Work Order	*4A-020A Tasks 2-5 Amendment* *Analyses/Evaluation of WO 003A Samples*
MALLINCKRODT US LLC	**Project Name**: Penobscot River Phase III Engineering Study **Project Number**: 3616166052

This Work Order ("Work Order"), when approved and signed by both parties, is issued under and amends that certain Agreement between the parties executed February 2, 2016 ("Agreement"). Except as expressly modified herein, all terms and conditions of the Agreement remain in full force and effect.

SCOPE OF SERVICES:

Amec Foster Wheeler shall perform the following services ("Services"):

☐ As set forth in the attached document entitled (Insert document description here}.

☒ As described as follows:

Under this Work Order (WO), Amec Foster Wheeler presents an amendment WO4A-020 to reflect the changes discussed during the monthly teleconference of 2 March 2017. The work order adjustment specifically address Tasks 2 through 5 of the WO4A-020 as authorized on 19 January 2017.

BACKGROUND AND PURPOSE

The current field work under Work Order 4A-020 involves preparation of samples collected under WO 003A in Fall 2016 for laboratory analysis. This work, which includes sieving and separation of solid materials prior to submitting samples to the lab, has proceeded more slowly than anticipated, primarily due to weather conditions and the challenges associated with working with frozen materials.

WO4A-020 stated "Field adjustments to the analytical matrix table may be required based on available sample quantities and the results of the proposed wet sieving processing." This work order outlines adjustments based on encountered conditions.

TASKS

Amec Foster Wheeler reviewed the quantity of individual analyses and has decided to reduce the numbers of samples/analyses from WO 4A-020 in several categories to be more efficient with our field time and analytical program, while still meeting the data objectives outlined in WO 4A-020. The bullets below describe the changes to WO 4A-020:

1) Reduced discrete samples (grab samples from a specific location) from 90 to 78. The majority of the discrete samples removed were collected from areas where samples were already planned to be composited together for "general area" characterizations.
2) Reduced sieve partitioned samples (composited samples by Reach and Zone which are sieved to separate the wood chips from the fines) from 34 to 21 by combining originally proposed individual composites from like Reach and Zone together (e.g., we originally proposed to individually composite and sieve partition the two Frankfort Flats trap-collected materials, but instead will combine the Frankfort Flats trap-collected materials into one composite prior to conducting the sieving).
3) Retained THg and MeHg analyses at Eurofins for all discrete and sieve partitioned solids (wood chips, dewatered fines, pre-sieve composite solids), but reduced the split samples for analytical method comparison being performed by Alpha Analytical (EPA Method 7474 for THg) and Flett Labs (EPA Method 7473 for THg). Removed the split samples for MeHg performed by Flett Labs (EPA Method 1630).
4) Reduced analysis of the sieve-partitioned liquids (filtered and unfiltered) from 42 to 28.
5) Increased the total organic carbon analyses (Lloyd-Kahn method) to be performed on all samples enabling organic content: total organic carbon evaluation on each sample.
6) Reduced the number of hydrometer measurements included with grain size (ASTM Method D422). Retained approximately 20 hydrometer samples with grain size and hydrometer to be conducted on the sieve-partitioned fines (dewatered sediment) and the pre-sieve sediment mix.
7) Reduced the number of samples for the organic content multi-temperature analysis measurements. Each of the samples will be measured for organic content (ASTM Method D2974) but at the temperature deemed appropriate after the multi-temperature analyses are performed on a representative number of samples.
8) Removed the lignin and carbon-14 analyses as sufficient data are available from the WO 04A-010 Spring/Summer 2016 samples.
9) In aggregate, the original 1,505 individual analytical results has been reduced to 1,001.

The revised analytical matrix table is attached as *Exhibit 1*.

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This reduction in analyses is not expected to compromise the objectives of the original WO 4A-020, and will also allow funding originally slated for these analyses to be re-directed toward sample processing, which is requiring more field effort than originally anticipated.

COMPENSATION

In addition to using the funding originally slated for the analyses to be eliminated, Amec Foster Wheeler is requesting an additional not-to-exceed amount of $24,890 to complete the Tasks 2 through 5 efforts outlined in WO 4A-020.

TASK NUMBER & DESCRIPTION	ESTIMATED WORK ORDER 4A-020A PRICE						
	Total Labor Hours	Labor Price	ODCs	Travel	Subs	Equip/ Supplies	TOTAL
Tasks 2-5 - Homogenization, Subsampling, and Analyses							
WORK ORDER TOTALS							

The not-to-exceed estimated funding requested above would bring the total cost of WO 4A-020 to

ATTACHMENTS

Exhibit 1 - Analytical Matrix

By their signatures below, the parties acknowledge that they shall be bound by the terms of this Work Order, including the attachments hereto, and that the undersigned are authorized to enter into this Work Order.

MALLINCKRODT US, LLC

Date: 3/7/17

By: Patricia Hitt Duft
(Signature)

Name: Patricia Hitt Duft
(Printed Name)

Title: Vice President

Amec Foster Wheeler Environment & Infrastructure, Inc.

Date: March 6, 2017

By: Nelson Walter
(Signature)

Name: Nelson Walter
(Printed Name)

Title: Vice President

3/7/2017 Approved Susan Collins Special Master

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foster
wheeler

Exhibit 1

ANALYTICAL MATRIX

Phase III Engineering Evaluation
Work Order 04-020 Analytics Plan - Analytical Summary - Tasks 2 through 5 Supplement - Exhibit 1

Version 2 edition - Subject to Field Adjustment based on sample quantity - Field Event Round 2
Effective 02/28/2017 @ 2045
Blue text are formulas - do not overwrite

	Laboratory Methods			Total Analyses		Discrete Sample Analyses					Wet Sieve Separation and Partition Analyses																					
								Container				Pre-Sieve				Sediment Partition					Wood Chip Partition							Liquid Partition				
												Container				Container					Number			Container				Container				
Parameter	Vendor	Preparation	Analysis	Analyses	Containers filled and shipped	Number	Type	Volume	Quantity (ea)	Containers filled and shipped	Number	Type	Volume	Quantity	Containers filled and shipped	Number	Type	Volume	Quantity	Containers filled and shipped	Individual	Triple Replicate	Type	Volume	Quantity	Containers filled and shipped	Number	Type	Volume	Quantity	Containers filled and shipped
Total mercury - solids	Eurofins	Sulfuric acid	1631e	187	143	78	plastic	8 ounce	1	78	21	amber	8 ounce	1	21	22	plastic	8 ounce	1	22		66	plastic	8 ounce	1	22					
Total mercury - solids (splits)	Alpha	Nitric acid	7474	36	22	1	plastic	4 ounce	1	1	7	amber	4 ounce	1	7	7	plastic	4 ounce	1	7		21	plastic	8 ounce	1	7					
Total mercury - solids (splits)	Flett		7473	22	0	1	plastic		shared	shared	7	amber		shared	shared	7	plastic		shared	shared	7		plastic		shared	shared					
Total mercury - liquids (unfiltered)	Eurofins		1631	28	28																						28	PP plastic	250 ml	1	28
Dissolved mercury (field filtered)	Eurofins		1631	28	28																						28	PP glass	250 ml	1	28
Total mercury - degraded liquids	Eurofins		1631	0	0																						0	PP plastic	vial	2	0
Methylmercury - solids	Eurofins	Sulfuric		187	0	78	plastic	8 ounce	shared	shared	21	amber	8 ounce	shared	shared	22	plastic	8 ounce	shared	shared		66	plastic	8 ounce	shared	shared					
Methylmercury - solids (splits)	Flett		1630	0	0	0	plastic		shared	shared	0	amber		shared	shared	0	plastic		shared	shared	0		plastic	8 ounce	shared	shared					
Methylmercury - liquids (unfiltered)	Eurofins		1630	28	28					0																	28	PP plastic	250 ml	1	28
Methylmercury - degraded liquids	Eurofins		1630	0	0					0																	0	PP plastic	vial	shared	shared
Total Organic Carbon	Alpha		Lloyd-Kahn	143	143	78	amber	4 ounce	1	78	21	amber	4 ounce	1	21	22	amber	4 ounce	1	22	22		amber	4 ounce	1	22					
Organic Content	AmecFW-RDU	440C	D2974c	28	0	1	plastic	2 ounce	shared	shared	9	plastic	2 ounce	shared	shared	9	plastic	2 ounce	shared	shared	9		plastic	8 ounce	shared	shared					
Organic Content	AmecFW-RDU	550C	D2974	28	0	1	plastic	2 ounce	shared	shared	9	plastic	2 ounce	shared	shared	9	plastic	2 ounce	shared	shared	9		plastic	8 ounce	shared	shared					
Organic Content	AmecFW-RDU	750C	D2974d	28	0	1	plastic	2 ounce	shared	shared	9	plastic	2 ounce	shared	shared	9	plastic	2 ounce	shared	shared	9		plastic	8 ounce	shared	shared					
Organic Content	AmecFW-RDU	TBD	D2974	107	0	107	plastic	2 ounce	shared	shared		plastic	2 ounce	shared	shared		plastic	2 ounce	shared	shared			plastic	8 ounce	shared	shared					
Grain Size	AmecFW-RDU	D422	D422	119	140	73	plastic	8 ounce	1	73	12	plastic	8 ounce	1	12	13	plastic	8 ounce	1	13	21		plastic	8 ounce	2	42					
Grain Size with hydrometer	AmecFW-RDU	D422	D422	19	19	1	plastic	8 ounce	1	1	9	plastic	8 ounce	1	9	9	plastic	8 ounce	1	9			plastic	16 ounce	1	0					
Density	AmecFW-RDU	D854	D854	13	0	1	plastic	4 ounce	shared	shared	3	plastic	4 ounce	shared	shared	3	plastic	4 ounce	shared	shared	6		plastic	8 ounce	shared	shared					
Lignin - solids (splits)	Eurofins Sub			0	0	0	plastic	2 ounce	1	0	0	plastic	2 ounce	1	0	0	plastic	2 ounce	1	0	0		plastic	2 ounce	1	0					
Carbon 14 (splits)	Eurofins Sub			0	0	0	plastic	2 ounce	1	0	0	plastic	2 ounce	1	0	0	plastic	2 ounce	1	0	0		plastic	2 ounce	1	0					
			SUM	1001	551	421				231	128				70	132				73	83	153				93	84				84