

# One-Week vs. Two-Week Sampling Interval Co-located Intercomparison Preliminary Results for the Mercury Deposition Network

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## Background

Since 1996, the National Atmospheric Deposition Program's (NADP) Mercury Deposition Network (MDN) is the only network providing a long-term record of total mercury (Hg) concentration and deposition in precipitation in the United States and Canada. In an effort to increase participation in the MDN network to provide more accurate and wide reaching area trends, the NADP Program Office (PO) began looking into ways to decrease operational costs.

Currently, all MDN sites operate on a sampling schedule in line with the National Trends Network (NTN) by collecting samples on a weekly basis. The proposed update would allow MDN sites to collect samples on a biweekly basis, thus cutting the cost of supply shipments, sample return shipments, and analysis in half.

## Study

Starting in Summer 2025, three sites (TN11, WA04, and WI06) were chosen to participate in a collocated study between 1- and 2-week sampling. The goal of this study was to determine if there is a statistically significant difference in the collected precipitation volumes and the reported Hg deposition in each sample.

Both types of precipitation collectors supported by NADP, the Aerochem (ACM) collector and the NCON collector, were tested during this study. The same collector types were used for both samples at each site; TN11 tested using two ACM collectors (Figure 1), while WA04 and WI06 tested using two NCON collectors (Figure 2) at each site. All factors other than sampling period, including procedures for deployment and sample processing, were kept consistent between all samples.

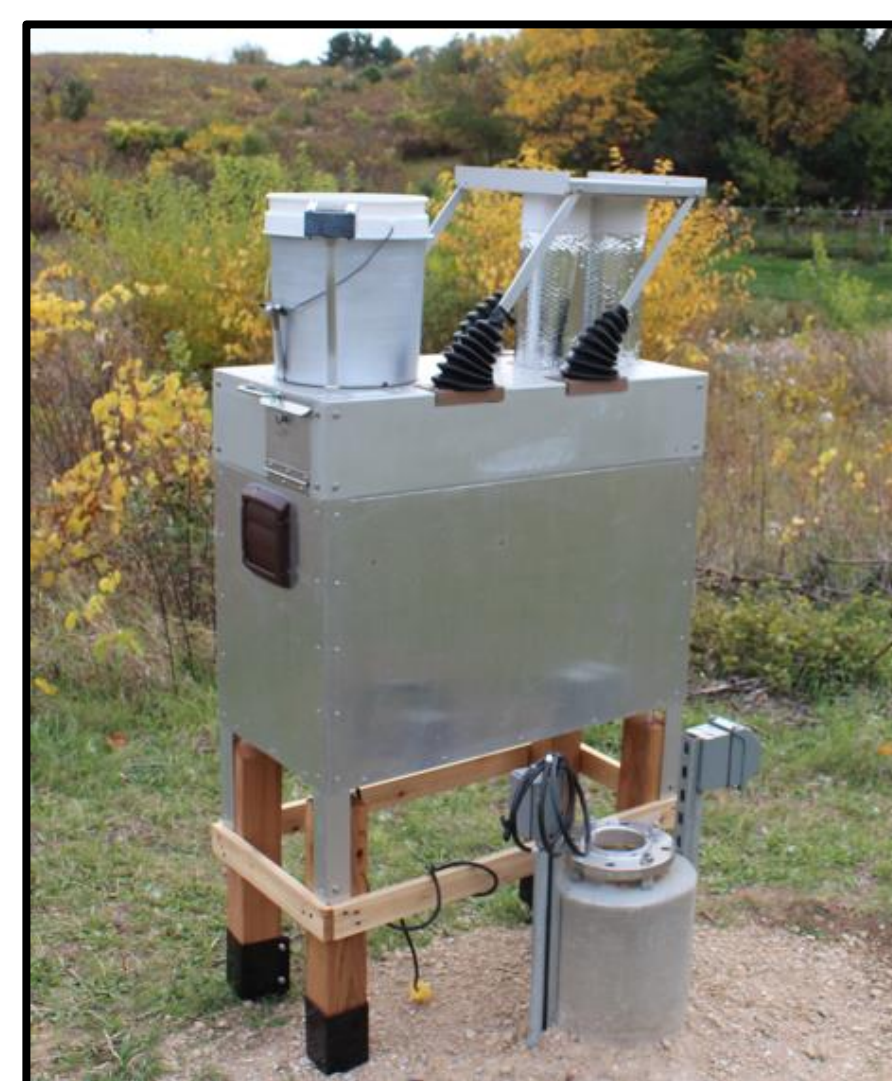


Figure 1: ACM MDN Collector



Figure 2: NCON MDN Collector

The study will compare the sample volume and Hg deposition of the 2-week sample with the sum of the two 1-week samples corresponding to that sampling period.

## Results

### Comparison Within Sites

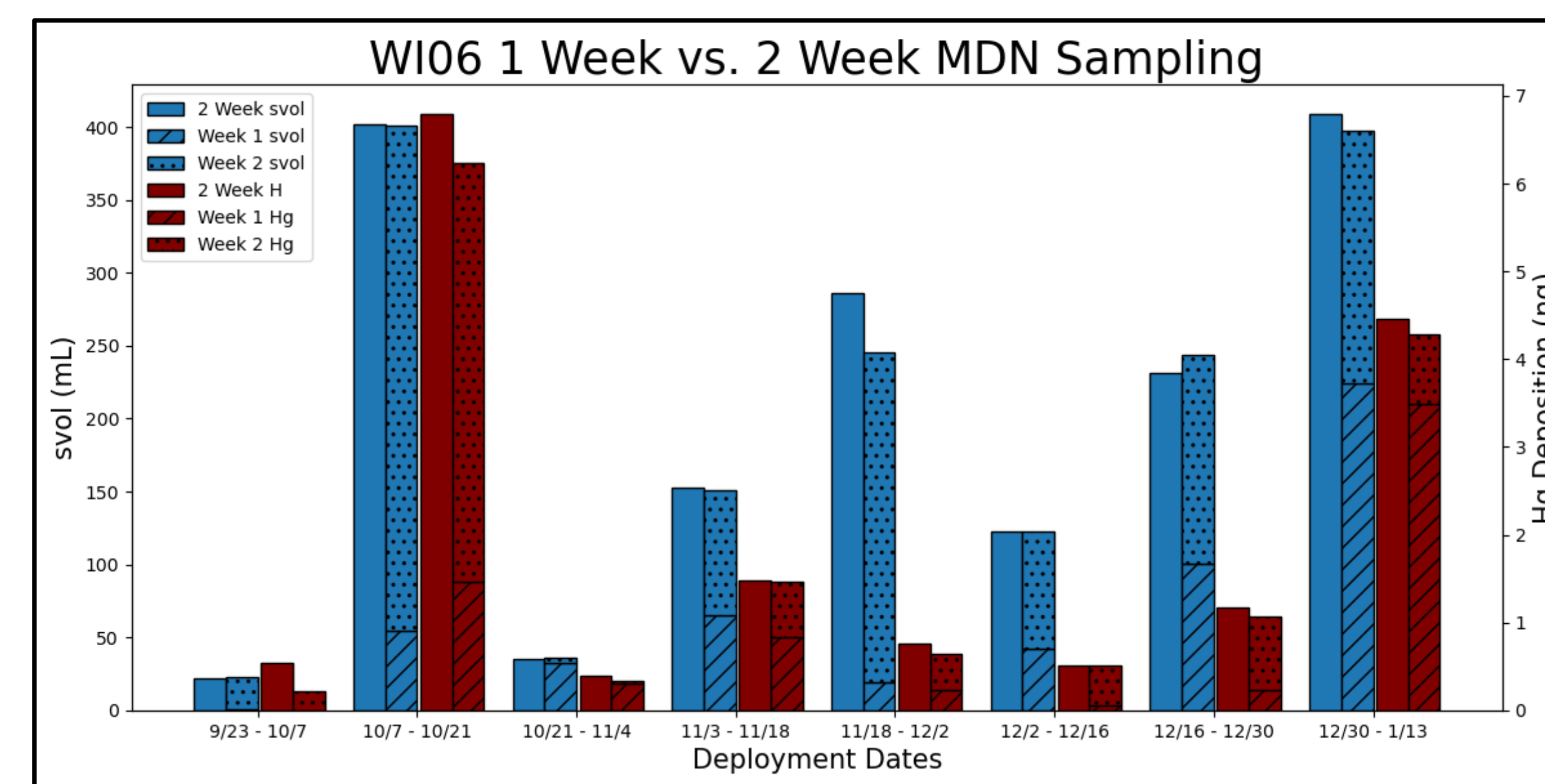


Figure 3: Comparison of 2-week sample and two combined 1-week sample volume and mercury deposition in 2025 at site WI06 – University of Wisconsin Arboretum – Madison, Wisconsin

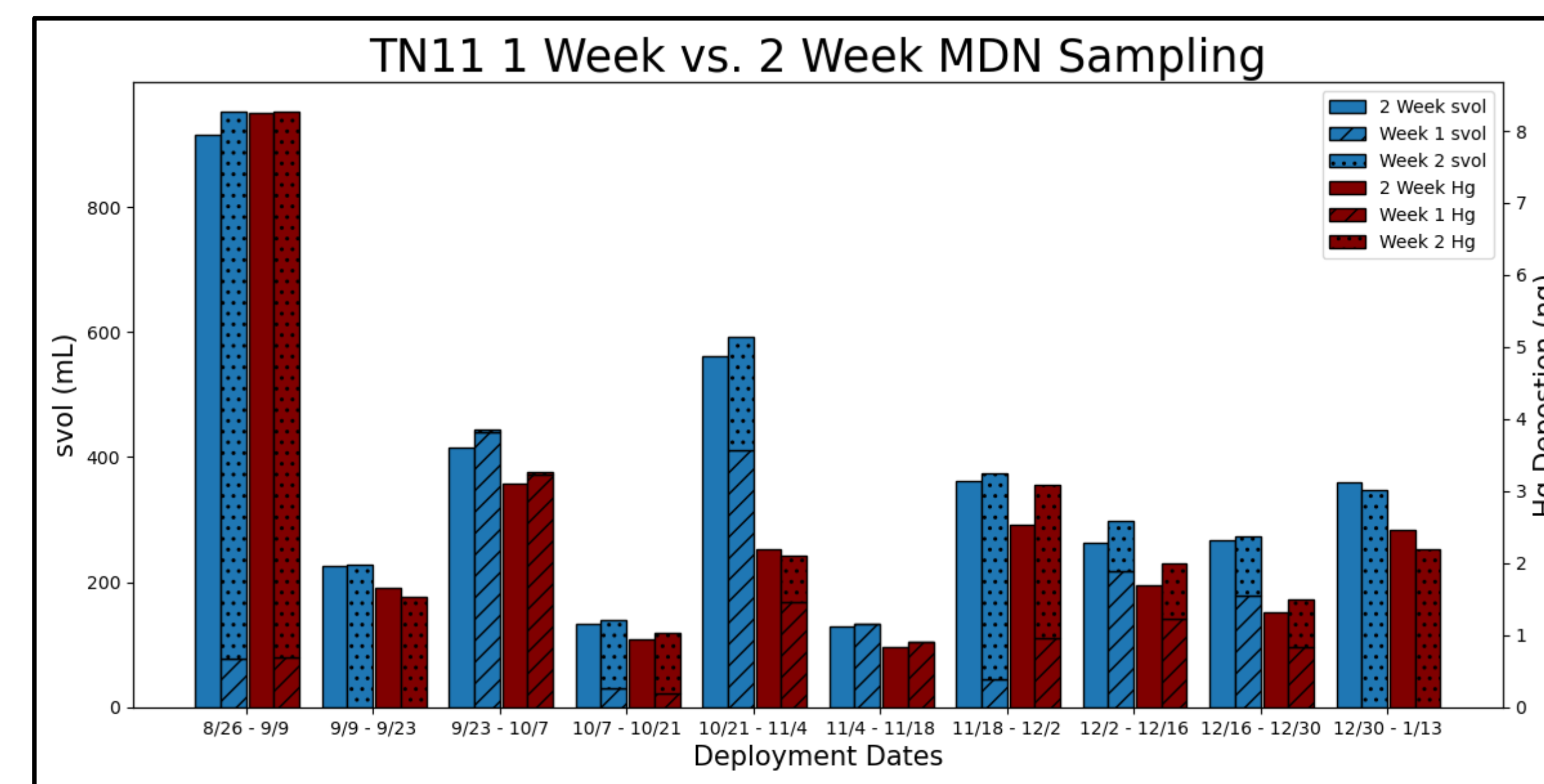


Figure 4: Comparison of 2-week sample and two combined 1-week sample volume and mercury deposition in 2025 at site TN11 - Great Smoky Mountains National Park-Elkmont - Gatlinburg, Tennessee

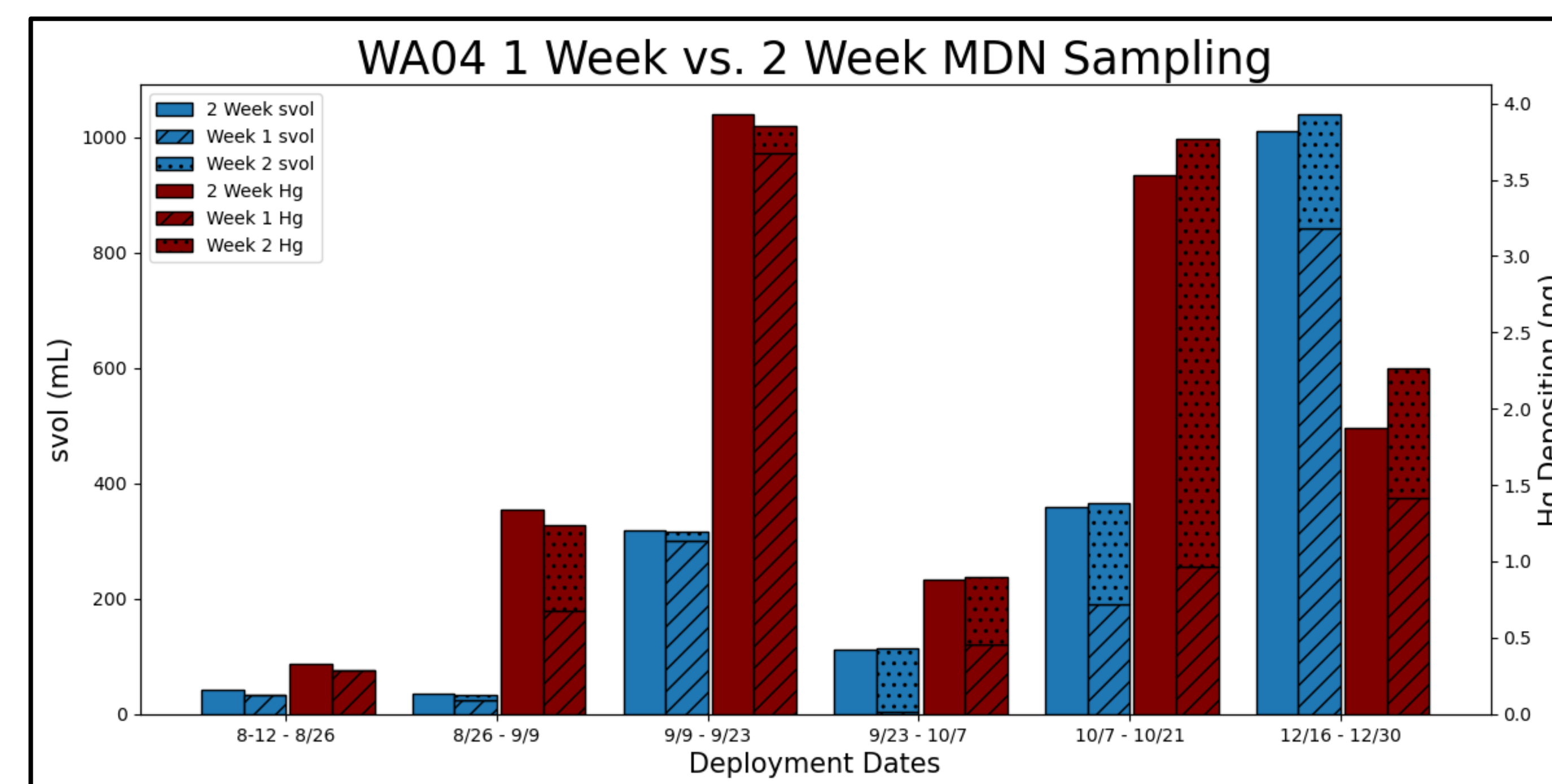


Figure 5: Comparison of 2-week sample and two combined 1-week sample volume and mercury deposition in 2025 at site WA04 - Confederated Tribes of the Umatilla Indian Reservation - Dayton, Washington

### Overall Comparison

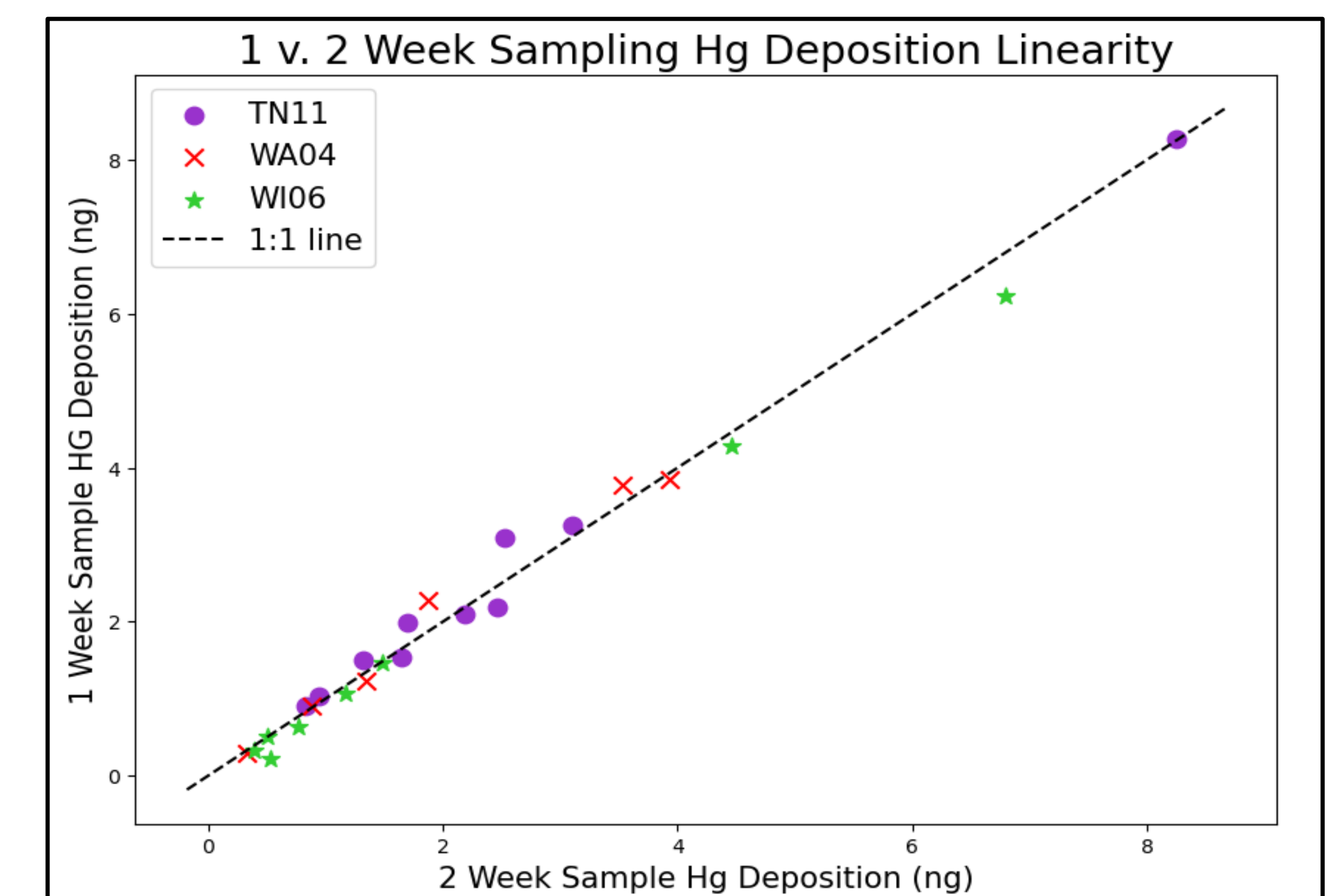


Figure 6: Plot shows Hg deposition in the combined 1-week samples with their corresponding 2-week sample for all samples during the study. The 1:1 line highlights the linearity between the sample comparison

The data collected in this preliminary intercomparison study show a very strong correlation between the 1- and 2-week samples in both the total sample volume collected and the total Hg deposition.

Figures 3, 4, and 5 show how the sum of the 1-week samples over the corresponding 2-week sampling period have comparable sample volumes and Hg deposition as the 2-week samples. Figure 6 demonstrates the linearity between each combined 1-week sample pair with their corresponding 2-week sample. A Pearson correlation coefficient was computed for the Hg deposition comparison to show a strong positive correlation between the two sampling periods,  $r = 0.9931$ .

The preliminary data collected during this intercomparison study give high confidence for the possibility of expanding the MDN network through 2-week sampling.

## Acknowledgments

Thank you to the site operators for all they do to provide consistent, quality samples to be able to conduct this intercomparison.

Thank you to the National Park Service (NPS) for partnering with NADP in conducting this study through the participation of TN11.

Thank you to the Environmental Protection Agency's (EPA) Agricultural Worker Protection Standard (WSP) for partnering with NADP in conducting this study through the participation of WA04.

