

ENGINEERING-SCIENCE, INC.

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September 22, 1994

Mr. Marty Faile
AFCEE/ERT
8001 Arnold Drive
Brooks AFB, Texas 78235-5357

RE: AFCEE Bioventing Test Initiative Final Tables

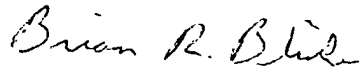
Dear Marty:

Please find attached final tables and site figures for two sites at which 12 months of bioventing pilot testing have been completed. Specifically, final tables and site figures are attached for Beale AFB - Site 11 and Travis AFB - Fuel Storage Area G (Site 1).

Please call me or Doug Downey at (303) 831-8100 if you have any questions.

Sincerely,

ENGINEERING-SCIENCE, INC.

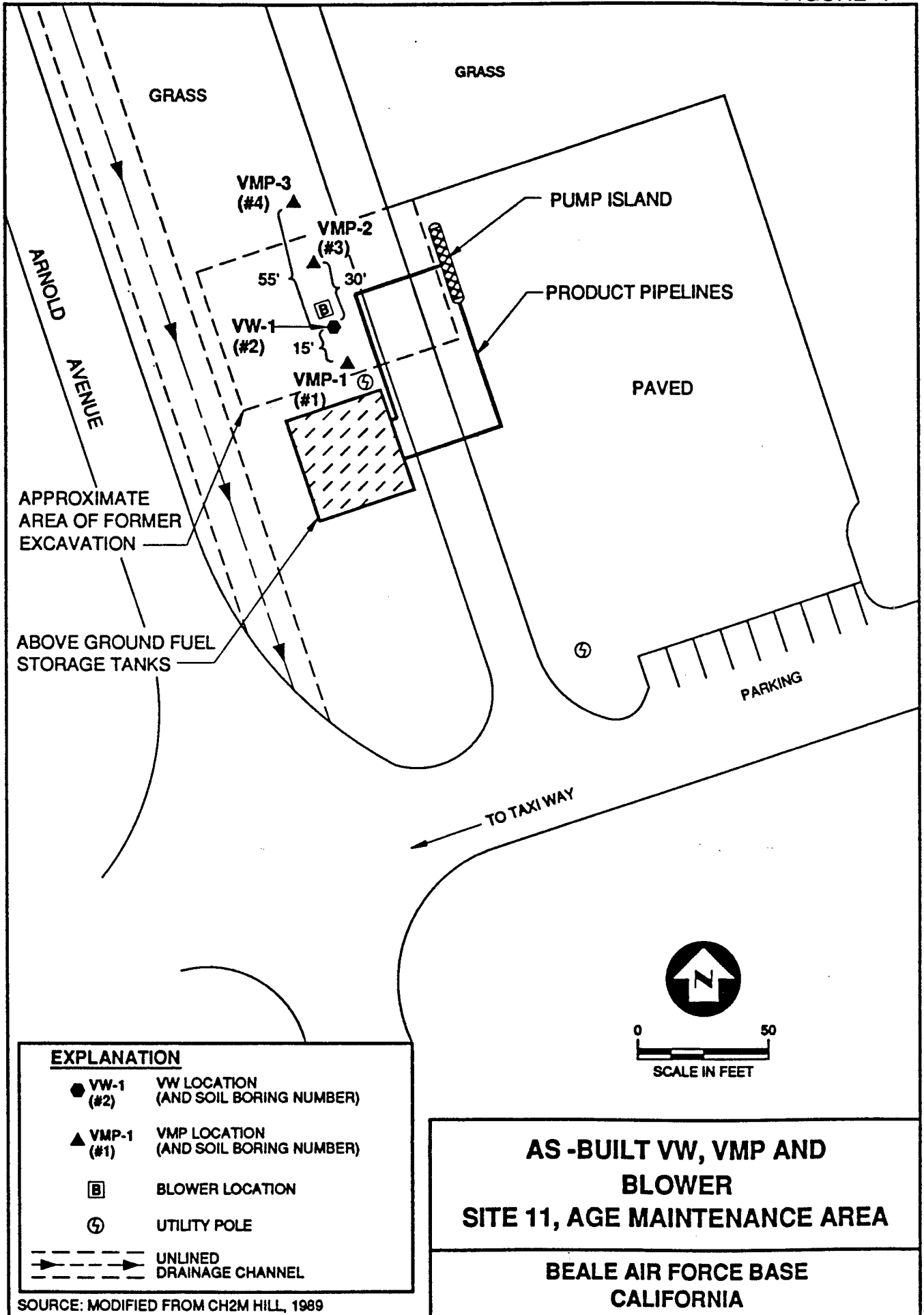


Brian R. Blicher
Environmental Engineer

c.c.: Doug C. Downey, P.E.
File

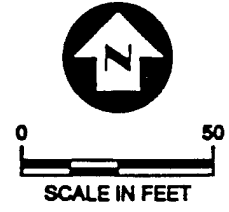
DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

FIGURE 1



EXPLANATION	
● VW-1 (#2)	VW LOCATION (AND SOIL BORING NUMBER)
▲ VMP-1 (#1)	VMP LOCATION (AND SOIL BORING NUMBER)
⊠	BLOWER LOCATION
⊕	UTILITY POLE
--->---	UNLINED DRAINAGE CHANNEL

SOURCE: MODIFIED FROM CH2M HILL, 1989



**AS -BUILT VW, VMP AND BLOWER
SITE 11, AGE MAINTENANCE AREA**

**BEALE AIR FORCE BASE
CALIFORNIA**

TABLE 1
 SITE 11
 RESPIRATION AND DEGRADATION RATES
 BEALE AFB, CALIFORNIA

Location - Depth	Initial - May 1993			6 - Month - December 1993			1 - Year - July 1994		
	K _o (%O ₂ /min)	Degradation Rate (mg/kg/year) ^{a/}	Soil Temperature (°C)	K _o (%O ₂ /min)	Degradation Rate (mg/kg/year) ^{b/}	Soil Temperature (°C)	K _o (%O ₂ /min)	Degradation Rate (mg/kg/year)	Soil Temperature (°C)
VMP1-24	0.0020	50	21.6	0.00065	47	23.5	0.00060	71	20.7
VMP1-40.5	NS ^{c/}	NS	22.8	NS	NS	20.4	NS	NS	20.6
VMP2-24	0.00078	130	NS	0.00063	110	NS	0.00038	63	NS
VMP3-30.5	0.0030	530	NS	0.00027	47	NS	0.00065	110	NS

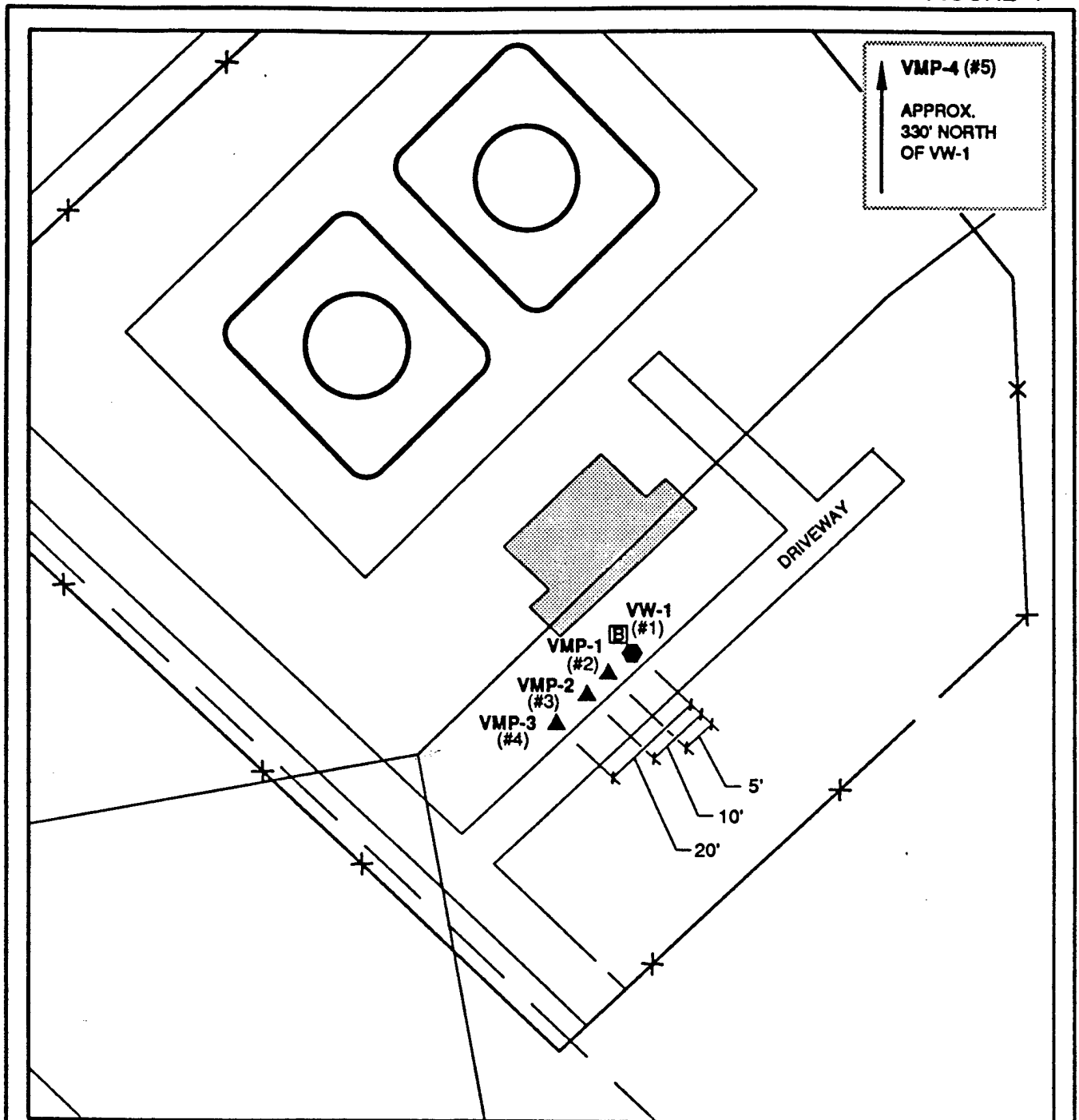
Notes:

^{a/} Milligrams of hydrocarbons per kilogram of soil per year.








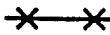
^{b/} Assumes moisture content of soil is average of initial and final moistures.

^{c/} NS = Not Sampled

FIGURE 1



EXPLANATION

- 
VW-1 (#1) VENT WELL LOCATION (AND SOIL BORING NUMBER)
- 
VMP-2 (#3) VAPOR MONITORING POINT LOCATION (AND SOIL BORING NUMBER)
- 
BLOWER LOCATION
- 
PRODUCT PIPELINE
- 
AREA OF ABOVE GROUND FUEL LINES
- 
FUEL TANK AND BERM
- 
STORM DRAIN
- 
FENCE

SOURCE: MODIFIED FROM EARTH TECHNOLOGY, 1992



**AS BUILT VW, VMP, AND BLOWER LOCATIONS
IRP SITE 1, FUEL STORAGE AREA G**

TRAVIS AIR FORCE BASE, CALIFORNIA

TABLE 1
 FUEL STORAGE AREA G (SITE 1)
 RESPIRATION AND DEGRADATION RATES
 TRAVIS AFB, CALIFORNIA

Location - Depth	Initial - June 1993			6 - Month - December 1993			1 - Year - July 1994		
	K _o (%O ₂ /min)	Degradation Rate (mg/kg/year) ^{a/}	Soil Temperature (°C)	K _o (%O ₂ /min)	Degradation Rate (mg/kg/year) ^{b/}	Soil Temperature (°C)	K _o (%O ₂ /min)	Degradation Rate (mg/kg/year)	Soil Temperature (°C)
VW-1	0.047	4,500	NS ^{c/}	NS	NS	NS	0.0057	690	NS
VMPI-3.5	0.052	3,900	19.5	NS	NS	16.6	NS	NS	23.8
VMPI-6.5	0.072	4,900	19.0	0.011	1,000	20.8	0.0077	930	22.4
VMP2-5	0.067	7,100	NS ^{c/}	0.0087	880	NS	0.0080	720	NS
VMP2-9	NS	NS	NS	0.018	1,600	NS	0.025	1,800	NS
VMP3-3.5	NS	NS	NS	NS	NS	NS	0.017	1,000	NS
VMP3-6.5	0.065	3,700	NS	0.015	910	NS	0.023	1,400	NS

Notes:

^{a/} Milligrams of hydrocarbons per kilogram of soil per year.

^{b/} Assumes moisture content of soil is average of initial and final moistures.

^{c/} NS = Not Sampled

TABLE 2
 FUEL STORAGE AREA G (SITE 1)
 INITIAL AND 1-YEAR SOIL AND SOIL GAS ANALYTICAL RESULTS
 TRAVIS AFB, CALIFORNIA

Analyte (Units) ^{a/}	Sample Locations - Depth (feet below ground surface)							
	VW1		VMP1-6.5		VMP2-6		VMP2-9	
	Initial ^{b/}	1-Year ^{c/}	Initial	1-Year	Initial	1-Year	Initial	1-Year
Soil Gas Hydrocarbons								
TVH (ppmv)	110,000	340	120,000	1,400	110,000	5,200		
Benzene (ppmv)	1,400	0.71	1,500	18.0	1,000	2.5		
Toluene (ppmv)	670	0.86	800	16	180	17		
Ethylbenzene (ppmv)	250	0.47	30	4.6	23	14		
Xylenes (ppmv)	120	3.6	120	24	51	66		
Soil Hydrocarbons								
TRPH (mg/kg)	<12	6.3	<12	12	6.9	230	21,500	
Benzene (mg/kg)	0.022	<0.0005	0.026	0.38	<0.0029	<1.2	<1.5	
Toluene (mg/kg)	0.030	<0.0005	0.027	2.0	<0.0029	<1.4	<1.5	
Ethylbenzene (mg/kg)	0.012	<0.0005	0.013	1.5	<0.0029	35	51	
Xylenes (mg/kg)	0.040	<0.0008	0.042	5.8	<0.0041	45	350	
Moisture (%)	14.8	13.7	16.4	14.3	14.8	NA ^{f/}	16.4	

^{a/} TVH = total volatile hydrocarbons; ppmv = parts per million, volume per volume;
^{b/} TRPH = total recoverable petroleum hydrocarbons; mg/kg = milligrams per kilogram.
^{c/} Initial soil gas samples collected on June 7 and 8, 1993.
^{d/} Final soil gas samples collected on July 5, 1994.
^{e/} Initial soil samples collected on February 16, 1993.
^{f/} Final soil samples collected on July 19, 1994.
^{g/} NA = Not analyzed.