Title: Pathogen releases due to inadequate wastewater treatment infrastructure in small-town Alabama

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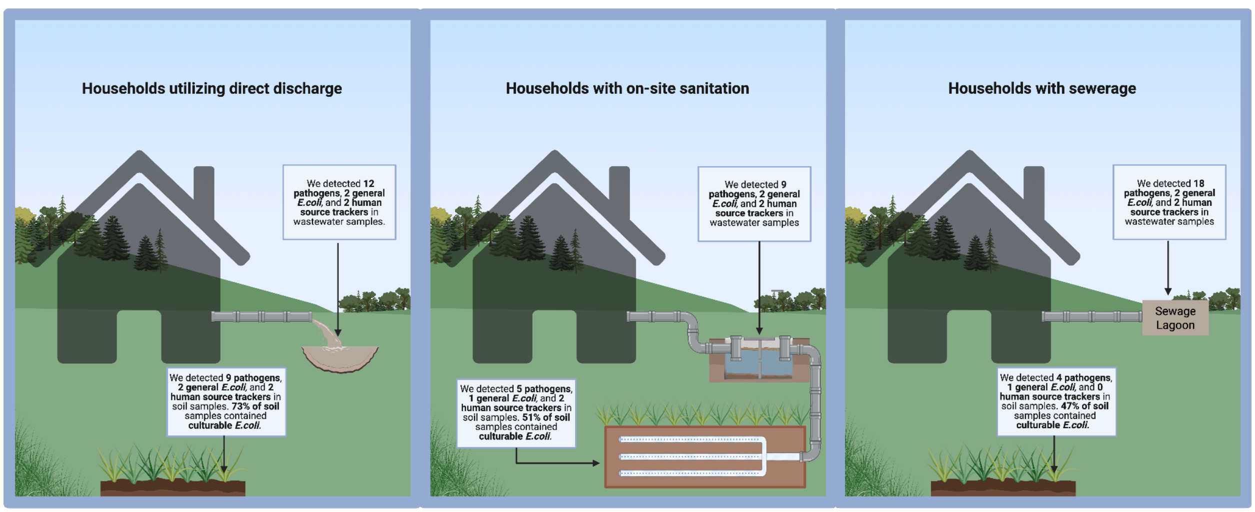
Abstract

Residents of the Alabama Black Belt lack safe and reliable wastewater treatment. Health risks of inadequate treatment are well-established, community-level contamination alone cannot characterize how sanitation failures translate into exposure risks, and few studies have identified pathogens associated with exposure. We surveyed of sanitation-related pathogen releases in a small town in Hale County, Alabama, lacking sanitation infrastructure. We enrolled 24 households with on-site sanitation, 18 utilizing direct discharge, and 10 in a neighboring sewered community for comparison. We visited each household three times over 9 months. We collected yard soil and

wastewater from direct-discharge effluent, on-site systems, and a sewage lagoon. We cultured samples for total coliform and *Escherichia coli* and analyzed via multi-parallel qPCR for 39 pathogen targets, 2 fecal markers, and 2 human source tracking markers. In soils from households served by sewerage, we detected 4 pathogens, 1 fecal marker, and 0 human source markers, 5 pathogens, 1 fecal marker, and 2 human source markers in soils from households with on-site sanitation, and 9 pathogens, 2 fecal markers, and 2 human source markers in soils from households utilizing direct discharge. These findings suggest that failing or absent wastewater treatment infrastructure contributes to environmental pathogen releases in this setting.

Graphical Abstract:



1. Introduction

Alabama's Black Belt is named for the dark and fertile soil that covers roughly 18 counties in Alabama [1]. The region is perhaps best known as the birthplace of the US Civil Rights Movement due to notable flashpoints including the Montgomery Bus Boycott and the Selma to Montgomery March occurring in this region [2],[3]. The Black Belt has once again received substantial national attention due to its failing or nonexistent wastewater infrastructure because, ironically, the very soil that gave the Black Belt its name makes it difficult for conventional on-site wastewater treatment systems to function due to low permeability [4], [5]. These vertisols soils, shrink swell clays, make it difficult for the liquid effluent from on-site systems such as septic tanks to filter through the drainfield, thus leaving untreated wastewater to pool on the ground surface or back up into homes [6].

Current estimates suggest that 50% of households in the Black Belt are connected to municipal sewer systems; the other 50% must rely on some type of on-site wastewater treatment system [7]. On-site systems are most commonly septic systems, cesspools, or straight pipes that directly discharge raw household wastewater (both grey and black water) to the environment. Several studies have quantified the scope of gaps in wastewater infrastructure and services in this area. Maxcy-Brown et al. describe the current conditions of wastewater treatment and the specific challenges relating to wastewater management in the Alabama Black Belt, estimating that across 17 Black Belt counties, approximately 169,000 do not have access to municipal sewerage [7]. Maxcy-Brown et al. describe the area's socioeconomic characteristics, population decline, unsuitable soil, the strain operation and maintenance of on-site systems puts on homeowners, and septage disposal as the most prominent challenges relating to wastewater management [7]. Work by Harmon et al. demonstrated that regions of the Black Belt relying only on on-site sanitation have widespread fecal contamination in soils at the community level [8]. Combined, these data indicate that while most of the Black Belt relies on on-site systems, these are often failing or inadequate for managing wastewater, contributing to measurable human fecal waste in the surrounding environment. To date, however, we have not assessed how these sanitation absences and failures translate into health exposure risks.

To address these risks, this study will characterize infrastructure failures and absences with measurable differences in environmental fecal contamination to identify potential exposure pathways and inform future solutions. We will do this by (1) quantifying the concentrations and prevalence of pathogens and fecal markers in soil and wastewater samples from household environments and (2) comparing concentrations and prevalence of pathogens and fecal markers across wastewater treatment types in two towns in Hale County, Alabama. The towns are defined as Town 1 and Town 2 for the purposes of this study. Town 1 does not have access to sewerage; therefore, residents must rely on on-site disposal via septics, cesspools, or straight pipes, while wastewater from homes in Town 2 is piped to a central lagoon. We detected 9 pathogens in soil samples collected from households utilizing direct discharge, 5 pathogens from households with on-site sanitation, and 4 pathogens from households with sewerage. We detected *E. coli* gad A/B from soil samples collected from households with all three sanitation types, but we only detected *E.coli* ybbW from households utilizing direct discharge. We only detected human source trackers in soil samples collected from households without access to sewerage (on-site sanitation and direct discharge).

2. Materials and Methods

This study was approved by the Institutional Review Board for Human Subjects Research (IRB) at the University of North Carolina at Chapel Hill (UNCCH) (IRB #24-0665) [9]. We collected, cultured, and analyzed (using multi-parallel qPCR) household-level (soil and wastewater) and community-level environmental samples (municipal sewage lagoon influent).

2.1 Eligibility, Recruitment, and Enrollment

We enrolled a total of 52 households in this study: 42 households from Town 1 and neighboring unincorporated communities and 10 households from Town 2. Eligible representatives of each household were 19 years or older (the age of majority in Alabama) and resided for the majority of the year at the enrolled household. This representative coordinated household visits with researchers. We recruited participants through in-person community events, postcards, door-to-door introductions, and snowball recruitment/word of mouth. Through each recruitment method, potential participants were presented with a description of the study, its purpose, and what participation in the study would entail. Participants were compensated with a $20 Visa gift card at each visit, which totaled $60 over the duration of the study.

We categorized each household's sanitation type into three primary categories: sewerage, on-site, and direct discharge. For this study, we are examining two categories of safely managed sanitation, sewerage and on-site sanitation, and one of unsafely managed, direct discharge. *Sewerage* refers to centralized sewage collection, containment and treatment via a municipal sewage lagoon. *On-site* refers to a system where the wastewater, to the knowledge of the participant, is contained and treated (cesspools and septic tanks). *Direct discharge* refers to any system where untreated wastewater is disposed directly to the environment.

2.2 Sample Collection

We visited each household three times throughout this study, once per sampling time point. Household-level samples included soil and wastewater. In an attempt to get a representative sample of soil from households in Town 2 connected to sewerage, we collected three samples from households connected to sewerage: one from the front, one from the side, and one from the back of the home. From households in Town 1 and surrounding areas, we collected three soil samples considered to be impacted by human fecal contamination, and three soil samples considered to be unimpacted. We defined impacted soil samples as those that were impacted by on-site sanitation or direct discharge, i.e. sites receiving waste from a cesspool, straight pipe, or on top of the septic drain field. We defined unimpacted soils at sections of the yard that were identified by the household and/or researcher as unimpacted by on-site sanitation or direct discharge. If no such area existed, we collected unimpacted soils from the front, side, and back of the home as far away from the presumed area of impact as possible. More details about how we collected impacted and unimpacted soil can be found in Supplement 1.

Over the course of this study, we collected 846 individual soil samples. We collected 90 soil samples from households with sewerage that we homogenized by household and visit into 30 composite soil samples. We collected 390 soil samples from households with on-site sanitation that we combined by household and visit into 130 composite samples, where 65 were presumptively impacted soil samples and 65 were presumptively unimpacted soil samples. We collected 366 soil samples from households utilizing direct discharge that we combined by household and visit into 122 composite samples, where 61 were presumptively impacted soil samples and 61 were presumptively unimpacted soil samples.

We only collected wastewater samples from households without access to sewerage. For households that utilized a septic tank or cesspool, we collected wastewater samples directly from the tank. For households that utilized direct discharge, we collected wastewater from the discharge site. More details about how we collected wastewater samples can be found in Supplement 2.

Community-level samples were collected from the influent point of the municipal sewage lagoon. We collected three sewage lagoon influent samples at three randomly selected times during the bounds of each time point, resulting in 9 total samples collected per time point. A 1 L bottle of sterile deionized (DI) water was used as a field control (CW). In the field, we stored all collected samples at 4°C until processing at the field laboratory.

2.3 Sample Processing

We processed the soil samples immediately to determine the dry weight of the samples gravimetrically by drying approximately 2 grams of soil at 105°C for two hours and reweighing (Supplement 3) [10]. Then, we prepared a composite sample of the impacted or unimpacted soils by combining 2 grams of soil from each of the three impacted or unimpacted soil samples and homogenizing the resulting 6 g mixture (Supplement 3).

We filtered wastewater samples with a liquid consistency in duplicate through a 0.22 μM (CW) or a 0.45 μM Millipore HA membrane (control water and some wastewater samples). For samples with a solid consistency, we weighed approximately 0.25 grams in duplicate (composite soil and some wastewater). In the rare case that wastewater samples were determined too liquid to be weighed but too solid to be filtered, we pipetted 250 μL in duplicate. We placed all samples in Zymo Collection tubes with DNA/RNA shield (Cat No: R1102) and stored them at -20°C until downstream processing for molecular analyses. Details on exact weights or volumes of soil and wastewater samples stored can be found in Supplements 4 and 5 respectively.

2.4 Culture of Fecal Indicator Bacteria via IDEXX

We cultured total coliform and *Escherichia coli* (*E. coli*) for every sample collected via IDEXX using the Quanti-Tray 2000 System for all time points. To culture soil samples, we suspended 3 grams of soil in 30 mL of PBS then homogenized and diluted that mixture twice. We cultured wastewater samples at two different dilutions ranging from 10^{-1} - 10^{-6}. We did not dilute the field control. To culture, we prepared the samples with IDEXX Colilert-18 media in the Quanti-Tray 2000 trays. Once we sealed and labeled the trays, we incubated them at 35°C for 18 hours [11], [12], [13]. Following incubation, we scored the wells based on the manufacturer's instructions to determine the most probable number (MPN) of both total coliform and *E. coli.*

Details on exact weights or volumes of soil and wastewater samples cultured can be found in Supplements 4 and 5, respectively.

2.5 Isolation of Total Nucleic Acids and Analysis

We isolated total nucleic acids from soil, wastewater, and control water samples, using the ZymoBIOMICS DNA/RNA Miniprep Kit (Zymo Research, Cat No, R2002). Immediately before extraction, we spiked all samples and the positive extraction control (PEC) with 10 μL of the Zoetis Inforce-3 vaccine (containing BHV and BRSV), which served as the DNA and RNA extraction control. We also included a negative extraction control (NEC), 250 μL of PCR-grade water with each batch of extractions. We measured the concentration of dsDNA and RNA from the extraction eluates using the Qubit High Sensitivity dsDNA and Qubit RNA High Sensitivity, Broad Range Assay Kits (Invitrogen, Carlsbad, CA, USA), respectively, immediately after extraction. All Qubit results can be found in Supplement 6.

Next, we analyzed the isolated total nucleic acids from soil, wastewater, and control water samples using a custom TaqMan Array Card (TAC, ThermoFisher Scientific, Waltham, MA) targeting 48 enteric pathogens, fecal markers, MST, and controls. Details on the targets included are in Supplement 7. We prepared the reverse-transcription real-time PCR mixture for each port of the TAC by combining 34 μL of the template with 68 μL of master mix, consisting of ThermoFisher AgPath-ID One-Step RT-PCR Reagents, the ThermoFisher Exogenous Internal Positive Control (IPC) Mixture as an Internal DNA amplification control, and a synthetic RNA gene fragment from hepatitis G as an internal RNA amplification control. If the sample was found to be inhibited, no observed amplification of hepatitis G and/or 16s, we diluted the template with nuclease free water. Details on exact template amounts can be found in Supplement 8.

For each card, we analyzed an engineered positive plasmid control (PPC), consisting of the full-length amplicon of each target included on our custom TAC [13]. The sequences for all three plasmids and details of the preparation of the PPCs can be found in Supplement 9. In addition, we prepared each TAC grouping with a negative PCR control (NPC), consisting of nuclease-free water and the IPC block.

For prepared TAC, we performed one-step reverse transcription qPCR using a QuantStudio 7 (Thermo Fisher Scientific, Waltham, MA) at the following thermocycling conditions: 45°C for 20 minutes and 94°C for 10 minutes, followed by 45 cycles of 95°C for 15 seconds and 60°C for 1 minute, with a ramp rate of 1°C/second between each step. Once complete, we compared the curves and multicomponent plots with the control plots to ensure only true positive amplifications were included. Unreliable results were flagged manually and omitted.

2.6 Standard Curves and Limit of Detection

To generate standard curves, we analyzed a serial dilution series of the positive control fragments, spanning five orders of magnitude, ranging from 10^{-1} - 10^5 copies/μL, consisting of alternating 5-fold and 2-fold dilutions. We analyzed each dilution seven times on each of the two QuantStudio instruments used for thermocycling and real-time analysis. We evaluated the resulting curves to identify the linear range across five dilutions for which all seven replicates amplified, and for which the slope of the linear model (CT versus $\log_{10}$ concentration) was between -3.58 and -3/10, corresponding to an efficiency of 90% to 110%, typically the accepted range of efficiency for an optimized probe-based assay [14]. All information about standard curves, including slope, y-intercept, R^2, and efficiency, can be found in Supplement 10.

We estimated the assay limit of detection (LOD) using a probit regression approach based on the full standard curve dilution series described above. We modeled binary detection outcomes (amplified vs. not amplified) as a function of log_{10}-transformed copies per μL. We fit separate probit models for each target and instrument after excluding flagged reactions and negative controls. All LOD data can be found in Supplement 11 and are defined as 90%, 95%, and 99% probability of detection, respectively.

Based on the method outlined by Forootan et al., we defined the limit of quantification (LOQ) as the lowest concentration at which the coefficient of variation (CV = 100 × SD/mean) of calculated concentrations across our replicates was below 35% [15]. If the calculated LOQ was less than the LOD, the LOQ was set equal to the LOD for that particular assay (Supplement 11). The Minimum Information for Publication of Quantitative Real-Time PCR Experiments can be found in Supplement 12.

2.7 Statistical Analysis

We analyzed all data using RStudio version 2026.01.1+403 (R Foundation for Statistical Computing, Vienna, Austria). This dataset was nonnormal even after log transformation, so to compare fecal markers and pathogens detected in household-level and community-level environmental samples, we used the Wilcoxon Rank Sum Test for continuous outcomes (e.g. gene copies/organisms per gram/liter) and Fisher's exact tests for binary outcomes (e.g., presence/absence) [16], [17]. We only tested fecal markers and pathogens we observed above the LOD in at least one sanitation category.

3. Results

We identified ten households from Town 2 with sewerage (19%), 20 households from Town 1 with on-site sanitation (38%), and 18 households from Town 1 utilizing direct discharge (35%) during all three visits. Four households fell into different sanitation categories between sampling time points as a result of on-site sanitation failure (i.e., septic systems were transitioned to direct discharge). We categorized three households with on-site sanitation during the first visit and utilizing direct discharge for all other visits, and one household with on-site sanitation for the first two visits and utilizing direct discharge for the third visit (Supplement 13). Of the 23 households that reported having a septic tank at any point during the study, only four (17%) said their system was permitted. Over the course of this study, between 43% - 52% of the households that did not have access to sewerage utilized direct discharge.

3.1 Detection and Quantification of Culturable Fecal Indicator Bacteria in Soils by Sanitation Type

Among the 30 composite soil samples that we cultured from households with sewerage, 27 (90%) had a detectable amount of total coliform ranging from 1 to > 2419.6 MPN/g (the upper limit of detection for IDEXX), and 14 (47%) had a measurable amount of *E. coli*, ranging from 1 to 216 MPN/g. Of the 130 composite soil samples that we cultured from households with on-site sanitation, 122 (94%) had a measurable amount of total coliform ranging from 1 to > 2419.6 MPN/g, and 66 (51%) had a measurable amount of *E. coli* ranging from 1 to 770 MPN/g. Of the 122 composite soil samples that we cultured from households utilizing direct discharge, 119 (98%) had a detectable amount of total coliform ranging from 1 to > 2419.6 MPN/g, and 87 (71%) had a measurable amount of *E. coli,* ranging from 1 to > 2419.6 MPN/g (Table 2).

For total coliform, we did not observe a statistically greater prevalence of total coliform in soil samples collected from households utilizing sewerage compared to soil samples collected from households utilizing direct discharge, households utilizing sewerage compared to soil samples collected from households with on-site sanitation, or households utilizing direct discharge compared to soil samples collected from households utilizing on-site sanitation. We observed a statistically greater concentration of total coliform in soil samples collected from households utilizing direct discharge compared to soil samples collected from households with on-site sanitation (Wilcoxon rank-sum test, $p = 0.015$) and compared to soil samples collected from households with sewerage (Wilcoxon rank-sum test, $p = 0.027$). We did not observe a statistically meaningful difference in log-transformed total coliform concentrations between soil samples collected at households with on-site sanitation compared to soil samples collected from households with sewerage.

For culturable *E. coli,* we observed a statistically greater concentration and prevalence of *E. coli* in soil samples collected at households utilizing direct discharge when compared to soil samples collected at households with on-site sanitation (Wilcoxon rank-sum test, $p < 0.001$ and Fisher's exact test, $p = 0.001$) and soil samples collected from households with sewerage (Wilcoxon rank-sum test, $p < 0.001$ and Fisher's exact test, $p = 0.017$). We did not observe a statistically meaningful difference in *E. coli* concentrations or prevalence between soil samples collected at households with on-site sanitation compared to soil samples collected from households with sewerage.

All visits combined: August 5th, 2024 – May 17th, 2025								
			Total Coliform			***E. coli***		
	Samples Positive/ Total	% Detected	Mean MPN	95% CI for mean MPN	Samples Positive/ Total	% Detected	Mean MPN	95% CI for mean MPN
Sewerage	27/30	90%	1.14×10^4	$0.00, 2.82 \times 10^4$	14/30	47%	1.54×10^1	0.00, 31.0
On-site	122/130	94%	2.66×10^4	$1.29 \times 10^4, 4.03 \times 10^4$	66/130	51%	1.01×10^2	$8.79, 1.94 \times 10^2$
Direct Discharge	119/122	98%	6.44×10^4	$4.07 \times 10^4, 8.81 \times 10^4$	87/122	71%	1.96×10^4	$6.24 \times 10^3, 3.30 \times 10^4$

Table 1: Soil culture results summarized by visit, organism, and sanitation category

3.2 Detection and Quantification of Pathogens, Fecal Markers, and Microbial Source Trackers in Soils by Sanitation Type

For households with sewerage, we detected 5 of the 41 pathogens and fecal markers (12%) and 0 of the 2 MST trackers (0%). in soil samples over the course of this study (Figure 1 and Table 3). We observed amplification below the LOD of the *Giardia* spp. assay from two soil samples and the sapovirus I, II, IV, V assay from one soil sample collected from households with sewerage.

For households with on-site sanitation, we detected 6 of the 41 pathogens and fecal markers (15%) and 2 of the 2 MST trackers (100%). in soil samples over the course of the study (Figure 1 and Table 3). We observed amplification below the LOD of the *E. coli* O157:H7/H-serotype assay in 3 samples, sapovirus I, II, IV, V assay in 3 samples, and the *Giardia* spp. assay in 3 soil samples collected from households with on-site sanitation. Of the general *E. coli* assays, we detected *E. coli* gadA/B in one soil sample from households with on-site sanitation.

In households utilizing direct discharge, we detected 11 of the 41 pathogens and fecal markers (27%) and 2 of the 2 MST trackers (100%). in soil samples over the course of the study (Figure 1 and Table 3). We observed amplification below the LOD of the enteroaggregative *E. coli* aaiC assay, enteropathogenic *E. coli* eae+ assay, and enteroaggregative *E. coli* aatA assay from one soil sample collected from a household utilizing direct discharge.

It is notable that norovirus GII, human mtDNA, and human-specific HF183 *Bacteroides* were only observed above the LOD in soil samples collected from households without access to sewerage (on-site and direct discharge) and astroviridae, adenovirus 40/41, *E. coli* O157:H7/H-serotype, *E. coli* ybbW, and *Giardia* spp was only observed above the LOD in soil samples collected from households with direct discharge systems. Details about targets that appear in at least one soil sample collected from at least one sanitation category can be found in Table 2 and details about all targets can be found in Supplement 14.

All Visits									
	Sewerage			On-site			Direct Discharge		
Target	Value	Mean (organism/g)	95% CI for mean (organism/g)	Value	Mean (organism/g)	95% CI for mean (organism/g)	Value	Mean (organism/g)	95% CI for mean (organism/g)
Virus									
Adenovirus 40/41	0/30	<LOD	<LOD	0/130	<LOD	<LOD	1/122	6.87×10^{1}	$(0, 2.05 \times 10^{2})$
Astroviridae	0/30	<LOD	<LOD	0/130	<LOD	<LOD	1/122	6.91×10^{1}	$(0, 2.06 \times 10^{2})$
Norovirus GII	0/30	<LOD	<LOD	2/130	2.89×10^{2}	$(0, 6.92 \times 10^{2})$	2/122	4.24×10^{2}	$(0, 1.04 \times 10^{3})$
Bacteria									
E. coli O157:H7	0/30	<LOD	<LOD	0/130	<LOD	<LOD	1/122	2.84×10^{1}	$(0, 8.36 \times 10^{1})$
General *E.coli*									
E. coli gadA/B	1/30	7.74×10^{2}	$(0, 2.36 \times 10^{3})$	1/130	2.55×10^{1}	$(0, 7.60 \times 10^{1})$	19/122	9.39×10^{3}	$(2.53 \times 10^{3}, 1.62 \times 10^{4})$
E. coli ybbW	0/30	<LOD	<LOD	0/130	<LOD	<LOD	14/122	6.55×10^{3}	$(1.09 \times 10^{3}, 1.20 \times 10^{4}$
Target	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)	Value	Mean (gene copies/g)	95% CI for mean(gene copies/g)
MST Markers									
Human Mitochondrial DNA	0/30	<LOD	<LOD	8/130	3.87×10^{2}	$(3.77 \times 10^{1}, 7.37 \times 10^{2})$	27/122	1.63×10^{4}	$(8.37 \times 10^{3}, 2.43 \times 10^{4})$
Human-specific HF183 *Bacteroides* 16S rRNA genetic marker	0/30	<LOD	<LOD	7/130	6.25×10^{3}	$(1.89 \times 10^{2}, 1.23 \times 10^{4})$	33/122	1.06×10^{6}	$(0.00, 2.27 \times 10^{6})$
Protozoan									
Acanthamoeba spp.	28/29	2.60×10^{5}	$(1.45 \times 10^{5}, 3.74 \times 10^{5})$	127/130	3.11×10^{5}	$(2.27 \times 10^{5}, 3.95 \times 10^{5})$	118/122	2.90×10^{5}	$(2.20 \times 10^{5}, 3.59 \times 10^{5})$
Balantidium coli	29/29	1.35×10^{6}	$(1.91 \times 10^{5}, 2.51 \times 10^{6})$	129/130	5.06×10^{6}	$(1.51 \times 10^{6}, 8.62 \times 10^{6})$	118/122	6.06×10^{6}	$(3.58 \times 10^{6}, 8.53 \times 10^{6})$
Blastocystis spp.	15/30	1.28×10^{4}	$(0.00, 2.61 \times 10^{4})$	102/130	1.67×10^{5}	$(0.00, 3.56 \times 10^{5})$	100/122	2.18×10^{5}	$(1.02 \times 10^{5}, 3.33 \times 10^{5})$
Cryptosporidium spp.	29/30	3.26×10^{2}	$(0.00, 9.94 \times 10^{2})$	29/130	3.85×10^{3}	$(1.83 \times 10^{3}, 5.88 \times 10^{3})$	28/122	4.66×10^{3}	$(2.31 \times 10^{3}, 7.00 \times 10^{3})$
Giardia spp.	0/30	<LOD	<LOD	0/130	<LOD	<LOD	3/122	3.31×10^{2}	$(0.00, 8.06 \times 10^{2})$

Table 2: Prevalence, average concentration, and 95% confidence intervals of average concentration of virus, bacteria, general E. coli, MST markers, and protozoan detected in soil samples summarized by sanitation category.

As seen in Table 3, we detected a statistically greater prevalence of all protozoan, *Blastocystis* spp. and *Cryptosporidium* spp. in soil samples collected from households with on-site sanitation when compared to soil samples collected from households with sewerage. We detected a statistically greater prevalence of all pathogens, all protozoan, *Blastocystis* spp., *Cryptosporidium* spp, all general *E. coli,* all MST markers, human mtDNA, and human-specific HF183 *Bacteroides* in soil samples collected from households utilizing direct discharge when compared to soil samples collected from households with sewerage. Finally, we detected a statistically greater prevalence of all general *E. coli, E. coli* gadA/B, *E. coli* ybbW, all MST markers, human mtDNA, and human-specific HF183 *Bacteroides* in soil samples collected from households utilizing direct discharge when compared to soil samples collected from households with on-site sanitation.

As seen in Figure 1 and Table 3, we detected a statistically greater concentration of *Balantidium coli,* *Blastocystis* spp. and *Cryptosporidium* spp., and all MST markers in soil samples collected from households with on-site sanitation when compared to soil samples collected from households with sewerage. We detected a statistically greater concentration of all pathogens, all bacteria, all protozoan, *Balantidium coli,* *Blastocystis* spp., *Cryptosporidium* spp, all general *E. coli, E. coli* ybbW, all MST markers, human mtDNA, and human-specific HF183 *Bacteroides* in soil samples collected from households utilizing direct discharge when compared to soil samples collected from households with sewerage. Finally, we detected a statistically greater concentration of all pathogens, all bacteria, *E. coli* O157:H7, *Blastocystis* spp., Giardia spp., all general *E. coli, E. coli* gadA/B, *E. coli* ybbW, all MST markers, human mtDNA, and human-specific HF183 *Bacteroides* in soil samples collected from households utilizing direct discharge when compared to soil samples collected from households with on-site sanitation.

Target	Sewerage statistically distinct from on-site? (Prevalence/Concentration)	Sewerage statistically distinct from direct discharge? (Prevalence/Concentration)	On-site statistically distinct from direct discharge? (Prevalence/Concentration)
All Pathogens	No (p = 0.100)/No (p = 0.162)	Yes (p = 0.008)/Yes (p = 0.005)	No (p = 0.102)/Yes (p = 0.018)
Virus			

All Virus	No (p = 1)/No (p = 0.894)	No (p = 1)/No (p = 0.433)	No (p = 0.438)/No (p = 0.232)
Adenovirus 40/41	NA	No (p = 1)/No (p = 0.489)	No (p = 0.484)/No (p = 0.145)
Astroviridae	NA	No (p = 1)/No (p = 0.632)	No (p = 0.484)/No (p = 0.306)
Norovirus GII	No (p = 1)/No (p = 0.503)	No (p = 1)/No (p = 0.219)	No (p = 1)/No (p = 0.134)
Bacteria			
All Bacteria	NA	No (p = 1)/Yes (p = 0.038)	No (p = 0.484)/Yes (p < 0.001)
E. coli O157:H7	NA	No (p = 1)/No (p = 0.053)	No (p = 0.484)/Yes (p = 0.003)
Protozoan			
All Protozoan	Yes (p = 0.027)/No (p = 0.162)	Yes (p = 0.012)/Yes (p = 0.007)	No (p = 0.686)/No (p = 0.268)
Acanthamoeba spp.	No (p = 0.557)/No (p = 0.936)	No (p = 0.480)/No (p = 0.920)	No (p = 1)/No (p = 0.789)
Balantidium coli	No (p = 1)/Yes (p = 0.006)	No (p = 1)/Yes (p = 0.002)	No (p = 1)/No (p = 0.276)
Blastocystis spp.	Yes (p = 0.003)/Yes (p < 0.001)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 0.529)/Yes (p = 0.006)
Cryptosporidium spp.	Yes (p = 0.017)/Yes (p = 0.002)	Yes (p = 0.017)/Yes (p = 0.002)	No (p =1)/No (p = 0.809)
Giardia spp.	NA	No (p = 1)/No (p = 0.785)	No (p = 0.112)/Yes (p = 0.033)
General *E.coli*			
All General *E. coli*	No (p = 0.340)/No (p = 0.513)	Yes (p = 0.006)/Yes (p = 0.008)	Yes (p < 0.001)/Yes (p < 0.001)
E. coli gadA/B	No (p = 0.341)/No (p = 0.509)	No (p = 0.127)/No (p = 0.076)	Yes (p < 0.001)/Yes (p < 0.001)
E. coli ybbW	NA	No (p = 0.073)/Yes (p = 0.045)	Yes (p < 0.001)/Yes (p < 0.001)
MST Markers			
All MST Markers	No (p = 0.083)/Yes (p = 0.031)	Yes (p < 0.001)/Yes (p < 0.001)	Yes (p < 0.001)/Yes (p < 0.001)
Human Mitochondrial DNA	No (p = 0.354)/No (p = 0.167)	Yes (p = 0.002)/Yes (p = 0.002)	Yes (p < 0.001)/Yes (p < 0.001)
Human-specific HF183 *Bacteroides* 16S rRNA genetic marker	No (p = 0.349)/No (p = 0.101)	Yes (p < 0.001)/Yes (p < 0.001)	Yes (p < 0.001)/Yes (p < 0.001)

Table 3: Comparison of prevalence (Fisher's exact test) and concentration (Wilcoxon rank sum) detected in at least one soil sample by sanitation category. White boxes indicate no significant difference in prevalence and concentration. Orange boxes indicate only a significant difference in prevalence or concentration. Green boxes indicate a significant difference in prevalence and concentration. Grey boxes indicate there was not enough information to make a comparison for either prevalence or concentration.

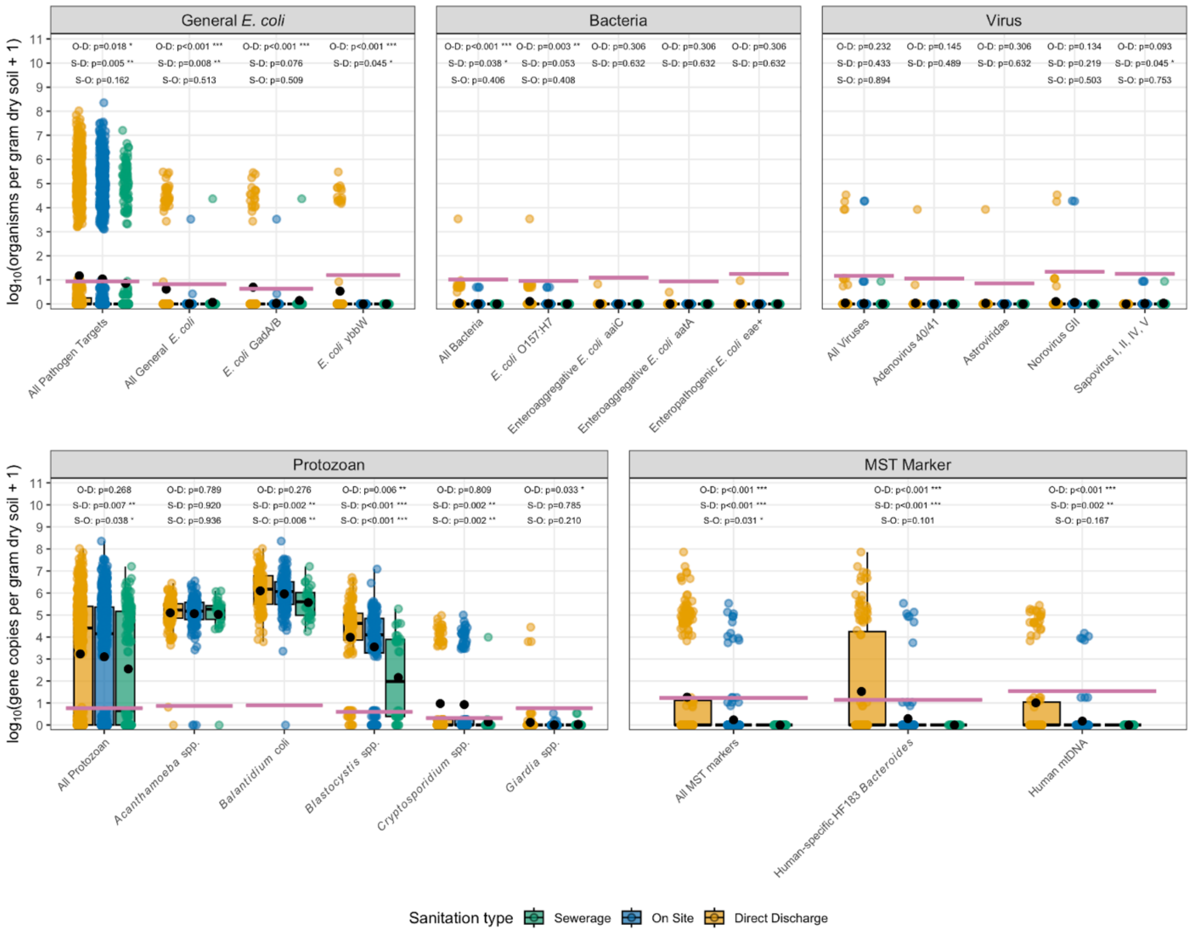


Figure 1: Comparison of pathogens, fecal markers, and microbial source trackers in soil samples by molecular methods during all time points. The top of the boxplot indicates the 25th percentile, the bottom indicates the 75th percentile, and the bolded line indicates the median. The upper and lower whiskers represent the maximum and minimum. The colored points are the values for each unique sample. The black points are the mean. The pink line represents the limit of quantification for each target. O-D (on-site compared to direct discharge), S-D (sewerage compared to direct discharge), and S-O (sewerage compared to on-site) indicates a comparison of the concentration of that particular pathogen, fecal marker of microbial source tracker, collected from households with the specified sanitation via Wilcoxon rank sum (* = p-value < 0.05, ** = p-value < 0.01, and *** = p-value < 0.001).

3.3 Detection and Quantification of Pathogens, Fecal Markers, and Microbial Source Trackers in Wastewater

Over the course of this study, we collected 27 wastewater samples from the sewage lagoon that services Town 2, 15 wastewater samples from septic tanks and cesspools from households in Town 1, and 58 wastewater samples from direct discharge effluent from households in Town 1.

All wastewater samples tested positive for culturable *E. coli* and total coliform. Excluding the assays used for controls, we detected 21 of the 41 pathogens and fecal markers (51%) 2 of the 2 MST trackers (100%) in these wastewater samples (Figure 2).

For samples collected from the sewage lagoon, we detected 20 of the 41 enteric pathogens and fecal markers (49%) and 2 of the 2 MST trackers (100%) (Figure 2 and Table 4). We observed amplification below the LOD of the *Campylobacter jejuni/coli*, *Clostridioides difficile*, *Salmonella enterica* assay in 2 wastewater samples, *Helicobacter pylori* and sapovirus I, II, IV, V in assay 3 samples, and the SARS-CoV-2 assay in 6 wastewater samples collected from the sewage lagoon.

For samples collected from households with on-site sanitation, we detected 11 of the 41 enteric pathogens and fecal markers (27%) and 2 of the 2 MST trackers (100%) (Figure 2 and Table 4). We observed amplification below the LOD of the enteropathogenic *E. coli* bfpA+ assay in 1 wastewater sample collected from households with on-site sanitation.

Finally, for samples collected from direct discharge effluent, we detected 14 of the 41 pathogens and fecal markers (34%) and 2 of the 2 MST trackers (100%) (Figure 2 and Table 4). We observed amplification below the LOD of the enteropathogenic *E. coli* eae+, sapovirus I, II, IV, V, and enteroaggregative *E. coli* aaiC in 1 wastewater sample and enterotoxigenic *E. coli* STp, *Entamoeba histolytica*, *Giardia* spp., and SARS-CoV-2 assay in 2 wastewater samples collected from direct discharge effluent.

It is notable that *Clostridium difficile* was only observed above the LOD in wastewater samples collected from direct discharge effluent. Adenovirus 40/41, astroviridae, enteroaggregative *E. coli* aatA, and *Plesiomonas shigelloides* were only observed above the LOD in wastewater samples collected from direct discharge effluent and sewage lagoon influent. Rotavirus and enteropathogenic *E. coli* eae+ were only observed above the LOD in wastewater samples collected from on-site systems and sewage lagoon influent. Details about targets that appear in at least one soil sample collected from at least one sanitation category can be found in Table 4 and details about all targets can be found in Supplement 15.

All Visits									
	Sewerage			On-site			Direct Discharge		
Target	Value	Mean (organism/g)	95% CI for mean (organism/g)	Value	Mean (organism/g)	95% CI for mean (organism/g)	Value	Mean (organism/g)	95% CI for mean (organism/g)
Virus									
Adenovirus 40/41	5/27	8.38 x 10^{3}	(0.00, 2.01 x 10^{4})	0/15	<LOD	<LOD	1/58	1.85 x 10^{5}	(0.00, 5.56 x 10^{5})
Astroviridae	10/27	2.11 x 10^{4}	(2.60 x 10^{3}, 3.95 x 10^{4})	0/15	<LOD	<LOD	1/58	9.24 x 10^{4}	(0.00, 2.77 x 10^{5})
Human Enterovirus	2/27	2.30 x 10^{-1}	(0.00, 5.60 x 10^{-1})	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Norovirus GI	12/27	3.25 x 10^{5}	(0.00, 7.30 x 10^{5})	1/15	5.86 x 10^{2}	(0, 1.84 x 10^{3})	2/58	1.57 x 10^{5}	(0.00, 4.70 x 10^{5})
Norovirus GII	9/27	2.27 x 10^{4}	(0.00, 4.70 x 10^{4})	3/15	6.01 x 10^{5}	(0, 1.85 x 10^{6})	2/58	5.30 x 10^{5}	(0,00, 1.59 x 10^{6})
Rotavirus	3/27	4.47 x 10^{2}	(0.00, 1.37 x 10^{3})	2/15	1.53 x 10^{6}	(0, 4.82 x 10^{6})	0/58	<LOD	<LOD
Bacteria									
Clostridium difficile	0/27	<LOD	<LOD	0/15	<LOD	<LOD	1/58	6.95 x 10^{3}	(0.00, 2.09 x 10^{4})
E. coli O157:H7	18/27	2.10 x 10^{5}	(0.00, 4.99 x 10^{5})	4/15	5.81 x 10^{3}	(1.38 x 10^{2}, 1.15 x 10^{4})	26/58	2.70 x 10^{7}	(0.00, 7.97 x 10^{7})
Enteroaggregative *E. coli* aaiC	11/27	2.50 x 10^{4}	(5.70 x 10^{3}, 4.42 x 10^{4})	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Enteroaggregative *E. coli* aatA	12/27	3.44 x 10^{4}	(1.85 x 10^{3}, 6.69 x 10^{4})	0/15	<LOD	<LOD	2/58	8.58 x 10^{2}	(0.00, 2.30 x 10^{3})
Enteropathogenic E. coli bfpA+	9/27	1.33 x 10^{4}	(6.90 x 10^{2}, 2.59 x 10^{4})	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Enteropathogenic E. coli eae+	16/27	1.45 x 10^{5}	(5.89 x 10^{4}, 2.31 x 10^{5})	2/15	1.91 x 10^{6}	(0.00, 5.99 x 10^{6})	0/58	<LOD	<LOD
Enterotoxigenic E. coli STp	4/27	3.08 x 10^{4}	(0.00, 6.57 x 10^{4})	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Plesiomonas shigelloides	1/27	1.24	(0.00, 2.61)	0/15	<LOD	<LOD	3/58	5.73 x 10^{4}	(0.00, 1.70 x 10^{5})
General *E.coli*									
E. coli gadA/B	27/27	6.35 x 10^{6}	(2.35 x 10^{6}, 1.03 x 10^{7})	15/15	1.18 x 10^{7}	(0.00, 2.50 x 10^{7})	52/58	9.20 x 10^{7}	(1.84 x 10^{7}, 1.66 x 10^{8})
E. coli ybbW	27/27	5.21 x 10^{6}	(2.33 x 10^{6}, 8.10 x 10^{6})	14/15	7.63 x 10^{6}	(2.47 x 10^{4}, 1.52 x 10^{7})	51/58	1.32 x 10^{8}	(0.00, 3.08 x 10^{8})
Target	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)
MST Markers									
Human Mitochondrial DNA	27/27	5.41 x 10^{6}	(2.04 x 10^{6}, 8.77 x 10^{6})	14/15	8.14 x 10^{8}	(0.00, 1.74 x 10^{9})	51/58	3.66 x 10^{8}	(5.85 x 10^{7}, 6.74 x 10^{8})

Human-specific HF183 *Bacteroides* 16S rRNA genetic marker	27/27	6.25×10^{8}	(2.11×10^{8}, 1.04×10^{9})	12/15	1.01×10^{7}	(0.00, 2.14×10^{7})	50/58	2.77×10^{10}	(0.00, 6.94×10^{10})
Protozoan									
Acanthamoeba spp.	21/27	5.77×10^{5}	(1.97×10^{5}, 9.57×10^{5})	15/15	8.70×10^{9}	(0.00, 2.67×10^{10})	45/57	8.48×10^{7}	(0.00, 1.99×10^{8})
Balantidium coli	27/27	9.68×10^{9}	(1.64×10^{9}, 1.77E+10)	11/15	2.38×10^{8}	(0.00, 7.25×10^{8})	47/56	8.96×10^{8}	(0.00, 2.03×10^{9})
Blastocystis spp.	26/27	1.86×10^{7}	(8.45×10^{6}, 2.87×10^{7})	5/15	3.97×10^{4}	(0.00, 9.14×10^{4})	39/58	4.92×10^{6}	(0.00, 1.12×10^{7})
Cryptosporidium spp.	18/27	1.26×10^{8}	(0.00, 2.62×10^{8})	3/15	6.28×10^{3}	(0.00, 1.62×10^{4})	20/58	7.60×10^{6}	(0.00, 2.16×10^{7})
Giardia spp.	10/27	2.56×10^{4}	(8.38×10^{3}, 4.28×10^{4})	0/15	<LOD	<LOD	0/58	<LOD	<LOD

Table 4: Prevalence, average concentration, and 95% confidence intervals of average concentration of virus, bacteria, general E. coli, MST markers, and protozoan detected in wastewater samples summarized by sanitation category.

As seen in Table 5, we detected a statistically greater prevalence of all pathogens, all viruses, astroviridae, norovirus GI, all bacteria, *E. coli* O157:H7, enteroaggregative *E. coli* aaiC, enteroaggregative *E. coli* aatA, enteropathogenic *E. coli* bfpA+, enteropathogenic *E. coli* eae+, all protozoan, *Balantidium coli, Blastocystis* spp. and *Cryptosporidium* spp., Giardia spp., all MST markers, and human-specific HF183 *Bacteroides* in wastewater collected from sewage lagoon samples when compared to on-site sanitation samples. We detected statistically greater prevalence of all pathogens, all viruses, adenovirus 40/41, astrovirade, norovirus GI and GII, rotavirus, all bacteria, enteroaggregative *E. coli* aaiC, enteroaggregative *E. coli* aatA, enteropathogenic *E. coli* bfpA+, enteropathogenic *E. coli* eae+, enterotoxigenic *E. coli* STp, all protozoan, *Balantidium coli, Blastocystis* spp. and *Cryptosporidium* spp., Giardia spp., all general *E. coli,* and all MST markers in wastewater collected from sewage lagoon samples when compared to direct discharge effluent. We detected a statistically greater prevalence of all viruses, rotavirus, and enteropathogenic *E. coli* eae+ in on-site sanitation wastewater samples when compared to direct discharge effluent. Finally, we detected a statistically greater prevalence of *Blastocystis* spp. in direct discharge effluent when compared to on-site sanitation samples.

As seen in Figure 2 and Table 5, we detected a statistically greater concentration of all pathogens, all viruses, adenovirus 40/41, astroviridae, norovirus GI, all bacteria, *E. coli* O157:H7, enteroaggregative *E. coli* aaiC, enteroaggregative *E. coli* aatA, enteropathogenic *E. coli* bfpA+, enteropathogenic *E. coli* eae+, all protozoan, *Balantidium coli, Blastocystis* spp. and *Cryptosporidium* spp., Giardia spp., and human-specific HF183 *Bacteroides* in wastewater collected from sewage lagoon samples when compared to on-site sanitation samples. We detected a statistically greater concentration of all pathogens, all viruses, adenovirus 40/41, astrovirade, human enterovirus, norovirus GI and GII, rotavirus, all bacteria, enteroaggregative *E. coli* aaiC, enteroaggregative *E. coli* aatA, enteropathogenic *E. coli* bfpA+, enteropathogenic *E. coli* eae+, enterotoxigenic *E. coli* STp, all protozoan, *Balantidium coli, Blastocystis* spp. and *Cryptosporidium* spp., Giardia spp., and human-specific HF183 *Bacteroides* in wastewater collected from sewage lagoon samples when compared to direct discharge effluent. We detected a statistically greater concentration of all viruses, rotavirus, norovirus GII, and enteropathogenic *E. coli* eae+ in on-site sanitation wastewater samples when compared to direct discharge effluent. Finally, we detected a statistically greater concentration of *Blastocystis* spp. and human-specific HF183 *Bacteroides* in direct discharge effluent when compared to on-site sanitation samples.

Target	Sewerage statistically distinct from on-site? (Prevalence/Concentration)	Sewerage statistically distinct from direct discharge? (Prevalence/Concentration)	On-site statistically distinct from direct discharge? (Prevalence/Concentration)
All Pathogens	Yes ($p < 0.001$)/Yes ($p < 0.001$)	Yes ($p < 0.001$)/Yes ($p < 0.001$)	No ($p = 1$)/No ($p = 0.665$)
Virus			
All Viruses	Yes ($p < 0.001$)/Yes ($p < 0.001$)	Yes ($p < 0.001$)/Yes ($p < 0.001$)	Yes ($p = 0.021$)/Yes ($p = 0.029$)
Adenovirus 40/41	No ($p = 0.142$)/Yes ($p = 0.009$)	Yes ($p = 0.011$)/Yes ($p < 0.001$)	No ($p = 1$)/No ($p = 0.484$)

Astroviridae	Yes (p = 0.007)/Yes (p = 0.002)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 1)/No (p = 0.484)
Human Enterovirus	No (p = 0.530)/No (p = 0.302)	No (p = 0.098)/Yes (p =0.039)	NA
Norovirus GI	Yes (p = 0.015)/Yes (p = 0.005)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 0.504)/No (p = 0.822)
Norovirus GII	No (p = 0.485)/No (p = 0.158)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 0.056)/Yes (p = 0.010)
Rotavirus	No (p = 1)/No (p = 0.412)	Yes (p = 0.030)/Yes (p = 0.011)	Yes (p = 0.040)/Yes (p < 0.001)
Bacteria			
All Bacteria	Yes (p < 0.001)/Yes (p < 0.001)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 0.542)/No (p = 0.626)
Clostridium difficile	NA	No (p =1)/No (p = 0.204)	No (p = 1)/No (p = 0.635)
E. coli O157:H7	Yes (p = 0.023)/Yes (p = 0.014)	No (p = 0.068)/No (p = 0.369)	No (p = 0.249)/No (p = 0.271)
Enteroaggregative *E. coli* aaiC	Yes (p = 0.003)/Yes (p < 0.001)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 1)/No (p = 0.484)
Enteroaggregative *E. coli* aatA	Yes (p = 0.003)/Yes (p < 0.001)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 1)/No (p = 0.383)
Enteropathogenic *E. coli* bfpA+	Yes (p = 0.016)/Yes (p = 0.016)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 1)/No (p = 0.053)
Enteropathogenic *E. coli* eae+	Yes (p = 0.008)/Yes (p = 0.001)	Yes (p < 0.001)/Yes (p < 0.001)	Yes (p = 0.040)/Yes (p < 0.001)
Enterotoxigenic *E. coli* STp	No (p = 0.279)/No (p =0.055)	Yes (p = 0.009)/Yes (p = 0.001)	No (p = 1)/No (p = 0.635)
Plesiomonas shigelloides	No (p = 1)/No (p = 0.084)	No (p = 1)/No (p = 0.262)	No (p = 1)/No (p = 0.249)
Protozoan			
All Protozoan	Yes (p < 0.001)/Yes (p < 0.001)	Yes (p < 0.001) /Yes (p < 0.001)	No (p = 0.339)/No (p = 0.275)
Acanthamoeba spp.	No (p = 0.073)/No (p =1)	No (p = 1)/No (p = 0.209)	No (p = 0.060)/No (p = 0.570)
Balantidium coli	Yes (p = 0.012)/Yes (p < 0.001)	Yes (p = 0.028)/Yes (p = 0.002)	No (p = 0.452)/No (p = 0.202)
Blastocystis spp.	Yes (p < 0.001)/Yes (p < 0.001)	Yes (p = 0.002)/Yes (p < 0.001)	Yes (p = 0.036)/Yes (p = 0.018)
Cryptosporidium spp.	Yes (p = 0.009)/Yes (p = 0.001)	Yes (p = 0.009)/Yes (p < 0.001)	No (p = 0.361)/No (p = 0.384)
Giardia spp.	Yes (p = 0.007)/Yes (p < 0.001)	Yes (p < 0.001)/Yes (p < 0.001)	No (p = 1)/No (p = 0.635)
General *E.coli*			
All General *E. coli*	No (p = 0.357)/Yes (p = 0.033)	Yes (p = 0.010)/No (p = 0.570)	No (p = 0.302)/No (p = 0.406)
E. coli gadA/B	No (p = 1)/No (p = 0.088)	No (p = 0.170)/No (p = 0.781)	No (p = 0.335)/No (p = 0.473)
E. coli ybbW	No (p = 0.357)/No (p = 0.181)	No (p = 0.092)/No (p = 0.654)	No (p = 1)/No (p = 0.585)
MST Markers			
All MST Markers	Yes (p = 0.014)/Yes (p = 0.003)	Yes (p = 0.003)/No (p = 0.242)	No (p = 1)/No (p = 0.051)

Human Mitochondrial DNA	No (p = 0.357)/No (p = 0.294)	No (p = 0.092)/No (p = 0.155)	No (p = 1)/No (p = 0.978)
Human-specific HF183 *Bacteroides* 16S rRNA genetic marker	Yes (p = 0.040)/Yes (p < 0.001)	No (p = 0.051)/Yes (p = 0.006)	No (p = 0.686)/Yes (p = 0.008)

Table 5: Comparison of prevalence (Fisher's exact test) and concentration (Wilcoxon rank sum) detected in at least one wastewater sample by sanitation category. White boxes indicate no significant difference in prevalence and concentration. Orange boxes indicate only a significant difference in prevalence or concentration. Green boxes indicate a significant difference in prevalence and concentration. Grey boxes indicate there was not enough information to make a comparison for either prevalence or concentration.

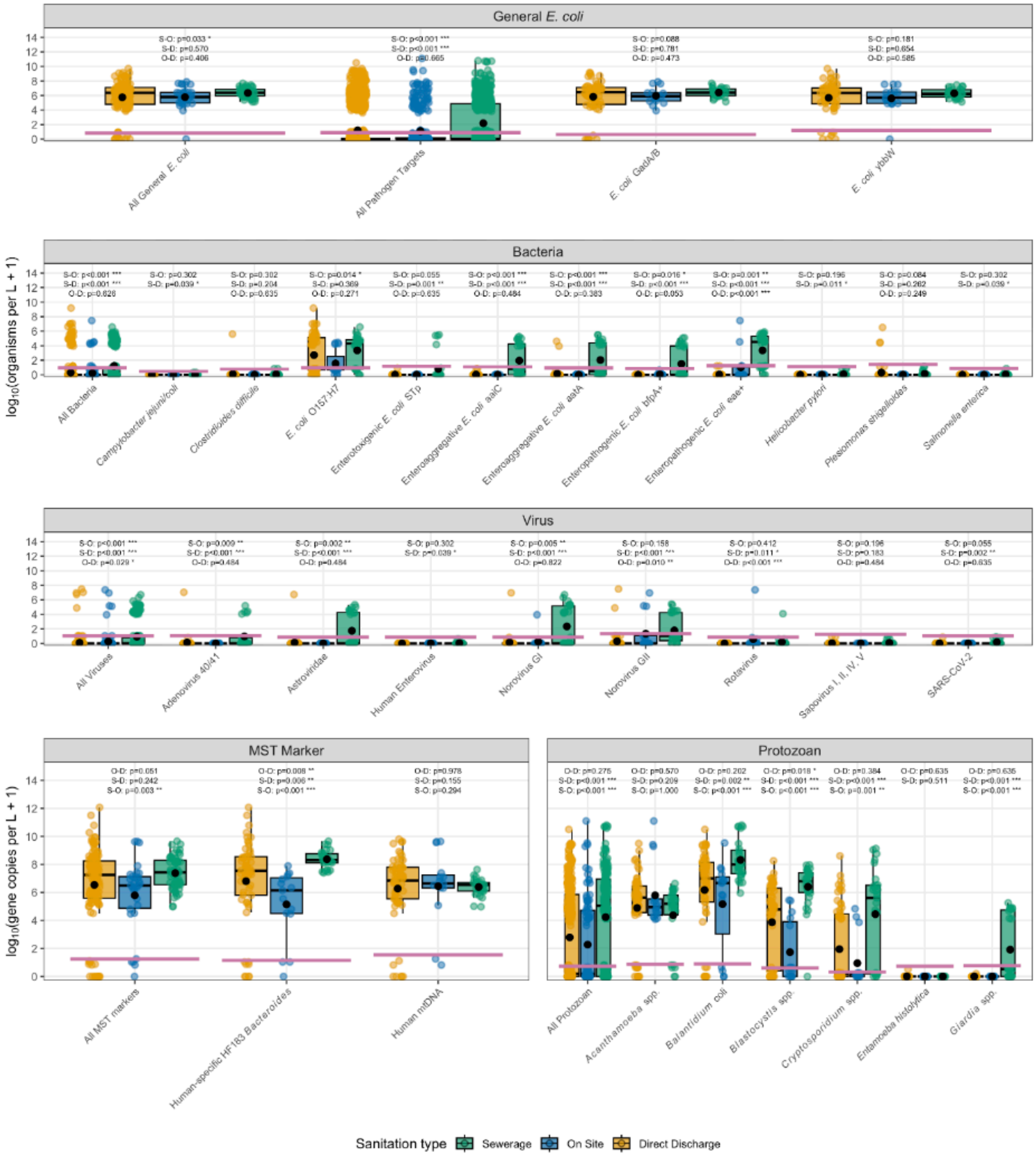


Figure 2: Comparison of pathogens and fecal markers in wastewater samples by molecular methods during all time points. The top of the boxplot indicates the 25th percentile, the bottom indicates the 75th percentile, and the bolded line indicates the median. The upper and lower whiskers represent the maximum and minimum. The colored points are the values for each unique sample. The black points are the mean. The pink line represents the limit of quantification for each target. O-D (on-site compared to direct discharge), S-D (sewerage compared to direct discharge), and S-O (sewerage compared to on-site) indicates a comparison of the concentration of that particular pathogen, fecal marker of microbial

source tracker, collected from households with the specified sanitation via Wilcoxon rank sum (* = p-value < 0.05, ** = p-value < 0.01, and *** = p-value < 0.001).

3.4 Comparison of Pathogens, Fecal Markers, and Microbial Source Trackers Observed in Soil and Wastewater

We consistently detected more pathogens in wastewater samples than soil samples across all sanitation categories. For example, we only detected 5 pathogens and fecal markers and 0 MST markers in soil samples collected from households with sewerage compared to 20 pathogens and fecal markers and 2 MST markers in sewage lagoon influent. All targets that were detected in soil samples were also detected in wastewater samples for that sanitation category except we only detected Giardia spp. in soil samples from households utilizing direct discharge not wastewater samples collected.

4. Discussion and Limitations

Both concentrations of *E. coli* and MST markers were statistically significantly highest in samples from homes utilizing direct discharge. Additionally, more pathogens were recovered from samples collected from homes utilizing direct discharge. These data strongly suggest direct measurable health risks associated with inadequate sanitation. Within the 9-month study period, 52% of the households that did not have access to the municipal sewage lagoon directly discharged their waste to the environment, a percentage seen throughout other studies conducted in the Alabama Black Belt [1], [18]. This suggests that inadequate access to sanitation infrastructure results in the persistent presence of human fecal contamination in the household environment, increasing the risk of pathogen exposure for those households.

The risk of pathogen exposure from raw sewage in the yards of these homes, for households utilizing direct discharge, is a recognized concern [19]. While the majority of households enrolled in this study were connected to municipal drinking water, in keeping with most rural homes reliant on on-site wastewater disposal, homes in the Black Belt are often served by private wells [20]. These wells could be at risk of contamination by raw sewage from failing or non-existent wastewater treatment systems, which, in turn, impacts public health. For example, in Capone et al., researchers identified an increased risk for pathogen detection in children's stool samples among those living in homes served or assumed to be served by well water [21].

While directly discharging wastewater can release pathogens into the environment, residents of the Black Belt are left with little to no alternatives if they are not located in an area served by a municipal wastewater treatment system. Conventional on-site systems, such as septic systems, are generally inappropriate in the Black Belt due to the region's heavy clay soils that are impermeable to water [1]. In fact, a recent systematic review conducted by Gyimah et al. emphasized that poor soil and hydrogeochemical conditions are the primary factor for observed septic contamination of underlying groundwaters [22]. This is evident in this study in a number of ways. First, over the course of the study, August 2024 to May 2025, four of the 42 households (10%) without access to sewerage began the study with an on-site system that then failed. All four households transitioned to direct discharge. This is not uncommon in this area, as recent estimates suggest that 40% - 90% of on-site systems in the Black Belt are functioning poorly or completely failing [23]. In this study, the qPCR data show that in 8 of the 24 households with on-site sanitation (11 of 130 soil samples) tested positive for the human mtDNA or human-specific HF183 *Bacteroides*, indicating that there is human fecal contamination in the environment. None of the soil samples collected from households with sewerage had this marker. With this, we can conclude that even households with on-site sanitation have more human fecal contamination at the household level when compared to households with access to sewerage. With this, we can make the assertion that ⅓ of the on-site systems involved in this study were not adequately functioning. Finally, of the 23 households that reported having a traditional on-site system, only 4 of them reported having a permitted system (17%). This does not necessarily mean that the other 19 households have systems that are not functional or that the ones that do have permits are, but it does mean that those households have not gone through the legal steps to ensure that it is properly installed and functional.

In this study, there were overall higher prevalence and concentrations of pathogens in wastewater influent collected from the sewage lagoon when compared to on-site sludge and direct discharge effluent. These results may initially appear counterintuitive because of our assumption *a priori* that there would be fewer pathogens for those using sewerage when compared to households without access to sewerage. However, it is important to note that wastewater samples collected from direct discharge effluent or on-site systems only served one household compared to the sewage lagoon that served a town of over 2,000 permanent residents, reflecting a broader diversity of individuals contributing waste and enteric pathogens. Furthermore, the sewage lagoon served one of the two public school systems in the county, the only grocery store in the county, gas stations, restaurants, and other places of business with public bathrooms that people in Town 2 and others may use. Thus, the larger population sample resulted in a greater prevalence and density of enteric pathogens we targeted. It is also important to note that the direct discharge effluent had a much more complex matrix than the samples from the sewage lagoon. The direct discharge effluent included a combination of wastewater, surface water, and soil, while the sewage lagoon samples were taken from the lagoon influent and were assumed to be wastewater only. In some cases, we were only able to examine 250 μL of wastewater from direct discharge effluent or on-site systems as compared to the 100 mL of sewage lagoon sample. This represents significantly more of the sewage lagoon sample, resulting in a higher probability of detecting certain pathogens [24].

Our findings should be interpreted alongside several limitations. First, it is important to note that utilizing a failing or absent wastewater treatment system is illegal in the state of Alabama [25]. Fear of penalties or punishments could have also biased the responses of participants, resulting in unreported or misreported characteristics, issues, or costs associated with their wastewater treatment system. We attempted to minimize this bias as much as possible by reassuring the participants that their data was protected and confidential, and by providing all participants the option to opt out of study questions or study activities at any point in time.

Another limitation is that this paper primarily focuses on failing and absent on-site sanitation systems and makes the assumption that the sewerage is safely and reliably collecting, transporting, and treating wastewater. However, these systems can fail, leading to untreated sewerage being discharged into the environment [26]. We attempted to minimize this limitation by working with the sewage lagoon operator who monitored any issues with service. We also surveyed all households involved in this study and asked questions such as: In the past year, have you or anyone in your household seen wastewater under the house, wastewater within 30 feet of the household, wastewater in a pit, cesspool, roadside ditch, or other location, and/or wastewater backed up into your home? Two households responded that they have observed wastewater under the house, and one of those households also observed wastewater within 30 feet of the house. Therefore, it is reasonable to assume that the sewerage in Town 2 was not always functioning as intended.

Another limitation is that we calculated our LOD and LOQ using previously published methods that are quite conservative. For the purpose of this analysis, if a sample had a target that amplified but did not meet the standards set for the LOD, they were treated as non-detects. This could contribute to false negatives for samples we analyzed in small amounts, especially with soil samples that have a complex matrix.

We stored samples in ZymoDNA/RNA shield (Zymo Research), which, according to the manufacturer, should prevent sample degradation due to freeze-thaw. However, our field lab was located in Town 2 and experienced a few power outages during storms. Therefore, while all samples were cultured and stored in the freezer after collection, some of the stored samples underwent multiple freeze-thaw cycles due to those power outages. All samples were also transported from the field lab to short-term storage at the University of Alabama and then transported to long-term storage at the UNCCH. We tried to limit loss of integrity of DNA and RNA as much as possible by transporting samples on ice or dry ice.

Another limitation is that almost all of our soil samples and a few of the wastewater samples were inhibited, leading to our having to dilute those samples before qPCR analysis. It is possible that this step diluted important pathogens, contributing to false negatives. It is also possible that some samples would have yielded more accurate results if they had been diluted but were not, since they met our minimum QA/QC standards.

While we tested each sample analyzed with our custom TAC for 48 enteric pathogens, fecal markers, MSTs, and controls, it is certainly possible that we may have missed other relevant targets. For example, we did not include any MSTs for animals, which could have provided information about environmental contamination due to pets or livestock. We also could have included a variety of other pathogens and fecal markers that are relevant. For example, the Zika virus, which is carried by mosquitoes, is prevalent in places that lack adequate water and sanitation infrastructure and was observed in local outbreaks in 2016 in Florida, which shares a border with Alabama [27], [28], [29].

Additionally, our study may be limited by the limited specificity of the culture-based and molecular-based assays used. The IDEXX Colilery assay was originally developed and validated for use with drinking water. In this study, we analyzed environmental soils which may include a complex community of microbes with β-galactosidase activity, such as *Aeromonas* spp. , which would cross-react with the ONPC-based assay for total coliforms in the Colilert media. Potential cross-reactivity with non-coliforms may limit the conclusions drawn from the measurements of total coliform alone.

Potential cross-reactivity from the molecular-based could lead to false positives. Often, the assays included on TAC were originally developed for analysis of clinical samples. While we aimed to select the most specific assay for each target on our custom TAC, it was not possible to eliminate the risk of cross-reactivity in a complex environmental sample. For example, the assay we included for *Cryptosporidium* spp. targeted the 18s rRNA region of all human-pathogenic *Cryptosporidium*, but the assay is not species-specific [30]. The X gene-specific assay we selected for *Trichuris trichiura,* is differentiated from *Stilesia* spp., *Cotugnia* spp., and *Ascaris* spp. by only one or two single nucleotide polymorphisms. This introduces some uncertainty because it is possible that one of these organisms with similar sequences may be detected. This is a possibility for other assays as well, and, therefore, positive detections should be interpreted as potential evidence of that organism's presence rather than certainty. We also had an assay for *Yersinia enterocolitica* on our custom TAC that consistently did not perform and was entirely removed from our analysis. In future studies, we will either replace this with another relevant pathogen, fecal marker, or MST, or find an assay for *Yersinia enterocolitica* that performs well on TAC.

Despite these limitations, we documented strong evidence of gaps in wastewater treatment service for households that rely on on-site sanitation or direct discharge in the Alabama Black Belt. We observed human fecal markers and pathogens in higher prevalence and concentration in household-level samples collected from households without access compared to households with access to sewerage. Therefore, these data provide evidence for environmental and public health risks associated with absent and failing sanitation infrastructure, and an important baseline for the longer-term project of upgrading infrastructure in this community. Further work should examine how failing or absent sanitation infrastructure shapes the exposure pathways of these pathogens and the corresponding health risks.

References

[1] M. O. Barnett *et al.*, "The Right to Sanitation in the Historic Alabama Black Belt," *Environ. Justice*, Feb. 2025, doi: 10.1089/env.2024.0065.

[2] R. A. Pratt, *Selma's bloody Sunday: Protest, voting rights, and the struggle for racial equality*. JHU Press, 2017.

[3] V. J. Heyer, "Tripping the Iron Feet of Oppression: The Montgomery Bus Boycott as the Starting Point of the Civil Rights Movement," *Thetean Stud. J. Sch. Hist. Writ.*, vol. 23, no. 1, p. 3, 1994.

[4] A. Okeowo, "The Heavy Toll of the Black Belt's Wastewater Crisis," *The New Yorker*, Nov. 23, 2020. Accessed: Nov. 20, 2022. [Online]. Available: https://www.newyorker.com/magazine/2020/11/30/the-heavy-toll-of-the-black-belts-wastewater-crisis

[5] "Office of Public Affairs \textbar Departments of Justice and Health and Human Services Announce Interim Resolution Agreement in Environmental Justice Investigation of Alabama Department of Public Health \textbar United States Department of Justice." May 2023. Accessed: Dec. 12, 2023. [Online]. Available: https://www.justice.gov/opa/pr/departments-justice-and-health-and-human-services-announce-interim-resolution-agreement

[6] I. T. Winkler and C. C. Flowers, "America's Dirty Secret: The Human Right to Sanitation in Alabama's Black Belt," *Columbia Hum. Rights Law Rev.*, vol. 49, no. 1, pp. 181–228, 2018 2017.

[7] J. Maxcy-Brown *et al.*, "The Past, Present, and Future of Wastewater Management in Alabama's Black Belt," *J. Sustain. Water Built Environ.*, vol. 10, no. 4, p. 04024007, Nov. 2024, doi: 10.1061/JSWBAY.SWENG-561.

[8] O. A. Harmon, M. E. J. Lott, M. Elliott, E. McGlohn, and J. Brown, "Environmental pathogen hazards reveal need for improved sanitation infrastructure in Alabama's Black Belt," *PLOS Water*, vol. 5, no. 4, p. e0000393, Apr. 2026, doi: 10.1371/journal.pwat.0000393.

[9] O. A. Harmon *et al.*, “Controlled, before-and-after analysis and pre–post surveys to assess the effects of a community-wide sanitation system on environmental contamination, infection risk and well-being in Alabama’s Black Belt: study protocol,” *BMJ Open*, vol. 16, no. 4, p. e108477, Apr. 2026, doi: 10.1136/bmjopen-2025-108477.
[10] A. C. D.-18 on S. and Rock, “Standard test methods for laboratory determination of water (moisture) content of soil and rock by mass,” ASTM, 2005.
[11] G. P. Yakub *et al.*, “Evaluation of Colilert and Enterolert defined substrate methodology for wastewater applications,” *Water Environ. Res.*, vol. 74, no. 2, pp. 131–135, 2002.
[12] G. W. Characklis, M. J. Dilts, O. D. Simmons III, C. A. Likirdopulos, L.-A. H. Krometis, and M. D. Sobsey, “Microbial partitioning to settleable particles in stormwater,” *Water Res.*, vol. 39, no. 9, pp. 1773–1782, 2005.
[13] M. Kodani and J. M. Winchell, “Engineered combined-positive-control template for real-time reverse transcription-PCR in multiple-pathogen-detection assays,” *J. Clin. Microbiol.*, vol. 50, no. 3, pp. 1057–1060, Mar. 2012, doi: 10.1128/JCM.05987-11.
[14] S. A. Bustin *et al.*, “The MIQE Guidelines: Minimum Information for Publication of Quantitative Real-Time PCR Experiments,” *Clin. Chem.*, vol. 55, no. 4, pp. 611–622, Apr. 2009, doi: 10.1373/clinchem.2008.112797.
[15] A. Forootan, R. Sjöback, J. Björkman, B. Sjögreen, L. Linz, and M. Kubista, “Methods to determine limit of detection and limit of quantification in quantitative real-time PCR (qPCR),” *Biomol. Detect. Quantif.*, vol. 12, pp. 1–6, Jun. 2017, doi: 10.1016/j.bdq.2017.04.001.
[16] R. A. Fisher, “Statistical methods for research workers,” in *Breakthroughs in statistics: Methodology and distribution*, Springer, 1970, pp. 66–70.
[17] F. Wilcoxon, “Individual comparisons by ranking methods,” *Biom. Bull.*, vol. 1, no. 6, pp. 80–83, 1945.
[18] J. Maxcy-Brown, M. A. Elliott, L. A. Krometis, J. Brown, K. D. White, and U. Lall, “Making waves: Right in our backyard- surface discharge of untreated wastewater from homes in the United States,” *Water Res.*, vol. 190, p. 116647, Feb. 2021, doi: 10.1016/j.watres.2020.116647.
[19] E. J. Calabrese *et al.*, “How much soil do young children ingest: an epidemiologic study,” *Regul. Toxicol. Pharmacol. RTP*, vol. 10, no. 2, pp. 123–137, Oct. 1989, doi: 10.1016/0273-2300(89)90019-6.
[20] J. Cook Wedgworth and J. Brown, “Limited Access to Safe Drinking Water and Sanitation in Alabama’s Black Belt: A Cross-Sectional Case Study,” *Water Qual. Expo. Health*, vol. 5, no. 2, pp. 69–74, Jun. 2013, doi: 10.1007/s12403-013-0088-0.
[21] D. Capone *et al.*, “Risk Factors for Enteric Pathogen Exposure among Children in Black Belt Region of Alabama, USA,” *Emerg. Infect. Dis.*, vol. 29, no. 12, Dec. 2023, doi: 10.3201/eid2912.230780.
[22] R. Gyimah, S. Lebu, I. Owusu-Frimpong, S. Semiyaga, A. Salzberg, and M. Manga, “Effluents from septic systems and impact on groundwater contamination: a systematic review,” *Environ. Sci. Pollut. Res.*, vol. 31, no. 54, pp. 62655–62675, Nov. 2024, doi: 10.1007/s11356-024-35385-1.
[23] M. K. Williams and S. Murthy, “Report on the October 25, 2011 Roundtable Meeting with the UN Special Rapporteur on the Human Right to Safe Drinking Water and Sanitation, Catarina De Albuquerque,” in *2011 Roundtable Meeting with the UN Special Rapporteur on the Human Right to Safe Drinking Water and Sanitation, Catarina De Albuquerque (October 2011)*, 2011.

[24] A. Bivins, “Revisiting the Potential Role of Urine in Wastewater Surveillance for COVID-19 and Beyond,” *Environ. Sci. Technol. Lett.*, vol. 12, no. 2, pp. 113–123, Jan. 2025, doi: 10.1021/acs.estlett.4c00911.
[25] C. C. Flowers, J. K. Ward, and I. T. Winkler, “Flushed and Forgotten: Sanitation and Wastewater in Rural Communities in the US | Institute for the Study of Human Rights”, Accessed: Nov. 17, 2022. [Online]. Available: https://www.humanrightscolumbia.org/news/flushed-and-forgotten-sanitation-and-wastewater-rural-communities-us
[26] S. E. Schwetschenau, Y. Kovankaya, M. A. Elliott, M. Allaire, K. D. White, and U. Lall, “Optimizing Scale for Decentralized Wastewater Treatment: A Tool to Address Failing Wastewater Infrastructure in the United States,” *ACS EST Eng.*, vol. 3, no. 1, pp. 1–14, Dec. 2022, doi: 10.1021/acsestengg.2c00188.
[27] A. Likos, “Local Mosquito-Borne Transmission of Zika Virus — Miami-Dade and Broward Counties, Florida, June–August 2016,” *MMWR Morb. Mortal. Wkly. Rep.*, vol. 65, 2016, doi: 10.15585/mmwr.mm6538e1.
[28] A. S. Akanda, K. Johnson, H. S. Ginsberg, and J. Couret, “Prioritizing water security in the management of vector-borne diseases: Lessons from Oaxaca, Mexico,” *GeoHealth*, vol. 4, no. 3, p. e2019GH000201, 2020.
[29] J. Pinchoff, M. Silva, K. Spielman, and P. Hutchinson, “Use of effective lids reduces presence of mosquito larvae in household water storage containers in urban and peri-urban Zika risk areas of Guatemala, Honduras, and El Salvador,” *Parasit. Vectors*, vol. 14, no. 1, p. 167, Mar. 2021, doi: 10.1186/s13071-021-04668-8.
[30] J. Liu *et al.*, “A laboratory-developed TaqMan Array Card for simultaneous detection of 19 enteropathogens,” *J. Clin. Microbiol.*, vol. 51, no. 2, pp. 472–480, Feb. 2013, doi: 10.1128/JCM.02658-12.

Supplement 1: Soil Sample Collection, Culturing, and Processing

At the lab place the 6 barcodes that will correspond with each soil sample on the 6 whirl pack bags.

- At the household you are sampling from get shovel for unimpacted soil, 3 whirl pack bags, a yard stick, and a sharpie.
- If this is your first visit randomly select an unimpacted area of the household's front yard (verify with the participant that it is assumed to be an unimpacted area) and collect the top layer of that soil into a whirl pack bag labeled unimpacted #1. If this is a return visit make sure to sample from the same location as the first visit.
- If this is your first visit randomly select a 2nd unimpacted area of the household's front yard and collect the top layer of that soil into a whirl pack bag labeled unimpacted #2. If this is a return visit make sure to sample from the same location as the first visit.
- If this is your first visit randomly select a 3rd unimpacted area of the household's front yard and collect the top layer of that soil into a whirl pack bag labeled unimpacted #3. If this is a return visit make sure to sample from the same location as the first visit.
- Return to your car and put all three sample bags in the cooler with ice.
- Fill out the sample checklist for unimpacted soil.
- Rinse off the unimpacted shovel with bleach then rinse with ethanol and put it on top of the cooler to dry.
- Get shovel for impacted soil, 3 whirl pack bags, a yard stick, and a sharpie
- Identify impacted soil site.
- At site of impact collect the top layer of that soil into a whirl pack bag labeled impacted #1.
- Use yard stick to move 1 ft away from impacted site and collect the top layer of that soil into a whirl pack bag labeled impacted #2.
- Use yard stick to move 3 ft away from impacted site and collect the top layer of that soil into a whirl pack bag labeled impacted #3.
- Return to your car and put all three sample bags in the cooler with ice.
- Fill out the sample checklist for impacted soil.
- Rinse off the shovel with bleach then rinse with ethanol and put it on top of the cooler to dry.

Weighing Soil (2 barcode label used per sample = 16 total):

- Preheat the oven to 105°C (221°F)
- Gather 2 scoops, 8 metal weigh boats, 4 whirl pack bags, 4 tubes with Zymo DNA/RNA Shield, 2 empty tubes, and 3 sample boxes.
- Open the bag labeled unimpacted #1.
- Using a clean and autoclaved metal scoop measure out roughly 2 grams of soil from unimpacted #1 in a clean metal weigh boat. Record EXACT weight in grams (3 decimal places) on the sample checklist in the row titled "Unimpacted #1" in the column titled "Amount in Mix"**.**
- Using a black sharpie label whirl pack bag with the household code, unimpacted soil (US), and C for combination (for example: HHXX-US-C).
- Put all the soil you weighted into the labeled whirl pack bag.
- Using the same metal scoop and weigh boat measure out another 2 grams of unimpacted #1 soil for the moisture test. Record EXACT weight in grams (3 decimal places) on the sample checklist in the row titled "Unimpacted #1" in the column titled "Moisture Before"**.**
- Place metal weigh boat with soil on a tray in a safe place until all other soil samples are ready for a moisture test.
- Repeat for Unimpacted #2 and #3

- The whirl pack bag labeled with the household code, unimpacted soil (US), and C for combination (for example: HHXX-US-C) should have roughly 6 grams of soil made up of samples from unimpacted #1, #2, and #3. Use your hands to homogenize the soil by massaging the outside of the bag for 30 seconds.
- Place a barcode label on a tube with Zymo DNA/RNA Shield and label with the printed barcode corresponding to that household, visit number, sample type, and aliquot A or B (for example: HHXX-VXX-US-CA).
- Repeat for 2nd aliquot (for example: HHXX-VXX-US-CB)
- Open the tube and place it on the scale and tarr the scale.
- Weigh out roughly 0.25 grams of the soil mixture and place it in the first tube with Zymo DNA/RNA Shield labeled HHXX-VXX-US-CA.
- Record EXACT weight in grams (3 decimal places) on the sample checklist in the row titled "Unimpacted MIX" in the column titled "1st Tube Amount"**.**
- Close the tube and place it in the sample box for "A" soil samples then place in freezer for short term storage.
- Repeat for 2nd aliquot. Open the tube and place it on the scale and tarr the scale. Weigh out roughly 0.25 grams of the soil mixture and place it in the first tube with Zymo DNA/RNA Shield labeled HHXX-VXX-US-CB. Record EXACT weight in grams (3 decimal places) on the sample checklist in the row titled "Unimpacted MIX" in the column titled "2nd Tube Amount"**.** Close the tube and place it in the sample box for "B" soil samples then place in freezer for short term storage.
- Use a clean weigh boat and metal scoop to weigh out 3 grams of soil to culture via IDEXX. Record EXACT weight in grams (3 decimal places) on the sample checklist in the row titled "Unimpacted MIX" in the column titled "IDEXX Amount"**.**
- Using a black sharpie label whirl pack bag with the household code, unimpacted soil (US), and IDEXX (for example: HHXX-US-IDEXX).
- Place all the soil you weighted into the labeled whirl pack bag (HHXX-US-IDEXX).
- Set this bag aside until all soil samples are ready to IDEXX.
- Take an empty tube and label it with the household code, visit number, and sample type (for example: HHXX-VXX-US).
- Using the same metal scoop fill that tube with the composite unimpacted soil sample and place it in the 3rd sample box labeled "Aliquots" for storage.
- Repeat ALL these steps with the impacted soil.
- Once all 6 soil samples have been measured place the moisture test samples in the oven.
- Record the start time and temperature on sample check list and set a timer for 2 hours.
- Place all the metal weigh boats and scoops in the bleach bath.
- Place all remaining soil in the refrigerator until all sample processing is complete and then put the soil in an autoclave bag.
- After two hours is over then take samples out of the oven and reweigh them on the scale.
- Record the end time on the sample checklist.
- Record EXACT weight in grams (3 decimal places) on the sample checklist in the row titled "Unimpacted #1-#3" or "Impacted #1-#3" in the column titled "Moisture After"**.**
- Record the results from the moisture test and measurements from the "Mix In" column in the spreadsheet titled "SOIL_TP#" for "Unimpacted #1-#3" or "Impacted #1-#3" samples.
- Record the measurements from "1st tube amount", "2nd tube amount", and "IDEXX Amount" in the excel file titled "RawData_TP#" in the sheet SOIL.
- Record what sample box and position in that sample box each soil sample is in the spreadsheet titled "archive inventory_#"

IDEXX Preparation

- Gather 4 whirl pack bags, a sharpie, 4 colilert chemical packs, 4 IDEXX trays, 1 graduated cylinders, two 10 mL pipette tips, 1 automatic pipette, 1 beaker, 1 clean tub, and at least 438 mL of PBS.
- Take the whirl pack bag labeled HHXX-US-IDEXX that contains 3 grams of composite unimpacted soil and measure out 30 mL of 1X PBS using the graduated cylinder.
- Add 30 mL of 1X PBS to the whirl pack bag with the 3 g of unimpacted composite sample.
- Shake for 30 sec or until completely homogenized. Use fingers to massage the outside of the whirl pack bag to remove any clumps.
- Place bag right side up in a clean tub for storage.
- Label a whirl pack bag with the household code, type of soil (US/IS), "C" for Colilert, and the amount of the composite soil you will be adding in mL (10) (for example: HHXX- US-C10).
- Open that bag and measure out 90 mL of PBS.
- Then use the 10 mL pipette tip and the automatic pipette to measure 10 mL of the unimpacted soil PBS mixture to place into the whirl pack bag for dilution #1.
- Shake for 30 sec or until completely homogenized.
- Label a whirl pack bag with the household code, type of soil (US/IS), "C" for Colilert, and the amount of the composite soil you will be adding in mL (1) (for example: HHXX- US-C1).
- Open that bag and measure out 99 mL of PBS.
- Then use the 10 mL pipette tip and the automatic pipette to measure 1 mL of the unimpacted soil PBS mixture to place into the whirl pack bag for dilution #2.
- Shake for 30 sec or until completely homogenized.
- Repeat these steps for the composite impacted soil sample.
- By the end you should have 4 whirl pack bags labeled "HHXX-US-C10", "HHXX-US-C1", "HHXX-IS-C10", and "HHXX-IS-C1".
- Place all bags in the clean tub until all other households and sample types (see SOP for drinking water, wastewater, surface water, and controls) have been prepped for IDEXX.

IDEXX

- Once all households and sample types have been prepped for IDEXX place Colilert-18 powder in the whirl pack bag and shake for at least 30 seconds to dissolve (make sure there are no viable clumps of IDEXX powder).
- Place back in the clean tub for storage. Label an empty IDEXX tray with the printed barcode that has a QR code and the households number, visit number, sample type, and dilution (for example: HHXX-VXX-US-CXX).
- Pour the contents of the whirl pack bag that contains the dilution sample type from the household that corresponds to the IDEXX tray label.
- Seal the tray.
- Set aside in a safe place until all the IDEXX trays ready for incubation.
- Place all trays in the incubator set to 35°C for 18 hours.
- Record start time on the sample check list.

Supplement 2: Wastewater Sample Collection, Culturing, and Processing

If a household has pools of water in the back or front yard (evident of failing sanitation) or the discharge site for the straight pipe is too liquidly and therefore cannot be treated as a solid wastewater sample, we will treat the sample as a liquid and if it more solid then we will trat the sample as a solid.

Collection:

- At the lab place the printed barcode corresponding to that household, visit number, sample type, and bottle 1 (for example: HHXX-VXX-WW-1) on a sterilized 0.5 L sample bottle (for liquid samples) and another printed barcode (HHXX-VXX-WW-2) on a 50 mL conical tube (for solid samples).
- Gather sample grabber, gloves, the labeled 0.5 L bottle, the labeled 50 mL sample bottle and a whirl pack bag.
- Ask the household to help you identify the septic tank, cesspool, or straight pipe discharge site.
    - If there is a septic tank or cesspool use the sample grabber to get the solids that have settled to the bottom of the tank.
    - If it is a straight pipe then get as much of the liquids as possible without getting a lot of soil.
- After you are done collecting the wastewater place the bottle in the whirl pack bag and seal it.
- Return to your card and put the tube in a whirl pack in the cooler with ice.

Solid: Weighing Wastewater:

- Take the 50 mL bottle out of the cooler and put the bottle on a bottle stand so all the solids can settle to the bottom.
    - o After all the other samples have been processed the solids should have settled to the bottom.
- Gather a sharpie, 1 hoop, one disposable weigh boat, 2 tubes with Zymo DNA/RNA Shield, 1 empty tube, 1 clean 50 mL conical tubes, and 3 sample boxes.
- Place a barcode label on a tube with Zymo DNA/RNA Shield and label with the printed barcode corresponding to that household, visit number, sample type, and aliquot 1 or 2 (for example: HHXX-VXX-WW-1).
- Repeat for 2nd aliquot (for example: HHXX-VXX-WW-2)
- Open the tube and place it on the scale and tarr the scale.
- Get a hoop and open the 50 mL bottle of solid wastewater that has settled to the bottom.
- Using the hoop measure out 0.25 g of the solids into the labeled Zymo DNA/RNA Shield tube.
- Record EXACT weight (3 decimal places) on the sample checklist in the sludge section in the column titled "1st Tube Amount"**.**
- Close the tube and place it in the sample box for "A" wastewater samples then place in freezer for short term storage.
- Repeat for 2nd aliquot. Open the tube and place it on the scale and tarr the scale. Weigh out roughly 0.25 grams of the wastewater solids and place it in the first tube with Zymo DNA/RNA Shield labeled HHXX-VXX-WW-2. Record EXACT weight in grams (3 decimal places) on the sample checklist on the sample checklist in the sludge section in the column titled "2nd Tube Amount"**.** Close the tube and place it in the sample box for "B" wastewater samples then place in freezer for short term storage.
- Clear the weight on the scale.
- Take the 50 mL conical tube and label it with the household code and sample type (for example: HHXX-WW)
- Put the 50 mL labeled conical tube on the scale and tarr the scale.
- Using the same hoop weight out 1 g of solid wastewater then put that wastewater in 50 mL labeled conical tube.

- Record EXACT weight (3 decimal places) in the RawData_TPX Spreadsheet in the sheet WW in the column titled IDEXX_g.
- Put the 50 mL labeled conical tube 1 g of wastewater in the refrigerator until time to IDEXX.
- Take an empty tube and label it with the household code, visit number, and sample type (for example: HHXX-VXX-WW).
- Using the same hoop fill that tube with wastewater and place it in the 3rd sample box labeled "Aliquots" for storage.
- Place ample boxes in the freezer until it is time to move them to Tuscaloosa for long time storage.
- Place all hoops in autoclave bag.
- Place remaining wastewater in the refrigerator until all samples have been processed and the put them in the autoclave bag.
- Record what sample box and position in that sample box each sample is in the spreadsheet titled "archive inventory_#"

Liquid: Membrane Filtration

- Gather 1 50 mL beaker filled with 70% ethanol, 2 sets of tweezers, a lighter, 2 47-mm Millipore HA filters, 2 tubes with Zymo DNA/RNA Shield, 1 empty tube, 3 sample boxes, 1 50 mL conical tube, 1 10 mL pipette, an automatic pipette, and a membrane filtration apparatus.
- Place a label on a tube with Zymo DNA/RNA Shield labeled with the printed barcode corresponding to that household, visit number, sample type, and aliquot 1 or 2 (for example: HHXX-VXX-WW-1).
- Repeat for 2nd aliquot (for example: HHXX-VXX-WW-2)
- Set up a membrane filtration apparatus.
- Flush the filtration apparatus, with no filter in place, 3 times with 100 mL of DI water.
- Use sterilized tweezers to remove a 47-mm Millipore HA filter from its packaging and place it on the stainless base of the membrane filtration set up.
- Place tweezers in the 50 mL beaker filled with 70% ethanol.
- Reassemble the filtration apparatus and turn on the vacuum pump.
- Measure 100 mL of the wastewater grab sample in a graduated cylinder.
- Record EXACT volume in the RawData_TP1 Spreadsheet in sheet WW in the column titled Filter1_mL.
- Pour the sample into the funnel and wait until all of the liquid has moved through the filter.
- After the entire sample has filtered disassemble the apparatus and use two tweezers (burn off excess ethanol with a lighter) to roll up the filter and place that filter in a labeled DNA/RNA Shield Collection Tube.
- Place tweezers in the 50 mL beaker filled with 70% ethanol.
- Place tube in the 1st sample box.
- Repeat all steps with the 2nd aliquot.
- Place tube in the 2nd sample box.
- Take the 50 mL conical tube and label it with the household code and sample type (for example: HHXX-WW)
- Using the 10 mL pipette measure 1 mL of wastewater and place it in then50 mL labeled conical tube.
- Put the 50 mL labeled conical tube 1 mL of wastewater in the refrigerator until time to IDEXX.
- Take an empty tube and label it with the household code, visit number, and sample type (for example: HHXX-VXX-WW).
- Fill that tube to the top with the wastewater from that household and place it in the 3rd sample box labeled "Aliquots" for storage.
- Place all three sample boxes into the freezer until it is time to move them to Tuscaloosa for long time storage.
- Record what sample box and position in that sample box each sample is in the spreadsheet titled "archive inventory_#"

IDEXX Preparation

- Gather 1 50 mL clean conical tube, 2 whirl pack bags, a sharpie, 2 Colilert chemical packs, 2 IDEXX tray, a clean tub, and 1 graduated cylinder.
- Label the whirl pack bags with the household code, sample type, and the type of IDEXX powder you are using, and dilution (for example: HH##-WW-C10).
- Using the 100 mL graduated cylinder measure out 90 mL of 1X PBS to the whirl pack bag labeled HH##-WW -C10
- Using the 100 mL graduated cylinder measure out 99 mL of 1X PBS to the whirl pack bag labeled HH##-WW -C1
- Close the whirl pack bag and place it into the clean tub
- Take the 50 mL conical tube of wastewater sample (containing 1 mL liquids or 1 g solids) from the refrigerator.
- Measure out 9 mL of 1X PBS using the graduated cylinder and place it in the 50 mL conical tube containing the wastewater sample.
- Shake for 30 Sec of until completely homogenized.
- Take the clean 50 mL conical tube and label it with the household code, sample type, and ending dilution concentration (10^-2) .
- Measure out 27 mL of 1X PBS using the graduated cylinder and place it in the clean 50 mL conical tube.
- Using the 10 mL pipette measure out 3 mL of the 10^-1 dilution from the first tube and place it in the clean 50 mL conical tube with 27 mL of PBS.
- Shake for 30 Sec of until completely homogenized.
- Then use the 10 mL pipette tip and the automatic pipette to measure 10 mL of the 10^-2 dilution wastewater sample to place into the whirl pack bag labeled HH##-WW -C10.
- Use the 10 mL pipette tip and the automatic pipette to measure 1 mL of the 10^-2 dilution wastewater sample to place into the whirl pack bag labeled HH##-WW -C1.
- The dilutions should follow this table:

Input concentration	Amount (mL)	PBS amount mL	Ending Amount	Ending Concertation
Sample	1	9	10	10^-1
10^-1	3	27	30	10^-2
10^-2	10	90	100	10^-3
10^-3	1	99	100	10^-4

- Close the whirl pack bag and shake for 30 sec or until completely homogenized.
- Close the whirl pack bag and place it into the clean tub until all other households and sample types (see SOP for soil, surface water, drinking water, and controls) have been prepped for IDEXX.
- Record exact measurement in the RawData_TP# Spreadsheet in sheet WW in the column titled CDilution1_mL and CDilution2_mL.

IDEXX

- Once all households and sample types have been prepped for IDEXX place Colilert-18 powder in the whirl pack bag and shake for at least 30 seconds to dissolve (make sure there are no viable clumps of IDEXX powder).
- Place back in the clean tub for storage. Label an empty IDEXX tray with the printed barcode that has a QR code and the households number, visit number, sample type, and dilution (for example: HHXX-VXX-WW-C).

- Pour the contents of the whirl pack bag that contains the dilution sample type from the household that corresponds to the IDEXX tray label.
- Seal the tray.
- Set aside in a safe place until all the IDEXX trays ready for incubation.
- Place all trays in the incubator set to 35°C for 18 hours.
- Record start time on the sample check list.

Supplement 3: Moisture test results and amount of soil in each composite

HHNo	VisitNo	Type	Date	BarNo	Before Moisture Test	After Moisture Test	MTF	Amount In Composite
HH01	V01	IS	2024-08-05	HH01-V01-IS-1	2.107	1.864	1.30E-01	2.031
HH01	V01	IS	2024-08-05	HH01-V01-IS-2	2.145	2.132	6.10E-03	2.09
HH01	V01	IS	2024-08-05	HH01-V01-IS-3	2.135	2.031	5.12E-02	2.092
HH01	V01	US	2024-08-05	HH01-V01-US-1	2.076	2.043	1.62E-02	2.011
HH01	V01	US	2024-08-05	HH01-V01-US-2	2.104	1.908	1.03E-01	2.005
HH01	V01	US	2024-08-05	HH01-V01-US-3	2.16	1.866	1.58E-01	2.052
HH02	V01	IS	2024-08-05	HH02-V01-IS-1	2.076	1.745	1.90E-01	2.152
HH02	V01	IS	2024-08-05	HH02-V01-IS-2	2.155	1.866	1.55E-01	2.004
HH02	V01	IS	2024-08-05	HH02-V01-IS-3	2.011	1.552	2.96E-01	2
HH02	V01	US	2024-08-05	HH02-V01-US-1	2.062	1.848	1.16E-01	2.113
HH02	V01	US	2024-08-05	HH02-V01-US-2	2.191	1.794	2.21E-01	2.071
HH02	V01	US	2024-08-05	HH02-V01-US-3	2.156	1.827	1.80E-01	2.102
HH04	V01	IS	2024-08-07	HH04-V01-IS-1	3.491	3.256	7.22E-02	2
HH04	V01	IS	2024-08-07	HH04-V01-IS-2	3.351	3.165	5.88E-02	2
HH04	V01	IS	2024-08-07	HH04-V01-IS-3	3.13	2.956	5.89E-02	2
HH04	V01	US	2024-08-07	HH04-V01-US-1	3.41	3.33	2.40E-02	2
HH04	V01	US	2024-08-07	HH04-V01-US-2	3.393	3.281	3.41E-02	2
HH04	V01	US	2024-08-07	HH04-V01-US-3	4.417	4.276	3.30E-02	2
HH03	V01	IS	2024-08-08	HH03-V01-IS-1	3.305	3.129	5.62E-02	2.161
HH03	V01	IS	2024-08-08	HH03-V01-IS-2	3.615	3.413	5.92E-02	2.118
HH03	V01	IS	2024-08-08	HH03-V01-IS-3	3.723	3.413	9.08E-02	2.115
HH03	V01	US	2024-08-08	HH03-V01-US-1	3.357	3.139	6.94E-02	2.105
HH03	V01	US	2024-08-08	HH03-V01-US-2	3.325	3.081	7.92E-02	2
HH03	V01	US	2024-08-08	HH03-V01-US-3	3.302	3.062	7.84E-02	2.108
HH05	V01	US	2024-08-12	HH05-V01-US-1	4.642	4.272	8.66E-02	2.009
HH05	V01	US	2024-08-12	HH05-V01-US-2	4.158	4.006	3.79E-02	2.386

HH05	V01	US	2024-08-12	HH05-V01-US-3	4.436	4.244	4.52E-02	2.077
HH06	V01	US	2024-08-12	HH06-V01-US-1	4.272	4.099	4.22E-02	3.172
HH06	V01	US	2024-08-12	HH06-V01-US-2	3.251	3.059	6.28E-02	3.176
HH06	V01	US	2024-08-12	HH06-V01-US-3	4.319	4.217	2.42E-02	3.065
HH07	V01	US	2024-08-13	HH07-V01-US-1	3.149	3.034	3.79E-02	2.085
HH07	V01	US	2024-08-13	HH07-V01-US-2	3.292	3.149	4.54E-02	2.115
HH07	V01	US	2024-08-13	HH07-V01-US-3	4.32	4.126	4.70E-02	2.082
HH08	V01	IS	2024-08-13	HH08-V01-IS-1	3.106	2.702	1.50E-01	2.136
HH08	V01	IS	2024-08-13	HH08-V01-IS-2	4.509	4.029	1.19E-01	2.154
HH08	V01	IS	2024-08-13	HH08-V01-IS-3	4.154	3.812	8.97E-02	2.072
HH08	V01	US	2024-08-13	HH08-V01-US-1	4.297	4.149	3.57E-02	3.042
HH08	V01	US	2024-08-13	HH08-V01-US-2	4.187	3.736	1.21E-01	3.106
HH08	V01	US	2024-08-13	HH08-V01-US-3	4.029	3.523	1.44E-01	3.113
HH09	V01	IS	2024-08-19	HH09-V01-IS-1	3.712	3.174	1.70E-01	2.052
HH09	V01	IS	2024-08-19	HH09-V01-IS-2	3.894	3.306	1.78E-01	2.086
HH09	V01	IS	2024-08-19	HH09-V01-IS-3	3.724	3.212	1.59E-01	2.235
HH09	V01	US	2024-08-19	HH09-V01-US-1	3.185	2.928	8.78E-02	2.073
HH09	V01	US	2024-08-19	HH09-V01-US-2	3.795	3.343	1.35E-01	2.06
HH09	V01	US	2024-08-19	HH09-V01-US-3	3.656	2.971	2.31E-01	2.176
HH10	V01	US	2024-08-19	HH10-V01-US-1	3.234	3.009	7.48E-02	2.026
HH10	V01	US	2024-08-19	HH10-V01-US-2	3.369	3.123	7.88E-02	2.048
HH10	V01	US	2024-08-19	HH10-V01-US-3	3.227	2.991	7.89E-02	2.101
HH11	V01	IS	2024-08-21	HH11-V01-IS-1	4.25	3	4.17E-01	2.047
HH11	V01	IS	2024-08-21	HH11-V01-IS-2	3.611	2.977	2.13E-01	2.081
HH11	V01	IS	2024-08-21	HH11-V01-IS-3	3.721	3.153	1.80E-01	2.031
HH11	V01	US	2024-08-21	HH11-V01-US-1	13.155	6.661	9.75E-01	1.7112
HH11	V01	US	2024-08-21	HH11-V01-US-2	4.18	2.534	6.50E-01	2.273
HH11	V01	US	2024-08-21	HH11-V01-US-3	2.832	2.514	1.26E-01	2.063

HH12	V01	IS	2024-08-21	HH12-V01-IS-1	2.888	2.571	1.23E-01	2.102
HH12	V01	IS	2024-08-21	HH12-V01-IS-2	3.297	2.831	1.65E-01	2.136
HH12	V01	IS	2024-08-21	HH12-V01-IS-3	3.769	3.355	1.23E-01	2.086
HH12	V01	US	2024-08-21	HH12-V01-US-1	3.386	2.945	1.50E-01	2.119
HH12	V01	US	2024-08-21	HH12-V01-US-2	3.702	2.529	4.64E-01	2.042
HH12	V01	US	2024-08-21	HH12-V01-US-3	4.709	2.83	6.64E-01	2.404
HH13	V01	US	2024-08-29	HH13-V01-US-1	4	3.839	4.19E-02	2.192
HH13	V01	US	2024-08-29	HH13-V01-US-2	3.102	2.996	3.54E-02	2.134
HH13	V01	US	2024-08-29	HH13-V01-US-3	3.495	3.367	3.80E-02	2.071
HH14	V01	US	2024-08-29	HH14-V01-US-1	3.808	3.727	2.17E-02	2.065
HH14	V01	US	2024-08-29	HH14-V01-US-2	3.114	3.055	1.93E-02	2.109
HH14	V01	US	2024-08-29	HH14-V01-US-3	5.564	5.494	1.27E-02	2.102
HH15	V01	US	2024-09-02	HH15-V01-US-1	3.433	3.391	1.24E-02	2.266
HH15	V01	US	2024-09-02	HH15-V01-US-2	3.824	3.713	2.99E-02	2.201
HH15	V01	US	2024-09-02	HH15-V01-US-3	4.124	3.995	3.23E-02	2.223
HH15	V01	IS	2024-09-02	HH15-V01-IS-1	3.828	3.433	1.15E-01	2.426
HH15	V01	IS	2024-09-02	HH15-V01-IS-2	3.572	3.262	9.50E-02	2.349
HH15	V01	IS	2024-09-02	HH15-V01-IS-3	3.909	3.609	8.31E-02	2.366
HH51	V01	US	2024-09-02	HH51-V01-US-1	4.031	4.006	6.24E-03	2.19
HH51	V01	US	2024-09-02	HH51-V01-US-2	3.248	3.196	1.63E-02	2.021
HH51	V01	US	2024-09-02	HH51-V01-US-3	3.836	3.333	1.51E-01	2.044
HH51	V01	IS	2024-09-02	HH51-V01-IS-1	4.476	4.052	1.05E-01	2.093
HH51	V01	IS	2024-09-02	HH51-V01-IS-2	3.513	3.205	9.61E-02	2.023
HH51	V01	IS	2024-09-02	HH51-V01-IS-3	3.283	3.021	8.67E-02	2.0185
HH16	V01	US	2024-09-04	HH16-V01-US-1	3.483	3.436	1.37E-02	2.285
HH16	V01	US	2024-09-04	HH16-V01-US-2	4.761	4.694	1.43E-02	2.313
HH16	V01	US	2024-09-04	HH16-V01-US-3	4.593	4.579	3.06E-03	2.221
HH16	V01	IS	2024-09-04	HH16-V01-IS-1	3.386	2.844	1.91E-01	2.182

HH16	V01	IS	2024-09-04	HH16-V01-IS-2	4.907	4.84	1.38E-02	2.223
HH16	V01	IS	2024-09-04	HH16-V01-IS-3	5.357	4.437	2.07E-01	2.286
HH17	V01	US	2024-09-04	HH17-V01-US-1	4.78	4.73	1.06E-02	2.157
HH17	V01	US	2024-09-04	HH17-V01-US-2	4.773	4.692	1.73E-02	2.092
HH17	V01	US	2024-09-04	HH17-V01-US-3	4.874	4.09	1.92E-01	2.108
HH17	V01	IS	2024-09-04	HH17-V01-IS-1	4.868	3.296	4.77E-01	2.267
HH17	V01	IS	2024-09-04	HH17-V01-IS-2	8.013	5.527	4.50E-01	2.468
HH17	V01	IS	2024-09-04	HH17-V01-IS-3	5.465	4.829	1.32E-01	2.214
HH18	V01	US	2024-09-07	HH18-V01-US-1	4.333	3.837	1.29E-01	2.11
HH18	V01	US	2024-09-07	HH18-V01-US-2	3.503	2.973	1.78E-01	2.022
HH18	V01	US	2024-09-07	HH18-V01-US-3	2.888	2.11	3.69E-01	2.037
HH18	V01	IS	2024-09-07	HH18-V01-IS-1	5.939	4.948	2.00E-01	2.395
HH18	V01	IS	2024-09-07	HH18-V01-IS-2	4.9	4.316	1.35E-01	2.265
HH18	V01	IS	2024-09-07	HH18-V01-IS-3	7.123	4.787	4.88E-01	2.333
HH19	V01	US	2024-09-09	HH19-V01-US-1	3.354	3.105	8.02E-02	2.307
HH19	V01	US	2024-09-09	HH19-V01-US-2	3.235	2.856	1.33E-01	2.118
HH19	V01	US	2024-09-09	HH19-V01-US-3	6.346	5.993	5.89E-02	2.02
HH19	V01	IS	2024-09-09	HH19-V01-IS-1	3.439	3.227	6.57E-02	2.03
HH19	V01	IS	2024-09-09	HH19-V01-IS-2	5.699	5.488	3.84E-02	2.019
HH19	V01	IS	2024-09-09	HH19-V01-IS-3	4.659	4.209	1.07E-01	2.092
HH20	V01	US	2024-09-09	HH20-V01-US-1	2.826	2.658	6.32E-02	2.099
HH20	V01	US	2024-09-09	HH20-V01-US-2	2.807	2.521	1.13E-01	2.161
HH20	V01	US	2024-09-09	HH20-V01-US-3	3.883	3.403	1.41E-01	2.011
HH20	V01	IS	2024-09-09	HH20-V01-IS-1	2.886	2.678	7.77E-02	2.161
HH20	V01	IS	2024-09-09	HH20-V01-IS-2	3.021	2.7	1.19E-01	2.105
HH20	V01	IS	2024-09-09	HH20-V01-IS-3	3.215	2.798	1.49E-01	2.148
HH21	V01	US	2024-09-09	HH21-V01-US-1	3.525	3.165	1.14E-01	2.163
HH21	V01	US	2024-09-09	HH21-V01-US-2	2.916	2.632	1.08E-01	2.127

HH21	V01	US	2024-09-09	HH21-V01-US-3	3.355	3.012	1.14E-01	2.118
HH21	V01	IS	2024-09-09	HH21-V01-IS-1	2.966	2.775	6.88E-02	2.256
HH21	V01	IS	2024-09-09	HH21-V01-IS-2	5.24	4.717	1.11E-01	2.227
HH21	V01	IS	2024-09-09	HH21-V01-IS-3	3.475	3.162	9.90E-02	2.263
HH22	V01	US	2024-09-10	HH22-V01-US-1	4.096	3.73	9.81E-02	2.081
HH22	V01	US	2024-09-10	HH22-V01-US-2	5.709	5.12	1.15E-01	2.087
HH22	V01	US	2024-09-10	HH22-V01-US-3	3.076	2.733	1.26E-01	2.307
HH22	V01	IS	2024-09-10	HH22-V01-IS-1	4.399	3.97	1.08E-01	2.219
HH22	V01	IS	2024-09-10	HH22-V01-IS-2	3.553	3.4	4.50E-02	2.311
HH22	V01	IS	2024-09-10	HH22-V01-IS-3	5.32	4.703	1.31E-01	2.123
HH23	V01	US	2024-09-10	HH23-V01-US-1	4.474	4.074	9.82E-02	2.181
HH23	V01	US	2024-09-10	HH23-V01-US-2	3.901	3.622	7.70E-02	2.227
HH23	V01	US	2024-09-10	HH23-V01-US-3	3.967	3.592	1.04E-01	2.138
HH23	V01	IS	2024-09-10	HH23-V01-IS-1	4.855	3.408	4.25E-01	2.138
HH23	V01	IS	2024-09-10	HH23-V01-IS-2	4.303	2.843	5.14E-01	2.372
HH23	V01	IS	2024-09-10	HH23-V01-IS-3	5.044	3.739	3.49E-01	2.118
HH24	V01	US	2024-09-10	HH24-V01-US-1	3.107	2.794	1.12E-01	2.227
HH24	V01	US	2024-09-10	HH24-V01-US-2	3.672	3.465	5.97E-02	2.101
HH24	V01	US	2024-09-10	HH24-V01-US-3	3.71	2.757	3.46E-01	2.169
HH24	V01	IS	2024-09-10	HH24-V01-IS-1	4.581	4.006	1.44E-01	2.032
HH24	V01	IS	2024-09-10	HH24-V01-IS-2	4.297	3.732	1.51E-01	2.056
HH24	V01	IS	2024-09-10	HH24-V01-IS-3	3.922	3.397	1.55E-01	2.274
HH25	V01	US	2024-09-11	HH25-V01-US-1	5.198	4.793	8.45E-02	2.046
HH25	V01	US	2024-09-11	HH25-V01-US-2	5.085	4.875	4.31E-02	2.166
HH25	V01	US	2024-09-11	HH25-V01-US-3	5.064	4.901	3.33E-02	2.162
HH25	V01	IS	2024-09-11	HH25-V01-IS-1	4.206	3.888	8.18E-02	2.201
HH25	V01	IS	2024-09-11	HH25-V01-IS-2	4.052	3.612	1.22E-01	2.024
HH25	V01	IS	2024-09-11	HH25-V01-IS-3	3.968	3.482	1.40E-01	2.023

HH26	V01	US	2024-09-11	HH26-V01-US-1	5.576	4.986	1.18E-01	2.036
HH26	V01	US	2024-09-11	HH26-V01-US-2	5.221	4.84	7.87E-02	2.067
HH26	V01	US	2024-09-11	HH26-V01-US-3	6.37	6.029	5.66E-02	2.083
HH26	V01	IS	2024-09-11	HH26-V01-IS-1	5.553	4.581	2.12E-01	2.053
HH26	V01	IS	2024-09-11	HH26-V01-IS-2	5.617	4.898	1.47E-01	2.076
HH26	V01	IS	2024-09-11	HH26-V01-IS-3	5.539	4.945	1.20E-01	2.123
HH27	V01	US	2024-09-27	HH27-V01-US-1	3.135	2.902	8.03E-02	2.211
HH27	V01	US	2024-09-27	HH27-V01-US-2	3.203	3	6.77E-02	2.119
HH27	V01	US	2024-09-27	HH27-V01-US-3	3.268	3.187	2.54E-02	2.09
HH27	V01	IS	2024-09-27	HH27-V01-IS-1	3.273	2.916	1.22E-01	2.123
HH27	V01	IS	2024-09-27	HH27-V01-IS-2	3.543	3.049	1.62E-01	2.059
HH27	V01	IS	2024-09-27	HH27-V01-IS-3	3.654	3.285	1.12E-01	2.186
HH28	V01	US	2024-09-27	HH28-V01-US-1	3.395	2.782	2.20E-01	2.061
HH28	V01	US	2024-09-27	HH28-V01-US-2	4.268	3.921	8.85E-02	2.467
HH28	V01	US	2024-09-27	HH28-V01-US-3	3.855	3.776	2.09E-02	2.348
HH28	V01	IS	2024-09-27	HH28-V01-IS-1	3.403	3.329	2.22E-02	2.079
HH28	V01	IS	2024-09-27	HH28-V01-IS-2	4.127	3.985	3.56E-02	2.328
HH28	V01	IS	2024-09-27	HH28-V01-IS-3	3.954	3.853	2.62E-02	2.216
HH29	V01	US	2024-09-29	HH29-V01-US-1	4.475	4.251	5.27E-02	2.069
HH29	V01	US	2024-09-29	HH29-V01-US-2	3.518	3.342	5.27E-02	2.133
HH29	V01	US	2024-09-29	HH29-V01-US-3	3.025	2.933	3.14E-02	2.188
HH29	V01	IS	2024-09-29	HH29-V01-IS-1	5	3.18	5.72E-01	2.277
HH29	V01	IS	2024-09-29	HH29-V01-IS-2	8.552	3.749	1.28E+00	2.1
HH29	V01	IS	2024-09-29	HH29-V01-IS-3	7.46	4.238	7.60E-01	2.17
HH30	V01	US	2024-09-29	HH30-V01-US-1	4.518	4.088	1.05E-01	2.034
HH30	V01	US	2024-09-29	HH30-V01-US-2	4.785	4.628	3.39E-02	2.218
HH30	V01	US	2024-09-29	HH30-V01-US-3	4.208	4.04	4.16E-02	2.119
HH30	V01	IS	2024-09-29	HH30-V01-IS-1	6.421	3.579	7.94E-01	2.214

HH30	V01	IS	2024-09-29	HH30-V01-IS-2	4.913	2.418	1.03E+00	2.326
HH30	V01	IS	2024-09-29	HH30-V01-IS-3	4.411	2.326	8.96E-01	2.409
HH31	V01	US	2024-09-30	HH31-V01-US-1	4.5	4.404	2.18E-02	2.107
HH31	V01	US	2024-09-30	HH31-V01-US-2	4.222	4.126	2.33E-02	2.108
HH31	V01	US	2024-09-30	HH31-V01-US-3	4.429	4.33	2.29E-02	2.161
HH31	V01	IS	2024-09-30	HH31-V01-IS-1	4.79	3.051	5.70E-01	2.039
HH31	V01	IS	2024-09-30	HH31-V01-IS-2	4.259	4	6.48E-02	2.122
HH31	V01	IS	2024-09-30	HH31-V01-IS-3	4.014	3.822	5.02E-02	2.004
HH32	V01	US	2024-09-30	HH32-V01-US-1	4.928	4.692	5.03E-02	2.055
HH32	V01	US	2024-09-30	HH32-V01-US-2	4.807	4.488	7.11E-02	2.086
HH32	V01	US	2024-09-30	HH32-V01-US-3	4.751	4.7	1.09E-02	2.141
HH32	V01	IS	2024-09-30	HH32-V01-IS-1	4.155	3.495	1.89E-01	2.062
HH32	V01	IS	2024-09-30	HH32-V01-IS-2	4.061	3.412	1.90E-01	2.071
HH32	V01	IS	2024-09-30	HH32-V01-IS-3	3.599	3.254	1.06E-01	2.145
HH33	V01	US	2024-10-07	HH33-V01-US-1	3.369	3.234	4.17E-02	2.11
HH33	V01	US	2024-10-07	HH33-V01-US-2	3.308	3.173	4.25E-02	2.062
HH33	V01	US	2024-10-07	HH33-V01-US-3	3.152	2.945	7.03E-02	2
HH33	V01	IS	2024-10-07	HH33-V01-IS-1	4.534	3.305	3.72E-01	2.371
HH33	V01	IS	2024-10-07	HH33-V01-IS-2	5.447	4.478	2.16E-01	2.352
HH33	V01	IS	2024-10-07	HH33-V01-IS-3	3.955	2.213	7.87E-01	2.494
HH34	V01	US	2024-10-07	HH34-V01-US-1	3.282	3.167	3.63E-02	2.031
HH34	V01	US	2024-10-07	HH34-V01-US-2	3.022	2.9	4.21E-02	2.031
HH34	V01	US	2024-10-07	HH34-V01-US-3	3.737	3.333	1.21E-01	2.076
HH34	V01	IS	2024-10-07	HH34-V01-IS-1	3.055	2.91	4.98E-02	2.116
HH34	V01	IS	2024-10-07	HH34-V01-IS-2	3.839	3.525	8.91E-02	2.121
HH34	V01	IS	2024-10-07	HH34-V01-IS-3	3.639	3.25	1.20E-01	2.146
HH35	V01	US	2024-10-07	HH35-V01-US-1	3.305	3.157	4.69E-02	2.228
HH35	V01	US	2024-10-07	HH35-V01-US-2	3.246	3.13	3.71E-02	2.171

HH35	V01	US	2024-10-07	HH35-V01-US-3	3.971	3.657	8.59E-02	2.058
HH35	V01	IS	2024-10-07	HH35-V01-IS-1	3.733	2.515	4.84E-01	2.114
HH35	V01	IS	2024-10-07	HH35-V01-IS-2	6.738	3.992	6.88E-01	3.319
HH35	V01	IS	2024-10-07	HH35-V01-IS-3	5.077	3.883	3.07E-01	2.405
HH36	V01	US	2024-10-07	HH36-V01-US-1	4.417	4.104	7.63E-02	2.041
HH36	V01	US	2024-10-07	HH36-V01-US-2	6.494	6.278	3.44E-02	2.221
HH36	V01	US	2024-10-07	HH36-V01-US-3	4.181	4.16	5.05E-03	2.096
HH36	V01	IS	2024-10-07	HH36-V01-IS-1	4.359	4.342	3.92E-03	2.164
HH36	V01	IS	2024-10-07	HH36-V01-IS-2	5.946	5.913	5.58E-03	2.091
HH36	V01	IS	2024-10-07	HH36-V01-IS-3	4.406	4.262	3.38E-02	2.241
HH37	V01	US	2024-10-09	HH37-V01-US-1	3.541	3.467	2.13E-02	2.191
HH37	V01	US	2024-10-09	HH37-V01-US-2	3.911	3.845	1.72E-02	2.122
HH37	V01	US	2024-10-09	HH37-V01-US-3	3.985	3.9	2.18E-02	2.127
HH37	V01	IS	2024-10-09	HH37-V01-IS-1	3.954	3.291	2.01E-01	2.129
HH37	V01	IS	2024-10-09	HH37-V01-IS-2	5.322	4.406	2.08E-01	2.185
HH37	V01	IS	2024-10-09	HH37-V01-IS-3	5.68	3.521	6.13E-01	2.122
HH38	V01	US	2024-10-09	HH38-V01-US-1	3.402	3.343	1.76E-02	2.047
HH38	V01	US	2024-10-09	HH38-V01-US-2	3.771	3.734	9.91E-03	2.167
HH38	V01	US	2024-10-09	HH38-V01-US-3	3.565	3.539	7.35E-03	2.075
HH38	V01	IS	2024-10-09	HH38-V01-IS-1	4.999	4.375	1.43E-01	2.191
HH38	V01	IS	2024-10-09	HH38-V01-IS-2	3.855	3.54	8.90E-02	2.345
HH38	V01	IS	2024-10-09	HH38-V01-IS-3	4.573	3.798	2.04E-01	2.089
HH39	V01	US	2024-10-09	HH39-V01-US-1	3.684	3.65	9.32E-03	2.237
HH39	V01	US	2024-10-09	HH39-V01-US-2	3.577	3.494	2.38E-02	2.094
HH39	V01	US	2024-10-09	HH39-V01-US-3	3.421	3.396	7.36E-03	2.349
HH39	V01	IS	2024-10-09	HH39-V01-IS-1	3.72	3.687	8.95E-03	2.146
HH39	V01	IS	2024-10-09	HH39-V01-IS-2	3.589	3.536	1.50E-02	2.344
HH39	V01	IS	2024-10-09	HH39-V01-IS-3	4.041	3.96	2.05E-02	2.014

HH40	V01	US	2024-10-10	HH40-V01-US-1	4.791	4.651	3.01E-02	2
HH40	V01	US	2024-10-10	HH40-V01-US-2	5.732	5.599	2.38E-02	2.019
HH40	V01	US	2024-10-10	HH40-V01-US-3	3.576	3.489	2.49E-02	2.169
HH40	V01	IS	2024-10-10	HH40-V01-IS-1	5.692	4.554	2.50E-01	2.423
HH40	V01	IS	2024-10-10	HH40-V01-IS-2	6.735	5.569	2.09E-01	2.24
HH40	V01	IS	2024-10-10	HH40-V01-IS-3	6.081	5.095	1.94E-01	1.959
HH41	V01	IS	2024-10-25	HH41-V01-IS-1	6.142	3.772	6.28E-01	2.652
HH41	V01	IS	2024-10-25	HH41-V01-IS-2	5.932	2.751	1.16E+00	2.523
HH41	V01	IS	2024-10-25	HH41-V01-IS-3	6.231	4.431	4.06E-01	2.457
HH41	V01	US	2024-10-25	HH41-V01-US-1	3.115	3.064	1.66E-02	2.169
HH41	V01	US	2024-10-25	HH41-V01-US-2	3.212	2.971	8.11E-02	2.016
HH41	V01	US	2024-10-25	HH41-V01-US-3	3.251	3.198	1.66E-02	2.137
HH42	V01	IS	2024-10-25	HH42-V01-IS-1	5.471	4.624	1.83E-01	2.518
HH42	V01	IS	2024-10-25	HH42-V01-IS-2	5.616	3.639	5.43E-01	2.667
HH42	V01	IS	2024-10-25	HH42-V01-IS-3	6.006	3.253	8.46E-01	2.08
HH42	V01	US	2024-10-25	HH42-V01-US-1	3.805	3.641	4.50E-02	2.041
HH42	V01	US	2024-10-25	HH42-V01-US-2	3.629	3.409	6.45E-02	2.164
HH42	V01	US	2024-10-25	HH42-V01-US-3	3.788	3.208	1.81E-01	2.133
HH43	V01	IS	2024-10-25	HH43-V01-IS-1	6.788	5.408	2.55E-01	2.448
HH43	V01	IS	2024-10-25	HH43-V01-IS-2	4.702	4.121	1.41E-01	2.067
HH43	V01	IS	2024-10-25	HH43-V01-IS-3	3.367	3.326	1.23E-02	2.065
HH43	V01	US	2024-10-25	HH43-V01-US-1	3.429	3.4	8.53E-03	2.132
HH43	V01	US	2024-10-25	HH43-V01-US-2	3.25	3.165	2.69E-02	2.134
HH43	V01	US	2024-10-25	HH43-V01-US-3	3.367	3.326	1.23E-02	2.065
HH44	V01	IS	2024-10-26	HH44-V01-IS-1	4.494	1.732	1.59E+00	2.543
HH44	V01	IS	2024-10-26	HH44-V01-IS-2	4.178	2.032	1.06E+00	2.592
HH44	V01	IS	2024-10-26	HH44-V01-IS-3	5.848	3.476	6.82E-01	2.579
HH44	V01	US	2024-10-26	HH44-V01-US-1	3.141	3.094	1.52E-02	2.036

HH44	V01	US	2024-10-26	HH44-V01-US-2	4.041	2.478	6.31E-01	2.543
HH44	V01	US	2024-10-26	HH44-V01-US-3	3.111	3.028	2.74E-02	2.026
HH45	V01	IS	2024-10-30	HH45-V01-IS-1	2.403	2.25	6.80E-02	2.292
HH45	V01	IS	2024-10-30	HH45-V01-IS-2	3.569	3.363	6.13E-02	2.039
HH45	V01	IS	2024-10-30	HH45-V01-IS-3	3.216	3.045	5.62E-02	2.139
HH45	V01	US	2024-10-30	HH45-V01-US-1	4.413	4.16	6.08E-02	2.138
HH45	V01	US	2024-10-30	HH45-V01-US-2	3.216	3.102	3.68E-02	2.022
HH45	V01	US	2024-10-30	HH45-V01-US-3	3.471	3.295	5.34E-02	2.095
HH46	V01	US	2024-11-03	HH46-V01-US-1	3.016	2.922	3.22E-02	2.139
HH46	V01	US	2024-11-03	HH46-V01-US-2	3.451	3.165	9.04E-02	2.11
HH46	V01	US	2024-11-03	HH46-V01-US-3	3.285	3.209	2.37E-02	2.079
HH46	V01	IS	2024-11-03	HH46-V01-IS-1	8	3.956	1.02E+00	2.14
HH46	V01	IS	2024-11-03	HH46-V01-IS-2	4.72	3.441	3.72E-01	2.192
HH46	V01	IS	2024-11-03	HH46-V01-IS-3	5.421	3.11	7.43E-01	2.508
HH47	V01	US	2024-11-05	HH47-V01-US-1	3.712	3.636	2.09E-02	2.126
HH47	V01	US	2024-11-05	HH47-V01-US-2	3.695	3.43	7.73E-02	2.068
HH47	V01	US	2024-11-05	HH47-V01-US-3	3.94	3.564	1.05E-01	2.037
HH47	V01	IS	2024-11-05	HH47-V01-IS-1	6.618	4.129	6.03E-01	2.038
HH47	V01	IS	2024-11-05	HH47-V01-IS-2	4.282	1.922	1.23E+00	2.288
HH47	V01	IS	2024-11-05	HH47-V01-IS-3	4.071	2.857	4.25E-01	1.879
HH48	V01	US	2024-11-07	HH48-V01-US-1	3.426	3.123	9.70E-02	2.158
HH48	V01	US	2024-11-07	HH48-V01-US-2	3.494	3.156	1.07E-01	2.165
HH48	V01	US	2024-11-07	HH48-V01-US-3	3.091	2.808	1.01E-01	2.335
HH48	V01	IS	2024-11-07	HH48-V01-IS-1	3.246	2.81	1.55E-01	2.195
HH48	V01	IS	2024-11-07	HH48-V01-IS-2	3.161	2.851	1.09E-01	2.195
HH48	V01	IS	2024-11-07	HH48-V01-IS-3	3.23	2.579	2.52E-01	2.302
HH49	V01	US	2024-11-07	HH49-V01-US-1	3.059	2.895	5.66E-02	2.168
HH49	V01	US	2024-11-07	HH49-V01-US-2	3.727	3.581	4.08E-02	2.013

HH49	V01	US	2024-11-07	HH49-V01-US-3	3.513	3.455	1.68E-02	2.013
HH49	V01	IS	2024-11-07	HH49-V01-IS-1	3.145	1.969	5.97E-01	2.222
HH49	V01	IS	2024-11-07	HH49-V01-IS-2	3.91	2	9.55E-01	2.122
HH49	V01	IS	2024-11-07	HH49-V01-IS-3	5.102	3.933	2.97E-01	2.053
HH50	V01	US	2024-11-07	HH50-V01-US-1	3.122	2.915	7.10E-02	2.156
HH50	V01	US	2024-11-07	HH50-V01-US-2	3.46	3.231	7.09E-02	2.377
HH50	V01	US	2024-11-07	HH50-V01-US-3	3.803	3.521	8.01E-02	2.109
HH50	V01	IS	2024-11-07	HH50-V01-IS-1	3.423	3.1	1.04E-01	2.178
HH50	V01	IS	2024-11-07	HH50-V01-IS-2	4.328	3.775	1.46E-01	2.089
HH50	V01	IS	2024-11-07	HH50-V01-IS-3	4.029	3.601	1.19E-01	2.225
HH52	V01	US	2024-11-07	HH52-V01-US-1	3.037	2.812	8.00E-02	2.076
HH52	V01	US	2024-11-07	HH52-V01-US-2	3.28	3.145	4.29E-02	2.195
HH52	V01	US	2024-11-07	HH52-V01-US-3	3.076	2.996	2.67E-02	2.005
HH52	V01	IS	2024-11-07	HH52-V01-IS-1	3.503	2.72	2.88E-01	2.111
HH52	V01	IS	2024-11-07	HH52-V01-IS-2	2.916	2.434	1.98E-01	2.084
HH52	V01	IS	2024-11-07	HH52-V01-IS-3	3.687	3.066	2.03E-01	2.158
HH53	V01	US	2024-11-08	HH53-V01-US-1	3.433	3.18	7.96E-02	2.08
HH53	V01	US	2024-11-08	HH53-V01-US-2	2.935	2.75	6.73E-02	2.137
HH53	V01	US	2024-11-08	HH53-V01-US-3	3.261	2.872	1.35E-01	2.086
HH53	V01	IS	2024-11-08	HH53-V01-IS-1	3.627	3.405	6.52E-02	2.226
HH53	V01	IS	2024-11-08	HH53-V01-IS-2	3.202	2.826	1.33E-01	2.296
HH53	V01	IS	2024-11-08	HH53-V01-IS-3	3.035	2.744	1.06E-01	2.139
HH54	V01	US	2024-11-08	HH54-V01-US-1	3.362	2.982	1.27E-01	2.372
HH54	V01	US	2024-11-08	HH54-V01-US-2	3.39	3.157	7.38E-02	2.255
HH54	V01	US	2024-11-08	HH54-V01-US-3	3.119	2.916	6.96E-02	2.21
HH54	V01	IS	2024-11-08	HH54-V01-IS-1	3.289	3.113	5.65E-02	2.154
HH54	V01	IS	2024-11-08	HH54-V01-IS-2	3.548	3.262	8.77E-02	2.262
HH54	V01	IS	2024-11-08	HH54-V01-IS-3	3.701	3.625	2.10E-02	2.14

HH01	V02	US	2024-11-20	HH01-V02-US-1	4.678	4.1	1.41E-01	2.215
HH01	V02	US	2024-11-20	HH01-V02-US-2	3.469	3	1.56E-01	2.218
HH01	V02	US	2024-11-20	HH01-V02-US-3	3.224	2.7	1.94E-01	2.218
HH02	V02	US	2025-01-08	HH02-V02-US-1	3.829	3	2.76E-01	2.025
HH02	V02	US	2025-01-08	HH02-V02-US-2	3.114	2.543	2.25E-01	2.09
HH02	V02	US	2025-01-08	HH02-V02-US-3	3.214	2.756	1.66E-01	2.144
HH03	V02	US	2024-11-25	HH03-V02-US-1	3.5	3.2	9.37E-02	2.2
HH03	V02	US	2024-11-25	HH03-V02-US-2	3.5	2.8	2.50E-01	2.2
HH03	V02	US	2024-11-25	HH03-V02-US-3	4.8	4.3	1.16E-01	2.5
HH04	V02	US	2025-01-30	HH04-V02-US-1	3.139	2.735	1.48E-01	2.017
HH04	V02	US	2025-01-30	HH04-V02-US-2	4.27	3.759	1.36E-01	2.027
HH04	V02	US	2025-01-30	HH04-V02-US-3	3.129	2.808	1.14E-01	2.03
HH05	V02	US	2025-01-15	HH05-V02-US-1	3.452	3	1.51E-01	2.106
HH05	V02	US	2025-01-15	HH05-V02-US-2	3.736	3.207	1.65E-01	2.1
HH05	V02	US	2025-01-15	HH05-V02-US-3	3.268	2.796	1.69E-01	2.042
HH06	V02	US	2024-12-18	HH06-V02-US-1	3.109	2.764	1.25E-01	2.168
HH06	V02	US	2024-12-18	HH06-V02-US-2	3.721	3.319	1.21E-01	2.086
HH06	V02	US	2024-12-18	HH06-V02-US-3	3.712	3.221	1.52E-01	2.085
HH07	V02	US	2025-01-07	HH07-V02-US-1	3.259	2.779	1.73E-01	2.056
HH07	V02	US	2025-01-07	HH07-V02-US-2	3.36	2.873	1.70E-01	2.088
HH07	V02	US	2025-01-07	HH07-V02-US-3	3.226	2.743	1.76E-01	2.048
HH08	V02	US	2025-01-15	HH08-V02-US-1	3.038	2.465	2.32E-01	2.01
HH08	V02	US	2025-01-15	HH08-V02-US-2	3.173	2.619	2.12E-01	2.044
HH08	V02	US	2025-01-15	HH08-V02-US-3	3.348	2.661	2.58E-01	2.135
HH08	V02	IS	2025-01-15	HH08-V02-IS-1	4.925	3.9	2.63E-01	2.051
HH08	V02	IS	2025-01-15	HH08-V02-IS-2	5.9	3.68	6.03E-01	1.951
HH08	V02	IS	2025-01-15	HH08-V02-IS-3	5.5	4.5	2.22E-01	2.09
HH09	V02	US	2025-02-03	HH09-V02-US-1	2.781	2.431	1.44E-01	2.073

HH09	V02	US	2025-02-03	HH09-V02-US-2	4.4	3.708	1.87E-01	2.019
HH09	V02	US	2025-02-03	HH09-V02-US-3	3.996	3.062	3.05E-01	2.01
HH09	V02	IS	2025-02-03	HH09-V02-IS-1	3.818	3.173	2.03E-01	2.063
HH09	V02	IS	2025-02-03	HH09-V02-IS-2	4.035	3.571	1.30E-01	2.103
HH09	V02	IS	2025-02-03	HH09-V02-IS-3	3.629	3.052	1.89E-01	2.057
HH10	V02	US	2024-12-09	HH10-V02-US-1	3.536	2.859	2.37E-01	2.116
HH10	V02	US	2024-12-09	HH10-V02-US-2	3.2	2.704	1.83E-01	2.056
HH10	V02	US	2024-12-09	HH10-V02-US-3	3.359	2.827	1.88E-01	2.157
HH11	V02	US	2024-12-09	HH11-V02-US-1	5.578	4.471	2.48E-01	2.243
HH11	V02	US	2024-12-09	HH11-V02-US-2	4.531	3.807	1.90E-01	2.32
HH11	V02	US	2024-12-09	HH11-V02-US-3	4.608	3.706	2.43E-01	2.277
HH11	V02	IS	2024-12-09	HH11-V02-IS-1	3.125	1.675	8.66E-01	2.749
HH11	V02	IS	2024-12-09	HH11-V02-IS-2	3.473	2.056	6.89E-01	2.269
HH11	V02	IS	2024-12-09	HH11-V02-IS-3	6.821	4.705	4.50E-01	2.374
HH12	V02	US	2024-11-25	HH12-V02-US-1	3.2	2.6	2.31E-01	2.2
HH12	V02	US	2024-11-25	HH12-V02-US-2	3.2	2.7	1.85E-01	2.1
HH12	V02	US	2024-11-25	HH12-V02-US-3	3.8	3	2.67E-01	2.3
HH12	V02	IS	2024-11-25	HH12-V02-IS-1	5	2.3	1.17E+00	2.3
HH12	V02	IS	2024-11-25	HH12-V02-IS-2	4.7	2.6	8.08E-01	2
HH12	V02	IS	2024-11-25	HH12-V02-IS-3	3.1	1.7	8.24E-01	2
HH13	V02	US	2024-12-20	HH13-V02-US-1	3.342	2.725	2.26E-01	2.124
HH13	V02	US	2024-12-20	HH13-V02-US-2	3.755	3.357	1.19E-01	2.117
HH13	V02	US	2024-12-20	HH13-V02-US-3	3.366	2.837	1.86E-01	2.169
HH14	V02	US	2024-12-04	HH14-V02-US-1	3.408	3.109	9.62E-02	2.04
HH14	V02	US	2024-12-04	HH14-V02-US-2	3.268	2.067	5.81E-01	2.037
HH14	V02	US	2024-12-04	HH14-V02-US-3	3.589	3.171	1.32E-01	2.049
HH15	V02	US	2024-12-02	HH15-V02-US-1	3.064	2.595	1.81E-01	2.139
HH15	V02	US	2024-12-02	HH15-V02-US-2	3.61	3.252	1.10E-01	2.244

HH15	V02	US	2024-12-02	HH15-V02-US-3	4.144	3.575	1.59E-01	2.263
HH15	V02	IS	2024-12-02	HH15-V02-IS-1	4.466	3.783	1.81E-01	2.006
HH15	V02	IS	2024-12-02	HH15-V02-IS-2	3.283	2.665	2.32E-01	2.069
HH15	V02	IS	2024-12-02	HH15-V02-IS-3	3.388	2.82	2.01E-01	2.018
HH16	V02	US	2025-01-15	HH16-V02-US-1	4.25	3.985	6.65E-02	2.134
HH16	V02	US	2025-01-15	HH16-V02-US-2	3.551	3.316	7.09E-02	2.011
HH16	V02	US	2025-01-15	HH16-V02-US-3	3.709	2.982	2.44E-01	2.028
HH16	V02	IS	2025-01-15	HH16-V02-IS-1	3.97	2.726	4.56E-01	2.117
HH16	V02	IS	2025-01-15	HH16-V02-IS-2	3.788	2.447	5.48E-01	1.921
HH16	V02	IS	2025-01-15	HH16-V02-IS-3	7.291	5.066	4.39E-01	1.887
HH17	V02	US	2024-12-04	HH17-V02-US-1	3.987	3.759	6.07E-02	2.067
HH17	V02	US	2024-12-04	HH17-V02-US-2	3.151	2.586	2.18E-01	2.062
HH17	V02	US	2024-12-04	HH17-V02-US-3	4.054	3.344	2.12E-01	2.284
HH17	V02	IS	2024-12-04	HH17-V02-IS-1	6.01	3.79	5.86E-01	2.075
HH17	V02	IS	2024-12-04	HH17-V02-IS-2	4.6	3.248	4.16E-01	2.05
HH17	V02	IS	2024-12-04	HH17-V02-IS-3	4.94	2.904	7.01E-01	2
HH19	V02	US	2025-01-29	HH19-V02-US-1	2.978	2.548	1.69E-01	2.015
HH19	V02	US	2025-01-29	HH19-V02-US-2	3.067	2.612	1.74E-01	2.005
HH19	V02	US	2025-01-29	HH19-V02-US-3	4.027	3.617	1.13E-01	2.086
HH19	V02	IS	2025-01-29	HH19-V02-IS-1	3.741	3.332	1.23E-01	2.019
HH19	V02	IS	2025-01-29	HH19-V02-IS-2	2.962	2.357	2.57E-01	2.031
HH19	V02	IS	2025-01-29	HH19-V02-IS-3	3.749	3.1	2.09E-01	2.068
HH20	V02	US	2025-01-29	HH20-V02-US-1	3.163	2.66	1.89E-01	2.025
HH20	V02	US	2025-01-29	HH20-V02-US-2	2.952	2.405	2.27E-01	2.1
HH20	V02	US	2025-01-29	HH20-V02-US-3	4.238	3.812	1.12E-01	2.085
HH20	V02	IS	2025-01-29	HH20-V02-IS-1	2.965	2.595	1.43E-01	2.067
HH20	V02	IS	2025-01-29	HH20-V02-IS-2	3.243	2.7	2.01E-01	2.022
HH20	V02	IS	2025-01-29	HH20-V02-IS-3	2.786	2.414	1.54E-01	2.058

HH21	V02	US	2025-02-03	HH21-V02-US-1	3.258	3.053	6.71E-02	2.081
HH21	V02	US	2025-02-03	HH21-V02-US-2	3.07	2.638	1.64E-01	2.1
HH21	V02	US	2025-02-03	HH21-V02-US-3	3.367	2.611	2.90E-01	2.04
HH21	V02	IS	2025-02-03	HH21-V02-IS-1	3.604	3	2.01E-01	2
HH21	V02	IS	2025-02-03	HH21-V02-IS-2	2.937	2.42	2.14E-01	2.021
HH21	V02	IS	2025-02-03	HH21-V02-IS-3	5.077	4.348	1.68E-01	2.047
HH22	V02	US	2024-11-20	HH22-V02-US-1	3.794	3.3	1.50E-01	2.14
HH22	V02	US	2024-11-20	HH22-V02-US-2	2.911	2.4	2.13E-01	2.061
HH22	V02	US	2024-11-20	HH22-V02-US-3	3.134	2.5	2.54E-01	2.322
HH22	V02	IS	2024-11-20	HH22-V02-IS-1	5.523	3.2	7.26E-01	2.044
HH22	V02	IS	2024-11-20	HH22-V02-IS-2	3.791	2.5	5.16E-01	2.282
HH22	V02	IS	2024-11-20	HH22-V02-IS-3	6.929	5.4	2.83E-01	2.458
HH23	V02	US	2025-01-14	HH23-V02-US-1	4.335	3.626	1.96E-01	2.075
HH23	V02	US	2025-01-14	HH23-V02-US-2	3.078	2.612	1.78E-01	2.105
HH23	V02	US	2025-01-14	HH23-V02-US-3	3.852	3.213	1.99E-01	2.154
HH23	V02	IS	2025-01-14	HH23-V02-IS-1	4.9	3.874	2.65E-01	2.238
HH23	V02	IS	2025-01-14	HH23-V02-IS-2	7.215	4.449	6.22E-01	2.983
HH23	V02	IS	2025-01-14	HH23-V02-IS-3	5.991	3.234	8.53E-01	2.334
HH24	V02	US	2025-01-28	HH24-V02-US-1	3.728	3.057	2.19E-01	2.076
HH24	V02	US	2025-01-28	HH24-V02-US-2	4.57	4.045	1.30E-01	2.802
HH24	V02	US	2025-01-28	HH24-V02-US-3	4.339	3.778	1.48E-01	2.054
HH24	V02	IS	2025-01-28	HH24-V02-IS-1	3.325	2.658	2.51E-01	2.091
HH24	V02	IS	2025-01-28	HH24-V02-IS-2	2.926	2.508	1.67E-01	2.03
HH24	V02	IS	2025-01-28	HH24-V02-IS-3	3.736	2.892	2.92E-01	2.1
HH25	V02	US	2024-12-02	HH25-V02-US-1	3.743	3.463	8.09E-02	2.08
HH25	V02	US	2024-12-02	HH25-V02-US-2	3.54	3.121	1.34E-01	2.06
HH25	V02	US	2024-12-02	HH25-V02-US-3	3.237	2.766	1.70E-01	2.1
HH25	V02	IS	2024-12-02	HH25-V02-IS-1	2.966	2.637	1.25E-01	2.109

HH25	V02	IS	2024-12-02	HH25-V02-IS-2	3.006	2.459	2.22E-01	2.128
HH25	V02	IS	2024-12-02	HH25-V02-IS-3	3.6	3.1	1.61E-01	2.086
HH26	V02	US	2025-01-08	HH26-V02-US-1	3.589	2.93	2.25E-01	2.014
HH26	V02	US	2025-01-08	HH26-V02-US-2	3.2	2.587	2.37E-01	2.11
HH26	V02	US	2025-01-08	HH26-V02-US-3	3.936	3.281	2.00E-01	2.1
HH26	V02	IS	2025-01-08	HH26-V02-IS-1	3.454	2.75	2.56E-01	2.173
HH26	V02	IS	2025-01-08	HH26-V02-IS-2	3.9	2.88	3.54E-01	2.076
HH26	V02	IS	2025-01-08	HH26-V02-IS-3	3.365	2.579	3.05E-01	2.076
HH27	V02	US	2024-12-09	HH27-V02-US-1	3.248	2.8	1.60E-01	2.111
HH27	V02	US	2024-12-09	HH27-V02-US-2	2.925	2.63	1.12E-01	2.453
HH27	V02	US	2024-12-09	HH27-V02-US-3	4.814	4.2	1.46E-01	2.061
HH27	V02	IS	2024-12-09	HH27-V02-IS-1	3.957	2.576	5.36E-01	2
HH27	V02	IS	2024-12-09	HH27-V02-IS-2	3.925	2.913	3.47E-01	2.362
HH27	V02	IS	2024-12-09	HH27-V02-IS-3	3.291	2.812	1.70E-01	2.16
HH28	V02	US	2024-11-24	HH28-V02-US-1	4	3.4	1.76E-01	2
HH28	V02	US	2024-11-24	HH28-V02-US-2	4.1	3.2	2.81E-01	2.1
HH28	V02	US	2024-11-24	HH28-V02-US-3	4	3.3	2.12E-01	2.4
HH28	V02	IS	2024-11-24	HH28-V02-IS-1	3.1	2.9	6.90E-02	2.4
HH28	V02	IS	2024-11-24	HH28-V02-IS-2	3.3	2.9	1.38E-01	2.1
HH28	V02	IS	2024-11-24	HH28-V02-IS-3	3.5	3	1.67E-01	2.2
HH29	V02	US	2024-12-19	HH29-V02-US-1	3.873	3.127	2.39E-01	2.171
HH29	V02	US	2024-12-19	HH29-V02-US-2	3.89	3.176	2.25E-01	2.031
HH29	V02	US	2024-12-19	HH29-V02-US-3	2.976	2.196	3.55E-01	2.167
HH29	V02	IS	2024-12-19	HH29-V02-IS-1	7.49	3.175	1.36E+00	3.875
HH29	V02	IS	2024-12-19	HH29-V02-IS-2	3.478	2.455	4.17E-01	3.675
HH29	V02	IS	2024-12-19	HH29-V02-IS-3	6.476	2.255	1.87E+00	3.382
HH30	V02	US	2024-12-19	HH30-V02-US-1	3.76	3.176	1.84E-01	2.122
HH30	V02	US	2024-12-19	HH30-V02-US-2	3.942	3.455	1.41E-01	2.135

HH30	V02	US	2024-12-19	HH30-V02-US-3	3.564	3.029	1.77E-01	2.148
HH30	V02	IS	2024-12-19	HH30-V02-IS-1	4.011	2.281	7.58E-01	2.444
HH30	V02	IS	2024-12-19	HH30-V02-IS-2	4.024	2.821	4.26E-01	2.918
HH30	V02	IS	2024-12-19	HH30-V02-IS-3	3.46	2.387	4.50E-01	2.241
HH31	V02	US	2025-01-08	HH31-V02-US-1	4.041	3.2	2.63E-01	2.067
HH31	V02	US	2025-01-08	HH31-V02-US-2	3.79	3.243	1.69E-01	2.009
HH31	V02	US	2025-01-08	HH31-V02-US-3	3.999	3.32	2.05E-01	2.074
HH31	V02	IS	2025-01-08	HH31-V02-IS-1	2.973	2.319	2.82E-01	2.024
HH31	V02	IS	2025-01-08	HH31-V02-IS-2	3.645	3.063	1.90E-01	2.023
HH31	V02	IS	2025-01-08	HH31-V02-IS-3	5.248	3.265	6.07E-01	2.6
HH32	V02	US	2025-01-08	HH32-V02-US-1	3.026	2.483	2.19E-01	2.19
HH32	V02	US	2025-01-08	HH32-V02-US-2	3.038	2.356	2.89E-01	2.045
HH32	V02	US	2025-01-08	HH32-V02-US-3	2.922	2.417	2.09E-01	2.016
HH32	V02	IS	2025-01-08	HH32-V02-IS-1	4.481	2.773	6.16E-01	2.421
HH32	V02	IS	2025-01-08	HH32-V02-IS-2	5.481	3.315	6.53E-01	2.064
HH32	V02	IS	2025-01-08	HH32-V02-IS-3	4.04	3.563	1.34E-01	2.073
HH33	V02	US	2025-01-29	HH33-V02-US-1	3.18	2.751	1.56E-01	2.026
HH33	V02	US	2025-01-29	HH33-V02-US-2	4.307	3.719	1.58E-01	2.022
HH33	V02	US	2025-01-29	HH33-V02-US-3	4.154	3.5	1.87E-01	2.039
HH33	V02	IS	2025-01-29	HH33-V02-IS-1	3.876	2.975	3.03E-01	2.822
HH33	V02	IS	2025-01-29	HH24-V02-IS-2	3.26	2.521	2.93E-01	2.324
HH33	V02	IS	2025-01-29	HH24-V02-IS-3	5	3.838	3.03E-01	2.28
HH35	V02	US	2024-11-20	HH35-V02-US-1	3.209	2.8	1.46E-01	2.156
HH35	V02	US	2024-11-20	HH35-V02-US-2	3.017	2.5	2.07E-01	2.35
HH35	V02	US	2024-11-20	HH35-V02-US-3	3.989	3.8	4.97E-02	2.189
HH35	V02	IS	2024-11-20	HH35-V02-IS-1	4.897	3.6	3.60E-01	2.464
HH35	V02	IS	2024-11-20	HH35-V02-IS-2	5.059	3.9	2.97E-01	2.025
HH35	V02	IS	2024-11-20	HH35-V02-IS-3	4.473	2.7	6.57E-01	2.17

HH36	V02	US	2025-02-03	HH36-V02-US-1	3.092	2.483	2.45E-01	2.033
HH36	V02	US	2025-02-03	HH36-V02-US-2	3.786	3.01	2.58E-01	2.012
HH36	V02	US	2025-02-03	HH36-V02-US-3	4.363	3.69	1.82E-01	2.026
HH36	V02	IS	2025-02-03	HH36-V02-IS-1	4.372	3.8	1.51E-01	2.094
HH36	V02	IS	2025-02-03	HH36-V02-IS-2	3.635	3.191	1.39E-01	2.022
HH36	V02	IS	2025-02-03	HH36-V02-IS-3	3.26	2.425	3.44E-01	2.132
HH37	V02	US	2025-01-10	HH37-V02-US-1	4	3.691	8.37E-02	2.013
HH37	V02	US	2025-01-10	HH37-V02-US-2	3.236	2.813	1.50E-01	2.035
HH37	V02	US	2025-01-10	HH37-V02-US-3	5.557	3.882	4.31E-01	2.267
HH37	V02	IS	2025-01-10	HH37-V02-IS-1	3.867	2.443	5.83E-01	1.826
HH37	V02	IS	2025-01-10	HH37-V02-IS-2	3.867	2.443	5.83E-01	2.009
HH37	V02	IS	2025-01-10	HH37-V02-IS-3	3.319	2.785	1.92E-01	2.03
HH38	V02	US	2024-12-02	HH38-V02-US-1	2.979	2.629	1.33E-01	2.047
HH38	V02	US	2024-12-02	HH38-V02-US-2	3.152	2.749	1.47E-01	2.22
HH38	V02	US	2024-12-02	HH38-V02-US-3	3.256	3.012	8.10E-02	2.279
HH38	V02	IS	2024-12-02	HH38-V02-IS-1	4.6	3.915	1.75E-01	2.328
HH38	V02	IS	2024-12-02	HH38-V02-IS-2	4.5	3.541	2.71E-01	2.122
HH38	V02	IS	2024-12-02	HH38-V02-IS-3	3.634	3.089	1.76E-01	2.15
HH39	V02	US	2025-01-29	HH39-V02-US-1	2.951	2.6	1.35E-01	2.046
HH39	V02	US	2025-01-29	HH39-V02-US-2	5.339	4.839	1.03E-01	2.096
HH39	V02	US	2025-01-29	HH39-V02-US-3	3.621	3.265	1.09E-01	2.092
HH39	V02	IS	2025-01-29	HH39-V02-IS-1	2.994	2.662	1.25E-01	2.043
HH39	V02	IS	2025-01-29	HH39-V02-IS-2	3.583	3.078	1.64E-01	2.073
HH39	V02	IS	2025-01-29	HH39-V02-IS-3	3.569	3.2	1.15E-01	2.018
HH40	V02	US	2025-02-04	HH40-V02-US-1	3.53	3.14	1.24E-01	2.052
HH40	V02	US	2025-02-04	HH40-V02-US-2	2.909	2.547	1.42E-01	2.02
HH40	V02	US	2025-02-04	HH40-V02-US-3	3.212	2.937	9.36E-02	2.072
HH40	V02	IS	2025-02-04	HH40-V02-IS-1	4.305	3.557	2.10E-01	2.01

HH40	V02	IS	2025-02-04	HH40-V02-IS-2	3.961	3.29	2.04E-01	2.078
HH40	V02	IS	2025-02-04	HH40-V02-IS-3	3.481	2.543	3.69E-01	2.109
HH41	V02	US	2025-01-07	HH41-V02-US-1	3.13	2.774	1.28E-01	2.129
HH41	V02	US	2025-01-07	HH41-V02-US-2	3.273	2.9	1.29E-01	2.15
HH41	V02	US	2025-01-07	HH41-V02-US-3	2.889	2.626	1.00E-01	2.146
HH41	V02	IS	2025-01-07	HH41-V02-IS-1	6.336	4.392	4.43E-01	2.036
HH41	V02	IS	2025-01-07	HH41-V02-IS-2	4.419	2.877	5.36E-01	2.194
HH41	V02	IS	2025-01-07	HH41-V02-IS-3	5.286	4.229	2.50E-01	2.133
HH42	V02	US	2025-02-10	HH42-V02-US-1	4.594	3.826	2.01E-01	2.052
HH42	V02	US	2025-02-10	HH42-V02-US-2	3	2.645	1.34E-01	2.023
HH42	V02	US	2025-02-10	HH42-V02-US-3	5.237	4.064	2.89E-01	2.06
HH42	V02	IS	2025-02-10	HH42-V02-IS-1	3.19	1.649	9.35E-01	2.384
HH42	V02	IS	2025-02-10	HH42-V02-IS-2	4.536	2.724	6.65E-01	2.588
HH42	V02	IS	2025-02-10	HH42-V02-IS-3	4.468	2.464	8.13E-01	2.42
HH43	V02	US	2025-01-17	HH43-V02-US-1	3.219	2.768	1.63E-01	2.122
HH43	V02	US	2025-01-17	HH43-V02-US-2	3.228	2.658	2.14E-01	2.034
HH43	V02	US	2025-01-17	HH43-V02-US-3	3.868	3.186	2.14E-01	2.016
HH43	V02	IS	2025-01-17	HH43-V02-IS-1	3.814	3.335	1.44E-01	2.006
HH43	V02	IS	2025-01-17	HH43-V02-IS-2	3.3	2.756	1.97E-01	2.011
HH43	V02	IS	2025-01-17	HH43-V02-IS-3	4.168	3.129	3.32E-01	2.312
HH44	V02	US	2025-01-17	HH44-V02-US-1	3.805	3.27	1.64E-01	2.137
HH44	V02	US	2025-01-17	HH44-V02-US-2	3.558	2.982	1.93E-01	2.083
HH44	V02	US	2025-01-17	HH44-V02-US-3	3.514	2.918	2.04E-01	2.043
HH44	V02	IS	2025-01-17	HH44-V02-IS-1	3.268	3.09	5.76E-02	2.313
HH44	V02	IS	2025-01-17	HH44-V02-IS-2	4.505	2.346	9.20E-01	2.25
HH44	V02	IS	2025-01-17	HH44-V02-IS-3	3.808	2.79	3.65E-01	2.148
HH45	V02	US	2024-12-18	HH45-V02-US-1	3.405	3.051	1.16E-01	2.13
HH45	V02	US	2024-12-18	HH45-V02-US-2	4.757	3.638	3.08E-01	2.106

HH45	V02	US	2024-12-18	HH45-V02-US-3	3.667	3.195	1.48E-01	2.1
HH45	V02	IS	2024-12-18	HH45-V02-IS-1	3.173	2.677	1.85E-01	2.07
HH45	V02	IS	2024-12-18	HH45-V02-IS-2	3.251	2.7	2.04E-01	2.069
HH45	V02	IS	2024-12-18	HH45-V02-IS-3	4.037	3.118	2.95E-01	2.066
HH46	V02	US	2024-12-19	HH46-V02-US-1	4.216	4.072	3.54E-02	2.05
HH46	V02	US	2024-12-19	HH46-V02-US-2	3.811	3.3	1.55E-01	2.015
HH46	V02	US	2024-12-19	HH46-V02-US-3	4.111	3.347	2.28E-01	2.113
HH46	V02	US	2024-12-19	HH46-V02-US-4	4.858	3.268	4.87E-01	2.1
HH46	V02	US	2024-12-19	HH46-V02-US-5	3.062	2.127	4.40E-01	2.045
HH46	V02	US	2024-12-19	HH46-V02-US-6	7.049	3.986	7.68E-01	2.083
HH48	V02	US	2025-02-10	HH48-V02-US-1	3.729	3.472	7.40E-02	2.089
HH48	V02	US	2025-02-10	HH48-V02-US-2	4.877	4.167	1.70E-01	2.091
HH48	V02	US	2025-02-10	HH48-V02-US-3	4.189	3.479	2.04E-01	2.081
HH48	V02	IS	2025-02-10	HH48-V02-IS-1	3.395	2.841	1.95E-01	2.09
HH48	V02	IS	2025-02-10	HH48-V02-IS-2	3.116	2.562	2.16E-01	2.1
HH48	V02	IS	2025-02-10	HH48-V02-IS-3	4.11	3.327	2.35E-01	2.106
HH49	V02	US	2024-12-20	HH49-V02-US-1	3.627	3.285	1.04E-01	2.185
HH49	V02	US	2024-12-20	HH49-V02-US-2	4.245	3.936	7.85E-02	2.119
HH49	V02	US	2024-12-20	HH49-V02-US-3	5.288	4.806	1.00E-01	2.044
HH49	V02	IS	2024-12-20	HH49-V02-IS-1	3.618	2.896	2.49E-01	2.046
HH49	V02	IS	2024-12-20	HH49-V02-IS-2	4.257	3.439	2.38E-01	2.046
HH49	V02	IS	2024-12-20	HH49-V02-IS-3	3.682	2.274	6.19E-01	2.241
HH50	V02	US	2024-12-11	HH50-V02-US-1	3.133	2.9	8.03E-02	2.2
HH50	V02	US	2024-12-11	HH50-V02-US-2	3.7	3.294	1.23E-01	2.189
HH50	V02	US	2024-12-11	HH50-V02-US-3	3.947	2.993	3.19E-01	2.147
HH50	V02	IS	2024-12-11	HH50-V02-IS-1	3.647	2.904	2.56E-01	2.144
HH50	V02	IS	2024-12-11	HH50-V02-IS-2	5.7	4.482	2.72E-01	2.194
HH50	V02	IS	2024-12-11	HH50-V02-IS-3	3.757	3.285	1.44E-01	2.2

HH52	V02	US	2025-02-10	HH52-V02-US-1	3.6	3.348	7.53E-02	2.02
HH52	V02	US	2025-02-10	HH52-V02-US-2	4.626	3.655	2.66E-01	2.07
HH52	V02	US	2025-02-10	HH52-V02-US-3	3.015	2.47	2.21E-01	2.042
HH52	V02	IS	2025-02-10	HH52-V02-IS-1	3	2.187	3.72E-01	2.143
HH52	V02	IS	2025-02-10	HH52-V02-IS-2	5.488	3.081	7.81E-01	2.343
HH52	V02	IS	2025-02-10	HH52-V02-IS-3	4.325	2.384	8.14E-01	2.282
HH53	V02	US	2024-12-13	HH53-V02-US-1	3.145	2.543	2.37E-01	2.059
HH53	V02	US	2024-12-13	HH53-V02-US-2	3.896	3.32	1.73E-01	2.015
HH53	V02	US	2024-12-13	HH53-V02-US-3	3.469	3.011	1.52E-01	2.028
HH53	V02	IS	2024-12-13	HH53-V02-IS-1	3.872	3.354	1.54E-01	2.181
HH53	V02	IS	2024-12-13	HH53-V02-IS-2	3.524	3.034	1.62E-01	2.168
HH53	V02	IS	2024-12-13	HH53-V02-IS-3	3.135	2.7	1.61E-01	2.074
HH54	V02	US	2025-02-10	HH54-V02-US-1	3.369	2.947	1.43E-01	2.048
HH54	V02	US	2025-02-10	HH54-V02-US-2	3.5	2.93	1.95E-01	2.07
HH54	V02	US	2025-02-10	HH54-V02-US-3	3.379	2.967	1.39E-01	2.04
HH54	V02	IS	2025-02-10	HH54-V02-IS-1	4.877	4.077	1.96E-01	2.488
HH54	V02	IS	2025-02-10	HH54-V02-IS-2	5.45	4.423	2.32E-01	4.133
HH54	V02	IS	2025-02-10	HH54-V02-IS-3	4	2.888	3.85E-01	2.04
HH02	V03	US	2025-04-02	HH02-V03-US-1	5.146	4.205	2.24E-01	2.048
HH02	V03	US	2025-04-02	HH02-V03-US-2	3.191	2.708	1.78E-01	2.047
HH02	V03	US	2025-04-02	HH02-V03-US-3	3.64	2.85	2.77E-01	2.014
HH03	V03	US	2025-03-27	HH03-V03-US-1	2.975	2.61	1.40E-01	2.023
HH03	V03	US	2025-03-27	HH03-V03-US-2	3.631	3.332	8.97E-02	2.069
HH03	V03	US	2025-03-27	HH03-V03-US-3	2.867	2.539	1.29E-01	2.012
HH04	V03	US	2025-02-24	HH04-V03-US-1	3.48	3.051	1.41E-01	2.014
HH04	V03	US	2025-02-24	HH04-V03-US-2	3.463	3.011	1.50E-01	2.063
HH04	V03	US	2025-02-24	HH04-V03-US-3	3.138	2.83	1.09E-01	2.015
HH05	V03	US	2025-04-28	HH05-V03-US-1	3.8	3.392	1.20E-01	2.082

HH05	V03	US	2025-04-28	HH05-V03-US-2	3.732	3.414	9.31E-02	2.048
HH05	V03	US	2025-04-28	HH05-V03-US-3	3.525	3.07	1.48E-01	2.04
HH06	V03	US	2025-03-24	HH06-V03-US-1	3.654	3.143	1.63E-01	2.024
HH06	V03	US	2025-03-24	HH06-V03-US-2	2.905	2.508	1.58E-01	2.057
HH06	V03	US	2025-03-24	HH06-V03-US-3	4.454	3.681	2.10E-01	2.092
HH07	V03	US	2025-04-21	HH07-V03-US-1	3.43	2.924	1.73E-01	2.06
HH07	V03	US	2025-04-21	HH07-V03-US-2	3.313	2.933	1.30E-01	2.021
HH07	V03	US	2025-04-21	HH07-V03-US-3	3.171	2.9	9.34E-02	2.105
HH08	V03	US	2025-02-26	HH08-V03-US-1	3.783	3.15	2.01E-01	2.079
HH08	V03	US	2025-02-26	HH08-V03-US-2	3.41	2.56	3.32E-01	2.031
HH08	V03	US	2025-02-26	HH08-V03-US-3	3.034	2.563	1.84E-01	2.016
HH08	V03	IS	2025-02-26	HH08-V03-IS-1	2.843	2.324	2.23E-01	2.086
HH08	V03	IS	2025-02-26	HH08-V03-IS-2	3.286	2.629	2.50E-01	2.187
HH08	V03	IS	2025-02-26	HH08-V03-IS-3	4.461	2.669	6.71E-01	2.287
HH08	V03	US	2025-03-03	HH01-V03-US-1	3.361	3.12	7.72E-02	2.076
HH08	V03	US	2025-03-03	HH01-V03-US-2	3.081	2.813	9.53E-02	2.038
HH08	V03	US	2025-03-03	HH01-V03-US-3	3.019	2.716	1.12E-01	2.031
HH09	V03	US	2025-04-15	HH09-V03-US-1	3.282	2.835	1.58E-01	2.07
HH09	V03	US	2025-04-15	HH09-V03-US-2	3.132	2.715	1.54E-01	2.019
HH09	V03	US	2025-04-15	HH09-V03-US-3	4.634	3.68	2.59E-01	2.022
HH09	V03	IS	2025-04-15	HH09-V03-IS-1	3.673	3.282	1.19E-01	2.022
HH09	V03	IS	2025-04-15	HH09-V03-IS-2	3.673	3.282	1.19E-01	2.028
HH09	V03	IS	2025-04-15	HH09-V03-IS-3	3.206	2.846	1.26E-01	2.024
HH10	V03	US	2025-03-05	HH10-V03-US-1	3.085	2.651	1.64E-01	2.095
HH10	V03	US	2025-03-05	HH10-V03-US-2	3.973	3.44	1.55E-01	2.087
HH10	V03	US	2025-03-05	HH10-V03-US-3	3.312	2.774	1.94E-01	2.074
HH11	V03	US	2025-03-05	HH11-V03-US-1	3.061	2.623	1.67E-01	2.111
HH11	V03	US	2025-03-05	HH11-V03-US-2	3.096	2.623	1.80E-01	2.12

HH11	V03	US	2025-03-05	HH11-V03-US-3	2.959	2.461	2.02E-01	2.038
HH11	V03	IS	2025-03-05	HH11-V03-IS-1	3.817	3.149	2.12E-01	2.014
HH11	V03	IS	2025-03-05	HH11-V03-IS-2	5.305	3.589	4.78E-01	2.331
HH11	V03	IS	2025-03-05	HH11-V03-IS-3	3.476	2.6	3.37E-01	2.165
HH12	V03	US	2025-05-08	HH12-V03-US-1	3.6	2.787	2.92E-01	2.095
HH12	V03	US	2025-05-08	HH12-V03-US-2	5.117	3.989	2.83E-01	2.009
HH12	V03	US	2025-05-08	HH12-V03-US-3	4.9	3.758	3.04E-01	2.064
HH12	V03	IS	2025-05-08	HH12-V03-IS-1	4.133	2.324	7.78E-01	2.04
HH12	V03	IS	2025-05-08	HH12-V03-IS-2	4.6	3.008	5.29E-01	2.084
HH12	V03	IS	2025-05-08	HH12-V03-IS-3	3.951	1.821	1.17E+00	2.33
HH13	V03	US	2025-04-10	HH13-V03-US-1	3.074	2.641	1.64E-01	2.018
HH13	V03	US	2025-04-10	HH13-V03-US-2	3.174	2.661	1.93E-01	2.051
HH13	V03	US	2025-04-10	HH13-V03-US-3	3.007	2.638	1.40E-01	2.022
HH14	V03	US	2025-04-01	HH14-V03-US-1	3.105	2.638	1.77E-01	2.031
HH14	V03	US	2025-04-01	HH14-V03-US-2	3.474	2.985	1.64E-01	2.013
HH14	V03	US	2025-04-01	HH14-V03-US-3	3.142	2.72	1.55E-01	2.07
HH15	V03	US	2025-04-14	HH15-V03-US-1	4.142	3.699	1.20E-01	2.052
HH15	V03	US	2025-04-14	HH15-V03-US-2	3.872	3.535	9.53E-02	2.03
HH15	V03	US	2025-04-14	HH15-V03-US-3	3.811	3.319	1.48E-01	2.1
HH15	V03	IS	2025-04-14	HH15-V03-IS-1	5.468	4.354	2.56E-01	2.06
HH15	V03	IS	2025-04-14	HH15-V03-IS-2	3.2	2.622	2.20E-01	2.091
HH15	V03	IS	2025-04-14	HH15-V03-IS-3	3.651	2.931	2.46E-01	2.025
HH16	V03	US	2025-03-03	HH16-V03-US-1	3.947	3.766	4.81E-02	2.056
HH16	V03	US	2025-03-03	HH16-V03-US-2	3.8	3.573	6.35E-02	2.083
HH16	V03	US	2025-03-03	HH16-V03-US-3	3.356	2.964	1.32E-01	2.004
HH16	V03	IS	2025-03-03	HH16-V03-IS-1	3.021	2.07	4.59E-01	2.032
HH16	V03	IS	2025-03-03	HH16-V03-IS-2	3.46	2.412	4.34E-01	2.138
HH16	V03	IS	2025-03-03	HH16-V03-IS-3	4.784	3.617	3.23E-01	2.123

HH17	V03	US	2025-02-24	HH17-V03-US-1	3.365	2.944	1.43E-01	2.064
HH17	V03	US	2025-02-24	HH17-V03-US-2	3.765	2.986	2.61E-01	2.135
HH17	V03	US	2025-02-24	HH17-V03-US-3	3.85	3.244	1.87E-01	2.056
HH17	V03	IS	2025-02-24	HH17-V03-IS-1	3.223	1.774	8.17E-01	1.965
HH17	V03	IS	2025-02-24	HH17-V03-IS-2	4.996	2.538	9.68E-01	2.065
HH17	V03	IS	2025-02-24	HH17-V03-IS-3	5.625	3.148	7.87E-01	2.1
HH19	V03	US	2025-05-05	HH19-V03-US-1	3.269	2.98	9.70E-02	2.051
HH19	V03	US	2025-05-05	HH19-V03-US-2	4.043	3.559	1.36E-01	2.058
HH19	V03	US	2025-05-05	HH19-V03-US-3	3.357	3.05	1.01E-01	2.094
HH19	V03	IS	2025-05-05	HH19-V03-IS-1	4.406	3.455	2.75E-01	2.099
HH19	V03	IS	2025-05-05	HH19-V03-IS-2	3.611	3.371	7.12E-02	2.092
HH19	V03	IS	2025-05-05	HH19-V03-IS-3	4.7	3.69	2.74E-01	2.039
HH20	V03	US	2025-05-05	HH20-V03-US-1	4.061	3.279	2.38E-01	2.058
HH20	V03	US	2025-05-05	HH20-V03-US-2	3.638	3.096	1.75E-01	2.059
HH20	V03	US	2025-05-05	HH20-V03-US-3	3.531	3.26	8.31E-02	2.091
HH20	V03	IS	2025-05-05	HH20-V03-IS-1	2.933	2.7	8.63E-02	2.004
HH20	V03	IS	2025-05-05	HH20-V03-IS-2	5.217	4.31	2.10E-01	2.069
HH20	V03	IS	2025-05-05	HH20-V03-IS-3	3.924	2.792	4.05E-01	2.005
HH21	V03	US	2025-04-28	HH21-V03-US-1	3.362	2.889	1.64E-01	2.091
HH21	V03	US	2025-04-28	HH21-V03-US-2	3.561	3.121	1.41E-01	2.007
HH21	V03	US	2025-04-28	HH21-V03-US-3	3.667	3.118	1.76E-01	2.079
HH21	V03	IS	2025-04-28	HH21-V03-IS-1	5.436	4.424	2.29E-01	2.071
HH21	V03	IS	2025-04-28	HH21-V03-IS-2	4.825	3.226	4.96E-01	2.088
HH21	V03	IS	2025-04-28	HH21-V03-IS-3	5.964	4.291	3.90E-01	2.112
HH22	V03	US	2025-04-14	HH22-V03-US-1	3.947	3.223	2.25E-01	2.028
HH22	V03	US	2025-04-14	HH22-V03-US-2	3.366	2.667	2.62E-01	2.059
HH22	V03	US	2025-04-14	HH22-V03-US-3	3.004	2.3	3.06E-01	2.098
HH22	V03	IS	2025-04-14	HH22-V03-IS-1	3.022	1.554	9.45E-01	2.009

HH22	V03	IS	2025-04-14	HH22-V03-IS-2	3.357	2.828	1.87E-01	2.08
HH22	V03	IS	2025-04-14	HH22-V03-IS-3	4.168	3.241	2.86E-01	2.105
HH23	V03	US	2025-04-15	HH23-V03-US-1	3.813	3.091	2.34E-01	2.049
HH23	V03	US	2025-04-15	HH23-V03-US-2	3.984	3.454	1.53E-01	2.072
HH23	V03	US	2025-04-15	HH23-V03-US-3	3.246	2.82	1.51E-01	2.087
HH23	V03	IS	2025-04-15	HH23-V03-IS-1	3.433	1.753	9.58E-01	2.05
HH23	V03	IS	2025-04-15	HH23-V03-IS-2	3.979	2.23	7.84E-01	2.106
HH23	V03	IS	2025-04-15	HH23-V03-IS-3	3.766	2.815	3.38E-01	2.111
HH24	V03	US	2025-02-24	HH24-V03-US-1	3.711	2.994	2.39E-01	2.092
HH24	V03	US	2025-02-24	HH24-V03-US-2	3.936	3.249	2.11E-01	2.048
HH24	V03	US	2025-02-24	HH24-V03-US-3	3.226	2.815	1.46E-01	2.052
HH24	V03	IS	2025-02-24	HH24-V03-IS-1	2.9	2.45	1.84E-01	2.121
HH24	V03	IS	2025-02-24	HH24-V03-IS-2	3.909	3.335	1.72E-01	2.121
HH24	V03	IS	2025-02-24	HH24-V03-IS-3	3.465	2.9	1.95E-01	2.014
HH25	V03	US	2025-04-14	HH25-V03-US-1	3.54	2.938	2.05E-01	2.061
HH25	V03	US	2025-04-14	HH25-V03-US-2	4.464	3.92	1.39E-01	2.006
HH25	V03	US	2025-04-14	HH25-V03-US-3	3.631	3.036	1.96E-01	2.073
HH25	V03	IS	2025-04-14	HH25-V03-IS-1	3.083	2.331	3.23E-01	2.082
HH25	V03	IS	2025-04-14	HH25-V03-IS-2	4.459	3.3	3.51E-01	2.104
HH25	V03	IS	2025-04-14	HH25-V03-IS-3	3.066	2.168	4.14E-01	2.016
HH26	V03	US	2025-03-05	HH26-V03-US-1	2.969	2.687	1.05E-01	2.087
HH26	V03	US	2025-03-05	HH26-V03-US-2	3.78	3.3	1.45E-01	2.084
HH26	V03	US	2025-03-05	HH26-V03-US-3	3.083	2.617	1.78E-01	2.1
HH26	V03	IS	2025-03-05	HH26-V03-IS-1	3.857	2.853	3.52E-01	2.017
HH26	V03	IS	2025-03-05	HH26-V03-IS-2	3.625	2.439	4.86E-01	2.093
HH26	V03	IS	2025-03-05	HH26-V03-IS-3	3.514	2.65	3.26E-01	2.046
HH27	V03	US	2025-04-07	HH27-V03-US-1	5	4.011	2.47E-01	2.076
HH27	V03	US	2025-04-07	HH27-V03-US-2	4.657	3.569	3.05E-01	2.156

HH27	V03	US	2025-04-07	HH27-V03-US-3	4.058	3.373	2.03E-01	2.009
HH27	V03	IS	2025-04-07	HH27-V03-IS-1	6.169	4.969	2.41E-01	2.108
HH27	V03	IS	2025-04-07	HH27-V03-IS-2	3.48	2.471	4.08E-01	2.07
HH27	V03	IS	2025-04-07	HH27-V03-IS-3	5.552	3.422	6.22E-01	2.159
HH28	V03	US	2025-03-04	HH28-V03-US-1	3.5	2.771	2.63E-01	2.071
HH28	V03	US	2025-03-04	HH28-V03-US-2	3.182	2.675	1.90E-01	2.042
HH28	V03	US	2025-03-04	HH28-V03-US-3	4.227	3.7	1.42E-01	2.069
HH28	V03	IS	2025-03-04	HH28-V03-IS-1	3.412	2.878	1.86E-01	2.1
HH28	V03	IS	2025-03-04	HH28-V03-IS-2	3.11	2.833	9.78E-02	2.053
HH28	V03	IS	2025-03-04	HH28-V03-IS-3	2.9	2.562	1.32E-01	2.079
HH29	V03	US	2025-03-31	HH29-V03-US-1	4.66	3.483	3.38E-01	2.057
HH29	V03	US	2025-03-31	HH29-V03-US-2	3.762	2.638	4.26E-01	2.043
HH29	V03	US	2025-03-31	HH29-V03-US-3	3.3	2.557	2.91E-01	2.032
HH29	V03	IS	2025-03-31	HH29-V03-IS-1	4.682	2.744	7.06E-01	2
HH29	V03	IS	2025-03-31	HH29-V03-IS-2	5	2.051	1.44E+00	2.69
HH29	V03	IS	2025-03-31	HH29-V03-IS-3	3.864	2.246	7.20E-01	2.285
HH30	V03	US	2025-03-31	HH30-V03-US-1	3.476	2.8	2.41E-01	2.006
HH30	V03	US	2025-03-31	HH30-V03-US-2	3.156	2.558	2.34E-01	2.008
HH30	V03	US	2025-03-31	HH30-V03-US-3	3.257	2.679	2.16E-01	2.091
HH30	V03	IS	2025-03-31	HH30-V03-IS-1	3.36	2.33	4.42E-01	2.138
HH30	V03	IS	2025-03-31	HH30-V03-IS-2	5.805	3.137	8.50E-01	3.519
HH30	V03	IS	2025-03-31	HH30-V03-IS-3	5.083	2.741	8.54E-01	2.17
HH31	V03	US	2025-04-07	HH31-V03-US-1	5.123	4.033	2.70E-01	2.014
HH31	V03	US	2025-04-07	HH31-V03-US-2	4.546	3.65	2.45E-01	2.072
HH31	V03	US	2025-04-07	HH31-V03-US-3	4.348	3.509	2.39E-01	2.034
HH31	V03	IS	2025-04-07	HH31-V03-IS-1	3.9	3.24	2.04E-01	2.028
HH31	V03	IS	2025-04-07	HH31-V03-IS-2	5.755	4.131	3.93E-01	2.186
HH31	V03	IS	2025-04-07	HH31-V03-IS-3	5.428	4.117	3.18E-01	2.139

HH32	V03	US	2025-03-26	HH32-V03-US-1	3.648	3.051	1.96E-01	2.174
HH32	V03	US	2025-03-26	HH32-V03-US-2	3.756	2.711	3.85E-01	2.143
HH32	V03	US	2025-03-26	HH32-V03-US-3	3.593	3.257	1.03E-01	2.15
HH32	V03	IS	2025-03-26	HH32-V03-IS-1	4.6	3.64	2.64E-01	2.005
HH32	V03	IS	2025-03-26	HH32-V03-IS-2	4.111	3.453	1.91E-01	2.04
HH32	V03	IS	2025-03-26	HH32-V03-IS-3	5.033	3.105	6.21E-01	2.05
HH33	V03	US	2025-02-26	HH33-V03-US-1	2.966	2.581	1.49E-01	2.055
HH33	V03	US	2025-02-26	HH33-V03-US-2	3.342	2.8	1.94E-01	2.069
HH33	V03	US	2025-02-26	HH33-V03-US-3	3.056	2.475	2.35E-01	2.026
HH33	V03	IS	2025-02-26	HH33-V03-IS-1	4.267	3.228	3.22E-01	2.187
HH33	V03	IS	2025-02-26	HH24-V03-IS-2	3.412	2.768	2.33E-01	2.152
HH33	V03	IS	2025-02-26	HH24-V03-IS-3	3.9	2.943	3.25E-01	2.115
HH34	V03	US	2025-03-26	HH34-V03-US-1	3.375	2.925	1.54E-01	2.167
HH34	V03	US	2025-03-26	HH34-V03-US-2	5.162	4.246	2.16E-01	2.026
HH34	V03	US	2025-03-26	HH34-V03-US-3	4.157	3.177	3.08E-01	2.027
HH34	V03	IS	2025-03-26	HH34-V03-IS-1	3.575	1.852	9.30E-01	2.288
HH34	V03	IS	2025-03-26	HH34-V03-IS-2	4.782	2.953	6.19E-01	2.198
HH34	V03	IS	2025-03-26	HH34-V03-IS-3	4.708	3.006	5.66E-01	2.222
HH35	V03	US	2025-04-28	HH35-V03-US-1	3.705	2.747	3.49E-01	2.065
HH35	V03	US	2025-05-04	HH35-V03-US-2	3.879	2.816	3.77E-01	2.028
HH35	V03	US	2025-05-04	HH35-V03-US-3	4.546	3.495	3.01E-01	2.019
HH35	V03	IS	2025-05-04	HH35-V03-IS-1	3.573	1.91	8.71E-01	2.072
HH35	V03	IS	2025-05-04	HH35-V03-IS-2	4.49	2.207	1.03E+00	2.049
HH35	V03	IS	2025-05-04	HH35-V03-IS-3	5.792	4.324	3.40E-01	2.097
HH36	V03	US	2025-04-21	HH36-V03-US-1	3.157	2.692	1.73E-01	2.071
HH36	V03	US	2025-04-21	HH36-V03-US-2	3.3	2.979	1.08E-01	2.025
HH36	V03	US	2025-04-21	HH36-V03-US-3	4.241	3.62	1.72E-01	2.074
HH36	V03	IS	2025-04-21	HH36-V03-IS-1	3.947	2.846	3.87E-01	2.042

HH36	V03	IS	2025-04-21	HH36-V03-IS-2	3.234	2	6.17E-01	2.046
HH36	V03	IS	2025-04-21	HH36-V03-IS-3	3.3	1.727	9.11E-01	2.144
HH37	V03	US	2025-05-17	HH37-V03-US-1	4.366	3.442	2.68E-01	2.007
HH37	V03	US	2025-05-17	HH37-V03-US-2	4.108	3.594	1.43E-01	2.066
HH37	V03	US	2025-05-17	HH37-V03-US-3	4.123	3.504	1.77E-01	2.063
HH37	V03	IS	2025-05-17	HH37-V03-IS-1	3.874	2.873	3.48E-01	2.07
HH37	V03	IS	2025-05-17	HH37-V03-IS-2	4.331	3.038	4.26E-01	2.069
HH37	V03	IS	2025-05-17	HH37-V03-IS-3	4.416	3.076	4.36E-01	2.082
HH38	V03	US	2025-04-23	HH38-V03-US-1	3.558	2.952	2.05E-01	2.095
HH38	V03	US	2025-04-23	HH38-V03-US-2	3.538	3.037	1.65E-01	2.077
HH38	V03	US	2025-04-23	HH38-V03-US-3	3.347	2.8	1.95E-01	2.052
HH38	V03	IS	2025-04-23	HH38-V03-IS-1	3.485	2.973	1.72E-01	2.085
HH38	V03	IS	2025-04-23	HH38-V03-IS-2	4.294	2.869	4.97E-01	2.042
HH38	V03	IS	2025-04-23	HH38-V03-IS-3	3.736	2.979	2.54E-01	2.08
HH39	V03	US	2025-03-21	HH39-V03-US-1	4.4	3.981	1.05E-01	2.087
HH39	V03	US	2025-03-21	HH39-V03-US-2	4.274	3.728	1.46E-01	2.056
HH39	V03	US	2025-03-21	HH39-V03-US-3	2.908	2.72	6.91E-02	2.117
HH39	V03	IS	2025-03-21	HH39-V03-IS-1	3.768	3.247	1.60E-01	2.033
HH39	V03	IS	2025-03-21	HH39-V03-IS-2	3.106	2.674	1.62E-01	2.029
HH39	V03	IS	2025-03-21	HH39-V03-IS-3	3.2	2.517	2.71E-01	2.005
HH41	V03	US	2025-04-07	HH41-V03-US-1	3.257	2.668	2.21E-01	2.005
HH41	V03	US	2025-04-07	HH41-V03-US-2	5.122	4.124	2.42E-01	2.036
HH41	V03	US	2025-04-07	HH41-V03-US-3	3.996	3.563	1.22E-01	2.059
HH41	V03	IS	2025-04-07	HH41-V03-IS-1	4.332	3.43	2.63E-01	2,025
HH41	V03	IS	2025-04-07	HH41-V03-IS-2	4.292	2.654	6.17E-01	2.12
HH41	V03	IS	2025-04-07	HH41-V03-IS-3	5.663	2.551	1.22E+00	2.046
HH42	V03	US	2025-04-16	HH42-V03-US-1	4.179	3.854	8.43E-02	2.024
HH42	V03	US	2025-04-16	HH42-V03-US-2	7.192	5.951	2.09E-01	2.075

HH42	V03	US	2025-04-16	HH42-V03-US-3	3.413	2.819	2.11E-01	2.05
HH42	V03	IS	2025-04-16	HH42-V03-IS-1	4.815	2.788	7.27E-01	2.008
HH42	V03	IS	2025-04-16	HH42-V03-IS-2	3.451	1.853	8.62E-01	2.03
HH42	V03	IS	2025-04-16	HH42-V03-IS-3	4.12	2.896	4.23E-01	1.981
HH43	V03	US	2025-04-21	HH43-V03-US-1	3.634	3.147	1.55E-01	2.08
HH43	V03	US	2025-04-21	HH43-V03-US-2	3.3	3.053	8.09E-02	2.072
HH43	V03	US	2025-04-21	HH43-V03-US-3	4.351	3.96	9.87E-02	2.104
HH43	V03	IS	2025-04-21	HH43-V03-IS-1	4.115	3.65	1.27E-01	2.071
HH43	V03	IS	2025-04-21	HH43-V03-IS-2	4.967	4.168	1.92E-01	2.076
HH43	V03	IS	2025-04-21	HH43-V03-IS-3	5.305	3.683	4.40E-01	2.564
HH43	V03	US	2025-04-23	HH43-V03-US-1	3.364	2.862	1.75E-01	2.018
HH43	V03	US	2025-04-23	HH43-V03-US-2	3.292	2.852	1.54E-01	2.107
HH43	V03	US	2025-04-23	HH43-V03-US-3	3.945	3.362	1.73E-01	2.045
HH43	V03	IS	2025-04-23	HH43-V03-IS-1	4.267	2.95	4.46E-01	2.058
HH43	V03	IS	2025-04-23	HH43-V03-IS-2	3.142	2.246	3.99E-01	2.045
HH43	V03	IS	2025-04-23	HH43-V03-IS-3	5.636	3.926	4.36E-01	2.048
HH44	V03	US	2025-04-07	HH44-V03-US-1	4.366	3.485	2.53E-01	2.026
HH44	V03	US	2025-04-07	HH44-V03-US-2	5.582	4.35	2.83E-01	2.06
HH44	V03	US	2025-04-07	HH44-V03-US-3	3.742	3.038	2.32E-01	2.024
HH44	V03	IS	2025-04-07	HH44-V03-IS-1	4.02	2.925	3.74E-01	2.322
HH44	V03	IS	2025-04-07	HH44-V03-IS-2	4.934	4.072	2.12E-01	2.092
HH44	V03	IS	2025-04-07	HH44-V03-IS-3	4.934	4.072	2.12E-01	2.092
HH45	V03	US	2025-04-08	HH45-V03-US-1	4.683	3.792	2.35E-01	2.09
HH45	V03	US	2025-04-08	HH45-V03-US-2	3.923	2.725	4.40E-01	2.039
HH45	V03	US	2025-04-08	HH45-V03-US-3	3.676	2.578	4.26E-01	2.1
HH45	V03	IS	2025-04-08	HH45-V03-IS-1	3.775	2.833	3.33E-01	2.037
HH45	V03	IS	2025-04-08	HH45-V03-IS-2	4.713	3.7	2.74E-01	2.114
HH45	V03	IS	2025-04-08	HH45-V03-IS-3	5.732	4.384	3.07E-01	2.04

HH46	V03	US	2025-04-28	HH46-V03-US-1	4.9	3.988	2.29E-01	2.109
HH46	V03	US	2025-04-28	HH46-V03-US-2	3.809	3.371	1.30E-01	2.061
HH46	V03	US	2025-04-28	HH46-V03-US-3	5.393	4.207	2.82E-01	2.039
HH46	V03	IS	2025-04-28	HH46-V03-IS-1	4.17	2.8	4.89E-01	2
HH46	V03	IS	2025-04-28	HH46-V03-IS-2	3.106	2.418	2.85E-01	2.091
HH46	V03	IS	2025-04-28	HH46-V03-IS-3	3.826	3.013	2.70E-01	2.031
HH47	V03	US	2025-03-21	HH47-V03-US-1	3.879	3.59	8.05E-02	2.111
HH47	V03	US	2025-03-21	HH47-V03-US-2	4.311	3.744	1.51E-01	2.087
HH47	V03	US	2025-03-21	HH47-V03-US-3	3.072	2.846	7.94E-02	2.026
HH47	V03	IS	2025-03-21	HH47-V03-IS-1	3.85	2.922	3.18E-01	2.222
HH47	V03	IS	2025-03-21	HH47-V03-IS-2	6.286	4.214	4.92E-01	2.155
HH47	V03	IS	2025-03-21	HH47-V03-IS-3	5.226	2.95	7.72E-01	3.122
HH48	V03	US	2025-04-28	HH48-V03-US-1	3.636	2.953	2.31E-01	2.077
HH48	V03	US	2025-04-28	HH48-V03-US-2	4.205	3.643	1.54E-01	2.014
HH48	V03	US	2025-04-28	HH48-V03-US-3	3.396	3.014	1.27E-01	2.08
HH48	V03	IS	2025-04-28	HH48-V03-IS-1	3.344	2.451	3.64E-01	2.078
HH48	V03	IS	2025-04-28	HH48-V03-IS-2	3.36	2.845	1.81E-01	2.059
HH48	V03	IS	2025-04-28	HH48-V03-IS-3	4.965	3.612	3.75E-01	2.095
HH49	V03	US	2025-05-13	HH49-V03-US-1	4.329	3.468	2.48E-01	2.07
HH49	V03	US	2025-05-13	HH49-V03-US-2	4.817	4.173	1.54E-01	2.044
HH49	V03	US	2025-05-13	HH49-V03-US-3	4.029	3.625	1.11E-01	2.039
HH49	V03	IS	2025-05-13	HH49-V03-IS-1	6.032	4.516	3.36E-01	2.006
HH49	V03	IS	2025-05-13	HH49-V03-IS-2	4.59	3.391	3.54E-01	2.084
HH49	V03	IS	2025-05-13	HH49-V03-IS-3	5.854	2.517	1.33E+00	2.026
HH50	V03	US	2025-04-28	HH50-V03-US-1	3.194	2.969	7.58E-02	2.049
HH50	V03	US	2025-04-28	HH50-V03-US-2	3.87	3.417	1.33E-01	2.074
HH50	V03	US	2025-04-28	HH50-V03-US-3	3.86	3.361	1.48E-01	2.095
HH50	V03	IS	2025-04-28	HH50-V03-IS-1	3.413	2.785	2.25E-01	2.065

HH50	V03	IS	2025-04-28	HH50-V03-IS-2	3.74	3.136	1.93E-01	2.04
HH50	V03	IS	2025-04-28	HH50-V03-IS-3	4.426	3.735	1.85E-01	2.067
HH52	V03	US	2025-05-07	HH52-V03-US-1	3.252	2.724	1.94E-01	2.021
HH52	V03	US	2025-05-07	HH52-V03-US-2	4.361	3.633	2.00E-01	2.051
HH52	V03	US	2025-05-07	HH52-V03-US-3	4.222	3.733	1.31E-01	2.048
HH52	V03	IS	2025-05-07	HH52-V03-IS-1	5.847	4.427	3.21E-01	2.064
HH52	V03	IS	2025-05-07	HH52-V03-IS-2	4.378	2.758	5.87E-01	2.209
HH52	V03	IS	2025-05-07	HH52-V03-IS-3	4.2	3.442	2.20E-01	2.071
HH53	V03	US	2025-05-08	HH53-V03-US-1	4.924	3.945	2.48E-01	2.051
HH53	V03	US	2025-05-08	HH53-V03-US-2	3.466	2.871	2.07E-01	2.034
HH53	V03	US	2025-05-08	HH53-V03-US-3	4.185	3.4	2.31E-01	2.041
HH53	V03	IS	2025-05-08	HH53-V03-IS-1	5.019	3.671	3.67E-01	2.089
HH53	V03	IS	2025-05-08	HH53-V03-IS-2	3.755	2.948	2.74E-01	2.106
HH53	V03	IS	2025-05-08	HH53-V03-IS-3	4.446	3.228	3.77E-01	2.192
HH54	V03	US	2025-04-02	HH54-V03-US-1	4.087	3.465	1.80E-01	2
HH54	V03	US	2025-04-02	HH54-V03-US-2	4.094	3.312	2.36E-01	2.059
HH54	V03	US	2025-04-02	HH54-V03-US-3	4.509	3.672	2.28E-01	2.026
HH54	V03	IS	2025-04-02	HH54-V03-IS-1	4.063	3.22	2.62E-01	2.089
HH54	V03	IS	2025-04-02	HH54-V03-IS-2	4.443	2.964	4.99E-01	2.136
HH54	V03	IS	2025-04-02	HH54-V03-IS-3	6.619	4.468	4.81E-01	2.076
HH01	V03	US	2025-03-03	HH01-V03-US-1	3.361	3.12	7.72E-02	2.076
HH01	V03	US	2025-03-03	HH01-V03-US-2	3.081	2.813	9.53E-02	2.038
HH01	V03	US	2025-03-03	HH01-V03-US-3	3.019	2.716	1.12E-01	2.031
HH40	V03	US	2025-04-23	HH40-V03-US-1	3.364	2.862	1.75E-01	2.018
HH40	V03	US	2025-04-23	HH40-V03-US-2	3.292	2.852	1.54E-01	2.107
HH40	V03	US	2025-04-23	HH40-V03-US-3	3.945	3.362	1.73E-01	2.045
HH40	V03	IS	2025-04-23	HH40-V03-IS-1	4.267	2.95	4.46E-01	2.058
HH40	V03	IS	2025-04-23	HH40-V03-IS-2	3.142	2.246	3.99E-01	2.045

HH40	V03	IS	2025-04-23	HH40-V03-IS-3	5.636	3.926	4.36E-01	2.048

Supplement 4: Amounts of soil stored and cultured

HHNo	Visit No	Type	Date	BarNo	Composite A Amount (g)	Composite B Amount (g)	IDEXX Amount (g)
HH01	V01	US	2024-08-05	HH01-V01-US-CA	0.212	0.248	3.084
HH01	V01	IS	2024-08-05	HH01-V01-IS-CA	0.243	0.231	3.145
HH02	V01	US	2024-08-05	HH02-V01-US-CA	0.207	0.216	3.198
HH02	V01	IS	2024-08-05	HH02-V01-IS-CA	0.205	0.216	3.158
HH03	V01	IS	2024-08-08	HH03-V01-IS-CA	0.227	0.271	3.056
HH03	V01	US	2024-08-08	HH03-V01-US-CA	0.248	0.212	3.07
HH04	V01	US	2024-08-07	HH04-V01-US-CA	0.25	0.25	3
HH04	V01	IS	2024-08-07	HH04-V01-IS-CA	0.25	0.25	3
HH05	V01	US	2024-08-12	HH05-V01-US-CA	0.223	0.235	3.103
HH06	V01	US	2024-08-12	HH06-V01-US-CA	0.379	0.301	3.055
HH07	V01	US	2024-08-13	HH07-V01-US-CA	0.248	0.329	3.131
HH08	V01	US	2024-08-13	HH08-V01-US-CA	0.227	0.228	3.099
HH08	V01	IS	2024-08-13	HH08-V01-IS-CA	0.207	0.226	3.129
HH09	V01	US	2024-08-19	HH09-V01-US-CA	0.429	0.255	3.111
HH09	V01	IS	2024-08-19	HH09-V01-IS-CA	0.347	0.25	3.106
HH10	V01	US	2024-08-19	HH10-V01-US-CA	0.225	0.227	3.085
HH11	V01	US	2024-08-21	HH11-V01-US-CA	0.205	0.204	3.186
HH11	V01	IS	2024-08-21	HH11-V01-IS-CA	0.271	0.212	3.096
HH12	V01	US	2024-08-21	HH12-V01-US-CA	0.223	0.224	3.046
HH12	V01	IS	2024-08-21	HH12-V01-IS-CA	0.407	0.225	3.084
HH13	V01	US	2024-08-29	HH13-V01-US-CA	0.323	0.207	3.238
HH14	V01	US	2024-08-29	HH14-V01-US-CA	0.295	0.215	3.137
HH15	V01	US	2024-09-02	HH15-V01-US-CA	0.204	0.251	3.371
HH15	V01	IS	2024-09-02	HH15-V01-IS-CA	0.338	0.273	3.197
HH16	V01	IS	2024-09-04	HH16-V01-IS-CA	0.242	0.271	3.248

HH16	V01	US	2024-09-04	HH16-V01-US-CA	0.226	0.287	3.124
HH17	V01	IS	2024-09-04	HH17-V01-IS-CA	0.389	0.237	3.101
HH17	V01	US	2024-09-04	HH17-V01-US-CA	0.241	0.42	3.114
HH18	V01	IS	2024-09-07	HH18-V01-IS-CA	0.244	0.303	3.267
HH18	V01	US	2024-09-07	HH18-V01-US-CA	0.223	0.236	3.149
HH19	V01	IS	2024-09-09	HH19-V01-IS-CA	0.225	0.296	3.008
HH19	V01	US	2024-09-09	HH19-V01-US-CA	0.27	0.224	3.245
HH20	V01	IS	2024-09-09	HH20-V01-IS-CA	0.238	0.217	3.297
HH20	V01	US	2024-09-09	HH20-V01-US-CA	0.223	0.245	3.192
HH21	V01	IS	2024-09-09	HH21-V01-IS-CA	0.315	0.329	3
HH21	V01	US	2024-09-09	HH21-V01-US-CA	0.287	0.247	3.266
HH22	V01	IS	2024-09-10	HH22-V01-IS-CA	0.242	0.289	3.064
HH22	V01	US	2024-09-10	HH22-V01-US-CA	0.242	0.241	3.134
HH23	V01	IS	2024-09-10	HH23-V01-IS-CA	0.228	0.267	3.277
HH23	V01	US	2024-09-10	HH23-V01-US-CA	0.266	0.269	3.229
HH24	V01	IS	2024-09-10	HH24-V01-IS-CA	0.206	0.217	3.006
HH24	V01	US	2024-09-10	HH24-V01-US-CA	0.344	0.25	3.078
HH25	V01	IS	2024-09-11	HH25-V01-IS-CA	0.219	0.412	3.29
HH25	V01	US	2024-09-11	HH25-V01-US-CA	0.347	0.21	3.112
HH26	V01	IS	2024-09-11	HH26-V01-IS-CA	0.227	0.222	3.235
HH26	V01	US	2024-09-11	HH26-V01-US-CA	0.256	0.225	3.074
HH27	V01	IS	2024-09-27	HH27-V01-IS-CA	0.237	0.265	3.06
HH27	V01	US	2024-09-27	HH27-V01-US-CA	0.299	0.204	3.101
HH28	V01	IS	2024-09-27	HH28-V01-IS-CA	0.27	0.293	3.059
HH28	V01	US	2024-09-27	HH28-V01-US-CA	0.246	0.235	3.374
HH29	V01	IS	2024-09-29	HH29-V01-IS-CA	0.268	0.284	3.225
HH29	V01	US	2024-09-29	HH29-V01-US-CA	0.271	0.299	3.021

HH30	V01	IS	2024-09-29	HH30-V01-IS-CA	0.297	0.278	3.415
HH30	V01	US	2024-09-29	HH30-V01-US-CA	0.21	0.223	3.032
HH31	V01	IS	2024-09-30	HH31-V01-IS-CA	0.24	0.25	3.147
HH31	V01	US	2024-09-30	HH31-V01-US-CA	0.323	0.285	3.217
HH32	V01	IS	2024-09-30	HH32-V01-IS-CA	0.232	0.293	3.148
HH32	V01	US	2024-09-30	HH32-V01-US-CA	0.23	0.227	3.054
HH33	V01	IS	2024-10-07	HH33-V01-IS-CA	0.272	0.332	3.212
HH33	V01	US	2024-10-07	HH33-V01-US-CA	0.289	0.208	3.07
HH34	V01	IS	2024-10-07	HH34-V01-IS-CA	0.224	0.255	3.061
HH34	V01	US	2024-10-07	HH34-V01-US-CA	0.424	0.222	3.101
HH35	V01	IS	2024-10-07	HH35-V01-IS-CA	0.24	0.439	3.011
HH35	V01	US	2024-10-07	HH35-V01-US-CA	0.226	0.297	3.041
HH36	V01	IS	2024-10-07	HH36-V01-IS-CA	0.235	0.239	3.007
HH36	V01	US	2024-10-07	HH36-V01-US-CA	0.332	0.216	3.053
HH37	V01	US	2024-10-09	HH37-V01-US-CA	0.253	0.253	3.051
HH37	V01	IS	2024-10-09	HH37-V01-IS-CA	0.252	0.387	3.189
HH38	V01	IS	2024-10-09	HH38-V01-IS-CA	0.372	0.322	3.038
HH38	V01	US	2024-10-09	HH38-V01-US-CA	0.257	0.336	3.227
HH39	V01	IS	2024-10-09	HH39-V01-IS-CA	0.279	0.378	3.065
HH39	V01	US	2024-10-09	HH39-V01-US-CA	0.331	0.317	3.178
HH40	V01	IS	2024-10-10	HH40-V01-IS-CA	0.286	0.405	3.215
HH40	V01	US	2024-10-10	HH40-V01-US-CA	0.226	0.244	3.091
HH41	V01	IS	2024-10-25	HH41-V01-IS-CA	0.308	0.283	3.087
HH41	V01	US	2024-10-25	HH41-V01-US-CA	0.219	0.245	3.048
HH42	V01	IS	2024-10-25	HH42-V01-IS-CA	0.248	0.231	3.178
HH42	V01	US	2024-10-25	HH42-V01-US-CA	0.25	0.279	3.142
HH43	V01	IS	2024-10-25	HH43-V01-IS-CA	0.329	0.237	3.159

HH43	V01	US	2024-10-25	HH43-V01-US-CA	0.239	0.268	3
HH44	V01	IS	2024-10-26	HH44-V01-IS-CA	0.285	0.366	3.125
HH44	V01	US	2024-10-26	HH44-V01-US-CA	0.27	0.321	3.034
HH45	V01	IS	2024-10-30	HH45-V01-IS-CA	0.406	0.244	3.168
HH45	V01	US	2024-10-30	HH45-V01-US-CA	0.341	0.351	3.263
HH46	V01	IS	2024-11-03	HH46-V01-IS-CA	0.269	0.344	3.184
HH46	V01	US	2024-11-03	HH46-V01-US-CA	0.231	0.351	3.167
HH47	V01	IS	2024-11-05	HH47-V01-IS-CA	0.268	0.344	3.072
HH47	V01	US	2024-11-05	HH47-V01-US-CA	0.324	0.337	3.052
HH48	V01	IS	2024-11-07	HH48-V01-IS-CA	0.223	0.248	3.15
HH48	V01	US	2024-11-07	HH48-V01-US-CA	0.262	0.218	3.193
HH49	V01	IS	2024-11-07	HH49-V01-IS-CA	0.305	0.305	3.187
HH49	V01	US	2024-11-07	HH49-V01-US-CA	0.238	0.313	3.024
HH50	V01	IS	2024-11-07	HH50-V01-IS-CA	0.246	0.23	3.008
HH50	V01	US	2024-11-07	HH50-V01-US-CA	0.252	0.301	3.064
HH51	V01	US	2024-09-02	HH51-V01-US-CA	0.433	0.231	3.248
HH51	V01	IS	2024-09-02	HH51-V01-IS-CA	0.237	0.244	3.289
HH52	V01	US	2024-11-07	HH52-V01-US-CA	0.264	0.253	3.192
HH52	V01	IS	2024-11-07	HH52-V01-IS-CA	0.294	0.434	3.02
HH53	V01	US	2024-11-08	HH53-V01-US-CA	0.262	0.263	3.137
HH53	V01	IS	2024-11-08	HH53-V01-IS-CA	0.264	0.265	3.191
HH54	V01	US	2024-11-08	HH54-V01-US-CA	0.409	0.306	3.286
HH54	V01	IS	2024-11-08	HH54-V01-IS-CA	0.314	0.336	3.118
HH01	V02	US	2024-11-20	HH01-V02-US-CA	0.257	0.25	3.045
HH02	V02	US	2025-01-08	HH02-V02-US-CA	0.265	0.264	3.056
HH03	V02	US	2024-11-25	HH03-V02-US-CA	0.2	0.2	3
HH04	V02	US	2025-01-30	HH04-V02-US-CA	0.266	0.262	3.022

HH05	V02	US	2025-01-15	HH05-V02-US-CA	0.266	0.285	3.037
HH06	V02	US	2024-12-18	HH06-V02-US-CA	0.304	0.434	3.026
HH07	V02	US	2025-01-07	HH07-V02-US-CA	0.24	0.29	3.1
HH08	V02	IS	2025-01-15	HH08-V02-IS-CA	0.3	0.271	3.1
HH08	V02	US	2025-01-15	HH08-V02-US-CA	0.25	0.27	3.115
HH09	V02	IS	2025-02-03	HH09-V02-IS-CA	0.28	0.361	3.012
HH09	V02	US	2025-02-03	HH09-V02-US-CA	0.309	0.26	2.975
HH10	V02	US	2024-12-09	HH10-V02-US-CA	0.318	0.256	3.1
HH11	V02	IS	2024-12-09	HH11-V02-IS-CA	0.331	0.331	3.071
HH11	V02	US	2024-12-09	HH11-V02-US-CA	0.247	0.335	3.151
HH12	V02	IS	2024-11-25	HH12-V02-IS-CA	0.3	0.3	3.3
HH12	V02	US	2024-11-25	HH12-V02-US-CA	0.2	0.2	3.1
HH13	V02	US	2024-12-20	HH13-V02-US-CA	0.29	0.243	3.021
HH14	V02	US	2024-12-04	HH14-V02-US-CA	0.255	0.259	3.12
HH15	V02	IS	2024-12-02	HH15-V02-IS-CA	0.226	0.23	3.212
HH15	V02	US	2024-12-02	HH15-V02-US-CA	0.276	0.376	3.17
HH16	V02	IS	2025-01-15	HH16-V02-IS-CA	0.258	0.271	3
HH16	V02	US	2025-01-15	HH16-V02-US-CA	0.29	0.264	3.056
HH17	V02	IS	2024-12-04	HH17-V02-IS-CA	0.244	0.243	3.273
HH17	V02	US	2024-12-04	HH17-V02-US-CA	0.275	0.249	3.19
HH19	V02	IS	2025-01-29	HH19-V02-IS-CA	0.257	0.246	3.014
HH19	V02	US	2025-01-29	HH19-V02-US-CA	0.316	0.26	3.09
HH20	V02	IS	2025-01-29	HH20-V02-IS-CA	0.26	0.283	3.056
HH20	V02	US	2025-01-29	HH20-V02-US-CA	0.275	0.262	3.066
HH21	V02	IS	2025-02-03	HH21-V02-IS-CA	0.294	0.306	3.081
HH21	V02	US	2025-02-03	HH21-V02-US-CA	0.293	0.331	3.016
HH22	V02	IS	2024-11-20	HH22-V02-IS-CA	0.2	0.2	3

HH22	V02	US	2024-11-20	HH22-V02-US-CA	0.3	0.2	3.1
HH23	V02	IS	2025-01-14	HH23-V02-IS-CA	0.28	0.315	3.058
HH23	V02	US	2025-01-14	HH23-V02-US-CA	0.254	0.277	3.02
HH24	V02	IS	2025-01-28	HH24-V02-IS-CA	0.273	0.269	3.009
HH24	V02	US	2025-01-28	HH24-V02-US-CA	0.345	0.271	3.065
HH25	V02	IS	2024-12-02	HH25-V02-IS-CA	0.227	0.319	3.043
HH25	V02	US	2024-12-02	HH25-V02-US-CA	0.244	0.225	3.008
HH26	V02	IS	2025-01-08	HH26-V02-IS-CA	0.275	0.265	3.129
HH26	V02	US	2025-01-08	HH26-V02-US-CA	0.248	0.279	3.1
HH27	V02	IS	2024-12-09	HH27-V02-IS-CA	0.281	0.276	3.3
HH27	V02	US	2024-12-09	HH27-V02-US-CA	0.289	0.218	3.238
HH28	V02	IS	2024-11-24	HH28-V02-IS-CA	0.3	0.2	3.1
HH28	V02	US	2024-11-24	HH28-V02-US-CA	0.2	0.3	3.3
HH29	V02	IS	2024-12-19	HH29-V02-IS-CA	0.291	0.261	2.872
HH29	V02	US	2024-12-19	HH29-V02-US-CA	0.252	0.3	3.022
HH30	V02	IS	2024-12-19	HH30-V02-IS-CA	0.419	0.25	3.448
HH30	V02	US	2024-12-19	HH30-V02-US-CA	0.277	0.31	3.123
HH31	V02	IS	2025-01-08	HH31-V02-IS-CA	0.296	0.3	3.11
HH31	V02	US	2025-01-08	HH31-V02-US-CA	0.252	0.246	3.108
HH32	V02	IS	2025-01-08	HH32-V02-IS-CA	0.343	0.381	3.074
HH32	V02	US	2025-01-08	HH32-V02-US-CA	0.331	0.319	3
HH33	V02	IS	2025-01-29	HH33-V02-IS-CA	0.304	0.32	3.141
HH33	V02	US	2025-01-29	HH33-V02-US-CA	0.283	0.271	3.078
HH34	V02	IS	2025-02-03	HH34-V02-IS-CA	0.256	0.256	2.992
HH34	V02	US	2025-02-03	HH34-V02-US-CA	0.282	0.289	3.089
HH35	V02	IS	2024-11-20	HH35-V02-IS-CA	0.275	0.238	3.029
HH35	V02	US	2024-11-20	HH35-V02-US-CA	0.272	0.258	3.334

HH36	V02	IS	2025-02-03	HH36-V02-IS-CA	0.333	0.3	3.017
HH36	V02	US	2025-02-03	HH36-V02-US-CA	0.27	0.256	3.037
HH37	V02	IS	2025-01-10	HH37-V02-IS-CA	0.307	0.278	3.033
HH37	V02	US	2025-01-10	HH37-V02-US-CA	0.258	0.257	3.133
HH38	V02	IS	2024-12-02	HH38-V02-IS-CA	0.256	0.263	3.085
HH38	V02	US	2024-12-02	HH38-V02-US-CA	0.251	0.245	3.005
HH39	V02	IS	2025-01-29	HH39-V02-IS-CA	0.255	0.293	3.091
HH39	V02	US	2025-01-29	HH39-V02-US-CA	0.284	0.254	3
HH40	V02	IS	2025-02-04	HH40-V02-IS-CA	0.284	0.313	3.035
HH40	V02	US	2025-02-03	HH40-V02-US-CA	0.294	0.329	3
HH41	V02	IS	2025-01-07	HH41-V02-IS-CA	0.281	0.321	3.078
HH41	V02	US	2025-01-07	HH41-V02-US-CA	0.258	0.234	3.027
HH42	V02	IS	2025-02-10	HH42-V02-IS-CA	0.259	0.3	3.027
HH42	V02	US	2025-02-10	HH42-V02-US-CA	0.292	0.27	3.074
HH43	V02	IS	2025-01-17	HH43-V02-IS-CA	0.261	0.289	3.037
HH43	V02	US	2025-01-17	HH43-V02-US-CA	0.253	0.258	3.04
HH44	V02	IS	2025-01-17	HH44-V02-IS-CA	0.259	0.287	3.03
HH44	V02	US	2025-01-17	HH44-V02-US-CA	0.261	0.274	3.1
HH45	V02	IS	2024-12-18	HH45-V02-IS-CA	0.326	0.238	3.049
HH45	V02	US	2024-12-18	HH45-V02-US-CA	0.251	0.266	3.049
HH46	V02	IS	2024-12-19	HH46-V02-IS-CA	0.296	0.32	3.167
HH46	V02	US	2024-12-19	HH46-V02-US-CA	0.263	0.277	3.043
HH47	V02	IS	2025-02-05	HH47-V02-IS-CA	0.314	0.325	3.084
HH47	V02	US	2025-02-05	HH47-V02-US-CA	0.276	0.26	3.073
HH48	V02	IS	2025-02-10	HH48-V02-IS-CA	0.304	0.361	3.056
HH48	V02	US	2025-02-10	HH48-V02-US-CA	0.254	0.262	3.137
HH49	V02	IS	2024-12-20	HH49-V02-IS-CA	0.262	0.266	3.106

HH49	V02	US	2024-12-20	HH49-V02-US-CA	0.258	0.277	3.006
HH50	V02	IS	2024-12-11	HH50-V02-IS-CA	0.244	0.247	3.109
HH50	V02	US	2024-12-11	HH50-V02-US-CA	0.276	0.318	3.159
HH52	V02	IS	2025-02-10	HH52-V02-IS-CA	0.349	0.318	3.124
HH52	V02	US	2025-02-10	HH52-V02-US-CA	0.31	0.333	3.07
HH53	V02	IS	2024-12-13	HH53-V02-IS-CA	0.291	0.269	3.128
HH53	V02	US	2024-12-13	HH53-V02-US-CA	0.249	0.275	3.066
HH54	V02	IS	2025-02-10	HH54-V02-IS-CA	0.318	0.377	3.128
HH54	V02	US	2025-02-10	HH54-V02-US-CA	0.282	0.288	3.041
HH01	V03	US	2025-03-03	HH01-V03-US-CA	0.49	0.24	3.069
HH02	V03	US	2025-04-02	HH02-V03-US-CA	0.256	0.256	3.083
HH03	V03	US	2025-03-27	HH03-V03-US-CA	0.25	0.271	3.027
HH04	V03	US	2025-02-24	HH04-V03-US-CA	0.313	0.315	3.041
HH05	V03	US	2025-04-28	HH05-V03-US-CA	0.238	0.246	3.071
HH06	V03	US	2025-03-24	HH06-V03-US-CA	0.249	0.295	3.129
HH07	V03	US	2025-04-21	HH07-V03-US-CA	0.238	0.244	3.06
HH08	V03	IS	2025-02-26	HH08-V03-IS-CA	0.258	0.275	3.023
HH08	V03	US	2025-02-26	HH08-V03-US-CA	0.27	0.3	3.023
HH09	V03	IS	2025-04-15	HH09-V03-IS-CA	0.248	0.285	3.07
HH09	V03	US	2025-04-15	HH09-V03-US-CA	0.3	0.28	3.088
HH10	V03	US	2025-03-05	HH10-V03-US-CA	0.257	0.277	3.022
HH11	V03	IS	2025-03-05	HH11-V03-IS-CA	0.26	0.252	3.1
HH11	V03	US	2025-03-05	HH11-V03-US-CA	0.28	0.27	3.025
HH12	V03	IS	2025-05-08	HH12-V03-IS-CA	0.3	0.274	3.039
HH12	V03	US	2025-05-08	HH12-V03-US-CA	0.253	0.233	3.065
HH13	V03	US	2025-04-10	HH13-V03-US-CA	0.277	0.227	3.031
HH14	V03	US	2025-04-01	HH14-V03-US-CA	0.388	0.287	3.076

HH15	V03	IS	2025-04-14	HH15-V03-IS-CA	0.257	0.27	3.074
HH15	V03	US	2025-04-14	HH15-V03-US-CA	0.255	0.263	3.076
HH16	V03	IS	2025-03-03	HH16-V03-IS-CA	0.287	0.274	3.08
HH16	V03	US	2025-03-03	HH16-V03-US-CA	0.3	0.3	3.056
HH17	V03	IS	2025-02-24	HH17-V03-IS-CA	0.312	0.257	3.06
HH17	V03	US	2025-02-24	HH17-V03-US-CA	0.3	0.3	3.056
HH19	V03	IS	2025-05-05	HH19-V03-IS-CA	0.284	0.264	3.012
HH19	V03	US	2025-05-05	HH19-V03-US-CA	0.313	0.25	3.006
HH20	V03	IS	2025-05-05	HH20-V03-IS-CA	0.295	0.231	3.000
HH20	V03	US	2025-05-05	HH20-V03-US-CA	0.253	0.264	3.07
HH21	V03	IS	2025-04-28	HH21-V03-IS-CA	0.242	0.233	3.07
HH21	V03	US	2025-04-28	HH21-V03-US-CA	0.252	0.352	3.025
HH22	V03	IS	2025-04-14	HH22-V03-IS-CA	0.25	0.336	3.031
HH22	V03	US	2025-04-14	HH22-V03-US-CA	0.245	0.268	3.051
HH23	V03	IS	2025-04-15	HH23-V03-IS-CA	0.235	0.246	3.025
HH23	V03	US	2025-04-15	HH23-V03-US-CA	0.273	0.236	3.1
HH24	V03	IS	2025-02-24	HH24-V03-IS-CA	0.273	0.279	2.035
HH24	V03	US	2025-02-24	HH24-V03-US-CA	0.286	0.3	3.127
HH25	V03	IS	2025-04-14	HH25-V03-IS-CA	0.281	0.3	3
HH25	V03	US	2025-04-14	HH25-V03-US-CA	0.304	0.289	3.017
HH26	V03	IS	2025-03-05	HH26-V03-IS-CA	0.27	0.342	3.06
HH26	V03	US	2025-03-05	HH26-V03-US-CA	0.257	0.251	3.106
HH27	V03	IS	2025-04-07	HH27-V03-IS-CA	0.236	0.29	3.09
HH27	V03	US	2025-04-07	HH27-V03-US-CA	0.288	0.286	3
HH28	V03	IS	2025-03-04	HH28-V03-IS-CA	0.307	0.264	3.016
HH28	V03	US	2025-03-04	HH28-V03-US-CA	0.278	0.268	3.063
HH29	V03	IS	2025-03-31	HH29-V03-IS-CA	0.282	0.3	3.056

HH29	V03	US	2025-03-31	HH29-V03-US-CA	0.251	0.248	3.021
HH30	V03	IS	2025-03-31	HH30-V03-IS-CA	0.265	0.292	3.053
HH30	V03	US	2025-03-31	HH30-V03-US-CA	0.259	0.289	3.116
HH31	V03	IS	2025-04-07	HH31-V03-IS-CA	0.274	0.285	3.081
HH31	V03	US	2025-04-07	HH31-V03-US-CA	0.29	0.291	3.074
HH32	V03	IS	2025-03-26	HH32-V03-IS-CA	0.277	0.26	3.107
HH32	V03	US	2025-03-26	HH32-V03-US-CA	0.235	0.28	3.068
HH33	V03	IS	2025-02-26	HH33-V03-IS-CA	0.308	0.281	3.082
HH33	V03	US	2025-02-26	HH33-V03-US-CA	0.257	0.281	3.038
HH34	V03	IS	2025-03-26	HH34-V03-IS-CA	0.263	0.301	3.042
HH34	V03	US	2025-03-26	HH34-V03-US-CA	0.266	0.252	3
HH35	V03	IS	2025-05-04	HH35-V03-IS-CA	0.258	0.26	3.05
HH35	V03	US	2025-05-04	HH35-V03-US-CA	0.258	0.264	3.078
HH36	V03	IS	2025-04-21	HH36-V03-IS-CA	0.235	0.271	3.031
HH36	V03	US	2025-04-21	HH36-V03-US-CA	0.255	0.341	3.04
HH37	V03	IS	2025-05-17	HH37-V03-IS-CA	0.253	0.246	3.014
HH37	V03	US	2025-05-17	HH37-V03-US-CA	0.273	0.277	3.068
HH38	V03	IS	2025-04-23	HH38-V03-IS-CA	0.269	0.272	3.02
HH38	V03	US	2025-04-23	HH38-V03-US-CA	0.3	0.232	3.03
HH39	V03	IS	2025-03-21	HH39-V03-IS-CA	0.3	0.239	3.3233
HH39	V03	US	2025-03-21	HH39-V03-US-CA	0.274	0.246	3
HH40	V03	IS	2025-04-23	HH40-V03-IS-CA	0.241	0.312	3.022
HH40	V03	US	2025-04-23	HH40-V03-US-CA	0.227	0.262	3.066
HH41	V03	IS	2025-04-07	HH41-V03-IS-CA	0.243	0.242	3.023
HH41	V03	US	2025-04-07	HH41-V03-US-CA	0.265	0.312	3.052
HH42	V03	IS	2025-04-16	HH42-V03-IS-CA	0.293	0.312	3.102
HH42	V03	US	2025-04-16	HH42-V03-US-CA	0.294	0.291	3

HH43	V03	IS	2025-04-21	HH43-V03-IS-CA	0.271	0.3	3.039
HH43	V03	US	2025-04-21	HH43-V03-US-CA	0.3	0.255	3.058
HH44	V03	IS	2025-04-07	HH44-V03-IS-CA	0.325	0.226	3.1
HH44	V03	US	2025-04-07	HH44-V03-US-CA	0.227	0.25	3
HH45	V03	IS	2025-04-08	HH45-V03-IS-CA	0.256	0.27	3.073
HH45	V03	US	2025-04-08	HH45-V03-US-CA	0.271	0.308	3.037
HH46	V03	IS	2025-04-28	HH46-V03-IS-CA	0.276	0.277	3.063
HH46	V03	US	2025-04-28	HH46-V03-US-CA	0.235	0.267	3.052
HH47	V03	IS	2025-03-21	HH47-V03-IS-CA	0.271	0.325	3.049
HH47	V03	US	2025-03-21	HH47-V03-US-CA	0.278	0.292	3.088
HH48	V03	IS	2025-04-30	HH48-V03-IS-CA	0.262	0.243	3.04
HH48	V03	US	2025-04-30	HH48-V03-US-CA	0.245	0.262	3.044
HH49	V03	IS	2025-05-13	HH49-V03-IS-CA	0.232	0.24	3.044
HH49	V03	US	2025-05-13	HH49-V03-US-CA	0.235	0.257	3.062
HH50	V03	IS	2025-04-28	HH50-V03-IS-CA	0.251	0.254	3.054
HH50	V03	US	2025-04-28	HH50-V03-US-CA	0.235	0.24	3.092
HH52	V03	IS	2025-05-07	HH52-V03-IS-CA	0.274	0.236	3.042
HH52	V03	US	2025-05-07	HH52-V03-US-CA	0.262	0.266	3.011
HH53	V03	IS	2025-05-08	HH53-V03-IS-CA	0.258	0.266	3.055
HH53	V03	US	2025-05-08	HH53-V03-US-CA	0.269	0.267	3.028
HH54	V03	IS	2025-04-02	HH54-V03-IS-CA	0.262	0.274	3.067
HH54	V03	US	2025-04-02	HH54-V03-US-CA	0.245	0.3	3.057

Supplement 5: Amounts of wastewater stored and cultured

HHNo	Visit No	Type	Date	BarNo	Filter 1 Amount (mL)	Filter 2 Amount (mL)	Tube 1 Amount (g)	Tube 2 Amount (g)	IDEXX Amount (g)
HH09	V01	WW	2024-08-19	HH09-V01-SLS-1			0.213	0.267	1.156
HH11	V01	WW	2024-08-21	HH11-V01-SLL-1	100	100			
HH12	V01	WW	2024-08-21	HH12-V01-SLL-1	100	50			
HH16	V01	WW	2024-09-04	HH16-V01-WW-1	100	100			
HH17	V01	WW	2024-09-04	HH17-V01-WW-1	100	100			
HH18	V01	WW	2024-09-07	HH18-V01-WW-1	150	100			
HH19	V01	WW	2024-09-09	HH19-V01-WW-1			0.375	0.237	3.005
HH22	V01	WW	2024-09-10	HH22-V01-WW-1	100	100			
HH23	V01	WW	2024-09-10	HH23-V01-WW-1	50	50			
HH25	V01	WW	2024-09-11	HH25-V01-WW-1	100	100			
HH28	V01	WW	2024-09-27	HH28-V01-WW-1	100	100			
HH29	V01	WW	2024-09-29	HH29-V01-WW-1	100	100			
HH30	V01	WW	2024-09-29	HH30-V01-WW-1	100	83			
HH32	V01	WW	2024-09-30	HH32-V01-WW-1			0.25	0.271	3.028
HH33	V01	WW	2024-10-07	HH33-V01-WW-1	100	100			
HH35	V01	WW	2024-10-07	HH35-V01-WW-1	75	50			
HH37	V01	WW	2024-10-09	HH37-V01-WW-1			0.285	0.308	1.01
HH40	V01	WW	2024-10-10	HH40-V01-WW-1	100	100			
HH41	V01	WW	2024-10-25	HH41-V01-WW-1	100	85			
HH42	V01	WW	2024-10-25	HH42-V01-WW-1	100	86			
HH43	V01	WW	2024-10-25	HH43-V01-WW-1			0.252	0.405	3.206
HH44	V01	WW	2024-10-26	HH44-V01-WW-1	30	32			
HH45	V01	WW	2024-10-30	HH45-V01-WW-1	100	100			
HH46	V01	WW	2024-11-03	HH46-V01-WW-1	100	100			
HH47	V01	WW	2024-11-05	HH47-V01-WW-1	80	69			

HH49	V01	WW	2024-11-07	HH49-V01-WW-1	100	50			
HH50	V01	WW	2024-11-07	HH50-V01-WW-1	100	100			
SLGN1	V01	WW	2024-08-07	SLGN1-V01-WW-A	100	100			
SLGN2	V01	WW	2024-08-07	SLGN2-V01-WW-A	100	100			
SLGN3	V01	WW	2024-08-07	SLGN3-V01-WW-A	100	100			
SLGN4	V01	WW	8/13/2024	SLGN4-V01-WW-A	100	100			
SLGN5	V01	WW	8/13/2024	SLGN5-V01-WW-A	100	100			
SLGN6	V01	WW	8/13/2024	SLGN6-V01-WW-A	100	100			
SLGN7	V01	WW	2024-08-21	SLGN7-V01-WW-A	100	100			
SLGN8	V01	WW	2024-08-21	SLGN8-V01-WW-A	100	100			
SLGN9	V01	WW	2024-08-21	SLGN9-V01-WW-A	100	100			
HH09	V02	WW	2025-02-03	HH09-V02-WW-A			0.255	0.372	1.035
HH11	V02	WW	2024-12-09	HH11-V02-WW-1			0.363	0.221	
HH12	V02	WW	2024-11-25	HH12-V02-WW-1	95	97			
HH16	V02	WW	2025-01-15	HH16-V02-WW-A	100	100			
HH17	V02	WW	2024-12-04	HH17-V02-WW-1	100	100			
HH22	V02	WW	2024-11-20	HH22-V02-WW-1	100	100			
HH23	V02	WW	2025-01-14	HH23-V02-WW-A			0.267	0.3	3.033
HH25	V02	WW	2024-12-02	HH25-V02-WW-1	100	100			
HH28	V02	WW	2024-11-24	HH28-V02-WW-1	100	100			
HH29	V02	WW	2024-12-19	HH29-V02-WW-A	100	100			

HH30	V02	WW	2024-12-19	HH30-V02-WW-A	100	100			
HH31	V02	WW	2025-01-08	HH31-V02-WW-A	100	100			
HH32	V02	WW	2025-01-08	HH32-V02-WW-A	100	100			
HH33	V02	WW	2025-01-29	HH33-V02-WW-A	0.25	0.25			
HH34	V02	WW	2025-02-05	HH34-V02-WW-A	50	48			
HH35	V02	WW	2024-11-20	HH35-V02-WW-1			0.3	0.2	3.1
HH37	V02	WW	2025-01-10	HH37-V02-WW-A	100	100			
HH40	V02	WW	2025-02-04	HH40-V02-WW-A	0.25	0.25			
HH41	V02	WW	2025-01-07	HH41-V02-WW-A	50	50			
HH42	V02	WW	2025-02-10	HH42-V02-WW-A	0.25	0.25			
HH44	V02	WW	2025-01-17	HH44-V02-WW-A	0.25	0.25			
HH45	V02	WW	2024-12-18	HH45-V02-WW-A	100	NA			
HH46	V02	WW	2024-12-20	HH46-V02-WW-A	80	100			
HH47	V02	WW	2025-02-05	HH47-V02-WW-A	0.25	0.25			
HH49	V02	WW	2024-12-20	HH49-V02-WW-A	35	60			
HH50	V02	WW	2024-12-11	HH50-V02-WW-1	100	100			
HH53	V02	WW	2024-12-13	HH53-V02-WW-A	100	100			
HH54	V02	WW	2025-02-10	HH54-V02-WW-A	100	100			
SLGN1	V02	WW	2024-12-11	SLGN1-V02-WW-A	100	100			

SLGN 2	V02	WW	2024-12-11	SLGN2-V02-WW-A	100	100			
SLGN 3	V02	WW	2024-12-11	SLGN3-V02-WW-A	100	100			
SLGN 4	V02	WW	2025-01-15	SLGN4-V02-WW-A	100	100			
SLGN 5	V02	WW	2025-01-15	SLGN5-V02-WW-A	100	100			
SLGN 6	V02	WW	2025-01-15	SLGN6-V02-WW-A	100	100			
SLGN 7	V02	WW	2025-02-05	SLGN7-V02-WW-A	100	100			
SLGN 8	V02	WW	2025-02-05	SLGN8-V02-WW-A	100	100			
SLGN 9	V02	WW	2025-02-05	SLGN9-V02-WW-A	100	100			
HH09	V03	WW	2025-04-15	HH09-V03-WW-1			0.25	0.233	1.046
HH11	V03	WW	2025-03-05	HH11-V03-WW-1	100	100			
HH12	V03	WW	2025-05-08	HH12-V03-WW-1	100	100			
HH16	V03	WW	2025-03-03	HH16-V03-WW-1	100	100			
HH17	V03	WW	2025-02-24	HH17-V03-WW-1	50	50			
HH22	V03	WW	2025-04-14	HH22-V03-WW-1	100	100			
HH23	V03	WW	2025-04-15	HH23-V03-WW-1	0.25	0.25			
HH25	V03	WW	2025-04-14	HH25-V03-WW-1	100	100			
HH28	V03	WW	2025-03-04	HH28-V03-WW-1	100	100			
HH29	V03	WW	2025-03-31	HH29-V03-WW-1	100	100			
HH30	V03	WW	2025-03-31	HH30-V03-WW-1	100	100			
HH31	V03	WW	2025-04-07	HH31-V03-WW-1	100	100			
HH33	V03	WW	2025-02-26	HH33-V03-WW-1	0.25	0.25			
HH34	V03	WW	2025-03-26	HH34-V03-WW-1	100	100			
HH35	V03	WW	2025-05-04	HH35-V03-WW-1	15	10			

HH36	V03	WW	2025-04-21	HH36-V03-WW-1	0.25	0.25			
HH37	V03	WW	2025-05-17	HH37-V03-WW-1	100	100			
HH40	V03	WW	2025-04-23	HH40-V03-WW-1	40	40			
HH41	V03	WW	2025-04-07	HH41-V03-WW-1	40	48			
HH42	V03	WW	2025-04-16	HH42-V03-WW-1	35	20			
HH44	V03	WW	2025-04-07	HH44-V03-WW-1	50	35			
HH45	V03	WW	2025-04-08	HH45-V03-WW-1	50	50			
HH47	V03	WW	2025-03-21	HH47-V03-WW-1	34	25			
HH49	V03	WW	2025-05-13	HH49-V03-WW-1	100	100			
HH50	V03	WW	2025-04-28	HH50-V03-WW-1	35	35			
HH53	V03	WW	2025-05-08	HH53-V03-WW-1	100	100			
HH54	V03	WW	2025-04-02	HH54-V03-WW-1	20	18			
SGLN 1	V03	WW	2025-03-03	SLGN1-V03-WW-A	100	100			
SGLN 2	V03	WW	2025-03-03	SLGN2-V03-WW-A	100	100			
SGLN 3	V03	WW	2025-03-03	SLGN3-V03-WW-A	100	100			
SGLN 4	V03	WW	2025-04-09	SLGN4-V03-WW-A	100	100			
SGLN 5	V03	WW	2025-04-09	SLGN5-V03-WW-A	100	100			
SGLN 6	V03	WW	2025-04-09	SLGN6-V03-WW-A	100	100			
SGLN 7	V03	WW	2025-05-13	SLGN7-V03-WW-A	100	100			
SGLN 8	V03	WW	2025-05-13	SLGN8-V03-WW-A	100	100			
SGLN 9	V03	WW	2025-05-13	SLGN9-V03-WW-A	100	100			

Supplement 6: DNA and RNA qubit results for all samples

BarNo	VisitNo	Type	DNA Qubit Results (ng/uL)	RNA Qubit Results (ng/uL)
CW1-V01-1	V01	CW	too low	too low
CW10-V01-1	V01	CW	0.146	too low
CW11-V01-1	V01	CW	0.12	too low
CW12-V01-1	V01	CW	0.101	too low
CW13-V01-1	V01	CW	too low	too low
CW2-V01-2	V01	CW	too low	too low
CW3-V01-1	V01	CW	0.052	too low
CW4-V01-1	V01	CW	too low	too low
CW5-V01-1	V01	CW	0.328	too low
CW6-V01-1	V01	CW	0.258	too low
CW7-V01-1	V01	CW	0.308	too low
CW8-V01-1	V01	CW	0.085	too low
CW9-V01-1	V01	CW	too low	too low
HH01-V01-IS-CA	V01	IS	2.14	1.82
HH01-V01-US-CA	V01	US	10.9	5.16
HH01.02-V01-CW-1	V01	CW	0.052	too low
HH02-V01-IS-CA	V01	IS	6.86	5.18
HH02-V01-US-CA	V01	US	29.4	7.12
HH02-V01-US-CB	V01	US	13.6	5.69
HH03-V01-IS-CA	V01	IS	7.35	5.05
HH03-V01-US-CA	V01	US	16	2.2
HH03-V01-US-CB	V01	US	19	4.2
HH03-V01-US-CB	V01	US	19	4.2
HH03.04-V01-CW-1	V01	CW	0.11	too low
HH04-V01-IS-CA	V01	IS	4.21	2.58
HH04-V01-US-CA	V01	US	8.96	4.12
HH05-V01-US-CA	V01	US	12.7	2.71
HH05.06-V01-CW-1	V01	CW	0.083	too low
HH06-V01-US-CA	V01	US	16.4	3.96
HH07-V01-US-CA	V01	US	1.86	1.8
HH07-V01-US-CA	V01	US	1.86	1.8
HH07.08-V01-CW-1	V01	CW	0.184	too low
HH08-V01-IS-CA	V01	IS	15.5	5.99
HH08-V01-SLS-1	V01	WW	26.4	9.13

HH08-V01-US-CA	V01	US	14.5	5.71
HH08-V01-US-CA	V01	US	14.5	5.71
HH08-V01-US-CA	V01	US	14.5	5.71
HH09-V01-IS-CA	V01	IS	1.68	2.86
HH09-V01-SLS-1	V01	WW	46	54
HH09-V01-US-CA	V01	US	14.9	8.34
HH09-V01-US-CA	V01	US	14.9	8.34
HH09.10-V1-CW-1	V01	CW	0.051	too low
HH10-V01-US-CA	V01	US	14.9	5.74
HH10-V01-US-CA	V01	US	14.9	5.74
HH10-V01-US-CA	V01	US	14.9	5.74
HH11-V01-IS-CA	V01	IS	5.17	3.37
HH11-V01-SLL-1	V01	WW	76.8	45.3
HH11-V01-SLL-1_REDO	V01	WW	76.8	45.3
HH11-V01-SLL-1_REDO	V01	WW	76.8	45.3
HH11-V01-US-CA	V01	US	9.08	2.4
HH11.12-V01-CW-1	V01	CW	too low	too low
HH12-V01-IS-CA	V01	IS	17	13.6
HH12-V01-SLL-1	V01	WW	17.2	19.9
HH12-V01-SLL-1	V01	WW	17.2	19.9
HH12-V01-SLL-1	V01	WW	17.2	19.9
HH12-V01-US-CA	V01	US	14.4	3.08
HH12-V01-US-CB	V01	US	6.83	3.55
HH13-V01-US-CA	V01	US	20.4	1.84
HH13-V01-US-CB	V01	US	17.8	3.15
HH14-V01-US-CA	V01	US	8.28	4.3
HH15-V01-IS-CA	V01	IS	8.88	6.87
HH15-V01-US-CA	V01	US	3.36	2.2
HH15.51-V01-CW-1	V01	CW	too low	too low
HH16-V01-IS-CA	V01	IS	4.18	4.15
HH16-V01-US-CA	V01	US	1.4	1.2
HH16-V01-WW-1	V01	WW	77	40.3
HH16.17.18-V01-CW-1	V01	CW	too low	too low
HH17-V01-IS-CA	V01	IS	8.79	5.84
HH17-V01-IS-CA	V01	IS	8.79	5.84
HH17-V01-US-CA	V01	US	9.91	4.89
HH17-V01-US-CA	V01	US	9.91	4.89
HH17-V01-US-CA	V01	US	9.91	4.89
HH17-V01-WW-1	V01	WW	6.82	40.2

HH18-V01-IS-CA	V01	IS	9.33	15.8
HH18-V01-US-CA	V01	US	4.21	3.18
HH18-V01-WW-1	V01	WW	26.4	45.9
HH19-V01-IS-CA	V01	IS	5.86	4.75
HH19-V01-IS-CA	V01	IS	5.86	4.75
HH19-V01-US-CA	V01	US	9	5.49
HH19-V01-WW-1	V01	WW	3.88	2.69
HH19-V01-WW-1_REDO	V01	WW	3.88	2.69
HH20-V01-IS-CA	V01	IS	6.04	3.3
HH20-V01-US-CA	V01	US	18.9	6.22
HH21-V01-IS-CA	V01	IS	6.91	5.8
HH21-V01-US-CA	V01	US	18.9	5.54
HH21-V01-US-CB	V01	US	13.8	6.01
HH22-V01-IS-CA	V01	IS	19	12.9
HH22-V01-US-CA	V01	US	25.5	6.82
HH22-V01-US-CB	V01	US	32.5	6.39
HH22-V01-WW-1	V01	WW	18.5	44.9
HH23-V01-IS-CA	V01	IS	10.3	5.51
HH23-V01-US-CA	V01	US	23.2	6.02
HH23-V01-WW-1	V01	WW	25.1	25.2
HH23-V01-WW-1	V01	WW	25.1	25.2
HH24-V01_US-CA-1:10	V01	US	15.8	8.32
HH24-V01_US-CA-1:2	V01	US	15.8	8.32
HH24-V01_US-CA-1:5	V01	US	15.8	8.32
HH24-V01_US-CA-IR	V01	US	15.8	8.32
HH24-V01-IS-CA	V01	IS	2.12	3.36
HH24-V01-US-CA	V01	US	15.8	8.32
HH25-V01-IS-CA	V01	IS	3.42	3.32
HH25-V01-US-CA	V01	US	7.77	3.06
HH25-V01-WW-1	V01	WW	3.11	11.8
HH25-V01-WW-1	V01	WW	3.11	11.8
HH26-V01-IS-CA	V01	IS	2.29	2.2
HH26-V01-US-CA	V01	US	5.61	3.84
HH27-V01-IS-CA	V01	IS	14.8	5.25
HH27-V01-US-CA	V01	US	12.8	5.38
HH28-V01-IS-CA	V01	IS	5.75	3.78
HH28-V01-US-CA	V01	US	21.4	4.36
HH28-V01-US-CB	V01	US	18.4	4.9
HH28-V01-WW-1	V01	WW	5.9	19

HH28-V01-WW-1	V01	WW	5.9	19
HH29-V01-IS-CA	V01	IS	15.1	5.57
HH29-V01-US-CA	V01	US	32	4.34
HH29-V01-US-CB	V01	US	31.4	7.34
HH29-V01-WW-1	V01	WW	42.3	84
HH29-V01-WW-1	V01	WW	42.3	84
HH29-V01-WW-1	V01	WW	42.3	84
HH30-V01-IS-CA	V01	IS	17.4	7.79
HH30-V01-US-CA	V01	US	15.5	6.21
HH30-V01-WW-1	V01	WW	18.5	71
HH31-V01-IS-CA	V01	IS	9.56	4.27
HH31-V01-US-CA	V01	US	11.7	6.55
HH32-V01-IS-CA	V01	IS	4.58	4.95
HH32-V01-US-CA	V01	US	8.98	5.71
HH32-V01-WW-1	V01	WW	7.06	6.65
HH32-V01-WW-1	V01	WW	7.06	6.65
HH33-V01-IS-CA	V01	IS	4.66	5.4
HH33-V01-US-CA	V01	US	2.16	1.38
HH33-V01-WW-1	V01	WW	24	45.4
HH34-V01-IS-CA	V01	IS	3.67	4.35
HH34-V01-US-CA	V01	US	7.03	6.95
HH34-V01-US-CA	V01	US	7.03	6.95
HH34-V01-US-CA	V01	US	7.03	6.95
HH35-V01-IS-CA	V01	IS	5.22	5.23
HH35-V01-US-CA	V01	US	8.33	5.07
HH35-V01-US-CA	V01	US	8.33	5.07
HH35-V01-US-CA	V01	US	8.33	5.07
HH35-V01-WW-1	V01	WW	57	20.4
HH35-V01-WW-1	V01	WW	57	20.4
HH35-V01-WW-1_REDO	V01	WW	57	20.4
HH36-V01-IS-CA	V01	IS	4.31	3.22
HH36-V01-US-CA	V01	US	7.39	7.03
HH37-V01-IS-CA	V01	IS	4.69	2.55
HH37-V01-US-CA	V01	US	10.2	5.76
HH37-V01-WW-2	V01	WW	15.7	7.96
HH38-V01-IS-CA	V01	IS	1.34	1.69
HH38-V01-US-CA	V01	US	19.7	3
HH38-V01-US-CB	V01	US	28	11.5
HH38-V01-US-CB	V01	US	28	11.5

HH39-V01-IS-CA	V01	IS	6.74	3.69
HH39-V01-US-CA	V01	US	4.32	3.58
HH40-V01-IS-CA	V01	IS	2.17	3.07
HH40-V01-US-CA	V01	US	1.22	2.2
HH40-V01-WW-1	V01	WW	22.3	55
HH40-V01-WW-1	V01	WW	22.3	55
HH41-V01-IS-CA	V01	IS	5.6	3.71
HH41-V01-US-CA	V01	US	11.3	7.11
HH41-V01-WW-1	V01	WW	42.1	11.3
HH42-V01-IS-CA	V01	IS	13.4	5.41
HH42-V01-US-CA	V01	US	8.94	7.06
HH42-V01-WW-1	V01	WW	17.2	26.1
HH43-V01-IS-CA	V01	IS	4.81	2.5
HH43-V01-US-CA	V01	US	3.34	7.34
HH43-V01-US-CA	V01	US	3.34	7.34
HH43-V01-US-CA	V01	US	3.34	7.34
HH43-V01-WW-1	V01	WW	10.3	5.14
HH43-V01-WW-1	V01	WW	10.3	5.14
HH44-V01-IS-CA	V01	IS	12.9	10.3
HH44-V01-US-CA	V01	US	7.25	7.85
HH44-V01-US-CA	V01	US	7.25	7.85
HH44-V01-WW-1	V01	WW	5.69	11.7
HH44-V01-WW-2	V01	WW	6.8	18.4
HH45-V01-IS-CA	V01	IS	25.3	14.7
HH45-V01-US-CA	V01	US	15	8.3
HH45-V01-US-CA	V01	US	15	8.3
HH45-V01-US-CA	V01	US	15	8.3
HH45-V01-WW-1	V01	WW	9.61	26.9
HH45-V01-WW-2	V01	WW	30.5	96
HH46-V01-IS-CA	V01	IS	3.33	5.05
HH46-V01-US-CA	V01	US	7.24	5.18
HH46-V01-WW-1	V01	WW	5.74	25.1
HH46-V01-WW-2	V01	WW	22	40.9
HH47-V01-IS-CA	V01	IS	0.09	0
HH47-V01-US-CA	V01	US	2.92	2.76
HH47-V01-WW-1	V01	WW	12.8	25.1
HH48-V01-IS-CA	V01	IS	2.89	3.5
HH48-V01-US-CA	V01	US	27	5.42
HH48-V01-US-CB	V01	US	14.4	4.7

HH49-V01-IS-CA	V01	IS	9.84	6.78
HH49-V01-US-CA	V01	US	9.48	5.37
HH49-V01-WW-1	V01	WW	20.5	38.6
HH50-V01-IS-CA	V01	IS	0.437	1.2
HH50-V01-US-CA	V01	US	4.34	4.04
HH50-V01-WW-1	V01	WW	18.2	46.3
HH51-V01-IS-C1	V01	IS	7.5	3.52
HH51-V01-US-C1	V01	US	15.2	11.6
HH52-V01-IS-CA	V01	IS	11.1	3.29
HH52-V01-US-CA	V01	US	16.2	6.75
HH53-V01-IS-CA	V01	IS	11.4	6.04
HH53-V01-US-CA	V01	US	11.4	4.74
HH53-V01-US-CA	V01	US	11.4	4.74
HH54-V01-IS-CA	V01	IS	8.45	6.38
HH54-V01-US-CA	V01	US	3.5	5.51
HH54-V01-US-CA	V01	US	3.5	5.51
SLGN1-V01-WW-A	V01	WW	5.04	8.43
SLGN1-V01-WW-A	V01	WW	5.04	8.43
SLGN2-V01-WW-A	V01	WW	3.77	8.79
SLGN2-V01-WW-A	V01	WW	3.77	8.79
SLGN3-V01-WW-C	V01	WW	4.22	5.75
SLGN4-V01-WW-A	V01	WW	27.9	53
SLGN4-V01-WW-A	V01	WW	27.9	53
SLGN5-V01-WW-A	V01	WW	26.5	56
SLGN6-V01-WW-A	V01	WW	26.8	53
SLGN7-V01-WW-A	V01	WW	39.6	51
SLGN7-V01-WW-A	V01	WW	39.6	51
SLGN8-V01-WW-C	V01	WW	16.1	20.4
SLGN9-V01-WW-A	V01	WW	45.9	51
SLGN9-V01-WW-A	V01	WW	45.9	51
CW1-V02-1	V02	CW	too low	too low
CW10-V02-1	V02	CW	too low	too low
CW11-V02-1	V02	CW	too low	too low
CW12-V02-1	V02	CW	too low	too low
CW13-V02-1	V02	CW	0.166	too low
CW15-V02-1	V02	CW	0.051	too low
CW16-V02-1	V02	CW	too low	too low
CW17-V02-1	V02	CW	too low	too low
CW18-V02-1	V02	CW	too low	too low

CW2-V02-1	V02	CW	too low	too low
CW3-V02-1	V02	CW	0.067	too low
CW4-V02-1	V02	CW	too low	too low
CW5-V02-1	V02	CW	too low	too low
CW6-V02-1	V02	CW	0.081	too low
CW7-V02-1	V02	CW	too low	too low
CW8-V02-1	V02	CW	too low	too low
CW9-V02-1	V02	CW	too low	too low
HH1-V02-US-CA	V02	US	23.8	8.01
HH1-V02-US-CA	V02	US	23.8	8.01
HH1-V02-US-CA	V02	US	23.8	8.01
HH10_V02_US_CA	V02	US	26.6	0
HH10_V02_US_CA	V02	US	26.6	0
HH10_V02_US_CA	V02	US	26.6	0
HH11-V02-IS-CA	V02	IS	6.14	2.78
HH11-V02-US-CA	V02	US	12.4	2
HH11-V02-WW-1	V02	WW	16.8	19.2
HH12-V02-IS-CA	V02	IS	7.67	10
HH12-V02-US-CA	V02	US	12.5	5.74
HH12-V02-WW-1	V02	WW	25.3	43.4
HH12-V02-WW-2	V02	WW	28.7	40.1
HH13-V02-US-CA	V02	US	32	3.32
HH13-V02-US-CA	V02	US	32	3.32
HH14-V02-US-CA	V02	US	7.39	7.67
HH14-V02-US-CA	V02	US	7.39	7.67
HH14-V02-US-CA	V02	US	7.39	7.67
HH15-V02-IS-CA	V02	IS	7.86	2.1
HH15-V02-US-CA	V02	US	23.4	6.3
HH16-V02-IS-CA	V02	IS	10.4	5.42
HH16-V02-US-CA	V02	US	9.39	4.42
HH16-V02-US-CA	V02	US	9.39	4.42
HH16-V02-WW-1	V02	WW	3.46	18.3
HH16-V02-WW-2	V02	WW	16.1	36.7
HH17-V02-IS-CA	V02	IS	3.42	2.5
HH17-V02-IS-CB	V02	IS	12.8	5.8
HH17-V02-US-CA	V02	US	24	6.03
HH17-V02-US-CA	V02	US	24	6.03
HH17-V02-US-CA	V02	US	24	6.03
HH17-V02-US-CA	V02	US	24	6.03

HH17-V02-WW-1	V02	WW	8.19	25.3
HH17-V02-WW-2	V02	WW	19.4	28.2
HH19-V02-IS-CA	V02	IS	9.92	4.36
HH19-V02-US-CA	V02	US	4.71	4.06
HH2-V02-US-CA	V02	US	10.4	6.01
HH20-V02-IS-CA	V02	IS	4.4	2.41
HH20-V02-IS-CB	V02	IS	14.6	2.58
HH20-V02-US-CA	V02	US	6.8	3.82
HH21-V02-IS-CA	V02	IS	1.88	2.3
HH21-V02-US-CA	V02	US	8.21	4.79
HH22-V02-IS-CA	V02	IS	2.08	3.42
HH22-V02-US-CA	V02	US	13.8	8.07
HH22-V02-US-CA	V02	US	13.8	8.07
HH22-V02-WW-1	V02	WW	2.25	14.4
HH23-V02-IS-CA	V02	IS	6.95	2.5
HH23-V02-IS-CA	V02	IS	6.95	2.5
HH23-V02-US-CA	V02	US	13.7	6.59
HH23-V02-WW-1	V02	WW	16.3	6.55
HH23-V02-WW-1	V02	WW	16.3	6.55
HH24-V02-IS-CA	V02	IS	2.16	1.81
HH24-V02-IS-CA	V02	IS	2.16	1.81
HH24-V02-US-CA	V02	US	3.23	2.43
HH25-V02-IS-CA	V02	IS	20.1	5.41
HH25-V02-US-CA	V02	US	15	2.88
HH25-V02-WW-1	V02	WW	7.07	24.9
HH25-V02-WW-2	V02	WW	6.89	15.1
HH26-V02-IS-CA	V02	IS	11	2.63
HH26-V02-IS-CB	V02	IS	12.1	0
HH26-V02-US-CA	V02	US	13.9	8.51
HH27-V02-IS-CA	V02	IS	16.6	7.9
HH27-V02-US-CA	V02	US	12.1	5.81
HH28-V02-IS-CA	V02	IS	11.7	5.51
HH28-V02-US-CA	V02	US	28.7	4.68
HH28-V02-WW-1	V02	WW	10	35.5
HH29-V02-IS-CA	V02	IS	13.6	5.26
HH29-V02-IS-CA	V02	IS	13.6	5.26
HH29-V02-US-CA	V02	US	20.8	2.8
HH29-V02-WW-1	V02	WW	12.6	46.1
HH3-V02-US-CA	V02	US	21.2	6.7

HH3-V02-US-CB	V02	US	23.2	8.53
HH30-V02-IS-CA	V02	IS	17	7.61
HH30-V02-US-CA	V02	US	19	4.2
HH30-V02-WW-1	V02	WW	3.25	22.5
HH31-V02-IS-CA	V02	IS	4.16	2.2
HH31-V02-US-CA	V02	US	7.19	4.78
HH31-V02-WW-1	V02	WW	0.579	2.4
HH31-V02-WW-2	V02	WW	0.667	4.79
HH32-V02-IS-CA	V02	IS	2.86	3.28
HH32-V02-US-CA	V02	US	12.5	7.26
HH32-V02-WW-1	V02	WW	2.3	14.9
HH33-V02-IS-CA	V02	IS	7.26	4.52
HH33-V02-US-CA	V02	US	2.78	1.76
HH33-V02-WW-1	V02	WW	2.2	7.17
HH34-V02-IS-CA	V02	IS	5.4	3.6
HH34-V02-US-CA	V02	US	4.51	3.38
HH34-V02-WW-1	V02	WW	18.2	27.1
HH35-V02-IS-CA	V02	IS	7.53	4.7
HH35-V02-US-CA	V02	US	4.64	2.55
HH35-V02-WW-1	V02	WW	1.96	4.53
HH35-V02-WW-1	V02	WW	1.96	4.53
HH36-V02-IS-CA	V02	IS	4.12	0.718
HH36-V02-US-CA	V02	US	19.6	6.41
HH37-V02-IS-CA	V02	IS	3.29	2.85
HH37-V02-US-CA	V02	US	7.63	2.82
HH37-V02-WW-1	V02	WW	7.54	38.6
HH37-V02-WW-1	V02	WW	7.54	38.6
HH38-V02-IS-CA1	V02	IS	4.02	2.4
HH38-V02-US-CA	V02	US	12.1	4.98
HH39-V02-IS-CA	V02	IS	4.84	2.2
HH39-V02-US-CA	V02	US	3.95	2.5
HH4-V02-US-CA	V02	US	3.56	3.14
HH40-V02-IS-CA	V02	IS	7.52	5.96
HH40-V02-IS-CA	V02	IS	7.52	5.96
HH40-V02-US-CA	V02	US	4.26	3.63
HH40-V02-WW-1	V02	WW	1.99	3.27
HH41-V02-IS-CA	V02	IS	2.29	2.79
HH41-V02-US-CA	V02	US	5.54	2.1
HH41-V02-WW-1	V02	WW	8.89	19.6

HH42-V02-IS-CA	V02	IS	11.2	3.39
HH42-V02-US-CA	V02	US	5.93	4.55
HH42-V02-WW-1	V02	WW	2.57	13.3
HH43-V02-IS-CA	V02	IS	7.44	4.29
HH43-V02-US-CA	V02	US	25.1	10.1
HH44-V02-IS-CA	V02	IS	9.25	7.28
HH44-V02-US-CA	V02	US	17.6	9.12
HH44-V02-WW-1	V02	WW	1.5	3.43
HH45-V02-IS-CA	V02	IS	11.9	6.57
HH45-V02-IS-CA	V02	IS	11.9	6.57
HH45-V02-US-CA	V02	US	8.15	2.96
HH45-V02-WW-1	V02	WW	26.9	29
HH46-V02-IS-CA	V02	IS	10.9	4.59
HH46-V02-US-CA	V02	US	17.8	7.42
HH46-V02-WW-1	V02	WW	6	16.5
HH46-V02-WW-2	V02	WW	9.12	41.3
HH47-V02-IS-CA	V02	IS	4.48	2.3
HH47-V02-US-CA	V02	US	3.52	1.56
HH47-V02-WW-1	V02	WW	1.37	5.45
HH48-V02-IS-CA	V02	IS	1.28	1.2
HH48-V02-IS-CB	V02	IS	2.4	2.5
HH48-V02-US-CA	V02	US	5.87	3.52
HH49-V02-IS-CA	V02	IS	7.67	3.92
HH49-V02-US-CA	V02	US	8.89	4.29
HH49-V02-WW-1	V02	WW	18	29.3
HH49-V02-WW-2	V02	WW	16.8	36.5
HH5-V02-US-CA	V02	US	25.8	3.43
HH5-V02-US-CB	V02	US	40	4.36
HH50-V02-IS-CA	V02	IS	0.702	1.25
HH50-V02-US-CA	V02	US	3.91	1.38
HH50-V02-US-CB	V02	US	3.27	1.17
HH50-V02-WW-1	V02	WW	3.7	21.8
HH52-V02-IS-CA	V02	IS	6.34	2.6
HH52-V02-IS-CB	V02	IS	58	8.8
HH52-V02-US-CA	V02	US	14.7	5.55
HH53-V02-IS-CA	V02	IS	5.12	2.88
HH53-V02-US-CA	V02	US	12.4	4.94
HH53-V02-US-CA	V02	US	12.4	4.94
HH53-V02-WW-1	V02	WW	22.6	69

HH53-V02-WW-1	V02	WW	22.6	69
HH54-V02-IS-CA	V02	IS	1.92	0.514
HH54-V02-US-CA	V02	US	17	7.08
HH54-V02-US-CA	V02	US	17	7.08
HH54-V02-WW-1	V02	WW	1.47	3.92
HH6-V02-US-CA	V02	US	35.4	8.45
HH7-V02-US-CA	V02	US	5.07	11.4
HH8-V02-IS-CA	V02	IS	15.9	6.75
HH8-V02-US-CA	V02	US	8.62	2.5
HH9-V02-IS-CA	V02	IS	6.7	2.72
HH9-V02-US-CA	V02	US	17.7	5.6
HH9-V02-WW-1	V02	WW	24.3	37.8
SLGN1-V02-WW-A	V02	WW	6.13	31.8
SLGN2-V02-WW-A	V02	WW	38.4	39.3
SLGN3-V02-WW-A	V02	WW	9.18	44.1
SLGN3-V02-WW-A	V02	WW	9.18	44.1
SLGN4-V02-WW-A	V02	WW	2.81	21.5
SLGN4-V02-WW-B	V02	WW	16.9	51
SLGN5-V02-WW-A	V02	WW	2.93	22.1
SLGN5-V02-WW-B	V02	WW	12.4	74
SLGN6-V02-WW-A	V02	WW	4.17	27.3
SLGN7-V02-WW-A	V02	WW	16.9	46.8
SLGN8-V02-WW-A	V02	WW	20.8	52
SLGN9-V02-WW-A	V02	WW	3.88	34.3
CW1-V03-1	V03	CW	too low	too low
CW10-V03-1	V03	CW	too low	too low
CW11-V03-1	V03	CW	too low	too low
CW12-V03-1	V03	CW	too low	too low
CW13-V03-1	V03	CW	0.061	too low
CW14-V02-1	V03	CW	0.11	too low
CW14-V03-1	V03	CW	too low	too low
CW15-V03-1	V03	CW	too low	too low
CW16-V03-1	V03	CW	too low	too low
CW17-V03-1	V03	CW	0.05	too low
CW18-V03-1	V03	CW	0.056	too low
CW19-V03-1	V03	CW	too low	too low
CW2-V03-1	V03	CW	too low	too low
CW20-V03-1	V03	CW	too low	too low
CW21-V03-1	V03	CW	too low	too low

CW22-V03-1	V03	CW	too low	too low
CW3-V03-1	V03	CW	too low	too low
CW4-V03-1	V03	CW	too low	too low
CW5-V03-1	V03	CW	too low	too low
CW6-V03-1	V03	CW	too low	too low
CW7-V03-1	V03	CW	too low	too low
CW8-V03-1	V03	CW	too low	too low
CW9-V03-1	V03	CW	too low	too low
HH1-V03-US-CA	V03	US	6.8	14
HH10-V03-US-CA	V03	US	14.6	0
HH10-V03-US-CA	V03	US	14.6	0
HH11-V03-IS-CA	V03	IS	8.54	1.43
HH11-V03-US-CA	V03	US	9.32	4.54
HH11-V03-WW-1	V03	WW	0.819	2.3
HH12-V03-IS-CA	V03	IS	8.23	9.7
HH12-V03-US-CA	V03	US	13.1	4.48
HH12-V03-WW-1	V03	WW	5.43	28
HH13-V03-US-CA	V03	US	17.3	4.78
HH13-V03-US-CA	V03	US	17.3	4.78
HH14-V03-US-CA	V03	US	19.6	8.02
HH14-V03-US-CA	V03	US	19.6	8.02
HH15-V03-IS-CA	V03	IS	4.35	2.3
HH15-V03-IS-CA	V03	IS	4.35	2.3
HH15-V03-US-CA	V03	US	3.09	2.75
HH16-V03-IS-CA	V03	IS	7.72	4.36
HH16-V03-US-CA	V03	US	3.4	1.63
HH16-V03-WW-1	V03	WW	1.59	16.3
HH17-V03-IS-CA	V03	IS	6.85	7.52
HH17-V03-US-CA	V03	US	27.1	5.56
HH17-V03-WW-1	V03	WW	11	24.1
HH19-V03-IS-CA	V03	IS	1.35	1.62
HH19-V03-US-CA	V03	US	7.8	5.533
HH2-V03-US-CA	V03	US	24.7	7.69
HH20-V03-IS-CA	V03	IS	7.36	4.81
HH20-V03-US-CA	V03	US	16.8	6.53
HH20-V03-US-CA	V03	US	16.8	6.53
HH20-V03-US-CA	V03	US	16.8	6.53
HH21-V03-IS-CA	V03	IS	3.73	3.14
HH21-V03-US-CA	V03	US	0.951	2.4

HH22-V03-IS-CA	V03	IS	15	8.42
HH22-V03-US-CA	V03	US	3.26	3.44
HH22-V03-US-CA	V03	US	3.26	3.44
HH22-V03-WW-1	V03	WW	2.77	2
HH23-V03-IS-CA	V03	IS	3.7	3.98
HH23-V03-US-CA	V03	US	3.57	1.72
HH23-V03-US-CA	V03	US	3.57	1.72
HH23-V03-WW-1	V03	WW	0.963	1.8
HH24-V03-IS-CA	V03	IS	4.17	3.36
HH24-V03-IS-CA	V03	IS	4.17	3.36
HH24-V03-US-CA	V03	US	11.9	4.08
HH25-V03-IS-CA	V03	IS	8.64	6.89
HH25-V03-US-CA	V03	US	14.5	7.92
HH25-V03-US-CA	V03	US	14.5	7.92
HH25-V03-US-CA	V03	US	14.5	7.92
HH25-V03-WW-1	V03	WW	2.59	5.37
HH26-V03-IS-CA	V03	IS	12.7	3.79
HH26-V03-US-CA	V03	US	8	2.83
HH27-V03-IS-CA	V03	IS	9.66	3.23
HH27-V03-US-CA	V03	US	5.9	10.5
HH28-V03-IS-CA	V03	IS	13.2	3.9
HH28-V03-US-CA	V03	US	8.73	5.55
HH28-V03-WW-1	V03	WW	6.43	33
HH29-V03-IS-CA	V03	IS	28.5	7.46
HH29-V03-IS-CA	V03	IS	28.5	7.46
HH29-V03-US-CA	V03	US	27.4	8.2
HH29-V03-WW-1	V03	WW	3.28	13.5
HH3-V03-US-CA	V03	US	18.8	8.01
HH30-V03-IS-CA	V03	IS	20.1	4.62
HH30-V03-IS-CA	V03	IS	20.1	4.62
HH30-V03-IS-CA	V03	IS	20.1	4.62
HH30-V03-US-CA	V03	US	5.21	13.1
HH30-V03-WW-1	V03	WW	0.951	5.76
HH31-V03-IS-CA	V03	IS	9.06	2.3
HH31-V03-US-CA	V03	US	9.7	6.2
HH31-V03-WW-1	V03	WW	0.608	4.55
HH32-V03-IS-CA	V03	IS	3.99	1.49
HH32-V03-IS-CB	V03	IS	10.8	2.1
HH32-V03-US-CA	V03	US	3.89	2.3

HH33-V03-IS-CA	V03	IS	4.76	3.82
HH33-V03-IS-CA	V03	IS	4.76	3.82
HH33-V03-US-CA	V03	US	4.5	2.63
HH33-V03-WW-1	V03	WW	2.14	5.84
HH34-V03-IS-CA	V03	IS	5.85	3.7
HH34-V03-US-CA	V03	US	9.04	3.57
HH34-V03-WW-1	V03	WW	9	26.8
HH35-V03-IS-CA	V03	IS	7.62	6.37
HH35-V03-US-CA	V03	US	5.82	5.19
HH35-V03-US-CA	V03	US	5.82	5.19
HH35-V03-WW-1	V03	WW	6.24	23.6
HH36-V03-IS-CA	V03	IS	5.21	4.33
HH36-V03-US-CA	V03	US	15.9	6.83
HH36-V03-WW-1	V03	WW	10.3	9.83
HH37-V03-IS-CA	V03	IS	12.5	6.82
HH37-V03-US-CA	V03	US	1.98	2.51
HH37-V03-US-CA	V03	US	1.98	2.51
HH37-V03-WW-1	V03	WW	1.97	12.7
HH38-V03-IS-CA	V03	IS	8.01	4.17
HH38-V03-US-CA	V03	US	8.83	4.12
HH39-V03-IS-CA	V03	IS	12.7	1.29
HH39-V03-IS-CB	V03	IS	15.3	0
HH39-V03-US-CA	V03	US	1.37	1.25
HH4-V03-US-CA	V03	US	7.86	3.97
HH40-V03-IS-CA	V03	IS	8.9	6.35
HH40-V03-US-CA	V03	US	6	2.74
HH40-V03-WW-1	V03	WW	10.1	39.3
HH41-V03-IS-CA	V03	IS	5.04	2
HH41-V03-US-CA	V03	US	4.92	2.3
HH41-V03-WW-1	V03	WW	10.4	51
HH42-V03-IS-CA	V03	IS	9.03	7.4
HH42-V03-US-CA	V03	US	14.5	5.74
HH42-V03-WW-1	V03	WW	13.9	29.5
HH43-V03-IS-CA	V03	IS	4.37	3.16
HH43-V03-US-CA	V03	US	26.3	8.8
HH43-V03-US-CB	V03	US	25.8	7.87
HH44-V03-IS-CA	V03	IS	3.94	1.34
HH44-V03-IS-CB	V03	IS	9.22	3.95
HH44-V03-US-CA	V03	US	7.9	4.8

HH44-V03-WW-1	V03	WW	18.3	19.7
HH45-V03-IS-CA	V03	IS	6.51	3.04
HH45-V03-IS-CA	V03	IS	6.51	3.04
HH45-V03-US-CA	V03	US	15.3	5.56
HH45-V03-WW-1	V03	WW	28.1	46.8
HH46-V03-IS-CA	V03	IS	2.75	2.95
HH46-V03-US-CA	V03	US	12.2	4.7
HH46-V03-US-CA	V03	US	12.2	4.7
HH47-V03-IS-CA	V03	IS	0.765	0
HH47-V03-US-CA	V03	US	1.42	7.73
HH47-V03-WW-1	V03	WW	10.4	22.5
HH47-V03-WW-1	V03	WW	10.4	22.5
HH48-V03-IS-CA	V03	IS	4.33	4.22
HH48-V03-US-CA	V03	US	10.7	3.92
HH49-V03-IS-CA	V03	IS	10.7	5.79
HH49-V03-US-CA	V03	US	3.78	2.81
HH49-V03-US-CA	V03	US	3.78	2.81
HH49-V03-WW-1	V03	WW	5.77	37.4
HH49-V03-WW-1	V03	WW	5.77	37.4
HH5-V03-US-CA	V03	US	2.88	2.87
HH5-V03-US-CA	V03	US	2.88	2.87
HH50-V03-IS-CA	V03	IS	0.426	1.46
HH50-V03-US-CA	V03	US	8.08	4.25
HH50-V03-WW-1	V03	WW	6.67	20.9
HH52-V03-IS-CA	V03	IS	3.39	2.34
HH52-V03-US-CA	V03	US	9.31	2.24
HH53-V03-IS-CA	V03	IS	2.76	2.3
HH53-V03-US-CA	V03	US	7.5	4.7
HH53-V03-US-CA	V03	US	7.5	4.7
HH53-V03-WW-1	V03	WW	6.01	4.87
HH54-V03-IS-CA	V03	IS	7.1	3.76
HH54-V03-US-CA	V03	US	4.17	2.59
HH54-V03-WW-1	V03	WW	10.6	29.3
HH6-V03-US-CA	V03	US	3.92	1.3
HH7-V03-US-CA	V03	US	4.78	8.51
HH8-V03-IS-CA	V03	IS	26.2	7.2
HH8-V03-US-CA	V03	US	5.55	3.96
HH9-V03-IS-CA	V03	IS	4.81	2.59
HH9-V03-US-CA	V03	US	21	3.65

HH9-V03-US-CA	V03	US	21	3.65
HH9-V03-US-CA	V03	US	21	3.65
HH9-V03-WW-1	V03	WW	6.78	28.4
SLGN1-V03-WW-A	V03	WW	11.8	36.5
SLGN2-V03-WW-A	V03	WW	20.3	77
SLGN3-V03-WW-A	V03	WW	20.4	70
SLGN4-V03-WW-A	V03	WW	12.6	29.2
SLGN5-V03-WW-A	V03	WW	2.31	27
SLGN6-V03-WW-A	V03	WW	2.78	33
SLGN7-V03-WW-A	V03	WW	18	39.6
SLGN8-V03-WW-A	V03	WW	18	39.2
SLGN9-V03-WW-A	V03	WW	3.37	32.3
NEC_010826		NEC	too low	too low
NEC_011026		NEC	too low	too low
NEC_011026_B		NEC	too low	too low
NEC_072925		NEC	too low	too low
NEC_073025		NEC	too low	too low
NEC_073125		NEC	too low	too low
NEC_080225		NEC	too low	too low
NEC_080225		NEC	too low	too low
NEC_081325		NEC	too low	too low
NEC_081425		NEC	too low	too low
NEC_081625		NEC	too low	too low
NEC_081625		NEC	too low	too low
NEC_082125		NEC	too low	too low
NEC_082225		NEC	too low	too low
NEC_082325		NEC	too low	too low
NEC_082425		NEC	too low	too low
NEC_082625		NEC	too low	too low
NEC_082725		NEC	too low	too low
NEC_082825		NEC	too low	too low
NEC_082925		NEC	too low	too low
NEC_090125		NEC	too low	too low
NEC_090225		NEC	too low	too low
NEC_090325		NEC	too low	too low
NEC_090425		NEC	too low	too low
NEC_090525		NEC	too low	too low
NEC_090925		NEC	too low	too low
NEC_091125		NEC	too low	too low

NEC_091225_A		NEC	too low	too low
NEC_091225_B		NEC	too low	too low
NEC_091425_A		NEC	too low	too low
NEC_091425_B		NEC	too low	too low
NEC_091525_A		NEC	too low	too low
NEC_091825_A		NEC	too low	too low
NEC_091925_A		NEC	too low	too low
NEC_092025_A		NEC	too low	too low
NEC_092425		NEC	too low	too low
NEC_092525		NEC	too low	too low
NEC_092725_A		NEC	too low	too low
NEC_092725_B		NEC	too low	too low
NEC_093025_A		NEC	too low	too low
NEC_093025_B		NEC	too low	too low
NEC_100125		NEC	too low	too low
NEC_100125		NEC	too low	too low
NEC_100225		NEC	too low	too low
NEC_100525		NEC	too low	too low
PEC_010826		PEC	too low	too low
PEC_011026		PEC	too low	too low
PEC_011026_B		PEC	too low	too low
PEC_072925		PEC	0.055	too low
PEC_073025		PEC	0.064	too low
PEC_073125		PEC	too low	too low
PEC_080225		PEC	too low	too low
PEC_080225		PEC	too low	too low
PEC_081325		PEC	too low	too low
PEC_081425		PEC	too low	too low
PEC_081625		PEC	too low	too low
PEC_081625		PEC	too low	too low
PEC_082125		PEC	too low	too low
PEC_082225		PEC	too low	too low
PEC_082325		PEC	too low	too low
PEC_082425		PEC	too low	too low
PEC_082625		PEC	too low	too low
PEC_082725		PEC	0.051	too low
PEC_082825		PEC	too low	too low
PEC_082925		PEC	too low	too low
PEC_090125		PEC	too low	too low

PEC_090225		PEC	too low	too low
PEC_090325		PEC	too low	too low
PEC_090425		PEC	too low	too low
PEC_090525		PEC	too low	too low
PEC_090925		PEC	0.064	too low
PEC_091125		PEC	too low	too low
PEC_091225_A		PEC	0.059	too low
PEC_091225_B		PEC	too low	too low
PEC_091425_A		PEC	too low	too low
PEC_091425_B		PEC	too low	too low
PEC_091525_A		PEC	too low	too low
PEC_091825_A		PEC	too low	too low
PEC_091925_A		PEC	too low	too low
PEC_092025_A		PEC	too low	too low
PEC_092425		PEC	0.075	too low
PEC_092525		PEC	too low	too low
PEC_092725_A		PEC	0.068	too low
PEC_092725_B		PEC	0.059	too low
PEC_093025_A		PEC	too low	too low
PEC_093025_B		PEC	0.068	too low
PEC_100125		PEC	too low	too low
PEC_100125		PEC	too low	too low
PEC_100225		PEC	too low	too low
PEC_100525		PEC	too low	too low

Supplement 7: Targets and assays included on TAC for Chapter 3

Target	Type	Sequence Accession Number	Location of Amplicon	Gene Copies per Organism	Forward Sequence(s) (5'-3')	Reverse Sequence(s) (5'-3')	Probe Sequence (5'-3')	Source
16S	Control				CCTACGGGDGGCWGCA	GGACTACHVGGGTMTCTAATC	CAGCAGCCGCGGTA	[1]
18S (Manufacturer's Controls)	Control							
Acanthamoeba spp.	Protozoan	AF019051	18s rRNA		CCCAGATCGTTTACCGTGAA	TAAATATTAATGCCCCCAACTATCC	CTGCCACCGAATACATTAGCATGG	[2]
Adenovirus 40/41	Virus	M28822	Fiber gene	1	AACTTTCTCTCTTAATAGACGCC	AGGGGGCTAGAAAACAAAA	CTGACACGGGCACTCT	[3]
Ancylostoma duodenale	Helminth	AJ001594	ITS-2		GAATGACAGCAAACTCGTTGTTG	ATACTAGCCACTGCCGAAACGT	ATCGTTTACCGACTTTAG	[3]
Ascaris lumbricoides	Helminth	AJ000895.1	ITS1		GTAATAGCAGTCGGCGGTTTCTT	GCCCAACATGCCACCTATTC	TTGGCGGACAATTGCATGCGAT	[4]
Astroviridae	Virus	AY720892	Capsid	1	CAGTTGCTTGCTGCGTTCA	CTTGCTAGCCATCACACTTCT	CACAGAAGAGCAACTCCATCGC	[3]
Balantidium coli	Protozoan	PZ008011.1	ITS-1		TGCAATGTGAATTGCAGAACC	TGGTTACGCACACTGAAACAA	CTGGTTTAGCCAGTGCCAGTTGC	[5]
Blastocystis spp.	Protozoan	MW683288.1	18s rRNA		TGGTCCGRTGAACACTTTGGAT	CCTACGGAAACCTTGTTACGACTTCA	CTTCCTCTAAATGRTAAGATT	[3]
Bovine herpesvirus (BHV)	Control	AJ004801	gB	1	TGTGGACCTAAACCTCACGGT	GTAGTCGAGCAGACCCGTGTC	AGGACCGCGAGTTCTTGCCGC	[6]
Bovine respiratory syncytial virus (BRSV)	Control	NC_038272.1	Nucleocapsid	1	GCAATGCTGCAGGACTAGGTATAAT	ACACTGTAATTGATGACCCCATTCT	ACCAAGACTTGTATGATGCTGCCAAAGCA	[7]

Campylobacter jejuni/coli	Bacteria	KC330891.1	cadF	3	CTGCTAAACCATAGAAATAAAATTTCTCAC	CTTTGAAGGTAATTTAGATATGGATAATCG	CATTTTGACGATTTTTGGCTTGA	[8]
Clostridioides difficile	Bacteria	PP410437.1	tcdB	1	GGTATTACCTAATGCTCCAAATAG	TTTGTGCCATCATTTTCTAAGC	CCTGGTGTCCATCCTGTTTC	[9]
Cryptosporidium spp.	Protozoan	HQ149028.1	18s rRNA	5	GGGTTGTATTTATTAGATAAAGAACCA	AGGCCAATACCCTACCGTCT	TGACATATCATTCAAGTTTCTGAC	[9]
E. coli gadA/B	Bacteria	AE014075.1	gad	2	GGATATCGTCTGGGACTTCCG	GCGGAGCCAGACCGAATTT	GTGAAATCGATCAGTGCTTCAGGCCA	[10]
E. coli O157:H7/H-serotype	Bacteria	AF305917	uidA	1	CAGTCTGGATCGCGAAAACTG	ACCAGACGTTGCCCACATAATT	ATTGAGCAGCGTTGG	[11]
E. coli ybbW	Bacteria	U00096	ybbW	1	TGATTGGCAAAATCTGGCCG	GAAATCGCCCAAATCGCCAT	CCGCCG[ZEN]AAAACGATATAGATGCACGG	[12]
Entamoeba histolytica	Protozoan	X64142.1	18s rRNA	200	ATTGTCGTGGCATCCTAACTCA	GCGGACGGCTCATTATAACA	TCATTGAATGAATTGGCCATTT	[13]
Enteroaggregative *E. coli* aaiC	Bacteria	EU637023	aaiC	1	ATTGTCCTCAGGCATTTCAC	ACGACACCCCTGATAAACAA	TAGTGCATACTCATCATTTAAG	[3]
Enteroaggregative *E. coli* aatA	Bacteria	EU637023	aatA	1	CTGGCGAAAGACTGTATCAT	TTTTGCTTCATAAGCCGATAGA	TGGTTCTCATCTATTACAGACAGC	[3]
Enterobius vermicularis	Helminths	AB221533.1	5s rRNA		CAAACAACTGCATCACCAATAAC	AGTGTAGAGCAATAAGCAGTAAAG	TACCAACAACACTTGCACGTCTCTTCA	[14]
Enteropathogenic *E. coli* bfpA+	Bacteria	U27184	bfpA+	1	TGGTGCTTGCGCTTGCT	CGTTGCGCTCATTACTTCTG	CAGTCTGCGTCTGATTCCAA	[9]
Enteropathogenic *E. coli* eae+	Bacteria	AE005595	eae+	1	CATTGATCAGGATTTTTCTGGTGATA	CTCATGCGGAAATAGCCGTTA	ATACTGGCGAGACTATTTCAA	[9]

Enterotoxigenic *E. coli* heat-labile	Bacteria	V00275	LT		TTCCCACCG GATCACCAA	CAACCTTGT GGTGCATGA TGA	CTTGGAGAGAA GAACCCT	[15]
Enterotoxigenic *E. coli* STh	Bacteria	M34916	STh		GCTAAACCA GYAGRGTCT TCAAAA	CCCGGTACA RGCAGGATT ACAACA	TGGTCCTGAAA GCATGAA	[9]
Enterotoxigenic *E. coli* STp	Bacteria	M34916	STp	1	TGAATCACT TGACTCTTC AAAA	GGCAGGATT ACAACAAA GTT+E5	TGAACAACACA TTTTACTGCT	[9]
Giardia spp.	Protozoan	M54878	18s rRNA	9	GACGGCTCA GGACAACG GTT	TTGCCAGCG GTGTCCG	CCCGCGGCGGT CCCTGCTAG	[13]
Helicobacter pylori	Bacteria	DQ189507.1	ureC	2	GACACCAG AAAAAGCG GCTA	AGCGCATGT CTTCGGTTA AA	TCACTAAAGCG TTTTCTACC	[3]
Hepatitis A	Virus	M14707.1	5' NCR		TCACCGCCG TTTGCCTAG	GGAGAGCC CTGGAAGA AAG	TTAATTCCTGCA GGTTCAGG	[16]
Hepatitis G	Control	U44402	NCR	1	CGGCCAAA AGGTGGTGG ATG	CGACGAGCC TGACGTCGG G	AGGTCCCTCTG GCGCTTGTGGC GAG	[17]
Human Enterovirus	Virus	KM881710.2	VP1	1	1: CACYGAACC AGARGAAG CCA	1: CCAAAGCTG CTCTACTGA GAAA	TCGCACAGTGA TAAATCARCAY GG	[18]
		PP474817	EV-D68 VP1		2: CACTGAACC AGAGGAAG CTA	2: CTAAAGCTG CCCTACTAA GRAA		
Human Mitochondrial DNA	MST Marker	NA	cytb		CAATGAATC TGAGGAGG CTAC	CGTGCAAGA ATAGGAGGT G	ACCCTCACACG ATTCTTTACCTT TCACT	[19]
Human-specific HF183 Bacteroides 16S rRNA genetic marker	MST Marker	AB242142	16s rRNA		ATCATGAGT TCACATGTC CG	CTTCCTCTC AGAACCCCT ATCC	CTAATGGAACG CATCCC	[20]
Necator americanus	Helminths	AJ001599	ITS2		CTGTTTGTC GAACGGTAC TTGC	ATAACAGCG TGCACATGT TGC	CTGTACTACGC ATTGTATAC	[21]

Norovirus GI	Virus	M87661.2	ORF1-ORF2	1	CGYTGGATGCGNTTYCATGA	CTTAGACGCCATCATCATTYAC	TGGACAGGAGATCGC	[3]
Norovirus GII	Virus	M87661.2	ORF1-ORF2	1	CARGARBCNATGTTYAGRTGGATGAG	TCGACGCCATCTTCATTCACA	TGGGAGGGCGATCGCAATCT	[3]
Plesiomonas shigelloides	Bacteria	OP222557.1	gyrB	1	CCGCCGTGAAGGCAAAG	GCTACCGGCTCACCCAGAT	CACACCCAAGAATAC	[3]
Poliovirus	Virus	NA	NCR		AGCACTTCTGTTTCCC	ACGGACACCCAAAGTA	ACATAAGAATCCTCCGGCCCCTGA	[22]
Rotavirus	Virus	AY740733	NSP3	1	ACCATCTWCACRTRACCCTCTATGAG	GGTCACATAACGCCCCTATAGC	AGTTAAAAGCTAACACTGTCAAA	[23]
Salmonella enterica	Bacteria	AY578070.1	ttr	1	CTCACCAGGAGATTACAACATGG	AGCTCAGACCAAAAGTGACCATC	CACCGACGGCGAGACCGACTTT	[24]
Sapovirus I, II, IV, V	Virus	AY237420	RdRp	1	1: GAYCASGCTCTCGCYACCTAC	CCCTCCATYTCAAACACTA	CCRCCTATRAACCA	[25]
		KP067444	Partial capsid region		2: TTGGCCCTCGCCACCTAC			
SARS-CoV-2	Virus	MN908947.3	N1	1	GACCCCAAAATCAGCGAAAT	TCTGGTTACTGCCAGTTGAATCTG	ACCCCGCATTACGTTTGGTGGACC	[26]
Shiga toxin producing *E. coli* Stx1	Bacteria	M16625	stx1		ACTTCTCGACTGCAAAGACGTATG	ACAAATTATCCCCTGWGCCACTATC	CTCTGCAATAGGTACTCCA	[9]
Shiga toxin producing *E. coli* Stx2	Bacteria	X07865	stx2		CCACATCGGTGTCTGTTATTAACC	GGTCAAAACGCGCCTGATAG	TTGCTGTGGATATACGAGG	[9]
Shigella spp. and enteroinvasive *E. coli*	Bacteria	M32063)	ipaH		CCTTTTCCGCGTTCCTTGA	CGGAATCCGGAGGTATTGC	CGCCTTTCCGATACCGTCTCTGCA	[27]

Strongyloides stercoralis	Helminths	AY028262	Dispersed repetitive sequence		TCCAGAAAA GTCTTCACT CTCCAG	TGCGTTAGA ATTTAGATA TTATTGTTG CT	TCAGCTCCAGTT GAACAACAGCC TCCAA	[3]
Trichuris trichiura	Helminths	LC596914.1	18s rRNA		TTGAAACGA CTTGCTCAT CAACTT	CTGATTCTC CGTTAACCG TTGTC	CGATGGTACGC TACGTGCTTACC ATGG	[9]
Yersinia enterocolitica	Bacteria	GCA_0007550 55.1	lyrA		TGATTCACC AGCAGCAAT AC	GGCATCATG AAAGGCGG	TGTCGGTTTCTC CTTCCAGG	[3]

[1] C. M. Liu *et al.*, “BactQuant: an enhanced broad-coverage bacterial quantitative real-time PCR assay,” *BMC Microbiol.*, vol. 12, p. 56, Apr. 2012, doi: 10.1186/1471-2180-12-56.

[2] Y. Qvarnstrom, G. S. Visvesvara, R. Sriram, and A. J. da Silva, “Multiplex real-time PCR assay for simultaneous detection of Acanthamoeba spp., Balamuthia mandrillaris, and Naegleria fowleri,” *J. Clin. Microbiol.*, vol. 44, no. 10, pp. 3589–3595, Oct. 2006, doi: 10.1128/JCM.00875-06.

[3] J. Liu *et al.*, “Optimization of Quantitative PCR Methods for Enteropathogen Detection,” *PLOS ONE*, vol. 11, no. 6, p. e0158199, Jun. 2016, doi: 10.1371/journal.pone.0158199.

[4] M. Basuni *et al.*, “A Pentaplex Real-Time Polymerase Chain Reaction Assay for Detection of Four Species of Soil-Transmitted Helminths,” *Am. J. Trop. Med. Hyg.*, vol. 84, no. 2, pp. 338–343, Feb. 2011, doi: 10.4269/ajtmh.2011.10-0499.

[5] D. Sow *et al.*, “Performance of Real-Time Polymerase Chain Reaction Assays for the Detection of 20 Gastrointestinal Parasites in Clinical Samples from Senegal,” *Am. J. Trop. Med. Hyg.*, vol. 97, no. 1, pp. 173–182, Jul. 2017, doi: 10.4269/ajtmh.16-0781.

[6] J. Wang *et al.*, “Validation of a real-time PCR assay for the detection of bovine herpesvirus 1 in bovine semen,” *J. Virol. Methods*, vol. 144, no. 1–2, pp. 103–108, Sep. 2007, doi: 10.1016/j.jviromet.2007.04.002.

[7] M. Boxus, C. Letellier, and P. Kerkhofs, “Real Time RT-PCR for the detection and quantitation of bovine respiratory syncytial virus,” *J. Virol. Methods*, vol. 125, no. 2, pp. 125–130, May 2005, doi: 10.1016/j.jviromet.2005.01.008.

[8] J. A. Platts-Mills *et al.*, “Detection of Campylobacter in Stool and Determination of Significance by Culture, Enzyme Immunoassay, and PCR in Developing Countries,” *J. Clin. Microbiol.*, vol. 52, no. 4, pp. 1074–1080, Apr. 2014, doi: 10.1128/JCM.02935-13.

[9] J. Liu *et al.*, “A laboratory-developed TaqMan Array Card for simultaneous detection of 19 enteropathogens,” *J. Clin. Microbiol.*, vol. 51, no. 2, pp. 472–480, Feb. 2013, doi: 10.1128/JCM.02658-12.

[10] A. P. Tedim, I. Merino, A. Ortega, M. Domínguez-Gil, J. M. Eiros, and J. F. Bermejo-Martín, “Quantification of bacterial DNA in blood using droplet digital PCR: a pilot study,” *Diagn. Microbiol. Infect. Dis.*, vol. 108, no. 1, p. 116075, Jan. 2024, doi: 10.1016/j.diagmicrobio.2023.116075.

[11] K. J. Yoshitomi, K. C. Jinneman, and S. D. Weagant, “Optimization of a 3′-minor groove binder-DNA probe targeting the *uid*A gene for rapid identification of *Escherichia coli* O157:H7 using real-time PCR,” *Mol. Cell. Probes*, vol. 17, no. 6, pp. 275–280, Dec. 2003, doi: 10.1016/j.mcp.2003.07.001.

[12] J. S. McQuillan and M. W. Wilson, “Recombinase polymerase amplification for fast, selective, DNA-based detection of faecal indicator Escherichia coli,” *Lett. Appl. Microbiol.*, vol. 72, no. 4, pp. 382–389, Apr. 2021, doi: 10.1111/lam.13427.

[13] J. J. Verweij *et al.*, “Simultaneous Detection of Entamoeba histolytica, Giardia lamblia, and Cryptosporidium parvum in Fecal Samples by Using Multiplex Real-Time PCR,” *J. Clin. Microbiol.*, vol. 42, no. 3, pp. 1220–1223, Mar. 2004, doi: 10.1128/JCM.42.3.1220-1223.2004.

[14] S. P. Rudko, N. J. Ruecker, N. J. Ashbolt, N. F. Neumann, and P. C. Hanington, “Enterobius vermicularis as a Novel Surrogate for the Presence of Helminth Ova in Tertiary Wastewater Treatment Plants,” *Appl. Environ. Microbiol.*, vol. 83, no. 11, pp. e00547-17, May 2017, doi: 10.1128/AEM.00547-17.

[15] A. Hidaka *et al.*, “Multiplex real-time PCR for exhaustive detection of diarrhoeagenic Escherichia coli,” *J. Appl. Microbiol.*, vol. 106, no. 2, pp. 410–420, Feb. 2009, doi: 10.1111/j.1365-2672.2008.04043.x.
[16] M. I. Costafreda, A. Bosch, and R. M. Pintó, “Development, Evaluation, and Standardization of a Real-Time TaqMan Reverse Transcription-PCR Assay for Quantification of Hepatitis A Virus in Clinical and Shellfish Samples,” *Appl. Environ. Microbiol.*, vol. 72, no. 6, pp. 3846–3855, Jun. 2006, doi: 10.1128/AEM.02660-05.
[17] J. L. Cashdollar *et al.*, “Development and Evaluation of EPA Method 1615 for Detection of Enterovirus and Norovirus in Water,” *Appl. Environ. Microbiol.*, vol. 79, no. 1, pp. 215–223, Jan. 2013, doi: 10.1128/AEM.02270-12.
[18] A. B. Boehm *et al.*, “Trends of Enterovirus D68 Concentrations in Wastewater, California, USA, February 2021–April 2023,” *Emerg. Infect. Dis.*, vol. 29, no. 11, pp. 2362–2365, Nov. 2023, doi: 10.3201/eid2911.231080.
[19] K. Zhu, B. Suttner, A. Pickering, K. T. Konstantinidis, and J. Brown, “A novel droplet digital PCR human mtDNA assay for fecal source tracking,” *Water Res.*, vol. 183, p. 116085, Sep. 2020, doi: 10.1016/j.watres.2020.116085.
[20] H. C. Green *et al.*, “Improved HF183 Quantitative Real-Time PCR Assay for Characterization of Human Fecal Pollution in Ambient Surface Water Samples,” *Appl. Environ. Microbiol.*, vol. 80, no. 10, pp. 3086–3094, May 2014, doi: 10.1128/AEM.04137-13.
[21] M. Basuni *et al.*, “A Pentaplex Real-Time Polymerase Chain Reaction Assay for Detection of Four Species of Soil-Transmitted Helminths,” *Am. J. Trop. Med. Hyg.*, vol. 84, no. 2, pp. 338–343, Feb. 2011, doi: 10.4269/ajtmh.2011.10-0499.
[22] Y. L. Tsai, B. Tran, L. R. Sangermano, and C. J. Palmer, “Detection of poliovirus, hepatitis A virus, and rotavirus from sewage and ocean water by triplex reverse transcriptase PCR,” *Appl. Environ. Microbiol.*, vol. 60, no. 7, pp. 2400–2407, Jul. 1994, doi: 10.1128/aem.60.7.2400-2407.1994.
[23] S. Q. Zeng, A. Halkosalo, M. Salminen, E. D. Szakal, L. Puustinen, and T. Vesikari, “One-step quantitative RT-PCR for the detection of rotavirus in acute gastroenteritis,” *J. Virol. Methods*, vol. 153, no. 2, pp. 238–240, Nov. 2008, doi: 10.1016/j.jviromet.2008.08.004.
[24] B. Malorny, E. Paccassoni, P. Fach, C. Bunge, A. Martin, and R. Helmuth, “Diagnostic Real-Time PCR for Detection of Salmonella in Food,” *Appl. Environ. Microbiol.*, vol. 70, no. 12, pp. 7046–7052, Dec. 2004, doi: 10.1128/AEM.70.12.7046-7052.2004.
[25] X. Liu *et al.*, “Molecular detection and characterization of sapovirus in hospitalized children with acute gastroenteritis in the Philippines,” *J. Clin. Virol. Off. Publ. Pan Am. Soc. Clin. Virol.*, vol. 68, pp. 83–88, Jul. 2015, doi: 10.1016/j.jcv.2015.05.001.
[26] X. Lu *et al.*, “US CDC Real-Time Reverse Transcription PCR Panel for Detection of Severe Acute Respiratory Syndrome Coronavirus 2,” *Emerg. Infect. Dis.*, vol. 26, no. 8, pp. 1654–1665, Aug. 2020, doi: 10.3201/eid2608.201246.
[27] D. T. Vu *et al.*, “Detection of Shigella by a PCR assay targeting the ipaH gene suggests increased prevalence of shigellosis in Nha Trang, Vietnam,” *J. Clin. Microbiol.*, vol. 42, no. 5, pp. 2031–2035, May 2004, doi: 10.1128/JCM.42.5.2031-2035.2004.

Supplement 8: Amount of Template in Reverse-Transcription Real-Time PCR Mixture

BarNo	VisitNo	Type	Template amount (uL)	Duplication Check
CW1-V01-1	V01	CW	34	2
CW10-V01-1	V01	CW	34	2
CW11-V01-1	V01	CW	34	2
CW12-V01-1	V01	CW	34	2
CW13-V01-1	V01	CW	34	2
CW2-V01-2	V01	CW	34	2
CW3-V01-1	V01	CW	34	2
CW4-V01-1	V01	CW	34	2
CW5-V01-1	V01	CW	34	2
CW6-V01-1	V01	CW	34	2
CW7-V01-1	V01	CW	34	2
CW8-V01-1	V01	CW	34	2
CW9-V01-1	V01	CW	34	2
HH01-V01-IS-CA	V01	IS	6.8	2
HH01-V01-US-CA	V01	US	6.8	2
HH01.02-V01-CW-1	V01	CW	34	2
HH02-V01-IS-CA	V01	IS	6.8	2
HH02-V01-US-CA	V01	US	6.8	0
HH02-V01-US-CB	V01	US	6.8	1
HH03-V01-IS-CA	V01	IS	6.8	2
HH03-V01-US-CA	V01	US	6.8	0
HH03-V01-US-CB	V01	US	6.8	0
HH03-V01-US-CB	V01	US	3.4	1
HH03.04-V01-CW-1	V01	CW	34	2
HH04-V01-IS-CA	V01	IS	6.8	2
HH04-V01-US-CA	V01	US	6.8	2
HH05-V01-US-CA	V01	US	6.8	2
HH05.06-V01-CW-1	V01	CW	34	2
HH06-V01-US-CA	V01	US	6.8	2
HH07-V01-US-CA	V01	US	34	0
HH07-V01-US-CA	V01	US	6.8	1
HH07.08-V01-CW-1	V01	CW	34	2
HH08-V01-IS-CA	V01	IS	6.8	2
HH08-V01-SLS-1	V01	WW	34	2
HH08-V01-US-CA	V01	US	34	0
HH08-V01-US-CA	V01	US	6.8	0

HH08-V01-US-CA	V01	US	3.4	1
HH09-V01-IS-CA	V01	IS	6.8	2
HH09-V01-SLS-1	V01	WW	34	2
HH09-V01-US-CA	V01	US	34	0
HH09-V01-US-CA	V01	US	6.8	1
HH09.10-V1-CW-1	V01	CW	34	2
HH10-V01-US-CA	V01	US	34	0
HH10-V01-US-CA	V01	US	6.8	0
HH10-V01-US-CA	V01	US	3.4	1
HH11-V01-IS-CA	V01	IS	6.8	2
HH11-V01-SLL-1	V01	WW	34	0
HH11-V01-SLL-1_REDO	V01	WW	34	0
HH11-V01-SLL-1_REDO	V01	WW	6.8	1
HH11-V01-US-CA	V01	US	6.8	2
HH11.12-V01-CW-1	V01	CW	34	2
HH12-V01-IS-CA	V01	IS	6.8	2
HH12-V01-SLL-1	V01	WW	34	0
HH12-V01-SLL-1	V01	WW	34	0
HH12-V01-SLL-1	V01	WW	34	2
HH12-V01-US-CA	V01	US	6.8	0
HH12-V01-US-CB	V01	US	6.8	1
HH13-V01-US-CA	V01	US	6.8	0
HH13-V01-US-CB	V01	US	6.8	1
HH14-V01-US-CA	V01	US	6.8	2
HH15-V01-IS-CA	V01	IS	6.8	2
HH15-V01-US-CA	V01	US	6.8	2
HH15.51-V01-CW-1	V01	CW	34	2
HH16-V01-IS-CA	V01	IS	6.8	2
HH16-V01-US-CA	V01	US	34	2
HH16-V01-WW-1	V01	WW	34	2
HH16.17.18-V01-CW-1	V01	CW	34	2
HH17-V01-IS-CA	V01	IS	6.8	0
HH17-V01-IS-CA	V01	IS	3.4	1
HH17-V01-US-CA	V01	US	34	0
HH17-V01-US-CA	V01	US	6.8	0
HH17-V01-US-CA	V01	US	3.4	1
HH17-V01-WW-1	V01	WW	34	2
HH18-V01-IS-CA	V01	IS	6.8	2
HH18-V01-US-CA	V01	US	34	2

HH18-V01-WW-1	V01	WW	34	2
HH19-V01-IS-CA	V01	IS	6.8	0
HH19-V01-IS-CA	V01	IS	10	1
HH19-V01-US-CA	V01	US	6.8	2
HH19-V01-WW-1	V01	WW	34	0
HH19-V01-WW-1_REDO	V01	WW	34	1
HH20-V01-IS-CA	V01	IS	6.8	2
HH20-V01-US-CA	V01	US	6.8	2
HH21-V01-IS-CA	V01	IS	6.8	2
HH21-V01-US-CA	V01	US	6.8	0
HH21-V01-US-CB	V01	US	6.8	1
HH22-V01-IS-CA	V01	IS	6.8	2
HH22-V01-US-CA	V01	US	6.8	0
HH22-V01-US-CB	V01	US	6.8	1
HH22-V01-WW-1	V01	WW	34	2
HH23-V01-IS-CA	V01	IS	6.8	2
HH23-V01-US-CA	V01	US	6.8	2
HH23-V01-WW-1	V01	WW	34	0
HH23-V01-WW-1	V01	WW	6.8	1
HH24-V01_US-CA-1:10	V01	US	3.4	0
HH24-V01_US-CA-1:2	V01	US	17	0
HH24-V01_US-CA-1:5	V01	US	6.8	1
HH24-V01_US-CA-IR	V01	US	34	0
HH24-V01-IS-CA	V01	IS	6.8	2
HH24-V01-US-CA	V01	US	34	0
HH25-V01-IS-CA	V01	IS	6.8	2
HH25-V01-US-CA	V01	US	34	2
HH25-V01-WW-1	V01	WW	34	0
HH25-V01-WW-1	V01	WW	34	1
HH26-V01-IS-CA	V01	IS	6.8	2
HH26-V01-US-CA	V01	US	6.8	2
HH27-V01-IS-CA	V01	IS	6.8	2
HH27-V01-US-CA	V01	US	6.8	2
HH28-V01-IS-CA	V01	IS	6.8	2
HH28-V01-US-CA	V01	US	6.8	0
HH28-V01-US-CB	V01	US	6.8	1
HH28-V01-WW-1	V01	WW	34	0
HH28-V01-WW-1	V01	WW	34	1
HH29-V01-IS-CA	V01	IS	6.8	2

HH29-V01-US-CA	V01	US	6.8	0
HH29-V01-US-CB	V01	US	6.8	1
HH29-V01-WW-1	V01	WW	34	0
HH29-V01-WW-1	V01	WW	34	0
HH29-V01-WW-1	V01	WW	34	1
HH30-V01-IS-CA	V01	IS	6.8	2
HH30-V01-US-CA	V01	US	6.8	2
HH30-V01-WW-1	V01	WW	34	2
HH31-V01-IS-CA	V01	IS	6.8	2
HH31-V01-US-CA	V01	US	6.8	2
HH32-V01-IS-CA	V01	IS	6.8	2
HH32-V01-US-CA	V01	US	6.8	2
HH32-V01-WW-1	V01	WW	34	0
HH32-V01-WW-1	V01	WW	6.8	1
HH33-V01-IS-CA	V01	IS	6.8	2
HH33-V01-US-CA	V01	US	34	2
HH33-V01-WW-1	V01	WW	34	2
HH34-V01-IS-CA	V01	IS	6.8	2
HH34-V01-US-CA	V01	US	34	0
HH34-V01-US-CA	V01	US	6.8	0
HH34-V01-US-CA	V01	US	3.4	1
HH35-V01-IS-CA	V01	IS	6.8	2
HH35-V01-US-CA	V01	US	34	0
HH35-V01-US-CA	V01	US	6.8	0
HH35-V01-US-CA	V01	US	3.4	1
HH35-V01-WW-1	V01	WW	34	0
HH35-V01-WW-1	V01	WW	6.8	1
HH35-V01-WW-1_REDO	V01	WW	34	0
HH36-V01-IS-CA	V01	IS	6.8	2
HH36-V01-US-CA	V01	US	6.8	2
HH37-V01-IS-CA	V01	IS	6.8	2
HH37-V01-US-CA	V01	US	6.8	2
HH37-V01-WW-2	V01	WW	34	2
HH38-V01-IS-CA	V01	IS	6.8	2
HH38-V01-US-CA	V01	US	6.8	0
HH38-V01-US-CB	V01	US	6.8	0
HH38-V01-US-CB	V01	US	3.4	1
HH39-V01-IS-CA	V01	IS	6.8	2
HH39-V01-US-CA	V01	US	6.8	2

HH40-V01-IS-CA	V01	IS	6.8	2
HH40-V01-US-CA	V01	US	6.8	2
HH40-V01-WW-1	V01	WW	34	0
HH40-V01-WW-1	V01	WW	34	1
HH41-V01-IS-CA	V01	IS	6.8	2
HH41-V01-US-CA	V01	US	6.8	2
HH41-V01-WW-1	V01	WW	34	2
HH42-V01-IS-CA	V01	IS	6.8	2
HH42-V01-US-CA	V01	US	6.8	2
HH42-V01-WW-1	V01	WW	34	2
HH43-V01-IS-CA	V01	IS	6.8	2
HH43-V01-US-CA	V01	US	34	0
HH43-V01-US-CA	V01	US	6.8	0
HH43-V01-US-CA	V01	US	3.4	1
HH43-V01-WW-1	V01	WW	34	0
HH43-V01-WW-1	V01	WW	34	1
HH44-V01-IS-CA	V01	IS	6.8	2
HH44-V01-US-CA	V01	US	34	0
HH44-V01-US-CA	V01	US	6.8	1
HH44-V01-WW-1	V01	WW	34	0
HH44-V01-WW-2	V01	WW	6.8	1
HH45-V01-IS-CA	V01	IS	6.8	2
HH45-V01-US-CA	V01	US	34	0
HH45-V01-US-CA	V01	US	6.8	0
HH45-V01-US-CA	V01	US	3.4	1
HH45-V01-WW-1	V01	WW	34	0
HH45-V01-WW-2	V01	WW	6.8	1
HH46-V01-IS-CA	V01	IS	6.8	2
HH46-V01-US-CA	V01	US	6.8	2
HH46-V01-WW-1	V01	WW	34	0
HH46-V01-WW-2	V01	WW	6.8	1
HH47-V01-IS-CA	V01	IS	6.8	2
HH47-V01-US-CA	V01	US	6.8	2
HH47-V01-WW-1	V01	WW	34	2
HH48-V01-IS-CA	V01	IS	6.8	2
HH48-V01-US-CA	V01	US	6.8	0
HH48-V01-US-CB	V01	US	6.8	1
HH49-V01-IS-CA	V01	IS	6.8	2
HH49-V01-US-CA	V01	US	6.8	2

HH49-V01-WW-1	V01	WW	34	2
HH50-V01-IS-CA	V01	IS	6.8	2
HH50-V01-US-CA	V01	US	6.8	2
HH50-V01-WW-1	V01	WW	34	2
HH51-V01-IS-C1	V01	IS	6.8	2
HH51-V01-US-C1	V01	US	6.8	2
HH52-V01-IS-CA	V01	IS	6.8	2
HH52-V01-US-CA	V01	US	6.8	2
HH53-V01-IS-CA	V01	IS	6.8	2
HH53-V01-US-CA	V01	US	6.8	0
HH53-V01-US-CA	V01	US	3.4	1
HH54-V01-IS-CA	V01	IS	6.8	2
HH54-V01-US-CA	V01	US	34	0
HH54-V01-US-CA	V01	US	6.8	1
SLGN1-V01-WW-A	V01	WW	34	0
SLGN1-V01-WW-A	V01	WW	34	1
SLGN2-V01-WW-A	V01	WW	34	0
SLGN2-V01-WW-A	V01	WW	34	1
SLGN3-V01-WW-C	V01	WW	34	2
SLGN4-V01-WW-A	V01	WW	34	0
SLGN4-V01-WW-A	V01	WW	34	1
SLGN5-V01-WW-A	V01	WW	34	2
SLGN6-V01-WW-A	V01	WW	34	2
SLGN7-V01-WW-A	V01	WW	34	0
SLGN7-V01-WW-A	V01	WW	34	1
SLGN8-V01-WW-C	V01	WW	34	1
SLGN9-V01-WW-A	V01	WW	34	0
SLGN9-V01-WW-A	V01	WW	34	1
CW1-V02-1	V02	CW	34	2
CW10-V02-1	V02	CW	34	2
CW11-V02-1	V02	CW	34	2
CW12-V02-1	V02	CW	34	2
CW13-V02-1	V02	CW	34	2
CW15-V02-1	V02	CW	34	2
CW16-V02-1	V02	CW	34	2
CW17-V02-1	V02	CW	34	2
CW18-V02-1	V02	CW	34	2
CW2-V02-1	V02	CW	34	2
CW3-V02-1	V02	CW	34	2

CW4-V02-1	V02	CW	34	2
CW5-V02-1	V02	CW	34	2
CW6-V02-1	V02	CW	34	2
CW7-V02-1	V02	CW	34	2
CW8-V02-1	V02	CW	34	2
CW9-V02-1	V02	CW	34	2
HH1-V02-US-CA	V02	US	34	0
HH1-V02-US-CA	V02	US	6.8	0
HH1-V02-US-CA	V02	US	3.4	1
HH10_V02_US_CA	V02	US	34	0
HH10_V02_US_CA	V02	US	6.8	0
HH10_V02_US_CA	V02	US	3.4	1
HH11-V02-IS-CA	V02	IS	6.8	2
HH11-V02-US-CA	V02	US	6.8	2
HH11-V02-WW-1	V02	WW	34	2
HH12-V02-IS-CA	V02	IS	6.8	2
HH12-V02-US-CA	V02	US	6.8	2
HH12-V02-WW-1	V02	WW	34	0
HH12-V02-WW-2	V02	WW	6.8	1
HH13-V02-US-CA	V02	US	6.8	0
HH13-V02-US-CA	V02	US	3.4	1
HH14-V02-US-CA	V02	US	34	0
HH14-V02-US-CA	V02	US	6.8	0
HH14-V02-US-CA	V02	US	3.4	1
HH15-V02-IS-CA	V02	IS	6.8	2
HH15-V02-US-CA	V02	US	6.8	2
HH16-V02-IS-CA	V02	IS	6.8	2
HH16-V02-US-CA	V02	US	34	0
HH16-V02-US-CA	V02	US	6.8	1
HH16-V02-WW-1	V02	WW	34	0
HH16-V02-WW-2	V02	WW	6.8	1
HH17-V02-IS-CA	V02	IS	6.8	0
HH17-V02-IS-CB	V02	IS	6.8	1
HH17-V02-US-CA	V02	US	34	0
HH17-V02-US-CA	V02	US	6.8	0
HH17-V02-US-CA	V02	US	3.4	0
HH17-V02-US-CA	V02	US	5	1
HH17-V02-WW-1	V02	WW	34	0
HH17-V02-WW-2	V02	WW	6.8	1

HH19-V02-IS-CA	V02	IS	6.8	2
HH19-V02-US-CA	V02	US	6.8	2
HH2-V02-US-CA	V02	US	6.8	2
HH20-V02-IS-CA	V02	IS	6.8	0
HH20-V02-IS-CB	V02	IS	6.8	1
HH20-V02-US-CA	V02	US	6.8	2
HH21-V02-IS-CA	V02	IS	6.8	2
HH21-V02-US-CA	V02	US	6.8	2
HH22-V02-IS-CA	V02	IS	6.8	2
HH22-V02-US-CA	V02	US	34	0
HH22-V02-US-CA	V02	US	6.8	1
HH22-V02-WW-1	V02	WW	34	2
HH23-V02-IS-CA	V02	IS	6.8	0
HH23-V02-IS-CA	V02	IS	6.8	1
HH23-V02-US-CA	V02	US	6.8	2
HH23-V02-WW-1	V02	WW	34	0
HH23-V02-WW-1	V02	WW	6.8	1
HH24-V02-IS-CA	V02	IS	6.8	0
HH24-V02-IS-CA	V02	IS	6.8	1
HH24-V02-US-CA	V02	US	6.8	2
HH25-V02-IS-CA	V02	IS	6.8	2
HH25-V02-US-CA	V02	US	6.8	2
HH25-V02-WW-1	V02	WW	34	0
HH25-V02-WW-2	V02	WW	6.8	1
HH26-V02-IS-CA	V02	IS	6.8	0
HH26-V02-IS-CB	V02	IS	6.8	1
HH26-V02-US-CA	V02	US	6.8	2
HH27-V02-IS-CA	V02	IS	6.8	2
HH27-V02-US-CA	V02	US	6.8	2
HH28-V02-IS-CA	V02	IS	6.8	2
HH28-V02-US-CA	V02	US	6.8	2
HH28-V02-WW-1	V02	WW	34	2
HH29-V02-IS-CA	V02	IS	6.8	0
HH29-V02-IS-CA	V02	IS	3.4	1
HH29-V02-US-CA	V02	US	6.8	2
HH29-V02-WW-1	V02	WW	34	2
HH3-V02-US-CA	V02	US	6.8	0
HH3-V02-US-CB	V02	US	6.8	1
HH30-V02-IS-CA	V02	IS	6.8	2

HH30-V02-US-CA	V02	US	6.8	2
HH30-V02-WW-1	V02	WW	34	2
HH31-V02-IS-CA	V02	IS	6.8	2
HH31-V02-US-CA	V02	US	6.8	2
HH31-V02-WW-1	V02	WW	34	0
HH31-V02-WW-2	V02	WW	6.8	1
HH32-V02-IS-CA	V02	IS	6.8	2
HH32-V02-US-CA	V02	US	6.8	2
HH32-V02-WW-1	V02	WW	34	2
HH33-V02-IS-CA	V02	IS	6.8	2
HH33-V02-US-CA	V02	US	6.8	2
HH33-V02-WW-1	V02	WW	34	2
HH34-V02-IS-CA	V02	IS	6.8	2
HH34-V02-US-CA	V02	US	6.8	2
HH34-V02-WW-1	V02	WW	34	2
HH35-V02-IS-CA	V02	IS	6.8	2
HH35-V02-US-CA	V02	US	6.8	2
HH35-V02-WW-1	V02	WW	34	0
HH35-V02-WW-1	V02	WW	34	1
HH36-V02-IS-CA	V02	IS	6.8	2
HH36-V02-US-CA	V02	US	6.8	2
HH37-V02-IS-CA	V02	IS	6.8	2
HH37-V02-US-CA	V02	US	6.8	2
HH37-V02-WW-1	V02	WW	34	0
HH37-V02-WW-1	V02	WW	34	1
HH38-V02-IS-CA1	V02	IS	6.8	2
HH38-V02-US-CA	V02	US	6.8	2
HH39-V02-IS-CA	V02	IS	6.8	2
HH39-V02-US-CA	V02	US	6.8	2
HH4-V02-US-CA	V02	US	6.8	2
HH40-V02-IS-CA	V02	IS	6.8	0
HH40-V02-IS-CA	V02	IS	6.8	1
HH40-V02-US-CA	V02	US	6.8	2
HH40-V02-WW-1	V02	WW	34	2
HH41-V02-IS-CA	V02	IS	6.8	2
HH41-V02-US-CA	V02	US	6.8	2
HH41-V02-WW-1	V02	WW	34	2
HH42-V02-IS-CA	V02	IS	6.8	2
HH42-V02-US-CA	V02	US	6.8	2

HH42-V02-WW-1	V02	WW	34	2
HH43-V02-IS-CA	V02	IS	6.8	2
HH43-V02-US-CA	V02	US	6.8	2
HH44-V02-IS-CA	V02	IS	6.8	2
HH44-V02-US-CA	V02	US	6.8	2
HH44-V02-WW-1	V02	WW	34	2
HH45-V02-IS-CA	V02	IS	6.8	0
HH45-V02-IS-CA	V02	IS	3.4	1
HH45-V02-US-CA	V02	US	6.8	2
HH45-V02-WW-1	V02	WW	34	2
HH46-V02-IS-CA	V02	IS	6.8	2
HH46-V02-US-CA	V02	US	6.8	2
HH46-V02-WW-1	V02	WW	34	0
HH46-V02-WW-2	V02	WW	6.8	1
HH47-V02-IS-CA	V02	IS	6.8	2
HH47-V02-US-CA	V02	US	6.8	2
HH47-V02-WW-1	V02	WW	34	2
HH48-V02-IS-CA	V02	IS	6.8	0
HH48-V02-IS-CB	V02	IS	6.8	1
HH48-V02-US-CA	V02	US	6.8	2
HH49-V02-IS-CA	V02	IS	6.8	2
HH49-V02-US-CA	V02	US	6.8	2
HH49-V02-WW-1	V02	WW	34	0
HH49-V02-WW-2	V02	WW	6.8	1
HH5-V02-US-CA	V02	US	6.8	0
HH5-V02-US-CB	V02	US	6.8	1
HH50-V02-IS-CA	V02	IS	6.8	2
HH50-V02-US-CA	V02	US	6.8	0
HH50-V02-US-CB	V02	US	6.8	1
HH50-V02-WW-1	V02	WW	34	2
HH52-V02-IS-CA	V02	IS	6.8	0
HH52-V02-IS-CB	V02	IS	6.8	1
HH52-V02-US-CA	V02	US	6.8	2
HH53-V02-IS-CA	V02	IS	6.8	2
HH53-V02-US-CA	V02	US	6.8	0
HH53-V02-US-CA	V02	US	3.4	1
HH53-V02-WW-1	V02	WW	34	0
HH53-V02-WW-1	V02	WW	34	1
HH54-V02-IS-CA	V02	IS	6.8	2

HH54-V02-US-CA	V02	US	6.8	0
HH54-V02-US-CA	V02	US	3.4	1
HH54-V02-WW-1	V02	WW	34	2
HH6-V02-US-CA	V02	US	6.8	2
HH7-V02-US-CA	V02	US	6.8	2
HH8-V02-IS-CA	V02	IS	6.8	2
HH8-V02-US-CA	V02	US	6.8	2
HH9-V02-IS-CA	V02	IS	6.8	2
HH9-V02-US-CA	V02	US	6.8	2
HH9-V02-WW-1	V02	WW	34	2
SLGN1-V02-WW-A	V02	WW	34	2
SLGN2-V02-WW-A	V02	WW	34	2
SLGN3-V02-WW-A	V02	WW	34	0
SLGN3-V02-WW-A	V02	WW	34	1
SLGN4-V02-WW-A	V02	WW	34	0
SLGN4-V02-WW-B	V02	WW	6.8	1
SLGN5-V02-WW-A	V02	WW	34	0
SLGN5-V02-WW-B	V02	WW	6.8	1
SLGN6-V02-WW-A	V02	WW	34	2
SLGN7-V02-WW-A	V02	WW	34	2
SLGN8-V02-WW-A	V02	WW	34	2
SLGN9-V02-WW-A	V02	WW	34	2
CW1-V03-1	V03	CW	34	2
CW10-V03-1	V03	CW	34	2
CW11-V03-1	V03	CW	34	2
CW12-V03-1	V03	CW	34	2
CW13-V03-1	V03	CW	34	2
CW14-V02-1	V03	CW	34	2
CW14-V03-1	V03	CW	34	2
CW15-V03-1	V03	CW	34	2
CW16-V03-1	V03	CW	34	2
CW17-V03-1	V03	CW	34	2
CW18-V03-1	V03	CW	34	2
CW19-V03-1	V03	CW	34	2
CW2-V03-1	V03	CW	34	2
CW20-V03-1	V03	CW	34	2
CW21-V03-1	V03	CW	34	2
CW22-V03-1	V03	CW	34	2
CW3-V03-1	V03	CW	34	2

CW4-V03-1	V03	CW	34	2
CW5-V03-1	V03	CW	34	2
CW6-V03-1	V03	CW	34	2
CW7-V03-1	V03	CW	34	2
CW8-V03-1	V03	CW	34	2
CW9-V03-1	V03	CW	34	2
HH1-V03-US-CA	V03	US	6.8	2
HH10-V03-US-CA	V03	US	6.8	0
HH10-V03-US-CA	V03	US	3.4	1
HH11-V03-IS-CA	V03	IS	6.8	2
HH11-V03-US-CA	V03	US	6.8	2
HH11-V03-WW-1	V03	WW	34	2
HH12-V03-IS-CA	V03	IS	6.8	2
HH12-V03-US-CA	V03	US	6.8	2
HH12-V03-WW-1	V03	WW	34	2
HH13-V03-US-CA	V03	US	6.8	0
HH13-V03-US-CA	V03	US	3.4	1
HH14-V03-US-CA	V03	US	6.8	0
HH14-V03-US-CA	V03	US	3.4	1
HH15-V03-IS-CA	V03	IS	6.8	0
HH15-V03-IS-CA	V03	IS	3.4	1
HH15-V03-US-CA	V03	US	6.8	2
HH16-V03-IS-CA	V03	IS	6.8	2
HH16-V03-US-CA	V03	US	6.8	2
HH16-V03-WW-1	V03	WW	34	2
HH17-V03-IS-CA	V03	IS	6.8	2
HH17-V03-US-CA	V03	US	6.8	2
HH17-V03-WW-1	V03	WW	34	2
HH19-V03-IS-CA	V03	IS	6.8	2
HH19-V03-US-CA	V03	US	6.8	2
HH2-V03-US-CA	V03	US	6.8	2
HH20-V03-IS-CA	V03	IS	6.8	2
HH20-V03-US-CA	V03	US	34	0
HH20-V03-US-CA	V03	US	6.8	0
HH20-V03-US-CA	V03	US	3.4	1
HH21-V03-IS-CA	V03	IS	6.8	2
HH21-V03-US-CA	V03	US	34	2
HH22-V03-IS-CA	V03	IS	6.8	2
HH22-V03-US-CA	V03	US	34	0

HH22-V03-US-CA	V03	US	6.8	1
HH22-V03-WW-1	V03	WW	34	2
HH23-V03-IS-CA	V03	IS	6.8	2
HH23-V03-US-CA	V03	US	34	0
HH23-V03-US-CA	V03	US	6.8	1
HH23-V03-WW-1	V03	WW	34	2
HH24-V03-IS-CA	V03	IS	6.8	0
HH24-V03-IS-CA	V03	IS	3.4	1
HH24-V03-US-CA	V03	US	6.8	2
HH25-V03-IS-CA	V03	IS	6.8	2
HH25-V03-US-CA	V03	US	34	0
HH25-V03-US-CA	V03	US	6.8	0
HH25-V03-US-CA	V03	US	3.4	1
HH25-V03-WW-1	V03	WW	34	2
HH26-V03-IS-CA	V03	IS	6.8	2
HH26-V03-US-CA	V03	US	6.8	2
HH27-V03-IS-CA	V03	IS	6.8	2
HH27-V03-US-CA	V03	US	6.8	2
HH28-V03-IS-CA	V03	IS	6.8	2
HH28-V03-US-CA	V03	US	6.8	2
HH28-V03-WW-1	V03	WW	34	2
HH29-V03-IS-CA	V03	IS	6.8	0
HH29-V03-IS-CA	V03	IS	3.4	1
HH29-V03-US-CA	V03	US	6.8	2
HH29-V03-WW-1	V03	WW	34	2
HH3-V03-US-CA	V03	US	6.8	2
HH30-V03-IS-CA	V03	IS	6.8	0
HH30-V03-IS-CA	V03	IS	34	0
HH30-V03-IS-CA	V03	IS	3.4	1
HH30-V03-US-CA	V03	US	6.8	2
HH30-V03-WW-1	V03	WW	34	2
HH31-V03-IS-CA	V03	IS	6.8	2
HH31-V03-US-CA	V03	US	6.8	2
HH31-V03-WW-1	V03	WW	34	2
HH32-V03-IS-CA	V03	IS	6.8	0
HH32-V03-IS-CB	V03	IS	6.8	1
HH32-V03-US-CA	V03	US	6.8	2
HH33-V03-IS-CA	V03	IS	6.8	0
HH33-V03-IS-CA	V03	IS	6.8	1

HH33-V03-US-CA	V03	US	6.8	2
HH33-V03-WW-1	V03	WW	34	2
HH34-V03-IS-CA	V03	IS	6.8	2
HH34-V03-US-CA	V03	US	6.8	2
HH34-V03-WW-1	V03	WW	34	2
HH35-V03-IS-CA	V03	IS	6.8	2
HH35-V03-US-CA	V03	US	34	0
HH35-V03-US-CA	V03	US	6.8	1
HH35-V03-WW-1	V03	WW	34	2
HH36-V03-IS-CA	V03	IS	6.8	2
HH36-V03-US-CA	V03	US	6.8	2
HH36-V03-WW-1	V03	WW	34	2
HH37-V03-IS-CA	V03	IS	6.8	2
HH37-V03-US-CA	V03	US	34	0
HH37-V03-US-CA	V03	US	6.8	1
HH37-V03-WW-1	V03	WW	34	2
HH38-V03-IS-CA	V03	IS	6.8	2
HH38-V03-US-CA	V03	US	6.8	2
HH39-V03-IS-CA	V03	IS	6.8	0
HH39-V03-IS-CB	V03	IS	6.8	1
HH39-V03-US-CA	V03	US	6.8	2
HH4-V03-US-CA	V03	US	6.8	2
HH40-V03-IS-CA	V03	IS	6.8	2
HH40-V03-US-CA	V03	US	6.8	2
HH40-V03-WW-1	V03	WW	34	2
HH41-V03-IS-CA	V03	IS	6.8	2
HH41-V03-US-CA	V03	US	6.8	2
HH41-V03-WW-1	V03	WW	34	2
HH42-V03-IS-CA	V03	IS	6.8	2
HH42-V03-US-CA	V03	US	6.8	2
HH42-V03-WW-1	V03	WW	34	2
HH43-V03-IS-CA	V03	IS	6.8	2
HH43-V03-US-CA	V03	US	6.8	0
HH43-V03-US-CB	V03	US	6.8	1
HH44-V03-IS-CA	V03	IS	6.8	0
HH44-V03-IS-CB	V03	IS	6.8	1
HH44-V03-US-CA	V03	US	6.8	2
HH44-V03-WW-1	V03	WW	34	2
HH45-V03-IS-CA	V03	IS	6.8	0

HH45-V03-IS-CA	V03	IS	3.4	1
HH45-V03-US-CA	V03	US	6.8	2
HH45-V03-WW-1	V03	WW	34	2
HH46-V03-IS-CA	V03	IS	6.8	2
HH46-V03-US-CA	V03	US	34	0
HH46-V03-US-CA	V03	US	3.4	1
HH47-V03-IS-CA	V03	IS	6.8	2
HH47-V03-US-CA	V03	US	6.8	2
HH47-V03-WW-1	V03	WW	34	0
HH47-V03-WW-1	V03	WW	6.8	1
HH48-V03-IS-CA	V03	IS	6.8	2
HH48-V03-US-CA	V03	US	6.8	2
HH49-V03-IS-CA	V03	IS	6.8	2
HH49-V03-US-CA	V03	US	34	0
HH49-V03-US-CA	V03	US	6.8	1
HH49-V03-WW-1	V03	WW	34	0
HH49-V03-WW-1	V03	WW	6.8	1
HH5-V03-US-CA	V03	US	34	0
HH5-V03-US-CA	V03	US	6.8	1
HH50-V03-IS-CA	V03	IS	6.8	2
HH50-V03-US-CA	V03	US	6.8	2
HH50-V03-WW-1	V03	WW	34	2
HH52-V03-IS-CA	V03	IS	6.8	2
HH52-V03-US-CA	V03	US	6.8	2
HH53-V03-IS-CA	V03	IS	6.8	2
HH53-V03-US-CA	V03	US	34	0
HH53-V03-US-CA	V03	US	6.8	1
HH53-V03-WW-1	V03	WW	34	2
HH54-V03-IS-CA	V03	IS	6.8	2
HH54-V03-US-CA	V03	US	6.8	2
HH54-V03-WW-1	V03	WW	34	2
HH6-V03-US-CA	V03	US	6.8	2
HH7-V03-US-CA	V03	US	6.8	2
HH8-V03-IS-CA	V03	IS	6.8	2
HH8-V03-US-CA	V03	US	6.8	2
HH9-V03-IS-CA	V03	IS	6.8	2
HH9-V03-US-CA	V03	US	34	0
HH9-V03-US-CA	V03	US	6.8	0
HH9-V03-US-CA	V03	US	3.4	1

HH9-V03-WW-1	V03	WW	34	2
SLGN1-V03-WW-A	V03	WW	34	2
SLGN2-V03-WW-A	V03	WW	34	2
SLGN3-V03-WW-A	V03	WW	34	2
SLGN4-V03-WW-A	V03	WW	34	2
SLGN5-V03-WW-A	V03	WW	34	2
SLGN6-V03-WW-A	V03	WW	34	2
SLGN7-V03-WW-A	V03	WW	34	2
SLGN8-V03-WW-A	V03	WW	34	2
SLGN9-V03-WW-A	V03	WW	34	2

Supplement 9: DNA and RNA Plasmids for Custom TaqMan Array Card

We obtained three custom plasmids from Twist Biosciences; two plasmids contained the amplicon sequences for the DNA targets, and one plasmid contained the amplicon sequences for the RNA targets (Supplemental Text 1). Within each plasmid, we incorporated the restriction site for the PI-SceI enzyme from New England Biolabs (Cat No. R0696S), which we used to linearize the plasmids according to the manufacturer's instructions. Within the plasmid containing RNA targets, we incorporated the sequence for the T7 promotor region and transcribed the linearized plasmid with the Invitrogen MEGAscript® T7 Transcription Kit (Cat No. AM1334). We cleaned the resulting RNA product with the Invitrogen MEGAclear™ Transcription Clean-Up Kit (Cat No. AM1908). We pooled the three final standards to a target concentration of 1.0 x 106 copies µL-1 each. We confirmed the final concentration of each plasmid by digital PCR (dPCR) using the QIAgen QIAcuity platform.

Supplemental Text 1: DNA Plasmid 1 and 2 and RNA Plasmid
DNA Plasmid 1 (2886 bp):
Restriction Cut Site (PI-SceI): ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGG
16S
Acanthamoeba spp.
Adenovirus 40/41
Ancylostoma duodenale
Ascaris lumbricoides
Balantidium coli
Bovine herpesvirus (BHV)
Blastocystis spp.
Clostridioides difficile
Campylobacter jejuni/coli
Cryptosporidium spp.
E. coli gadA/B
E. coli O157:H7/H-serotype
Enteroaggregative E. coli aaiC
Enteroaggregative E. coli aatA
Entamoeba histolytica
Enterobius vermicularis
Enteropathogenic E. coli bfpA+
Restriction Cut Site (B PI-SceI): ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGG

ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGGACTCCTACGGGAGGCAGCAGTGGGG
AATATTGCACAATGGGCGCAAGCCTGATGCAGCCATGCCGCGTGTATGAAGAAGGCCTTCGGG
TTGTAAAGTACTTTCAGCGGGGAGGAAGGGAGTAAAGTTAATACCTTTGCTCATTGACGTTAC
CCGCAGAAGAAGCACCGGCTAACTCCGTGCCAGCAGCCGCGGTAATACGGAGGGTGCAAGC
GTTAATCGGAATTACTGGGCGTAAAGCGCACGCAGGCGGTTTGTTAAGTCAGATGTGAAATCC
CCGGGCTCAACCTGGGAACTGCATCTGATACTGGCAAGCTTGAGTCTCGTAGAGGGGGGTAG
AATTCCAGGTGTAGCGGTGAAATGCGTAGAGATCTGGAGGAATACCGGTGGCGAAGGCGGCC
CCCTGGACGAAGACTGACGCTCAGGTGCGAAAGCGTGGGGAGCAAACAGGATTAGATACCC
TGGTAGTCCACGGGGCCCAGATCGTTTACCGTGAAAAAATTAGAGTGTTCAAAGCAGGCAGA
TCCAATTTTCTGCCACCGAATACATTAGCATGGGATAATGGAATAGGACCCTGTCCTCCTATTTT
CAGTTGGTTTTGGCAGCGCGAGGACTAGGGTAATGATTAATAGGGATAGTTGGGGGCATTAAT
ATTTAATTACGAACTTTCTCTCTTAATAGACGCCCCACTTAATGCTGACACGGGCACTCTTCGC
CTTCAAAGTGCTGCACCTCTTGGACTAGTGGACAAAACACTAAAAGTTTTGTTTTCTAGCCCC
CTCTAGCTGAATGACAGCAAACTCGTTGTTGCTGCTGAATCGTTTACCGACTTTAGAACGTTT
CGGCAGTGGCTAGTATAACGATGTAATAGCAGTCGGCGGTTTCTTTTTTTTTGGCGGACAATTG

CATGCGATTTGCTATGTGTTGAGGGAGAATAGGTGGCATGTTGGGCTTGATATGCAATGTGAAT
TGCAGAACCATGAATCATCGGATATTCTAACGCAACTGGCACTGGCTAAACCAGTATACTTGTT
TCAGTGTGCGTAACCAAACCTTTGTGGACCTAAACCTCACGGTTCTGGAGGACCGCGAGTTC
TTGCCGCTAGAAGTGTACACGCGCGCCGAGCTCGCCGACACGGGTCTGCTCGACTACAGCGA
ATGGTCCGATGAACACTTTGGATCTTTGATATTCTTTTGAATATTAAAGAGAAGTTGTGTAAAT
CTTACCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGACACCTGCTAAACCAT
AGAAATAAAATTTCTCACCTACATCAATACCTTTAATAGCACTCAAATAAGTTCTTGTAATATCT
GTAGTTTTATTTGTATTTGTATATTTAACATCAGAATAATGCTCTAACCCAAATTCTAATTGATCA
AGCCAAAAATCGTCAAAATGATAACCAAGTCTAATCCCTGGTGCATAACGATTATCCATATCTA
AATTACCTTCAAAGTAAAGTTTTGTGCCATCATTTTCTAAGCTTCTTAAACCTGGTGTCCATCC
TGTTTCCCAAGCAAATACTCTATTTGGAGCATTAGGTAATACCATTGTAGGGTTGTATTTATTAG
ATAAAGAACCAATATAATTGGTGACTCATAATAACTTTACGGATCACATTAAATGTGACATATCA
TTCAAGTTTCTGACCTATCAGCTTTAGACGGTAGGGTATTGGCCTACCCCAGCGGAGCCAGAC
CGAATTTATGGCCTGAAGCACTGATCGATTTCACACGCGGCAGGCGGAAGTCCCAGACGATAT
CCGGGATTCAGTCTGGATCGCGAAAACTGTGGAATTGAGCAGCGTTGGTGGGAAAGCGCGTT
ACAAGAAAGCCGGGCAATTGCTGTGCCAGGCAGTTTTAACGATCAGTTCGCCGATGCAGATAT
TCGTAATTATGTGGGCAACGTCTGGTATCCATACGACACCCCTGATAAACAACCTTAAATGATG
AGTATGCACTACCTGATTTAGTTGATTCCCTACGTAAAATTTCTATTTTAACTTCTTTTTCACCTC
TCTTAAAAAAGTTCTCCAGAAGGTCTTGTATGTGTTTAGTAACCCTAAGCTTCAAATTAATTAA
ATCAAAAACAGTACCGTCAATTCCTGAAAAAGCGTGAAATGCCTGAGGACAATGTCACTCTG
GCGAAAGACTGTATCATTGATAATTTCTTTCAGAAAAGCATCCAGTTTAATTCTTATTCTCTTGA
TATCGAAGAGTTAGATATTAATAAACATAACAATATAAAAACGATGTTACCAGATATAAATATAG
GGTTAGGGCAGTATATAAACAACAATCAATGGTTCTCATCTATTACAGACAGCCATTTTTATTTA
TCATTATCCTATAATCTTCTATCGGCTTATGAAGCAAAAATGACAATTGTCGTGGCATCCTAACT
CACTTAGAATGTCATTTCTCAATTCATTGAATGAATTGGCCATTTTGTACTAATACAAACTGGAT
CGTCTCAAGTATTATCTTTATCATTCACAAAGCTATCCTTGTATTTTACTAACCAAAGAAACTAT
TACTGTTATAATGAGCCGTCCGCAGTAAACAAACAACTGCATCACCAATAACTTCTTGATCACT
TCCTATACCAACAACACTTGCACGTCTCTTCAACTACTTTACTGCTTATTGCTCTACACTATTAG
ACGTTGCGCTCATTACTTCTGAAATGGCATTCTGTGACTTATTGGAATCAGACGCAGACTGGTA
GTAAAACATCACACCGGCAGTAACGGTTGCAGCAAGCGCAAGCACCATTGATCTATGTCGGG
TGCGGAGAAAGAGGTAATGAAATGG

DNA Plasmid 2 (1975 bp):
Restriction Cut Site (PI-SceI): ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGG
Enteropathogenic E. coli eae+
Enterotoxigenic E. coli heat-labile
Enterotoxigenic E. coli STh
Enterotoxigenic E. coli STp
Giardia spp.
Helicobacter pylori
Human-specific HF183 Bacteroides 16S rRNA genetic marker
Human Mitochondrial DNA
Necator americanus
Plesiomonas shigelloides
Salmonella enterica
Shigella spp. And enteroinvasive E. coli
Shiga toxin producing E. coli Stx1
Shiga toxin producing E. coli Stx2
Strongyloides stercoralis
Trichuris trichiura
E. coli ybbW

Yersinia enterocolitica
Restriction Cut Site (PI-SceI): ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGG

ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGGTCCTGATTGGCAAAATCTGGCCGGG
ATTTTTAACTCTCGGTGGTGATTTTACCTTGTTAGGCCTTTCGCTACCGGGCTTAATTACTTTCT
TACTCTTCTGGCTGGTTAACGTTGGTATTGGTTTTGGCGGTGGCAAAGTTTTAAATAAATTCAC
TGCCATTCTTAACCCGTGCATCTATATCGTTTTCGGCGGCATGGCGATTTGGGCGATTTCACTCT
TCATTGATCAGGATTTTTCTGGTGATAATACCCGTTTAGGTATTGGTGGCGAATACTGGCGAGA
CTATTTCAAAAGTAGCGTTAACGGCTATTTCCGCATGAGCGGCCACAACCTTGTGGTGCATGAT
GAATCCAGGGTTCTTCTCTCCAAGCTTGGTGATCCGGTGGGAAACCGCACCCGGTACAAGCA
GGATTACAACACAATTCACAGCAGTAATTGCTACTATTCATGCTTTCAGGACCACTTTTATTACT
TTTTTTTGCAATGTTACATTTTTTTGATTCTAGTGTGATTTTTTCTTTTGAAGACTCTACTGGTTT
AGCATCACAGGCAGGATTACAACAAAGTTCACAGCAGTAAAATGTGTTGTTCATATTTTCTGA
TTTTTTTTCACTGTTGTTTTTTACAACATCACACTTTTTAGTCTCTAATGTAATTTTCTCTTTTGA
AGAGTCAAGTGATTCAGTTGCGGACGGCTCAGGACAACGGTTGCACCCCCCGCGGCGGTCCC
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GCTTTAGTGAGCGCTTTAACTTCCATAGGCTATAATGTGATTCAAATAGGGCCTATGCCTACCCC
TGCGATTGCGTTTTTAACCGAAGACATGCGCTGCGGACCTTCCTCTCAGAACCCCTATCCATC
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TCAGTAGACAGTCCCACCCTCACACGATTCTTTACCTTTCACTTCATCTTGCCCTTCATTATTGC
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GTGAGCCGGTAGCGCCGGTAGCTCAGACCAAAAGTGACCATCCCACCGACGGCGAGACCGA
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TCCGCGTTCCTTGACCGCCTTTCCGATACCGTCTCTGCACGCAATACCTCCGGATTCCGTGATC
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ACAATAATATCTAAATTCTAACGCAGTATAGACTTCTCGACTGCAAAGACGTATGTAGATTCGC
TGAATGTCATTCGCTCTGCAATAGGTACTCCATTACAGACTATTTCATCAGGAGGTACGTCTTT
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CACACCCCACCGGGCAGTTATTTTGCTGTGGATATACGAGGGCTTGATGTCTATCAGGCGCGTT
TTGACCATCGCTTTGAAACGACTTGCTCATCAACTTTCGATGGTACGCTACGTGCTTACCATGG
TGACAACGGTTAACGGAGAATCAGGGTATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAAT
GG

RNA Plasmid 1 (1748 bp):
Restriction Cut Site (PI-SceI): ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGG
T7 Promotor Sequence: TAATACGACTCACTATAG
Astroviridae
Bovine respiratory syncytial virus (BRSV)
Hepatitis A
Hepatitis G
Human Enterovirus
Norovirus GI
Norovirus GII
Poliovirus
Rotavirus
Sapovirus I, II, IV, V
SARS-CoV-2
Restriction Cut Site (PI-SceI): ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGG

ATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGGTAATACGACTCACTATAGTACCAGTT
GCTTGCTGCGTTCATGGCAGAAGACCATCCTTTTAAAGTGTATGTGGAACACTGCCTGTCACG
GACTGCTAAGCAGCTTCGTGATTCTGGTCTCCCGGCCAGACTCACAGAAGAGCAACTCCATC
GCATTTGGAGGGGAGGACCAAAGAAGTGTGATGGCTAGCAAGCCCATAGGCAATGCTGCAGG
ACTAGGTATAATGGGTGAGTATAGAGGTACACCAAGAAACCAAGACTTGTATGATGCTGCCAA
AGCATATGCAGAACAACTAAAAGAGAATGGGGTCATCAATTACAGTGTATTTAACACTGAACC
AGAAGAAGCCATACAAACTCGCACAGTGATAAATCAACACGGTGTATCCGAAACTCTAGTGG
AAAATTTTCTCAGTAGAGCAGCTTTGGTGTACCTCACCGCCGTTTGCCTAGGCTATAGGCTAA
ATTTTCCCTTCCCCTTTCCCTTCCCTATTCCCTTTATTTTGTTTGTAAATATTAATTCCTGCAGGT
TCAGGGTTCTCAAATCTGTTTCTCTATAAGAACACTCATTTTTCACGCTTTCTGTCTTCTTTCTT
CCAGGGCTCTCCCCTGACCGGCCAAAAGGTGGTGGATGGGTGATGCCAGGGTTGGTAGGTCG
TAAATCCCGGTCATCTTGGTAGCCACTATAGGTGGGTCTTAAGGGTTAGTCAAGGTCCCTCTGG
CGCTTGTGGCGAGAAGCGCACGGTCCACAGGTGTTGGCCCTACCGGTGTGAATAAGGGCCCG
ACGTCAGGCTCGTCGTTATTCCGCTGGATGCGATTCCATGATCTAAGTTTGTGGACAGGAGATC
GCGATCTCCTGCCCGATTATGTAAATGATGATGGCGTCTAAGGACAGACAAGAGGCCATGTTC
AGATGGATGAGATTCTCTGACCTCAGCACATGGGAGGGCGATCGCAATCTTGCTCCCGAGGGT
GTGAATGAAGATGGCGTCGAATGACAAGCACTTCTGTTTCCCCGGTGATGTTGTATAGACTGC
TTGCGTGGTTGAAAGCGACGGATCCGTTATCCGCTTATGTACTTCGAGAAGCCCAGTACCACC
TCGGAATCTTCGATGCGTTGCGCTCAGCACTCAACCCCAGAGTGTAGCTTAGGCTGATGAGTC
TGGACATCCCTCACCGGTGACGGTGGTCCAGGCTGCGTTGGCGGCCTACCTATGGCTAACGCC
ATGGGACGCTAGTTGTGAACAAGGTGTGAAGAGCCTATTGAGCTACATAAGAATCCTCCGGCC
CCTGAATGCGGCTAATCCCAACCTCGGGGCAGGTGGTCACAAACCAGTGATTGGCCTGTCGT
AACGCGCAAGTCCGTGGCGGAACCGACTACTTTGGGTGTCCGTGTTTTAACCATCTACACATG
ACCCTCTATGAGCACAATAGTTAAAAGCTAACACTGTCAAAAACCTAAATGGCTATAGGGGCG
TTATGTGACCTATGACCAGGCTCTCGCCACCTACAATGCTTGGTTCATAGGTGGTACAGTGCCT
GACCCAGTGGGTCACACTGAAGGGACCCACAAAATAGTGTTTGAGATGGAGGGCAAATGGA
CCCCAAAATCAGCGAAATGCACCCCGCATTACGTTTGGTGGACCCTCAGATTCAACTGGCAGT
AACCAGAATGATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGG

Supplement 10: Standard curves

Target	QS7 Number	Slope	y-intercept	R^2	Efficiency
16s	one	-2.966	33.683	0.982	2.173
Acanthamoeba spp.	one	-3.217	34.741	0.995	2.046
Adenovirus 40/41	one	-3.125	34.079	0.977	2.089
Ancylostoma duodenale	one	-3.133	36.384	0.989	2.085
Ascaris lumbricoides	one	-3.105	35.000	0.974	2.099
Astroviridae	one	-3.110	35.319	0.992	2.097
Balantidium coli	one	-3.215	35.832	0.992	2.046
Bovine herpesvirus (BHV)	one	-3.236	35.532	0.984	2.037
Blastocystis spp.	one	-3.280	37.459	0.977	2.018
Bovine respiratory syncytial virus (BRSV)	one	-3.302	36.641	0.989	2.008
Campylobacter jejuni/coli	one	-3.176	35.502	0.984	2.065
Clostridioides difficile	one	-3.250	34.875	0.988	2.031
Cryptosporidium spp.	one	-3.241	35.235	0.981	2.035
Enteroaggregative *E. coli* aaiC	one	-3.232	34.306	0.987	2.039
Enteroaggregative *E. coli* aatA	one	-3.489	34.725	0.938	1.935
Enteropathogenic *E. coli* bfpA+	one	-3.252	34.807	0.990	2.030
Enteropathogenic *E. coli* eae+	one	-3.347	36.318	0.995	1.990
E. coli gadA/B	one	-3.319	35.843	0.979	2.001
Enterotoxigenic *E. coli* heat-labile	one	-3.176	35.096	0.987	2.065
E. coli O157:H7/H-serotype	one	-3.126	36.573	0.968	2.089
Enterotoxigenic *E. coli* STh	one	-3.107	35.626	0.981	2.098
Enterotoxigenic *E. coli* STp	one	-3.317	35.224	0.989	2.002
E. coli ybbW	one	-3.287	36.120	0.992	2.015
Entamoeba histolytica	one	-3.034	36.445	0.983	2.136

Enterobius vermicularis	one	-3.302	36.255	0.992	2.008
Giardia spp.	one	-3.392	35.584	0.993	1.972
Helicobacter pylori	one	-3.420	35.764	0.989	1.961
Hepatitis A	one	-3.109	35.255	0.926	2.097
Hepatitis G	one	-3.080	34.924	0.971	2.112
Human-specific HF183 Bacteroides 16S rRNA genetic marker	one	-3.308	36.094	0.993	2.006
Human Enterovirus	one	-3.182	36.019	0.988	2.062
Human Mitochondrial DNA	one	-3.289	35.523	0.984	2.014
Necator americanus	one	-3.246	38.050	0.988	2.033
Norovirus GI	one	-3.158	37.519	0.992	2.073
Norovirus GII	one	-3.072	35.111	0.983	2.116
Plesiomonas shigelloides	one	-3.239	35.210	0.981	2.036
Poliovirus	one	-3.559	35.846	0.988	1.910
Rotavirus	one	-3.154	37.009	0.987	2.075
Salmonella enterica	one	-3.391	35.987	0.974	1.972
Sapovirus I, II, IV, V	one	-3.028	34.454	0.995	2.139
SARS-CoV-2	one	-3.097	35.122	0.992	2.103
Shiga toxin producing *E. coli* Stx1	one	-3.215	36.618	0.982	2.047
Shiga toxin producing *E. coli* Stx2	one	-3.251	36.192	0.983	2.030
Shigella spp. and enteroinvasive *E. coli*	one	-3.363	35.555	0.976	1.983
Strongyloides stercoralis	one	-3.220	35.632	0.991	2.045
Trichuris trichiura	one	-3.321	36.504	0.993	2.000
16s	two	-2.995	33.816	0.971	2.157
Acanthamoeba spp.	two	-3.210	34.703	0.992	2.049
Adenovirus 40/41	two	-3.132	33.997	0.987	2.086
Ancylostoma duodenale	two	-3.162	36.393	0.991	2.072
Ascaris lumbricoides	two	-3.077	34.711	0.982	2.114
Astroviridae	two	-3.011	34.776	0.970	2.148
Balantidium coli	two	-3.267	35.970	0.992	2.023
Bovine herpesvirus (BHV)	two	-3.198	35.279	0.990	2.054

Blastocystis spp.	two	-3.301	37.754	0.979	2.009
Bovine respiratory syncytial virus (BRSV)	two	-3.263	36.399	0.986	2.025
Campylobacter jejuni/coli	two	-3.263	35.843	0.989	2.025
Clostridioides difficile	two	-3.240	34.867	0.997	2.036
Cryptosporidium spp.	two	-3.239	35.174	0.987	2.036
Enteroaggregative *E. coli* aaiC	two	-3.284	34.658	0.988	2.016
Enteroaggregative *E. coli* aatA	two	-3.369	34.089	0.991	1.981
Enteropathogenic *E. coli* bfpA+	two	-3.300	35.106	0.990	2.009
Enteropathogenic *E. coli* eae+	two	-3.440	36.690	0.993	1.953
E. coli gadA/B	two	-3.220	35.744	0.987	2.044
Enterotoxigenic *E. coli* heat-labile	two	-3.326	35.684	0.992	1.998
E. coli O157:H7/H-serotype	two	-3.198	36.900	0.981	2.055
Enterotoxigenic *E. coli* STh	two	-3.375	36.568	0.988	1.978
Enterotoxigenic *E. coli* STp	two	-3.462	35.565	0.992	1.945
E. coli ybbW	two	-3.241	36.093	0.996	2.035
Entamoeba histolytica	two	-3.182	36.738	0.969	2.062
Enterobius vermicularis	two	-3.218	35.959	0.992	2.045
Giardia spp.	two	-3.282	35.218	0.991	2.017
Helicobacter pylori	two	-3.160	35.094	0.965	2.072
Hepatitis A	two	-3.249	35.521	0.977	2.031
Hepatitis G	two	-2.915	34.613	0.964	2.203
Human-specific HF183 Bacteroides 16S rRNA genetic marker	two	-3.348	36.176	0.992	1.989
Human Enterovirus	two	-3.121	35.999	0.996	2.091
Human Mitochondrial DNA	two	-3.560	36.312	0.979	1.910

Necator americanus	two	-3.308	38.501	0.996	2.006
Norovirus GI	two	-3.207	37.176	0.938	2.050
Norovirus GII	two	-3.074	35.028	0.972	2.115
Plesiomonas shigelloides	two	-3.252	35.438	0.994	2.030
Poliovirus	two	-3.435	35.625	0.963	1.955
Rotavirus	two	-3.089	36.810	0.990	2.108
Salmonella enterica	two	-3.284	35.847	0.992	2.016
Sapovirus I, II, IV, V	two	-3.033	34.382	0.986	2.136
SARS-CoV-2	two	-3.393	36.032	0.978	1.971
Shiga toxin producing *E. coli* Stx1	two	-3.202	36.968	0.992	2.053
Shiga toxin producing *E. coli* Stx2	two	-3.233	36.258	0.992	2.038
Shigella spp. and enteroinvasive *E. coli*	two	-3.223	35.385	0.993	2.043
Strongyloides stercoralis	two	-3.284	35.907	0.989	2.016
Trichuris trichiura	two	-3.417	36.774	0.995	1.962

Supplement 11: 90%, 95%, and 99% LOD and LOQ

Target	Q7S Number	LOD 90% (gene copies/template)	LOD 95% (gene copies/template)	LOD99 (gene copies/template)	LOQ (gene copies/template)
16s	one	0.000	0.000	0.000	0.000
Acanthamoeba spp.	one	6.760	11.017	27.536	11.017
Adenovirus 40/41	one	2.918	4.474	9.974	7.743
Ancylostoma duodenale	one	1.382	1.448	1.579	2.492
Ascaris lumbricoides	one	3.122	5.177	13.369	5.177
Astroviridae	one	2.960	3.764	5.907	6.187
Balantidium coli	one	2.148	2.987	5.545	2.987
Bovine herpesvirus (BHV)	one	3.802	5.445	10.680	5.445
Blastocystis spp.	one	3.699	6.936	22.555	6.936
Bovine respiratory syncytial virus (BRSV)	one	9.596	16.850	48.448	16.850
Campylobacter jejuni/coli	one	3.339	6.727	25.039	6.727
Clostridioides difficile	one	6.168	12.008	41.908	12.008
Cryptosporidium spp.	one	4.533	7.958	22.871	7.958
Enteroaggregative *E. coli* aaiC	one	2.750	3.265	4.504	7.743

Enteroaggregative *E. coli* aatA	one	2.773	4.193	9.106	4.193
Enteropathogenic *E . coli* bfpA+	one	3.534	5.760	14.395	5.760
Enteropathogenic *E . coli* eae+	one	15.879	30.610	104.844	30.610
E. coli gadA/B	one	4.804	9.125	30.395	9.125
Enterotoxigenic *E. coli* heat-labile	one	9.449	16.155	44.176	16.155
E. coli O157:H7/H-serotype	one	5.452	10.840	39.337	10.840
Enterotoxigenic *E. coli* STh	one	19.985	35.864	107.408	35.864
Enterotoxigenic *E. coli* STp	one	5.598	8.642	19.516	8.642
E. coli ybbW	one	4.074	4.237	4.561	6.718
Entamoeba histolytica	one	3.418	5.180	11.300	5.180
Enterobius vermicularis	one	1.924	3.361	9.572	3.361
Giardia spp.	one	7.001	10.482	22.346	10.482
Helicobacter pylori	one	9.900	16.274	41.342	16.274
Hepatitis A	one	7.887	14.823	48.406	14.823
Hepatitis G	one	8.893	14.824	38.666	14.824

Human-specific HF183 Bacteroides 16S rRNA genetic marker	one	13.161	19.759	42.349	19.759
Human Enterovirus	one	2.272	2.804	4.160	6.187
Human Mitochondrial DNA	one	6.061	11.175	35.205	11.175
Necator americanus	one	16.937	28.643	76.750	28.643
Norovirus GI	one	6.145	11.219	34.698	11.219
Norovirus GII	one	6.250	9.099	18.408	16.825
Plesiomonas shigelloides	one	4.074	4.237	4.561	6.718
Poliovirus	one	1.311	1.489	1.891	6.187
Rotavirus	one	6.608	10.549	25.371	10.549
Salmonella enterica	one	7.046	12.350	35.389	12.350
Sapovirus I, II, IV, V	one	4.846	6.825	12.977	16.825
SARS-CoV-2	one	7.428	12.332	31.916	12.332
Shiga toxin producing *E. coli* Stx1	one	16.937	28.643	76.750	28.643
Shiga toxin producing *E. coli* Stx2	one	20.438	38.146	122.977	38.146
Shigella spp. and enteroinvasive *E. coli*	one	9.757	14.612	31.164	14.612

Strongyloides stercoralis	one	9.546	16.919	49.499	16.919
Trichuris trichiura	one	7.788	13.440	37.400	13.440
16s	two	0.000	0.000	0.000	0.000
Acanthamoeba spp.	two	3.991	6.464	15.971	6.464
Adenovirus 40/41	two	5.529	10.523	35.183	10.523
Ancylostoma duodenale	two	3.865	6.892	20.400	6.892
Ascaris lumbricoides	two	1.382	1.448	1.579	2.492
Astroviridae	two	3.080	4.464	8.956	6.187
Balantidium coli	two	3.865	6.892	20.400	6.892
Bovine herpesvirus (BHV)	two	6.870	11.942	33.690	11.942
Blastocystis spp.	two	1.980	2.989	6.476	2.989
Bovine respiratory syncytial virus (BRSV)	two	1.342	1.584	2.165	6.187
Campylobacter jejuni/coli	two	3.483	5.998	16.624	5.998
Clostridioides difficile	two	2.676	5.062	16.735	5.062
Cryptosporidium spp.	two	3.802	5.445	10.680	5.445

Enteroaggregative *E. coli* aaiC	two	6.692	11.439	31.271	11.439
Enteroaggregative *E. coli* aatA	two	3.213	5.041	11.739	7.743
Enteropathogenic *E. coli* bfpA+	two	3.445	6.541	21.775	6.541
Enteropathogenic *E. coli* eae+	two	9.547	16.611	46.945	16.611
E. coli gadA/B	two	4.222	6.589	15.185	6.589
Enterotoxigenic *E. coli* heat-labile	two	4.831	7.820	19.297	7.820
E. coli O157:H7/H- serotype	two	4.533	7.958	22.871	7.958
Enterotoxigenic *E. coli* STh	two	17.231	36.587	150.233	36.587
Enterotoxigenic *E. coli* STp	two	8.846	14.148	34.138	14.148
E. coli ybbW	two	9.811	14.805	32.036	14.805
Entamoeba histolytica	two	2.648	4.418	11.543	4.418
Enterobius vermicularis	two	1.332	1.399	1.534	2.492
Giardia spp.	two	21.654	43.524	161.238	43.524

Helicobacter pylori	two	12.381	24.418	87.293	24.418
Hepatitis A	two	2.272	2.804	4.160	6.187
Hepatitis G	two	1.321	1.378	1.490	6.187
Human-specific HF183 Bacteroides 16S rRNA genetic marker	two	8.890	13.025	26.660	13.025
Human Enterovirus	two	1.311	1.489	1.891	6.187
Human Mitochondrial DNA	two	13.430	24.230	73.293	33.986
Necator americanus	two	8.846	14.148	34.138	14.148
Norovirus GI	two	2.272	2.804	4.160	6.187
Norovirus GII	two	10.366	20.788	76.684	20.788
Plesiomonas shigelloides	two	13.413	25.852	88.529	25.852
Poliovirus	two	5.666	9.500	25.041	9.500
Rotavirus	two	1.392	1.455	1.582	6.187
Salmonella enterica	two	3.771	5.212	9.562	6.718
Sapovirus I, II, IV, V	two	8.610	15.399	45.823	16.825
SARS-CoV-2	two	5.655	9.944	28.674	9.944
Shiga toxin producing *E. coli* Stx1	two	8.985	13.813	30.954	13.813
Shiga toxin producing *E. coli* Stx2	two	7.175	12.062	31.960	12.062

Shigella spp. and enteroinvasive *E. coli*	two	13.911	23.214	60.663	23.214
Strongyloides stercoralis	two	9.507	17.326	53.417	17.326
Trichuris trichiura	two	6.414	8.178	12.900	33.986

Supplement 12: Minimum information for publication of quantitative real-time PCR experiments

ITEM TO CHECK	IMPORTANCE	CHECKLIST
EXPERIMENTAL DESIGN		
Definition of experimental and control groups	**E**	A cross-sectional study with no experimental or control groups.
Number within each group	**E**	We collected 282 soil samples, 100 wastewater samples, and 24 surface water samples.
Assay carried out by core lab or investigator's lab?	D	Investigator's lab
Acknowledgement of authors' contributions	D	See acknowledgement section.
SAMPLE		
Description	**E**	Around 0.25 g of each soil and 0.405-0.2 g of the solid wastewater was extracted directly from samples. 100 mL of each surface water and between 150-0.25 mL of liquid wastewater was filtered through a Millipore HA membrane then extracted.
Volume/mass of sample processed	D	Exact volumes processed can be found in Appendix B.
Microdissection or macrodissection	**E**	NA
Processing procedure	**E**	See methods section. Exact processing procedure can be found in supplemental table Appendix B.
If frozen - how and how quickly?	**E**	On the day we collected each sample was frozen at -20°C for up to two weeks, transported on ice to the University of Alabama and stored there at -80°C for up to 9 months, transported on dry ice to the UNC, and finally stored at -80°C.
If fixed - with what, how quickly?	**E**	Samples were stored in Zymo DNA/RNA shield within 8 hours of collection.

Sample storage conditions and duration (especially for FFPE samples)	**E**	Samples were stored at -20°C for up to two weeks and -80°C for up to one year.
NUCLEIC ACID EXTRACTION		
Procedure and/or instrumentation	**E**	See methods section.
Name of kit and details of any modifications	**E**	ZymoBIOMICS DNA/RNA Miniprep Kit
Source of additional reagents used	D	NA
Details of DNase or RNAse treatment	**E**	NA
Contamination assessment (DNA or RNA)	**E**	We included one negative extraction control for each group of extractions.
Nucleic acid quantification	**E**	Qubit High Sensitivity dsDNA and Qubit RNA High Sensitivity
Instrument and method	**E**	Qubit 4 Fluorometer
Purity (A260/A280)	D	Not measured
Yield	D	See Appendix B.
RNA integrity method/instrument	**E**	Not measured
RIN/RQI or Cq of 3' and 5' transcripts	**E**	NA
Electrophoresis traces	D	NA
Inhibition testing (Cq dilutions, spike or other)	**E**	We spiked hepatitis G and measured amplification as inhibition control
REVERSE TRANSCRIPTION		
Complete reaction conditions	**E**	One-step reverse transcription
Amount of RNA and reaction volume	**E**	1.5 uL
Priming oligonucleotide (if using GSP) and concentration	**E**	Included in TAC.
Reverse transcriptase and concentration	**E**	Included in TAC.
Temperature and time	**E**	45°C for 20 minutes
Manufacturer of reagents and catalogue numbers	D	AgPath-ID™ One-Step RT-PCR Reagents
Cqs with and without RT	D*	40
Storage conditions of cDNA	D	2-8°C
qPCR TARGET INFORMATION		
If multiplex, efficiency and LOD of each assay.	**E**	See Appendix B.
Sequence accession number	**E**	See Appendix B.
Location of amplicon	D	See Appendix B.

Amplicon length	**E**	See Appendix B.
In silico specificity screen (BLAST, etc)	**E**	We put all assays through BLAST to confirm specificity
Pseudogenes, retropseudogenes or other homologs?	D	We put all assays through BLAST to identify potential pseudogenes, retropseudogenes or other homologs.
Location of each primer by exon or intron (if applicable)	**E**	NA
What splice variants are targeted?	**E**	NA
qPCR OLIGONUCLEOTIDES		
Primer sequences	**E**	See Appendix B.
RTPrimerDB Identification Number	D	NA
Probe sequences	D**	See Appendix B.
Location and identity of any modifications	**E**	No modifications
Manufacturer of oligonucleotides	D	ThermoFisher Scientific
Purification method	D	NA
qPCR PROTOCOL		
Complete reaction conditions	**E**	45°C for 20 minutes and 94°C for 10 minutes, followed by 45 cycles of 95°C for 15 seconds and 60°C for 1 minute, with a ramp rate of 1°C/second between each step
Reaction volume and amount of cDNA/DNA	**E**	34 uL of template and 68 uL of AgPath-ID™ One-Step RT-PCR Reagents
Primer, (probe), Mg++ and dNTP concentrations	**E**	All assays included 900 nanomolar of primers and 250 nanomolar of probe.
Polymerase identity and concentration	**E**	AmpliTaq Gold™ DNA Polymerase
Buffer/kit identity and manufacturer	**E**	AgPath-ID™ One-Step RT-PCR Reagents
Exact chemical constitution of the buffer	D	Not avalible from ThermoFisher Scientific
Additives (SYBR Green I, DMSO, etc.)	**E**	NA
Manufacturer of plates/tubes and catalog number	D	ThermoFisher Scientific

Complete thermocycling parameters	**E**	45°C for 20 minutes and 94°C for 10 minutes, followed by 45 cycles of 95°C for 15 seconds and 60°C for 1 minute, with a ramp rate of 1°C/second between each step
Reaction setup (manual/robotic)	D	We manually step up in a dead air hood that was disinfected with 10% for 10 minutes, cleaned with 70% ethanol, and UVd for 15 minutes before use
Manufacturer of qPCR instrument	**E**	ThermoFisher Scientific
qPCR VALIDATION		
Evidence of optimisation (from gradients)	D	Liu et al. 2013 and Liu et al. 2016
Specificity (gel, sequence, melt, or digest)	**E**	Liu et al. 2013 and Liu et al. 2016
For SYBR Green I, Cq of the NTC	**E**	NA
Standard curves with slope and y-intercept	**E**	See Appendix B.
PCR efficiency calculated from slope	**E**	See Appendix B.
Confidence interval for PCR efficiency or standard error	D	Not reported
r2 of standard curve	**E**	See Appendix B.
Linear dynamic range	**E**	See Appendix B.
Cq variation at lower limit	**E**	See Appendix B.
Confidence intervals throughout range	D	Not reported
Evidence for limit of detection	**E**	See Appendix B.
If multiplex, efficiency and LOD of each assay.	**E**	NA
DATA ANALYSIS		
qPCR analysis program (source, version)	**E**	QuantStudio(TM) 7 Flex System
Cq method determination	**E**	Automatically with the QuantStudio Design and Analysis Software
Outlier identification and disposition	**E**	Amplification curves were visually assessed for quality control and we flagged and removed outliers.
Results of NTCs	**E**	We observed no amplification before the LOD in any our negative controls.
Justification of number and choice of reference genes	**E**	NA

Description of normalization method	**E**	We normalized by volume (mL) for surface water samples and mass (gram) for soil. We normalized by nucleic acid quantification for wastewater
Number and concordance of biological replicates	D	We collected every sample in duplicate
Number and stage (RT or qPCR) of technical replicates	**E**	Targets were analyzed as single reactions on TaqMan Array Cards without technical qPCR replicates.
Repeatability (intra-assay variation)	E	NA
Reproducibility (inter-assay variation, %CV)	D	NA
Power analysis	D	NA
Statistical methods for result significance	**E**	See methods section.
Software (source, version)	E	R Studio 2026.01.1+403
Cq or raw data submission using RDML	**D**	Available at https://osf.io/9te2c/

Supplement 13: Sanitation Infrastructure Category for all Enrolled Households

Visit one: August 5th, 2024 - November 8th, 2024		
	Value	(%)
Sewerage	10	19%
On-site	24	46%
Direct Discharge	18	35%
Visit two: November 20th, 2024 - February 11th, 2025		
	Value	(%)
Sewerage	10	19%
On-site	21	40%
Direct Discharge	21	40%
Visit three: February 24th, 2025 - May 17th 2025		
	Value	(%)
Sewerage	10	19%
On-site	20	38%
Direct Discharge	22	42%
All visits combined: August 5th, 2024 - May 17th, 2025		
	Value	(%)
Sewerage	30	19%
On-site	65	42%
Direct Discharge	61	39%

Supplement 14: Prevalence and Concentration of Organisms and Gene Copies per g of Soil

All Visits									
	Sewerage			On-site			Direct Discharge		
Target	Value	Mean (organism/g)	95% CI for mean (organism/g)	Value	Mean (organism/g)	95% CI for mean (organism/g)	Value	Mean (organism/g)	95% CI for mean (organism/g)
Helminths									
Ancylostoma duodenale	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Ascaris lumbricoides	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Enterobius vermicularis	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Necator americanus	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Strongyloides stercoralis	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Trichuris trichiura	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Virus									
Adenovirus 40/41	0/30	<LOD	<LOD	0/130	<LOD	<LOD	1/122	6.87E+01	(0, 2.05E+02)
Astroviridae	0/30	<LOD	<LOD	0/130	<LOD	<LOD	1/122	6.91E+01	(0, 2.06E+02)
Hepatitis A	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Human Enterovirus	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Norovirus GI	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Norovirus GII	0/30	<LOD	<LOD	2/130	2.89E+02	(0, 6.92E+02)	2/122	4.24E+02	(0, 1.04E+03)
Rotavirus	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Poliovirus	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Sapovirus I, II, IV, V	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
SARS-CoV-2	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Bacteria									
Campylobacter jejuni/coli	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Clostridium difficile	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
E. coli O157:H7	0/30	<LOD	<LOD	0/130	<LOD	<LOD	1/122	2.84E+01	(0, 8.36E+01)
Enteroaggregative *E. coli* aaiC	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Enteroaggregative *E. coli* aatA	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD

Enteropathogenic *E. coli* bfpA+	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Enteropathogenic *E. coli* eae+	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Enterotoxigenic *E. coli* heat-labile	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Enterotoxigenic *E. coli* STh	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Enterotoxigenic *E. coli* STp	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Helicobacter pylori	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Plesiomonas shigelloides	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Salmonella enterica	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Shiga toxin producing *E. coli* Stx1	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Shiga toxin producing *E. coli* Stx2	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Shigella spp. and enteroinvasive *E. coli*	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
General *E.coli*									
E. coli gadA/B	1/30	7.74E+02	(0, 2.36E+03)	1/130	2.55E+01	(0, 7.60E+01)	19/122	9.39E+03	(2.53E+03, 1.62E+04)
E. coli ybbW	0/30	<LOD	<LOD	0/130	<LOD	<LOD	14/122	6.55E+03	(1.09E+03, 1.20E+04)
Target	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)
MST Markers									
Human Mitochondrial DNA	0/30	<LOD	<LOD	8/130	3.87E+02	(3.77E+01, 7.37E+02)	27/122	1.63E+04	(8.37E+03, 2.43E+04
Human-specific HF183 *Bacteroides* 16S rRNA genetic marker	0/30	<LOD	<LOD	7/130	6.25E+03	(1.89E+02, 1.23E+04)	33/122	1.06E+06	(0.00, 2.27E+06)
Protozoan									

Acanthamoeba spp.	28/29	2.60E+05	(1.45E+05, 3.74E+05)	127/130	3.11E+05	(2.27E+05, 3.95E+05)	118/122	2.90E+05	(2.20E+05,3.59E+05)
Balantidium coli	29/29	1.35E+06	(1.91E+05, 2.51E+06)	129/130	5.06E+06	(1.51E+06, 8.62E+06)	118/122	6.06E+06	(3.58E+06, 8.53E+06)
Blastocystis spp.	15/30	1.28E+04	(0.00E+00, 2.61E+04)	102/130	1.67E+05	(0.00, 3.56E+05)	100/122	2.18E+05	(1.02E+05, 3.33E+05)
Cryptosporidium spp.	29/30	3.26E+02	(0.00E+00, 9.94E+02)	29/130	3.85E+03	(1.83E+03, 5.88E+03)	28/122	4.66E+03	(2.31E+03, 7.00E+03)
Entamoeba histolytica	0/30	<LOD	<LOD	0/130	<LOD	<LOD	0/122	<LOD	<LOD
Giardia spp.	0/30	<LOD	<LOD	0/130	<LOD	<LOD	3/122	3.31E+02	(0.00, 8.06E+02)

Supplement 15: Prevalence and Concentration of Organisms and Gene Copies per L of Wastewater

All Visits									
	Sewerage			On-site			Direct Discharge		
Target	Value	Mean (organism/g)	95% CI for mean (organism/g)	Value	Mean (organism/g)	95% CI for mean (organism/g)	Value	Mean (organism/g)	95% CI for mean (organism/g)
Helminths									
Ancylostoma duodenale	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Ascaris lumbricoides	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Enterobius vermicularis	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Necator americanus	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Strongyloides stercoralis	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Trichuris trichiura	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Virus									
Adenovirus 40/41	5/27	8.38E+03	(0.00, 2.01E+04)	0/15	<LOD	<LOD	1/58	1.85E+05	(0.00, 5.56E+05)
Astroviridae	10/27	2.11E+04	(2.60E+03 , 3.95E+04)	0/15	<LOD	<LOD	1/58	9.24E+04	(0.00, 2.77E+05)
Hepatitis A	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Human Enterovirus	2/27	2.30E-01	(0.00, 5.60E-01)	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Norovirus GI	12/27	3.25E+05	(0.00, 7.30E+05)	1/15	5.86E+02	(0, 1.84E+03)	2/58	1.57E+05	(0.00, 4.70E+05)
Norovirus GII	9/27	2.27E+04	(0.00, 4.70E+04)	3/15	6.01E+05	(0, 1.85E+06)	2/58	5.30E+05	(0,00, 1.59E+06)
Rotavirus	3/27	4.47E+02	(0.00, 1.37E+03)	2/15	1.53E+06	(0, 4.82E+06)	0/58	<LOD	<LOD
Poliovirus	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Sapovirus I, II, IV, V	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
SARS-CoV-2	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Bacteria									
Campylobacter jejuni/coli	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Clostridium difficile	0/27	<LOD	<LOD	0/15	<LOD	<LOD	1/58	6.95E+03	(0.00, 2.09E+04)
E. coli O157:H7	18/27	2.10E+05	(0.00, 4.99E+05)	4/15	5.81E+03	(1.38E+02 , 1.15E+04)	26/58	2.70E+07	(0.00, 7.97E+07)
Enteroaggregative *E. coli* aaiC	11/27	2.50E+04	(5.70E+03 , 4.42E+04)	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Enteroaggregative *E. coli* aatA	12/27	3.44E+04	(1.85E+03 , 6.69E+04)	0/15	<LOD	<LOD	2/58	8.58E+02	(0.00, 2.30E+03)
Enteropathogenic E. coli bfpA+	9/27	1.33E+04	(6.90E+02 , 2.59E+04)	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Enteropathogenic E. coli eae+	16/27	1.45E+05	(5.89E+04 , 2.31E+05)	2/15	1.91E+06	(0.00, 5.99E+06)	0/58	<LOD	<LOD
Enterotoxigenic E. coli heat-labile	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Enterotoxigenic E. coli STh	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Enterotoxigenic E. coli STp	4/27	3.08E+04	(0.00, 6.57E+04)	0/15	<LOD	<LOD	0/58	<LOD	<LOD

Helicobacter pylori	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/122	<LOD	<LOD
Plesiomonas shigelloides	1/27	1.24	(0.00, 2.61E+00)	0/15	<LOD	<LOD	3/58	5.73E+04	(0.00, 1.70E+05)
Salmonella enterica	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Shiga toxin producing *E. coli* Stx1	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Shiga toxin producing *E. coli* Stx2	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Shigella spp. and enteroinvasive *E. coli*	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
General *E.coli*									
E. coli gadA/B	27/27	6.35E+06	(2.35E+06 , 1.03E+07)	15/15	1.18E+07	(0.00, 2.50E+07)	52/58	9.20E+07	(1.84E+07, 1.66E+08)
E. coli ybbW	27/27	5.21E+06	(2.33E+06 , 8.10E+06)	14/15	7.63E+06	(2.47E+04 , 1.52E+07)	51/58	1.32E+08	(0.00, 3.08E+08)
Target	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)	Value	Mean (gene copies/g)	95% CI for mean (gene copies/g)
MST Markers									
Human Mitochondrial DNA	27/27	5.41E+06	(2.04E+06 , 8.77E+06)	14/15	8.14E+08	(0.00, 1.74E+09)	51/58	3.66E+08	(5.545, 6.934)
Human-specific HF183 *Bacteroides* 16S rRNA genetic marker	27/27	6.25E+08	(2.11E+08 , 1.04E+09)	12/15	1.01E+07	(0.00, 2.14E+07)	50/58	2.77E+10	(0.00, 6.94E+10)
Protozoan									
Acanthamoeba spp.	21/27	5.77E+05	(1.97E+05 , 9.57E+05)	15/15	8.70E+09	(0.00, 2.67E+10)	45/57	8.48E+07	(0.00, 1.99E+08)
Balantidium coli	27/27	9.68E+09	(1.64E+09 , 1.77E+10)	11/15	2.38E+08	(0.00, 7.25E+08)	47/56	8.96E+08	(0.00, 2.03E+09)
Blastocystis spp.	26/27	1.86E+07	(8.45E+06 , 2.87E+07)	5/15	3.97E+04	(0.00, 9.14E+04)	39/58	4.92E+06	(0.00, 1.12E+07)
Cryptosporidium spp.	18/27	1.26E+08	(0.00, 2.62E+08)	3/15	6.28E+03	(0.00, 1.62E+04)	20/58	7.60E+06	(0.00, 2.16E+070)
Entamoeba histolytica	0/27	<LOD	<LOD	0/15	<LOD	<LOD	0/58	<LOD	<LOD
Giardia spp.	10/27	2.56E+04	(8.38E+03 , 4.28E+04)	0/15	<LOD	<LOD	0/58	<LOD	<LOD