19

Preventive Maintenance Data Sheet
WT-106304 - TFISB

Perform work per procedure. Record data below.

Data sheet WT-106304

This data sheet has been set up to track inspections of the T Farm Interim Surface Barrier (TISB).

Equipment needed for inspection:
- Tape measure
- Camera

Take a photo of deficiencies found and include in completed work package.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
SOIL EMBANKMENT AND STABILIZATION ROCK	STABILIZATION ROCK ON SIDE SLOPES SHOWS NO SIGNS OF EROSION, SETTLEMENT SLIPPAGE, OR OTHER DAMAGE	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	STRUCTURAL INTEGRITY - WALL IS VISUALLY VERTICAL AND SHOWS NO HORIZONTAL DISPLACEMENT	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	CONCRETE BLOCKS ARE FREE OF CRACKS AND IN TIGHT CONTACT WITH ONE ANOTHER (GAPS LESS THAN 1/2 INCH) HORIZONTAL DISPLACEMENT	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	GUARD RAIL IS IN GOOD CONDITION AND SECURELY FASTENED TO RETAINING WALL	✓	
VEHICLE ACCESS RAMPS AND ROADS	CRUSHED ROCK ROAD SURFACE IS FREE OF RUTS, EROSION, OR OTHER DAMAGE	✓	
POLYUREA LINER	LINER IS FREE OF EXCESSIVE ROCKS, STICKS, COMBUSTIBLE MATERIAL,	✓	
POLYUREA LINER	LINER IS IN GOOD CONDITION WITH NO EXCESSIVE WEAR, TEARS, HOLES, OR OTHER DAMAGE THAT WOULD CAUSE WATER LEAKAGE TO THE SUBSURFACE. PHOTOGRAPH ANY DEFICIENCIES AND NOTE LOCATION	~~✓~~ EZ 2/5/19	✓
POLYUREA LINER	LINER IS SECURELY ANCHORED AT PERIMETER WITH NO EVIDENCE OF WIND UPLIFT OR PULL OUT FROM ANCHOR TRENCH	✓	
POLYUREA LINER	SEAL BETWEEN LINER AND CONCRETE BLOCK RETAINING WALL IS INTACT WITH NO LEAKS OR OBVIOUS SIGNS OF DAMAGE THAT COULD CAUSE LEAKS		✓

Work Order # 507775 Page 1 of 2

Preventive Maintenance Data Sheet
WT-106304 - TFISB

LINER PENETRATIONS	ALL VAULT, PIPE SLEEVE, AND BOOT LINER PENETRATIONS ARE IN GOOD CONDITION AND PAINTED YELLOW FOR EASY VISIBILITY	✓		
LINER PENETRATIONS	THE LINER FORMS A CRACK-FREE SEAL AS IT TRANSITIONS FROM HORIZONTAL TO VERTICAL AROUND PENETRATIONS. SEPARATION OF THE VERTICAL PORTION OF THE LINER FROM THE PENETRATION IS ACCEPTABLE			✓
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH INLET FROM THE INTERIM SURFACE BARRIER IS FREE OF SIGNIFICANT DEBRIS AND SEDIMENT THAT WOULD RESTRICT DRAINAGE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DRAINAGE DITCH IS FREE OF SIGNIFICANT DEBRIS AND SEDIMENT	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH LINER IS IN GOOD CONDITION WITH NO EXCESSIVE WEAR, TEARS, HOLES, OR OTHER DAMAAGE THAT WOULD CAUSE WATER LEAKAGE TO THE SUBSURFACE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	INFILTRATION AREA IS FREE FROM SIGNIFICANT SEDIMENT, DEBRIS, ANIMAL INTRUSION, WEED GROWTH, OR OTHER PHYSICAL DAMAGE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH INLET SPILLWAY IS IN GOOD CONDITION	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	OVERFLOW AREA OUTLET SPILLWAY IS IN GOOD CONDITION WIT NO EVIDENCE OF RIPRAP DISPLACEMENT OR EROSION	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	STABILIZATION ROCK ON SIDE SLOPES OF DITCH AND RUN-ON DIVERSION BERM SHOWS NO SIGNS OF EROSION, SLIPPAGE, OR OTHER DAMAGE	✓		

Work Order # 507775

T Farm Second Quarter Inspection, 4-22-19

Preventive Maintenance Data Sheet
WT-106304 - TFISB

Perform work per procedure. Record data below.

Data sheet WT-106304

This data sheet has been set up to track inspections of the T Farm Interim Surface Barrier (TISB).

Equipment needed for inspection:
- Tape measure
- Camera

Take a photo of deficiencies found and include in completed work package.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
SOIL EMBANKMENT AND STABILIZATION ROCK	STABILIZATION ROCK ON SIDE SLOPES SHOWS NO SIGNS OF EROSION, SETTLEMENT SLIPPAGE, OR OTHER DAMAGE	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	STRUCTURAL INTEGRITY - WALL IS VISUALLY VERTICAL AND SHOWS NO HORIZONTAL DISPLACEMENT	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	CONCRETE BLOCKS ARE FREE OF CRACKS AND IN TIGHT CONTACT WITH ONE ANOTHER (GAPS LESS THAN 1/2 INCH) HORIZONTAL DISPLACEMENT	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	GUARD RAIL IS IN GOOD CONDITION AND SECURELY FASTENED TO RETAINING WALL	✓	
VEHICLE ACCESS RAMPS AND ROADS	CRUSHED ROCK ROAD SURFACE IS FREE OF RUTS, EROSION, OR OTHER DAMAGE	✓	
POLYUREA LINER	LINER IS FREE OF EXCESSIVE ROCKS, STICKS, COMBUSTIBLE MATERIAL,	✓	
POLYUREA LINER	LINER IS IN GOOD CONDITION WITH NO EXCESSIVE WEAR, TEARS, HOLES, OR OTHER DAMAGE THAT WOULD CAUSE WATER LEAKAGE TO THE SUBSURFACE. PHOTOGRAPH ANY DEFICIENCIES AND NOTE LOCATION		✓ South & North side see photos
POLYUREA LINER	LINER IS SECURELY ANCHORED AT PERIMETER WITH NO EVIDENCE OF WIND UPLIFT OR PULL OUT FROM ANCHOR TRENCH	✓	
POLYUREA LINER	SEAL BETWEEN LINER AND CONCRETE BLOCK RETAINING WALL IS INTACT WITH NO LEAKS OR OBVIOUS SIGNS OF DAMAGE THAT COULD CAUSE LEAKS	✓	

Work Order # 519953

Page 1 of 2

Preventive Maintenance Data Sheet
WT-106304 - TFISB

LINER PENETRATIONS	ALL VAULT, PIPE SLEEVE, AND BOOT LINER PENETRATIONS ARE IN GOOD CONDITION AND PAINTED YELLOW FOR EASY VISIBILITY	✓		
LINER PENETRATIONS	THE LINER FORMS A CRACK-FREE SEAL AS IT TRANSITIONS FROM HORIZONTAL TO VERTICAL AROUND PENETRATIONS. SEPARATION OF THE VERTICAL PORTION OF THE LINER FROM THE PENETRATION IS ACCEPTABLE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH INLET FROM THE INTERIM SURFACE BARRIER IS FREE OF SIGNIFICANT DEBRIS AND SEDIMENT THAT WOULD RESTRICT DRAINAGE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DRAINAGE DITCH IS FREE OF SIGNIFICANT DEBRIS AND SEDIMENT	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH LINER IS IN GOOD CONDITION WITH NO EXCESSIVE WEAR, TEARS, HOLES, OR OTHER DAMAAGE THAT WOULD CAUSE WATER LEAKAGE TO THE SUBSURFACE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	INFILTRATION AREA IS FREE FROM SIGNIFICANT SEDIMENT, DEBRIS, ANIMAL INTRUSION, WEED GROWTH, OR OTHER PHYSICAL DAMAGE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH INLET SPILLWAY IS IN GOOD CONDITION	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	OVERFLOW AREA OUTLET SPILLWAY IS IN GOOD CONDITION WIT NO EVIDENCE OF RIPRAP DISPLACEMENT OR EROSION	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	STABILIZATION ROCK ON SIDE SLOPES OF DITCH AND RUN-ON DIVERSION BERM SHOWS NO SIGNS OF EROSION, SLIPPAGE, OR OTHER DAMAGE	✓		

Work Order # 519953

T Farm Third Quarter Inspection, 7-18-19

Preventive Maintenance Data Sheet
WT-106304 - TFISB

Perform work per procedure. Record data below.

Data sheet WT-106304

This data sheet has been set up to track inspections of the T Farm Interim Surface Barrier (TISB).

Equipment needed for inspection:
- Tape measure
- Camera

Take a photo of deficiencies found and include in completed work package.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
SOIL EMBANKMENT AND STABILIZATION ROCK	STABILIZATION ROCK ON SIDE SLOPES SHOWS NO SIGNS OF EROSION, SETTLEMENT SLIPPAGE, OR OTHER DAMAGE	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	STRUCTURAL INTEGRITY - WALL IS VISUALLY VERTICAL AND SHOWS NO HORIZONTAL DISPLACEMENT	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	CONCRETE BLOCKS ARE FREE OF CRACKS AND IN TIGHT CONTACT WITH ONE ANOTHER (GAPS LESS THAN 1/2 INCH HORIZONTAL DISPLACEMENT	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	GUARD RAIL IS IN GOOD CONDITION AND SECURELY FASTENED TO RETAINING WALL	✓	
VEHICLE ACCESS RAMPS AND ROADS	CRUSHED ROCK ROAD SURFACE IS FREE OF RUTS, EROSION, OR OTHER DAMAGE	✓	
POLYUREA LINER	LINER IS FREE OF EXCESSIVE ROCKS, STICKS, COMBUSTIBLE MATERIAL,	✓	
POLYUREA LINER	LINER IS IN GOOD CONDITION WITH NO EXCESSIVE WEAR, TEARS, HOLES, OR OTHER DAMAGE THAT WOULD CAUSE WATER LEAKAGE TO THE SUBSURFACE. PHOTOGRAPH ANY DEFICIENCIES AND NOTE LOCATION		✓
POLYUREA LINER	LINER IS SECURELY ANCHORED AT PERIMETER WITH NO EVIDENCE OF WIND UPLIFT OR PULL OUT FROM ANCHOR TRENCH	✓	
POLYUREA LINER	SEAL BETWEEN LINER AND CONCRETE BLOCK RETAINING WALL IS INTACT WITH NO LEAKS OR OBVIOUS SIGNS OF DAMAGE THAT COULD CAUSE LEAKS	✓	

Work Order # 535668

Page 1 of 2

Preventive Maintenance Data Sheet
WT-106304 - TFISB

LINER PENETRATIONS	ALL VAULT, PIPE SLEEVE, AND BOOT LINER PENETRATIONS ARE IN GOOD CONDITION AND PAINTED YELLOW FOR EASY VISIBILITY	✓		
LINER PENETRATIONS	THE LINER FORMS A CRACK-FREE SEAL AS IT TRANSITIONS FROM HORIZONTAL TO VERTICAL AROUND PENETRATIONS. SEPARATION OF THE VERTICAL PORTION OF THE LINER FROM THE PENETRATION IS ACCEPTABLE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH INLET FROM THE INTERIM SURFACE BARRIER IS FREE OF SIGNIFICANT DEBRIS AND SEDIMENT THAT WOULD RESTRICT DRAINAGE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DRAINAGE DITCH IS FREE OF SIGNIFICANT DEBRIS AND SEDIMENT	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH LINER IS IN GOOD CONDITION WITH NO EXCESSIVE WEAR, TEARS, HOLES, OR OTHER DAMAAGE THAT WOULD CAUSE WATER LEAKAGE TO THE SUBSURFACE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	INFILTRATION AREA IS FREE FROM SIGNIFICANT SEDIMENT, DEBRIS, ANIMAL INTRUSION, WEED GROWTH, OR OTHER PHYSICAL DAMAGE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH INLET SPILLWAY IS IN GOOD CONDITION	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	OVERFLOW AREA OUTLET SPILLWAY IS IN GOOD CONDITION WIT NO EVIDENCE OF RIPRAP DISPLACEMENT OR EROSION	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	STABILIZATION ROCK ON SIDE SLOPES OF DITCH AND RUN-ON DIVERSION BERM SHOWS NO SIGNS OF EROSION, SLIPPAGE, OR OTHER DAMAGE	✓		

Work Order # 535668

Page **2** of **2**

T Farm Fourth Quarter Inspection, 10-2-19

Preventive Maintenance Data Sheet
WT-106304 - TFISB

Perform work per procedure. Record data below.

Data sheet WT-106304

This data sheet has been set up to track inspections of the T Farm Interim Surface Barrier (TISB).

Equipment needed for inspection:
- Tape measure
- Camera

Take a photo of deficiencies found and include in completed work package.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
SOIL EMBANKMENT AND STABILIZATION ROCK	STABILIZATION ROCK ON SIDE SLOPES SHOWS NO SIGNS OF EROSION, SETTLEMENT SLIPPAGE, OR OTHER DAMAGE	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	STRUCTURAL INTEGRITY - WALL IS VISUALLY VERTICAL AND SHOWS NO HORIZONTAL DISPLACEMENT	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	CONCRETE BLOCKS ARE FREE OF CRACKS AND IN TIGHT CONTACT WITH ONE ANOTHER (GAPS LESS THAN 1/2 INCH) HORIZONTAL DISPLACEMENT	✓	
PRECAST CONCRETE BLOCK RETAINING WALL	GUARD RAIL IS IN GOOD CONDITION AND SECURELY FASTENED TO RETAINING WALL	✓	
VEHICLE ACCESS RAMPS AND ROADS	CRUSHED ROCK ROAD SURFACE IS FREE OF RUTS, EROSION, OR OTHER DAMAGE	✓	
POLYUREA LINER	LINER IS FREE OF EXCESSIVE ROCKS, STICKS, COMBUSTIBLE MATERIAL,	✓	
POLYUREA LINER	LINER IS IN GOOD CONDITION WITH NO EXCESSIVE WEAR, TEARS, HOLES, OR OTHER DAMAGE THAT WOULD CAUSE WATER LEAKAGE TO THE SUBSURFACE. PHOTOGRAPH ANY DEFICIENCIES AND NOTE LOCATION	✓	✓
POLYUREA LINER	LINER IS SECURELY ANCHORED AT PERIMETER WITH NO EVIDENCE OF WIND UPLIFT OR PULL OUT FROM ANCHOR TRENCH	✓	
POLYUREA LINER	SEAL BETWEEN LINER AND CONCRETE BLOCK RETAINING WALL IS INTACT WITH NO LEAKS OR OBVIOUS SIGNS OF DAMAGE THAT COULD CAUSE LEAKS	✓	

Work Order # 559667

Preventive Maintenance Data Sheet
WT-106304 - TFISB

LINER PENETRATIONS	ALL VAULT, PIPE SLEEVE, AND BOOT LINER PENETRATIONS ARE IN GOOD CONDITION AND PAINTED YELLOW FOR EASY VISIBILITY	✓		
LINER PENETRATIONS	THE LINER FORMS A CRACK-FREE SEAL AS IT TRANSITIONS FROM HORIZONTAL TO VERTICAL AROUND PENETRATIONS. SEPARATION OF THE VERTICAL PORTION OF THE LINER FROM THE PENETRATION IS ACCEPTABLE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH INLET FROM THE INTERIM SURFACE BARRIER IS FREE OF SIGNIFICANT DEBRIS AND SEDIMENT THAT WOULD RESTRICT DRAINAGE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DRAINAGE DITCH IS FREE OF SIGNIFICANT DEBRIS AND SEDIMENT	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH LINER IS IN GOOD CONDITION WITH NO EXCESSIVE WEAR, TEARS, HOLES, OR OTHER DAMAAGE THAT WOULD CAUSE WATER LEAKAGE TO THE SUBSURFACE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	INFILTRATION AREA IS FREE FROM SIGNIFICANT SEDIMENT, DEBRIS, ANIMAL INTRUSION, WEED GROWTH, OR OTHER PHYSICAL DAMAGE	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	DITCH INLET SPILLWAY IS IN GOOD CONDITION	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	OVERFLOW AREA OUTLET SPILLWAY IS IN GOOD CONDITION WIT NO EVIDENCE OF RIPRAP DISPLACEMENT OR EROSION	✓		
LINED DRAINAGE DITCH AND INFILTRATION AREA	STABILIZATION ROCK ON SIDE SLOPES OF DITCH AND RUN-ON DIVERSION BERM SHOWS NO SIGNS OF EROSION, SLIPPAGE, OR OTHER DAMAGE	✓		

Work Order # 559667

A1.2 TY- FARM INSPECTIONS

TY Farm First Quarter Inspection, 1-30-19

Preventive Maintenance Data Sheet
WT-107279 - 241-TY, Interim Surface Barrier Inspec

Perform work per instructions and record data below.

This data sheet has been set up to track inspections of the TY Farm Interim Surface Barrier (TYISB).

Equipment needed for inspection:
- Tape measure
- Camera

Take a photo of deficiencies found and include in completed work package.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
SOIL EMBANKMENT AND STABILIZATION ROCK	STABILIZATION ROCK ON SIDE SLOPES SHOWS NO SIGNS OF EROSION, SETTLEMENT SLIPPAGE, OR OTHER DAMAGE	✓	
Vehicle Access Ramps and Roads	Crushed Rock Road Surface is Free of Ruts, Erosion, or other Damage	✓	
Asphalt	Asphalt is Free of Excessive Rocks, Sticks, and Combustible Material	✓	
Asphalt	Asphalt is in Good Condition with No Cracks, Ruts, or Other Damage that Would Cause Water Leakage to the Sub-Surface. Photograph Any Deficiencies and Note Location	✓	
Asphalt Berm Around Barrier Parameter	Asphalt is in Good Condition with Cracks Which Would Allow Water to Leak Off of Barrier	✓	
Asphalt Penetrations	All Vaults, Steel Riser Sleeves and and Asphalt Penetrations are in Good Condition and Yellow paint is visible	✓	
Penetration Sealant	Black Sealant Between All Vaults, Steel Riser Sleeves and Asphalt Penetrations are Intact with No Leaks or Obvious Signs of Damage that could Cause Leaks	✓	
Storm Water Inlet Drains	Inlet Drains Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Sediment Clean Out	Inlet Drains and Vortex Separator		

Work Order # 503679 Page 1 of 2

Preventive Maintenance Data Sheet
WT-107279 - 241-TY, Interim Surface Barrier Inspec

Box - Solids Separator	Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Evapotranspiration Basin	Stabilization Rock on Side Slopes of Basin Shows No Sign of Erosion, slippage, or Other Damage	✓	
Evapotranspiration Basin	Basin is Free of Wind Blown Tumbleweeds	✓	

Work Order # 503677

Page 2 of 2

TY Farm Second Quarter Inspection, 4-22-19

Preventive Maintenance Data Sheet
WT-107279 - 241-TY, Interim Surface Barrier Inspec

Perform work per instructions and record data below.

This data sheet has been set up to track inspections of the TY Farm Interim Surface Barrier (TYISB).

Equipment needed for inspection:
- Tape measure
- Camera

Take a photo of deficiencies found and include in completed work package.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
SOIL EMBANKMENT AND STABILIZATION ROCK	STABILIZATION ROCK ON SIDE SLOPES SHOWS NO SIGNS OF EROSION, SETTLEMENT SLIPPAGE, OR OTHER DAMAGE	✓	
Vehicle Access Ramps and Roads	Crushed Rock Road Surface is Free of Ruts, Erosion, or other Damage	✓	
Asphalt	Asphalt is Free of Excessive Rocks, Sticks, and Combustible Material	✓	
Asphalt	Asphalt is in Good Condition with No Cracks, Ruts, or Other Damage that Would Cause Water Leakage to the Sub-Surface. Photograph Any Deficiencies and Note Location	✓	
Asphalt Berm Around Barrier Parameter	Asphalt is in Good Condition with Cracks Which Would Allow Water to Leak Off of Barrier	✓	
Asphalt Penetrations	All Vaults, Steel Riser Sleeves and and Asphalt Penetrations are in Good Condition and Yellow paint is visible	✓	
Penetration Sealant	Black Sealant Between All Vaults, Steel Riser Sleeves and Asphalt Penetrations are Intact with No Leaks or Obvious Signs of Damage that could Cause Leaks	✓	
Storm Water Inlet Drains	Inlet Drains Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Sediment Clean Out	Inlet Drains and Vortex Separator	✓	

Work Order # 515952

Page 1 of 2

Preventive Maintenance Data Sheet
WT-107279 - 241-TY, Interim Surface Barrier Inspec

Box - Solids Separator	Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Evapotranspiration Basin	Stabilization Rock on Side Slopes of Basin Shows No Sign of Erosion, slippage, or Other Damage	✓	
Evapotranspiration Basin	Basin is Free of Wind Blown Tumbleweeds	✓	

Work Order # 519950

Page 2 of 2

TY Farm Third Quarter Inspection, 7-18-19

Preventive Maintenance Data Sheet
WT-107279 - 241-TY, Interim Surface Barrier Inspec

Perform work per instructions and record data below.

This data sheet has been set up to track inspections of the TY Farm Interim Surface Barrier (TYISB).

Equipment needed for inspection:
- Tape measure
- Camera

Take a photo of deficiencies found and include in completed work package.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
SOIL EMBANKMENT AND STABILIZATION ROCK	STABILIZATION ROCK ON SIDE SLOPES SHOWS NO SIGNS OF EROSION, SETTLEMENT SLIPPAGE, OR OTHER DAMAGE	✓	
Vehicle Access Ramps and Roads	Crushed Rock Road Surface is Free of Ruts, Erosion, or other Damage	✓	
Asphalt	Asphalt is Free of Excessive Rocks, Sticks, and Combustible Material	✓	
Asphalt	Asphalt is in Good Condition with No Cracks, Ruts, or Other Damage that Would Cause Water Leakage to the Sub-Surface. Photograph Any Deficiencies and Note Location	✓	
Asphalt Berm Around Barrier Parameter	Asphalt is in Good Condition with Cracks Which Would Allow Water to Leak Off of Barrier	✓	
Asphalt Penetrations	All Vaults, Steel Riser Sleeves and and Asphalt Penetrations are in Good Condition and Yellow paint is visible	✓	
Penetration Sealant	Black Sealant Between All Vaults, Steel Riser Sleeves and Asphalt Penetrations are Intact with No Leaks or Obvious Signs of Damage that could Cause Leaks	✓	
Storm Water Inlet Drains	Inlet Drains Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Sediment Clean Out	Inlet Drains and Vortex Separator	✓	

Work Order # 535667

Page 1 of 2

Preventive Maintenance Data Sheet
WT-107279 - 241-TY, Interim Surface Barrier Inspec

Box - Solids Separator	Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Evapotranspiration Basin	Stabilization Rock on Side Slopes of Basin Shows No Sign of Erosion, slippage, or Other Damage	✓	
Evapotranspiration Basin	Basin is Free of Wind Blown Tumbleweeds	✓	

Work Order # 535667

Page 2 of 2

TY Farm Fourth Quarter Inspection, 10-2-19

Preventive Maintenance Data Sheet
WT-107279 - 241-TY, Interim Surface Barrier Inspec

Perform work per instructions and record data below.

This data sheet has been set up to track inspections of the TY Farm Interim Surface Barrier (TYISB).

Equipment needed for inspection:
- Tape measure
- Camera

Take a photo of deficiencies found and include in completed work package.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
SOIL EMBANKMENT AND STABILIZATION ROCK	STABILIZATION ROCK ON SIDE SLOPES SHOWS NO SIGNS OF EROSION, SETTLEMENT SLIPPAGE, OR OTHER DAMAGE	✓	
Vehicle Access Ramps and Roads	Crushed Rock Road Surface is Free of Ruts, Erosion, or other Damage	✓	
Asphalt	Asphalt is Free of Excessive Rocks, Sticks, and Combustible Material	✓	
Asphalt	Asphalt is in Good Condition with No Cracks, Ruts, or Other Damage that Would Cause Water Leakage to the Sub-Surface. Photograph Any Deficiencies and Note Location	✓	
Asphalt Berm Around Barrier Parameter	Asphalt is in Good Condition with Cracks Which Would Allow Water to Leak Off of Barrier	✓	
Asphalt Penetrations	All Vaults, Steel Riser Sleeves and and Asphalt Penetrations are in Good Condition and Yellow paint is visible	✓	
Penetration Sealant	Black Sealant Between All Vaults, Steel Riser Sleeves and Asphalt Penetrations are Intact with No Leaks or Obvious Signs of Damage that could Cause Leaks	✓	
Storm Water Inlet Drains	Inlet Drains Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Sediment Clean Out	Inlet Drains and Vortex Separator	✓	

Work Order # 559664

Page 1 of 2

Preventive Maintenance Data Sheet
WT-107279 - 241-TY, Interim Surface Barrier Inspec

Box - Solids Separator	Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Evapotranspiration Basin	Stabilization Rock on Side Slopes of Basin Shows No Sign of Erosion, slippage, or Other Damage	✓	
Evapotranspiration Basin	Basin is Free of Wind Blown Tumbleweeds	✓	

Work Order # 559664

Page 2 of 2

A1.3 SX FARM QUARTERLY INSPECTIONS

SX Farm Third Quarter Inspection, 08-22-19

Preventive Maintenance Data Sheet
WT-202894 for 241-SX, Interim Surface Barrier Inspection

Perform visual inspection and record data below.

Note - This data sheet has been set up to track inspections of the SX Farm Interim Surface Barrier (SXISB. Tape measure and camera may be used to perform inspection.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
Soil Embankment and Stabilization Rock	Stabilization Rock/Soil on Side Slopes Shows No Signs of Erosion, Settlement Slippage, or Other Damage	✓	
Vehicle Access Ramps and Roads	Crushed Rock Road Surface is Free of Ruts, Erosion, or other Damage	✓	
Asphalt	Asphalt is Free of Excessive Rocks, Sticks, and Combustible Material	✓	
Asphalt	Asphalt is in Good Condition with No Cracks, Ruts, or Other Damage that Would Cause Water Leakage to the Sub-Surface. Photograph Any Deficiencies and Note Location	✓	
Asphalt Berm Around Barrier Parameter	Asphalt is in Good Condition with No Cracks Which Would Allow Water to Leak Off of Barrier	✓	
Asphalt Penetrations	All Vaults, Corrugated Metal Piping, and Asphalt Penetrations are in Good Condition and Yellow Paint is Visible	✓	
Penetration Sealant	Black Sealant Between All Vaults, Steel Riser Sleeves and Asphalt Penetrations are Intact with No Leaks or Obvious Signs of Damage that Could Cause Leaks	✓	
Storm Water Inlet Drains	Inlet Drains Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	

Work Order # 584500

Page 1 of 2

Preventive Maintenance Data Sheet
WT-202894 for 241-SX, Interim Surface Barrier Inspection

Sediment Clean Out Box - Solids Separator	Inlet Drains and Separator Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	
Evapotranspiration Basin	Stabilization Rock on Side Slopes of Basin Shows No Sign of Erosion, Slippage, or Other Damage	✓	
Evapotranspiration Basin	Basin is Free of Wind Blown Tumbleweeds	✓	

Comments: N/A

Work Order # 584500

SX Farm Fourth Quarter Inspection, 10-28-19

Preventive Maintenance Data Sheet
WT-202894 for 241-SX, Interim Surface Barrier Inspection

Perform visual inspection and record data below.

Note - This data sheet has been set up to track inspections of the SX Farm Interim Surface Barrier (SXISB. Tape measure and camera may be used to perform inspection.

ITEM	INSPECTION CRITERIA	MEETS CRITERIA	DOES NOT MEET CRITERIA
Soil Embankment and Stabilization Rock	Stabilization Rock/Soil on Side Slopes Shows No Signs of Erosion, Settlement Slippage, or Other Damage	✓	
Vehicle Access Ramps and Roads	Crushed Rock Road Surface is Free of Ruts, Erosion, or other Damage	✓	
Asphalt	Asphalt is Free of Excessive Rocks, Sticks, and Combustible Material	✓	
Asphalt	Asphalt is in Good Condition with No Cracks, Ruts, or Other Damage that Would Cause Water Leakage to the Sub-Surface. Photograph Any Deficiencies and Note Location	✓	
Asphalt Berm Around Barrier Parameter	Asphalt is in Good Condition with No Cracks Which Would Allow Water to Leak Off of Barrier	✓	
Asphalt Penetrations	All Vaults, Corrugated Metal Piping, and Asphalt Penetrations are in Good Condition and Yellow Paint is Visible	✓	
Penetration Sealant	Black Sealant Between All Vaults, Steel Riser Sleeves and Asphalt Penetrations are Intact with No Leaks or Obvious Signs of Damage that Could Cause Leaks	✓	
Storm Water Inlet Drains	Inlet Drains Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓	

Work Order [redacted] 94921

Page 1 of 2

Preventive Maintenance Data Sheet
WT-202894 for 241-SX, Interim Surface Barrier Inspection

Sediment Clean Out Box - Solids Separator	Inlet Drains and Separator Are Free of Significant Debris and Sediment that Would Restrict Drainage	✓		
Evapotranspiration Basin	Stabilization Rock on Side Slopes of Basin Shows No Sign of Erosion, Slippage, or Other Damage			✓
Evapotranspiration Basin	Basin is Free of Wind Blown Tumbleweeds	✓		

Comments: N/A

Work Order [redacted]9421

A2.0 INTERIM MEASURES MONITORING

A2.1 INTERIM MAINTENANCE AND MONITORING PROGRAM

Management Observation

WRPS-MOP-2019-0932

Status: Finalized 4/9/19 11:11:55 AM PDT Run: 4/11/19 9:55:13 AM PDT

ASSESSMENT INFORMATION

Originator: Cooley, Jerralee A H4680576

Acting For 1: Bowers, Holly M H0002000

Organization 1: Regulatory Interface

Acting For 2: Cooley, Jerralee A H4680576

Organization 2: ENV Prog Reprtg & Tech Support

Date of Visit/Observation

03/28/2019

Location/Job Number/Work Order Number

SST Farms 200E and 200W

Organization(s) Reviewed

ESH&Q,Production Operations

Topic/Description/Keyword(s)

Annual Calendar Year 2019 Interim Measures Maintenance Plan (IMMP) Assessment per TFC-PLN-14, Waste Information Data System Surveillance and Maintenance Description. This MOP addresses the EMS Core Elements Operations/Operational Planning and Control, Performance Evaluation/Evaluation of Compliance, Improvement/General.

Summary of Results or Observations (List error precursors/error likely situations observed, latent weaknesses discovered)

This MOP documents performance of a visual inspection as required and in accordance with TFC-PLN-14, Section 5.2. The IMMP requires supplemental visual inspections as deemed necessary, typically to be performed immediately following a significant rainfall or snow melt event. the IMMP requires the Tank Farm Environmental Organization to perform a visual inspection of the water control system identified in the "IMMP Drawings" listed below against the specific "IMMP Inspection criteria" also identified below.

The IMMP requires the Tank Farm Environmental organization to perform visual inspections of the water control systems identified in the "IMMP Drawings" listed below against the specific "IMMP Inspection Criteria" also identified below.

IMMP Drawings:

1. WMA A-AX
- Engineering Drawing H-2-830624, Rev. 0, Sheets 1-3, Specifications
- Engineering Drawing H-2-830625, Rev. 0, Sheets 1-3

2. WMA B-BX-BY
- Engineering Drawing H-2-830624, Rev. 0, Sheets 1-3, Specifications
- Engineering Drawing H-2-830626, Rev. 0, Sheets 1-6

3. WMA C
- Engineering Drawing H-2-830624, Rev. 0, Sheets 1-3, Specifications
- Engineering Drawing H-2-830627, Rev. 0, Sheets 1-3

4. WMA S-SX
- Engineering Drawing H-830434, Rev. 2, Sheet 1
- Engineering Drawing H-830435, Rev. 1, Sheet 1
- Engineering Drawing H-830436, Rev. 1, Sheet 1

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Approved for Public Release;
Further Dissemination Unlimited

- Engineering Drawing H-830437, Rev. 1, Sheets 1-5
5. WMAs T, TX-TY
- Engineering Drawing H-830428, Rev. 1, Sheet 1
- Engineering Drawing H-830429, Rev. 1, Sheet 1
- Engineering Drawing H-830430, Rev. 1, Sheet 1
- Engineering Drawing H-830431, Rev. 1, Sheet 1
- Engineering Drawing H-830432, Rev. 1, Sheet 1
- Engineering Drawing H-830433, Rev. 1, Sheet 1
6. WMA U
- Engineering Drawing H-830267, Rev. 2, Sheets 1-6, and Rev. 1, Sheet 7

IMMP Set "Inspection Criteria" - The berms, run off collection areas and culverts were inspected to:

1. Confirm their ability to divert water runoff without failure.
2. Verify that there are no obvious voids, animal burrows, or low spots.
3. Confirm of adequate rock/gravel surface rather than dirt;
4. Verify culverts are free of large cracks, washouts, missing sections, and to ensure pipe lap joints are not obviously inadequate [bent or torn lap seams]
5. Confirm that discharge areas are not filled in with sand, nor has substantial erosion.

Summary of inspection results:

One new Finding was identified during the inspection that requires corrective action in accordance with the IMMP and requires an update to the B Farm drawing H-2-830626 Sheet 3 Rev 0, to remove the rip-rap and add the pump and treat line.

General observation's and area's for potential improvement to prevent future findings or corrective actions requirement(s) from being triggered are:

A Farm: rip-rap (corner of A Farm on Buffalo St.) was present, but appeared diminished in size compared to the required specification and partially buried in sand. Recommend Engineering assess location and size against required specifications and verify size and location. As needed, either revise the drawing if existing specification is no longer adequate, or rebuild/add additional rip-rap if deemed necessary; see drawing H-2-830625 Sheet 1 Rev 0.

242-A: culvert at base of parking lot by the TEDF manhole was full of water; water sounded like it was potentially leaking in to the nearby manhole marked as a confined space. Operations should investigate the adjacent manhole to verify integrity and check for potential water intrusion issues.

B Farm: West side of Baltimore and 12th intersection - culvert and drain were working as intended, however were partially full of vegetation, tumbleweeds, and silt. Culvert and rip-rap should be cleaned out and repaired if needed in order to restore full drainage capacity.

T Farm: Culvert that crosses 23rd Street is 50% blocked with tumbleweeds fragments and blow sand; rip-rap inside PFP, RBA boundary is more than 50% silted in and requires cleaning and repair to ensure continuing, adequate drainage capacity. Culvert leading into the Evaporation Basin has a partially blocked opening into the basin, needs silt and tumbleweeds removed.

C Farm: Clean debris and silt from rip-rap/culvert located at the Corner of Buffalo and 7th.

Peer Checking (Did you observe workers actively monitoring each other, and coaching each other when necessary, to improve performance or avoid at-risk behaviors?)

No

Good Practices Observed/Recognized

Not Applicable

Feedback or Mentoring Provided

Not Applicable

Worker Feedback (Questions, Concerns, and Issues Raised by Employees)

Not Applicable

List of Procedures, Requirements, and Criteria Used in this assessment

TFC-PLN-14
WRPS-0900388, Rev. 2, IMMP
WRPS-MOP-2018-2380
WRPS-MOP-2017-0832
WRPS-MOP-2016-2530
WRPS-MOP-2015-2686
WRPS-MOP-2014-2897
WRPS-MOP-2013-3017
WRPS-MOP-2012-2977
WRPS-MOP-2011-2441

Records (List records reviewed and any problems identified)

WMA A-AX
- Engineering Drawing H-2-830624, Rev. 0, Sheets 1-3, Specifications
- Engineering Drawing H-2-830625, Rev. 0, Sheets 1-3

WMA B-BX-BY
- Engineering Drawing H-2-830624, Rev. 0, Sheets 1-3, Specifications
- Engineering Drawing H-2-830626, Rev. 0, Sheets 1-6

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WMA U
- Engineering Drawing H-830267, Rev. 2, Sheets 1-6, and Rev. 1, Sheet 7

Method(s) of Assessment

Document Review,Observation

Conduct of Operations Field Activities

No

Subcontractor Oversight

No

Lessons Learned

No

Actions Performed/Will Be Performed to Resolve Concerns/Issues

Corrective actions are launched via the PER system and linked to this MOP to resolve the identified issues and further evaluate the suggested opportunities for improvement.

ISMS Core Function(s)

Provide Feedback And Continuous Improvement

HPI Tool(s) Observed:

NA

PER No.

WRPS-PER-2019-0672

WRPS-PER-2019-0688

Document Name	Owner	Attached Date
2019 IMMP Inspection	Cooley, Jerralee A	04/09/2019

ANNUAL ENVIRONMENTAL INTERIM MEASURES MAINTENANCE PLAN (IMMP) INSPECTION

IMMP Inspection Criteria:

The berms, run off collection areas and culverts will be inspected to;

1. Confirm their ability to divert water runoff without failure.
2. Verify that there are no obvious voids, animal burrows, or low spots.
3. Confirm of adequate rock/gravel surface rather than dirt;
4. Verify culverts are free of large cracks, washouts, missing sections, and to ensure pipe lap joints are not obviously inadequate *(bent or torn lap seams)*.
5. Confirm that discharge areas are not filled in with sand, nor has substantial erosion

Inspection Date: 03/28/2019

Inspection Start Time *(Military Hours, Pacific Standard Time)*: 1300, PST

Inspection End Time *(Military Hours, Pacific Standard Time)*: 1545, PST

PER's Associated with Issues Requiring Corrective Action: WRPS-PER-2019-0672

Location	Finding/Issues Requiring Corrective Action *(date and nature of any spills, discharges, repairs, or remediation)*
WMA A-AX	No Findings
WMA B-BX-BY	Update B Farm drawing H-2-830626 Sheet 3 Rev 0, removing rip-rap and adding the pump and treat line.
WMA C	No Findings
WMA S-SX	No Findings
WMA T-TX-TY	Unable to inspect TY and TX Farms due to PFP road closure
WMA U	Unable to inspect U Farm due to PFP road closure

Any General Observations/Opportunities for Improvement:

A Farm: rip-rap (corner of A Farm on Buffalo St.) was present, but appeared diminished in size compared to the required specification and partially buried in sand. Recommend Engineering assess location and size against required specifications and verify size and location. As needed, either revise the drawing if existing specification is no longer adequate, or rebuild/add additional rip-rap if deemed necessary; see drawing H-2-830625 Sheet 1 Rev 0.
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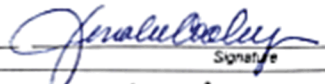
A-6007-352 (REV 0)

ANNUAL ENVIRONMENTAL INTERIM MEASURES MAINTENANCE PLAN (IMMP) INSPECTION
(Continued)

Any General Observations/Opportunities for Improvement:

C Farm: Clean debris and silt from rip-rap/culvert located at the Corner of Buffalo and 7th.

Signatures

Inspector:		
Jerralee Cooley *Print First and Last Name*	 *Signature*	03/28/2019 *Date*
Inspector:		
Holly Bowers *Print First and Last Name*	 *Signature*	03/28/2019 *Date*

A-6007-352 (REV 0)