

Saltstone Disposal Facility
Saltstone Disposal Unit (SDU) Thermocouple Data

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Prepared by: Savannah River Remediation LLC
Waste Disposal Authority
Aiken, SC 29808



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1.0 PURPOSE

The purpose of this document is to provide a summary of thermocouple temperature data recorded for Saltstone Disposal Units (SDU) 4 (Cells D, E, F, J, K, and L), 2A, 2B, 5A, and 5B through December 2017. This information is an update to data provided to the U. S. Nuclear Regulatory Commission (NRC) in response to an Action Item from the December 6, 2012, NRC monitoring visit. [SRR-CWDA-2013-00012]

2.0 THERMOCOUPLE DATA

Data presented in this report was obtained from the Process Information (PI) system installed in the Saltstone Production Facility (SPF) control room. The PI system captures relevant data associated with processing of material through the production facility as well as the disposal facilities. This report documents the thermocouple data obtained from SDU 4 and SDU Cells 2A, 2B, 5A, and 5B. Data used to prepare the charts has been corrected for obvious abnormal signal data (i.e., “I/O Timeout” or “-10” default) due to various failure mechanisms, such as system outages or default readings. Abnormal data has been removed and will appear as gaps in the data plots.

3.0 DATA PRESENTATION

Thermocouple data obtained from the PI system is presented graphically. The data tables used to produce these depictions were generated from PI system data.

Since SDU 4 and SDU Cells 2A, 2B, 5A, and 5B are physically different designs, a representative sketch of the thermocouple locations is presented for each cell design. After the sketch, a plot of cell thermocouple data and approximate saltstone fill height versus time is provided. Any data qualifiers for each data set are provided as notes below the applicable figure.

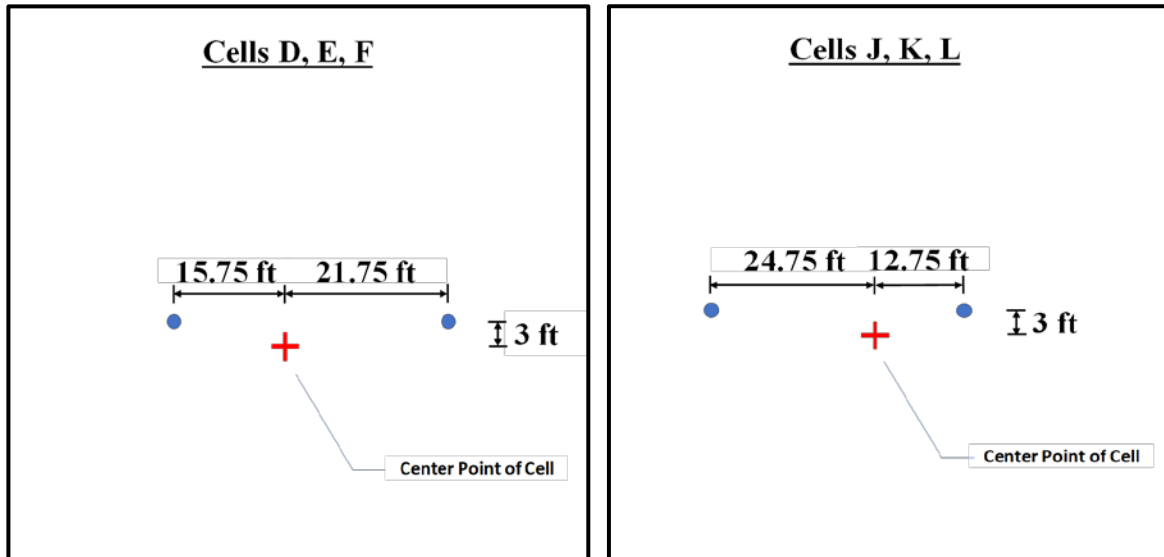
Figure 3-1 depicts thermocouple locations for the SDU 4 Cells. Figures 3-2 through 3-9 contain thermocouple data plots for SDU 4. The figures for SDU 4 contain data from thermocouple Trains “A” and “B” in each cell located as depicted in Figure 3-1. In SDU 4, these trains are generally more reliable than Train “C” over longer time periods. Data plots that contain a single thermocouple height represent the maximum temperature recorded in the original thermocouple data document. The data for Cells F and K include three different heights representative of the entire cells’ temperature performance over time.

Figure 3-10 depicts thermocouple locations for SDU Cells 2A, 2B, 5A, and 5B. Figures 3-11 through 3-19 contain thermocouple data plots from trains “A,” “B,” and “C” at representative depths (i.e., 2.5 feet, 10.5 feet, and 15.5 feet). In addition, Figure 3-17 depicts thermocouple data for all depths recorded from the SDU Cell 2B, Train C.

Each temperature plot contains a black line indicating the approximate grout level, taken from the right vertical axis, as a function of time. Caution should be used when assessing the accuracy of this approximation; the fill height data is visually determined by observing a marked gauge via Closed Circuit Television instead of taken from a calibrated field device. The recorded value is

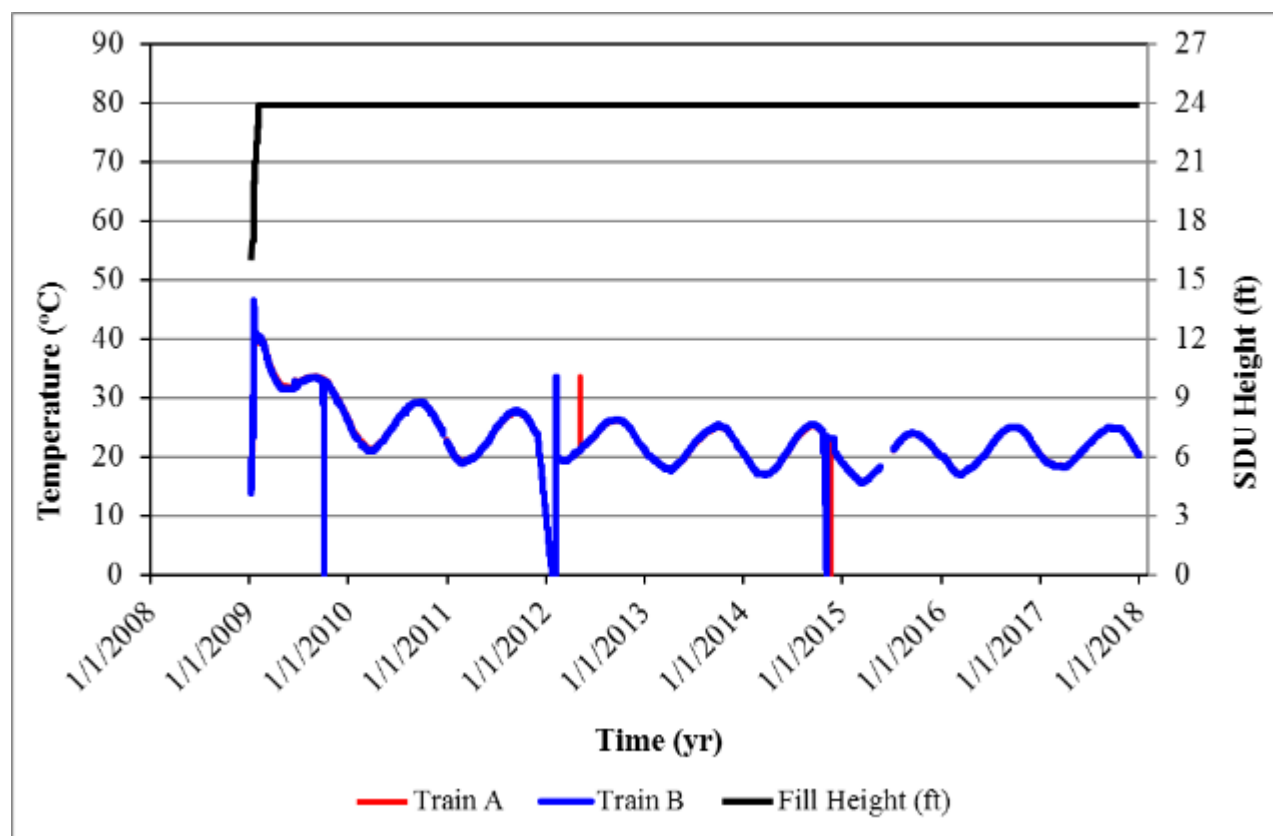
rounded for conservatism by the facility. The amount of uncertainty in this value is partly dependent on the level of grout.

Figure 3-1: SDU 4 Individual Cell Thermocouple Location Sketch



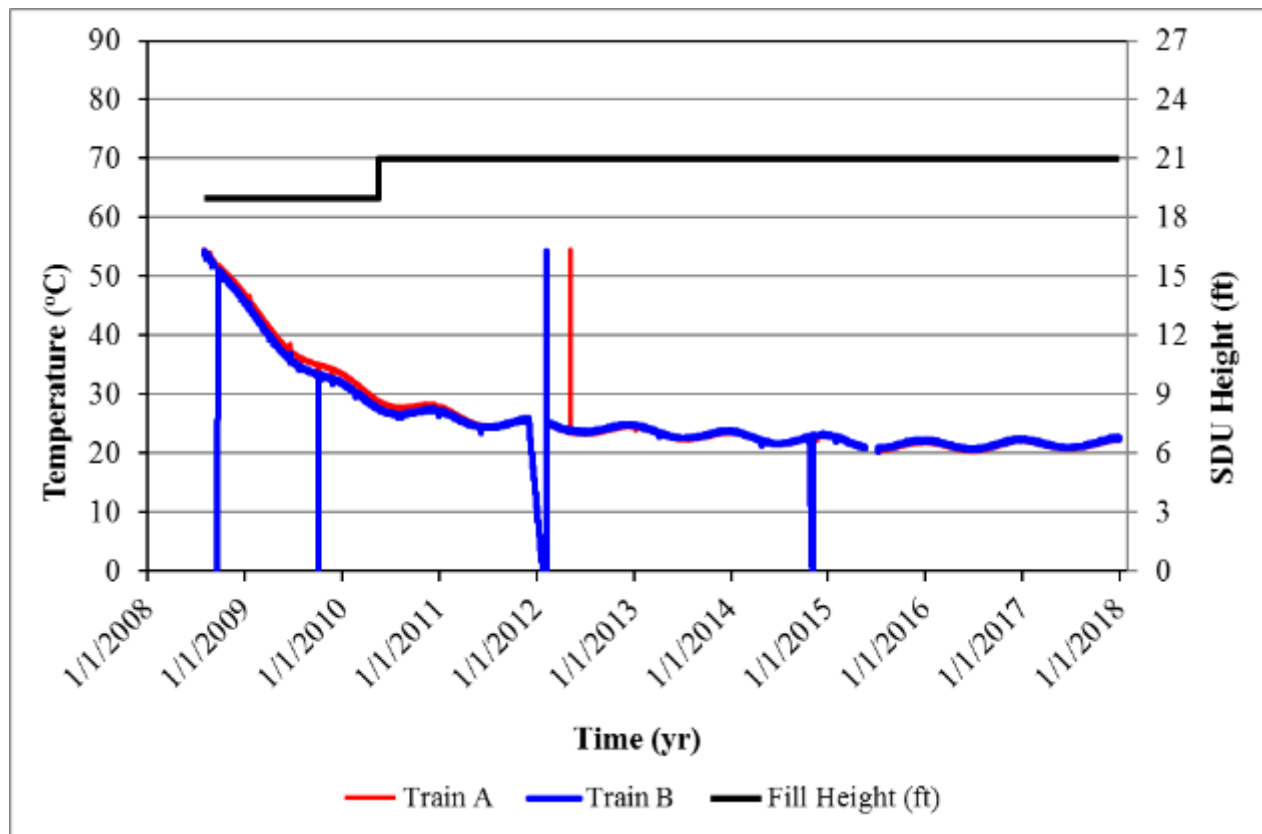
Note: Thermocouples located every foot vertically up to 27 feet off the cell floor for Trains A and B.

Figure 3-2: SDU 4 Cell D Profiles, 19' Elevation



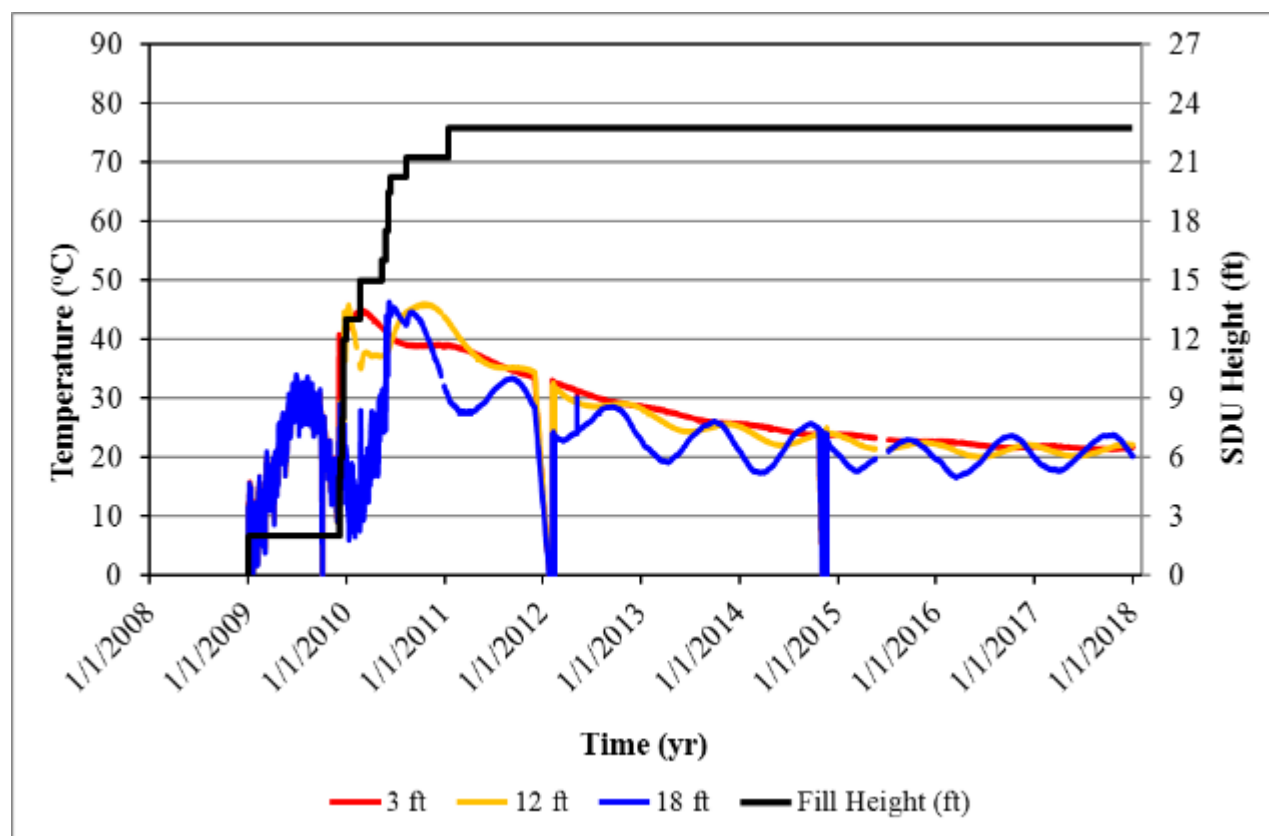
Note: Outage periods represented by downward spikes are included.

Figure 3-3: SDU 4 Cell E Profiles, 9' Elevation



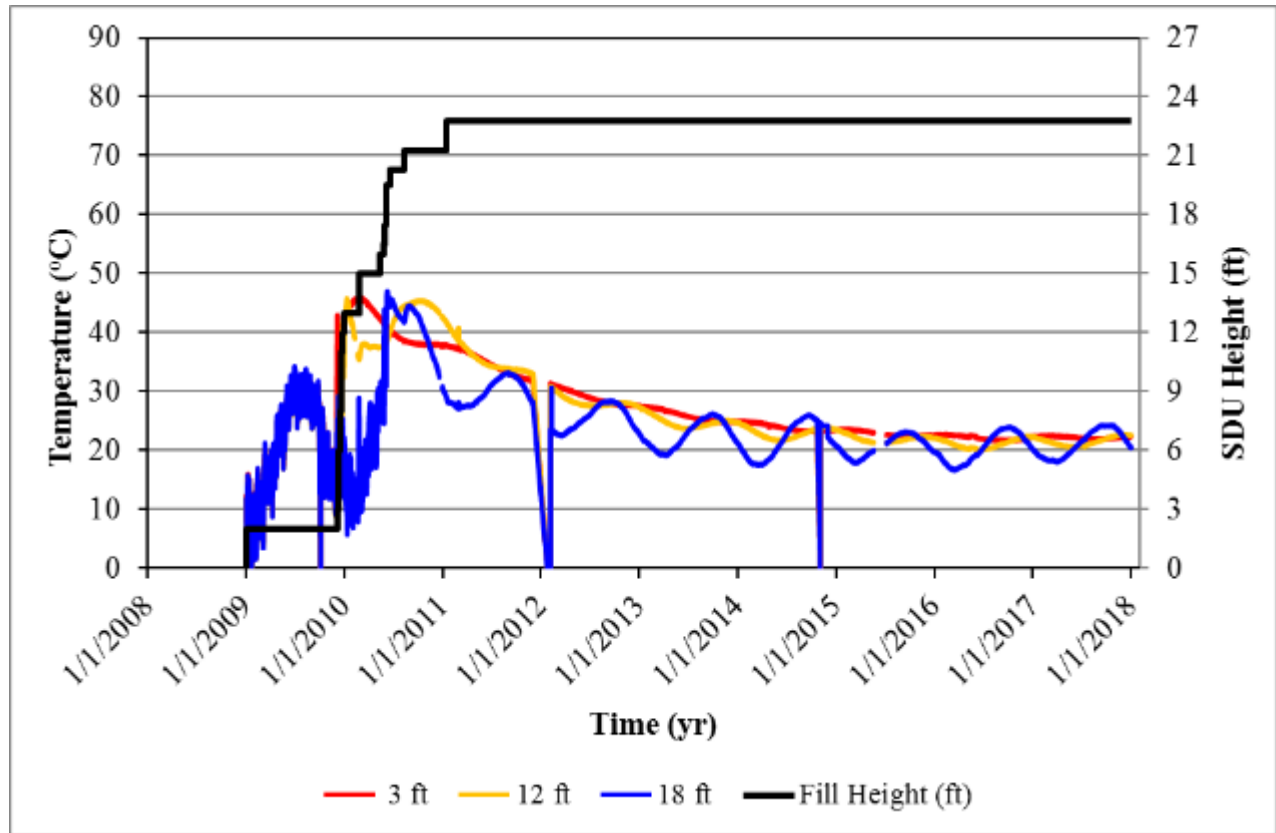
Note: Outage periods represented by downward spikes are included. Monitoring of this cell was not available prior to pouring to approximately 19'.

Figure 3-4: SDU 4 Cell F, Train A Profiles



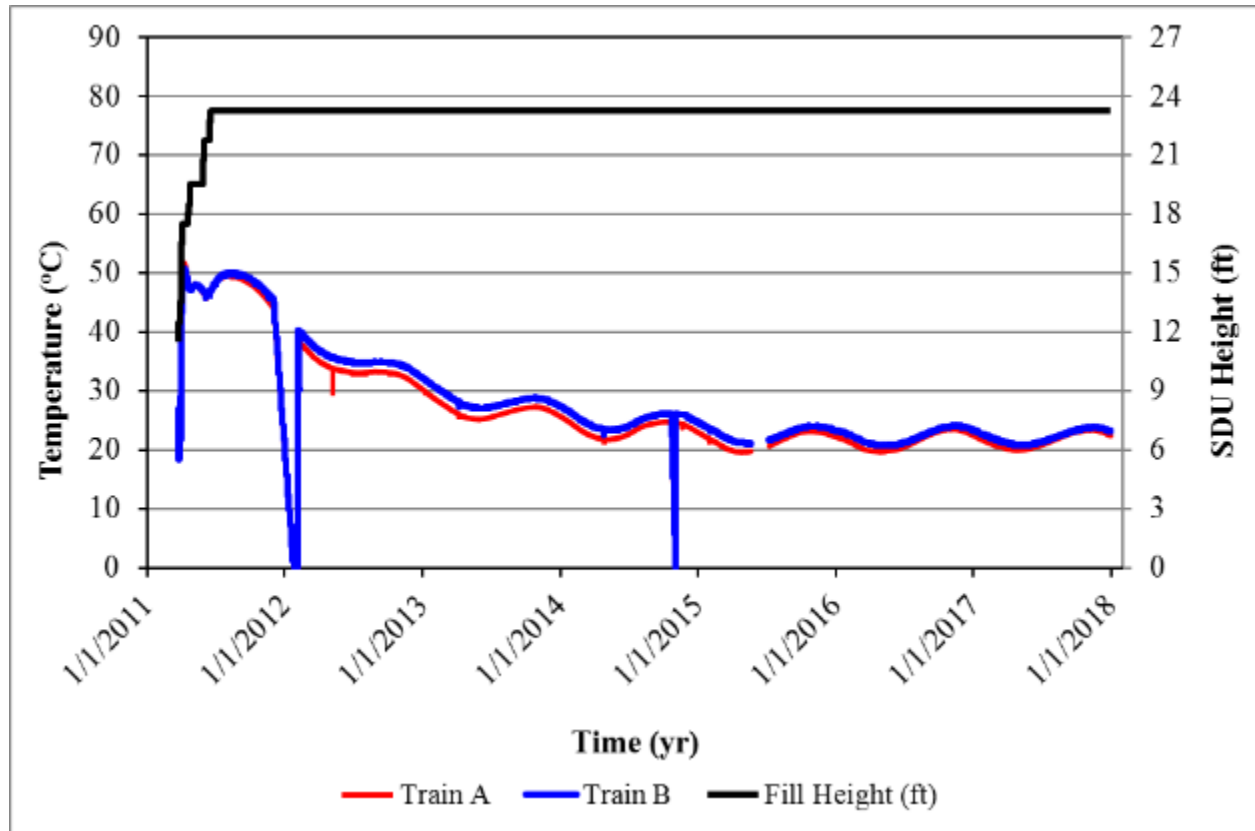
Note: Outage periods represented by downward spikes are included.

Figure 3-5: SDU 4 Cell F, Train B Profiles



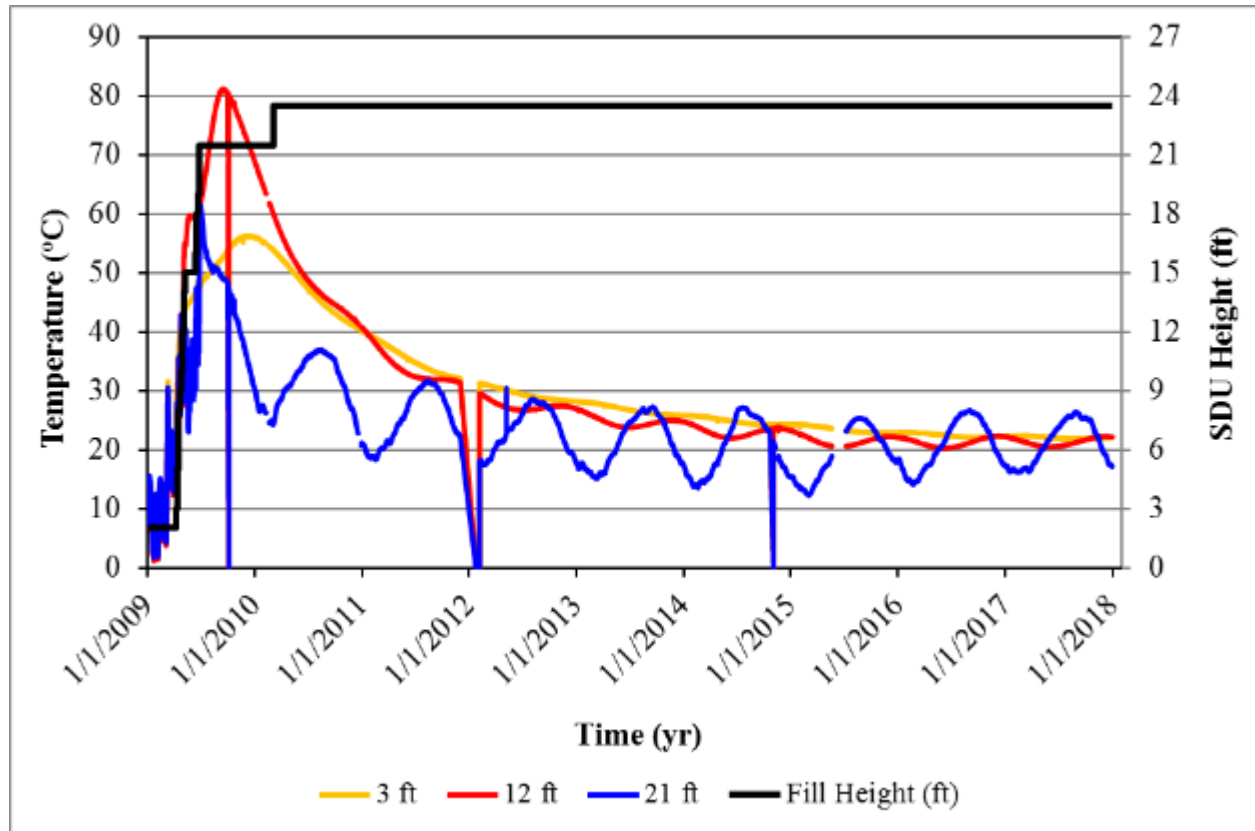
Note: Outage periods represented by downward spikes are included.

Figure 3-6: SDU 4 Cell J Profiles, 15' Elevation



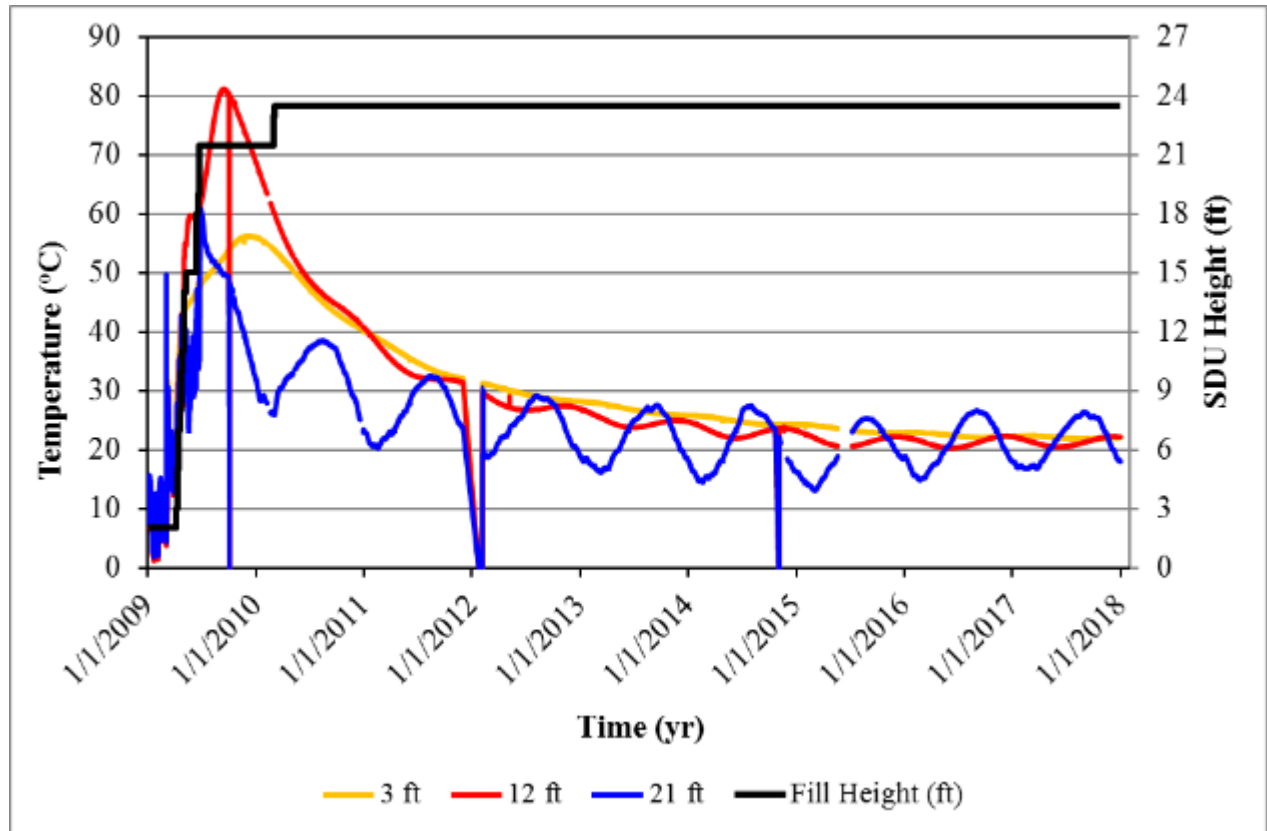
Note: Outage periods represented by downward spikes are included.

Figure 3-7: SDU 4 Cell K, Train A Profiles



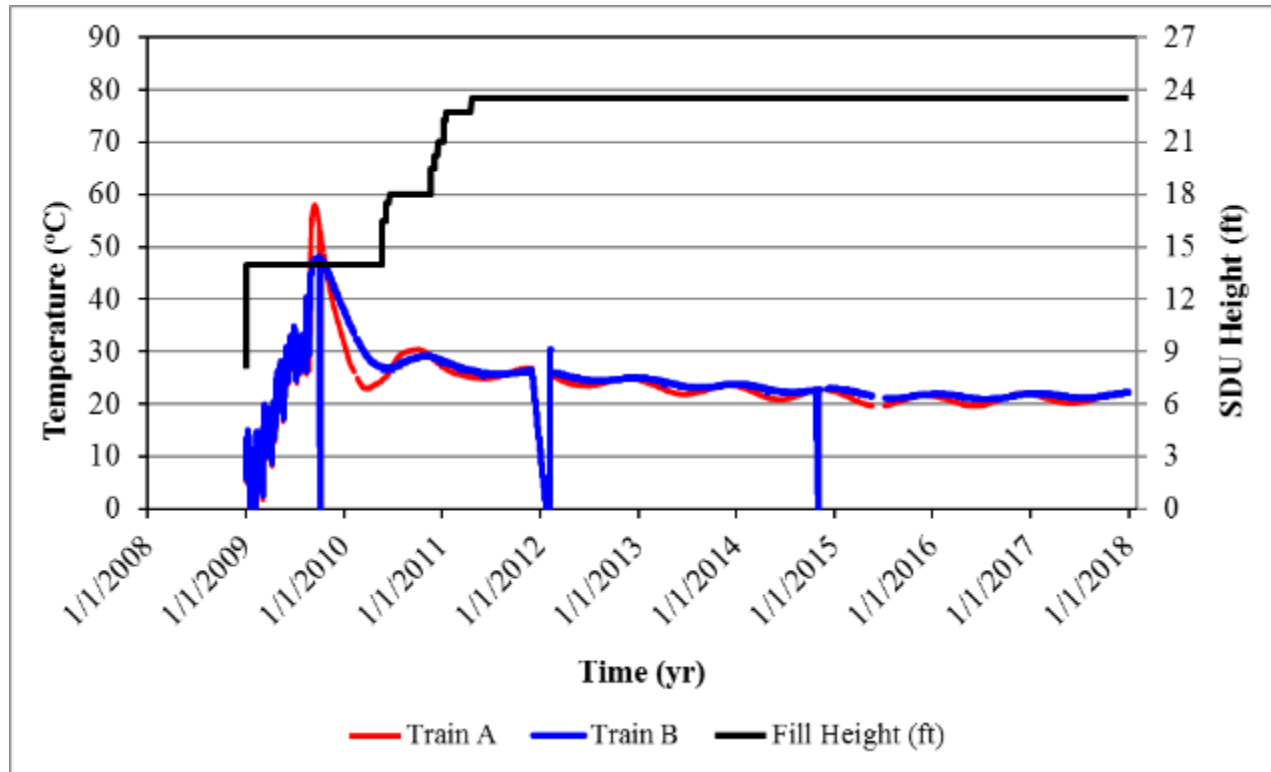
Note: Outage periods represented by downward spikes are included.

Figure 3-8: SDU 4 Cell K, Train B Profiles



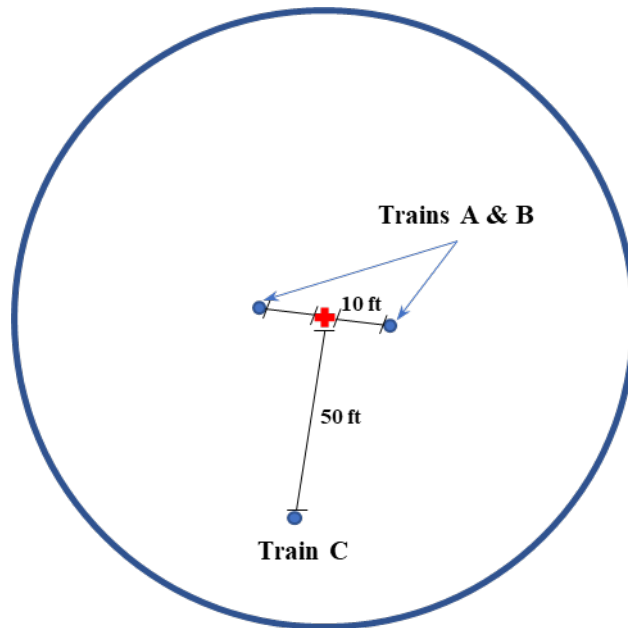
Note: Outage periods represented by downward spikes are included.

Figure 3-9: SDU 4 Cell L Profiles, 12' Elevation



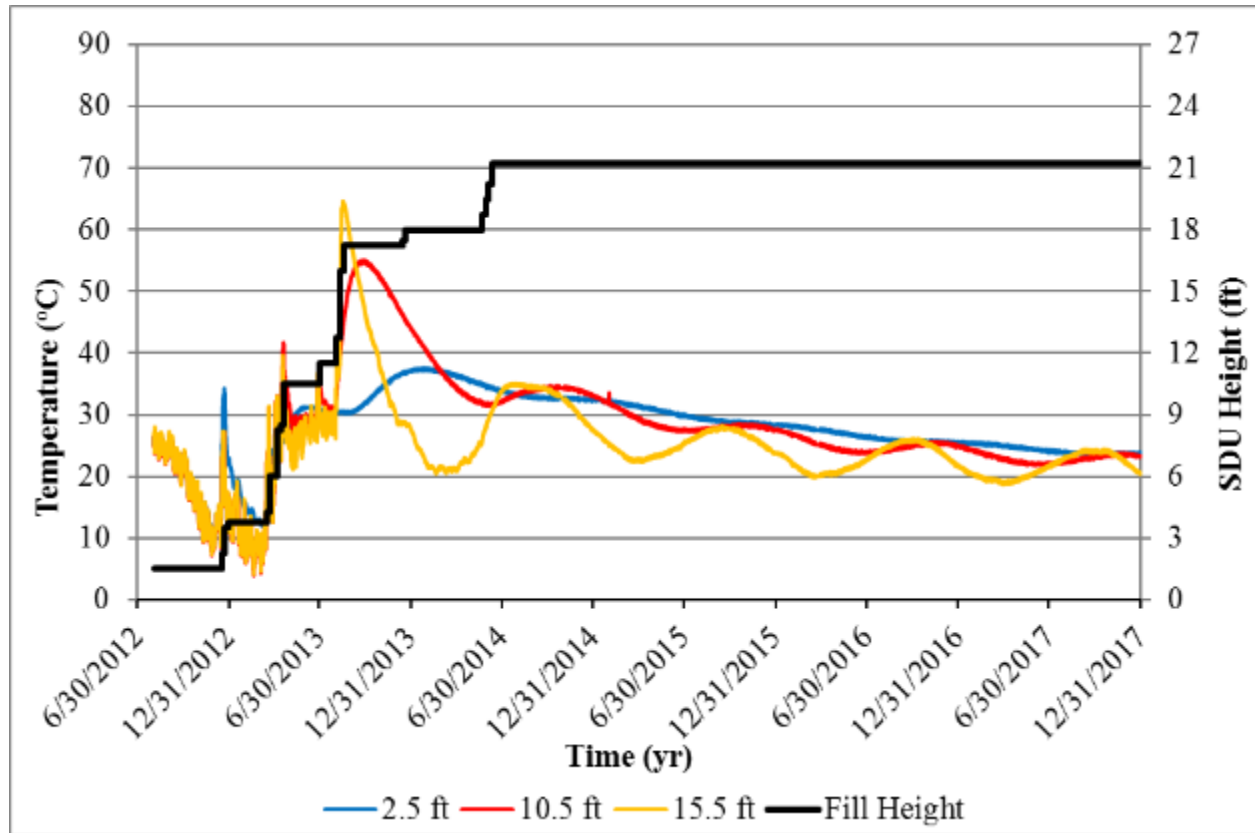
Note: Outage periods represented by downward spikes are included.

Figure 3-10: SDUs 2 and 5 Individual Cell Thermocouple Location Sketch



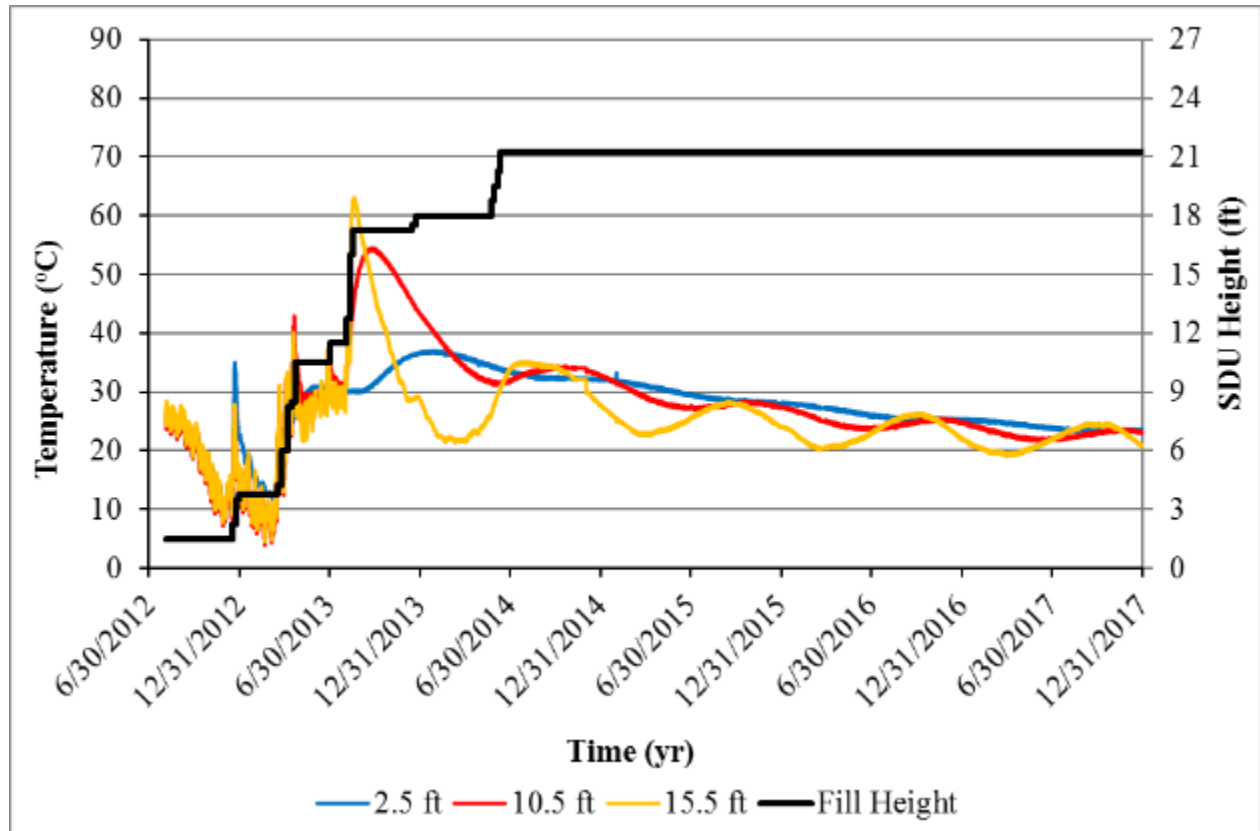
Note: Thermocouples located every foot vertically from 0.5' to 23.5' off cell floor for Trains A and B, and 0.5' to 22.5' off cell floor for Train C. For SDU 5, only Train C is in use.

Figure 3-11: SDU Cell 2A Profiles, Train A



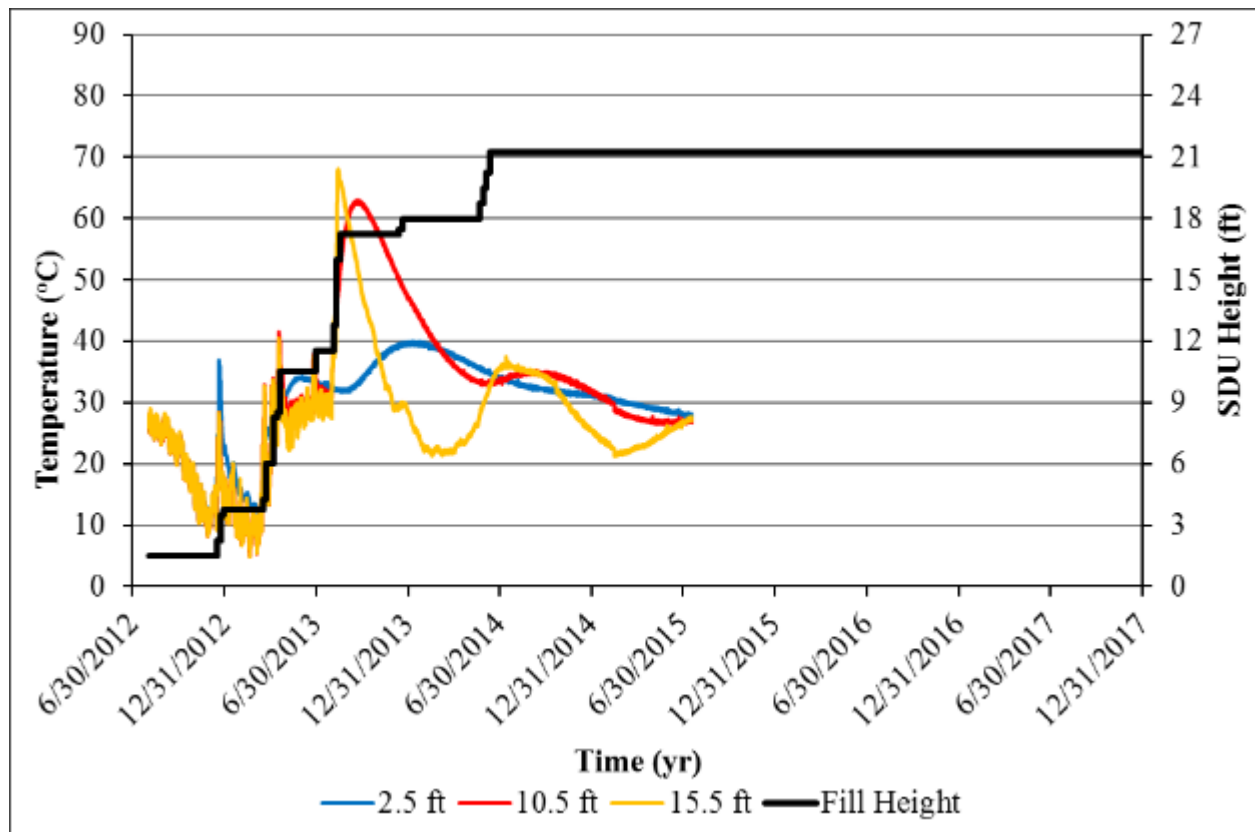
Note: SDU Cell 2A contains saltstone to a 21.25' elevation.

Figure 3-12: SDU Cell 2A Profiles, Train B



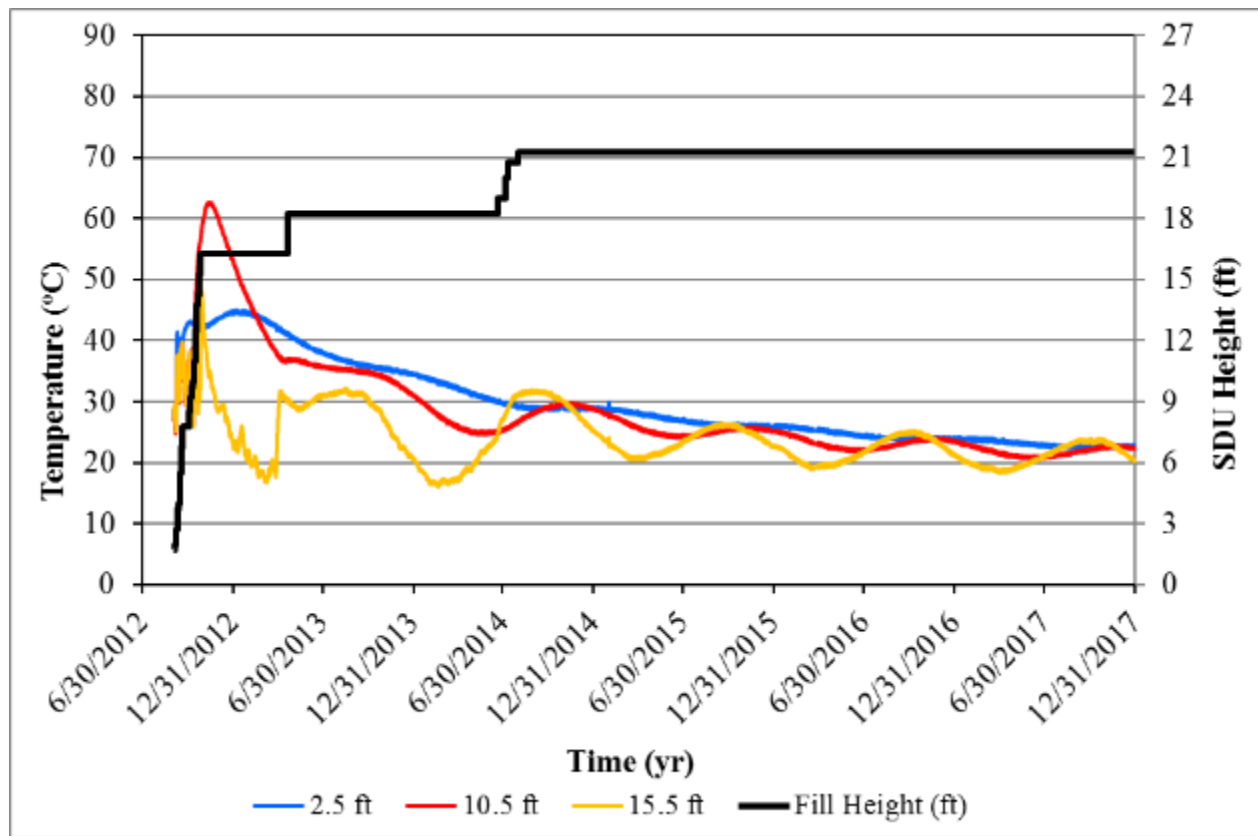
Note: SDU Cell 2A contains saltstone to a 21.25' elevation.

Figure 3-13: SDU Cell 2A Profiles, Train C



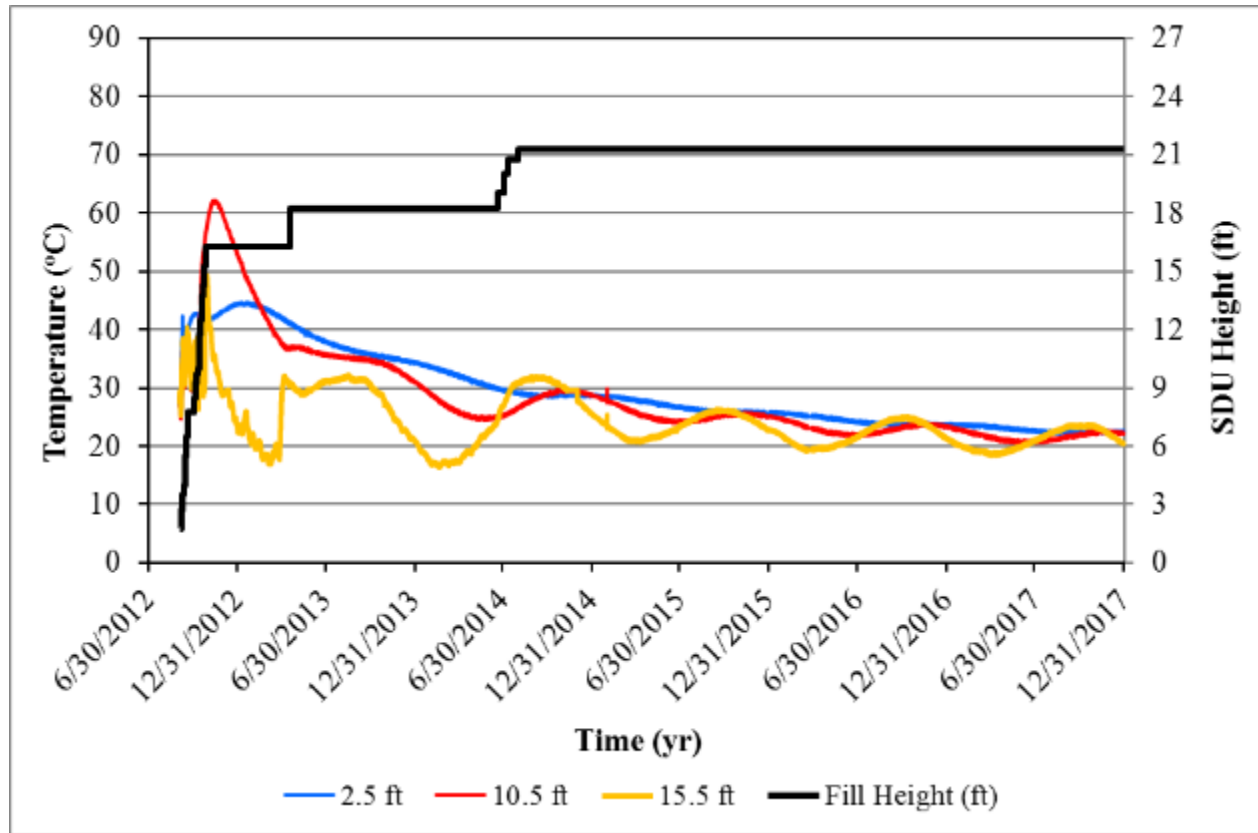
Note: SDU Cell 2A contains saltstone to a 21.25' elevation. SDU Cell 2A thermocouple Train C failed in 2015 and did not return to service. Trains A and B continued to function.

Figure 3-14: SDU Cell 2B Profiles, Train A



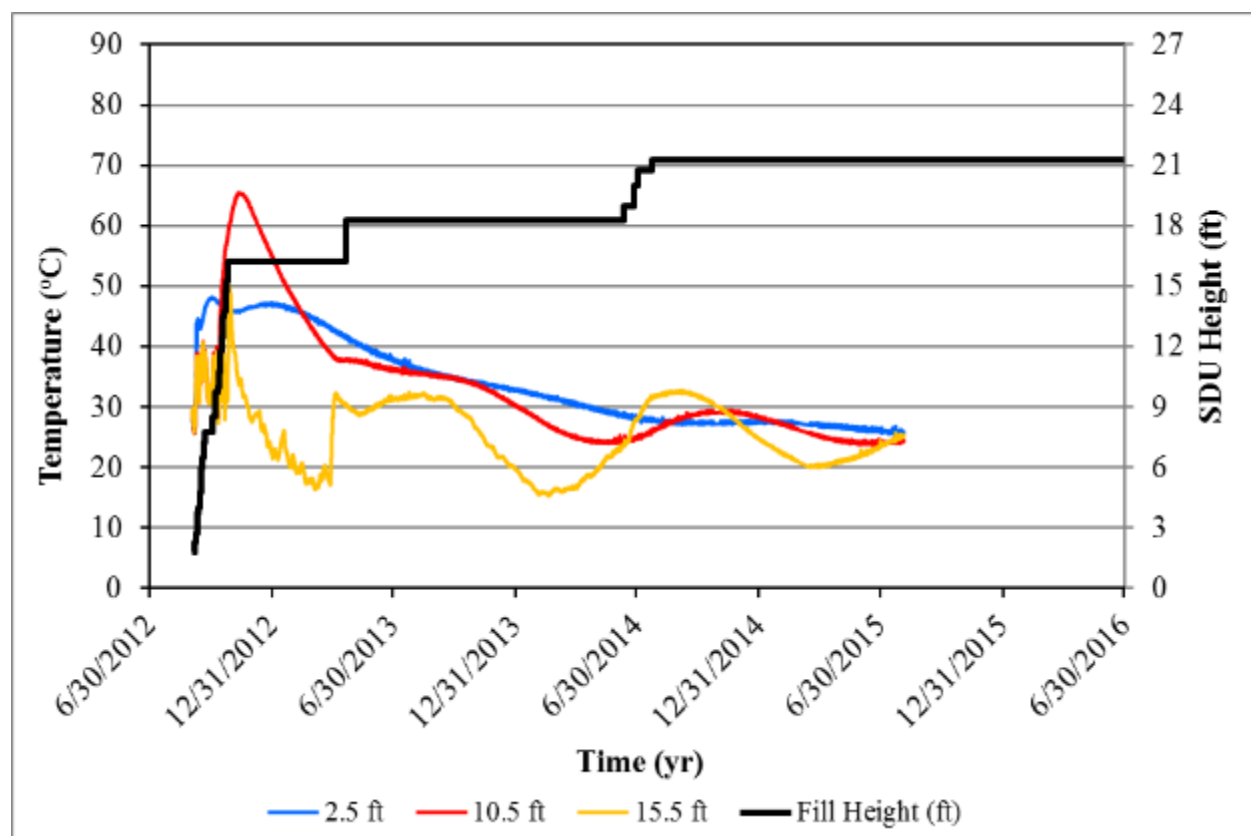
Note: SDU Cell 2B contains saltstone to a 21.25' elevation.

Figure 3-15: SDU Cell 2B Profiles, Train B



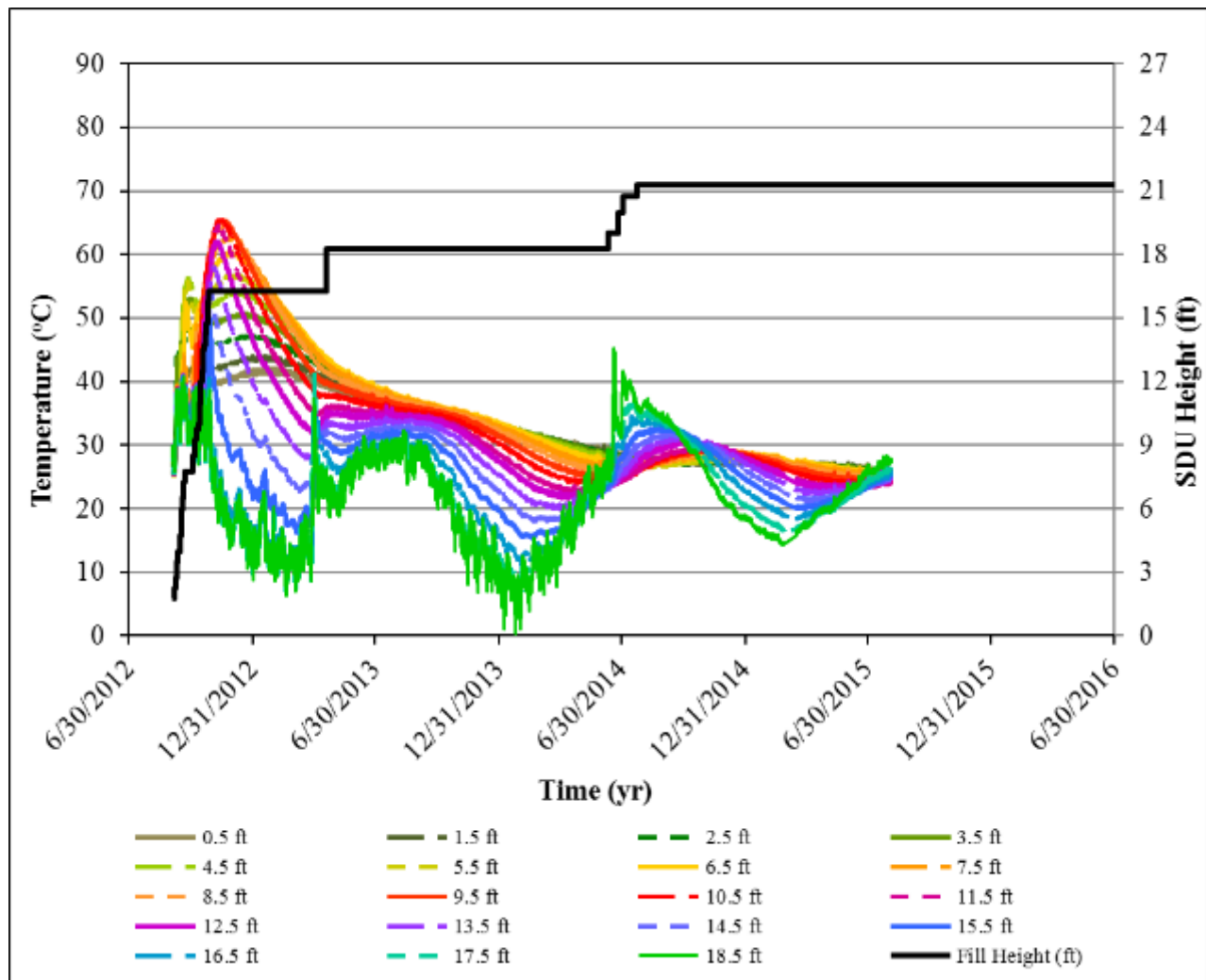
Note: SDU Cell 2B contains saltstone to a 21.25' elevation.

Figure 3-16: SDU Cell 2B Profiles, Train C



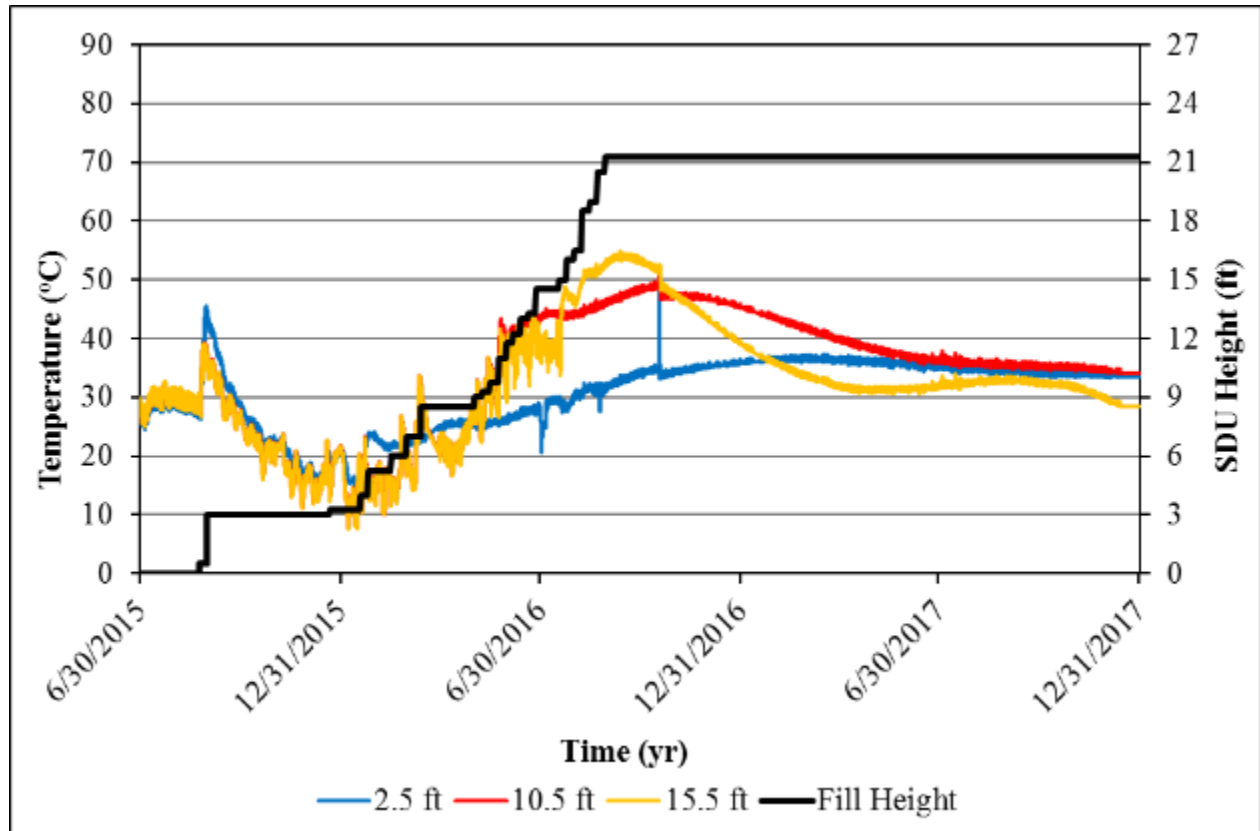
Note: SDU Cell 2B lost Train C function in 2015. Since Trains A and B continued to function, Train C was not recovered.

Figure 3-17: SDU Cell 2B Profiles, Train C Various Depths



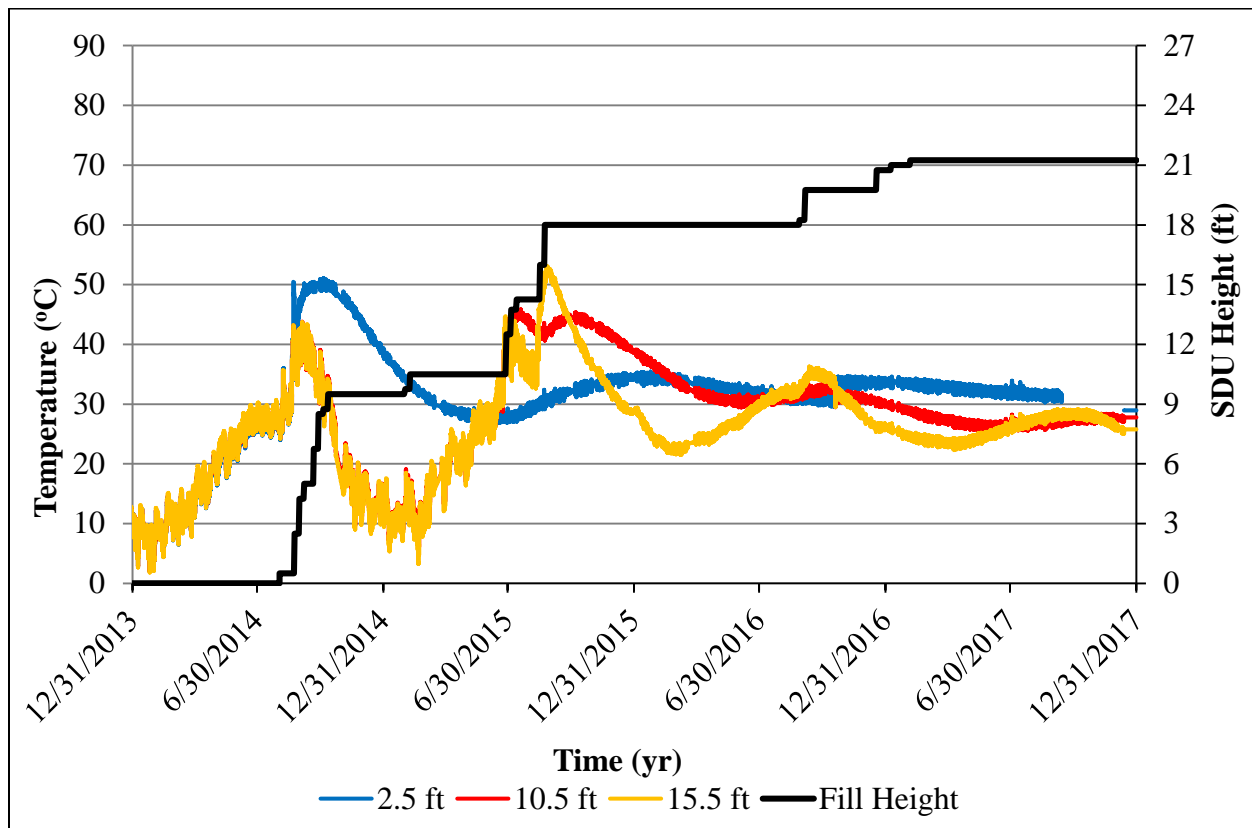
Note: SDU Cell 2B contains saltstone to a 21.25' elevation.

Figure 3-18: SDU Cell 5A Profiles, Train C



Note: SDU Cell 5A Train C only in use.

Figure 3-19: SDU Cell 5B Profiles, Train C



Note: SDU Cell 5B Train C only in use. The thermocouple at 2.5' elevation lost function through the end of 2017.

4.0 REFERENCES

SRR-CWDA-2013-00012, *Saltstone Disposal Facility Saltstone Disposal Unit (SDU) 4 and SDU Cell 2B Thermocouple Data*, Savannah River Site, Aiken, SC, Rev. 0, January, 2013.