DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 377TH AIR BASE WING (AFMC)

377 ABW/EMR
2000 Wyoming Blvd SE
Kirtland AFB NM 87117-5659

Ms. Nancy Morlock, Environmental Engineer
RCRA Permits Branch
U.S. EPA Region 6
1445 Ross Ave, Ste 1200
Dallas TX 75202-7233

Dear Ms. Morlock

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As a continuation of their pilot bioventing project, the Air Force Center for Environmental Excellence (AFCEE) has proposed additional testing activities at SWMU 6-16, Kirtland Fire Training Area (IRP Site FT-13).

AFCEE intends to gain a better understanding of factors that may be limiting biodegradation at the site. The attached fax, which I'm forwarding for your information contains complete details.

Please contact me at (505) 846-2773/0053 if you have any questions.

Sincerely

CHRISTOPHER B. DeWITT, R.P.G
Chief, Restoration Branch
Environmental Management Division

Attachment:
Test Plan

cc:
NMED-HRMB (Mr. S. Pullen)
Brown & Root Env. (Mr. K. Walter)

PARSONS ENGINEERING SCIENCE, INC.

1700 Broadway, Suite 900 • Denver, Colorado 80290 • (303) 831-8100 • Fax: (303) 831-8208

April 18, 1995

Mr. Christopher DeWitt
377 ABW/EMR
2000 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5659

Subject: Nutrient and Moisture Addition Test Plan
Kirtland AFB, Site FT-13

Dear Mr. DeWitt:

This letter describes additional testing activities proposed for Site FT-13 at Kirtland AFB. The tests have been designed to better understand what factors may be limiting biodegradation at this site. Activities will include the addition of small quantities of nutrient solution to the soil to determine if moisture and/or nutrient availability is limiting biodegradation. Due to the limited number of monitoring points available on this site the test will not be able to differentiate between moisture and nutrient effects.

Additional testing will consist of injecting nutrient solution into selected soil vapor monitoring points (MPs), followed by a respiration test lasting approximately four weeks. Oxygen utilization rates from this test will be compared to previous respiration tests to determine if nutrients and moisture addition will increase biodegradation rates at the site. The following is a summary of the completed and proposed activities for additional testing at Site FT-13:

April 1993

- Initial pilot testing and respiration testing at site.

June 1993

- 3-month respiration testing at site.

November 1993

- 6-month respiration testing at site.

February 1994

- 9-month respiration testing at site.

May 1994

- 12-month respiration testing and soil sampling at site.

1-5 May 1995: Nutrient/Moisture Addition

- On 2 May 1995, measure initial soil gas oxygen, carbon dioxide, and TVH concentrations at monitoring points. Insert two temporary monitoring points and measure initial soil gas in shallow soils;
- On 2-3 May 1995, inject nutrient solution into selected monitoring point intervals;
- On 4 May 1995, restart blower system. Let system run for approximately one week to allow equilibrium to be established between soil moisture and soil gas;
- On 11 May 1995, turn off blower system. Seal all air lines and the vent well; and
- Measure and record soil gas oxygen, carbon dioxide, and TVH concentrations at monitoring points. (start of nutrient/moisture addition respiration test).

8-9 June 1995: End Nutrient/Moisture Respiration Test

- Measure and record soil gas oxygen, carbon dioxide, and TVH concentrations at monitoring points.
- Determine if the rate of oxygen uptake over previous 4 weeks has changed significantly from the rate determined for previous respiration tests. (April 1993 to May 1994). Based on previous respiration tests, approximately 10 to 20 percent of the initial soil gas oxygen should be utilized during this 4-5 week period.

Additional Discussion

A water and ammonium nitrate nutrient solution will be injected into all sampling locations. The quantity of water or solution added to each screened interval will be minimized to reduce the potential for contaminant migration. Only enough water and solution will be added to each location to theoretically saturate a volume of soil with a radius of approximately 1.5 feet around the well screen. The quantity of water or nutrient solution was calculated based on an assumed total porosity of 0.35, existing soil moisture determined from soil samples at corresponding depths, effective screen length (length of sand pack), and a radius of 1.5 feet. Proposed injection locations and water/solution quantities are provided in Table 1. Some injection locations may be added to or deleted from this list based on nutrient injection results.

The nutrient solutions will consist of ammonium nitrate dissolved in water obtained from the base potable water supply. Nitrogen will be the only nutrient added to the water. Soil sampling results indicate that phosphorous, another important nutrient, occurs in sufficient concentrations in soils at all depths from 2 to 17 feet.

Nutrient solutions will be mixed in a 55-gallon D.O.T drum at the site. For monitoring points at 15 and 24 foot depths, water and nutrient solutions will be gravity injected into each screened interval using a combination of siphon-action and, the head developed by water in the riser casing (potentially 6 to 11 psi). A small pump may be used to inject water and solution into MPs which are screened in silty soils and may not accept water fast enough under a gravity feed system.

Following water and nutrient injection, the blower system will be turned on and allowed to run for one week to allow soil moisture and soil gas to equilibrate. The blower system will be temporarily adjusted for a maximum air injection rate to expedite aerating the soil. After approximated one week, the blower system will be turned off and air lines and vent well sealed. Soil gas oxygen, carbon dioxide and TVH concentrations will again be measured. These measurements will be the initial values for the "moisture/nutrient added" respiration test.

Parsons ES will return to the site after approximately four weeks to complete the respiration test. Soil gas oxygen, carbon dioxide, and TVH concentrations will be measured and oxygen utilization rates calculated. It is possible that the soil bacteria population will not rapidly multiply and that the test period required to observe significant changes in oxygen utilization will be longer than the proposed four weeks. To account for a potential delay in nutrient and moisture effect, another respiration test could be conducted in July or August if needed. The blower system will be turned on, and flow rate adjusted following these measurements. Results from this test will be compared to results of the previous respiration tests to determine the effects of nutrient and moisture addition.

A brief letter report summarizing the extended testing results will be prepared following field activities. If the results are positive, Parsons ES will include recommendations for moisture and nutrient addition which can be used by Kirtland AFB to enhance remediation of this site.

If you have any comments or suggestions on this test please give Robert Williams or me a call at (303) 831-8100.

Sincerely,

Douglas C. Downey
Project Manager

cc: Marty Faile - AFCEE

RDW/169.WW6

TABLE 1
PROPOSED WATER AND NITRATE SOLUTION INJECTION SUMMARY
SITE FT-13
KIRTLAND AFB, NEW MEXICO

Location	Screened Interval (feet)	Effective Screen Length (feet)	Oxygen Utilization Rate (%/min)[a/]	Solution Required (gal.)	Solution Concentration (mg/L)
MPA-15	15-15.5	0.5	9.4×10^{-5}	27.5	1500
MPA-24	24-24.5	0.5	NS[b/]	27.5	1500
MPB-15	15-15.5	0.5	NS	27.5	1500
MPB-24	24-24.5	0.5	6.2×10^{-5}	27.5	1500
MPC-15	15-15.5	0.5	NS	27.5	1500
MPC-24	24-24.5	0.5	9.9×10^{-5}	27.5	1500

[a/] Oxygen Utilization Rates taken from 12-month respiration test conducted in May 1994.
[b/] NS=Not Sampled. These monitoring points were not sampled during recent previous respiration tests.