→ Binyoti Felix - SER/RR
Your copy

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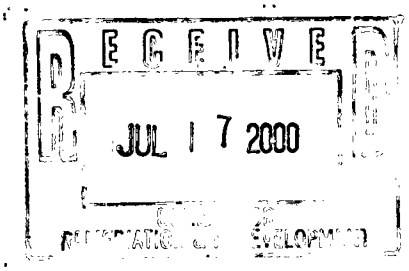
14 July 2000



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: Draft Work Plan for Pilot-Scale Solid Phase Bioremediation Testing

Dear Mr. Hart:

Roy F. Weston Inc. (WESTON) on behalf of Kerr McGee Chemical, LLC, (KMC) is pleased to submit responses to comments listed in your letter dated 10 May 2000, a Pilot Test Workplan and a Quality Assurance Project Plan (QAPP) for conducting a solid-phase bioremediation test for contaminated soils at the Moss-American Site in Milwaukee, Wisconsin. Please note that the QAPP is an Addendum No. II to the QAPP associated with the Groundwater Performance Monitoring Program. Further, in accordance with EPA QAPP guidance only new or revised subsections/appendices are included in the addendum.

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

Kerr McGee Chemical, LLC
Moss American Site
Solid Phase Bioremediation Pilot Test
Work Plan

Prepared for :

Kerr McGee Chemical, LLC

Prepared by:

Roy F. Weston, Inc.
Suite 500
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July 2000

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SECTION 1

INTRODUCTION

1.1 BACKGROUND

Kerr-McGee Chemical, LLC, (KMC) is implementing remedial actions at the Moss American Site in Milwaukee, Wisconsin. To date, implementation of groundwater treatment elements of the remedy has resulted in the excavation and staging of contaminated soils requiring treatment in order to meet on-site disposal standards set forth in the amended Record of Decision (ROD). Some of the staged soils are considered to be candidates for on-site treatment by Solid Phase Bioremediation (SPB). In order to evaluate this option, KMC plans to perform a field scale SPB pilot test at the Moss American site. This Workplan provides an outline of the SPB pilot test.

SPB typically provides for aerobic biodegradation of target constituents in soils by placing the soils in (typically) 12 to 18-inch thick layers, adjusting environmental parameters as needed and periodically tilling for mixing and aeration. Under these conditions, aerobically degradable contaminants are remediated by naturally occurring (and/or supplemental) microorganisms within the soil matrix. The process is technically simple and efficient, with the primary operating constraint being the need for a relatively large treatment area per unit volume of soils.

In the past, the following categories of contaminated soil were identified as being amenable to treatment with bioremediation:

Category A – Soil with naphthalene concentrations between 0.4 and 100 mg/kg and total CPAH concentrations of <1.9 mg/kg.

Category B – Soil with naphthalene concentrations between 0.4 and 100 mg/kg and total CPAH between 1.9 and 3.1 mg/kg.

Category C – Soil with naphthalene concentrations between 0.4 and 100 mg/kg and total CPAH between 3.1 and 10 mg/kg

Since Category C soil encompasses naphthalene and total CPAH concentration of both Category B and Category C soils, only Category C soil will undergo pilot-scale testing.

1.2 OBJECTIVE

The objective of this SPB pilot test will be to demonstrate that bioremediation technology can effectively treat the excavated soils to meet the on-site disposal criteria, allowing replacement of treated soils on site. In particular, the objective is to provide treatment for naphthalene to meet the generic groundwater RCL of 0.4 mg/kg.

This objective will be achieved in the pilot test by treating small volumes of candidate soils under varying treatment conditions and comparing reductions in contaminant levels against the redisposal criterion and against performance of a control treatment.

SECTION 2

TECHNICAL APPROACH

2.1 GENERAL APPROACH

The Moss-American Site SPB pilot test will use a series of small test plots, or treatment cells, to evaluate treatment conditions and effectiveness. The scale of each test plot will be sufficient to effectively simulate full scale materials handling and treatment conditions.

The pilot test will consist of the following principal steps:

- Selection of test soil conditions based upon the actual matrices to be treated.
- Selection of amendments and additives, as appropriate, to enhance the biodegradation process, based upon prior experience and literature data for similar applications.
- Site preparation and construction of test treatment pad meeting environmental and regulatory (WDNR) requirements, as appropriate.
- Preparation of test soil mixtures.
- Preparation of amended soils for testing.
- Initiation of testing and process monitoring.
- Completion of testing including final performance sampling and analysis.
- Demobilization of the test site.
- Preparation of Pilot Test Technical Memorandum.

The results of the pilot test will be used to develop plans for full-scale operation.

The Moss-American Site SPB demonstration will use five tests to evaluate a range of treatment conditions. The pilot-scale testing is expected to last for approximately 84 days. This test period is based on an assumption that the pilot-scale testing would last from 30 to 90 days. However,

ID	Task Name
1	Workplan Approval
2	Mobilization
3	Site Construction/Soil Blending
4	Testing Period
5	Site Demobilization
6	Receipt of Analytical Data
7	Preparation of Draft Technical Memorandum
8	Agency Review
9	Submission of Final Technical Memorandum

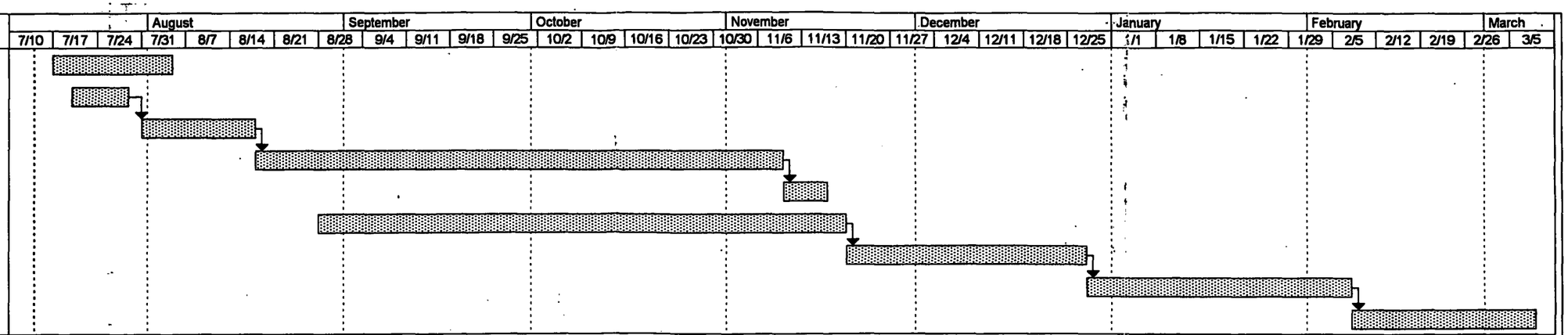


Figure 5-1 Schedule for Pilot Scale Solid Phase Bioremediation Testing
Date: Fri 7/14/00

Task | Progress | Summary | Rolled Up Split | Rolled Up Progress | Project Summary
Split | Milestone | Rolled Up Task | Rolled Up Milestone | External Tasks

the sampling frequency is such that the last scheduled sample will be collected on the 84th day. If necessary, the pilot-test will be extended for an additional 30 days.

Since Category C soil encompasses the naphthalene and total CPAH concentration of both Category B and Category C soils, only Category C soil will undergo pilot-scale testing. Test soils will be drawn from the existing Category C soil and blended to provide a reasonably homogeneous mixture for testing.

2.2 SELECTION OF AMENDMENTS AND ADDITIVES

Several treatment conditions, including but not necessarily limited to amendments and additives, will be evaluated for their potential to enhance the biodegradation process for the Moss-American site soils. The initial evaluation and selection of materials is based upon prior experience and literature data for similar applications. The types of additives considered include nutrients, microbial formulations, and ingredients such as sand, mulch, and/or straw to modify texture as necessary, and other materials which have been demonstrated to assist bioremediation in similar settings. Based upon this review, test conditions are selected which are considered to have the best promise for performance enhancements.

The pilot-scale testing will use blended soils to ensure homogeneous starting conditions with respect to soil texture/physical properties and contaminant concentrations. Moisture content will be held constant for all test plots, while additives and microbial formulations will vary among the plots. Test Cell No. 1 (TC-1) will serve as a control plot. Blended soil associated with this test plot will not undergo any treatment and hence would not receive any additives and/or amendments. However, the soil will be turned or mixed at a frequency which is similar to soils associated with other test cells.

The following provides an initial summary of the selected test conditions.

- Test Cell No. 1 (TC-1) - Control cell; Will undergo no active treatment.

- Test Cell No. 2 (TC-2) – Will contain a nutrient formulation.
- Test Cell No. 3 (TC-3) – Will contain a selected microbial formulation.
- Test Cell No. 4 (TC-4) – Will contain a combination of the nutrient and the selected microbial formulation.
- Test Cell No. 5 (TC-5) – Will contain a second microbial formulation and proprietary additive.

Soil in all test cells will be turned once per week. The specific amendments (nutrients, microbial additive products and proprietary process amendments) will be selected from those available commercially for field scale application. Selection criteria include the nature of the product, and available data for similar applications to maximize the likelihood of success. At present, microbial additive products and proprietary process amendments under review include Daramend Bioremediation Technology (W.R. Grace & Co.), 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.

Nutrient quantities will be sufficient to provide an slight stoichiometric excess of nutrients based upon the measured TOC level in the blended soil stockpile and an target C:N:P ratio of 100:10:1.

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.

2.3 SITE PREPARATION AND CONSTRUCTION OF TREATMENT PAD AND CELLS

Following approval of the Workplan site development will proceed with the construction of the treatment pad. This will include site clearing and preparation as required, establishment of site controls, and building of the test cells themselves. The location of the treatment pad is shown in Figure 2-1.

The treatment pad will consist of 2 feet of compacted clay to preclude migration of rainwater into subsurface soils. Clay will be imported from an off-site borrow source and will be placed in 8-inch loose lifts. Each lift will be compacted to 95% of standard Proctor density. The treatment pad would be approximately 125 x 125 feet in size. A perimeter berm will be constructed around the site; the 5 cells within the bermed area will be placed and segregated in such a matter so as to prevent mixing of soils from various treatments. Each test cell will be 30 x 30 feet in size. The berms will be designed to permit equipment access and have a height of two feet. Plan and sectional views of the treatment pad as well as the location and layout of the treatment cells are shown in Figure 2-2.

Pilot test operations will be conducted in such a manner as to minimize the possibility for generation of leachate. At the same time the configuration of the cells will provide for management on non-contact and contact water.

The working surface of the treatment pad will be sloped to direct incident precipitation and leachate (if any) to a collection sump. Sump pumps will be placed in the collection area. The treatment pad will be tarped during treatment (between maintenance or sampling activities). Precipitation which comes in contact with the contaminated soils will be collected at the collection point and conveyed to portable storage tanks for eventual treatment and disposal. The impermeable layer on the base of the cell will be covered with a sacrificial indicator layer of sand, gravel or straw to ensure that the base is not penetrated during soil treatment.

The overall sequence of construction will be as follows:

1. Grading of the treatment pad area.

2. Utilities clearance.
3. Establishment of erosion and sediment controls.
4. Subgrade preparation, if any.
5. Placement and compaction of specified clay material to a minimum thickness of 2 feet. Surface to be sloped (1 to 2%).
6. Construction of berms with a minimum height of 2 feet around the pad.
7. Installation of sump pump and temporary piping for stormwater/leachate conveyance system.
8. Placement of test cells.

2.4 PREPARATION OF TEST SOIL MIXTURES

The Moss-American Site SPB pilot test will use five cells, all residing on the treatment pad, to evaluate treatment conditions and effectiveness. Each test cell will contain of approximately 50 CY of Category C soil. The dimensions of each test cell will be 30 ft x 30 ft. Arrangement of the treatment cells is shown in Figure 2-2.

The SPB Test (and subsequent full scale remediation) will use soils blended to achieve reasonably homogeneous starting conditions with respect to soil texture/physical properties and contaminant concentrations. The objective for the pilot test blending is to provide similar soil texture/physical properties and initial contaminant levels both within each test cell and among the five test cells so that performance data can be compared under similar conditions. For the SPB pilot test, soils will be blended with a backhoe or similar equipment. Soil samples will be collected from the blended stockpile to provide initial characterization data and to estimate final additive quantities for the amended test cells.

2.5 PREPARATION OF AMENDED SOILS FOR TESTING

The blended soils mixtures will be amended with the selected additives. Additives will be prepared and used according to the vendor's specifications. The amended soils will then be placed within the treatment bed. Preparation of the amended soils will constitute the initiation of the active testing phase and the initial sampling events will occur when the full batch of test soil has been prepared.

2.6 INITIATION OF TESTING, AND PROCESS MONITORING

The amended soils will be sampled initially upon placement in the test bed and periodically through the test phase to assess contaminant degradation efficiency and progress toward the remediation objectives. Each sampling event will consist of preparation of several composite soil samples from the soil batch, with each composite being made from multiple grab samples. Specific sampling and analysis procedures will be in accordance with the approved Quality Assurance and Project Plan (QAPP).

Field measurements will be collected and recorded before each turning event to ensure that soil conditions remain within desired ranges for biodegradation. The field parameters would include pH, temperature, and moisture content. Additionally, the test plots will be sampled and analyzed every three weeks for polynuclear aromatic hydrocarbons (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 (total heterotrophic cell counts) to assess contaminant degradation efficiency and progress toward the remediation objectives.

Samples for field measurements and laboratory parameters will be collected at four discrete points within each test plot. The field measurements will be recorded at each of the four sampling points within each test plots. For laboratory parameters, however, the soil sample from each test cell will be a composite sample collected from each of the four sampling points within each test plot. The sampling protocol of the composite sample will be in accordance with the approved QAPP.

2.7 SOIL PROCESSING

2.7.1 Routine Operations

Placement of Treatment Layer

Blended contaminated soil placed in the treatment area will be spread in an even layer 18 inches thick in a manner that avoids compaction. The final thickness of the treatment layer will not exceed effective mixing depth of the mixing equipment (discs, roto-tillers, etc.). The treatment layer will be amended with additives according to the desired treatment conditions and thoroughly aerated (mixed/tilled) on a regular basis. A tillage frequency of one week will provide adequate soil aeration.

2.7.2 Adjustment of Environmental Conditions

The following procedures will be used as necessary to adjust and maintain desired soil conditions during treatment.

2.7.2.1 Soil pH

Adjustment of pH during treatment is not anticipated. Soil pH may be adjusted during initial mixing if data suggest it is outside of desired range. The most likely event is low soil pH in which case it would be amended at the start of the test by application of agricultural lime.

2.7.2.2 Moisture

Moisture may be lost from the soils during mixing and treatment primarily by evaporative loss. Moisture monitoring will be conducted to assess soil moisture content. If moisture falls to below desired ranges supplemental water will be added and immediately mixed into the soils. All moisture addition will be conducted immediately prior to a mixing event to distribute the water though the soil and minimize the likelihood for runoff. Moisture addition will be controlled by calculating the total quantity of water needed (based upon moisture measurements), and adding the required amount evenly and at a controlled rate from a calibrated supply (metering pump if

from a water tank, or a calibrated hose supply if from a water line). The water will be added at a sufficiently slow rate as to allow its incorporation into the soil matrix, and avoid ponding/runoff.

2.7.2.3 Nutrients

For nutrient amended treatments the objective is to prove a modest stoichiometric excess of nutrients in this initial mixture. The nutrient dosages will be determined based upon initial characterization of the blended soil stockpile. Supplemental nutrient addition is not anticipated during the baseline testing phase in order to allow evaluation of the adequacy of this nutrient application rate. If the final data suggest that performance was nutrient limited, the supplemental operating phase may be used to verify this finding.

2.7.2.4 Amendments

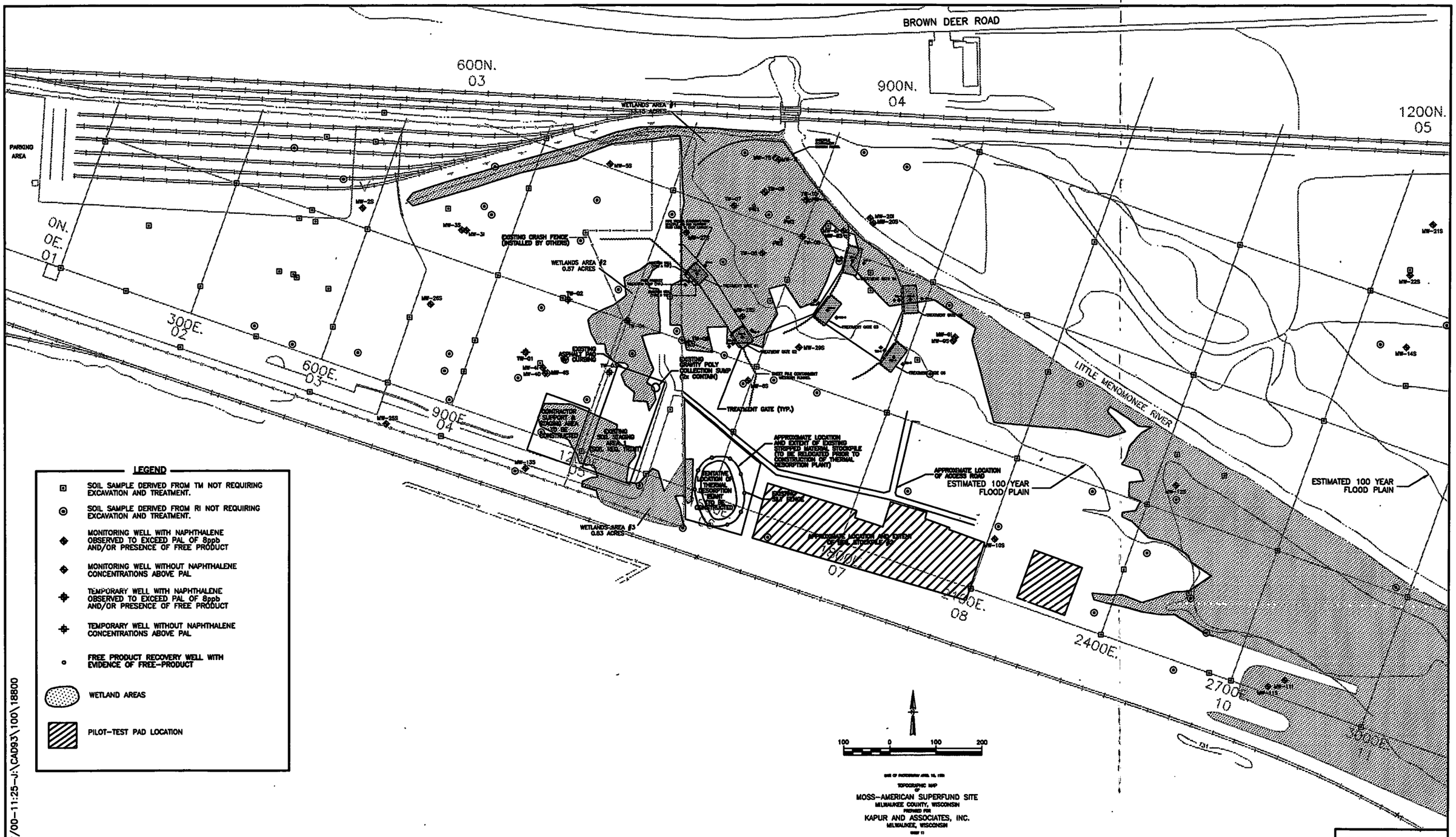
For amended treatments the objective is to evaluate the effect of the selected dosage on performance. Supplemental amendment addition is not anticipated during the baseline testing phase. If the final data suggest that performance was limited by the amendment quantity (as compared to the nature of the amendment itself), the supplemental operating phase may be used to verify this finding.

2.8 COMPLETION OF TESTING, AND FINAL PERFORMANCE SAMPLING AND ANALYSIS

At the completion of the test period, the test soils will be sampled to assess contaminant degradation efficiency relative to the treatment objective. Sampling will consist of preparation of several composite soil samples from the soil batch, with each composite being made from multiple grab samples. In general, specific sampling and analysis procedures will be in accordance with the approved QAPP.

2.9 DEMOBILIZATION OF THE TEST SITE

At the completion of the Solid Phase Bioremediation Pilot Test the test site will be demobilized as appropriate depending on determinations for its future reuse. If additional testing and/or full scale treatment is to be considered and the test cells can effectively be integrated into full scale operations, the site will be secured as necessary to prevent releases or damage pending reuse. If no additional work is anticipated the site will be demobilized and returned to pretesting conditions. Contaminated equipment and materials will be decontaminated where possible. Contaminated materials which cannot be effectively decontaminated (such as the test bed base soils) will be properly disposed. Uncontaminated construction materials will be staged for reuse in other site areas or disposed as appropriate.



LEGEND

- SOIL SAMPLE DERIVED FROM TM NOT REQUIRING EXCAVATION AND TREATMENT.
- SOIL SAMPLE DERIVED FROM RI NOT REQUIRING EXCAVATION AND TREATMENT.
- MONITORING WELL WITH NAPHTHALENE OBSERVED TO EXCEED PAL OF 8ppb AND/OR PRESENCE OF FREE PRODUCT
- MONITORING WELL WITHOUT NAPHTHALENE CONCENTRATIONS ABOVE PAL
- TEMPORARY WELL WITH NAPHTHALENE OBSERVED TO EXCEED PAL OF 8ppb AND/OR PRESENCE OF FREE PRODUCT
- TEMPORARY WELL WITHOUT NAPHTHALENE CONCENTRATIONS ABOVE PAL
- FREE PRODUCT RECOVERY WELL WITH EVIDENCE OF FREE-PRODUCT
- WETLAND AREAS
- PILOT-TEST PAD LOCATION

TOPOGRAPHIC MAP OF
MOSS-AMERICAN SUPERFUND SITE
MILWAUKEE COUNTY, WISCONSIN
PREPARED FOR
KAPUR AND ASSOCIATES, INC.
MILWAUKEE, WISCONSIN

ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS

ABRAMS
AERIAL SURVEY CORPORATION
124 NORTH LARCH LANSING, MI 48312
PO Box 15009 LANSING, MI 48901-5009

WESTON MANAGERS DESIGNERS/CONSULTANTS
750 E. Bunker Ct.
Suite 500
Vernon Hills, Illinois
60061

FIGURE 2-1

LOCATION OF PILOT TEST PAD

MOSS - AMERICAN SITE
Milwaukee, Wisconsin

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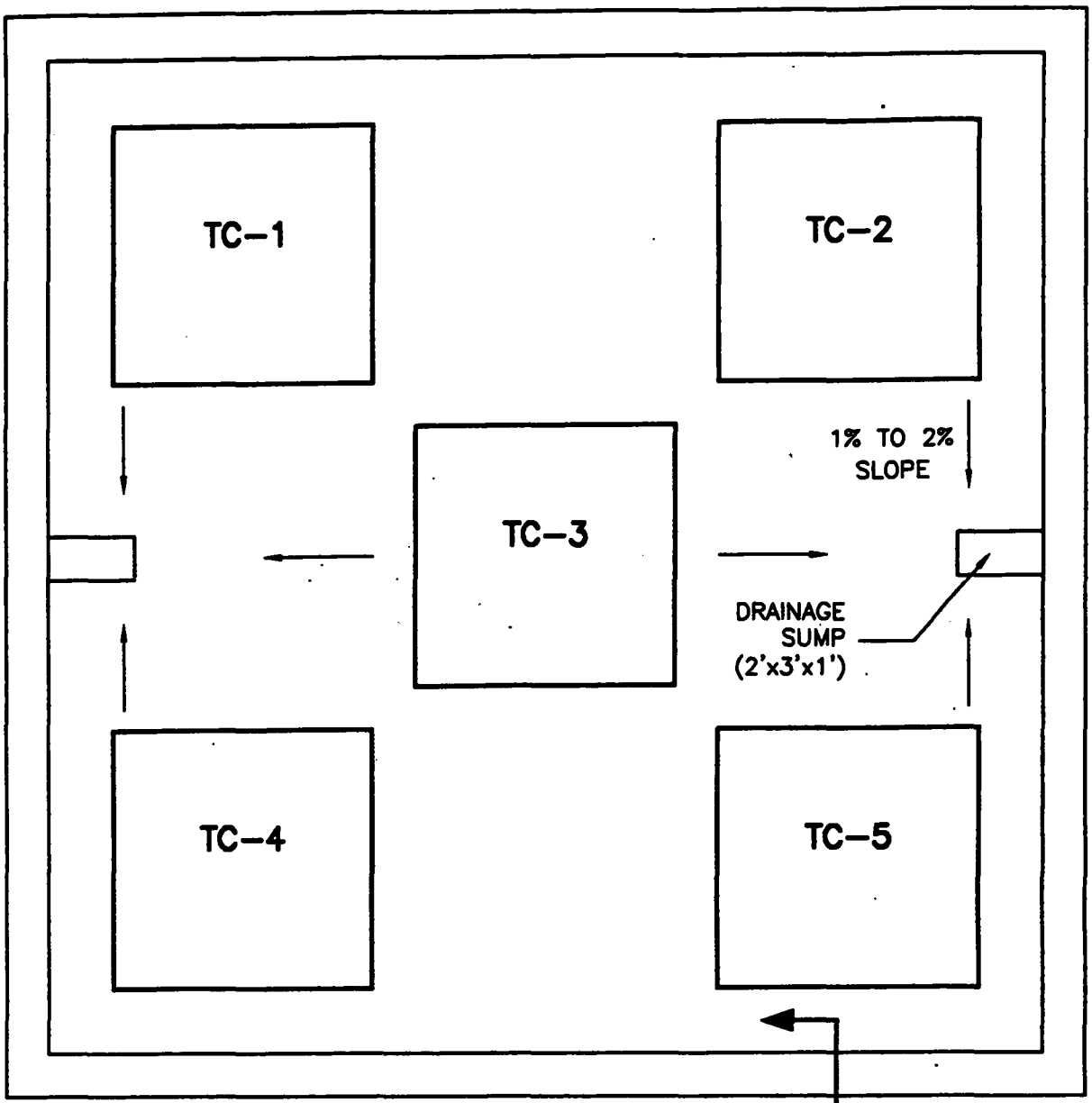

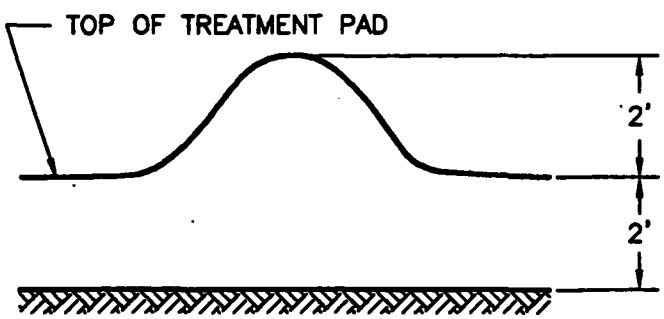

BERM DESIGN

N.T.S.

0 20'

SCALE

FIGURE 2-2

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WESTON MANAGERS DESIGNERS/CONSULTANTS

750 E. Bunker Ct.
Suite 500
Vernon Hills, Illinois
60061

TEST PAD AND TEST CELL LAYOUT

MOSS-AMERICAN SITE

Milwaukee, Wisconsin

SECTION 3

SAMPLING AND ANALYSIS PROCEDURES

Samples will be collected for analysis of contaminants of concern and selected parameters to assess treatment performance. In general, sampling and analysis procedures will be in accordance with the approved QAPP. A summary of the overall sampling schedule is provided in Tables 3-1 and 3-2. Analytical methods, containers, preservation requirements and handling times are provided in Table 3-3. Samples will be collected, prepared and shipped under Chain-of-Custody documentation. QAPP procedures will apply.

Composite samples will be collect as follows. Discrete grab samples will be collected from individual quadrants of the treatment cell. Approximately equal volumes of the grab samples will be placed in clean stainless steel bowls for compositing. The samples will be blended with a stainless steel spoon. A portion of the blended sample will then be collected for analysis. Clean (new or decontaminated) sampling and compositing equipment will be used for each sample.

Table 3-1

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

Sample Matrix	Field Parameters[1]	Characterization Samples		
		Number	Frequency	Total
Soil	pH	300	1	300
	Moisture Content	300	1	300
	Temperature	300	1	300

Note: Field parameters are measured in the field prior to samples being collected.

1 – Soil parameters are measured on a weekly basis.

Table 3-2

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 3-3

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	PAH	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
	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.

SECTION 4

DATA ANALYSIS AND REPORTING

4.1 DATA MANAGEMENT

Raw data reports from the analytical laboratory will be used to prepare summaries of results for contaminants of concerns and other analytical parameters as appropriate. Analytical data will be summarized and maintained in electronic spreadsheet format (Microsoft Excel) for interpretation and reporting.

Field logs will be maintained for all materials handling and field monitoring activities. As appropriate, data from field measurements will be added to the electronic spreadsheet database for interpretation and reporting. In general field parameters which may affect performance and which therefore should be evaluated in conjunction with contaminant removal data, will be entered into the electronic database format.

4.2 DATA REDUCTION

As appropriate for specific parameters, data reduction will include summaries of analytical results and appropriate statistics (ranges, arithmetic mean) using statistical tools in the electronic spread sheet. In addition, data will be plotted, typically as average concentrations over time for purposes of assessing contaminant removal.

To the extent supported by the data, kinetic analysis will be considered. The general expected response of the lighter end PAH fraction will be relatively rapid initial removal followed by a tailing off effect which may appear to be asymptotic in nature. Although first order kinetics are often used to describe these events, it is often found that this approximation does not fit the data well, possibly because the rate limiting steps may not be simply the degradability of the compound but also other factors such as but not limited to sorption to/desorption from the soils and other mass transfer limitations. Therefore an effort will be made to interpret the data kinetically, though the limitations of the rate estimates obtained should be recognized.

4.3 PREPARATION OF PILOT TEST TECHNICAL MEMORANDUM

A pilot test Technical Memorandum will be prepared to document the performance of the test and provide recommendations for further application as appropriate. The Technical Memorandum, will document all phases of the test, and provide all analytical data in summary from (with raw data provided as appendices). Data interpretation regarding efficiency of the treatment will be summarized and recommendations regarding full scale application will be provided.

SECTION 5

SCHEDULE

Figure 5-1 shows the anticipated schedule for the pilot-scale testing.

ID	Task Name
1	Workplan Approval
2	Mobilization
3	Site Construction/Soil Blending
4	Testing Period
5	Site Demobilization
6	Receipt of Analytical Data
7	Preparation of Draft Technical Memorandum
8	Agency Review
9	Submission of Final Technical Memorandum

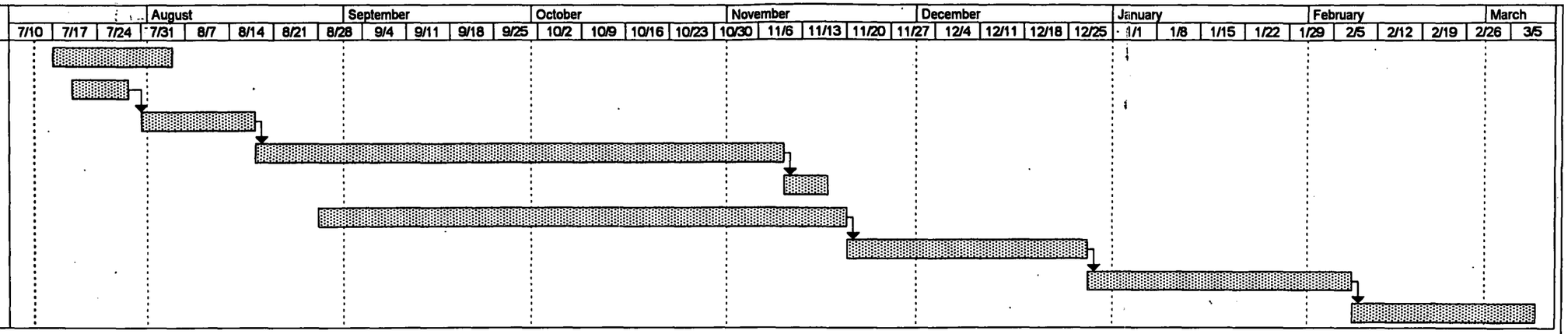

Figure 5-1 Schedule for Pilot Scale Solid Phase Bioremediation Testing
Date: Fri 7/14/00

Task | Progress | Summary | Rolled Up Split | Rolled Up Progress | Project Summary
Split | Milestone | Rolled Up Task | Rolled Up Milestone | External Tasks