Received 07/27/2000

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25 July 2000

Mr. Russell D. Hart
Remedial Project Manager (HSRW-6J)
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604

RFW Work Order No. 02687.007.003
KMC Work Order No. 40-50-01-AKW-A

Re: Revised QAPP Addendum Pages for Pilot-Scale Solid Phase Bioremediation Testing
Moss-American Site, Milwaukee, Wisconsin

Dear Mr. Hart:

Roy F. Weston, Inc. (WESTON®) on behalf of Kerr-McGee Chemical LLC (KMC) is submitting revised pages of Addendum II to the Groundwater Performance Monitoring Quality Assurance Project Plan (QAPP) and a map showing the Treatment Pad Areas for full-scale bioremediation. The revised pages of the QAPP incorporate responses to agency comments contained in an email dated 21 July 2000.

If you have any questions or require additional information, please do not hesitate to contact me at (847) 918-4142, or Keith Watson at (405) 270-3747.

Very truly yours,

ROY F. WESTON, INC.

Thomas P. Graan

Thomas P. Graan, Ph.D
Principal Project Manager

TPG:sk

Attachments

cc: K. Watson, KMC
G. Edelstein, WDNR
Binyoti Felix, WDNR

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3.4 LABORATORY OPERATIONS

All analyses will be conducted by Lancaster Laboratories with the exception of microbial enumeration. BioRenewal Technologies, Inc., (BioRenewal) of Madison, Wisconsin is anticipated to perform the microbial enumeration analysis.

4.2 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

Table 4-1b presents the project analytical limits, project detection limits, and laboratory method detection limits for analysis of the test cell soil samples.

7.1 FIELD INSTRUMENTS/EQUIPMENT

Field instruments to be used during sampling of the Moss-American pilot-scale bioremediation study will include the following:

- Combination moisture content and temperature meter.
- pH meter.

The calibration, checkout, and maintenance programs for each instrument are outlined in the respective SOP's presented in Appendix E, along with the procedures for field measurements.

8.1 OFF-SITE LABORATORY ANALYTICAL SERVICES

Field measurements will be collected every week. Field measurements will entail gathering data on pH, temperature, and moisture content of soils used in the pilot-scale testing. Soil samples will be collected and analyzed every three weeks for PAHs, total organic carbon (TOC), total Kjeldahl nitrogen (TKN), orthophosphate-phosphorous (ORP-P), ammonia-nitrogen (Ammonia-N), total phosphate-phosphorus (Total P), and microbial enumeration. Laboratory SOPs for

Table 4-1b

Project Detection Limits and Method Detection Limits for Pilot-Scale Solid Phase Bioremediation Testing
Moss-American Site
Milwaukee, Wisconsin

Parameter	Soil Method	Project Detection Limit for Soil Samples (ug/kg)	Method Detection Limit for Soil Samples (ug/kg)
Acenaphthene	Method 3510B/8310	270	27
Acenaphthylene	Method 3510B/8310	270	27
Anthracene	Method 3510B/8310	5	0.5
Benzo(a)anthracene	Method 3510B/8310	3	0.25
Benzo(a)anthracene	Method 3510B/8310	3	0.25
Benzo(a)pyrene	Method 3510B/8310	3	0.25
Benzo(b)fluoranthene	Method 3510B/8310	2	0.2
Benzo(k)fluoranthene	Method 3510B/8310	2	0.2
Benzo(g,h,i)perylene	Method 3510B/8310	16	1.5
Chrysene	Method 3510B/8310	11	1.0
Dibenzo(a,h)anthracene	Method 3510B/8310	5	0.5
Fluoranthene	Method 3510B/8310	5	0.5
Fluorene	Method 3510B/8310	27	2.5
Indeno(1,2,3-cd)pyrene	Method 3510B/8310	11	1.0
Naphthalene	Method 3510B/8310	270	27
Phenanthrene	Method 3510B/8310	11	1
Pyrene	Method 3510B/8310	27	2.5
Nutrient and Biological Parameters (mg/kg)			
TOC	EPA 415.1	50	12
TKN	EPA 351.2 (Amended for Soils)	500	38
ORP-P			
Ammonia-N	EPA Method (EPA-600/4-79/030)	20	0.2
Total P	EPA 365.1	10	
Microbial Enumeration	AWWA Standard Method No. 9215C	N/A	N/A

Note: Specific detection limits are highly matrix dependent. The detection limits listed above are provided for guidance and may not be achievable. The laboratory can estimate down to the method detection limit.

PAHs – Polynuclear Aromatic Hydrocarbons
TOC - Total Organic Carbon
TKN - Total Kjeldahl Nitrogen
ORP-P - Orthophosphate Phosphorous
Ammonia-N - Ammonia Nitrogen
Total P - Total Phosphate Phosphorous.

- Proprietary formulations produced by Sybron Biochemicals and BSI Environmental, Inc.; and
- *Mycobacterium* Sp. RHGII (Strain 135) developed by the University of Cincinnati.

Final selection of microbial additive products and proprietary process amendments will be communicated to the agencies in the near future.

Microbial formulations and proprietary process additives will be added to the starting soils at rates based upon recommendations from the product manufacturer as well as literature data as appropriate. For planning purposes it is intended that this initial bacterial levels on the test soils be on the order of 10^6 colony forming units per gram (CFU/gram) or as otherwise determined by the vendor.

Test cell TC-1 is the control cell and will undergo no treatment. TC-2 will contain a nutrient formulation. TC-3 will contain a selected microbial formulation. TC-4 will contain a combination of the nutrient and the selected microbial formulation. TC-5 will contain a second microbial formulation and proprietary additive.

During the study period, the bioremediation test cells will be monitored, sampled and analyzed according to the following schedule:

- Weekly, the soil will be evaluated for pH, temperature, and moisture content.
- Every three weeks, soil samples will be collected and four locations will be composited from each cell. Samples will be analyzed for polynuclear aromatic hydrocarbons (PAHs), total organic carbon (TOC), total Kjeldahl nitrogen (TKN), phosphorous contributed from orthophosphate (ORP-P), nitrogen contributed from ammonia (Ammonia-N), total phosphorus, and microbial enumeration.

Analytical data obtained from these test cells will provide an indication of the effectiveness of bioremediation on the soil.

3.2 FIELD QUALITY CONTROL SAMPLES

Two types of quality control (QC) samples will be collected during the sampling activities:

- Field duplicates
- Matrix spike/matrix spike duplicates (MS/MSD)

The purpose for collection of each QC sample is explained in Section 4 of the QAPP. The specific level of QC effort for the Moss-American Site is summarized in Table 2-1c, and the procedures for collection of the QC samples is detailed in the following subsections.

3.2.1 Field Duplicate Samples

Field duplicate samples will be collected at a frequency of one duplicate sample per ten soil samples. Field duplicate samples will only be collected for analysis of PAH parameters.

3.2.2 Matrix Spike/Matrix Duplicate Samples (MS/MSD)

Matrix spike/matrix duplicate samples will be collected at a frequency of one MS/MSD per 20 soil samples collected or once per week. A MS/MSD is needed with every batch of samples. A MS/MSD will only be collected for analysis of PAH parameters.

4.1 PROJECT SAMPLE NUMBERING SYSTEM

- Sample type and location. Test cells will have the designation TC (see section 2.1.6 for all test cell designations).

Soil Samples Collected from the Test Cells

- MA3—TC-1—020700-01
  - Moss-American Site, phase 3
  - Test Cell 1.

Table 2-1c

Summary of Sampling Effort for Laboratory Parameters
Pilot-Scale Solid Phase Bioremediation Testing
Moss-American Site
Milwaukee, Wisconsin

Sample Matrix	Laboratory Parameters[1]	Characterization Samples			Field Duplicate Samples			Matrix Spike/Matrix Duplicate Samples			Matrix Total
		No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Soil	PAHs[2]	25	1	25	3	1	3	2	1	2	28
	TOC[3]	25	1	25	--	--	--	--	--	--	25
	TKN[4]	25	1	25	--	--	--	--	--	--	25
	ORP-P[5]	25	1	25	--	--	--	--	--	--	25
	Ammonia-N[6]	25	1	25	--	--	--	--	--	--	25
	Total P[7]	25	1	25	--	--	--	--	--	--	25
	Microbial Enumeration	25	1	25	--	--	--	--	--	--	25

Note: Figures are based on a 3 month pilot operation period. Four soil samples from each test cell will be collected and homogenized to comprise one sample per cell. MS/MSD are not additional samples, MS/MSD samples are characterization samples that are to undergo a MS/MSD analysis.

1 – Soil samples are collected every third week. Sampling will occur on Days 0, 21, 42, 63, and 84.
2 – Polynuclear Aromatic Hydrocarbons.
3 – Total Organic Carbon.
4 – Total Kjeldahl Nitrogen.
5 – Orthophosphate Phosphorous.
6 – Ammonia Nitrogen.
7 – Total Phosphate Phosphorous.

Table 5-1b

Required Sample Volume, Containers, and Sample Preservation
Pilot-Scale Solid Phase Bioremediation Testing
Moss-American Site
Milwaukee, Wisconsin

Sample Matrix	Analysis	No. Of Containers	Container Type	Preservatives	Holding Time
Soil	PAHs	1	16-oz clear glass wide-mouth (Teflon-lined cap)	--	14 days to extract; analyze within 40 days of extracting
	TOC	1	8-oz clear glass wide-mouth (Teflon-lined cap)	--	28 days
	TKN	1	8-oz clear glass wide-mouth (Teflon-lined cap)	--	28 days
	ORP-P	1	8-oz clear glass wide-mouth (Teflon-lined cap)	--	48 hours
	Ammonia-N	1	8-oz clear glass wide-mouth (Teflon-lined cap)	--	28 days
	Total P	1	8-oz clear glass wide-mouth (Teflon-lined cap)	--	28 days
	Microbial Enumeration	1	8-oz clear glass wide-mouth (Teflon-lined cap)	--	48 hours

Note: No additional soil volume is required for analysis of MS/MSD (organics) and duplicates (inorganics). No trip blanks will be collected for soil samples or inorganic or extractable analyses.

PAH - Polynuclear Aromatic Hydrocarbons
TOC - Total Organic Carbon
TKN - Total Kjeldahl Nitrogen
ORP-P - Orthophosphate Phosphorous
Ammonia-N - Ammonia Nitrogen
Total P - Total Phosphate Phosphorous