Lower Passaic River Porewater Generation Procedure Detail

PREPARED FOR: Mark Stinnett/GNV

COPY TO: Roger McCready/DAY Jennifer Wilkie/CHC

:D BY: CH2M Hill Applied Sciences Laboratory

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PROJECT NUMBER:

Porewater, or Interstitial water, will be generated from 2 foot core sections provided to CH2M Hill's Applied Sciences Laboratory that will be sent off for analysis of polychlorinated dibenzodioxins / polychlorinated dibenzofurans (PCDD/PCDF), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), total organic carbon (TOC), and dissolved organic carbon (DOC) following CH2M Hill ASL SOP SVO50 (*Standard Operating Procedure for the Ex-Situ Extraction of Interstitial Water from Sediment Samples*). Porewater for analysis of mercury species will be prepared at the laboratory performing this analysis (Brooks Rand Labs).

The porewater will be generated by centrifugation of the homogenized core samples with the resulting porewater filtered through a 0.7 micron glass fiber filter (Whatman glass microfiber filter, Grade GF/F, or equivalent) prior to being composited and then subsampled. The resulting subsamples will be shipped to the appropriate laboratories for further analysis.

Porewater Generation Procedure Details

The following describes details specific to the porewater generation for the Lower Passaic core samples and may represent changes for the standard laboratory SOP.

Sample Preparation

Each sample, consisting of multiple cores, will be processed in a single batch to negate any cross-contamination of samples.

All tools utilized during sample processing will be precleaned, solvent, and ASTM Type I water rinsed prior to use and between samples.

Each core sample will be opened over a precleaned tray to capture any free water released as the core section is removed from the core sleeve. Large artifacts will be manually removed and documented.

The samples will be homogenized by placing each core into a precleaned stainless steel bowl and mixing the sample with a precleaned stainless steel spatula or similar tools. The homogenized samples will be partitioned into 500 mL centrifuge bottles.

Centrifugation

Once the centrifuge bottles have been filled with sediment and balanced they will be placed into the Sorvall Instruments RC-3B Refrigerated Centrifuge.

The centrifuge will be programmed to maintain a internal temperature of 4 °C during the time that porewater is being generated.

Each set of centrifuge bottles containing sediment samples will be centrifuged at a target speed of 5000 rpms (but not lower than 3000 rpms).

Specific Operating Parameters. The specific operating parameters for each sample will be determined by the initial set of bottles centrifuged. This first set of bottles will be centrifuged for a total time of 15 minutes. The speed achieved for this initial set will be the target speed for all subsequent centrifuging with an allowance of 10% deviation in speed between sets of bottles.

At the end of the first 15 minute centrifuge period the overlying water will be decanted and measured using a pre-

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cleaned graduated cylinder. These vessels will be placed back into the centrifuge and processed for an additional 15 minutes. The resulting overlying water will be decanted and measured using a pre-cleaned graduated cylinder. If the volume of water from the second period of centrifuging is less that 10% of the volume from the first period, 15 minutes will be set as the duration for all future centrifuging of that sample. If it exceeds 10% the process will be repeated until an appropriate duration is determined.

Once the speed and duration have been set from the measurements of the first set of centrifuge bottles these parameters will be used for all future sample processing.

Filtration

The pore water filtering process will be a two step technique. The first step will be to pass all raw pore water through a 'coarse' glass fiber filter of 1.5um pore size to remove the larger suspended particles. This step helps to minimize the clogging characteristics found with the smaller 0.7um filter. The second and final step of the filtering process will be the use of the "fine" 0.7 micron glass fiber filter to remove any smaller particulate matter.

The resulting filtered porewater will be composited into a pre-cleaned glass carboy until all porewater has been generated. This composited porewater will be homogenized and subsampled into sterile sample bottles to be shipped to the end laboratories. All generated porewater will be maintained at 0-6 °C from generation through shipment to the end laboratories.

Prioritization of Analytical Fractions

The number of cores to be processed for pore water extraction was estimated based on a target production volume adequate to prepare two pore water composite samples. Each pore water composite sample will be analyzed for the following organic constituents:

1. PCDDs/PCDFs using EPA Method 1613B
2. PCBs (homologs and congeners) using EPA Method 1668A
3. PAHs and Alkyl PAHs using a laboratory-specific SOP based on California EPA Air Resources Board Method 429 and NOAA ORCA 130 Method
4. DOC using SW846-9060
5. TOC using SW846-9060

In the event that lower than estimated pore water volume is generated for a given pore water composite, the analytical fractions will be prioritized as presented above. For example, bottles will first be filled for PCDDs/PCDFs, followed by PCBs, then PAHs, etc.

If excess pore water is generated, duplicate samples will be prepared and sent for analysis following the same prioritization as the primary samples.

Packaging, Shipping, and Documentation

Pore water samples will be transferred into containers supplied by the project's contracted commercial laboratories. Details including sample size, sample collection bottles, preservative requirements, and holding times are provided in Worksheet #19 of both the 2011 River Mile 10.9 Characterization Quality Assurance Project Plan (QAPP) and Addendum D (CH2M HILL, 2013) of this QAPP. ASL will ship the samples under proper chain-of-custody to the contract laboratories for analysis.

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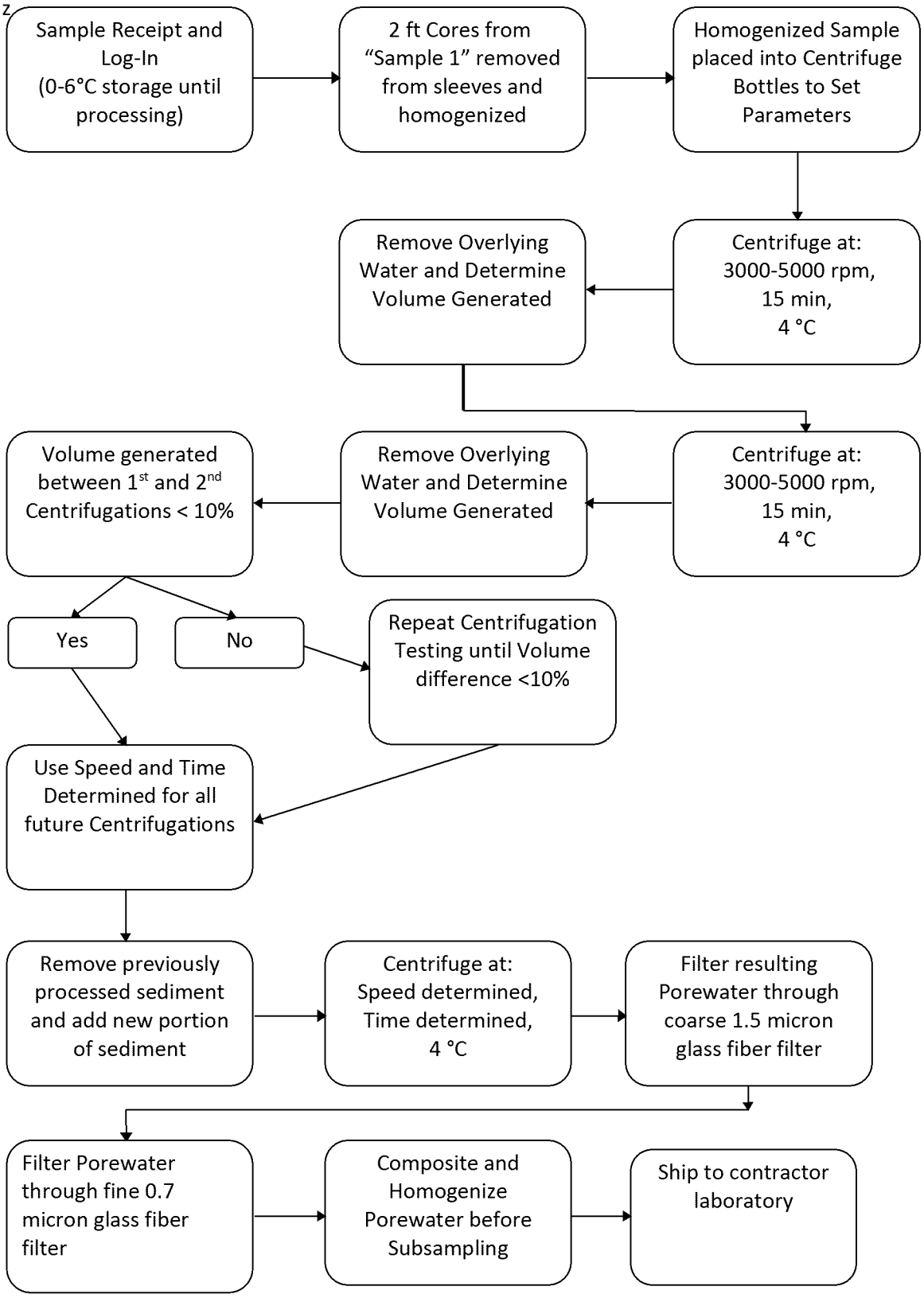
Figure 1. Flow Diagram



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