SFUND RECORDS CTR
67465

TRC

PRELIMINARY SITE CHARACTERIZATION REPORT WASTE DISPOSAL, INC. SUPERFUND SITE VOLUME II

Prepared for

Waste Disposal, Inc. Group

Santa Fe Springs, California

Prepared by

TRC

Irvine, California

Project No. 94-256
March 1998

TRC
21 Technology Drive
Irvine, California 92618
Telephone 714-727-9336
Facsimile 714-727-7399

cyclable and made from recycled paper

APPENDIX B

GEOPROBE LOGS AND VOLUME CALCULATIONS

TRC

ATTACHMENT B.1

GEOPROBE BORING LOGS

TRC

BORING NO. WDI-TS-01 SHEET 1 OF 1

DRILLING CO/RIG TEG

SAMPLER TYPE Continuous Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-6-97

DATE FINISHED 10-6-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	0825	CC 1' Recov.	ml/sm		SANDY SILT TO SILTY SAND: Light gray, trace of gravel, dry, No staining
				ml		(~1.1'-1.7') SILT: Red, trace of sand, dry, No staining
		0845	10" Rec.	SW		(~1.7'-2') SAND: Light brown, trace of silt, fine to med. grained, well graded, trace of white calcium deposits, dry, No staining
				cl/ml		
5		0850	1' Rec.			(3'-3.8') SAND: Light brown, trace of gravel, fine to med. grained, well graded, dry
		0855	1.5' Rec.			(3.8'-4') SILTY CLAY TO CLAYEY SILT: Dark brown, slightly moist, No staining, similar to 3.8'-4' core. (4'-6')
		0900	2' Rec.			(6.8'-8') CLAY: Dark gray to green, trace of sand, saturated, stained (black), strong odor (7.9'-8') White clayey material, moist, No staining)
10						(8'-8.9') SIMILAR MATERIAL AS 7.9'-8')
		0905	2' Rec.	cl		8.9'-10') CLAY: DARK GRAY TO GREEN, trace of sand. (10'-11') SIMILAR MATERIAL AS 8.9'-10'; (11'-12') DARK GRAY to green, Black stained areas, saturated. trace of brown hydrocarbon stained areas (concentrated areas)
		0910	2' Rec.			Similar material as 11'-12' core
15		0915	2' Rec.			Similar material as 12'-14'. Increase in dark brown hydrocarbon staining from 15'-16', strong odor (concentrated areas)
		0920	2' Rec.			Similar material as 14'-16' core. Decrease in brown hydrocarbon staining
20		0930	2' Rec.			Similar material as 16'-18' core.
		0950	1.8' Rec.			(20.7'-21.8') Clay: Green, trace of sand, saturated does not appear stained; (21.8'-22') Sand: Light brown, fine to med. grained, trace of silt, well graded, dry, No staining
		1000	1.6' Rec.	SW		(22.5'-22.8') SAND: Light brown to green, med. to coarse grained, well graded, No staining
25		1005	2' Rec.			(22.8'-23') Red: light brown, fine to med. grained sand, trace of silt, No staining (23'-23.1') Clay: green, trace of sand, No staining (23.1'-24') Sand: light brown, fine to med. grained, trace of silt, dry, stained
		1020	1' Rec.			(24'-26') SAND: Light brown to green, fine to med. grained, well graded, dry, stained, Slight odor (hydrocarbon)
						(26'-27') Similar material as 24'-26' core. Difficult coring. Discontinued at 27'. Slight odor (hydrocarbon)
30						

Total Depth: 27 Feet

No ground water during drilling.

Backfilled with hydrated bentonite pellets.

8.9'-21' Clayey zone may potentially be sump material.

White material at 7.9'-8.9' (stained) appears to be paddy material.

NM - Not measured

CC - Continuous Core

NA - Not Applicable

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-02 SHEET 1 OF 1

DRILLING CO./RIG: TEG
SAMPLER TYPE AND DIMENSION: Continuous Core 1" x 2'
FIELD ENGINEER: A. Isaly
EDITED BY: A Isaly
CHECKED BY:

COORDINATES N: NM E: NM
DATE BEGAN: 10.6.97
DATE FINISHED: 10.6.97
GROUND SURFACE EL: NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION-RESISTANCE (BLOWS-PER-FOOT) TYPE SAMPLER	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1115	CC 1.5' rec	114/5m		(.8"-.10") SANDY SILT TO SILTY SAND: Light gray, trace of gravel, well graded, dry, No staining. (.10"-2') SAND; Brown, fine to med grained, trace of silt, well graded, dry, No staining (increase in silt content (1.6'-2')
		1120	1' rec.	SW		(3'-3.7') similar as 0-2' sample; (3.7'-4') Dark brown, trace of clay, dry, No staining
5		1125	9" rec			(5.3'-5.6') Clay: Dark brown, trace of sand, moist, No staining, (5.6-6') white clayey material, moist, No staining, No odor
		1135	1.3' rec			(6.10'-7.2') Clay; white, moist, trace of sand, No staining No odor (7.2'-8') Clay: Dark gray to green, trace of sand, evidence of staining (black areas) strong odor, saturated
		1140	1.7' rec			
10		1145	2' rec	CL		(8.5'-10') Similar material as 7.2'-8' core. Decrease in black material staining in concentrated areas (11.9'-12') (10'-12') Similar material as 8.5'-10' core. Dark brown hydrocarbon
		1150	2' rec.			(12'-14') Similar material as 10'-12' core. Increase in dark brown hydrocarbon staining areas (12'-13'). No evidence of hydrocarbon staining (13'-14')
15		1205	2' rec.			(14'-16') Similar material as 12'-14' core. Evidence of dark brown hydrocarbon staining (15'-16').
		1215	2' rec			(16'-18') Similar material as 14'-16' core. No hydrocarbon staining (16'-17'). Increase in hydrocarbon staing (17'-18')
		1225	2' rec.			
20		1240	2' rec.			(18'-20') Similar material as 16'-18' core. Increase in hydrocarbon staining throughout core. (20'-22') Similar material as 18'-20' core.
		1255	1.9' rec			(22.3'-23.5') Similar material as 20'-22' core.
25		1315	2' rec	SP		(23.5'-24') SAND: Dark gray to green, fine to med grained, poorly graded, dry, possibly stained, strong hydrocarbon odor (24'-26') Similar material as 23.5'-24' core.
30						

Total Depth: 26 FEET

No ground water during drilling.

Backfilled with bentonite pellets.

Clay (stained) Material below white clayey substance could potentially be sump material.

White material at 5.6'-7.2' appears to be puddy material.

NM - Not Measured
NA - Not Applicable
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT: EPA

PROJECT NO.: 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-03 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-6-97

DATE FINISHED 10-6-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	CC 1340	1.3' Rec	ml/sm, sw	
		1345	1.4' Rec	ml/sm, cl/ml	
5		1350	1.1' Rec	cl	
		1355	1.6' Rec		
		1400	2' Rec.		
10		1405	2' Rec		
		1410	2' Rec.		
15		1425	2' Rec.	ml/sm	
		1430	2' Rec.		
20		1435	2' Rec.		
25					
30					

DESCRIPTION

(0.8'-.11') Silty Sand To Sandy Silt: Light brown, trace of gravel, well graded, No staining, dry (.11'-1.3') Sand: Brown, fine to med. grained, trace of silt, well graded, No staining, dry (1.3'-1.6') Sand: Red, trace of silt, No staining, dry (1.6'-2') Silty Sand To Sandy Silt: Dark brown, trace of coarse sand, well graded, micaceous, No staining, No odor, dry

(2.9'-3.9') Silty Clay To Clayey Silt: Dark Brown, trace of sand, No staining, dry, No odor (3.9'-4') Clay, White, moist, trace of sand, No odor, No staining.

(4.11'-6') Silty Clay To Clayey Silt: Dark Brown, trace of sand, well graded, moist, No odor, No staining

(6.7'-7.7') Similar material as (4.11'-6'). (7.7'-8') Clay, dark brown, trace of sand, moist, No odor, No staining.

(8-8.6') Similar material as (7.7'-8') core. (8.6-10') Clay: Dark gray to green, trace of sand, stained dark black areas (9.4'-10'), moist

(10'-12') Clay: Brown to green, trace of sand, moist, No black staining

(12'-12.11') Similar material as 10'-12' core. (12.11'-14') Silty Sand To Sandy Silt: Light brown to green, trace of coarse stained sand, well graded, slightly moist, No odor, possible staining

(14'-16') Green Similar material as 12.11'-14' core. Trace of clay. No odor. possible staining.

(16'-17') Similar material as 14'-16' core. (17'-18') Increase in silt cont.

(18'-20') Similar material as 18'-20' core. No odor, possible staining.

Total Depth: 20 Feet

No ground water during drilling.

Backfilled with bentonite pellets.

Clay (stained) Zone ~4.11'-13' may potential be sump material.

White clay ~3.9'-4' may be pudddy material.

NA - Not Applicable
NM - Not measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS04 SHEET 1 OF 1

DRILLING CO/RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10·6·97

DATE FINISHED 10.6.97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time Sampled	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1510	CC 1.4' rec.			(0.3'-1.3') Silty Sand To Sandy Silt: Light brown, trace of gravel, well graded, No odor, No staining, dry (1.3'-2') Dark brown to red, micaceous, No staining, dry
		1515	1.5' rec.	ml/sm		(2.6'-4') Similar material as 1.3'-2' core. Trace of coarse grained sand. No staining. No odor
5		1520	1.1' rec.			(4.11'-6') Similar material as 1.6'-2' core. Increase in sand content.
		1530	1.4' rec			(6.3'-8') Dark brown, moist, No odor, No staining.
		1535	1.6' rec.	cl/ml		(8.6'-10') Silty Clay to Clayey Silt: Dark brown, trace of sand, micaceous, well graded, slightly moist, No odor, No staining
10		1540	2' rec	ml/sm		(10'-12') Silty Sand to Sandy Silt: Brown to Red, trace of coarse sand, well graded, moist, No odor, No staining
		1550	2' rec			(12'-13.7') Similar material as 10'-12' core. (13.7'-14') Silt: Dark gray to green, poorly graded, slightly moist, micaceous, No odor, No staining
15		1600	2' rec.	ml		(14'-14.6') Similar material as 13.7'-14' core. (14.6'-16') Silty Sand to Sandy Silt: Dark gray to green, micaceous, mottled, slightly moist, No odor, No staining
		1605	1.6' rec	ml/sm		(16.6'-18') Similar material as 14.6'-16 core. No odor, No staining
20		1625	1.4' rec.			(18.1'-19.5') Similar material as 16.6'-18' core. Difficult coring.

Total Depth: 19.5 Feet

No ground water during drilling

Backfilled with bentonite pellets.

Did not appear to encounter sump material or white puddly.

NM - Not measured
NA - Not applicable
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-05 **SHEET** 1 **OF** 1

DRILLING CO./RIG: TEG

SAMPLER TYPE AND DIMENSION: Continuous Core 1" x 2'

COORDINATES: N NM; E NM

FIELD ENGINEER: A. Isaly

DATE BEGAN: 10.7.97

EDITED BY: A. Isaly

DATE FINISHED: 10.7.97

CHECKED BY:

GROUND SURFACE EL: NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME (MINUTES)	SAMPLE NO. AND TYPE (RECOVERY)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0655	CC 1.2' rec.		
		0700	1.2' rec.	ml/sm	
5		0705	1.1' rec.		
		0710	1.7' rec.		
		0715	1.8' rec.	cl/ml	
10		0720	2' rec.		
		0725	1.10' rec.		
				sp	
15		0730	1.7' rec.		
				cl/ml	
		0735	2' rec.	ml/sm	
		0745	2' rec.	ml	
20		0800	1.9' rec.	sp	
25					

DESCRIPTION

(0.9'-1.2') SILTY SAND TO SANDY SILT; Light gray, trace of gravel, well graded, dry, No odor, No staining (1.2'-2') Dark brown, trace of coarse grained sand, No odor, No staining, slightly moist

(2.10'-4') similar material as 1.2'-2' core. No staining

(4.11'-5.8') similar material as 2.10'-4' core. (5.8'-6') Silty Clay to Clayey SILT; Brown to green; trace of fine grained sand, med. plastici micaceous, moist, No odor, No staining.

(6.5'-7.6') similar material as 5.8'-6' core. Black material from 6.8'-7' (possibly organic. (7.6'-8') Light green to black, trace of med to coarse sand, micaceous, moist, slight odor, stained

(8.4'-10') Dark brown to black, increase in sand content strong hydrocarbon odor, stained (majority of core is black in color)

(10'-12') similar material as 8.4'-10' core.

(12.2'-12.7') similar material as 10'-12' core. Dark gray. (12.7'-14') SAND; Dark gray to black, fine to med. grained, trace of silt, poorly graded, moist, strong odor, stained

(14.5-15') similar material as 12.7'-14' core. (15'-16') SILTY Clay to Clayey SILT; Dark green to black, trace of fine grained sand, micaceous, slightly moist, slight odor possibly stained

(16'-16.4') SILTY SAND TO SANDY SILT, Dark green to black, fine to med. grained sand micaceous, slightly moist, slight odor, stained (16.4'-18') similar material as 16'-16.4'. Decrease in grain size. Poorly graded. Slight odor. does not appear stained

(18'-20') SILT; Green (olive), poorly graded, micaceous, slightly moist, No odor, black material throughout core (possibly organic), does not appear stained

(20.3'-20.11') similar material as 18'-20' core. (20.11'-22') SAND; Light gray to olive green, fine grained, poorly graded, slightly moist, No odor, No staining (Difficult drilling)

Total Depth: 22 FEET

No ground water during drilling.

Backfilled with bentonite pellets.

Soil appears to be stained from ~7.6-15'. (Black)

NM - Not measured.
NA - Not Applicable
CC - Continuous core

A-FIELD/FMB REV. 03/20/92

CLIENT: EPA

PROJECT NO. 94-256

Suite To Source CA

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-06 **SHEET** 1 **OF** 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

COORDINATES N NM E NM

FIELD ENGINEER A. Isaly

DATE BEGAN 10-7-97

EDITED BY A. Isaly

DATE FINISHED 10-7-97

CHECKED BY

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time Sampled	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA		CC	ml/sm	
		0830	1.1' rec		
		0835	1' rec.	cl/ml	
5		0840	1.2' rec		
		0845	2' rec.		
		0850	2' rec.	cl	
10		0855	1.8' rec.		
		0900	2' rec.		
15		0905	2' rec	ml/sm	
		0910	1.11' rec	ml/sm	
		0915	2' rec	ml	
20		0920	2' rec.	Sp	
25					

DESCRIPTION

(1'-1.2') SILTY SAND TO SANDY SILT; Light brown to light gray, trace of gravel, well graded, dry, No staining (1.2'-2') SILTY Clay to Clayey SILT: Dark brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(3'-4') Similar material as (1.2'-2') core. mottling. No odor. No staining.
(4.9'-5.3') Similar material as 3'-4' core. (5.3'-6') Clay, Dark brown to dark gray, trace of sand, micaceous, saturated, strong odor, stained
(6'-8') Dark gray to olive green, trace of black material (possibly organic), saturated, strong odor. stained (Dark brown hydrocarbon stained areas).
(8'-10') similar material as 6'-8' core. Hydrocarbon staining throughout core
(10.5'-12') Similar material as 8'-10' core. Decrease in hydrocarbon staining.
(12'-13.9') Similar material as 10.5'-12' core. No evidence of hydrocarbon staining. (13.9'-14') SILTY SAND TO SANDY SILT, Olive green to dark brown, coarse grained sand, well graded, slightly moist, slight odor, does not appear stained
(14'-15.4') similar material as 13.9'-14' core. Appears to be slight increase in silt content (14.7'-15.4') does not appear to be stained. (15.4'-15.9') SAND; Light brown to olive green, fine to med. grained, well graded (15.9'-16') SILTY SAND TO SANDY SILT. Olive green, coarse grained sand, well graded, slight hydrocarbon odor, does not appear stained, slightly moist
(16.1'-16.10') Similar material as 15.9'-16' core. slight odor, No staining (16.10'-18') increase in fines (fine grained sand), micaceous, poorly graded, slight odor, No staining
(18'-19.2') SILT; olive green, poorly graded, micaceous, slightly moist, slight odor, No staining (19.2'-20') SILTY SAND TO SANDY SILT: Olive green, fine grained sand, poorly graded, micaceous, slight odor. No staining.
(20'-22') SAND; olive green, fine grained, trace of silt, poorly graded, slightly moist, slight odor, No staining

Total Depth: 22 Feet

No ground water during drilling.

Backfilled with bentonite pellets.

Clayey stained zone from 5.3' to 12' could potentially be sump material

NM - Not measured
NA - Not Applicable
CC - Continuous core.

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDT-TS-07 SHEET 1 OF 1

DRILLING CO/RIG TFG

SAMPLER TYPE Continuous Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-7-97

DATE FINISHED 10-7-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1030	CC 1.1' Rec	ml/sm	
		1035	10" Rec.	cl/ml	
5		1040	8" Rec.		
		1045	2' Rec.		
		1050	2' Rec.		
10		1055	2' Rec.		
		1100	1.8' Rec.		
15		1105	1.10' Rec	cl	
		1110	2' Rec.		
		1115	2' Rec.		
20		1120	1.11' Rec		
		1125	1.10' Rec.	Sp	
25					

DESCRIPTION

Asphalt ~4" Thick

(0.11'-1.4') Silty Sand. To Sandy Silt: Light brown to light gray, trace of gravel, well graded, dry, no staining (1.4'-2') Silty Clay to Clayey Silt, dark brown, trace of coarse sand, micaceous, slightly moist, no odor, no staining.

(3.2-4') Similar material as 1.4'-2' core. Slight increase in clay content, no odor, no staining

(5.4'-5.6') Similar material as 3.2'-4' core. (5.6'-6') Clay: dark brown, micaceous, saturated, high plasticity, no odor, no staining. trace of sand

(6'-8') olive green to dark gray, trace of sand, saturated, black material throughout core (possibly organic), saturated, strong hydrocarbon odor, possibly stained.

(8'-10') Olive green, similar material as 6'-8' core. Possible hydrocarbon staining (brown) ~ 9.3-9.10'.

(10'-12') Similar material as 8'-10' core. Hydrocarbon staining (11.7'-12') appears to be dark brown in concentrated areas also an increase in black material

(12.4'-14') Similar materials as 10'-12' core. Saturated. Does not appear to hydrocarbon staining; strong odor.

(14.2'-16') Similar material as 12.4'-14' core. Increase in hydrocarbon staining throughout core. Strong odor.

(16'-18') Similar material as 14.2'-16' core. Hydrocarbon staining evident throughout core. Black material from 17'-18'

(18'-20') Similar material as 16'-18' core. Decrease in hydrocarbon staining from 18'-19.7'. Increase in hydrocarbon staining from 19.7'-20'.

(20.1'-21.9') Similar material as 18'-20' core. (21.9'-22') Sand; olive green to light gray, fine grained, poorly graded, slightly moist, strong hydrocarbon odor, possibly stained.

(22.2'-24') fine to med. grained, poorly graded, slightly moist, slight odor, no hydrocarbon staining.

Total Depth: 24 Feet

Ground water was not encountered during drilling

Backfilled with bentonite pellets. Asphalt patch at surface.

Clay (stained) zone ranging from ~ 6'-21.9' could potentially be sump material.

NM - Not measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

CLIENT EPA

PROJECT NO. 94-256

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WNT-TS-08 SHEET 1 OF 1

DRILLING CO/RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10.7.97

DATE FINISHED 10.7.97

GROUND SURFACE EL NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (RECOVERY)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1255	CC 1.5' rec	m/sm	
		1300	~9" rec.		
5		1305	1.4' rec.		
		1310	1.8' rec.	cl/ml	
		1315	2' rec.	cl	
10		1320	2' rec.		
		1325	2' rec.	cl/ml	
15		1330	2' rec.		
		1335	2' rec		
		1340	1.8' rec	sp	
20					

DESCRIPTION

(9"-1') SILTY SAND TO SANDY SILT: Brown, trace of gravel, well graded, trace of roots, dry, no staining. (1'-2') Light brown, trace of coarse sand, dry, No staining. mottling
(3.8'-4') Similar material as 1'-2' core. No staining
(4.8-6') Dark brown, trace of coarse sand, well graded, mottling, micaceous. Slightly moist, No odor, No staining
(6.4'-8') SILTY CLAY to CLAYEY SILT: Dark brown, trace of coarse sand, trace micaceous, friable, low plasticity, slightly moist, No odor, No STAINING.
(8'-10') Similar material as 6.4'-8' core. Clay, high plasticity, black material interlayered (possibly organic), No odor. No STAINING.
(10'-12') Similar material as 8'-10' core. No hydrocarbon staining
(12-14) SILTY Clay to Clayey Silt; Light brown to brown, trace of sand, micaceous, moist, no odor, no staining.
(14'-16') Similar material as 12'-14' core. Increase in silt content, black to dark brown areas throughout core (possibly organic), slightly moist, No odor, does not appear to be stained
(16.2'-17.7') Similar material as 14'-16'. No staining. (17.7'-18') SAND: Light brown, poorly graded, micaceous, slightly moist No odor, No STAINING.
(18.4-20') Similar material as 17.7'-18' core. Red to brown, fine to med. grained, micaceous, slightly moist, No odor, No staining
poorly graded

Total Depth: 20 FEET

Ground water was not encountered during drilling

Backfilled with bentonite pellets.

Did not appear to contact sump material.

NM - Not measured
NA - Not Applicable
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WD7-TS-09 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-7-97

DATE FINISHED 10-7-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1430	CC 1' rec	ml/sm	
		1435	1.2' rec		
5		1440	1.1' rec		
		1445	1.1' rec		
		1450	1' rec		
10		1455	1.1' rec	cl/ml	
		1500	1.1' rec		
15		1505	2' rec		
		1510	1.6' rec		
		1515	1.6' rec	ml/sm	
20		1520	1.11' rec	ml	
25					

DESCRIPTION

(1'-2') SANDY SILT TO SILTY SAND: Light brown, trace of gravel (1'-1.2'), trace of coarse grained sand, well graded, dry, No odor, No staining.

(2.10'-4') Increase in sand content, well graded, intermixed with red and white material, dry, No odor, No staining

(4.11'-5.1') Similar material as 2.10'-4' core. (5.1'-6') Silty Clay to Clayey Silt: Dark brown, trace of coarse sand and gravel, micaceous, slightly moist, Strong hydrocarbon odor, possibly stained.

(6.11'-7.1') Black silty clay, intermixed with fine to med. grained Red to light brown sand (7.1'-8') Silty Clay to Clay Silt: Black, trace of sand, intermixed with light gray sand deposits, strong hydrocarbon odor, stained.

(9'-10') Black to olive green, saturated, strong odor, stained

(10.11'-12') Similar material as 9'-10' core. stained.

(12.8'-14) Similar material as 10.11'-12' core. stained

(14'-16') DARK BROWN to olive green, trace of fine grained sand, slightly moist, slight odor, possibly stained.

(16.6'-18') BROWN, similar material as 14'-16' core, No odor, does not appear stained.

(18.6'-20') SILTY SAND TO SANDY SILT: Olive green, trace of coarse sand, well graded, micaceous, slightly moist, No odor, does not appear stained.

(20.1'-20.9') similar material as 18.6'-20' core (20.9'-22') SILT: Light gray, trace of fine grained sand, poorly graded, micaceous, slightly moist, No odor, No staining

Total Depth: 22 FEET

Ground Water was not encountered during drilling

Backfilled with bentonite pellets.

Contacted possible slump material at ~6' to 14'.

NM - Not measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDT-TS10 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-7-97

DATE FINISHED 10-7-97

GROUND SURFACE EL NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1550	CC 10" rec	ml/sm	
		1555	1.6' rec	ml	
5		1600	6" rec	ml/sm	
		1630	1.4' rec		
		1635	1.6' rec		
10		1640	1.3' rec		
		1645	1.6' rec		
15		1650	2' rec	cl/ml	
		1655	1.9' rec		
		1700	2' rec		
20		1705	2' rec		
		1725	2' rec		
25		1735	1.4 rec.	Sp	

DESCRIPTION

(1.2'-2') SILTY SAND TO SANDY SILT: Light brown, trace of coarse sand, higher silt content (1.2'-1.6'), trace of vegetation, well graded, dry, No odor, No staining

(2.6'-2.9') Silty Clay to Clayey Silt; Dark brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining

(2.9'-3.0') Silty Sand to Sandy Silt; Brown, trace of coarse sand, well graded, slightly moist, No staining (3'-3.4') Silt; Red, poorly graded (3.4'-4') Silty Sand to Sandy Silt; Brown to Red, trace of coarse sand, intermixed with fine grained light brown sand, slightly moist, No odor, No staining.

(5.6'-6') Similar material as 3.4'-4' core. No odor, No staining

[Rock in shoe of sampler. Relocated boring ~2.5' North of original]

(6.8'-7') Silty Clay to Clayey Silt: White, trace of sand, slightly moist, black material intermixed, strong hydrocarbon odor, stained (7-8') Similar material as 6.9'-7' core. Black to dark brown, hydrocarbon stained, strong odor.

(8.7'-10') Olive green, increase in hydrocarbon staining (9.5'-10') strong odor

(10.9'-12') Similar material as 8.7'-10' core. Decrease in hydrocarbon staining, strong odor

(12.6'-14') Similar material as 10.9'-12' core. Strong hydrocarbon odor. Possibly stained (No evidence of hydrocarbon staining visible)

(14'-16') Similar material as 12.6'-14' core. Evidence of hydrocarbon staining at 15.7'.

(16.3'-18') Similar material as 14'-16' core. Hydrocarbon staining throughout core.

(18'-20') Similar material as 16.3'-18' core. Hydrocarbon staining throughout core.

(20'-22') Similar material as 18'-20' core. Core appears to be very stained. (large volume of hydrocarbon)

(22'-23.9') Similar material as 20'-22' core. (23.9'-24') Sand; Olive green, fine to med. grained, poorly graded, slightly moist, strong hydrocarbon odor, possibly stained.

(24.8'-26') Similar material as 23.9'-24' core. Fine grained trace of silt slight odor, No staining (Difficult drilling)

TOTAL DEPTH: 26 FEET

Ground Water was Not encountered during drilling

Backfilled both borings (6' & 26') with bentonite pellets

Sump material appears to be from 6.8' to 23.9'.

NM - Not Measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

CLIENT EPA

PROJECT NO. 94-256

Santa Fe Springs CA

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-11 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-8-97

DATE FINISHED 10-8-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0650	CC 8"	ml/sm	
		0655	1.7' rec		
5		0700	1.3' rec		
		0705	1.5' rec		
		0710	1.3' rec		
10		0715	1.3' rec		
		0720	1' rec.		
15		0725	1.6' rec	cl/ml	
		0730	2' rec.		
		0735	2' rec.		
20		0740	1.6' rec.		
		0745	2' rec.		
				Sp	
25		0750	1.7' rec.	ml	

DESCRIPTION

(1.4'-1.6') SILTY SAND TO SANDY SILT: Brown, trace of gravel, trace of vegetation, well graded, dry, No staining (1.6'-2') Light brown, increase in fines, No odor, No staining.
(2.6'-2.10') Brown, No odor, No staining (2.10'-4') Brown to Light brown, trace of gravel, No odor, No staining
(4.9'-5.3') Similar material as 2.10'-4' core. (5.3'-6') Silty Clay to Clay Silt: Dark brown to black, Saturated, micaceous, strong hydrocarbon odor, stained
(6.7'-7.4') Similar material as 5.3'-6' core. (7.4'-8') Olive green to black, saturated, strong hydrocarbon odor, stained
(8.9'-10') Similar material as 7.4'-8' core. Strong odor, stained
(10.9'-12) Similar material as 8.9'-10' core. Decrease in black material content, stained.
(13'-14') Similar material 8.9'-10' core. Decrease in black material content. Slight hydrocarbon odor, possibly stained.
(14.6'-16') Similar material as 13'-14' core. Slight increase in black material (15.5'-16') possibly stained
(16'-18') Similar material as 14.6'-16' core. Brown hydrocarbon staining (17.9'-18')
(18'-20') Similar material as 16'-18' core. Hydrocarbon staining throughout core Trace of gravel at 19.1'
(20.6'-22') Similar material as 18'-20' core Decrease in hydrocarbon staining.
(22-23.9') Similar material as 20.6'-22' core. Increase in hydrocarbon staining (23.9'-24') Sand, olive green, fine grained, trace of silt, black material intermixed, poorly graded, slightly moist, strong hydrocarbon odor, possibly stained.
(24.5'-26') Silt, olive green, poorly graded, micaceous, slightly moist, No odor, does not appear to be stained

Total Depth: 26 feet
Ground water was not encountered during drilling.
Backfilled with bentonite pellets
Sump material appears to be from ~5.3' to 23.9'.

NM - Not measured
NA - Not Applicable
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256
Santa Fe Springs CA

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-12 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER D. Isaly

EDITED BY D. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-8-97

DATE FINISHED 10-8-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	0820	CC 10" rec	ml/sm		(1.2'-1.6') Silty Sand to Sand Silt: Brown to light brown, trace of gravel, trace of vegetation, well graded. Dry, No staining (1.6'-2') Light gray, trace of coarse sand. No odor, No staining
		0825	1.3' rec			(2.9'-4') Similar material as 1.6'-2' core. [2.9'-3') Brown (3'-3.7') Light brown (3.7'-4') Light gray]. No staining
5		0830	1.2' rec.			(4.10'-6') Similar material as 2.9'-4' core. Slightly moist, slight hydrocarbon odor. Increase in tines with depth.
		0835	2' rec.	cl		(6'-8') Clay, olive green to dark gray, micaceous, trace of sand (fine grained), saturated, high plasticity, moist, No odor, does not appear stained (trace of black material)
		0840	1.7' rec			
10		0845	2' rec.	cl/sw		(8.5'-10') Sandy Clay to Clayey Sand, olive green to dark gray, well graded sand, micaceous, moist, slight odor, does not appear stained.
		0850	1.5' rec	ml/sm		(10'-12') Similar material as 8.5'-10' core. Decrease in sand content. Slight hydrocarbon odor, does not appear stained.
15		0855	1.8' rec			(12.7'-14') Silty Clay to Clayey Silt: Dark brown, trace of sand, micaceous, mottling, moist, No odor, No Staining
		0900	1.5' rec	ml		(14.4'-16') Similar material as 12.7'-14' core. No odor, No staining.
		0905	2' rec.			(16.7'-17.2') Silty Sand to Sandy Silt, gray, trace of coarse sand, micaceous, dry, No odor, No staining (17.2'-18') Silt; light gray, micaceous. No odor, No staining.
20						(18'-20') Similar material as 17.2'-18' core. No odor, No staining

Total Depth: 20 Feet

Ground water was not encountered during drilling

Backfilled with bentonite pellets.

Did not appear to contact sump material.

NM - Not measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TB-13 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 2" x 1'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-8-97

DATE FINISHED 10-8-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	0940	CC 5" rec	ml/sm		(1.7'-2') Silty Sand to Sandy Silt; Light brown to light gray, poorly graded, dry, No odor, No staining.
		0945	1.9' rec.			(2.4'-3.2') Similar material as 1.7'-2' core. (3.2'-4') increase in sand content (coarse grained), moist, No odor, No staining
5		0950	2' rec.			(4'-6') Silty Clay to Clayey Silt; Olive green to black, trace of coarse sand, micaceous, moist, slight hydrocarbon odor, does not appear to be hydrocarbon stained.
		0955	1.7' rec.			(6.5'-7') similar material as 4'-6' core. hydrocarbon (brown) stained. (7'-8') Brown, white material intermixed in concentrated areas, hydrocarbon stained, strong odor.
		1000	2' rec	cl/ml		(8'-10') similar material as 6.5'-8' core olive green, hydrocarbon stained throughout core.
10		1005	1.8' rec.			(10.4-12') similar material as 8'-10' core. No evidence of brown hydrocarbon staining, slight odor, saturated, (olive green to dark gray)
		1010	1.2' rec			(12.10'-14') Similar material as 10.4'-12' core. No staining, slight odor
15		1015	2' rec			(14'-16') Similar material as 12.0'-14' core. Dark brown, slight odor, No evidence of staining.
		1020	1.4' rec.	ml/sm		(16.8'-18') Silty Sand to Sandy Silt; Dark brown, micaceous, well graded, slightly moist, No odor, No staining.
20		1025	1.5' rec	ml		(18.7'-20') Silt; Light gray to olive green, trace of sand, micaceous, mottling, slightly moist, slight odor (hydrocarbon), No staining. (Difficult drilling)
25						

Total Depth: 20 Feet

No ground water during drilling.

Backfilled with bentonite pellets.

Sump material appeared from ~4'-10'.

NM - Not measured.

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-856

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDT-TS-14 **SHEET** 1 **OF** 1

DRILLING CO./RIG: TEG
SAMPLER TYPE AND DIMENSION: Continuous Core 1" x 2'
FIELD ENGINEER: A. Isaly
EDITED BY: A. Isaly
CHECKED BY:
COORDINATES N: NM E: NM
DATE BEGAN: 10-8-97
DATE FINISHED: 10-8-97
GROUND SURFACE EL: NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (RECOVERY)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1100	CC 1' rec		
		1105	1.6' rec	ml/sm	
5		1110	9" rec		
		1140	9" rec	sw	
		1230	1.6' rec		
10		1240	1.10' rec	cl/ml	
		1250	1.5' rec		
15		1300	2' rec		
		1310	2' rec	sw, ml	
		1320	1.2' rec	sw, ml	
20					
25					

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt; Light brown to light gray, trace of coarse sand and gravel, well graded, dry, No odor, No staining
(3.7'-4') Brown, white powder (3.10'-4') broken rock, No odor, No staining.
[MOVED BORING ~1.5' SOUTH FROM ORIGINAL DUE TO ROCK] [COLLECTED ANOTHER SAMPLE]
(2.6'-4') Similar material as 1'-2' core. (2.6'-2.10') Dark brown (2.10'-3.1') Light brown (3.1'-4') Brown, trace of broken rock fragments, no odor, No staining.
(5.3'-6') Similar material as 3.1'-4' core. Red brown brick (5.4'-5.5'), wood fragment at ~6'. Slight hydrocarbon odor, No staining.
[Refusal at 6'. Relocated boring ~7' south from original location. wood fragments in shoe. Saturated with black oily liquid. Strong odor.]
(7.3'-7.5') Similar material as 5.3'-6' core. Increase in coarseness. Black
(7.5'-7.9') Sand: white to light gray, well graded, does not appear to be stained. (7.9'-8') Silty Clay to Clayey Silt, trace of coarse sand, well graded, saturated (dark oily liquid), strong hydrocarbon odor, stained
[Refusal at 8'. Relocated ~20' west from current location. Begin sampling 8']
(8.6'-10') Silty Clay to Clayey Silt; Olive green, trace of sand, micaceous, saturated, strong hydrocarbon odor, Hydrocarbon staining throughout core. (9.8'-10') Black material (stained)
(10.2'-12') Similar material as 8.6'-10' core. Hydrocarbon (brown) staining throughout core.
(12.7'-14') Similar material as 10.2'-12' core. (12.7'-12.10') Hydrocarbon staining (brown. slight odor. Brown material at 14'
(14'-16') Similar material as 12.7'-14' core. Brown, decrease in sand cont, strong hydrocarbon odor, possibly stained
(16'-17.1') Similar material as 14'-16' core. Olive green, saturated, strong hydrocarbon odor, possibly stained. (17.1'-17.6') SAND, light brown, med. to coarse grained, well graded, slightly moist (17.6'-18') Silt, Light brown, trace of fine grained sand, micaceous, poorly graded, dry, slight odor, does not appear to be stained.
(18.10'-19') SAND; Light brown, med to coarse grained, well graded, No staining (19.0'-20') SILT; Light brown to olive green, trace of fine sand, poorly graded, micaceous, slightly moist, slight odor, staining

Total Depth: 20 FEET
No ground water during drilling.
Backfilled each attempt of boring with bentonite pellets.
Sump material appears to be from ~8' to 17.1'.

NA - Not Applicable
NM - Not measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

CLIENT: EPA
PROJECT NO.: 94-256

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-15 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER D. Isaly

EDITED BY D. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-8-97

DATE FINISHED 10-8-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1425	CC 1.7' rec	ml/sm	
		1430	1.3' rec	?	
5		1435	1' rec.	cl/ml	
		1440	2' rec.		
		1445	1.6' rec.		
10		1450	2' rec.		
		1455	1.3' rec.	m/sm	
				cl/ml	
15		1500	1.7' rec	sl	
				cl/ml	
		1505	1.3 rec	ml	
20					
25					

DESCRIPTION

(.5'-1.4') Silty Sand To Sandy Silt; Brown, trace of coarse sand, Trace of gravel, well graded, moist, No staining (1.4'-2') white material, high plasticity, possibly puddy, No odor, No staining (2.9'-3.6') similar material as 1.4'-2' core. (3.6'-4') - Silty Clay to Clayey Silt, Brown to olive green, trace of sand (coarse) micaceous, slightly moist, slight odor, No evidence of staining (5'-6') Similar material as 3.6'-4' core. Saturated, strong hydrocarbon odor, possibly stained. (6'-8') similar material as 5'-6' core, strong hydrocarbon odor, black material intermixed, does not appear stained. (8.6'-10') similar material as 6'-8' core. (10'-12') olive green to brown, slightly moist, trace of coarse sand, HC odor, Hydrocarbon staining (brown) (~18") (12.4'-14') Silty Sand To Sandy Silt: olive green to brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining. (14.5'-15.3') Silty Clay to Clayey Silt, Olive green, trace of coarse sand, saturated, No staining (15.3-15.9') Sand; Light brown, fine to med. grained, poorly graded, No staining (15.9-16') Silty Clay to Clayey Silt, olive green, micaceous, slightly moist, No odor, No staining (16.9-18') Silt, Olive green to light brown, micaceous, slightly moist, No odor, No staining. (Difficult drilling. T- hard to proceed)

Total Depth: 18 Feet

No ground water during drilling.

Backfilled with bentonite pellets.

White puddy material from 1.4' to 3.6'

Sump Material appeared from ~3.6' to 12'.

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-16 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2.5

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-8-97

DATE FINISHED 10-8-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ PINE SAMPLES	SAMPLE NO. AND TYPE (RECOVERY)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1525	CC 10" rec.	SW ml/sm	
		1530	10" rec.	ml/sm	
5		1535	1.9' rec.	cl/ml	
		1540	1.8' rec.	cl	
		1545	1.11' rec.	ml/sm	
10		1550	1.11' rec.	cl/ml	
		1555	1.8' rec.		
15		1400	1.5 rec.		
		1405	2' rec.	Sp	
		1410	2' rec.	ml	
20					
25					

→ 4" thick Asphalt, Light

DESCRIPTION

(1.2'-1.3') SAND; brown, med grained, poorly graded, slightly moist. (1.3'-1.6') med to coarse grained sand, well graded, No staining (1.6'-1.8) Silty sand to sandy silt, Dark brown, trace of coarse sand, slightly moist, No staining (1.8'-1.10') white puddy material, high plasticity, moist (1.10'-2') Silty Sand to Sandy silt, brown, trace of coarse sand, micaceous, No odor, No staining

(3.2'-3.10') Similar material as 1.10'-2' core. (3.10'-4') Silty Clay to Clayey Silt, dark brown, saturated, strong hydrocarbon odor, No staining

(4.3'-5') Similar material as 3.10'-4' core. Olive green, black material intermixed, moist, slight odor, possibly stained

(5'-6') Clay, olive green, moist, slight odor, possibly stained

(6.4'-7.7') Similar material as 5'-6' core. (7.7'-8') Silty Sand to Sandy silt, Black to Dark olive green, trace of coarse sand, well graded, slightly moist, strong hydrocarbon odor, stained

(8.1'-8.6') similar material as 7.7'-8' core. (8.6'-10') Clayey Silt to Silty Clay, brown, trace of sand, micaceous, slightly moist, No odor, no staining.

(10.1'-12') Similar material as 8.6'-10' core. No odor, No stain

(12.4'-14') Similar material as 10.1'-12' core. No odor. No stain.

(14.7'-16') Similar material as 12.4'-14' core. Black material intermixed (possibly organic) No odor, No staining

(16-16.6') similar material as 14.7'-16'. No odor, No staining.

(16.6'-18') SAND; Red brown, fine grained, trace of silt, micaceous, poorly graded, slightly moist, No odor, No staining.

(18'-20') SILT; Light brown, micaceous, poorly graded, saturated. No odor, No stain.

Total Depth: 20 FEET

No ground water during drilling

Backfilled with bentonite pellets. Asphalt patch at surface.

Sump material encountered from ~3.10'-8.6' Feet

White puddy material from 1.8'-1.10'.

NM - Not measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-17 SHEET 1 OF 1

DRILLING CO/RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1"x2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0645	CC 1.1'	ml/sm	
		0650	1.3'	sw / ml/sm	
5		0655	1'		
		0700	1.5'	cl/ml	
		0705	2'		
10		0710	2'		
		0715	1.10'		
15		0730	1.4'	ml	
		0735	2'		
		0750	1.7'		
20					

DESCRIPTION

~~~4" thick asphalt~~

(1'-1.7') Silty Sand to Sandy Silt. Brown, trace of gravel, well graded, slightly moist, No staining (1.7'-2') SAND; Light brown, med. to coarse grained, trace of gravel, well graded, dry, No odor, No staining. (2.9'-3.4') Silty Sand to Sandy Silt; Brown, trace of coarse sand, well graded, slightly moist, No staining. (3.9'-3.10') SAND; gray, coarse grained, well graded (3.10'-4') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining (5'-6') similar material as (3.10'-4') core. Light gray lense ~ 5.4'. No staining, No odor (6.7'-8') similar material as 5'-6' core. Increase in clay content. No staining. No odor. (8'-10') Similar material as 6.7'-8' core. No odor. No staining. (10'-12) similar material as 8'-10' core. No odor. No staining (12.2'-13.4') Similar material as 10'-12' core. Increase in silt content No odor No staining. (13.4'-14') Silt, Light gray to Light brown, micaceous, poorly graded, slightly moist, No odor. No staining (14.9'-14.9) Silty Sand to Sandy Silt, Dark brown, trace of coarse sand, well graded, No staining, No odor. (14.4'-16') Silt (similar material as 13.4'-14' core) No odor, No staining (16'-18') similar material as 14.9'-16' core. 16'-16.8' soil color varies from dark brown to light brown, No odor. No staining. (18.5'-20') similar material as 16'-18' core. No odor. No staining

Total Depth: 20 Feet

Ground was not encountered during drilling.

Backfilled with bentonite pellets.

Sump material was not encountered.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.
~~~

BORING NO. WDI-TS-18 **SHEET** 1 **OF** 1

DRILLING CO./RIG: TEG

SAMPLER TYPE AND DIMENSION: Continuous Core 1" x 2'

FIELD ENGINEER: A. Isaly

EDITED BY: A. Isaly

CHECKED BY:

COORDINATES: N NM, E NM

DATE BEGAN: 10-9-97

DATE FINISHED: 10-9-97

GROUND SURFACE EL: NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE~~ (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0835	CC 1.1'	ml/sm	
		0840	1.5'		
5		0845	1.5'		
		0850	2'	cl/ml	
		0855	1.7'		
10		0900	1.10'		
		0905	1.4'		
15		0910	2'		
		0915	2'	SP	
		0920	1.9'	ml/sm SP	
20					

DESCRIPTION

~~4" thick Asphalt~~

(1.11'-1.') Silty Sand to sandy silt, light gray, trace of coarse sand, well graded, dry, No staining (1'-2') Silty Clay to Clayey Silt, Dark Brown, trace of sand, micaceous, med. plasticity, slightly moist, No odor, No staining.

(2.7'-4') similar material as 1.'-2' core. No odor. No staining

(4.7'-6') similar material as 2.7'-4' core. No odor. No staining.

(6'-8') similar material as 4.7'-6' core. No odor. No staining.

(8.5'-10') similar material as 6'-8' core No odor. No staining.

(10.2'-12') similar material as 8.5'-10' core. No odor. No staining.

(12.8'-13.6') similar material as 10.2'-12' core. Increase in silt content

(13.6'-14') Light brown to light gray, similar material as 12.8'-13.6' core.

(14'-15.8') similar material as 13.6'-14' core. No odor. No staining. (15.8'-16') SAND, Light brown to red, fine grained, trace of silt, poorly graded, slightly moist No odor No staining

(16'-18') similar material as 15.9'-16' core. No odor No staining

(18.3'-18.9') similar material as 16'-18' core. (18.9'-18.10') Dark brown, Silty SAND to SANDY SILT (18.10'-19.5') SAND; Brown, fine to med grained, No staining (19.5-20') Increase in silt content. [Note: Med coarse sand at bottom of sample tube]

Total Depth: 20 Feet

No ground water during drilling.

Backfilled with bentonite pellets. Asphalt patch at surface.

Sump material was not encountered during drilling

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT: EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDF-TS-19 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE AND DIMENSION Continuous Core 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0945	CC 6"		
		0950	1.3'	ml/sm	
5		0955	1'		
		1000	1.4'		
		1005	1.8'		
10		1010	2'	cl/ml	
		1015	2'		
15		1020	2'		
20					

DESCRIPTION

4"-6" Concrete Pad

(1.6'-1.9') Silty Sand to Sandy Silt; Light gray to white, trace gravel and coarse grained sand, well graded, dry, No staining (1.9'-2') brown, decrease in coarse material, micaceous, slightly moist, No odor No staining

(2.9'-4') Similar material as 1.9'-2' core. No odor. No staining.

(5'-6') similar material as 2.9'-4' core, trace of coarse sand. No odor. No staining.

(6.8'-7') similar material as 5'-6' core. (7'-8') Silty Clay to Clayey Silt; Dark brown micaceous, moist, No odor, No staining

(8.5'-10') Similar material as 7'-8' core. No odor No staining

(10'-12') similar material as 8.5'-10' core. No odor. No staining

(12'-14') similar material as 10'-12' core, Brown, No odor, No staining.

(14'-16') similar material as 12'-14' core. Dark brown to black material intermixed throughout core (possibly organic). No odor, No staining.

Total Depth: 16 Feet

No ground water during drilling

Backfilled with Bentonite Pellets. Asphalt patch at surface.

Did not appear to encounter sump material

NM - Not measured

NA - Not Applicable

CC - Continuous Core.

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-20 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1045	CC 11"	ml/sm		(1.1'-1.7') Silty Sand to Sandy Silt; Brown, trace of gravel, trace of coarse sand, well graded, trace of vegetation (grass & roots), dry, No staining (1.7'-2') Light gray, decrease in coarseness with depth, dry, No odor, No staining. (2.3'-2.9') Brown, trace of coarse sand, well graded, No odor, No staining (2.9'-3.4') Light brown, increase in sand (fine grained) content, No staining (3.4'-4') Dark brown to black, micaceous, No odor, No staining (Poor recovery) (5.7'-6) similar material as 3.4'-4 core, No staining (6.7'-7.2') similar material as 5.7'-6 core. No staining (7.2'-8') Silty Clay to Clayey Silt; Dark brown to brown, trace of coarse sand, slightly moist, No odor, No staining (9'-10') similar material as 7.2'-8' core. No odor. No staining.
		1050	1.9'			
5		1055	.5"			
		1100	1.5'			
		1105	1'	cl/ml		
10						

Total Depth: 10 Feet

Ground water was not encountered during drilling

Backfilled with bentonite pellets.

Did not encounter sump material.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-2' SHEET 1 OF 1

DRILLING CO/RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Kelly

EDITED BY A. Kelly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS-PER-FOOT) Time	SAMPLE NO. AND TYPE (RECOVERY)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1130	CC 1.1	SW	
				m/SW	
		1135	8"		
5		1140	4"	gw/SW	
		1145	2'	cl/ml	
		1150	1.1'		
10					

DESCRIPTION

(.11'-1.2') Gravelly Sand; Light brown, well graded, dry, No staining (1.2'-2') Silty Sand To Sandy Silt; Dark brown to Light brown, trace of coarse sand, trace of gravel, micaceous, dry, No odor, No staining.
(3.4'-4') Sandy Gravel to Gravelly Sand; Dark brown to Light gray, well graded, slightly moist, No staining, No odor.
(5.8'-6') similar material as 3.4'-4' core. No odor. No staining.
(6'-8') Silty Clay to Clay Silt; Dark brown to Dark gray, trace of sand, saturated, strong hydrocarbon odor, possibly stained.
(8.11'-10') Similar material as 6'-8' core. Black material (8.11'-9.5') Hydrocarbon stained (brown) (9.5-10'), strong hydrocarbon odor.

Total Depth: 10 Feet

Ground water was Not encountered during drilling.

Backfilled with bentonite pellets.

Encountered Sump material from 6'-10'

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-22 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE Time (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1230	CC 1.2'	sw/sw		(10"-1.2') Sandy Gravel to Gravelly Sand; Brown, well graded, Loose, No staining, dry (1.2'-2') Silty Sand to Sandy Silt, brown, trace of coarse sand, trace of gravel, well graded, Slightly moist, No odor, No staining.
		1235	9"	ml/sm		
5		1240	6"			(3.3'-4') Similar material as 1.2'-2' core. Trace of clay. No odor. No Staining.
		1245	4"	cl/ml		(5.6'-5.9') Black, wood fibers, slightly moist, Possibly Stained
		1250	0	gw		(5.9-6') Silty Clay to Clayey Silt, Dark brown, trace of sand, slightly moist, Slight hydrocarbon odor, possibly Stained.
10						(7.8'-8') Gravel, Dark brown, well graded, saturated, Strong hydrocarbon odor, possibly Stained. (poor Recovery) H_2O in core tube.
						(8'-10') No Recovery. Hydrocarbon stained tube liquid. (Brown) Similar material on drill casing. Evidence of H_2O (oily Sheen) Strong hydrocarbon odor. (possibly perched H_2O zone)

Total Depth: 10 Feet

Ground Water was Not encountered during drilling.

Backfilled with Bentonite Pellets.

Material appears to be impacted from 5.6'-10'.

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

FIELD ACTIVITY REPORT

Waste Disposal Inc.	PROJECT NUMBER 94-256	DATE 10·6·97
FIELD ACTIVITY SUBJECT Drill Geotechnical Probes		PAGE 1 OF 1

PROJECT LOCATION Santa Fe Springs, CA

TIME	DESCRIPTION OF DAILY ACTIVITIES
0700	ARRIVED ON-SITE
0730	Met with TEG and discussed
	Scope of work.
0825	Began coring at WDI-TS-01
	Refer to sitemap for
	probe locations. Refer to
	boring log for complete
	description of boring.
1115	Began coring WDI-TS-02.
1340	Began coring WDI-TS-03
1570	Began coring WDI-TS-04.
1715	Left-site
	SITE VISITORS: G. Androsko & R. Puga (TRC-ESI), Ian Webster (UNOCAL), George (EPA)

SKETCH

Summary

- Drilled WDI-TS-01, -02, -03, -04
- Refer to boring logs for complete boring descriptions

NOTES:

WDI-TS-01: ~6.8'-21' possible sump material (strong odor, stained)
- ~7.9'-8.9' white puddy material
- Native contact at ~21'

WDI-TS-02: ~7.2'-23.5' possible sump material (strong odor, stained)
- ~5.6'-7.2' white puddy material
- Native contact 23.5'

WDI-TS-03 - ~8.6'-13' possible sump material (strong odor, stained)
- ~3.9-4' white puddy material
- Native contact @ ~13'

WDI-TS-04 - Did not appear to contact sump material or white puddy

THIS FIELD REPORT PROVIDES ONLY THE RESULTS OF OBSERVATIONS AND TESTS BY ENVIRONMENTAL SOLUTIONS, INC. PERSONNEL. THIS REPORT SHOULD NOT BE CONSTRUED AS SUPERVISION, DIRECTION, OR A RECOMMENDATION.

Prepared By: Alexander M. Pauly

Date/Time: 10·6·97 ; 1900

ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, California 92718

FIELD ACTIVITY REPORT

Waste Disposal Inc.	PROJECT NUMBER 94-256	DATE 10.7.97
FIELD ACTIVITY SUBJECT Drilling Geotechnical Probes		PAGE 1 OF 1

PROJECT LOCATION South Fe Springs, CA

SKETCH

Summary

Drilled & sampled: WDI-TS-05, -06, 07, -08, -09, -10.

Refer to boring logs & site map for complete boring description.

• Relocated WDI-05 & -09 based data from borings (WDI-TS-03 & -03).

TIME	DESCRIPTION OF DAILY ACTIVITIES
0630	Arrived on-site & met with TEG.
0655	Began drilling WDI-TS-05.
0830	Began drilling WDI-TS-06.
1030	Began drilling WDI-TS-07.
1255	Began drilling WDI-TS-08.
1430	Began drilling WDI-TS-09.
1550	Began drilling WDI-TS-10.
	For a complete description of each boring, refer to boring logs. Refer to site location map for location of borings.
1800	Left site
	Site Visitors: George (EPA)
	Notes:
	WDI-TS-05 → Soil stained from ~7.6'-15' (does not appear to be sump material)
	-06 → Soil stained from ~5.3'-12' (sump material)
	-07 → Soil stained from ~6'-21.9' (sump material)
	-08 → Did not appear to have contacted impacted soil.
	-09 → Soil stained from ~6'-14' (sump material)
	-10 → Soil stained from ~6.8'-23.9' (sump material)

THIS FIELD REPORT PROVIDES ONLY THE RESULTS OF OBSERVATIONS AND TESTS BY ENVIRONMENTAL SOLUTIONS, INC. PERSONNEL. THIS REPORT SHOULD NOT BE CONSTRUED AS SUPERVISION, DIRECTION, OR A RECOMMENDATION.

Prepared By: Howard R. Daly

Date/Time: 10.7.97 / 1830

ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, California 92718

FIELD ACTIVITY REPORT

WASTE DISPOSAL INC.	PROJECT NUMBER 94-256	DATE 10-8-97
FIELD ACTIVITY SUBJECT Drilling Geoprobe borings		PAGE 1 OF 1

PROJECT LOCATION Santa Fe Springs

TIME	DESCRIPTION OF DAILY ACTIVITIES
0630	Arrived on-site & met TEG.
0650	Began Drilling WDI-TS-11
0820	Began drilling WDI-TS-12
0940	Began drilling WDI-TS-13
1100	Began drilling WDI-TS-14
1425	Began drilling WDI-TS-15
1525	Began drilling WDI-TS-16
1730	Left site

SKETCH

Summary

- Drilled WDI-TS-11, -12, -13, -14, -15, -16
- Refer to boring logs & location of borings for complete description.

SITE VISITORS: George (EPA), Ian Webster (UNOCAL)

- Modifications to boring locations due to previous data. (R. Rugo) Refer to site plan for changes.

NOTES:

WDI-TS-11 → Sump material ~5.3'-23.9' (soil stained)
WDI-TS-12 → Did not appear to encounter impacted soil
WDI-TS-13 → Sump material ~4'-10' (soil stained)
WD-TS-14 → Sump material ~8 to 17' (soil stained)
WDI-TS-15 → Sump material ~3.6'-12' (soil stained). White putty (1.4'-3.6')
WDI-TS-16 → Sump material ~3.10'-8.6' (soil stained). White putty (1.8'-1.10')

THIS FIELD REPORT PROVIDES ONLY THE RESULTS OF OBSERVATIONS AND TESTS BY ENVIRONMENTAL SOLUTIONS, INC. PERSONNEL. THIS REPORT SHOULD NOT BE CONSTRUED AS SUPERVISION, DIRECTION, OR A RECOMMENDATION.

Prepared By: Alexander M. Psaly

Date/Time: 10-8-97 ; 1900

ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, California 92718

FIELD ACTIVITY REPORT

Waste Disposal, Inc.	PROJECT NUMBER 94-256	DATE 10-9-97
FIELD ACTIVITY SUBJECT Drilling geoprobe borings		PAGE 1 OF 1

PROJECT LOCATION Santa Fe Springs, CA

TIME	DESCRIPTION OF DAILY ACTIVITIES
0630	Arrived onsite
0645	Began drilling WDI-TS-17
0835	Began drilling WDI-TS-18
0945	Began drilling WDI-TS-19
1045	Began drilling WDI-TS-20
1130	Began drilling WDI-TS-21
1230	Began drilling WDI-TS-22
1330	Left Site.

SKETCH

Summary

Drilled WDI-TS-17, -18, -19, -20, -21, -22

Refer to boring logs and location of borings for complete descriptions.

Site Visitors: Gerrego (EPA), Ian Webster (Unocal), R. Puga (TRC)

· Modifications to boring locations & depths were made due to previous data. Additional borings were also included. Refer to site plans for changes. Decisions made by R. Puga (TRC)

Notes:

WDI-TS-17 → Did not appear to encounter impacted material

WDI-TS-18 → Did not appear to encounter impacted material

WDI-TS-19 → Did not appear to encounter impacted material (16' T.D.)

WDI-TS-20 → Did not appear to encounter impacted material (10' T.D.)

WDI-TS-21 → Encountered sump material ~6'-10' (10' T.D.)

WDI-TS-22 → Encountered impacted material ~5.6'-10' (10' T.D.)

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Prepared By: Alexander N. Psaly

Date/Time: 10-9-97; 1430

ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, California 92718

BORING NO. WDI-TS-15 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER D. Isaly

EDITED BY D. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-8-97

DATE FINISHED 10-8-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1425	CC 1.7' rec	ml/sm	
		1430	1.3' rec	?	
5		1435	1' rec.	cl/ml	
		1440	2' rec.		
		1445	1.6' rec.		
10		1450	2' rec.		
		1455	1.3' rec.	m/sm	
				cl/ml	
15		1500	1.7' rec	sp	
				cl/ml	
		1505	1.3 rec	ml	
20					
25					

DESCRIPTION

(.5'-1.4') Silty Sand To Sandy Silt; Brown, trace of coarse sand, Trace of gravel, well graded, moist, No staining (1.4'-2') white material, high plasticity, possibly puddy, No odor, No staining (2.9'-3.6') similar material as 1.4'-2' core. (3.6'-4') - Silty Clay to Clayey Silt, Brown to olive green, trace of sand (coarse) micaceous, slightly moist, slight odor, No evidence of staining (5'-6') Similar material as 3.6'-4' core. Saturated, strong hydrocarbon odor, possibly stained.
(6'-8') similar material as 5'-6' core, strong hydrocarbon odor, black material intermixed, does not appear stained.
(8.6'-10') similar material as 6'-8' core.
(10'-12') olive green to brown, slightly moist, trace of coarse sand, HC odor, Hydrocarbon staining (brown) (~18")
(12.4'-14') Silty Sand To Sandy Silt; olive green to brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining.
(14.5'-15.3') Silty Clay to Clayey Silt, olive green, trace of coarse sand, saturated, No staining (15.3-15.9') Sand; Light brown, fine to med. grained, poorly graded, No staining (15.9-16') Silty Clay to Clayey Silt, olive green, micaceous, slightly moist, No odor, No staining
(16.9-18') Silt, Olive green to light brown, micaceous, slightly moist, No odor, No staining. (Difficult drilling. T- hard to ground)

Total Depth: 18 Feet
No ground water during drilling.
Backfilled with bentonite pellets.
White puddy material from 1.4' to 3.6'
Sump Material appeared from ~3.6' to 12'.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

Santa Fe Springs, CA

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-16 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2.5

FIELD ENGINEER D. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-8-97

DATE FINISHED 10-8-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1525	CC 10" rec.	SW	
		1530	10" rec	ml/SM	
5		1535	1.9' rec.	cl/ml	
		1540	1.8' rec.	cl	
		1545	1.11' rec	ml/SM	
10		1550	1.11' rec.	cl/ml	
		1555	1.8' rec		
15		1400	1.5 rec		
		1405	2' rec.	SP	
		1410	2' rec.	ml	
20					
25					

→ 4" thick Asphalt, DESCRIPTION

(1.2'-1.3') Sand; brown, med grained, poorly graded, slightly moist. (1.3'-1.6') med to coarse grained sand, well graded, No staining (1.6'-1.9) Silty sand to sandy silt, Dark brown, trace of coarse sand, slightly moist, No staining (1.9'-1.10') white puddy material, high plasticity, moist (1.10'-2') Silty Sand to Sandy silt, brown, trace of coarse sand, micaceous, No odor, No staining

(3.2'-3.10') similar material as 1.10'-2' core. (3.10'-4') Silty Clay to Clayey Silt, dark brown, saturated, strong hydrocarbon odor, No staining

(4.3'-5') similar material as 3.10'-4' core. Olive green, black material intermixed, moist, slight odor, possibly stained (5'-6') Clay, olive green, moist, slight odor, possibly stained (6.4'-7.7') similar material as 5'-6' core. (7.7'-8') Silty Sand to Sandy silt, Black to Dark olive green, trace of coarse sand, well graded, slightly moist, strong hydrocarbon odor, stained

(8.1'-8.6') similar material as 7.7'-8' core. (8.6'-10') Clayey Silt to Silty Clay, brown, trace of sand, micaceous, Slightly moist, No odor, no staining.

(10.1'-12') similar material as 8.6'-10' core. No odor, No stain

(12.4'-14') similar material as 10.1'-12' core. No odor. No stain.

(14.7'-16') similar material as 12.4'-14' core. Black material intermixed (possibly organic) No odor, No staining

(16-16.6') similar material as 14.7'-16'. No odor, No staining.

(16.6'-18') SAND; Red brown, fine grained, trace of silt, poorly graded, slightly moist, No odor, No staining.

(18'-20') SILT; Light brown, micaceous, poorly graded saturated. No odor, No stain.

Total Depth: 20 FEET

No ground water during drilling

Backfilled with bentonite pellets. Asphalt patch at surface.

Sump material encountered from ~3.10'-8.6' Feet

White puddy material from 1.8'-1.10'.

NM- Not measured

NA- Not Applicable

CC- Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-17 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1"x2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE NO. AND TYPE (Core only)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0645	CC 1.1'	ml/sm	
		0650	1.3'	sw / ml/sm	
5		0655	1'		
		0700	1.5'	cl/ml	
		0705	2'		
10		0710	2'		
		0715	1.10'		
15		0730	1.4'	ml	
		0735	2'		
		0750	1.7'		
20					

DESCRIPTION

~4" thick Asphalt

(1'-1.7') Silty Sand to Sandy Silt. Brown, trace of gravel, well graded, slightly moist, No staining (1.7'-2') SAND; Light brown, med. to coarse grained, trace of gravel, well graded, dry, No odor, No staining. (2.9'-3.9') Silty Sand to Sandy Silt; Brown, trace of coarse sand, well graded, slightly moist, No staining. (3.9'-3.10') SAND; gray, coarse grained, well graded (3.10'-4') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining (5'-6') similar material as (3.10'-4') core. Light gray lense @ 5.4'. No staining, No odor (6.7'-8') similar material as 5'-6' core. Increase in clay content. No staining. No odor. (8'-10') Similar material as 6.7'-8' core. No odor. No staining. (10'-12) similar material as 8'-10' core. No odor. No staining (12.2'-13.4') Similar material as 10'-12' core. Increase in silt content No odor No staining. (13.4'-14') Silt, Light gray to Light brown, micaceous, poorly graded, slightly moist, No odor. No staining (14.9'-14.9) Silty Sand to Sandy Silt, Dark brown, trace of coarse sand, well graded, No staining, No odor. (14.4'-16') Silt (similar material as 13.4'-14' core) No odor, No staining (16'-18') similar material as 14.9'-16' core. 16'-16.5' soil color varies from dark brown to light brown. No odor. No staining. (18.5'-20') similar material as 16'-18' core. No odor. No staining

Total Depth: 20 Feet

Ground was not encountered during drilling.

Backfilled with bentonite pellets.

Sump material was not encountered.

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-18 **SHEET** 1 **OF** 1

DRILLING CO./RIG: TEG

SAMPLER TYPE: Continuous Core AND DIMENSION: 1" x 2'

FIELD ENGINEER: A Isaly

EDITED BY: A. Isaly

CHECKED BY:

COORDINATES N: NM E: NM

DATE BEGAN: 10-9-97

DATE FINISHED: 10-9-97

GROUND SURFACE EL: NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	0835	CC 1.1'	ml/sa		~~4" thick Asphalt~~ (1.11'-1') Silty Sand to Sandy Silt, Light gray, trace of coarse sand, well graded, dry, No staining (1'-2') Silty Clay to Clayey Silt, Dark Brown, trace of sand, micaceous, med. plasticity, slightly moist, No odor, No staining.
		0840	1.5'			
5		0845	1.5'			
		0850	2'	cl/ml		(2.7'-4') similar material as 1'-2' core. No odor. No staining
		0855	1.7'			(4.7'-6') similar material as 2.7'-4' core. No odor. No staining. (6'-8') similar material as 4.7'-6' core. No odor. No staining. (8.5'-10') similar material as 6'-8' core No odor. No staining.
10		0900	1.10'			(10.2'-12') similar material as 8.5'-10' core. No odor. No staining.
		0905	1.4'			(12.8'-13.6') similar material as 10.2'-12' core. Increase in silt content (13.6'-14') Light brown to Light gray, similar material as 12.8'-13.6' core.
15		0910	2'			(14'-15.6') similar material as 13.6'-14' core. No odor. No staining. (15.8'-16') Sand, Light brown to red, fine grained, trace of silt poorly graded, slightly moist No odor No staining
		0915	2'	sp		(16'-18') similar material as 15.9'-16' core. No odor No staining
		0920	1.9'	ml/sa sp		(18.7'-18.9') similar material as 16'-18' core. (18.9'-18.10'). Dark brown, Silty Sand to Sandy Silt (18.10'-19.5') Sand; Brown, fine to med grained, No staining (19.5-20') Increase in silt content. [Note: Med coarse sand at bottom of sample tube]
20						

Total Depth: 20 Feet

No ground water during drilling.

Backfilled with bentonite pellets. Asphalt patch at surface.

Sump material was not encountered during drilling

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT: EPA

PROJECT NO.: 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDF-TS-19 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0945	CC 6"		
		0950	1.3'	ml/sm	
5		0955	1'		
		1000	1.4'		
		1005	1.8'		
10		1010	2'	cl/ml	
		1015	2'		
15		1020	2'		
20					

DESCRIPTION

4"-6" Concrete pad

(1.6'-1.9') Silty Sand to sandy silt; light gray to white, trace gravel and coarse grained sand, well graded, dry, No staining (1.9'-2') brown, decrease in coarse material, micaceous, slightly moist, No odor No staining

(2.9'-4') similar material as 1.9'-2' core. No odor. No staining.

(5'-6') similar material as 2.9'-4' core, trace of coarse sand. No odor. No staining.

(6.8'-7') similar material as 5'-6' core. (7'-8') Silty Clay to Clayey Silt; Dark brown micaceous moist, No odor, No staining

(8.5'-10') Similar material as 7'-8' core. No odor No staining

(10'-12') similar material as 8.5'-10' core. No odor. No staining

(12'-14') similar material as 10'-12' core, Brown, No odor, No staining.

(14'-16') similar material as 12'-14' core. Dark brown to black material intermixed throughout core (possibly organic). No odor, No staining.

Total Depth: 16 Feet

No ground water during drilling

Backfilled with Bentonite Pellets. Asphalt patch at surface.

Did not appear to encounter sump material

NM - Not measured

NA - Not Applicable

CC - Continuous Core.

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDT-TS-20 SHEET 1 OF 1

DRILLING CO/RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE NO. AND TYPE (RECOVERY)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1045	CC 11"	ml/sm		(1.1'-1.7') Silty Sand to Sandy Silt; Brown, trace of gravel, trace of coarse sand, well graded, trace of vegetation (grass & roots), dry, No staining (1.7'-2') Light gray, decrease in coarseness with depth, dry, No odor, No staining. (2.3'-2.9') Brown, trace of coarse sand, well graded, No odor, No staining (2.9'-3.4') Light brown, increase in sand (fine grained) content, No staining (3.4'-4') Dark brown to black, micaceous, No odor, No staining (5.7'-6) similar material as 3.4'-4 core, No staining (Poor recovery) (6.7'-7.2') similar material as 5.7'-6 core. No staining (7.2'-8') Silty Clay to Clayey Silt; Dark brown to brown, trace of coarse sand, slightly moist, No odor, No staining. (9'-10') similar material as 7.2'-8' core. No odor, No staining.
		1050	1.9'			
5		1055	.5"			
		1100	1.5'			
		1105	1'	cl/ml		
10						

Total Depth: 10 Feet

Ground water was not encountered during drilling

Backfilled with bentonite pellets.

Did not encounter sump material.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-2' SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Kelly

EDITED BY A. Kelly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE NO. AND TYPE (RECOVERY)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1130	CC 1.1	sw		(.11'-1.2') Gravelly Sand; Light brown, well graded, dry, No staining (1.2'-2') Silty Sand to Sandy Silt; Dark brown to Light brown, trace of coarse sand, trace of gravel, micaceous, dry, No odor, No staining.
		1135	8"	m/sw		
		1140	4"	gw/sw		(3.4'-4') Sandy Gravel to Gravelly Sand; Dark brown to Light gray, well graded, slightly moist, No staining, No odor.
5		1145	2'	cl/ml		(5.8'-6') similar material as 3.4'-4' core. No odor. No staining.
		1150	1.1'			(6'-8') Silty Clay to Clay Silt; Dark brown to Dark gray, trace of sand, saturated, strong hydrocarbon odor, possibly stained.
10						(8.11'-10') similar material as 6'-8' core. Black material (8.11'-9.5') Hydrocarbon stained (brown) (9.5-10'), strong hydrocarbon odor.

Total Depth: 10 Feet

Ground water was Not encountered during drilling.

Backfilled with bentonite pellets.

Encountered Sump material from 6'-10'

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-B-22 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-9-97

DATE FINISHED 10-9-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1230	CC 1.2'	sw/sw		(0"-1.2') Sandy Gravel to Gravelly Sand: Brown, well graded, Loose, No staining, dry (1.2'-2') Silty Sand to Sandy Silt, brown, trace of coarse sand, trace of gravel, well graded, Slightly moist, No odor, No staining.
		1235	9"	ml/sm		
5		1240	6"			(3.3'-4') Similar material as 1.2'-2' core. Trace of clay. No odor. No Staining.
		1245	4"	cl/ml		(5.6'-5.9') Black, wood fibers, slightly moist, Possibly Stained (5.9-6') Silty Clay to Clayey Silt, Dark brown, trace of sand, slightly moist, Slight hydrocarbon odor, possibly Stained.
10		1250	0	gw		(7.8'-8') Gravel, Dark brown, well graded, saturated, Strong hydrocarbon odor, possibly Stained. (poor Recovery) H_2O in core tube. (8'-10') No Recovery. Hydrocarbon stained tube, liquid. (Brown) Similar material on drill casing. Evidence of H_2O (oily sheen) Strong hydrocarbon odor. (possibly perched H_2O zone)

Total Depth 10 Feet

Ground Water was Not encountered during drilling.

Backfilled with Bentonite Pellets.

Material appears to be impacted from 5.6'-10'.

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT EPA

PROJECT NO. 94-256

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-23 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

COORDINATES N NM E NM

FIELD ENGINEER A. Isaly DATE BEGAN 10-23-97

EDITED BY A. Isaly DATE FINISHED 10-23-97

CHECKED BY _____ GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (RECOVERY)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NM	0810	CC 1.1'	ml/sm		Asphalt surface ~4"-6" thick (11"-1') Silty sand to sandy silt; Brown, trace of gravel, well graded, micaceous, dry, No staining (1'-2') Silty Clay to Clayey Silt; Brown, trace of coarse sand, micaceous, slight hydrocarbon odor, No staining
		0815	6"	cl/ml		(3.6'-3.9') Similar material as 1'-2' core. No staining. (3.9'-4') Similar material as 3.6'-3.9' core. Black to dark brown, strong hydrocarbon odor, stained
5		0820	0'			(4'-6') Difficult drilling No recovery. Material in shoe similar to 3.9'-4' material
		0830	6"			(7.6'-8') Silty Clay to Clayey Silt; Brown trace of sand, micaceous, low plasticity, slightly moist, slight odor, No staining.
		0835	1'	cl		(9'-10') Clay, Brown, trace of coarse sand, micaceous, stiff, slightly moist, No odor, No staining
10						

TOTAL DEPTH: 10

Backfilled with bentonite PELLETS; Asphalt patch at surface

Encountered impacted soil from 3.9'-7.6'.

No groundwater during drilling.

NM - Not Measured
NA - Not Applicable
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-24 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N XIW E NM

DATE BEGAN 10-23-97

DATE FINISHED 10-23-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1315	CC 5"	ml/sm		(1.7'-2') Silty SAND TO SANDY SILT; Light gray to light brown, trace of coarse sand and gravel, well graded, slightly moist, No odor, No staining
		1320	0'			(2'-4') Rock in shoe. No recovery.
5		1325	10"			(5.2'-5.5') Similar material as 1.7'-2' Core. (5.5'-6') SAND; Gray, trace of silt med. to coarse grained, well graded, moist, slight odor, possibly stained
		1330	11"	cl		(7.1'-8') Clay; Dark gray to Olive green, trace of coarse SAND, high plasticity, slightly moist, slight odor, possibly stained.
10		1335	1.9'	SP		(8.3'-10') SAND: Brown, fine grained, trace of silt, poorly graded micaceous, slightly moist, No odor, No staining

Total Depth: 10 Feet

Backfilled with bentonite pellets

No ground water during drilling.

Impacted Soil from 5.5'-8.3'.

NM - Not Measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-25 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core

AND DIMENSION 1.5' x 3'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-23-97

DATE FINISHED 10-23-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE ~~(BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA		CC			Asphalt surface (~4-6 Thick)
		1400	3'	CL/SW		(6"-3') Sandy Clay to Clayey Sand; Brown, med to coarse grained sand, med. plasticity, moist, No odor, No staining.
5			NS	NS	NS	
		1415	1'11"	CL/ML		(8.1'-10) Silty Clay to Clayey Silt; Olive green, trace of sand, micaceous, moist, strong hydrocarbon odor, stained
10						

Total Depth: 10 FEET

No ground water during drilling

Backfilled with bentonite pellets. Asphalt patch at surface

Sampling for geotechnical analysis

NS - Not Sampled

NM - Not Measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-26 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

COORDINATES N NM E NM

FIELD ENGINEER A. Isaly DATE BEGAN 10-24-97

EDITED BY A. Isaly DATE FINISHED 10-24-97

CHECKED BY _____ GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ 1mm	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	0735	CC 1.6'	ml/sm, sw		(6"-1.1') Silty Sand To Sandy Silt; Brown to light brown, trace of coarse sand, trace of vegetation, dry, No staining (1.1'-1.7') Sand; Brown, to light brown, med. to coarse grained, well graded, trace of silt, white coarse material, dry, No staining (1.7'-2') White material, hard, coarse grained, dry, No odor, No staining. (gravelly sand ?)
		0740	1.2'	gw/sw, ml		(2.10'-3.2') Similar material as (1.7'-2') core. No staining (3.2'-4') Silt, Brown, trace of coarse sand, micaceous, dry, No odor, No staining
5		0745	1.8'	ml/sm		(4.4'-6') Silty Sand To Sandy Silt; Brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining.
		0750	2'	cl/ml		(6'-8') Silty Clay to Clayey Silt; Dark brown, trace of sand, micaceous, med. plasticity, dry, No odor, No staining
		0755	2'	ml/sm		(8'-10') Silty Sand To Sandy Silt; Dark brown to dark gray, trace of med. to coarse sand, micaceous, slightly moist, No odor, No staining.
10		0800	2'			(10'-12') Similar material as 8'-10' core. No odor, No staining.
		0805	1.8'	SW		(12.4'-14') Sand; Gray, med. to coarse grained, well graded, slightly moist, No odor, No staining
15		0810	1.8'			(14.4'-16') Similar material as 12.4-16' core No odor. No staining. (difficult drilling).

Total Depth: 16 Feet

No ground water during drilling.

Backfilled with bentonite pellets.

~25' NE of fence line

Did not encounter sump material.

NM - Not Measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT ~~WDI~~ UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-27 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isola

EDITED BY A Isola

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-24-97

DATE FINISHED 10-24-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	0845	CC 1.1'	ml/sm		(11"-2') Silty Sand to Sandy Silt; Brown to light brown, trace of gravel and coarse sand, well graded, dry, no odor, no staining.
		0850	8"			(3.4'-4') Sand; Brown to light brown, mud to coarse grained, trace of gravel, black material (wood), well graded micaceous, dry, no odor. No staining.
5		0855	10"	sw		(5.2'-5.10') Similar material as 3.4'-4' core. No staining. (5.10-6') Silty Clay to Clayey Silt, dark brown to black, trace of sand, moist, slight hydrocarbon odor, possibly stained.
		0900	11"	cl/ml		(7.1'-8') Similar material as 5.10'-6' core. Olive green. Black material intermixed, hydrocarbon odor, stained.
		0905	1'			(9'-10') Similar material as 7.1'-8' core. Black to Olive green, increase in sand content. Strong hydrocarbon odor, stained.
10		0910	1'			(11'-12') Clay; Dark brown to dark gray, trace of sand, moist, strong hydrocarbon odor, Hydrocarbon staining.
		0915	1.5'	cl		(12.7'-14') Similar material as 11'-12' core. Strong hydrocarbon odor, increase in hydrocarbon staining.
15		0945	9'			(15.3'-16') Silty Clay to Clayey Silt, Olive green, trace of sand, moist, slight hydrocarbon odor, possibly stained.
		0955	1.7'	cl/ml		(16.5'-18') Similar material as 15.3'-16' core. Strong odor, increase in hydrocarbon staining.
		1015	0'			(18'-20') No Recovery.
20		1030	1.6'			(20.6'-22') Similar material as 16.5'-18'. Strong odor. Hydrocarbon staining.
25						

Total Depth: 22 FEET

No ground water during drilling.

Backfilled with bentonite pellets.

Contacted sump material at ~5.10" to 22'.

NA- Not Applicable
NM- Not Measured
CC- Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WD1-TS-28 SHEET 1 OF 1

DRILLING CO./RIG TES

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-24-97

DATE FINISHED 10-24-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1100	CC 1.5'	m'/km		(7"-2') Silty Sand To Sandy Silt; Brown to Light brown, Trace of Coarse grained Sand, well graded, dry, no odor, no staining
		1105	1.6'			(2.6'-3.7') Similar material as 7"-2' core. No odor. No staining
						(3.7'-4') Clay, brown, trace of sand, moist, No odor, No staining.
5		1110	8"	cl		(5.4'-6') Similar material as 3.7'-4' core. Slight hydrocarbon odor. No staining.
		1115	9"			(7.3'-8') Sand; Dark gray to black, med to coarse grained, trace of gravel, well graded, saturated, Strong hydrocarbon odor, stained. (trace of wood fragments)
				sw		
		1120	2'			
10		1125	1'10"			(8'-10') Clay, black, trace of sand, saturated, oily sheen, strong hydrocarbon odor, stained (hydrocarbon).
		1130	1.11"			(10.2'-12') Similar material as 8'-10' core. (10.2'-10.9') Black, stained, strong odor (10.9'-12') olive green, hydrocarbon odor and staining.
15		1135	1.3'	cl		(12.1'-14') Similar material as 10.9'-12' core strong hydrocarbon odor, stained.
		1140	2'			(14.9'-16') Similar material as 12.1'-14' core. Olive green to dark brown, strong hydrocarbon odor hydrocarbon stained.
		1150	2'			(16'-18') Similar material as 14.9'-16' core. Strong odor, stained.
20						(18'-20') Similar material as 16'-18' core. Strong odor, stained.
		1200	1.7'			(20.5'-22') Similar material as 18'-20' core Strong odor. Stained
		1205	2'			(22'-24') Similar material as 20.5'-22' core. Strong odor, stained
25		1215	2'			(24'-26') Similar material as 22'-24' core strong odor. stained

Total Depth: 26 FEET

Backfilled with bentonite pellets

No ground water during drilling.

Contacted sump material from ~7.3' to 8'.

NM - Not Measured

NA - Not Applicable

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WA1

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-29 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-24-97

DATE FINISHED 10-24-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1300	CC 1.4'	ml/sm		(8"-2') Silty Sand To Sandy Silt, Light brown, trace of coarse sand and gravel, micaceous, dry, No odor, No Staining.
		1305	1.2'			(2.10"-4') similar material as 8"-2' core. Red material (~3.2'-3.8') poss. brick, No odor, No staining.
5		1310	10"			(5.2'-6') Similar material as 2.10"-4' core. Light brown (5.2'-5.4')
		1315	1'			(5.4'-6') Dark brown, increase in silt content, slightly moist, slight odor, No staining
		1320	1.2'			(7'-8') Similar material as 5.4'-6' core, Olive green to black, moist Strong hydrocarbon odor, possibly stained.
10		1325	1.9'			(8'10"-10) similar material as 7'-8' core. Strong hydrocarbon odor, stained.
						(10 3'-12') similar material as 8.10"-10 core. Strong hydrocarbon odor. Hydrocarbon Stained.
15						

Total Depth - 12 FEET

No ground water during drilling.

Backfilled with bentonite pellets.

Encountered Sump material from ~6'-12'.

NA- Not Applicable

NM- Not Measured

CC- Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT WDCSC

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WD1-TS-30 SHEET 1 OF 1

DRILLING CO/RIG TE6

SAMPLER TYPE Continuous Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-24-97

DATE FINISHED 10-24-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1400	CC 1.1'	ml/sm		(11"-2') Silty Sand to Sandy Silt; light brown, trace of course grained sand, friable, dry, No odor, No staining.
		1405	1.4'			(2.8'-4') Similar material as 11"-2' core. Trace of gravel, well graded micaceous, No odor, No staining (2.11'-3.1') Black material, No staining.
5		1410	1.6'			(4.6'-5.2') Similar material as (2.8'-4') core. Increase in coarseness, No staining. (5.2-6') Silty Clay to Clayey Silt; black, micaceous, high plasticity, trace of sand, No odor, No staining
		1420	1.3'	cl/ml		(6.9'-8') Similar material as 5.2'-6' core. Dark brown to olive green, No odor, Does not appear stained.
		1425	1.6'			(8.6'-10') Clay, Dark brown to Olive green, micaceous, trace of sand, moist, Slight odor, No staining
10		1430	1.3'	cl		(10.9'-12') similar material as 8.6'-10' core. Hydrocarbon odor. Hydrocarbon staining
		1435	2'			(12'-14') Similar material as 10.9'-12' core. Black, strong odor, stained
15		1440	1.3'			(14.9'-16') Silty Clay to Clayey Silt, Dark brown to black, trace of sand, micaceous, slightly moist, hydrocarbon odor, stained.
		1445	2'	cl/ml		(16'-18') Similar material as 14.9'-16' core. Dark brown, increase in clay content, micaceous, slightly moist, No odor, No staining
		1450	2'			(18-19.7') Similar material as 16'-18' core. No staining (19.7-20') Silt, gray, micaceous, slightly moist, No odor, No staining.
20		1455	2'	ml / ml/sm		(20'-20.8') similar material as 19.7'-20' core. (20.8'-22') Silty Sand to Sandy Silt, light gray to light brown, micaceous, slightly moist, No odor, No staining

Total Depth 22 Feet

No ground water during drilling.

Backfilled with bentonite pellets.

Encountered impacted soil from ~10' to 16'.

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

Located ~10' from outer edge of reservoir

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WD1

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-31 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0830	CC 1.4'	ml/sm	
		0835	1.9'		
5		0840	1.3'		
		0845	1'	cl/ml	
		0850	2'		
10		0855	2'		
		0900	1.7'		
15		0905	2'		

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt; Light brown to Light gray, trace of gravel and coarse sand, micaceous, well graded, dry, No odor, No staining.
(2'-3.3') Similar material as 8"-2' core. No odor No staining. (~3') Red material (possible brick) (3.3'-4') increase in silt content. Light brown to dark brown, No odor. No staining.
(4.9'-5.5') increase in coarseness. Dark brown. No staining.
(5.5'-6') Silty Clay to Clayey Silt. Dark brown to dark gray, trace of coarse sand, micaceous, slightly moist, slight hydrocarbon odor. possibly stained.
(7'-7.6') Similar material as 5.5'-6' core. (7.6-8') Black hydrocarbon staining. Strong odor.
(8'-10') Similar material 7.6'-9' core. Strong hydrocarbon odor, Hydrocarbon Staining throughout core.
(10'-12') Similar material as 8'-10' core. Olive green. moist. Strong odor. Staining throughout core.
(12.5-14') Similar material as 10'-12' core. Dark brown to Olive green. Strong hydrocarbon odor. Decrease in hydrocarbon staining.
(14'-16') Similar material as 12.5'-14' core. Strong hydrocarbon odor. Hydrocarbon stained.

Total Depth 16 FEET

Did not encounter ground water during drilling

Backfilled with bentonite pellets

Contacted impacted soil from ~5.5' to 16'.

NM - Not Measured
NA - Not Applicable
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-32 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	0910	CC 1.2'	ml/sm	
		0915	1'10"		
5		0920	1.3'		
		0925	1'10"	cl/ml	
		0930	2'	ml	
10		0935	2'	cl/ml	
		0940	2'	cl	
15		0945	2'		
		0950	2'		
20					

DESCRIPTION

(10"-2') Silty Sand To Sandy Silt: Light brown, trace of coarse sand, micaceous, dry, No odor. No staining. (Gray material intermixed)
(2.2'-4') Similar material as 10"-2' core, Trace of gravel. Slight hydrocarbon odor, No staining. Dark brown
(4.9'-5.7') Similar material as 2.2'-4' core. Increase in coarseness. 4.9' red brick material. (5.7'-6') Dark brown to black, increase in silt content, micaceous, moist, strong hydrocarbon odor. Hydrocarbon stained.
(6.2'-7.6') Silty Clay to Clayey Silt, Dark brown to black, trace of coarse sand, saturated, strong odor, stained (7.6'-9') Silt, Gray, trace of coarse sand, micaceous, dry, No staining, slight odor
(8'-8.11") Similar material as 7.6'-9' core, trace of gravel, slight odor, minor hydrocarbon staining (8.11"-10') Silty Clay to Clayey Silt, Dark brown to olive green, trace of sand, micaceous, saturated, strong hydrocarbon odor, hydrocarbon staining.
(10'-12') Similar material as 8.11"-10' core, Increase in hydrocarbon staining, Strong hydrocarbon odor.
(12'-14') Clay, Olive green, trace of sand, micaceous, high plasticity, saturated, hydrocarbon odor, Decrease in hydrocarbon staining.
(14'-16') Similar material as 12'-14' core. Dark brown to Olive green, stiff, micaceous, slightly moist, slight hydrocarbon odor does not appear to be stained
(16'-18') Similar material as 14'-16' core. Slight odor No staining

Total Depth: 18 FEET

Did not encounter ground water during drilling
Backfilled with bentonite pellets.
Encountered impacted material from ~5.7' to 14'.
(Does not appear stained from 7.6' to 8.11")

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-33 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Continuous Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE NO. AND TYPE (Recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1000	CC 1'10"	ml/sm		(2"-2') Silty SAND TO SANDY SILT; light brown, trace of coarse sand and gravel, well graded, micaceous, dry, No odor, No staining.
		1005	2'			(2'-3.7') Similar material as 2"-2' core. Light brown to dark brown to light gray, increase in coarseness, No staining (3.7'-4') Silty Clay to Clayey Silt, Dark brown to black, trace of sand, moist, strong hydrocarbon odor, hydrocarbon stained
5		1010	1.3'	cl/ml		(4.9'-6') Similar material as 3.7'-4' core. Increase in coarse sand content, strong odor, stained.
		1015	2'			(6'-8') Similar material as 4.9'-6' core, decrease in coarse sand, strong odor, increase in hydrocarbon staining.
		1020	2'			(8'-10') Similar material as 6'-8' core, strong hydrocarbon odor, decrease in staining.
10		1025	2'			(10'-12') Similar material as 8'-10' core. Strong odor, stained.
15						

Total Depth: 12 FEET

Did not encounter ground water during drilling

Backfilled with bentonite pellets

Encountered impacted material from 3.7'-12'.

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WD1-TS-34 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont. Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (recovery)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1035	CC 1.7'	ml/sm		(5"-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand and gravel, well graded, dry, no odor, no staining.
		1040	1.4'			(2.8'-3.7') Similar material as 5"-2' core. No staining. (3.7'-4') Sand, Light gray, fine to med. grained, poorly graded, moist, strong hydrocarbon odor. Black hydrocarbon stained
5		1045	1.9'	sp		
		1050	2'			(4.3'-6') Silty Clay to Clayey Silt, Dark brown to black, trace of Sand, saturated, strong odor, stained.
		1055	2'	cl/ml		(6'-8') Similar material as 4.3'-6' core. Olive green to gray, strong odor, hydrocarbon stained throughout core.
10		1100	2'			(8'-10') Similar material ~~material~~ as 6'-8' core strong odor, stained (10'-12') Similar material as 8'-10' core strong odor. stained.
		1105	1.5'			(12.7'-14') Clay, Dark brown, trace of sand, micaceous, stiff, slightly moist, slight odor, does not appear stained.
15		1110	2'	cl		(14'-16') Similar material as 12.7'-14' core. No odor. No staining

Total Depth: 16 FEET

No ground water during drilling.

Backfilled with bentonite pellets

Encountered impacted soil from ~3.7' to 12.7'.

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT Unocal

PROJECT NO. 94-256

LOCATION WD1

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-3.5 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont. Core

AND DIMENSION 1.5' x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time (Rec.)	SAMPLE NO. AND TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1130	CC 1.3'	ml/sm		(9"-2') Silty Sand to Sandy Silt; Light brown to light gray, trace of coarse sand and gravel, well graded, dry, No odor, No staining.
		1135	1.2'			(2'10"-3.5') Similar material as 9"-2' core. Rock at 2.10'. (3.5'-4') Silty Clay to Clayey silt, black to olive green, trace of sand, saturated, hydrocarbon odor, stained
5		1140	1.4'	cl/ml		(4.8'-6') similar material as 3.5'-4' core. strong odor stained
		1145	2'			(6'-8') similar material as 4.8'-6' core. strong odor. Stained
		1150	1.7'			(8.5'-10') Clay, Dark brown to Olive green, trace of sand, micaceous, stiff, slightly moist, slight odor, minor staining.
10		1155	2'	cl		(10'-12') Similar material as 8.5'-10' core. Slight odor, No staining.
		1200	2'			(12'-14') Similar material as 10'-12' core. slight odor, No staining
15						

TOTAL DEPTH. 14 FEET

Did not encounter ground water during drilling

Backfilled with bentonite pellets.

Encountered impacted soil from ~3.5' to 10'.

NA - Not Applicable

NM - Not Measured

CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-252

LOCATION WD1

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-36 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont. Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY
0	NA	1215	CC 1.5	ml/sm	
		1220	2'	cl/ml	
5		1225	1.2'		
		1230	1.9'	cl	
		1235	11"		
10					

DESCRIPTION

(7"-1.9') Silt sandy to sandy Silt; brown, trace of course sand and gravel, slightly moist, No staining (1.9'-2') Silty Clay to Clayey silt, Olive green to black, trace of sand, saturated, Strong hydrocarbon odor, stained.
(2'-4') Similar material as 1.9'-2' core. strong odor, stained
(4'10"-6') Clay, Dark brown to Dark gray, trace of sand, micaceous, slightly moist, Slight odor, does not appear stained
(6.3'-8') Similar material as 4'10"-6' Core, Brown No odor No staining
(8.1'-10') Similar material as 6.3'-8'. Increase in silt content, Dark brown, No odor, No staining.

TOTAL Depth: 10 FEET

Did Not encounter ground water during drilling.
Backfilled with bentonite pellets.
Encountered impacted soil from ~ 1.9' to ~4'10".

NA - Not Applicable
NM - Not Measured
CC - Cont. Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WD1-TS-37 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont. Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) TIME	SAMPLE NO. AND TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1300	CC 9"	ml/sm		(0.3'-2') Silty SAND TO SANDY SILT; Light gray to Light brown, trace of coarse sand, dry, No odor, No staining.
		1305	1.7'			(2.5'-4') Similar material as 1.3'-2' core, increase in coarseness, Slightly moist, No odor, No staining.
5		1310	1.6'	cl/ml		(4.6'-5.8') Silty Clay to Clayey Silt, dark brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining (5.8'-6') Silty Sand to Sandy Silt, Light gray to brown, trace of coarse sand and gravel, well graded, moist, slight odor, No staining
		1315	1.7'			
		1320	1.2'	ml/sm		(6.5'-8') Similar material as 5.8'-6' core. Olive green, micaceous, trace of coarse sand, slightly moist, slight odor, poss staining at 7.8'.
10		1325	2'			
		1330	1.3'			(8.10"-10') Similar material as 6.5'-8' core. Dark brown, slight odor, No staining.
				cl		(10'-12') Similar material as 8.10"-10' core. Slight odor, No staining.
15						(12.9'-13.8') Similar material as 10'-12' core, No staining
						(13.8-14') Clay Red to brown, trace of sand, micaceous, very stiff, slightly moist, No odor, No staining.

Total Depth: 14 FEET

No ground water during drilling.

Backfilled with bentonite pellets.

Did not appear to contact impacted material.

NA - Not Applicable

NM - Not Measured

CC - Cont. Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WD1

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-38 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont. Core AND DIMENSION 1" x 2'

FIELD ENGINEER A Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1345	CC 9"			(1.3'-2') Silty SAND TO SANDY Silt; Light brown, trace of gravel, micaceous, dry, No odor, No staining.
		1350	9"	ml/sm		(3.3'-4') similar material as 1.3'-2' core. No odor. No staining.
						(4'-6') No Recovery.
5		1355	0"			(6.6'-7.1') similar material as 3.3'-4' core. (7.1'-8') Silty Clay to Clayey Silt, Black to Olive green, trace of sand, saturated, strong hydrocarbon odor, Hydrocarbon stained.
		1400	1.6'			
		1405	2'			(8'-10') Similar material as 7.1'-8' core. strong odor, stained
10		1410	2'	cl/ml		(10'-12') similar material as 8'-10' core. strong odor, stained.
						(12'-14') similar material as 10'-12' core. strong odor. Stained.
		1415	2'			(14'-16') similar material as 12'-14' core. strong odor. decrease in hydrocarbon staining.
15		1425	2'			
		1430	1.9'			(16.3'-17.5') similar material as 14'-16' core. Does not appear stained.
		1435	2'	cl		(17.5'-18') Clay, Red to brown, trace of sand, micaceous, very stiff, slightly moist, No odor, No staining
20						(18'-20') similar material as 17.5'-18' core. No odor. No staining.

Total Depth: 20 FEET

No ground water during drilling.

Backfilled with Bentonite pellets.

Contacted impacted soil from ~7.1' to 17.5'.

NA - Not Applicable

NM - Not Measured

CC - Cont. Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WD1

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-39 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont. Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-27-97

DATE FINISHED 10-27-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE NO. AND TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1450	CC 1.6'			(6"-2') Silty Sand to Sandy Silt, light brown, trace of coarse sand and gravel, well graded, micaceous, dry, No odor, No staining
		1455	1.3'			(2.9'-4') similar material as 6"-2' core, No odor, No staining
5		1500	1.2'			(4'10"-6') similar material as 2.9'-4' core. Brown, increase in coarseness. No odor, No staining.
		1505	1.5'	ml/sm		(6.7'-8') similar material as 4'10"-6' core. No odor. No staining.
		1510	1'			(9'-10') similar material as 6.7'-8' core. No odor. No staining.
10		1515	1.3'			(10.9'-12') similar material as 9'-10' core. Increase in silt content, No odor, No staining.
		1520	1.8'			(12.4'-13') similar material as 10.9'-12' core. No staining.
15		1525	2'			(13'-14') Silty Clay to Clayey Silt, Black to dark brown, trace of sand, micaceous, saturated, strong hydrocarbon odor, Hydrocarbon stained.
		1530	2'	cl/ml		(14'-16') similar material as 13'-14' core strong odor. stained
		1535	2'			(16'-18') similar material as 14'-16' core. Strong odor, stained.
20		1540	1.9'			(18'-20') similar material as 16'-18' core. Olive green to dark brown, strong odor, stained
						(20'-21.4') similar material as 18'-20' core. strong odor, stained.
				sl/sm		(21.4'-22') SILTY SAND TO SANDY SILT, DARK BROWN, trace of sand, micaceous, Slightly moist, No odor, No staining

Total Depth: 22 FEET

No ground water during drilling.

Backfilled with bentonite pellets.

Encountered sump material from ~13' to 21.4'.

NA- Not Applicable

NM- Not Measured

CC- Cont. Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-40 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont. Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-28-97

DATE FINISHED 10-28-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	0720	CC 1.3'	ml/sm		(0'-2') Silty Sand to SANDY Silty, Light brown, trace of coarse sand and gravel, trace of vegetation, micaceous dry, No odor No staining
		0725	1.5'			(2.7'-3.9') similar material as 0'-2' core. No staining (3.9'-4') Silty Clay to Clayey Silt, trace of sand, micaceous, dry, med plasticity, dry, No odor, No staining
5		0730	1.2'			(4.10'-6') similar material as 3.9'-4' core. Increase in coarseness (sand gravel) No odor, No staining,
		0735	2'			(6'-8') Clay, Dark brown to black, trace of sand, micaceous, moist, Strong hydrocarbon odor, stained.
		0740	1.2'			(8.10"-10') similar material as 6'-8' core. Strong odor. stained
10		0745	2'	Cl		(10'-12') similar material as 8.10"-10' core. Strong odor stained
		0750	2'			(12'-14') similar material as 10'-12' core. Strong odor stained
15		0755	2'			(14'-16') similar material as 12'-14' core. Strong odor. stained
		0800	2'			(16'-18') similar material as 14'-16' core. Olive green, Strong odor stained
20		0805	2'	cl/ml		(18'-20') Silty Clay to Clayey Silt, Dark brown, trace of coarse sand, micaceous, stiff, slightly moist, Slight odor, No staining.

Total Depth: 20 FEET

No ground water encountered drilling.

Backfilled with bentonite pellets

Encountered sump material from ~6' to 18'.

NA - Not Applicable

NM - Not Measured

CC - Cont. Core

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WDI-TS-41 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER A. Isaly
EDITED BY A Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-28-97
DATE FINISHED 10-28-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE NO. AND TYPE (loc.)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	0820	CC 1.2'	ml/sm		(10"-2') Silty sand to Sandy Silt, light brown, trace of gravel & coarse sand, trace of vegetation, well graded, micaceous, dry, No odor, No Staining.
		0825	1.3'			(2.9'-4') Similar material as 10"-2' core. No odor. No staining
5		0830	1'			(5'-5.8') similar material as 2.9'-4' core, No odor. No staing
		0835	1.1'	cl/ml		(5.3'-6') Silty Clay to Clay Silt, brown, trace of sand, micaceous, slightly moist, No odor, No staining.
		0840	1.2'			(6'11"-8') Similar material as 5.8'-6' core. No odor. No staining, rock (black material) @ 8'
10		0845	2'			(8'10"-10') Similar material as 6'11"-8' core. Dark brown to black, saturated, strong hydrocarbon odor, stained.
		0850	2'	cl		(10'-12') Clay, Olive green to black, trace of sand, saturated, strong odor, stained.
15		0855	2'			(12'-14') similar material as 10'-12' core. strong odor, stained
		0900	2'	cl/ml		(14'-16') Similar material as 12'-14' core strong odor stained (16-16.9') similar material as 14'-16' core. Odor, stained. (16.9'-18') Clayey Silt to Silty Clay, Dark brown, trace of sand, micaceous, slightly moist, slight odor, No staining.
20						
25						
30						
35						
40						
45						

Total Depth: 18 FEET.
No ground water during drilling
Backfilled with bentonite pellets.
Encountered sump material ~ 9' to 16.9'.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-FIELD/FMB REV. 03/20/92

CLIENT Unocal
PROJECT NO. 94-256
LOCATION WDI

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WD1-TS-42 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont. Core AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-28-97

DATE FINISHED 10-28-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NO. AND TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION (= broken and bright orang.)
0	NA	0920	CC 1'	ml/sm		(1'-2') Silty Sand To Sandy Silt, Light brown, trace of gravel & coarse sand, well graded, dry, No odor, No staining.
		0925	1.5'			(2.7'-4') Similar material as 1'-2' Core. No odor, No staining.
5		0930	10"			(5.2'-6') Silty Clay to Clayey Silt, Dark brown, trace of sand, micaceous, slightly moist, Slight hydrocarbon odor, No staining
		0935	1.5'	cl/ml		(6.7'-8') Similar material as 5.2'-6' core Black, Strong odor, Stained
		0940	1.4'			(8.8'-10') Similar material as 6.7'-8' core. Strong odor, Stained
10		0945	2'			(10'-12') Clay, Olive green to black, trace of sand, micaceous, Saturated, Strong odor, Stained.
		0950	2'	cl		(12'-14') Similar material as 10'-12' Core. Strong odor. Stained
						(14'-15.2') Similar material as 12'-14' Core. odor, Stained.
15		0955	2'	cl/ml		(15.2'-16') Silty Clay to Clayey silt, Red to brown, trace of sand, micaceous, Stiff, slightly moist, No odor, No staining
20						
25						* Allowed Boring to sit open for 2 hrs to allow liquids to infiltrate into boring. No liquids were encountered.
30						Total Depth: 16 FEET
						No ground water during drilling.
35						Backfilled with bentonite pellets.
						Encountered sump material from ~ 6.7' to 15.2'.
40						NA - Not Applicable
						NM - Not Measured
						CC - Cont. Core
45						

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WD1

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO. WD1-TS-43 SHEET 1 OF 1

DRILLING CO./RIG TEG

SAMPLER TYPE Cont Core

AND DIMENSION 1" x 2'

FIELD ENGINEER A. Isaly

EDITED BY A. Isaly

CHECKED BY

COORDINATES N NM E NM

DATE BEGAN 10-28-97

DATE FINISHED 10-28-97

GROUND SURFACE EL. NM

DEPTH IN FEET	PID OR FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE NO. AND TYPE (Loc.)	U.S.C.S.	PROFILE/ LITHOLOGY	DESCRIPTION
0	NA	1000	CC 6"	ML/SM		(1.5'-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand and gravel, micaceous, dry, No odor, No staining.
		1005	1.1'			(2.11"-4') Similar material as 1.5'-2' core. Increase in coarse material, No odor, No staining. (Refusal at ~4'. Moved boring location ~5' to the East)
5		1010	1.1'	CL/ML		(4.11"-6') Silty Clay to Clayey Silt, Brown, trace of sand and gravel, slightly moist, micaceous, No odor, No staining.
		1015	2'			(6'-8') similar material as 4.11'-6' core. Olive green to black, saturated, slight hydrocarbon odor, stained
		1020	2'			(8'-10') similar material as 6'-8' core, strong odor, stained
10						
15						
20						
25						
30						
35						
40						
45						

Total Depth. 10 FEET

No ground water during drilling.

Backfilled with bentonite pellets.

CONTACTED Sump material ~6' to 8'.

NM - Not Measured

NA - Not Applicable

CC - Cont. Core

Refusal at 4', Moved boring location ~5' to East.

A-FIELD/FMB REV. 03/20/92

CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION WD1

(ALL FIELD LOGGING ON THIS FORM, ORIGINAL TO PROJECT FILES)

ENVIRONMENTAL SOLUTIONS, INC.

~~MONITORING WELL~~ BORING No. WDI-TS-44 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-28-97
DATE FINISHED 10-28-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1020	CC 10"	ml/sm		
		1025	1.5'			
5		1030	1.5'			
		1035	2'	cl/ml		
10		1040	2'	ml		
		1045	2'			
		1050	1.7'	cl/ml		
15		1055	2'			
20						
25						
30						
35						
40						

DESCRIPTION

(1.2'-2') Silty Sand to Sandy Silt, Light brown, trace of Coarse Sand, micaceous, dry. No odor, No Staining.
(2.7'-4') similar material as 1.2'-2' core. Increase in silt content from ~3.5-4'. No odor, No staining.
(4'-5.1') similar material as 3.5'-4' core. No odor No staining (5.1'-6') Silty Clay to Clayey silt, brown, trace of sand, micaceous, moist, No odor, No staining
(6'-8') similar material as 5.1'-6' core. No odor, No staining.
(8'-9.3') similar material as 6'-8' core. (9.3'-9.8') silt, gray, trace of sand, No staining (9.8'-10') Similar material as 8'-9.3' core. slight odor, minor hydrocarbon staining.
(10'-12') similar material as 9.8'-10' core. Black to olive green, saturated, strong odor, stained
(12.5'-14') similar material as 10'-12' core. olive green, strong odor, Decrease in hydrocarbon staining
(14-15.7') similar material as 12.5'-14' core.
(15.7'-16') Similar material as 14-15.7' core. Black brown, micaceous, trace of Coarse sand, slight moist, No odor, No staining

Total Depth: 16 FEET

No ground water during drilling.
Backfilled with bentonite pellets.
Encountered sump material from ~10' to 15.7'.

NM - Not Measured
NA - Not Applicable
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME Unocal
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

Boring No.

~~MONITORING WELL~~ WDI-B-45 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-28-97
DATE FINISHED 10-28-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE TYPE (sec)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1100	CC 1.2'	ml/sm		
		1105	2'			
5		1110	1'			
		1125	1.10"	cl/ml		
		1130	2'			
10		1135	2'			
		1140	2'	cl		
15		1145	1.9'			
20						
25						
30						
35						
40						

DESCRIPTION

(10"-2') SILTY SAND TO SANDY SILT, Light brown, trace of coarse sand and gravel, micaceous, dry, No odor, No staining
(2'-4') Similar material as 10"-2' core. No odor, No staining.
(5'-6') Silty Clay to Clayey Silt, Brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining
(6.2'-8') similar material as 5'-6' core. No odor No staining
(8'-9.9') similar material as 6.2'-8' core. Olive green, saturated, slight hydrocarbon odor, Minor hydrocarbon staining (9.9'-10') Sand; Gray to brown, fine grained, poorly graded, moist, slight odor, No staining.
(10'-12') Clay, Olive green, trace of sand, saturated, strong odor, does not appear to be hydrocarbon stained
(12'-14') Similar material as 10'-12' core odor, pass. stained
(14-15') similar material as 12'-14' core. odor, pass. stained.
(15'-16') Clay, Red to brown, trace of sand, micaceous, stiff, slightly moist, No odor, No staining.

Total Depth: 16 FEET
No ground water during drilling.
Backfilled with bentonite pellets
Contacted impacted material from 8' to 15'.
NA- Not Applicable
NM- Not Measured
CC- Cont. Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME Unocal
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

~~MONITORING WELL~~ BORING & NO. WDI-TS-46 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST Alsaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM
E NM
DATE BEGAN 10-28-97
DATE FINISHED 10-28-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1220	CC 1.6'	ml/sm		
		1225	1.2'	cl/ml		
5		1230	9"	ml/sm		
		1235	2'	cl/ml		
10						
15						
20						
25						
30						
35						
40						

DESCRIPTION

(6"-1.7') Silty Sand to Sandy Silt, light brown, trace of gravel and coarse sand, trace of veg., well graded, dry, No odor, No staining. (1.7'-2') Silty Clay to Clayey Silt, brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(2.10"-4') Silty Sand to Sandy Silt, light brown, trace of gravel and coarse sand, well graded, dry, No odor, No staining.
(5.3'-5.7') similar material as 2.10"-4' core.
(5.7'-6') Silty Clay to Clayey Silt, black, trace of sand, Saturated, strong hydrocarbon odor, stained
(6'-8') Similar material as 5.7'-6' core. Strong hydrocarbon odor, stained

Total Depth: 8 FEET

No ground water during drilling
Backfilled with bentonite pellets.
Contacted sump material ~ 5.7' to 8'.
NA - Not Applicable
NM - Not Measured
CC - Cont. Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME HADCAL
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

Boring No.

~~MONITORING WELL~~ WDI-TS-47 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-28-97
DATE FINISHED 10-28-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE TYPE (rec)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1240	CC 9"	ml/sm			(1.3'-2') Silty Sand to Sandy Silt, Light brown, trace of gravel and coarse sand, well graded, loose, dry, No odor, No staining
		1245	1.5'				(2.1'-4') Similar material as 1.3'-2' core. Increase in silt content, No odor, No staining.
5		1250	1.9'	cl/ml			(4.3'-6') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, slight hydrocarbon odor, No staining
		1255	2'				(6'-8') Similar material as 4.3'-6' core. Black to olive green, saturated, strong hydrocarbon odor, hydrocarbon staining.
10							
15							
20							
25							Total Depth 8 FEET
30							No ground water during drilling.
							Backfilled with bentonite pellets
							Encountered Sump material from ~6'-8'.
35							NA - Not Applicable
							NM - Not Measured
40							CC - Cont. Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME UNOCAL
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

~~MONITORING WELL~~ BORING No. WDI-TS-48 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-28-97
DATE FINISHED 10-28-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1300	CC 6"				(1.6'-2') Silty Sand to Sandy Silt, Light brown, trace of Coarse sand and gravel, well graded, dry, No odor, No staining.
		1305	1.1'				(2.10"-4') similar material as 1.6'-2' core. No odor, No staining.
5		1310	1.7'	ml/sm			(4.5'-6') Similar material as 2.11" to 4' core. No odor, No staining.
		1315	1.3'				(6.9'-8') Similar material as 4.5'-6' core. Gray to black, saturated, Strong hydrocarbon odor stained
		1320	7"				(8.5'-9') similar material as 6.9'-8' core. Strong odor, stained (Refusal at 9'. Concrete in shoe)
10		1335	1.8'				(10.4'-12') Clay, Olive green to black, Saturated, strong odor, stained
		1340	2'	Cl			(12'-14') Similar material as 10.4'-12' core. Strong odor, stained.
		1345	2'				(14-16') Similar material as 12'-14' core. strong odor. stained
15		1350	1.7'				(16.5'-16.9') Similar material as 14'-16' core. odor, pos. stained
							(16.9'-18') Similar material as 16.5'-16.9' core. Brown, trace of sand, micaceous, stiff, slightly moist, slight odor, No staining
20							
25							Total Depth: 18 FEET
							No ground water during drilling
30							Backfilled with bentonite pellets.
							Encountered sump material from ~ 6.9' to 16.9'.
35							NM - Not Measured
							NA - Not Applicable
40							CC - Cont. Core
							Refusal at ~9'. Relocated boring ~ 10' to South (towards Los Nietos Rd)

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME UNOCAL
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

Boring No.

~~MONITORING WELL~~ WDI-TS-49 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-29-97
DATE FINISHED 10-29-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0830	CC 1.4'	m/sm		
		0835	1.6'			
5		0840	1.7'	cl/ml		
		0845	2'			
		0850	1.10"			
10		0855	2'	cl		
		0900	1.7'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt; Light brown, trace of gravel and coarse sand, micaceous, loose, dry, No odor No staining
(2.6'-4') Silty Clay to Clayey Silt; Brown, trace of gravel and sand, micaceous, slightly moist, No odor, No staining
(4.5'-6') similar material as 2.6'-4' core. Dark brown to dark gray, saturated, strong hydrocarbon odor, poss. stained.
(6'-8') similar material as 4.5'-6' core. Black to Olive green, strong odor, hydrocarbon stained.
(8.2'-10') Clay, Olive green, trace of sand saturated, strong odor, stained
(10'-12') similar material as 8.2'-10' core. Increase in sand content, Dark brown, slight odor, poss stained
(12.5'-14') similar material as 10'-12' core. Red to brown, micaceous, stiff, slightly moist, No odor, No staining

Total Depth: 14 Feet
No ground water during drilling.
Backfilled with bentonite pellets.
Contacted sump material from ~4.5' to 12'.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME UNOCAL
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-50 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-29-97
DATE FINISHED 10-29-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0910	CC 9"				(1.3'-2') Silty Sand to Sandy Silt; light brown, trace of gravel and coarse sand, well graded, loose, dry, No odor, No staining
		0915	1.5'				(2.7'-4') similar material as 1.3'-2' core. No odor. No staining
5		0920	1.1'	ml/sm			(4.11"-6') similar material as 2.7'-4' core. Brown, increase in coarseness, No odor, No staining.
		0925	1.2'				(6.10"-8') similar material as 4.11"-6' core. Dark brown to black, moist, slight hydrocarbon odor, stained (7.9'-8'
		0930	1.1'				(8.10"-10') similar material as 7.9'-8' core. slight odor, stained
10		0935	2'				(10'-11') similar material as 8.10"-10 core. Saturated, slight odor, stained. (11'-12') Clay, Olive green, trace of sand, saturated, slight odor, poss. stained
		0940	2'	cl			(12'-13.6') similar material as 11'-12' core. Dark brown, moist, No odor, No staining (13.6-14') Red to brown, stiff, slightly moist, No odor.
15							
20							
25							
30							Left open to check for liquids @ 0940. Soil caved in to 9'. No Liquids.
35							Total DEPTH: 14 FEET No ground water during drilling Backfilled with Bentonite pellets. Contacted sump material from 6.10" to 11'.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME UNOCAL
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-S1 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-29-97
DATE FINISHED 10-29-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time (Rec.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0945	CC 9"			
		0950	1.4'			
5		0955	1'	ml/sm		
		1000	1.6'			
		1005	11"			
10		1010	2'	cl		
		1015	2'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(1.3'-2') Silty Sand to sandy silt; Light brown, trace of gravel and coarse sand, micaceous, dry, No odor, No staining.
(2.8'-4') Similar material as 1.3'-2' core, Brown, No odor, No staining.
(5'-6') Similar material as 2.8'-4' core, increase in coarseness, No odor, No staining. (Red brick in shoe).
(6.6'-8') Similar material as 5'-6' core, Dark brown to gray, broken rock fragments, slightly moist, No odor, No staining
(9.1'-10') Similar material as 6.6'-8' core. Increase in coarse material, No odor, No staining.
(10'-10.9') Similar material as 9.1'-10' core. Dark brown, Saturated, No odor, No staining. (10.9'-12') Clay, Dark brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(12'-14') Similar material as 10.9'-12' core. Red to brown, Stiff, No odor, No staining.

Total Depth: 14 FEET
No ground water during drilling
Backfilled with Bentonite pellets
Did Not Appear to encounter impacted soil.
NM - Not Measured
NA - Not Applicable
CC - Continous Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME UNOCAL
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WD1-TS-52 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-29-97
DATE FINISHED 10-29-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER 6 OUT)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1035	CC 1.4'	ml/sm		
		1040	1.6'			
5		1045	1.3'			
		1050	1.6'	cl		
		1055	2'			
10		1100	2'			
		1105	2'			
15						

DESCRIPTION

(0"-1.10') Silty SAND to Sandy Silt, Light brown, trace of coarse sand and gravel, dry, No odor, No staining
(1.11'-2') Clay, Brown, trace of sand, micaceous, dry, No odor, No staining.
(2.6'-4') Similar material as 1.11'-2' core. moist, No odor, No staining.
(4.9'-6') Similar material as 2.6'-4' core. No odor, No staining.
(6.6'-8') similar material as 4.9'-6' core, saturated, No odor, No staining.
(8'-10') similar material as 6.6'-8' core Dark brown, No odor, No staining.
(10'-11') Similar material as 8'-10' core, No odor, No staining
(12'-12') Similar material as 10'-11' core. Rock, stiff, slightly moist, No odor, No staining.
(12'-14') Similar material as 11'-12' core, No odor, No staining.

Total Depth: 14 FEET
No ground water during drilling
Backfilled with bentonite pellets.
Did not appear to contact sump material.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME UNOCAL
PROJECT NO. 94-256
LOCATION WD1

ENVIRONMENTAL SOLUTIONS, INC.

Boring No.

MONITORING WELL WDI-TS-53 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-29-97
DATE FINISHED 10-29-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE TYPE (Rec)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1115	CC 1.4'	ml/sm		
		1120	1.7'			
5		1125	1.1'			
		1130	1.1'	cl		
		1135	2'			
10		1140	2'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(8"-2') Silty SAND TO SANDY Silt, Light brown, trace of gravel and coarse sand, micaceous, dry, No odor, No staining.
(2.-3.3') Similar material as 8"-2' core, No odor, No staining. (3.3'-4') Clay, brown, trace of sand, micaceous, stiff, slightly moist, No odor, No staining. Dark brown,
(4.11"-6') similar material as 3.3'-4' core, decrease in sand content, soft, micaceous, moist. No odor, No staining.
(6.11"-8') similar material as 4.11"-6' core. No odor, No staining.
(8'-10') Similar material as 6.11"-8' core, increase in silt content (~9.0') No odor, No staining.
(10-11.4') similar material as 8'-10' core. No odor, No staining. (11.4'-12) Similar material as 10.-11.4', Red, trace of sand, micaceous, stiff, slightly moist, No odor, No staining.

Total Depth: 12 FEET
No ground water during drilling.
Backfilled with bentonite pellets.
Did not appear to encounter sump material

NA- Not Applicable
NM- Not Measured
CC- Continuous Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME Unocal
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No

~~MONITORING WELL~~ WDI-TS-54 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM
E NM
DATE BEGAN 10-29-97
DATE FINISHED 10-29-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1155	CC 1.2'	ml/sm		
		1200	1.7'			
5		1205	1.8'			
		1210	2'	Cl		
		1215	2'			
10		1220	2'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(5"-2') Silty SAND TO Sandy SILT, Light brown, trace of gravel and coarse sand, trace of vegetation, dry, No odor, No staining.
(2.5'-4') Clay, Dark brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(4.4'-6') similar material as 2.5'-4' core. Dark brown to black, saturated, strong hydrocarbon odor, stained.
(6'-7.2') similar material as 4.4'-6' core, strong odor, stained.
(7.2'-8') clay, Dark brown, trace of sand, micaceous, moist, No odor, No staining.
(8'-9.2') similar material as 7.2'-8' core. No odor, No staining (9.2'-10') similar material as 8'-9.2' core. Red, trace of sand, micaceous, stiff, slightly moist, No odor, No staining.
(10'-12') similar material as 9.2'-10' core. No odor, No staining.

Total Depth: 12 FEET
No ground water during drilling.
Backfilled with bentonite pellets
Contacted impacted soil from ~ 4.4' to 7'.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core.

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME UNOCAL
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No

~~MONITORING WELL~~ WDI-TS-SS SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-29-97
DATE FINISHED 10-29-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE ~~BLOWS PER FOOT~~ Time (Rec.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1230	CC 1.4'	ml/sm		
		1235	1.5'			
5		1240	1'			
		1245	2'			
		1250	1.9'	CL		
10		1255	2'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt; Light brown, trace of gravel and coarse sand, well graded, trace of vegetation, dry, No odor, No staining.
(2.7'-4') similar material as 8"-2' core. Dark brown, No odor, No staining.
(5'-5.3') similar material as 2.7'-4' core. (5.3'-6') Clay, black, trace of sand, saturated, strong hydrocarbon odor, stained.
(6'-8') Similar material as 5.3'-6' core. Olive green, strong odor, stained.
(8.3'-9.8') similar material as 6'-8' core, Dark brown strong odor, No hydrocarbon staining. (9.8'-10') Clay, Brown to Red, trace of sand, micaceous, stiff, slightly moist, No odor, No staining.
(10'-12') similar material as 9.8'-10' core. No odor, No staining.

Total Depth: 12 FEET
No ground water during drilling.
Backfilled with Bentonite Pellets.
Contacted impacted soil from ~5.3' to 10'.
NA- Not Applicable
NM- Not Measured
CC- Continuous Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME UNOCAL
PROJECT NO. 94-256
LOCATION WDI

ENVIRONMENTAL SOLUTIONS, INC.

Boring No.

MONITORING WELL WDI-TS-57 SHEET 1 OF 1

DRILLING CO./RIG: TEG
SAMPLER TYPE AND DIMENSION: Cont. Core 1" x 2'
FIELD ENGINEER/GEOLOGIST: A Isaly
EDITED BY: A. Isaly
CHECKED BY:

COORDINATES N: NM E: NM
DATE BEGAN: 10-29-97
DATE FINISHED: 10-29-97
GROUND SURFACE EL.: NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) Time	SAMPLE TYPE (Rec.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1435	CC 1.4'	ml/sm		
		1440	1.1'			
5		1445	8"	cl/ml		
		1450	1.10"	cl/sw		
		1500	1.1'			
10		1505	2'	ml/sm		
		1510	2'	cl		
15		1515	2'			
		1520	2'	cl/ml		
20		1525	2'	cl		
25						
30						
35						
40						

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt; Light brown, trace of gravel & coarse sand, micaceous, dry, No odor, No staining
(2'11" - 4') similar material as 8"-2' Core. Brown, No odor, No staining.
(5.4'-6') Silty Clay to Clayey Silt, Brown, trace of coarse sand and gravel, micaceous, slightly moist, No odor, No staining.
(6.2'-8') Sandy Clay to Clayey Sand, brown, trace of gravel, well graded, micaceous, stiff, slightly moist, No odor, No staining.
(8'11"-9.6') similar material as 6.2'-8' Core. No staining
(9.6'-10') Silty Sand to Sandy Silt; Light brown, trace of gravel, well graded, moist, slight hydrocarbon odor, No staining.
(10'-10.8') Similar material as 9.6'-10' Core. No staining.
(10.8'-12') Clay, Black, trace of sand, saturated, strong hydrocarbon odor, Hydrocarbon stained.
(12'-14') similar material as 10.8'-12' Core. Black to Olive green, strong odor, stained.
(14'-16') similar material as 12'-14' Core. strong odor, stained.
(16'-17.8') similar material as 14'-16' Core. strong odor. Stained
(17.8'-18') Silty Clay to Clayey silt, Dark brown, trace of sand, micaceous, slightly moist, slight odor, No staining.
(18'-20') Clay, Dark brown, trace of sand, micaceous, stiff, slightly moist, slight odor, No staining.

TOTAL DEPTH: 20 FEET
No ground water during drilling
Backfilled with bentonite pellets
Contacted sump material from ~10.8' to 17.8'

NM - Not Measured
NA - Not Applicable
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

PROJECT NAME: UNOCAL
PROJECT NO.: 94-256
LOCATION: WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ W01-TS-58 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0915	CC 1'	ml/sm			1"-6" Asphalt (1'-2') Silty Sand to Sandy Silt; Light brown to brown, trace of gravel and coarse sand, micaceous, slightly moist, No odor, No staining.
		0920	1.6'				(2.6'-4') Silty Clay to Clayey Silt, brown, trace of sand, micaceous, slightly moist, No odor, No staining.
5		0925	11"				(5.1'-6') Similar material as 2.6'-4' core. Dark brown to black, moist, strong hydrocarbon odor, stained.
		0925	1.8'	cl/ml			(6.4'-8') Similar material as 5.1'-6' core. Olive green to black, strong odor, stained.
10		0930	1.3'				(8.9'-10') Similar material as 6.4'-8' core, saturated, strong odor, stained.
		0935	2'				(10'-12') Similar material as 8.9'-10' core. Dark brown, slight odor, No staining.
		0940	2'				(12'-13') Similar material as 10'-12' core. No odor, No staining (13'-14') Similar material as 12'-13' core. Increase in silt content, slightly moist, stiff, No odor, No staining.
15		0950	2'				(14'-16') Similar material as 13'-14' core. No odor, No staining.
20							
25							
30							Encountered sump material from ~5' to 10'.
35							TOTAL DEPTH: 16 FEET No ground water during drilling Back filled with Bentonite pellets. Asphalt patch at surface
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-59 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Dont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1000	CC 1.2'	ml/sm		
		1005	1'	cl/ml		
5		1010	10"	ml/sm		
		1015	1.10"			
10		1020	2'	cl		
		1025	1.9'			
		1030	2'			
15						
20						
25						
30						
35						
40						

→ 4"-6" Asphalt

DESCRIPTION

(10"-1.4') Silty Sand to Sandy Silt, Light brown, trace of gravel and coarse sand, micaceous, dry, No odor, No staining. (1.4'-2') Silty Clay to Clayey, brown, trace of sand, micaceous stiff, dry, No odor, No staining. (3'-3.3') similar material as 1.4'-2'. (3.3'-4') Silty Sand to Sandy Silt, Light to dark brown, trace of gravel and coarse sand, well graded, slightly moist, No odor, No staining. (5.2'-5.7') Similar material as 3.3'-4' core. No odor, No staining. (5.7'-6') Clay, black to Dark brown, trace of sand, saturated, Strong hydrocarbon odor, stained.
(6.2'-8') similar material as 5.7'-6' core. Olive green, Strong odor, stained
(8'-10') similar material as 6.2'-8' core. Strong odor, stained
(10.3'-12') similar material as 8'-10' core, Dark brown Strong odor, stained.
(12'-13.6') similar material as 10.3'-12' core. Slight odor, No staining, (13.6'-14') Similar material as 12-13.6' core. Dark brown, trace of sand, increase in silt content micaceous, stiff, Slightly moist No odor, No staining.

Encountered sump material from ~5.7' to 12'

TOTAL DEPTH: 14 FEET
No ground water during drilling.
Backfilled with bentonite pellets. Asphalt patch at surface

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ W01-TS-60 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1035	CC 1'	ml/sn		4"x6" Asphalt
		1040	1'			
5		1045	1.2'	cl/ml		
		1050	1.7'			
		1055	2'	cl		
10		1100	1.6'			
		1105	2'	cl/ml		
15						
20						
25						
30						
35						
40						

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt, Brown, trace of gravel and coarse sand, well graded, micaceous, slightly moist, No odor, No staining.
(2'-3.10') Similar material as 1'-2' core. Red brick fragments
(3.10'-4') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining
(4.10'-5.2') Similar material as 3.10'-4' core. No odor, No staining (5.2'-6') Black, moist, strong hydrocarbon odor, stained
(6.5'-8') Clay, black to olive green, trace of sand, saturated, strong odor, stained.
(8'-10') Similar material as 6.5'-8' core, strong odor, stained
(10.6'-11.8') Similar material as 8'-10' core. Dark brown, strong odor, stained. (11.8'-12') Silty Clay to Clayey Silt, dark brown, trace of sand, micaceous, moist, slight odor, No staining
(12'-14') Similar material as 11.8'-12' core. Slight odor, No staining.

Encountered Sump material from ~5.2' to 11.8'.

TOTAL DEPTH: 14 FEET
No ground water during drilling.
Backfilled with bentonite pellets. Asphalt patch at surface.

NA- Not Applicable
NM- Not Measured
CC- Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL
PROJECT NO. 94-256
LOCATION Santa Fe Springs, CA
W01

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ W01-TS-61 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1110	CC 1.2'			
		1115	1.4'	cl/ml		
5		1120	1.9'			
		1125	1'			
		1130	1.6'	cl		
10		1135	1.7'			
		1140	1.8'	ml/sm		
15						
20						
25						
30						
35						
40						

DESCRIPTION

* 4"-6" Asphalt

(10"-2') Silty Clay to Clayey Silt, brown to Dark brown, trace of gravel and Coarse Sand, micaceous, slightly moist. No odor, No staining.
(2.8'-4') Similar material as 10"-2' core. No odor, No staining
(4.3'-6') Similar material as 2.8'-4' core. Dark brown, No odor, No staining.
(7'-8') Clay, Black to dark brown, trace of sand, micaceous, saturated, strong hydrocarbon odor, stained.
(8.6'-10') Similar material as 7'-8' core. olive green to black, strong odor, stained.
(10.5'-11.7') Similar material as 8.6'-10' core. strong odor, stained. (11.7'-12') Silty Sand to Sandy Silt, Dark brown, micaceous, moist, strong odor, No staining.
(12.4'-14') Similar material as 11.7'-12' core. Slight odor, No staining.

Encountered sump material from ~7' to 11.7'.

TOTAL DEPTH: 14 FEET
No ground water during drilling.
Backfilled with bentonite pellets. Asphalt patch @ surface.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT Unocal

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WOI-TS-62 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1145	CC 1.1'	ml/sm		
		1150	5"	cl/ml		
5		1155	3"			
		1200	5"	ml/sm		
		1205	11"			
10		1210	2'	cl		
		1215	1.4'			
15		1220	2'	cl/ml		
20						
25						
30						
35						
40						

→ 4"-6" Asphalt

DESCRIPTION

(11"-2') Silty Sand to Sandy Silt, brown, trace of gravel and coarse sand, well graded, dry, No odor, No staining.
(3.7'-4') Silty Clay to Clayey Silt, brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(5.9'-6') Silty Sand to Sandy Silt, light brown, trace of gravel & coarse sand, dry, No odor, No staining.
(7.7'-8') Similar material as 5.9'-6' core. No odor, No staining.
(9.1'-10') Clay, Dark brown to Olive green, trace of sand, saturated, strong hydrocarbon odor, stained.
(10'-12') Similar material as 9.1'-10' core. Strong odor, stained.
(12.8'-14') Silty Clay to Clayey Silt, dark brown, trace of sand, micaceous, moist, slight odor, No staining.
(14'-16') Similar material as 12.8'-14' core. No odor, No staining.

Encountered sump material from ~9' to 12.8'.

TOTAL DEPTH: 16 FEET
No ground water during drilling.
Backfilled with bentonite pellets. Asphalt patch @ surface.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT WOCSL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WOI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ W01-TS-63 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1250	CC 1.3'	ml/sm			→ 4"-6" Asphalt (9"-2') Silty Sand to sandy silt, brown, trace of gravel & coarse sand, micaceous, dry, No odor, No staining.
		1255	1.1'				(2.11"-4') Similar material as 9"-2' core, No odor, No staining.
5		1300	1.4'				(4.8'-4.10") Similar material as 2.11"-4' core. No odor No staining, (4.10"-6') Clay, black, saturated, strong hydrocarbon odor, stained
		1305	2'	cl			(6'-8') Similar material as 4.10"-6' core. Strong odor, stained.
		1310	2'				
10		1315	1.9'	cl/ml			(8'-10') Similar material as 6'-8' core. Strong odor, stained.
		1320	1.6'				(10.3'-12') Silty clay to clayey silt, ~~brown~~ black, trace of sand, micaceous, saturated, strong odor, stained (~10.3'-10.8') No staining (10.9'-12').
15							(12.6'-14') Similar material as 10.3'-12' core. Slight odor, No staining.
20							
25							
30							Encountered sump material from ~ 4.10" to 10.3'
35							TOTAL DEPTH: 14 FEET No ground water during drilling. Backfilled with bentonite pellets. Asphalt patch at surface.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WOI-TS-64 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1325	CC, 1.5	ml/sm			4"-6" Asphalt (7"-2') Silty sand to sandy silt, brown, trace of gravel & coarse sand, micaceous, slight moist, No odor, No staining. (2.11"-4') similar material as 7"-2' core. No odor, No staining. (5.3'-6') similar material as 2.11"-4' core No odor, No staining. (6.5'-8') Silty Clay to Clayey Silt, Dark brown, trace of sand, saturated, No odor, No staining. (8.10'-10') similar material as 6.5'-8' core slight odor, No staining. (10.4'-12') Clay, Olive green to black, saturated, strong hydrocarbon odor, stained. (12.6-14') Similar material as 10.4'-12' core, trace of sand strong odor, stained, (REFUSAL AT 14'. DISCONTINUED DRILLING).
		1330	1.1'				
5		1335	9"				
		1340	1.7'	cl/ml			
		1345	1.2'				
10		1350	1.8'				
		1355	1.6'	cl			
15							
20							
25							
30							Encountered sump material from ~10.4' to 14'.
35							TOTAL DEPTH: 14 FEET No ground water during drilling. Backfilled with bentonite pellets. Asphalt patch @ surface
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WOI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-65 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME (REC.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
							4"-6" Asphalt
0	NA	1400	CC 1.8'				(4"-2') Silty Sand to Sandy Silt; Brown, trace of gravel and coarse sand, micaceous, slightly moist, No odor, No staining
		1405	1'10"	ml/sm			(2.2'-4') Similar material as 4"-2' core. No odor, No staining.
5		1410	1'				(5'-6') Similar material as 2.2'-4' core. No odor, No staining.
		1415	1.4'				(6.8'-7.2') Similar material as 5'-6' core. No odor No staining. (7.2'-8') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist. No odor, No staining.
		1420	11"				(9.1'-10') Similar material as 7.2'-8' core. No odor. No staining.
10		1425	1.2'	cl/ml			(10.10"-12') Similar material as 9.1'-10' core. No odor, No staining.
		1430	1.4'				(12.8'-14') Similar material as 10.10"-12' core. No odor. No staining.
15		1435	2'				(14'-16') Similar material as 12.8'-14' core. No odor No staining.
		1440	2'				(16'-18') Similar material as 14'-16' core. No odor No staining.
20							
25							
30							Do Not Encounter Dump Material.
35							TOTAL DEPTH: 18 FEET No ground water during drilling. Backfilled with bentonite pellets. Asphalt patch @ surface.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT Unocal

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-66 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97
DATE FINISHED 10-30-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1500	CC 1.2'				4"-6" Asphalt (10"-2') Silty Sand to Sandy silt, brown, trace of gravel and Coarse sand, slightly moist, No odor, No staining.
		1505	7"	ml/sm			(3.5'-4') similar material as 10"-2' core. No odor, No staining.
5		1510	1.2'				(4'10"-6') Similar material as 3.5'-4' core. No odor, No staining.
		1515	1'				(7'-7.5') Similar material as 4'10"-6' core. No staining
		1520	2'				(7.5'-8') Clay, black, saturated, strong hydrocarbon odor, stained
10		1525	2'				(8'-10') similar material as 7.5'-8' core, Black to Olive green, strong odor, stained.
		1535	2'	Cl			(10'-12') similar material as 8'-10' core. Strong odor stained.
15		1540	2'				(12'-14') similar material as 10'-12' core. Strong odor, stained.
		1545	2'				(14'-16') similar material as 12'-14' core. Strong odor, stained
20							(16'-18') similar material as 14'-16' core. Dark brown, trace of sand, micaceous, slightly moist, stiff, No odor, No staining.
25							
30							Encountered sump material from ~ 7.5' to 16'.
35							TOTAL DEPTH: 18 FEET No ground water during drilling. Backfilled with bentonite pellets. Asphalt patch @ surface.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-67 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-30-97 / 10-31-97
DATE FINISHED 10-30-97 / 10-31-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1545	CC 1'			
		1550	1'			
5		1555	8"	ml/sm		
10/30		1600	6"			
		1605	7"			
10		0820	10"			
10/31		0825	1.2'	gw		
15		0830	6"			
		0835	0"			
20						
25						
30						
35						
40						

4"-6" Asphalt

DESCRIPTION

(1'-2') Silty Sand to sandy silt; Light brown to brown, trace of gravel and sand, micaceous, slightly moist No odor, No staining.
(3'-4') Similar material as 1'-2' core. No odor. No staining.
(5.4'-6') Similar material as 3'-4' core. Brown, No odor, No staining.
(7.6'-8') Similar material as 5.4'-6'. moist, No odor, No staining.
(9.5'-10') Similar material as 7.6'-8' core. Dark brown to black, saturated, No odor, No staining.
(REFUSAL AT 10'. Relocated ~3' to the South
(11.2'-12') Gravel, black to olive green, trace of clay., saturated, strong hydrocarbon odor, stained.
(12.10"-13') Similar material as 11.2'-12' core. Increase in clay content, strong odor, stained.
(14.6'-16') Similar material as 12.10"-13' core. Black, strong odor, saturated.
(No recovery from 16'-18')

Encountered sump material ~ 11.2' to 18'.
(Sump material intermixed with gravel)

TOTAL DEPTH: 18 FEET

Liquids in boring ~ 10' in depth.
Backfilled w/ bentonite pellets. Asphalt patch @ surface

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ W01-TS-68 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-31-97
DATE FINISHED 10-31-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (TIME)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0910	CC 1.2'			
		0915	1.5'			
5		0920	10"	ml/sm		
		0925	4"			
		0930	8"			
10		0940	0"			
		0950	2'	SW		
15		1000	2'			
		1005	2'	Cl		
		1010	2'			
20						
25						
30						
35						
40						

→ 4"-6" Asphalt

DESCRIPTION

(10"-2') Silty Sand to Sandy Silt, Light brown to brown, trace of gravel and coarse sand, micaceous, slightly moist, No odor, No staining.
(2.7'-4') Similar material as 10"-2' Core. Light gray to white, broken Rock fragments, No odor, No staining.
(5.2'-6') Similar material as 2.7'-4' Core. Broken Concrete (white powder), No odor, No staining.
(7.8'-8') Similar material as 5.2'-6' Core. No odor No staining
(9.4'-10') Similar material as 7.8'-8' Core. Black, saturated increase in moisture (liquids), No odor, No staining.
(Refusal at 10', moved ~2' south of original location)
(No Recovery 10'-12')
(12'-14') Sand, Black to Olive green, med. to coarse grained, saturated, strong odor, stained
(14'-16') Clay, Black, trace of gravel & sand, saturated, strong odor, stained
(16'-18') Similar material as 14'-16' Core. Trace of sand, strong odor, stained.
(18'-20') Similar material as 16'-18' Core. Dark brown, stiff, trace of sand, micaceous, slightly moist, slight odor, minor staining.

Encountered impacted material from ~12' to 18'.

TOTAL DEPTH: 20 FEET
Encountered liquids in boring ~10' in depth.
Backfilled with bentonite pellets. Asphalt patch at surface

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT Unocal

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WELL

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-69 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-31-97
DATE FINISHED 10-31-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1040	CC 8"			
		1045	1'	ml/sm		
5		1050	1'			
		1055	1.7'			
		1100	10"			
10		1105	2'	cl/ml		
		1110	2'			
15		1115	2'			
		1120	2'			
		1125	1.10"	cl		
20						
25						
30						
35						
40						

4"-6" Asphalt

DESCRIPTION

(1.4'-2') Silty Sand to Sandy Silt; Light brown, trace of gravel and coarse sand, well graded, dry, No odor, No staining.
(3'-4') Similar material as 1.4'-2' core. No odor. No staining.
(5'-6') Similar material as 3'-4' core. No odor, No staining
(6.5'-8') Silty Clay to Clayey Silt, Olive green to black, trace of sand, micaceous, saturated, slight hydrocarbon odor, stained
(9.2'-10') Similar material as 6.5'-8' core trace of gravel, slight odor, stained.
(10'-12') Similar material as 9.2'-10' core. Strong odor. Stained.
(12'-14') Similar material as 10'-12' core, Black Strong odor, stained.
(14'-16') Similar material as 12'-14' core, Strong odor, Stained
(16'-18') Similar material as 14'-16' core strong odor, Stained.
(18.2'-20') Clay, Dark brown trace of sand, micaceous, Stiff, slightly moist, slight odor, No staining.

Encountered sump material from ~6.5' to 18'.

TOTAL DEPTH: 60 FEET
No liquids during drilling.
Backfilled with bentonite pellets and asphalt patch @ Surface.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-70 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 10-31-97
DATE FINISHED 10-31-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ Time	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1140	CC 1.2'				4"-6" Asphalt (10"-2') Silty Sand to Sandy Silt, Brown, trace of gravel & Sand, Micaceous, dry. No odor, No staining.
		1145	1.4'				(2.8'-4') similar material as 10"-2' core. Broken rock fragments, No odor, No staining.
5		1150	1.1'	ml/sm			(4.11"-6') similar material as 2.8'-4' core. Increase in coarseness, No odor, No staining.
		1155	1.4'				(6.8'-8') similar material as 4.11"-6' core. Dark brown, No odor, No staining.
		1200	2"				
10		1215	1.2'	gw			(9.10"-10') Gravel, Dark brown, trace of sand, well graded, saturated, No odor, No staining.
		1220	2'	cl/sw			(10.10"-12) similar material as 9.10"-10' core. Liquids in tube, increase in sand content, trace of clay, slight odor, minor staining
15		1225	2'				(12'-14') Sandy Clay to Clayey Sand, Black, trace of gravel, saturated, strong odor, stained.
		1230	2'	cl			(14'-16') Clay, black, trace of sand, saturated, strong odor, staining.
		1235	2'				(16'-18') similar material as 14'-16' core. Olive green to black, strong odor, stained.
20							(18'-20') similar material as 16'-18' core. Dark brown, trace of sand, micaceous, stiff, slightly moist, slight odor, No staining.
25							
30							Encountered sump material from ~12' to 18'.
35							TOTAL DEPTH: 20 FEET Encountered liquids ~10' Backfilled with bentonite pellets and Asphalt patch @ surface.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-71 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11/3/97
DATE FINISHED 11/3/97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0720	CC 1.2'				→ 4"-6" Asphalt (10"-2') Silty Sand to Sandy Silt, brown, trace of coarse sand, trace of gravel, well graded micaceous, dry. No odor, No staining.
		0725	7"				(3.5'-4') similar material as 10"-2' core. No odor, No staining.
5		0730	8"	ml/sm			(5.4'-6') similar material as 3.5'-4' core. No odor, No staining.
		0735	0'				(No RECOVERY 6'-8')
		0740	0'				(No Recovery 8'-10') Rock in shoe.
10		0750	1.5'				(10.7'-11.4') Similar material as 5.4'-6' core (11.4'-12') Silty Clay to Clayey Silt, brown, trace of sand, micaceous, Dry, No odor, No staining.
		0755	1'	cl/ml			(13'-14') similar material as 11.4'-12' core Red to brown, slightly moist, No odor, No staining.
15		0800	1.1'				(14.11'-16') similar material as 13'-14' core, increase in clay, No odor, No staining.
		0805	1.5'				(16.7'-18') Similar material as 14.11'-16' core. Stiff, No odor, No staining.
20							
25							
30							Did not encounter sump material.
35							TOTAL DEPTH: 18 FEET Did not encounter liquids during drilling. Backfilled with bentonite pellets. Asphalt patch at surface.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-72 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11/3/97
DATE FINISHED 11/3/97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
							4"-6" Asphalt
0	NA	0820	CC 1.2'				(10"-2') Silty Sand to Sandy Silt, light brown, trace of coarse sand and gravel, broken rock fragments, well graded, dry, No odor, No staining.
		0825	10"	ml/sm			(3.2'-4') Similar material as 10"-2' core. Red brick fragments, No odor, No staining.
5		0830	8"				(5.4'-6') Similar material as 3.2'-4' core. No odor, No staining.
		0835	1.1'				(6.11"-8') Similar material as 5.4'-6' core, Increase in silt content, broken rock fragments, No odor, No staining
		0840	1'				(9'-10') Similar material as 6.11'-8' core, Brown, No odor, No staining.
10		0845	1.8'				(10.4'-12') Silty Clay to Clayey Silt, brown, trace of sand, micaceous, slightly moist, No odor, No staining.
		0850	7'	cl/ml			(13.5'-14') Similar material as 10.4'-12' core. No odor, No staining.
15		0855	1.8"				(14.4'-16') Similar material as 13.5'-14' core increase in silt content, Dark brown, No odor, No staining.
		0900	1.8"				(16.4'-18') Similar material as 14.4'-16 core, No odor, No staining.
20							
25							
30							Did not encounter sump material.
35							TOTAL DEPTH: 18 FEET
40							Backfilled with bentonite pellets & Asphalt patch at surface.

No liquids during drilling.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

CLIENT ~~PROJECT NAME~~ UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ W01-TS-73 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11/3/97
DATE FINISHED 11/3/97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0925	CC 1.8'				4"-6" Asphalt
		0925	2'	CL/ML			(4"-2') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining. (2'-4') Similar material as 4"-2' core. moist, No odor, No staining
5		0930	1.10"				(4.2'-5.3') similar material as 2'-4' core. Light gray, green staining at 4.10', No hydrocarbon staining (5.3'-6') similar material as 2'-4' core. increase in Clay content, Dark brown, No odor, No staining.
		0935	2'				
10		0940	2'	CL			(6-8') Clay, Red, trace of sand, micaceous, stiff, slightly moist, No odor, No staining. (8'-10') similar material as 6'-8' core. No odor, No staining
		0945	1.8'				(10.4'-12') similar material as 8'-10' core. increase in silt content, No odor, No staining.
15							
20							
25							
30							No sump material during drilling.
35							TOTAL DEPTH: 12 FEET. Backfilled with bentonite pellets & asphalt patch
40							No liquids during drilling.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WD1

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-14 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11/3/97
DATE FINISHED 11/3/97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0950	CC 1.4'			
		0955	1.2'	ml/sm		
5		1000	7"			
		1005	2'			
		1010	1.8"	cl		
10		1015	2'			
15						
20						
25						
30						
35						
40						

4"-6" Asphalt

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt, Light brown, trace of gravel and coarse sand, well graded, micaceous dry, No odor, No staining.
(3.10"-4') similar material as 8"-2' core Trace of clay, brown, slightly moist, No odor, No staining.
(5.5'-6') similar material as 3.10'-4' core. No odor, No staining.
(6'-8') Clay, Red, micaceous, stiff, slightly moist, No odor, No staining.
(8.4'-10') similar material as 6'-8' core. No odor, No staining.
(10'-12') similar material as 8.4'-10' core. No odor. No staining.

Did not encounter impacted material.

TOTAL DEPTH: 12 FEET
Backfilled with bentonite pellets & asphalt patch.
No liquids during drilling.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-75 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-4-97
DATE FINISHED 11-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0730	CC 1.5'			
		0735	1.8'	ml/sm		
5		0740	1.8'			
		0745	2'			
10		0750	2'	cl		
		0755	2'			
		0800	2'			
15						
20						
25						
30						
35						
40						

→ 4"-6" Asphalt

DESCRIPTION

(7"-2') Silty Sand to Sandy Silt; Light brown to brown, trace of gravel and coarse sand, micaceous, slightly moist, No odor, No staining.
(2.4'-4') similar material as 7"-2' core. Trace of clay, black material (3.3'-3.6'), moist, slight odor, No staining
(4.4'-6') similar material as 3.4'-4' core. Increase in silt content, dark brown, No odor, No staining
(6'-8') Clay, Red brown, trace of silt & sand, stiff, micaceous, slightly moist, No odor, No staining.
(8'-10') similar material as 6'-8' core. No odor, No staining
(10'-12') similar material as 8'-10' core. No odor, No staining.
(12'-14') similar material as 10'-12' core. Increase in silt content. No odor, No staining

Did not encounter impacted soil.

TOTAL DEPTH: 14 FEET
Did not encounter liquids.
Backfilled with bentonite pellets & Asphalt patch

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-76 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE AND DIMENSION Cont. Core 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-4-97
DATE FINISHED 11-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0805	CC 1'	ml/sm		
		0810	2'			
5		0815	2'			
		0820	2'	cl		
		0825	2'			
10		0830	2'			
		0835	2'			
15						
20						
25						
30						
35						
40						

→ 4"-6" Asphalt

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt, Light brown to light gray, trace of coarse sand and gravel, dry, No odor, No staining
(2'-4') similar material as 1'-2' core, Dark brown to black increase in silt content, slightly moist, slight hydrocarbon odor, Possible staining
(4'-6') Clay, olive green, trace of sand & silt saturated, strong hydrocarbon odor, stained.
(6'-8') Similar material as 4'-6' core. Brown to Red, trace of sand, increase in silt content, slightly moist, slight hydrocarbon odor, No staining.
(8'-10') Similar material as 6'-8' core. Red brown, stiff, No odor, No staining.
(10'-12') Similar material as 8'-10' core. Increase in silt content, No odor, No staining.
(12'-14') Similar material as 10'-12' core. No odor No staining.

Encountered impacted soil from ~ 3' to 6'.

TOTAL DEPTH: 14 FEET
Did not encounter liquids during drilling
Backfilled with bentonite pellets & Asphalt patch.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-77 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-4-97
DATE FINISHED 11-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (TIME)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0845	CC 1'			4"-6" concrete slab
		0850	1.4'	ml/sm		
5		0855	1.3'			
		0900	1.5'			
		0905	2'	cl		
10		0910	2'			
		0915	1.5'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt, brown, trace of gravel and sand, micaceous, slightly moist, No odor, No staining
(2.8'-4') similar material as 1'-2' core. Black material intermixed, Dark brown, No odor, No staining.
(4.9'-6') similar material as 2.8'-4' core. Increase in silt content, No odor, No staining
(6.7'-8') Clay, Red brown, trace of fine grained sand, micaceous, stiff, slightly moist, No odor, No staining.
(8'-10') similar material as 6.7'-8' core. No odor, No staining
(10'-12') similar material as 8'-10' core, Increase in silt content, No odor, No staining.
(12.7'-14') similar material as 10'-12' core. Brown, slightly moist, No odor, No staining.

Did not encounter impacted soil.

TOTAL DEPTH: 14 FEET
Did not encounter liquids during drilling.
Backfilled with bentonite pellets & concrete patch
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-78 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-4-97
DATE FINISHED 11-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (min)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0950	CC 10"	ml/sm			4"-6" Concrete pad. (1.2'-2') Silty Sand to Sandy Silt, light gray, broken concrete, dry, no odor, no staining.
		0955	1.7"				(2.5'-4') similar material as 1.2'-2' core (soil, no concrete fragments), Dark brown, trace of coarse sand, black material intermixed, micaceous, moist, slight hydrocarbon odor, poss. staining.
5		1000	1.9'				
		1005	2'				(4.3'-6') Silty Clay to Clayey Silt, Dark brown, trace sand, micaceous, slightly moist, No odor, No staining.
		1010	1.7'	cl/ml			(6'-8') similar material as 4.3'-6' core. Red brown, stiff, No odor, No staining.
10		1015	1.4'				(8.5'-10') similar material as 6'-8' core. Increase in silt content, No odor, No staining.
		1020	1.3'				
15							(10.8'-12') similar material as 8.5'-10' core. Brown, No odor, No staining.
							(12.9'-14') similar material as 10.8'-12' core. Red brown. Increase in silt content, No odor. No staining.
20							
25							
30							Did not encounter sump material (Poss. Trac ~4')
35							TOTAL DEPTH: 14 FEET
40							No liquids during drilling. Backfilled with bentonite pellets & concrete patch.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-79 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-4-97
DATE FINISHED 11-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME (REC.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1025	CC 11"	ml/sm			(1.1'-2') Silty Sand to Sandy Silt, Light gray to Dark brown, trace of coarse sand, (Light gray is broken Concrete material), slightly moist, No odor, No staining.
		1030	2"				(3.10"-4') Silty Clay to Clayey Silt, Dark brown, saturated, slight hydrocarbon odor, possibly stained. (Black material in sample)
5		1035	1.3'				(4.9'-6') similar material as 3.10"-4' Core. Dark brown, slightly moist, increase in clay content, trace of sand, micaceous, No odor, No staining.
		1040	2'				
		1045	2'	cl/ml			(6'-8') Similar material as 4.9'-6' core. Red brown, No odor, No staining.
10		1050	2'				(8'-10') similar material as 6'-8' core. Brown. Stiff, No odor, No staining.
		1055	1.7'				(10'-12') similar material as 8'-10' core. Red brown, increase in silt content, No odor, No staining.
15							(12.5-14') similar material as 10'-12' core. Light brown to Red, increase in silt content, slightly moist, micaceous, No odor, No staining.
20							
25							Did not encounter Sump material (Poss. trace at ~4')
30							
35							TOTAL DEPTH: 14 FEET
40							No liquids during drilling. Backfilled with bentonite pellets & Concrete patch.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-80 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-4-97
DATE FINISHED 11-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (PPM)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1200	CC 11"			
		1205	1.2'	ml/Sto		
5		1210	1.3'			
		1215	1.4'			
		1220	9"			
10		1225	1.2'			
		1230	1'			
15		1235	1'	cl/(ml)		
		1240	1.4'			
		1245	1.10"			
20						
25						
30						
35						
40						

DESCRIPTION

(1.1'-2') Silty Sand to Sandy Silt, Light brown to Light gray, trace of gravel and coarse sand, dry, No odor, No staining
(2.10"-4) similar material as 1.1'-2' core. Trace of red brick fragments, No odor, No staining.
(4.9'-6') similar material as 2.10"-4' core. Dark brown, micaceous, No odor, No staining.
(6.8'-8') similar material as 4.9'-6' core. No odor, No staining
(8.3'-10) similar material as 6.8'-8' core. No odor, No staining.
(10.10"-12') Silty Clay to Clayey Silt, Brown, trace of fine grained sand, micaceous, slightly moist, No odor. No staining.
(13'-14') similar material as 10.10"-12 core. No odor, No staining.
(15-16') Similar material as 13'-14' core. No odor, No staining.
(16.8'-18') Similar material as 15'-16' core, stiff No odor, No staining.
(18.2'-20') similar material as 16.8'-18' core. No odor, No staining.

Did not encounter impacted soil.

TOTAL DEPTH: 20 FEET
No liquids during drilling.
Backfilled with bentonite pellets.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL
PROJECT NO. 94-256
LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ W01-TS-01 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-4-97
DATE FINISHED 11-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1320	CC 1.6'				(6"-2') Silty Sand to Sandy Silt, Light brown, trace of gravel and coarse sand, trace of vegetation, micaceous, dry, No odor, No staining. well graded
		1325	1.4'				(2.0'-4') similar material as 6"-2' core. No odor, No staining
5		1330	1.3'	ml/SM			(4.9'-6') similar material as 2.0'-4' core, No odor. No staining. dark brown
		1335	1.2'				(6.10"-8') similar material as 4.9'-6' core. No odor, No staining
		1340	8"				(9.4'-10') similar material as 6.10"-8' core. No odor, No staining.
10		1350	9"				(11.3'-12') similar material as 9.4'-10' core. No odor, No staining.
		1355	8"				(13.4'-14') similar material as 11.3'-12' core. No odor, No staining
15		1400	1.4'				(14.8'-16') Silty Clay to Clayey Silt, Dark brown to red, trace of fine grained sand, micaceous, slightly moist, No odor, No staining.
		1405	2'	cl/ml			(16-18') similar conditions as 14.8'-16' core. Stiff, No odor, No staining.
		1410	2'				(18'-20') similar material as 16'-18' core. very stiff, dry, No odor, No staining.
20							
25							
30							Did not encounter sump material.
35							TOTAL DEPTH: 20 FEET Did not encounter liquids during drilling. Backfilled with bentonite pellets.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

W01

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-82 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-4-97
DATE FINISHED 11-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1430	CC 1'			
		1435	1.5'			
5		1440	1.5'			
		1445	11"	ml/sm		
		1450	11"			
10		1455	8"			
		1500	1'			
15		1505	1.2'			
		1510	1.2'	sl/ml		
		1515	2'			
20		1520	1.5'			
		1525	1.5'	Sp		
25						
30						
35						
40						

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand, micaceous, dry, No odor, No staining.
(2.7'-4') similar material as 1'-2' core, No odor, No staining. (trace of gravel)
(4.7'-6') similar material as 2.7'-4' core. No odor. No staining. (light gray material, broken rock fragments)
(7.1'-8') similar material as 4.7'-6' core. Increase in coarseness, No odor, No staining. (broken rock fragments)
(9.1'-10') similar material as 7.1'-8' core. No odor No staining. (broken rock fragments)
(11.4'-12') similar material as 9.1'-10' core (Dark brown) No odor, No staining.
(13'-14') similar material as 11.4'-12' core. No odor, No staining.
(14'10"-15.8') similar material as 13'-14' core. No odor. No staining. (15.8'-16') Silty Clay to Clayey Silt, Dark brown, trace of fine grained sand, Micaceous, slightly moist No odor, No staining.
(16.10"-18') similar material as 15.8-16' core. Red brown, very stiff, dry, No odor, No staining, increase in clay content.
(18'-20') similar material as 16.10'-18' core, No odor, No staining.
(20.7'-22') SAND, Brown, fine to med. grained, poorly graded, trace of silt, slightly moist, No odor, No staining.
(22.7'-24) similar material as 20.7'-22' core. No odor, No staining

TOTAL DEPTH: 24 FEET
Did not encounter impacted soil.
Did not encounter liquids.
Backfilled with bentonite pellets.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client Unocal

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-03 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (TIME)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0720	CC 10"			
		0725	2"			
5		0730	1'	ml/sm		
		0735	8"			
		0740	1.5'			
10		0745	1'			
		0750	1.1'			
15		0755	1.6'			
		0800	1.6'			
		0805	2'	Cl		
20		0810	2'	SW		
25						
30						
35						
40						

DESCRIPTION

(1.2'-2') Silty Sands to Sandy Silt; Light brown, trace of coarse sand, trace of vegetation, dry, No odor, No staining
(3.10"-4') Similar material as 1.2'-2' Core. No odor, No staining.
(5'-6') Similar material as 3.10"-4' Core. Trace of gravel (broken rock fragments) No odor, No Staining
(7.4'-8') Similar material as 5'-6' Core. No odor, No staining.
(8.7'-10') Similar material as 7.4'-8' core increase in coarseness, No odor, No staining.
(11'-12') Similar material as 8.7'-10' core light brown to light gray, No odor, No staining.
(12.11"-14') Similar material as 11'-12' core. Dark brown, increase in silt content, micaceous, slightly moist, No odor, No staining.
(14.6'-16') Similar material as 12.11"-to 14' core, trace fine grained sand, slightly moist, No odor, No staining.
(16.6'-18') Clay, Red brown, micaceous, high plasticity, micaceous, slightly moist, No odor, No staining.
(18'-20') Similar material as 16.6'-18' core. Trace of sand and silt, stiff, No odor, No staining
(20'-20.10") Similar material as 18'-20' core. Moist, No staining
(20.10"-22') Sand, Red brown, med to coarse grained well graded
Trace of clay & silt, slightly moist, No odor, No staining

Did not encounter impacted soil.

TOTAL DEPTH: 22 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-B4 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0830	CC 1'			
		0835	1'			
5		0840	1.1'			
		0845	1.2'	ml/sm		
		0850	1'			
10		0855	1'			
		0900	1.4'			
15		0905	1.6'			
		0910	1'	cl/ml		
		0915	1.7'	ml		
20		0920	1.3'	ml/sm		
25						
30						
35						
40						

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt; Light brown, trace of coarse sand and gravel, well graded, dry, No odor, No Staining.
(3'-4') Similar material as 1'-2' core. Decrease in gravel content, No odor, No staining.
(4.11"-6') Similar material as 3'-4' core. Light brown to dark brown, No odor, No staining.
(6.10"-8') Similar material as 4.11"-6' core. Broken Rock fragments, No odor, No staining.
(9'-10') Similar material as 6.10"-8' core No odor, No staining.
(11'-11.5') similar material as 9'-10' core. No odor, No staining (11.5'-12') Brown, silt and med grained sand, micaceous No gravel, slightly moist, No odor No staining.
(12.8'-14') Similar material as 11.5'-12' core. No odor, No staining.
(14.6'-16') Similar material as 12.8'-14' core. No odor, No staining.
(17'-18') Silty clay to Clayey Silt; Red brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(18.5'-19.1') Similar material as 17'-18' core. No odor, No staining (19.1'-20') Silt, Tan, trace of sand, micaceous dry, No odor, No staining
(20.9'-22') Silty Sand to Sandy Silt, Tan, trace of coarse sand, hard, mottling, dry, No odor, No staining.

Did not encounter impacted soil.

TOTAL DEPTH: 22 FEET
Did not encounter liquids
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL
PROJECT NO. 94-256
LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

Boring No.

~~MONITORING WELL~~ WDI-TS-05 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (TIME)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0930	CC 1.1'			
		0935	10"			
5		0940	1.3'	ml/sm		
		0945	9"			
		0950	5"			
10		0955	8"			
		1000	1'	cl/ml		
15		1005	1.9'	cl		
		1010	1.10"	cl/ml		
		1015	2'			
20						
25						
30						
35						
40						

DESCRIPTION

(11"-2') Silty Sand to Sandy Silt, Light brown, trace of gravel and fine sand, dry, No odor, No staining.
(3.2'-4') Similar material as 11"-2' core. micaceous, No odor, No staining.
(4.9'-6') Similar material as 3.2'-4' core. Brown, slightly moist, No odor, No staining
(7.3'-8') Similar material as 4.9'-6' core. No odor, No staining.
(9.7'-10') Red brick fragments, No odor, No staining.
(11.4'-11.8') Similar material as 9.7'-10' core. No staining.
(11.8'-12') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous. Slightly moist, No odor, No staining.
(13'-14') Similar material as 11.8'-12' core. No odor, No staining.
(14.3'-16') Clay, Red brown, trace of silt and sand, micaceous, Slightly moist, No odor, No staining.
(16.2'-18') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, Slightly moist, No odor, No staining.
(18'-20') Similar material as 16.2'-18' core. Increase in silt content, No odor, No staining.

Did not encounter impacted soil.

TOTAL DEPTH: 20 FEET
Did not encounter liquids
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-96 SHEET 1 OF 1

DRILLING CO/RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1030	CC 9"			
		1035	1.1'			
5		1040	9"			
		1045	1.1'	ml/5m		
		1050	6"			
10		1055	1'			
		1100	1.5'			
15		1105	2'			
		1110	1.6"			
		1115	2'			
20						
25						
30						
35						
40						

DESCRIPTION

(1.3'-2') Silty Sand to Sandy Silt, light brown, trace of coarse sand and gravel, micaceous, dry No odor, No staining.
(2.11'-4') Similar material as 1.3'-2' core. No odor, No staining.
(5.3'-6') similar material as 2.11'-4' core. No odor No staining.
(6.11"-8') similar material as 5.3'-6' core. No odor. No staining.
(9.6'-10') similar material as 6.11'-8' core. broken Rock Fragments, No odor, No staining.
(11'-11.7') Similar material as 9.6'-10' core. No odor, No staining (11.7'-12') Increase in silt content, brown, micaceous, slightly moist, No odor, No staining
(12.7'-14') Similar material as 11.7'-12' core, red brown No odor No staining
(14'-16') similar material as 12.7'-14' core. Increase in density, No odor, No staining.
(16.6'-18') Similar material as 14'-16' core. No odor. No staining
(18'-20') Similar material as 16.6'-18' core No odor, No staining. G (very dense)

Did not encounter impacted soil.

TOTAL DEPTH: 20 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-87 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (PPM)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1210	CC 1.3'				(9"-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand, micaceous, dry, No odor, No staining
		1215	1.10'	ml/sm			(2.2'-4') Similar material as 9"-2' Core. very dense, No odor, No staining. (Difficult drilling)
5		1220	2'				(4'-6') similar material as 2.2'-4' core. No odor, No staining
		1225	2'				(6'-8') similar material as 4'-6' core. No odor. No drilling.
		1230	1.8'	SW			(8.4'-10') SAND, Light brown, med. to coarse grained, trace of silt, well graded, dry, No odor, No staining.
10		1235	2'				(10'-12') similar material as 8.4'-10' core. Very dense (diff. cont drilling), No odor, No staining.
15							
20							
25							Did not encounter impacted soil
30							
35							TOTAL DEPTH: 12 feet Did not encounter liquids Backfilled with bentonite pellets
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-88 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1300	CC 1.4'	ml/sm		
		1305	2'			
5		1310	1.8'			
		1315	2'	cl/sc		
10		1320	1.9'			
		1325	1.9'	sw		
		1330	1.6'			
15		1335	1.8'			
		1340	2'	ml		
20						
25						
30						
35						
40						

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand and gravel, micaceous, dry, No odor, No staining
(2'-4') similar material as 8"-2" core. Dark brown. No gravel, fine grained sand, micaceous, dry, No odor, No staining.
(4.4'-6') similar material as 2'-4' core. trace of clay, dense, No odor, No staining.
(6'-8') Sandy Clay to Clayey Sand, Red brown fine to med. grained, micaceous stiff slightly moist, No odor, No staining.
(8.3'-10') Sand, Red brown, fine to med grained, trace of silt well graded, very dense, slightly moist, No odor, No staining
(10.3'-11.5') similar material as 8.3'-10' core. No odor. No staining. (11.5'-12') med. to coarse grained, well graded, No odor, No staining.
(12.6'-14') similar material as 11.5'-12' core. Light brown, dense, No odor, No staining.
(14.4'-16') similar material as 12.6'-14' core. No odor. No staining
(16-17.6') similar material as 14.4'-16' core. No odor No staining. (17.6'-18') Silt, light brown, micaceous, dry, No odor, No staining.

Did Not encounter impacted material

TOTAL DEPTH: 18 FEET
Did not encounter liquids
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-89 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1350	CC 8"			
		1355	10"	ml/sm		
5		1400	1'			
		1405	1.5'			
		1410	1.6'	cl/sc		
10		1415	1.9'			
		1420	1.7'			
15		1425	1.9'	SW		
		1430	1.6'			
		1435	2'	ml		
20						
25						
30						
35						
40						

DESCRIPTION

(1.4'-2') Silty Sand to Sandy Silt, Light brown, trace of gravel and Coarse sand, micaceous, dry, No odor, No staining
(3.2'-4') similar material as 1.4'-2' core. Brown, No odor, No staining.
(5'-6') similar material as 3.2'-4' core. increase in silt content No odor, No staining
(6.7'-8') similar material as 5'-6' core. Red brown, No gravel, fine to med. grained sand, No odor, No staining
(8.6'-10') Sandy Clay to Clayey Sand, Red brown, med. grained sand, stiff, micaceous, slightly moist, No odor, No staining.
(10.3'-12') Sand, Red brown, med to coarse grained, trace of silt, well graded, slightly moist, No odor, No staining.
(12.5'-14') similar material as 10.3'-12' core. No odor. No staining
(14.3'-16') similar material as 12.5'-14' core. Light brown No odor, No staining.
(16.6'-18') Similar material as 16.6'-18' core. No odor. No staining.
(18'-19.4') Similar material as 16.6'-18' core. No odor. No staining (19.4'-20') Silt, Light brown, micaceous, slightly moist, No odor, No staining

Did not encounter impacted soil.

TOTAL DEPTH: 20 FEET
Did not encounter liquids
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-90 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1500	CC 1.4'	ml/sm		
		1505	1.8'	cl/ml		
5		1510	1.8'	cl		
		1515	1.7'	cl/ml		
		1520	1.3'			
10		1525	1.9'	cl		
		1530	1.4'	cl/ml		
15		1535	1.5'			
		1540	1.8'			
		1545	1.5			
20						
25						
30						
35						
40						

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt, light brown, trace of coarse sand, dry, No odor, No staining.
(2.4'-4') Silty Clay to Clayey Silt, brown, trace of sand micaceous, slightly moist No odor, No staining
(4.4'-6') Clay, Red brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(6.5-8') Silty Clay to Clayey Silt, Red brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(8.9-10') similar material as 6.5-8' core. increase in clay content, stiff, No odor, No staining.
(10.3'-12') Clay, Red brown, trace of sand and silt, stiff micaceous, slightly moist, No odor, No staining.
(12.8'-14') Silty Clay to Clayey Silt, Red brown, stiff trace of sand, micaceous, slightly moist, No odor, No staining.
(14.7'-16') similar material as 12.8'-14 core No odor, No staining.
(16.4'-18') similar material as 14.7'-16' core. No odor, No staining
(18.7'-20') similar material as 16.4'-18' core. No odor, No staining

Did not encounter Sump material

TOTAL DEPTH: 20 FEET
Did not encounter liquids
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-91 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-5-97
DATE FINISHED 11-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1555	CC 1.8'	ml/sm		
		1600	3"			
5		1605	1.2'			
		1610	1.4'			
10		1615	4"	Cl		
		1620	1.6'			
		1625	1.1'	ml/sm		
15		1630	1.3'			
		1635	1.4'			
20		1640	2'	al/ml		
		1645	1.5'	ml/sm		
		1650	1.7'			
25		1655	1.3'	sp		
30						
35						
40						

DESCRIPTION

(4"-2') Silty Sand to Sandy Silt, Dark brown to dark gray, trace of Coarse Sand and gravel, dry. No odor, No staining.
(3.9'-4') similar material as 4"-2' core. slight odor, No staining.
(4'10"-6') Similar material as 3.9'-4' core. Dark brown, slight odor, poss. staining
(6.8'-8') Clay, Dark brown to black, trace of sand, Micaceous, moist, strong hydrocarbon odor, stained
(9.8'-10') similar material as 6.8'-8' core No Coarse material, saturated, strong odor, stained
(10.6'-12') similar material as 9.8'-10' core. Olive green to black, strong odor, stained
(12'11'-14') Silty Sand to Sandy Silt, dark brown, Micaceous, slightly moist, slight odor, No staining
(14.9'-16') Similar material as 12'11'-14' Core Trace of clay, slightly moist, No odor, No staining
(16.8'-18') Silty Clay to Clayey Silt, Dark brown, trace of sand, micaceous, slightly moist, No odor, No staining
(18'-20') similar material as 16.8'-18' core. Increase in silt content, No odor, No staining
(20.7'-22') Silty Sand to Sandy Silt, Dark brown, fine to med. grained sand, slightly moist, No odor, No staining.
(22.5'-24') similar material as 20.7'-22' core, Olive green Increase in sand content (coarse grained), No odor, No staining
(24.9-26') SAND olive green fine to med grained, poorly graded, slightly moist No odor, No staining.

TOTAL DEPTH: 26 FEET.
Encountered sump material from ~5' to 12'.
No liquids were encountered.
Backfilled with bentonite pellets.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-92 SHEET 1 OF 1

DRILLING CO./RIG: TEG
SAMPLER TYPE AND DIMENSION: Cont. Core 1" x 2'
FIELD ENGINEER/GEOLOGIST: A. Isaly
EDITED BY: A. Isaly
CHECKED BY:

COORDINATES N: NM E: NM
DATE BEGAN: 11-6-97
DATE FINISHED: 11-6-97
GROUND SURFACE EL.: NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT) TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0830	CC 9"			
		0835	1'	ml/sm		
5		0840	1.2'			
		0845	1.8'			
		0850	1.9'	cl/ml		
10		0855	1.5'			
		0900	2'	cl		
15		0905	2'	cl/sc		
		0910	1.6'	ml/sm		
20		0915	1.10"	Sp		
25						
30						
35						
40						

DESCRIPTION

(1.3'-2') Silty Sand to Sandy Silt, Brown, trace of gravel and coarse sand, micaceous, Clay, No odor, No staining
(3'-4') Similar material as 1.3'-2' core. No odor, No staining.
(4.10'-6') Similar material as 3'-4' core. Slightly moist, No odor, No staining.
(6.4'-8') Similar material as 4.10'-6' core. Increase in silt content, fine grained material, No odor, No staining.
(8.3'-10') Silty Clay to Clayey Silt, Red brown, trace of sand, micaceous, [illegible]
(10.7'-12') Similar material as 9.3'-10' core. Increase in clay content, No odor, No staining.
(12'-14') Clay, Red brown, high plasticity, Slightly moist, No odor, No staining. → stiff
(14'-16') Sandy Clay to Clayey Sand, light brown, fine to medium grained sand, micaceous, slightly moist, No odor, No staining.
(16.6'-18') Silty Sand to Sandy Silt, light brown, fine grained sand, trace of mica, slightly moist, No odor, No stainings. (17.2' & 17.9')
(18.2'-20') SAND, Red to light brown, fine to medium grained, poorly graded, slightly moist, No odor, No staining. → dense

Did not encounter impacted soil.

TOTAL DEPTH: 20 FEET

Did not encounter liquids.

Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT: UNOCAL

PROJECT NO. 94-256

LOCATION: Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-93 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0920	CC 1.2'			
		0925	1.3'			
5		0930	1.5'	ml/sm		
		0935	1.5'			
		0940	1.6'			
10		0945	1.10"			
		0950	2'	ml		
15		0955	2'	Sp		
20						
25						
30						
35						
40						

DESCRIPTION

(10"-2') Silty Sand to Sandy Silt, light brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining
(2.9'-4') similar material as 10"-2' core. Brown, no odor, no staining.
(4.7'-6') similar material as 2.9'-4' core. No odor, no staining.
(6.7'-8') similar material as 4.7'-6' core. No odor, No staining
(8.6'-10') similar material as [illegible] No odor, No staining.
(10.2'-11.8') similar material as 8.6'-10' [illegible] No staining (11.8'-12') [illegible]
(12'-14') similar material [illegible]
(14'-14.4') similar material as 12-14' core No odor No staining. (14.4'-16') Sand, light brown, fine to med grained, poorly graded, slightly moist, dense No odor, No staining.
(Difficult drilling @ 16').

Did not encounter impacted soil.

TOTAL DEPTH: 16 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-94 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME (SEC.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1000	CC 10"	ml/sm			(1.2'-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand and gravel, dry, No odor, No staining.
		1005	1.9'	cl/ml			(2.3'-4') Silty Clay to Clayey Silt, Red to Red brown, trace of sand, stiff, slightly moist, No odor, No staining.
5		1010	2'				
		1015	2'	cl			(4'-6') [illegible] material as [illegible]
		1020	2'	cl/ml			
10		1025	2'	ml			(6'-8') Clay, Red brown, trace of sand, micaceous, Stiff, Dry, No odor, No staining.
		1030	1.3'	sp			(8'-10') Silty Clay to Clayey Silt, Red brown, trace of sand, [illegible] No staining.
15							(10'-11') Similar material as 8'-10' [illegible] No staining (11'-12') Silt, Light brown, trace of sand, micaceous, mottling, Dry, No odor, No staining.
20							(12.9'-13') Similar material as 11'-12' [illegible], No odor, No staining. (13'-14') SAND, Light brown, fine to med. grained, trace of silt, dense, poorly graded, slightly moist, No odor, No staining
25							(Difficult drilling @ 13')
30							Did not encounter impacted soil.
35							TOTAL DEPTH: 14 FEET
							Did not encounter liquids.
40							Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-95 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1040	CC 1.4'	cl/ml		
		1045	1.6'	ml/sm		
5		1050	1.9'			
		1055	2'	cl/ml		
		1100	1.9'			
10		1105	1.9'	ml		
15						
20						
25						
30						
35						
40						

DESCRIPTION

(8"-2') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(2.6'-4') Silty Sand to Sandy Silt, Brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining.
(4.3'-6') Silty Clay to Clayey Silt, Dark brown, trace of sand, micaceous, mod. plasticity, slightly moist, No odor, No staining.
(6'-8') similar material as 4.3'-6' core. Red brown, stiff fine grained sand, trace of micaceous, No odor. No staining
(8.3'-10') Similar material as 6'-8' core. No odor, No staining.
(10.3'-11.8') Similar material as 9.3'-10' core. No odor, No staining. (11.8'-12') Silt, light brown, micaceous, mottling, Dry, No odor, No staining.
(Refusal at 12 FEET)

Did not encounter impacted soil.

TOTAL DEPTH: 12 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-96 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1115	CC 1'	ml/sm			(1'-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand, micaceous, dry, No odor, No staining
		1120	1.5'				(2.7-4') Similar material as 1'-2' core. Increase in silt content, Slightly moist, No odor, No staining
5		1125	1.8'				(4.4'-6') Similar material as 3.7'-4' core. Trace of clay, stiff, No odor, No staining
		1130	2'				(6'-8') Silty Clay to Clayey Silt, Red brown, trace fine to med. grained sand, micaceous, stiff, slightly moist, No odor, No staining.
10		1135	2'	cl/ml			(8'-10') Similar material as 6'-8' core. Increase in sand content, No odor, No staining
		1140	1.8'				(10.4'-12') Similar material as 8'-10' core. Increase in silt content, No odor, No staining.
		1145	1.8'				(12.4'-14') Sand, Red brown, fine to med. grained, micaceous, slightly moist, No odor, No staining.
15		1150	1.7'	sp			(14.5'-16') Similar material as 12.4'-14' core. No odor, No staining.
		1155	1.6'	ml			(16.6'-17.8') Similar material as 14.5'-16' core. No odor, No staining. (17.8'-18') Silt, Light brown, micaceous, mottling, Dry, No odor, No staining. (Difficult drilling
20							
25							
30							Did not encounter impacted soil.
35							TOTAL DEPTH: 18 feet
40							Did not encounter liquids
							Backfilled with bentonite pellets
							NA - Not Applicable
							NM - Not Measured
							CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-97 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1250	CC. 1.2	ml/sm			(10"-2') Silty Sandy to Sandy Silt, light brown to light gray, trace of coarse sand and gravel. Broken rock fragments dry, No odor, No staining.
		1255	7"				(3.5'-4') similar material as 10"-2' core. No odor, No staining.
5		1300	1'	cl/ml			(5'-6') Sandy Clay to Clayey Silt, Brown, Micaceous, mottling, slightly moist. No odor, No staining.
		1305	1.3'				(6.9'-9') Clay, Dark brown, micaceous mottling, soft, moist, No odor, No staining.
10		1310	1.6'				(8.4'-10') Similar material as 6.9'-9' core. Trace of sand, No odor, No staining.
		1315	1.5'	cl			(10.7'-12') similar material as 8.4'-10' core. Dark brown, No odor, No staining.
		1320	2'				(12'-14') similar material as 10.7'-12' core. Slightly moist, stiff, No odor, No staining.
15		1325	2'				(14'-16') similar material as 12'-14' core. No odor, No staining
20							
25							
30							Did Not encounter sump material
35							TOTAL DEPTH: 16 FEET Did not encounter liquids. Backfilled with bentonite pellets. NA - Not Applicable NM - Not Measured CC - Continuous Core
40							

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-98 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1325	CC 8"	Concrete powder		
		1340	1.5'	ml/sm		
5		1345	1.4'			
		1350	1'			
		1355	1.5'	cl		
10		1400	2'			
		1405	1.8'			
15						
20						
25						
30						
35						
40						

4"-6" Concrete pad

DESCRIPTION

(1.4'-2') Concrete fragments & white powder, No staining
(2.7'-3.5) Similar material as 1.4'-2' core. No staining
(3.5'-4') Silty Sand to Sandy Silt, Black, trace of Coarse sand and gravel, micaceous, moist, slight hydrocarbon odor, Stained
(4.8'-6') Clay, Dark brown to Dark gray, trace of sand, micaceous, moist, soft, No odor, No staining
(7'-8') Similar material as 4.8'-6' core. Increase in fine to med grained sand content, No odor, No staining.
(8.7'-10') Similar material as 7'-8' core. Decrease in sand content, stiff, No odor, No staining.
(10'-12') Similar material as 8.7'-10' core. No odor, No staining.
(12.4'-14') Similar material as 10'-12' core. Brown, trace of silt, No odor, No staining

Encountered impacted material from ~3.5' to 4' (TRACE)
↳ ~6" recovery in tube.

TOTAL DEPTH: 14 FEET
Did not encounter liquids during drilling
Backfilled with Bentonite pellets & Concrete patch
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-99 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1410	CC 1.8'	ml/sm		
		1415	1.4'			
5		1420	1.6'	Cl		
		1425	1.7'			
		1430	1.5'			
10						
15						
20						
25						
30						
35						
40						

DESCRIPTION

(4"-2') Silty Sand to Sandy Silt, light brown to dark brown, trace of Coarse Sand & gravel, well graded, dry, No odor, No staining.
(2.8'-4') Clay, dark brown, micaceous, soft, moist, No odor, No staining.
(4.6'-6') Similar material as 2.8'-4' core, trace of sand, No odor, No staining.
(6.5'-8') Similar material as 4.6'-6' core. Trace of silt, stiff, slightly moist, No odor, No staining.
(8.7'-10') Similar material as 6.5'-8' core. Decrease in silt and sand content, No odor, No staining.

Did not encounter impacted soil

TOTAL DEPTH: 10 Feet
Did not encounter liquids.
Backfilled with bentonite pellets.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-100 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE AND DIMENSION Cont. Core 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1440	CC 1.3'	ml/sm			4"-6" Asphalt (9"-2') Silty Sand to Sandy Silt, Dark brown, trace of coarse sand and gravel, micaceous, slightly moist, No odor, No staining.
		1445	2'				
5		1450	1.1'	Cl			(2'-4') Clay, Dark brown to black, trace of coarse sand, moist, slight hydrocarbon odor, No staining
		1455	1.2'				(5.1'-6') Similar material as 2'-4' core, saturated, strong odor, stained
10		1500	2'	ml/sm			(6.10'-8') Similar material as 5'-6' core strong odor, stained
		1505	1.4'				(8'-10') Silty Sand to Sandy Silt, olive green to black, trace of coarse sand and gravel, saturated, strong odor, stained.
		1510	1.8'	Cl			
15							(10.8'-12') Clay, Dark brown, trace of sand, stiff, micaceous, slightly moist, No odor, No staining
							(12.4'-14') Similar to 10.8'-12' core. No odor No staining.
20							
25							
30							Encountered sump material from 5' to 10.8'
35							TOTAL DEPTH: 14 Feet Did not encounter liquids. Backfilled with bentonite pellets & asphalt patch.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-101 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1510	CC 1.6'	ml/sm		
		1515	8"	cl/ml		
5		1520	1.7'			
		1525	1.6'			
10		1530	1.10"	Cl		
		1535	2'			
		1540	2'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(6"-2') Silt Sand to Sandy Silt, Light brown, trace of coarse sand and gravel (broken rock fragments), micaceous, dry, No odor, No staining.
(3.4'-4') Silty Clay to Clayey Silt, Brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining.
(4.5'-6') Clay, Dark brown, trace of sand, soft, slightly moist, No odor, No staining.
(6.6'-8') similar material as 4.5'-6' core. Dark brown to Olive green, trace of silt, micaceous, No odor, No staining
(8.2'-10') similar material as 6.6'-8' core. Decrease of silt content, No odor, No staining.
(10'-12') Similar material as 8.2'-10' core. Dark brown, micaceous, stiff, slightly moist, No odor, No staining.
(12'-14') Similar material as 10'-12' core, stiff, No odor, No staining.

Did Not encounter sump material

TOTAL DEPTH: 14 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-102 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-6-97
DATE FINISHED 11-6-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1540	CC 1.8'	ml/sm		
		1545	1.9'			
5		1550	1.3'	sp		
		1555	1.9'			
10		1600	1.6'	Cl		
		1605	1.10"			
		1610	2'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(4"-2') Silty Sand to Sandy Silt, Light brown, trace of Coarse sand and gravel, micaceous, dry, no odor, No staining.
(2.3'-3.8') Similar material as 4"-2' core. No odor, No staining, (3.8'-4') Sand, Dark brown, fine grained, poorly graded, micaceous, dry, No odor, No staining
(4.9'-6') Clay, Dark brown to black, soft, moist, No odor, No staining
(6.3'-8') Similar material as 4.9'-6' core. Trace SD Sand, micaceous, No odor, No staining.
(8.6-10') Similar material as 6.3'-8' core. Increase in Black material, trace of silt, slight moist, slight hydrocarbon odor, possible staining.
(10.2-12') Similar material as 8.6-10' core. Darker brown, soft, decrease in silt content, slight odor, minor staining.
(12'-14') Similar material as 10.2'-12' core. Stiff, trace of sand, No odor, No staining.

Encountered impacted soil from ~8.6' to 12'

TOTAL DEPTH: 14 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-103 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0710	CC 1.7'	ml/sm		
		0715	1.9'			
5		0720	1'			
		0725	1'	cl		
		0730	2'			
10		0735	2'			
		0740	2'	cl/ml		
15						
20						
25						
30						
35						
40						

DESCRIPTION

(5'-2') Silty Sand to Sandy Silt, Light Brown, trace of Coarse sand and gravel (broken rock fragments), micaceous, well graded, Dry, No odor, No staining.
(2.3'-4') Similar material as 5'-2' core. Dark brown to black, increase in coarseness, No odor, No staining
(5-5.3') similar material as 2.3'-4' core. No odor. No staining (5.3'-6') Clay, Black to Olive green, trace of sand moist, slight hydrocarbon odor, possibly stained
(7'-8') Similar material as 5.3'-6' [illegible] green to black [illegible]
(8'-10') similar material as 7'-8' core Olive green, slight odor, stained.
(10'-12') Similar material as 8'-10' core. Dark brown, trace of sand, micaceous, stiff, slightly moist, No odor, No staining.
(12-14') Silty Clay to Clayey Silt, Dark brown to Olive green, trace of fine grained sand, micaceous slightly moist, No odor, No staining.

Encountered impacted soil from ~5.3' to 10'.

TOTAL DEPTH: 14 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL
PROJECT NO. 94-256
LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-104 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0745	CC 1.3'				4"-6" Asphalt (9"-2') Silty Sand to Sandy Silt, Light brown to dark brown, trace of Coarse sand and gravel (broken Rock fragments), well graded, slightly moist, No odor, No staining.
		0750	1.7'	ml/sm			
5		0755	1.1'				(2.5-4') Similar material as 9"-2' core Dark brown to black, increase in Cohesiveness, slightly moist, No odor, No staining.
		0800	1.5'	Cl			
		0805	2'				(4.11'-6') Clay, Black, trace of sand and silt, micaceous slightly moist, No odor, No staining.
10		0810	2'				(6.7'-8') Similar material as 4.11'-6' core Olive green to black, Decrease in Cohesiveness, saturated, Strong odor, Stained
		0815	2'	cl/ml			(8'-10') Similar material as 6.7'-8' core. Strong odor, Stained.
15							(10'-11') Similar material as 8'-10' core. Olive green, moist, slight odor, No staining. (11'-12') Similar material as 8'-10' core. Dark brown, trace of sand, micaceous, stiff, slightly moist, No odor No staining.
20							(12'-14') Silty Clay to Clayey Silt, Dark brown, trace of fine grained sand, micaceous, slightly moist, slight odor, No staining.
25							
30							Encountered sump material from ~6.7' to 11'. Slight hydrocarbon odor @ 14 Feet. Broke sampler in hole. Discont. drilling.
35							TOTAL DEPTH: 14 FEET. Did not encounter liquids during drilling. Backfilled with bentonite pellets & Asphalt patch.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client Unocal

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-105 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE AND DIMENSION Cont. Core 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0820	CC 1'	ml/sm		
		0825	1.9'			
5		0830	1.5'			
		0835	1'			
10		0840	1.5'	cl		
		0845	1.8'			
		0850	2'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt, light brown, trace of coarse sand and gravel, dry, No odor, No staining
(2.3'-4') Similar material as 1'-2' core. Brown to dark brown, broken rock fragments (Red brick), well graded, No odor, No staining.
(4.7'-6') Silty Clay to Clayey Silt, Red brown, trace sand, micaceous, slightly moist, No odor, No staining
(7'-7.5') similar material as 4.7'-6' core. No odor, No staining (7.5'-9') Clay, Black, trace of sand, Saturated, Strong hydrocarbon odor stained
(9.7'-10') Similar material as 7.5'-9' core. Olive green, Strong odor, Stained.
(10.4'-10.10') similar material as 9.7'-10' core. Strong odor stained (10.10'-12') Similar material as 10.4'-10.10" core. Dark Brown to Olive green, trace of sand, micaceous, stiff, slightly moist, No odor, No staining.
(12'-14') Similar material as 10.10"-12' core. No odor, No staining.

Encountered sump material from ~7.5' to 10.10".

TOTAL DEPTH: 14 FEET
Did not encounter liquids.
Backfilled with bentonite pellets
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-106 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0900	CC 10'				(1.2'-2') Silty Sand to Sandy Silt, Light brown, trace of gravel and coarse sand, micaceous, dry, No odor, No staining
		0905	1.4'	ml/sm			(2.8'-4') Similar material as 1.2'-2' core. Broken Rock fragments (Red brick), increase in coarseness, No odor, No staining
5		0910	1.6'				
		0915	1.1'	cl/ml			(4.6'-6') Similar material as 2.8'-4' core. No odor, No staining
		0920	1.9'				
10		0925	2'				(6.11'-7.8') Similar material as 4.6'-6' core. No odor, No staining, (7.8'-8') Silty Clay to Clayey Silt, Brown trace of sand, micaceous slightly moist, No odor, No staining.
		0930	2'	cl			
15		0935	2'	cl/mit			(8.3'-10') Clay, Brown, trace of fine to med grained sand, Soft, moist, No odor, No staining
20							(10'-12') Similar material as 8.3'-10' core. Olive green, slight hydrocarbon odor, stained (11.4'-12')
							(12'-13.9') Similar material as 10'-12' core, soft, No odor, No staining (13.9'-14') Dark brown to Olive green, trace of sand, micaceous, stiff, slightly moist, No odor, No staining.
25							(14-14.8') Similar material as 13.9'-14' core. No odor, No staining
							(14.8-16') Silty Clay to Clayey Silt, Red brown, trace of sand, micaceous, slightly moist, No odor, No staining
30							Encountered sump material from ~10 to 13.9. (10'-12' obvious impacted soil, 12-13.9' possible)
35							TOTAL DEPTH: 16
							Did not encounter liquids.
							Backfilled with bentonite pellets.
40							NA - Not Applicable
							NM - Not Measured
							CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA

WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-107 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0940	CC 9"			
		0945	10"	ml/sm		
5		0950	1'			
		0955	9"	cl/ml		
		1000	1.4'			
10		1005	2'	cl		
		1010	2'	sp / cl		
15		1015	2"			
		1020	2	cl/ml		
20						
25						
30						
35						
40						

DESCRIPTION

(1.3'-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand and gravel, dry, No odor, No staining.
(3.2'-4') Similar material as 1.3'-2' core. No odor, No staining.
(5'-6') Similar material as 3.2'-4' core Broken Rock fragments (Red brick), No odor, No staining
(7.3'-8') Silty Clay to Clayey Silt, Dark brown to black, trace of sand, moist, Strong hydrocarbon odor, stained.
(8.8'-10') Clay, Olive green, trace of silt and sand, micaceous, moist, soft, Strong odor, poss. stained.
(10'-12') Similar material as 8.8'-10' core. Strong odor, stained
(12'-12.5') Sand, Olive green fine grained, poorly graded, moist, Strong odor, stained (12.5'-14') Clay, Olive green, trace of fine grained sand, micaceous, moist, Strong odor, stained.
(14.-15.5') Similar material as 12.5'-14' core, Strong odor, stained, (15.5'-16') Silty Clay to Clayey Silt, brown, trace of fine grained sand, micaceous, Stiff, Slightly moist, No odor, No staining.
(16'-18') Similar material as 15.5'-16' core. Red brown, No odor, No staining

Encountered sump material from ~7.3' to 7.5

TOTAL DEPTH: 18 FEET
Did not encounter liquids
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-103 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1100	CC. 1.8'			
		1105	1.4'	ml/sm		
5		1110	1.1'			
		1115	1.2'	cl/ml		
		1120	1.5'			
10		1125	2'			
		1130	1.4'	Cl		
15		1135	2'			
20						
25						
30						
35						
40						

→ 4"-6" Asphalt

DESCRIPTION

(4"-2') Silty Sand to Sandy Silt, Light brown to Dark brown, trace of coarse Sand and gravel, well graded micaceous dry, No odor, No staining.
(2.8'-4') similar material as 4"-2' core. Brown, decrease in coarse materials, dry, No odor, No staining.
(5.1'-6') Silty Clay to Clayey Silt, Brown trace of sand (fine grained), Micaceous, slightly moist, No odor, No Staining
(6'10"-8') Similar material as 5.1'-6' Core. No odor, No staining.
(8.7'-10') similar material as 6'10"-8 core. No odor, No staining
(10'-12') Clay, Brown, trace of sand, micaceous, moist, soft, No odor, No staining.
(12.8'-14') similar material as 10'-12' core. Increase in silt & sand content, slightly moist, stiff, No odor, No staining.
(14'-16') similar material as 12.8'-14' core. very stiff (difficult drilling) No odor, No staining.

Did Not encounter sump material

TOTAL DEPTH: 16 FEET
Did not encounter liquids
Backfilled with bentonite pellets & asphalt patch.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-109 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1135	CC 1.4'			
		1140	1'	ml/sm		
5		1145	1'			
		1150	1.5'			
		1155	1.2'	cl/ml		
10		1200	1.6'			
		1205	1.5'	cl		
15		1210	2'			
20						
25						
30						
35						
40						

4"-6" Asphalt

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt, Brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining
(3'-4') similar material as 8"-2' core. No odor, No staining.
(5'-6') similar material as 3'-4' core No odor, No staining.
(6.7'-8') similar material as 5'-6' core. Dark brown, increase in silt content, No odor, No staining.
(8.10"-10') Silty Clay to Clayey Silt, Dark brown, trace of fine grained sand, micaceous, moist, No odor, No staining.
(10.6'-12') Clay, Dark brown, trace of sand, micaceous, moist, soft No odor, No staining.
(12.7'-14') Similar material as 10.6'-12' core slightly moist, No odor, No staining.
(14-15.9') similar material as 12.7'-14' core. No odor, No staining (15.9'-16') Sandy Clay to Clayey Sand, Red brown, fine grained sand, slightly moist, No odor, No staining

Did not encounter sump material.

TOTAL DEPTH: 16 FEET
Did not encounter liquids
Backfilled with bentonite pellets & Asphalt patch
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client WDCSL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-110 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
							4"-6" Asphalt
0	NA	1400	CC 1.4'	ml/sm			(8"-2') Silty Sand to Sandy Silt, light brown to Dark brown, trace of coarse sand and gravel, micaceous, dry, No odor, No staining.
		1405	1.6'				(2.6'-4') Silty Clay to Clayey Silt, Brown, trace of fine grained sand, micaceous, slightly moist, No odor, No staining
5		1410	1.1'				(4'11"-6') Similar material as 2.6'-4' core. Increased in clay content, No odor, No staining.
		1415	1.2'	cl/ml			(6.10"-8') Similar material as 4.11"-6' core. No odor, No staining.
		1420	1'				(9'-10') Similar material as 6.10"-8' core. No odor No staining.
10		1425	1'				(11'-12') Clay, brown, trace of fine grained sand, Very Stiff, moist, No odor, No staining.
		1430	1.5'	cl			(12.7'-14') Similar material as 11'-12' core. Dark brown, Stiff, dry, No odor, No staining
15		1435	2'				(14'-16') Similar material as 12.7'-14' core. No odor, No staining.
20							
25							
30							Did not encounter sump material
35							TOTAL DEPTH: 16 FEET
40							Did not encounter liquids
							Backfilled with bentonite pellets & Asphalt patch.
							NA - Not Applicable
							NM - Not Measured
							CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-111 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-7-97
DATE FINISHED 11-7-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME (REC.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1430	CC 1'	ml/sm		
		1435	1.3'			
5		1440	1.4'	cl/ml		
		1445	1.3'			
10		1450	1.1'	cl/sc		
		1455	1.7'			
		1500	1.6'	cl		
15		1505	2'			
20						
25						
30						
35						
40						

~4"-6" Asphalt

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt, light brown to dark brown, trace of coarse sand and gravel, micaceous, dry, No odor, No staining
(2.9'-3.5') Similar material as 1'-2' core. Red brick fragments, No odor, No staining. (3.8'-4') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, No odor, No staining
(4.8'-6') similar material as 3.8'-4' core. No odor No staining.
(6.9'-8') similar material as 4.8'-6' core. increase in clay content, No odor, No staining
(8.11'-10') Sandy Clay to Clayey Sand, Brown, fine to med. grained sand, slightly moist, No odor, No staining.
(10.5'-12') Clay, Dark brown, trace of fine grained sand, micaceous, slightly moist, soft, No odor, No staining.
(12.6'-14') similar material as 10.5'-12' core. slightly moist stiff, No odor, No staining.
(14'-16') similar material as 12.6'-14' core. Red brown, very stiff, dry No odor, No staining.

Did Not encounter sump material

TOTAL DEPTH: 16 FEET
Did not encounter liquids
Backfilled with bentonite pellets. & Asphalt patch

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-112 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-10-97
DATE FINISHED 11-10-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0900	CC 1.6'	ml/sm			→ 4"-6" ASPHALT (6"-2') Silty Sand to Sandy Silt; Dark brown to Dark gray, fine to med. grained Sand, micaceous, slightly moist, No odor, No staining.
		0905	1.1'	cl/ml			(2.11'-4') Silty Clay to Clayey Silt. Dark gray to Olive green, Trace of fine sand, micaceous, moist, No odor, No staining.
5		0910	1.4'				(4.8'-6') Clay, Olive green, trace of sand, micaceous, soft moist, slight odor, possibly stained.
		0915	2'	cl			(6'-8') Similar materials as 4.8'-6' core. Strong odor, stained
		0920	2'				(8'-10') Similar material as 6'-8' core. Increase in stiffness with depth, Strong odor, stained.
10		0925	2'				(10'-12') Similar material as 8'-10' core. Dark Brown to Dark gray, stiff, slightly moist No odor No staining
15							
20							
25							
30							Encountered sump material from ~4.5' to 10'
35							TOTAL DEPTH: 12 feet
40							

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-113 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-10-97
DATE FINISHED 11-10-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0930	CC 1'	ml/sm			→ 4"-6" Asphalt (1'-2') Silty Sand to Sandy Silt Dark brown to Dark gray, trace of coarse sand, Micaceous, slightly moist, No odor, No Staining
		0935	0'				(2'-4') No recovery
5		0940	1.6'				(4.6'-6') Clay, Olive green, trace of sand, micaceous, soft, strong odor, stained
		0945	2'	Cl			(6'-8') similar material as 4.6'-6' core. Dark brown to Olive green, trace of sand, mica[illegible], slightly moist, med. stiff, slight odor [illegible] staining.
10		0950	2'				(8'-10') Similar material as 6'-8' core. Dark brown, slightly moist, stiff, No odor, No Staining
		0955	2'				(10'-12') Similar material as 8'-10' core. Trace of silt, slight increase in sand content No odor, No Staining
15							
20							
25							
30							Encountered impacted soil from ~ 4.6' to 6'
35							TOTAL DEPTH: 12 Feet Did not encounter liquids. Backfilled with bentonite [illegible] Asphalt patch.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-114 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-10-97
DATE FINISHED 11-10-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1005	CC 1.5'	ml/sm			4"-6" Asphalt
		1010	1.3'	cl/ml			(7"-1') Silty SAND to Sandy Silt, Dark brown to Black, trace of coarse SAND, micaceous, slightly moist, No staining.
5		1015	1.6'	cl			(1'-2') Clayey Silt to Silty Clay, Dark brown to olive green, trace of sand, micaceous, moist, No odor, No staining.
		1020	1.8'	cl			(2.9'-4') Clay, Dark brown, trace of sand, micaceous, moist, soft, No odor, No staining.
		1030	1.5'				(4.6'-6') Silty SAND to SANDY Silt, Brown, trace of coarse sand, micaceous, moist, No odor, No staining.
10		1035	2'	ml/sm			(6.4'-8') Clay, Dark brown, trace of [illegible] grained), micaceous, [illegible] stiff [illegible] No staining.
15							(8.7'-[illegible]) [illegible] material [illegible] No odor, No staining.
20							(10'-12') Silty Sand to Sandy Silt, Brown, micaceous, slightly moist, No odor, No staining
25							
30							Did not encounter sump material
35							TOTAL DEPTH: 12 Feet Did not encounter liquids Backfilled with bentonite pellets & Asphalt patch
40							

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL
PROJECT NO. 94-256
LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-115 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-10-97
DATE FINISHED 11-10-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1045	CC 1.2'	ml/om		
		1050	1'			
5		1055	10"	cl/ml		
		1100	1.8'	Cl		
		1110	2'			
10		1115	2'			
15						
20						
25						
30						
35						
40						

DESCRIPTION

4"-6" Asphalt

(10"-2') Silty Sand to Sandy Silt, Dark brown to black, trace of coarse sand and gravel, micaceous, slightly moist, No odor, No Staining.

(3'-3.6') Similar material as 10"-2' core. No odor, No Staining. (3.6'-4') Silty Clay to Clayey Silt, Olive green to black, trace of sand, micaceous, moist, Slight hydrocarbon odor, stained.

(5.2'-6') Clay, Olive green to black, micaceous, moist, soft, strong odor, stained

(6.4'-8') Similar material as 5.2'-6' core. Strong odor, stained

(8'-10') Similar material as 6.4'-8' core. Strong odor, stained.

(10'-12') Similar material as 8'-10' core. Dark brown to Dark gray, trace of sand, micaceous, slightly moist. Stiff. No odor, No staining.

Encountered Sump material from ~3.6' to 10'

TOTAL DEPTH: 12 Feet

Did not encounter liquid

Backfilled with bentonite pellets & asphalt patch

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client WDCSL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-116 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-10-97
DATE FINISHED 11-10-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1100	CC 1'				4"-6" Asphalt
		1105	1.5'	ml/sm			(1'-2') Silty SAND to SANDY Silt, Dark Brown to black, trace of coarse sand, micaceous, slightly moist, No odor, No staining. (2.7'-3.3') Similar material as 1'-2' core. Brown No odor, No staining. (3.3'-4') Brown, increase in fines, micaceous, moist, No odor, No staining
5		110	1.8'				
		1115	1.2'	cl/ml			
		1120	1.6'				(4.4'-6') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining.
10		1125	1.8'	cl			(6.10"-8') Similar material as 4.4'-6' core. No odor, No staining. (8.6'-10') Clay, Brown, trace of sand, silt, micaceous, moist, stiff, No odor, No staining (10.4'-12') Similar material as 8.6'-10' core No odor, No staining.
15							
20							
25							
30							Did not encounter impacted soil
35							TOTAL DEPTH: 12 feet
40							Did not encounter liquids. Backfilled with bentonite pellets & Asphalt patch.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-117 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-10-97
DATE FINISHED 11-10-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1145	CC 1.8'	m/bn		
		1150	2'	cl/ml		
5		1155	1.3'			
		1200	2'	cl		
10		1205	1.10"			
		1210	2'			
15						
20						
25						
30						
35						
40						

4"-6" Asphalt

DESCRIPTION

(4"-2') Silty Sand to Sandy Silt, Dark brown to light brown, trace of course sand & gravel, slightly moist, No odor, No staining.
(2'-4') Silty Clay to Clayey Silt, Black, trace of sand micaceous, moist, strong odor, stained
(4.9'-6') Clay, Olive green, trace of sand, micaceous, moist, soft, strong odor, stained
(6'-8') Similar material as 4.9'-6' core. Strong odor, stained,
(8.2'-9.4') Similar material as 6'-8' core. Slight odor, No staining. (9.4'-10') Dark brown to Olive green, increase in sand content, micaceous, stiff. Slightly moist, No odor, No staining.
(10'-12') Dark brown to dark gray, No odor, No staining

Encountered impacted soil from ~2'-9.4'.

TOTAL DEPTH: 12 FEET
Did Not encounter liquids
Backfilled with bentonite pellets & Asphalt patch.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-11B SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-11-97
DATE FINISHED 11-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME (REC.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0720	CC 1.7				(5"-2') Silty Sand to Sandy Silt, light brown to dark brown, trace of coarse sand, micaceous, slightly moist, No odor, No staining.
		0725	1'10"	ml/sm			(2.2'-4') Similar material as 5"-2' core. light gray to black, No odor, No staining.
5		0730	1.3'				(4.9'-6') Similar material as 2.2'-4'. Increase in sands, Black, strong hydrocarbon odor, stained
		0735	1.1'				(6'10"-8') Clay, black, trace of silt, [illegible] stiff, strong odor, stained.
10		0740	2'				(8'-10') Similar material as 6'10" - 8' core. Olive green, trace of gravel, strong odor, stained
		0745	2'	cl			(10'-12') Similar material as 8'-10' core. strong odor, stained.
		0750	2'				(12'-14') Similar material as 10'-12' core. Decrease in hydrocarbon staining, strong odor, stained.
15		0755	2'				(14'-15.3') Similar material as 12'-14' core. Slight odor No hydrocarbon staining (sump material) (15.3'-16') Dark brown to Olive green, slightly moist, stiff. Slight odor, No staining.
		0800	2'	cl/sil			(16'-18') Silty Clay to Clayey Silt, Brown, trace of sand (med. to coarse grained, micaceous, slightly moist. No odor, No staining.
20							
25							
30							
35							
40							

Encountered sump material from ~4.4' to 15.3'!

TOTAL DEPTH: 18 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-119 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-11-97
DATE FINISHED 11-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	0820	CC 1.1'	ml/sm			→ 4"-6" ASPHALT (11"-2') Silty Sand to Sandy Silt, Light gray to brown, trace of coarse sand & gravel, well graded, dry, No odor, No staining.
		0825	1'				(3'-4') Similar Material as 11"-2' core. No odor, No staining.
5		0830	1'				(5'-6') Silty Clay to Clayey Silt, Brown, trace of sand saturated, No odor, No staining
		0835	1.8'	Cl			(6.4'-7.3') Similar material as 5'-6' core No odor, No staining, (7.3'-8') Olive green, micaceous, slightly moist, No odor, No staining.
10		0840	2'				(8'-10') Clay, Olive green, trace of sand, micaceous, slightly moist, No odor, No staining
		0845	2'				(10'-12') Similar material as 8'-10' core. Brown, No odor, No staining.
		0850	2'	Cl/ml			(12'-14') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining.
15							
20							
25							
30							Did not encounter sump material.
35							TOTAL DEPTH: 14 FEET Did not encounter liquids Backfilled with bentonite pellets & asphalt patch
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-120 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-20-97
DATE FINISHED 11-20-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0900	CC 1.4'	ml/sm		
		0905	11"			
5		0910	1.5'			
		0915	2'	cl		
10		0920	2'	cl/ml		
		0925	2'			
15						
20						
25						
30						
35						
40						

→ 4"-6" ASPHALT

DESCRIPTION

(8"-2') Silty Sand to Sandy Silt, Brown, trace of gravel and coarse sand, micaceous, slightly moist, No odor. No staining
(3.1'-4') Similar material as 8"-2' core. Back in shoe, No odor No staining.
(4.7'-5.5') Similar material as 3.1'-4' core. No odor; No staining (5.5'-6') Clay, Olive green trace of sand micaceous, moist, soft, Hydrocarbon odor, stained
(6'-7.3') Similar material as 5.5'-6' core Strong odor, stained (7.3'-8') Silty Clay to Clayey Silt, Dark brown to Olive green, trace of sand, micaceous, slightly moist, No odor No staining
(8'-10') Similar material as 7.3'-8' core. Dark brown increase in clay content, slightly moist, stiff, No odor, No staining.
~~(10'-12')~~ Silty Clay to Clayey Silt, Dark brown, trace of sand, micaceous, slightly moist, stiff, No odor, No staining.

Encountered sump material at 5.5' to 7.3'.

TOTAL DEPTH: 12 FEET.
Did not encounter liquids.
Backfilled with bentonite pellets & Asphalt patch

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-121 SHEET 1 OF 1

DRILLING CO./RIG: TEG
SAMPLER TYPE AND DIMENSION: Cont. Core 1" x 2'
FIELD ENGINEER/GEOLOGIST: A. Isaly
EDITED BY: A. Isaly
CHECKED BY:

COORDINATES N: NM E: NM
DATE BEGAN: 11-11-97
DATE FINISHED: 11-11-97
GROUND SURFACE EL.: NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0945	CC 1.4'	ml/sm		
		0950	1.1'			
5		0955	1.2'	cl/ml		
		1000	2'			
		1005	2'			
10		1010	2'	cl		
15						
20						
25						
30						
35						
40						

→ 4"-6" ASPHALT

DESCRIPTION

(0'-2') Silty Sand to Sandy Silty, Brown, trace of coarse sand and gravel (broken rock fragments), micaceous, slightly moist, No odor, No staining.
(2.10'-3.7') Similar material as 0'-2' core. No odor. No staining. (3.7'-4') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining.
(4'10"-6') Similar material as 3.7'-4' core. No odor, No staining.
(6'-8') Similar material as 4'10"-6' core. Olive green to brown, moist, soft, No odor, No staining.
(8-9.2') Similar material as 6'-8' core. Olive green, No odor, No staining. (9.2'-10') Clay, Red brown, trace of sand, micaceous, slightly moist, stiff. No odor, No staining.
(10'-12') Similar material as 9.2'-10' core. No odor, No staining.

Did not encounter sump material.

TOTAL DEPTH: 12 FEET
Did not encounter liquids.
Backfilled with bentonite pellets & asphalt patch.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT: UNOCAL
PROJECT NO. 94-256
LOCATION: Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS- /22 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-11-97
DATE FINISHED 11-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1020	CC 1.2'	ml/sm		
		1025	1.3'	cl/ml		
5		1030	1.4'	Sp		
		1035	1.7'	cl/sc		
		1040	2'	Sp		
10		1045	2'			
		1050	2'	cl		
15		1055	2'			
		1100	1.9'	cl/sc		
20						
25						
30						
35						
40						

4"-6" ASPHALT

DESCRIPTION

(10"-2') Silty Sand to Sandy Silt, Brown, trace of coarse sand and gravel, slightly moist, No odor, No staining.
(2.9'-3.5') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining
(3.5-4') Sand, Light brown, fine grained, trace of silt, poorly graded, Micaceous, Slightly moist, No odor, No staining.
(4.8'-5') Similar material as 3.5'-4' core No odor, No staining (5-6') Sandy Clay to Clayey Sand, brown, micaceous, slightly moist. No odor, No staining.
(6.5-8') Similar material as 5'-6' core No odor No staining.
(8-8.4') Sand, light brown, fine grained, poorly graded slightly moist, No odor, No staining (8.4'-10') Clay, olive green, trace of sand, micaceous, moist, soft, No odor, No staining.
(10'-12') Similar material as 8.4'-10' core. No odor, No staining
(12-14') Similar material as 10'-12' core. No odor No staining.
(14'-16') Similar material as 12'-14' core, No odor No staining.
(16.3'-18') Sandy Clay to Clayey Sand, Red Brown, Micaceous, Moist, No odor, No staining.

Encounter Olive green clay from ~8.4' to 16' possibly drilling mud, No odor, No staining.
TOTAL DEPTH: 18 FEET
Did not encounter liquids.
Backfilled with bentonite pellets & Asphalt patch.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-123 SHEET 1 OF 1

DRILLING CO./RIG: TEG
SAMPLER TYPE AND DIMENSION: Cont. Core 1" x 2'
FIELD ENGINEER/GEOLOGIST: A. Isaly
EDITED BY: A. Isaly
CHECKED BY:

COORDINATES N: NM E: NM
DATE BEGAN: 11-11-97
DATE FINISHED: 11-11-97
GROUND SURFACE EL.: NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1240	CC 1.6'	ml/sm		
		1245	2'			
5		1250	1.6'			
		1255	1.3'			
		1300	2'			
10		1305	2'	Cl		
		1310	2'			
15		1315	1.7'			
20						
25						
30						
35						
40						

DESCRIPTION

(6"-2') Silty Sand to Sandy Silt; Light brown, trace of coarse sand, micaceous, dry, No odor, No staining.
(2'-4') Similar material as 6"-2' core, Brown Increase in silt content, slightly moist, No odor, No staining
(4.6'-6') Similar material as 2'-4' core. Light grey to black, broken rock fragments, slight hydrocarbon odor, No staining.
(6.9'-8') Similar material as 4.6'-6' core. Increase in coarse material content, slight odor, No staining
(8'-10') Clay, Black to Olive green, trace of sand, micaceous, moist, soft, strong odor, stained.
(10'-12') similar material as 10'-12' core. Strong odor, stained.
(12'-14') Similar material as 10'-12' core. Strong odor, stained.
(14.5-16.6') similar material as 12'-14' core. mod. stiff, slightly moist, slight odor, No staining
(16.6'-18') similar material as 14.5'-16.6' material Red-brown, stiff. No odor, No staining

Encountered sump material from ~ 8' to 14

TOTAL DEPTH: 16 FEET
Did not encounter liquids.
Backfilled with bentonite pellets.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ Client: UNOCAL
PROJECT NO. 94-256
LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-124 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-11-97
DATE FINISHED 11-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1315	CC 1'				(1'-2') Silty Sand to Sandy Silt, Brown, micaceous, slightly moist, No odor, No Staining.
							* (Refusal @ 2'. Rock in shoe of sampler. Relocated boring @ 2' to North. 6 attempts within a 5' Radius of original location. Refusal @ 2'.) Possible Concrete Slab.
5							Discontinued drilling.
10							
15							
20							
25							
30							
35							TOTAL DEPTH: 2'
							Did not encounter liquids or sump material
40							Backfilled w/ Pellets
							NA - Not Applicable
							NM - Not Measured
							CC - Continuous Core

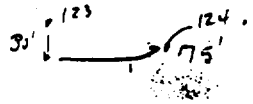
A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.



BORING NO.

~~MONITORING WELL~~ WDI-TS-125 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-11-97
DATE FINISHED 11-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1355	CC 1.5'				(9"-2') Silty Sand to Sandy Silt, Light brown, trace of coarse sand, micaceous, dry, No odor, No staining
		1400	2'	ml/sm			(2'-4') Similar material as 9"-2' core. Black to light gray, No odor, No staining.
5		1405	1.8'				(4.10"-6') Similar material as 2'-4' core. SAND layers intermixed broken rock fragments well graded. No odor, No staining.
		1410	1.9'				
		1415	1'				(6.3'-8') similar material as 4.10"-6' core. Gray, increase in silt content, trace of gravel, slightly moist, slight odor, stained (~8').
10		1420	2'	Cl			
		1425	2'				(9'-10') Clay, Black, trace of sand, micaceous moist, soft, strong odor, stained.
15		1430	1.9'				(10'-12') similar material as 9'-10' core. Olive green to black, increase in sand content, strong odor, stained.
20							(12'-14') similar material as 10'-12' core strong odor, stained.
25							(14.3'-15.4') similar material as 12'-14' core. Slightly moist, slight odor, poss stained (15.4'-16') similar material as 14.3'-15.4' core. Dark brown trace of sand, micaceous, slightly moist, stiff slight odor, No staining.
30							Encountered sump material from ~8' to 15.4'
35							TOTAL DEPTH: 16 FEET
40							Did not encounter liquids
							Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-126 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 11-11-97
DATE FINISHED 11-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (REC.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1430	CC 1'			
		1435	1'	ml/sm		
5		1440	2'			
		1445	1.3'			
		1450	1.4'			
10		1455	2'	cl		
		1500	2'			
15		1505	2'			
20						
25						
30						
35						
40						

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt, Light Brown, trace of Coarse sand & gravel, dry, No odor, No staining.
(3'-4') Similar material as 1'-2' core. Some sand (~4), No odor, No staining.
(4'-5.4') Similar material as 3'-4' core. Light gray, slightly moist to black, No odor, No staining (5.4'-6') increase in silt content, black, strong odor, stained. olive green to black
(6.9'-8') similar material as 5.4'-6' core, increase in coarseness, Red brick fragments, moist, slight odor, Stained,
(8.8'-10') Clay, Olive green to black, trace of sand, moist, soft, Strong odor, Stained.
(10'-12') similar material 8.8'-10' core. Strong odor, Stained.
(12'-14') similar material as 10'-12' core. Strong odor, Stained.
(14'-15.1') similar material as 12'-14' core. slightly moist, slight odor, minor staining. (15.1'-16') Red brown, slightly moist, stiff, No odor, No staining

Encountered Sump material from ~5.4' to 15.1

TOTAL DEPTH: 16 FEET
Did not encounter liquids
Backfilled with bentonite pellets.
NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

GEOPROBES

WDI-TS-127

THROUGH

WDI-TS-142

WERE USED FOR

CHEMISTRY/LIQUID

SAMPLING

BORING NO.

~~MONITORING WELL~~ WDI-TS-143 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12-4-97
DATE FINISHED 12-4-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1440	CC 1'				(1'-2') Silty Sand to Sandy silt, Red brown, trace of gravel & Coarse sand, trace of vegetation, dry, No odor, No staining. micaceous
		1445	1.8'	ml/sm			(2.4'-4') Similar material as 1'-2' core. Trace of red brick fragments, No odor, No staining.
5		1450	1.3'				(4.9'-6') similar material as 2.4'-4' core increase in sand (fine grained) content, Brown, No odor, No staining.
		1500	1'				(7'-8') Similar material as 4.9'-6' core. No odor, No staining.
		1505	1.3'				(8.9'-9.6') similar material as 7.'-8 core increase in silt content, moist, No staining (9.6'-10') Clayey silt to Silty Clay, Olive green to black, trace of sand, moist, strong odor, stained.
10		1510	1.11'				(10.1'-12') similar material as 9.6'-10' core, slight increase in strong sand content odor, stained
		1515	2'				(12'-14') similar material as 10.1'-12' core. strong odor, stained.
15		1520	2'				(14'-16') similar material as 12'-14' core. strong odor, stained.
		1525	2'	cl/ml			(16'-18') similar material as 14'-16' core. odor, stained.
		1530	2'				(18'-20') similar material as 16'-18' core. strong odor, stained.
20		1535	2'				(20'-22') similar material as 18'-20' core. strong odor, stained
		1540	2'				(22'-24') similar material as 20'-22' core. strong odor, stained
25		1545	2'				(24'-26') similar material as 22'-24' core. strong odor, stained
		1550	2'				(26-28') similar material as 24-26' core. strong odor, stained.
		1555	2'	SP			(28-29.4') similar material as 26'-28' core. (29.4-30) Sand, light gray, fine to med grained, poorly graded, moist, slight odor, No staining.
30							
35							
40							

TOTAL DEPTH: 30 FEET. Encountered sump material from 9.6' to 29.4'.

Backfilled with bentonite pellets.

Drilled approx. 8' south of GW-6.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

Did not encounter g.w.

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-144 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12.5.97
DATE FINISHED 12.5.97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	~~WELL CONSTRUCTION DETAIL~~	DESCRIPTION
0	NA	0740	CC 1.4'	ml/sm			(8"-2') Silty Sand to Sandy Silt, Brown, trace of gravel & coarse sand, well graded, dry, micaceous, No odor, No staining
		0745	1.3'				(2.9'-4') similar material as 8"-2' core. Slightly moist, No odor, No staining
5		0750	10"				(5.2'-6') Silty Clay to Clayey Silt, Dark brown to black, trace of gravel, moist, Hydrocarbon odor, stained
		0755	1.6'				(6.6'-8') similar material as 5.2'-6' core. Dark brown, decrease in coarse material content. Slight odor, minor, staining.
10		0800	1.3'	cl/ml			(8.9-10') similar material as 6.6'-8' core. Brown, moist, slight odor, No staining.
		0805	1.9'				(10.3'-12') Similar material as 8.9'-10' core. No odor, No staining.
		0810	2'				(12'-14') similar material as 10.3'-12' core, slightly moist, No odor, No staining.
15		0815	1.4'				(14.8'-16') Similar material as 12-14' core. Dark brown, increase in silt content, No odor, No staining.
		0820	1.6'				(16.6'-18') Similar material as 14.8'-16. core. No odor. No staining
20		0825	2'	cl			(18'-20') Clay, Dark brown, trace of silt, micaceous, hard, slightly moist, No odor, No staining
25							
30							
35							
40							

Collected geotechnical sample from 10-12'. (1¼"Ø tube)

Encountered impacted soil (does not appear to be samp. material), from ~ 5.2 to 8.9.

TOTAL DEPTH: 20 FEET

Did not encounter liquids.

Backfilled with bentonite pellets.

Split with EPA.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

CLIENT ~~PROJECT NAME~~ UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-145 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12-5-97
DATE FINISHED 12-5-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (TIME)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	0920	CC 1.5'			
		0925	1.6'	ml/sm		
5		0930	6"			
		0935	1.3'			
		0940	1.3'			
10		0945	1.2'			
		1020	1.4'	Cl		
15		1025	2'			
		1030	1.4'			
20						
25						
30						
35						
40						

DESCRIPTION

(7"-2') Silty Sand to Sandy Silt, Brown, trace of gravel and Coarse Sand, micaceous, dry, No odor, No staining
(2.6'-4') similar material 7"-2' Core. No Odor, No Staining.
(5.6'-6') similar materials as 2.6'-4' Core. (Poor Recovery) No odor, No Staining.
(6.9'-7.6') Broken Concrete fragments, sand, well graded (7.6'-8') Clay, Red brown, trace of fine grained sand, Soft, Moist, No odor, No staining
(8.9'-10') similar material as 7.6'-8' Core. No odor, No staining
(10.10'-12') similar material 8.9'-10' Core. No odor, No staining. Sample was used for geotechnical analysis (1¼" ϕ tube). Split with EPA.
(12.8'-14') similar material as 10.10'-12' core. Hard, Slightly moist, No odor, No staining.
(14'-16') similar material as 12.8'-14' core. Dark brown, Soft, No odor, No staining.
(16.8'-18') Similar material as 14'-16' core. Hard (diff drilling), No odor, No staining.

Did not encounter impacted soil.
Did not encounter liquids.

TOTAL DEPTH: 18 FEET

Backfilled with bentonite pellets

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

8-11-5'01 10-1/5-01

BORING No.

~~MONITORING WELL~~ WDI-TS-146 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12.5.97
DATE FINISHED 12.5.97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (TIME)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1100	CC 1.8'	cl/ml			(4"-2') Silty Clay to Clayey Silt, Red brown to brown, trace of gravel and coarse sand, red brick fragments, slightly moist, No odor, No staining.
		1105	2'				(2'-4') Clay, Red brown, trace of fine grained sand, micaceous, soft, slightly moist, No odor, No staining
5		1110	1.5'				(4.7'-6') similar material as 2-4' core No odor, No staining
		1115	1.5	Cl			(6.7'-8') similar material as 4.7'-6' core No odor, No staining.
10		1120	2'				(8'-10') similar material as 6.7'-8' core. No odor, No staining
		1130	1.8'				(10.4-12') similar material as 8'-10' core. No odor, No staining.
		1135	1.8'				(12.4'-14') similar material as 10.4'-12' core. No odor, No staining.
15		1140	1.10'				(14.2'-16') similar material as 12.4'-14' core. Dark brown, No odor, No staining
		1145	2'				(16'-18') similar material as 14.2'-16' core. No odor. No staining.
20							
25							
30							
35							
40							

Collected geotechnical sample from 10'-12' (1 1/4" ϕ tube)

Did not encounter impacted soils.

Did not encounter liquids

TOTAL DEPTH: 18 Feet

Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

CLIENT ~~PROJECT NAME~~ UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-147 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly / N. Bocsik
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12 10 97
DATE FINISHED 12 10 97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (ppm)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1350	CC 1'	m/sm		
		1355	11"			
5		1400	9"			
		1405	1.3'	cl/ml		
		1410	1.8'			
10		1415	2'			
		1420	2'			
15		1425	1.5'	Cl.		
		1430	1.8'			
20		1435	1.4'	gw/sw		
25						
30						
35						
40						

DESCRIPTION

(1'-2') Silty Sand to Sandy Silt, Brown, trace of coarse grained sand, micaceous, slightly moist, No odor, No staining

(3.1'-4') Silty Clay to Clayey Silt, Brown, trace of sand, micaceous, slightly moist, No odor, No staining

(5.3'-6') similar material as 3.1'-4' core. No odor, No staining

(6.9'-8') similar material as 5.3'-6' core. Dark brown, increase in Clay content, No odor, No Staining.

(9.4'-10') similar material as 6.9'-8' core. No odor. No staining

(10'-12') Clay, Dark brown, trace of sand, micaceous, slightly moist, soft, No odor, No staining.

(12'-14') Similar material as 10'-12' core. No odor, No staining.

(14.7'-16') Similar material as 12'-14' core. No odor. No staining.

(16.4'-18') similar material as 14.7'-16' core. No odor, No staining.

(18.8'-20') Sandy Gravel, Brown, trace of silt, well graded, moist, No odor, No Staining

Collected geotechnical Sample (1¼"Φ) from 8' to 10'

Did not encounter impacted soil,
Did not encounter liquids.

TOTAL DEPTH: 20 FEET

Backfilled with bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-148 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST A. Isaly / M. Basik
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12.10.97
DATE FINISHED 12.10.97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1500	CC 1.1'			
		1505	6"	Cl/ml		
5		1510	1.6'			
		1515	1.2'	Cl		
		1520	2'			
10		1525	2'			
		1530	1.9'	Cl/ml		
15		1535	1.9'			
		1540	2'			
		1545	2'			
20						
25						
30						
35						
40						

DESCRIPTION

(1.1'-2') Silty Clay to Clayey Silt, Brown, trace of sand and vegetation, slightly moist, No odor, No staining.
(3.6'-4') Similar material as 1.1'-2' core. No odor, No staining
(4.6'-6') Clay, Dark brown, trace of sand, micaceous, moist, soft, No odor, No staining.
(6.10'-8') similar material as 4.6'-6' core, Dark Gray, No odor, No staining.
(8'-10') Similar material as 6.10'-8' core. Dark gray to black, No odor, Does not appear stained.
(10'-12') Silty Clay, trace sand, gray to black, strong odor, hydrocarbon staining
(12.3'-14') Silty Clay, trace sand, dark gray no odor, no staining
(14.3'-16') Silty Clay, trace sand, brownish gray, no odor, no staining
(16'-18') Silty Clay w/ sand, grayish brown, no odor, no staining
(18'-20') same material as 16'-18', no odor no staining.

Collected geotechnical sample @ 3'-5' (1/4")
Collected impacted sample @ 10'-12' (1/4")
Encountered impacted soil @ 10'-12'

TOTAL DEPTH: 20 feet

Backfilled w/ Bentonite

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL
PROJECT NO. 94-256
LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING NO.

~~MONITORING WELL~~ WDI-TS-149 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST ~~[illegible]~~/MB
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12-11-97
DATE FINISHED 12-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ (TIME)	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	7:45	CC 18"	ml/cl		
		07:47	12"			
5		07:50	15"			
		0757	6"			
		0800	9"	cl		
10		0802	15"			
		0805	24"			
15		0808	24"			
		0810	18"	cl		
20		0815	24"	cl/ml		
25						
30						
35						
40						

DESCRIPTION

(0.5'-2.0') Silty Clay w/ trace sand, brown, slightly moist, no odor, no staining
(3'-4') same material as (0.5'-2.0'), no odor, no staining, slightly moist.
(4.7'-6.0') Same material as (3'-4'), brown, no odor, no staining, slightly moist
(7.5'-8') same material as (4.7'-6.0') brown, no odor, no staining, slightly moist, brick obstruction.
(9.3'-10') dark gray silty clay, micaceous, no odor, no staining, moist.
(10.7'-12') dark gray silty clay, micaceous, strong odor, no staining, moist.
(12'-14') dark gray silty clay, soft, micaceous, strong odor, some staining, moist.
(14'-16') dark gray, silty clay w/ sand, micaceous, strong odor, stained, moist
(16.5'-18') brownish gray silty clay w/ sand, micaceous, slight odor @ 16.5', no odor @ 18', slightly moist
(18'-20') same material as (16.5'-18'), micaceous, no odor, no staining, slightly moist.

Geotechnical sample @ 4'-6'
Impacted soil encountered from 10.7'-16.0'
Did not encounter liquids.
Impacted sample @ 12'-14'
TOTAL DEPTH: 20'

Backfilled w/ Bentonite Pellets

NA- Not Applicable
NM- Not Measured
CC- Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-150 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST ~~A. Isaly~~ MB
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12-11-97
DATE FINISHED 12-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	905	CC 15"	ml/5m			(0.7'-2.0') brown clayey silt w/ sand, no odor, slightly moist, no staining
		910	20"				(2.3'-4.0') orangish brown sandy silt to silty sand, no odor, dry, no staining, micaceous
5		913	21"				(4.2'-6.0') same material as (2.3'-4.0'), no odor, no staining, dry, micaceous
		917	24"				(6.0'-8.0') same material as (4.2'-6.0') no odor, no staining, dry, micaceous.
10		920	18"				(8.5'-10.0') same material as (6.0'-8.0'), micaceous, no odor, no staining, dry.
		925	24"				(10'-12') same material as (8.5'-10.0') micaceous no odor, no staining, slightly moist.
		930	21"				(12.3'-14.0') same material as (10.0'-12.0') micaceous, no odor, no staining, slightly moist.
15							
20							
25							Refusal @ 14.0' Geotechnical sample collected (4'-6') (1¼" dia) Did not encounter impacted soil. Did not encounter liquids
30							
35							TOTAL DEPTH: 14' Backfilled with Bentonite pellets.
40							NA - Not Applicable NM - Not Measured CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-151 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST ~~A. Isely~~ MB
EDITED BY A. Isely
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12-11-97
DATE FINISHED 12-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1050	CC 13"	ml/cl			(0.9'-2') gray to black silty clay, slight odor, no staining, moist, micaceous
		1055	14"				(2.8'-4.0') gray clayey silt w/ sand, slight odor, no staining, moist, micaceous
5		1100	24"				(4.0'-6.0') dark gray clayey silt w/ sand, no odor, no staining, moist, micaceous
		1105	24"	ml/sm			(6.0'-8.0') orangish brown sandy silt to silty sand, no odor, no staining, slightly moist, micaceous.
10		1108	24"				(8.0'-10.0') same material as (6'-8'), no odor, no staining, slightly moist, micaceous.
		1112	22"				(10.2'-12.0') sandy silt w/ clay, orangish brown, no odor, no staining, slightly moist, micaceous.
		1116	24"	ml/cl			(12.0'-14.0') brown clayey silt w/ sand no odor, no staining, slightly moist, micaceous.
15		1125	24"				(14.0'-16.0') same material as (12'-14') no odor, no staining, slightly moist, micaceous.
20							
25							
30							Refusal @ 16'
							No impacted soil encountered
							No liquids encountered.
							Geotechnical sample @ 8'-10'
35							TOTAL DEPTH: 16'
							Backfilled w/ Bentonite Pellets
40							NA - Not Applicable
							NM - Not Measured
							CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-152 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST ~~A. Isaly~~ MB
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12-11-97
DATE FINISHED 12-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~ TIME (REC.)	SAMPLE TYPE	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL
0	NA	1405	CC 24"	SM/ml		
		1417	21"	ml/cl		
5		1421	22"	cl		
		1424	20"			
		1428	24"	cl/ml		
10		1432	24"			
		1435	24"			
15		1439	24"			
20						
25						
30						
35						
40						

DESCRIPTION

(0'-2') light brown silty sand, coarse, no odor, slightly moist no staining.
(2.25'-4') gray to black clayey silt w/ sand, strong odor @ 4', wet to very wet, stained 3.5'-4'.
(4.1'-6.0') grayish brown clayey silt w/ sand, no odor @ 6', slightly moist, no no staining, micaceous
(6.3'-8.0') brown silty clay w/ sand, no odor, no staining, slightly moist, micaceous
(8'-10') same material as (6.3'-8'), no odor, no staining, slightly moist, micaceous
(10'-12') brown clayey silt to silty clay w/ sand, no odor, no staining, slightly moist, micaceous.
(12'-14') same material as (10'-12'), no odor, no staining, moist, micaceous.
(14'-16') same material as (12'-14'), no odor, no staining, moist, micaceous.

Refusal @ 16'
Impacted soil encountered from ~3.5' to ~4.0'
Liquids encountered from ~2' to ~4'
Geotechnical sample taken @ 8'-10'

TOTAL DEPTH: 16'
Backfilled w/ Bentonite Pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

BORING No.

~~MONITORING WELL~~ WDI-TS-153 SHEET 1 OF 1

DRILLING CO./RIG TEG
SAMPLER TYPE Cont. Core
AND DIMENSION 1" x 2'
FIELD ENGINEER/ GEOLOGIST ~~A. Isaly~~ MB
EDITED BY A. Isaly
CHECKED BY

COORDINATES N NM E NM
DATE BEGAN 12-11-97
DATE FINISHED 12-11-97
GROUND SURFACE EL. NM

DEPTH IN FEET	PID or FID (ppm)	~~PENETRATION RESISTANCE (BLOWS PER FOOT)~~	SAMPLE TYPE (REC.)	U.S.C.S.	PROFILE/ LITHOLOGY	WELL CONSTRUCTION DETAIL	DESCRIPTION
0	NA	1510	CC 15"	ml/cl			(0.4'-2.0') gray silty clay w/ sand, no odor, slightly moist, no staining.
		1515	16"	sm/ml			(2.33'-4.0') gray silty sand to sandy silt w/ gravel, no odor, slightly moist, no staining
5		1517	19"	ml			(4.6'-6.0') gray clayey silt w/ sand, no odor, slightly moist, no staining, micaceous.
		1519	16"	ml/cl			(6.33'-8.0') brown silty clay w/ sand, no odor, slightly moist, no staining, micaceous.
10		1521	24"				(8'-10') same material as (6.33'-8.0'), no odor or staining, slightly moist, micaceous.
		1524	17"				(10.4'-12.0') brown clayey silt w/ sand, no odor, no staining, slightly moist, micaceous.
		1527	16"				(12.33'-14') same material as (10.4'-12.0') no odor, no staining, slightly moist, micaceous
15		1530	24"				(14'-16') same material as (12.33'-14.0') no odor, no staining, slightly moist, micaceous.
		1535	24"				(16'-18') same material as (14'-16') no odor, no staining, slightly moist, micaceous.
20							
25							
30							
35							
40							

No liquids encountered.
No impacted soil encountered.
Geotechnical Sample taken @ 6'-8'

TOTAL DEPTH: 18'

Backfilled w/ Bentonite pellets.

NA - Not Applicable
NM - Not Measured
CC - Continuous Core

A-Field/Blank MW Log REV. 04/06/92

~~PROJECT NAME~~ CLIENT UNOCAL

PROJECT NO. 94-256

LOCATION Santa Fe Springs, CA
WDI

ENVIRONMENTAL SOLUTIONS, INC.

ATTACHMENT B.2

VOLUME CALCULATIONS

TRC

TRC

By A. Isaly Date 3·19·98 Subject Calculated Volume of Waste Sheet No. 1 of 3
Chkd. By D.D. Date 3·19·98 Waste Disposal, Inc. Superfund Site Proj. No. 94·256

The following are estimated volumes of waste material within the reservoir and Areas 1 through 8. Data used to calculate the volumes were generated from the geoprobe data collected during October and November 1997.

Volume of Waste within Reservoir:

Approximate diameter of reservoir from the top of the berm = 532 ft

$$\text{AREA} = \frac{\pi D^2}{4} = \frac{\pi (532)^2}{4} = 222{,}286\ ft^2$$

Avg. thickness of waste material = 18 ft

$$222{,}286\ ft^2 \times 18\ ft = 4{,}001{,}158\ ft^3 = \boxed{148{,}190\ yd^3}$$

AREA 1:

Area = 16,000 ft²
Avg. waste thickness: 1.5 ft

$$16{,}000\ ft^2 \times 1.5\ ft = 24{,}000\ ft^3 = \boxed{890\ yd^3}$$

AREA 2:

Area = 592,900 ft²
Area - Reservoir = 592,900 ft² - 222,300 ft²
= 370,600 ft²
Avg. waste thickness = 12 ft

$$370{,}600\ ft^2 \times 12\ ft = 4{,}447{,}200\ ft^3 = \boxed{164{,}700\ yd^3}$$

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By A.I. Date 3/19/98 Subject Volume of Waste Sheet No. 2 of 3
Chkd. By DD Date 3/19/98 WDI Proj. No. 94-256

AREA 3:

- Waste material was not detected in AREA 3.

AREA 4:

Area: 47,000 ft²
Avg. waste thickness: 12 ft

47,000 ft² × 12 ft = 564,000 ft³ = 20,900 yd³

AREA 5:

AREA = 28,250 ft²
AVG waste thickness: 10 ft

28,250 ft² × 10 ft = 282,500 ft³ = 10,500 yd³

AREA 6:

- Waste material was not detected in Area 6

AREA 7:

Area: 17,000 ft²
Avg waste Thickness: 12 ft

17,000 ft² × 12 ft = 204,000 ft³ = 7,600 yd³

AREA 8:

Area: 56,000 ft²
Avg. waste thickness: 3 ft
56,000 ft² × 3 ft = 168,000 ft³ = 6,225 yd³

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By A.I. Date 3/19/98 Subject Volume of Waste Sheet No. 3 of 3
Chkd. By DD Date 3/19/98 WDI Proj. No. 94-256

Volume Summary

LOCATION	Approximate Volume of Waste material (yd^3)(1)
Reservoir	148,000
1	900
2	165,000
3	0
4	21,000
5	10,500
6	0
7	7,600
8	6,200

(1) Volumes are calculated assuming 5 feet of fill material covers the waste material.

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APPENDIX C

GAS GENERATION CALCULATIONS

TRC

ATTACHMENT C.1

METHANE GENERATION

(Appendix B: February 13, 1998 Transmittal to EPA)

TRC

TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 15 Sep 97 Subject METHANE GENERATION Sheet No. 1 of 9
Chkd. By TLP Date 11/25/97 AT WDI Proj. No. 94-256

PURPOSE

Calculate potential methane (CH_4) generation rate from anaerobic decomposition of petroleum hydrocarbons in soil at Waste Disposal, Inc. (WDI) Superfund Site in Santa Fe Springs, CA.

APPROACH

Use fundamental reactions of anaerobic decomposition taken from similar theory developed for simulation of landfill gas generation in municipal solid waste (Attachment 1). Apply reactions to petroleum hydrocarbons in a unit mass of soil.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 1Sep97 Subject METHANE GENERATION Sheet No. 2 of 9
Chkd. By TLP Date 11/25/97 AT WDI Proj. No. 94-256

ASSUMPTIONS

- Petroleum hydrocarbons can be adequately represented by the generic molecule $C_{24.5}H_{51}$, an alkane calculated as midway between the range found in petroleum according to Attachment B.2.
- Soil containing petroleum hydrocarbons that produce most of the methane is in the sludge materials, which has an average thickness less than 10 feet (see Attachment B.3).

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By EGW Date 15Sep97 Subject METHANE GENERATION Sheet No. 3 of 9
Chkd. By ZP Date 11/25/97 AT WDI Proj. No. 94-256

ASSUMPTIONS (continued)

- The density of the generic petroleum hydrocarbon, $C_{24.5}H_{51}$, is that of crude oil, or approximately 7.3 lb/gal as shown in Attachment B.4.
- Subsurface temperature equals long-term average of Los Angeles = 65°F as shown in Attachment B.5.
- The generated methane behaves thermodynamically as an ideal gas.
- Anaerobic decomposition of organics proceeds with first order kinetics in which the rate of CH_4 generation is proportional to the amount of remaining (unreacted) organics, as discussed in Attachment B1.
- The half-life of the $C_{24.5}H_{51}$ is quite long based on the disposal period lasting decades, ending in 1954, and continuing to produce CH_4 today. It is assumed to be 50 years, but calculations will also use 25 years for comparison.

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By EJW Date 1 Sep 97 Subject METHANE GENERATION Sheet No. 4 of 9
Chkd. By TLP Date 11/25/97 AT WDT Proj. No. 94-256

ASSUMPTIONS (continued)

- Area underlain by main sludge waste = 16.7 acres (see Attachment B.6).
- Total waste soil disposed = sludge area times the estimated average thickness of 10 feet.
- Mass concentration of $C_{24.5}H_{51}$ in waste = 12,183 $\frac{mg\ C_{15}H_{32}}{kg\ waste}$, assumed to be total (petroleum) hydrocarbons (see Attachment B.7).
- Waste disposal period began in 1944, lasted 10 yrs and ended in 1954.
- Waste density is 1.56 g cm^{-3} as shown for sludge material (Sample WDI-TS-25B, taken at depth of 7-10 ft) in Attachment B.8.

- Area of reservoir = 5.06 acres, based on circle with a diameter = 530 ft (see Attachment B.6).
- Flux box measurements in 1995 (Attachment B.9) captured methane emitted from surface without appreciable loss during migration from sludge materials.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 15Sep97 Subject METHANE GENERATION Sheet No. 5 of 9
Chkd. By TLP Date 11/25/97 AT UDI Proj. No. 94-256

CALCULATION

A unit mass of sludge waste material contains 12,183 mg/kg of TPH or 1.2183×10^{-2} lb in one lb of material.

This mass of $C_{24.5}H_{51}$ is equivalent to

$$\frac{1.2183 \times 10^{-2} \text{ lb } C_{24.5}H_{51}}{(24.5 \cdot 12 + 51 \cdot 1) \frac{\text{lb } C_{15}H_{32}}{\text{lb-mole } C_{15}H_{32}}}$$

$$= 3.53 \times 10^{-5} \text{ lb-mole } C_{15}H_{32}.$$

Using Equation 1 in ~~Attachment B.1~~, each molecule of $C_{24.5}H_{51}$ decomposes anaerobically as follows:

$$C_{24.5}H_{51} + 11.75 H_2O \xrightarrow{\text{anaerobic}} 18.625 CH_4 + 5.875 CO_2$$

Methane is ultimately produced in a quantity of $18.625 \frac{\text{lb-mole } CH_4}{\text{lb-mole } C_{24.5}H_{51}}$, hence the molar amount of $C_{24.5}H_{51}$ in the unit mass of soil will ultimately produce $18.625 \frac{\text{lb-mole } CH_4}{\text{lb-mole } C_{24.5}H_{51}} \times 3.53 \times 10^{-5}$ lb-mole $C_{24.5}H_{51}$ =

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By BMW Date 1/5/97 Subject METHANE GENERATION Sheet No. 6 of 9
Chkd. By TLC Date 11/25/97 AT WDI Proj. No. 94-256

CALCULATION (continued)

6.57×10^{-4} lb-mole CH_4.

In terms of volume, this molar amount provides the following:

$$6.57 \times 10^{-4} \text{ lb-mole } CH_4 \cdot 383.4 \frac{ft^3 \, CH_4 \text{ (at 65°F)}}{\text{lb-mole } CH_4}$$

$= 0.252 \; ft^3 \, CH_4$

This ultimate yield is generated over the lifetime of the $C_{24.5}H_{51}$ and is equivalent on a waste mass basis to $0.252 \frac{ft^3 \, CH_4}{\text{lb sludge material}}$.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 1 Sep 97 Subject METHANE GENERATION Sheet No. 7 of 9
Chkd. By [illegible] Date 11/25/97 AT WDI Proj. No. 94-256

CALCULATION (continued)

Use Equations 19+20 in Attachment B.1 as follows:

$$Q_{CH_4} = G_{CH_4} R \left(e^{-\frac{0.693 N}{\tau}} - e^{-\frac{0.693 t}{\tau}}\right) \quad (1)$$

where Q_{CH_4} = CH_4 generation rate $[L^3 T^{-1}]$

G_{CH_4} = ultimate CH_4 yield $[L^3 M^{-1}]$ per unit mass of $C_{24.5}H_{51}$

R = waste soil disposal rate $[M T^{-1}]$

τ = half-life of anaerobic decomposition $[T]$

N = time since $C_{24.5}H_{51}$ last disposed $[T]$

t = time since disposal began $[T]$

Unknown disposal rate R is estimated as follows:

$$R = \frac{16.7\ ac \times 43{,}560 \frac{ft^2}{ac} \times 10 ft \times 1.56 \times 62.4 \frac{lb}{ft^3}}{10\ yrs \times 2000\ lb/ton}$$

$$= 3.54 \cdot 10^4 \frac{tons}{yr} = 96.9 \frac{tons}{dy} \text{ contaminated soil}$$

$$= 7.08 \cdot 10^7 \frac{lbs\ soil}{yr}$$

Dimensions in [ ] brackets: L = length, M = mass and T = time.

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By [illegible] Date 15 Sep 97 Subject METHANE GENERATION Sheet No. 8 of 9
Chkd. By [illegible] Date 11/25/97 AT WDI Proj. No. 94-256

CALCULATION (continued)

Using Eq. 1,

$$Q_{CH_4} = 0.252 \frac{\text{scf } CH_4}{\text{lb soil}} \cdot 7.08 \cdot 10^7 \frac{\text{lb soil}}{\text{yr}} \frac{1\text{ yr}}{365.25\text{ dy}} \cdot \Big(\underbrace{e^{-\frac{0.693 \cdot 43\text{yr}}{50\text{yr}}}}_{0.551} - \underbrace{e^{-\frac{0.693 \cdot 53\text{yr}}{50\text{yr}}}}_{0.480}\Big)$$

$$= 3476 \frac{\text{scf } CH_4}{\text{dy}} = 2.41 \text{ scfm } CH_4 \text{ from sludge materials.}$$

$$\simeq 3500 \frac{\text{scf } CH_4}{\text{dy}} \qquad = 3.3 \times 10^{-6} \text{ scfm } CH_4/\text{ft}^2 \text{ area.}$$

For comparison, the methane emission rate from the surface over sludge material can be estimated by multiplying the arithmetic mean and maximum measured fluxes in Attachment B.9 by the area underlain by sludge as follows:

Arithmetic mean methane emission rate (measured)

$$= 2.5 \times 10^{-7} \frac{\text{scfm}}{\text{ft}^2} \times 729{,}000 \text{ ft}^2 = 0.18 \text{ scfm}$$

Maximum methane emission rate (measured)

$$= 3.8 \times 10^{-7} \frac{\text{scfm}}{\text{ft}^2} \times 729{,}000 \text{ ft}^2 = 0.28 \text{ scfm}$$

Also for comparison, Q_{CH_4} (25 yr. half life in Equation 1)

$= 2.51$ scfm, similar to that for 50 yr. half life.

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By [illegible] Date 1 Sp 97 Subject METHANE GENERATION Sheet No. 9 of 9
Chkd. By TLP Date 11/25/97 AT WDI Proj. No. 94-256

CONCLUSION

The methane generation rates calculated by the two approaches are both low enough to be easily removed by a passive collection system placed above existing cover material.

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ATTACHMENT B.1

TRC
LANDFILL GAS GENERATION MODEL
(GAS IA)

JANUARY 15, 1998

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SUBATTACHMENT 1.A: LIST OF SYMBOLS AND DIMENSIONS OF VARIABLES

SUBATTACHMENT 1.B: CASE STUDY - SANTA CLARA LANDFILL, VENTURA COUNTY, CALIFORNIA

SUBATTACHMENT 1.C: CASE STUDY - EL SOBRANTE LANDFILL, RIVERSIDE COUNTY, CALIFORNIA

SUBATTACHMENT 1.D: CASE STUDY - MIRAMAR LANDFILL, SAN DIEGO COUNTY, CALIFORNIA

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1	Simplified Composition of Municipal Solid Waste

LIST OF FIGURES

FIGURE NO.	TITLE
1	Comparison of Actual LFG Collection Rate and Estimated LFG Generation Rate at Santa Clara Landfill, Ventura County

1.0 INTRODUCTION

1. This document presents a technical discussion of TRC's landfill gas (LFG) generation model, GAS IA. The model is comprised of: (1) a methodology developed by TRC to determine the methane generation potential of a unit of municipal solid waste (MSW) based on site-specific conditions; and (2) a first-order decay function, based on the Scholl Canyon model (EMCON, 1976, 1980), as summarized by the Solid Waste Association of North America (SWANA, 1991). This mathematical function is consistent with the same function used in the New Source Performance Standard for MSW landfills (EPA, 1996).

2. The model has been implemented as two types of spreadsheets. The first type of spreadsheet calculates methane generation potential per unit mass of MSW for a specified phase of a landfill, based on waste composition and other site-specific factors related to moisture content of the MSW. The second type of spreadsheet prepares a methane/LFG generation forecast based on the unit methane generation potential and site-specific factors defining the amount and rate at which MSW was disposed in the landfill.

3. The model was validated in three case studies in which the predicted generation rate of LFG was compared to the actual LFG collection rate at the Santa Clara Landfill located in Ventura County, California, and predicted generation rates of methane were compared to actual methane collection rates at the El Sobrante Landfill located in Riverside County, California, and Miramar Landfill in San Diego County.

4. The remainder of this document presents a brief overview of the model and its formulation, a detailed technical description, model usage instructions, and the results of the case studies using actual data from the Santa Clara, El Sobrante and Miramar Landfills.

2.0 MODEL OVERVIEW

1. GAS IA is an extension and improvement of the Scholl Canyon model (EMCON, 1976, 1980), as summarized by SWANA (1991), and is comprised of two modules. The first module estimates the methane generation potential of a unit of MSW. The second module prepares a methane and LFG generation forecast based on first order kinetics. This section presents an overview of the assumptions and parameters in the model. A detailed technical description of the model is then provided in Section 3.0.

2.1 UNIT GENERATION MODULE

1. The unit generation module of GAS IA uses the composition of MSW, its moisture content, and precipitation rate to calculate the total potential volume of methane which could be generated from a unit mass of MSW. This site specific information is provided by the user.

2. MSW composition is categorized into three decomposable fractions of organic material (food waste, vegetation waste, and paper waste), and a fourth non-decomposable, largely non-organic fraction (cans, bottles, etc.). The carbon content of each of the three decomposable fractions is approximated in the model by representing the different types of waste by a characteristic molecule. For food waste, the representative molecule is glucose, a simple sugar with the formula $C_6H_{12}O_6$. For vegetation and paper waste, the representative molecule is cellulose, a biopolymer with the formula $C_6H_{10}O_5$. The cellulose molecule is used to represent approximately one-half of the vegetation and paper waste categories. The other half is made up of lignins, minerals and other substances that do not anaerobically decompose to produce methane (Huitric, 1981).

3. Based on the known composition of typical LFG and stoichiometry of anaerobic decomposition reactions, the model assumes that half the atoms of carbon in the representative molecule for each individual waste component is converted to methane and the other half is converted to carbon dioxide. Using this assumption, the model estimates the maximum amount of methane that could be generated by a unit mass of MSW. However, anaerobic decomposition also consumes water, so the maximum amount of LFG which could be generated depends on the moisture content of the MSW. Water availability is assumed to limit LFG generation potential in direct proportion to the moisture content of the MSW on a wet basis.

4. In addition to decomposition of MSW, the relative importance of some other causes of moisture gain or loss were evaluated. Infiltration of precipitation during the period between initial placement of the MSW in the landfill and the placement of final cover is considered the only significant additional source of moisture to the waste. A secondary source of water gain is aerobic decomposition, which occurs for a short period immediately after waste disposal. Losses of moisture which were evaluated included evaporation, breathing of the landfill, and removal of saturated LFG. These losses were considered to be either balanced by the minor sources of water (i.e., aerobic decomposition) or negligible.

5. The unit generation module of GAS IA results in a calculated maximum volume of potential methane generation for a unit mass of MSW. This volume is then used as input into the forecast module.

2.2 FORECAST MODULE

1. The forecast module uses the results of the unit generation module with additional inputs such as the half life of methane generation, operational history of the landfill, and MSW disposal rate to calculate the generation rate of methane and LFG within the entire landfill as a function of time.

2. The forecast module is based on the Scholl Canyon model (EMCON, 1976, 1980), as reported by SWANA (1991), which is considered one of the simplest of the published models to utilize (WMNA, 1992). The Scholl Canyon model is based on the assumption that LFG generation rate for a unit mass of MSW peaks soon after placement of the waste in the landfill. The short time lag during which oxygen in the MSW is depleted by aerobic decomposition is neglected. The LFG generation rate for a unit mass of MSW is then assumed to decrease according to first order kinetics (i.e., exponential decay) as the amount of decomposable organic material remaining from the initial placement of the waste decreases.

3. The methane and LFG generation rate at any time can be calculated by summing the individual contributions from each unit mass of MSW during an incremental time period. The model uses an equation which was developed by integrating over all unit masses of MSW in the landfill.

3.0 TECHNICAL DESCRIPTION

1. GAS IA has been developed to estimate the methane and LFG generated by MSW in landfills operating under varying moisture conditions and waste flow rates. The model is an extension and improvement on the Scholl Canyon model (EMCON, 1976, 1980), as summarized by SWANA (1991), which generates time-dependent methane and LFG generation rates based on the amount of waste in the landfill and the operational status of the landfill. The Scholl Canyon model assumes that generation of methane and LFG by MSW follow first order kinetics. This means that the rates of methane and LFG generation at any time are proportional to the remaining decomposable MSW mass.

2. GAS IA improves upon the Scholl Canyon model by predicting the total amount of gas produced per unit of MSW according to the composition, moisture content, compaction of the waste, and infiltration of precipitation. The model is comprised of two modules, the unit generation module, which estimates the total methane generation potential of a unit of MSW, and the forecast module, which uses the result of the first module to estimate methane or LFG generation versus time.

3. GAS IA focuses on the processes that have the greatest effect on LFG generation and are subject to landfill management control. The following discussion presents the technical basis for development of GAS IA, and is organized as follows:
   - Section 3.1 - Unit Generation Module:
     - Section 3.1.1: Composition of Solid Waste
       The composition of solid waste is characterized and simplifying assumptions are made regarding the chemistry and biodegradation of the various components.
     - Section 3.1.2: Effect of Moisture
       The role of water in the waste is taken into account. Precipitation and infiltration of water into the waste is conceptualized and parameterized for incorporation in model equations.
   - Section 3.2 - Forecast Module: The first order kinetics of methane/LFG generation, which are part of the Scholl Canyon Model, are briefly summarized.

4. A list of symbols and dimensions of variables used in the following discussion is provided in Subattachment 1.A.

3.1. UNIT GENERATION MODULE

1. This section characterizes MSW composition and moisture content, and derives an equation which is based on MSW composition and moisture content to calculate the total potential methane and LFG generation for a unit mass of MSW.

3.1.1 COMPOSITION OF SOLID WASTE

1. SWANA has published data on typical MSW composition. This information was simplified by categorizing MSW constituents into three decomposable components: food, vegetation, and paper. A fourth component includes nonmethane-producing, generally nondecomposing materials such as plastics, metals, and glass. Table 1 shows the four component waste stream categorization used in this model. This categorization can account for solid waste diversion as required by the California Integrated Solid Waste Management Act of 1989 (Assembly Bill [AB] 939).

2. For the purposes of evaluating LFG generation, anaerobic decomposition can be viewed as the conversion of carbon in MSW components to methane (CH_4) and carbon dioxide (CO_2). Only the three decomposable components in Table 1 contribute carbon to LFG. Each of the three decomposable components is a complex mixture of molecules. Complete chemical characterization of the components would be infeasible for the purposes of developing a practical LFG generation model. However, simplifying assumptions can be made regarding the general chemical characteristics common to decomposable organic matter.

3. Based on the work of Tchobanoglous, et al. (1977) and its presentation by Schumacher (1983), the general reaction for the carbon, hydrogen, and oxygen atoms in the molecules of the three organic MSW components can be represented by:

$$C_{a_i} H_{b_i} O_{c_i} + ([4_{a_i} - b_i - 2_{c_i}]/4)\, H_2O \xrightarrow[\text{decomposition}]{\text{anaerobic}} ([4_{a_i} + b_i - 2_{c_i}]/8)\, CH_4 + ([4_{a_i} - b_i + 2_{c_i}]/8)\, CO_2 \qquad (1)$$

where i = index number for a component of the solid waste (i.e., 1 = food, 2 = vegetation, 3 = paper, and 4 = nonorganic materials such as cans, bottles, etc.).

4. Based on Equation 1, a_i molecules each of methane and CO_2 are generated from two molecules of $C_{a_i}H_{b_i}O_{c_i}$. This assumes that sufficient water is available for bacteria to complete this reaction. Following SWANA (1991), it is assumed in this model that methane

comprises half the LFG (on a volume or molar basis) at the point of generation. Other reactions and mechanisms can affect the specific composition of LFG, such as the dissolution of carbon dioxide in water or leachate, or abiotic reactions of gaseous constituents.

5. GAS IA assumes a representative molecule for each component of the MSW. Food waste is represented by the molecular composition of a basic sugar, $C_6H_{12}O_6$, while half of paper/cardboard and vegetative waste in the two other organic components is represented by the molecular composition of cellulose, $C_6H_{10}O_5$, as suggested by Bookter and Ham (1982). The other half of these two components is composed of lignins, minerals and other nondecomposable substances (Huitric, 1981). For these representative organic molecules, $a_i = 6$ for $i = 1,2,3$, and $a_4 = 0$.

6. Derivation of model equations is based on an incremental unit mass of MSW (m) that is landfilled during a specific time period. The unit mass (m) contains the four components in user defined proportions and a specified amount of moisture which is apportioned to the four components based on user-supplied specifications. If the dry organic mass in each solid waste component (i) is represented by m_{d_i}, and the molecular weight of the organic molecule selected to typify component (i) is represented by M_i, then the number of moles (n_i) of organic compound available to react with water is given by:

$$n_i = m_{d_i} / M_i \tag{2}$$

where $M_i = 12ai + b_i + 16ci$.

7. Using the assumption that one half the carbon atoms in a component of waste is converted to methane, the maximum number of moles of methane which could potentially be generated by complete reaction of the organic matter can be calculated using:

$$n_{CH_{4i}} = (a_i/2)n_i = (a_i/2)m_{d_i} / M_i \tag{3}$$

8. Equation 3 calculates the maximum amount of methane that can be produced from the dry organic mass based on carbon content. As shown in Equation 1, anaerobic decomposition requires water. Further, water is needed to create an environment for anaerobic microbes to function. Therefore, the next step in the development of the model, discussed in Section 3.1.2, is to account for the limiting effect of water on the amount of gas generated.

3.1.2 EFFECT OF MOISTURE

1. GAS IA assumes that moisture is critical to the decomposition process. There are three sources of moisture in MSW:
   - Moisture content in the MSW at the time of disposal on the active face.
   - Infiltration of precipitation through daily and intermediate cover.
   - Moisture created during the brief period immediately following landfilling when the waste is decomposing aerobically (aerobic decomposition generates primarily CO_2 and water).

2. The first two of these three sources, initial moisture content and infiltration of precipitation, are the most significant in determining the moisture of the waste if the landfill is being operated properly (placement of daily cover, design of drainage diversion structures, etc.). The third source, moisture added by aerobic decomposition, is relatively minor, and is assumed to balance potential losses of water by the processes discussed in Section 3.1.2.2. Therefore, the model quantitatively simulates only initial moisture content and infiltration of precipitation. Initial moisture content can be measured or estimated from available data. Table 1 shows a distribution of average wet-basis moisture content for each of the four MSW components as they are received at the landfill (SWANA, 1991).

3. For the purposes of model formulation, the moisture content on a wet basis (W_{w_i}) of waste component (i) is represented by:

$$W_{w_i} = m'_i/(m_{d_i} + m'_i) \tag{4}$$

   where m'_i is the mass of water in component (i). W_{w_i} has the range $0 \leq W_{w_i} \leq 1$.

4. Studies by DeWalle, et al. (1978); Ramaswamy (1970); Merz and Stone (1968); Merz (1964); Pfeffer (1973); Rovers and Farquhar (1973); and Cooney and Wise (1975) show that the total volume of LFG generated by a unit mass of dry MSW depends on the moisture content of the waste. Based on those studies, it is assumed herein that the total potential amount of methane generated is directly proportional to the moisture content on a wet basis. Using this assumption as an approximation to account for the effect of water on methane generation, Equation 3 becomes:

$$n_{CH_4i} = (a_i/2M_i)m_{d_i} W_{w_i} \tag{5}$$

   when applied to the individual MSW components. Note that as W_{w_i} increases, methane generation potential approaches its maximum.

5. Having established the above relationship of methane generation to MSW moisture content, it is necessary to determine the potential effects that precipitation, water loss and water gain, may have upon the above relationship. These effects are discussed in Sections 3.1.2.1, 3.1.2.2 and 3.1.2.3.

3.1.2.1 Infiltration of Precipitation

1. During the normal lifetime of a landfill, MSW is placed in lifts, and at the end of each day exposed MSW is covered with approximately 6 inches of soil. A lift contains layers, typically 2-foot thick (e.g., five 2-foot layers in one 10-foot lift), and each lift will remain in the topmost position (nearest the atmosphere) for some period of time. Depending upon specific operating conditions, either a 6-inch layer of daily cover or a 1-foot-thick layer of intermediate cover soil will be placed over the day's waste. Daily and intermediate cover, unlike final cover, are not designed to be impermeable to precipitation. The model allows the user to specify that a fixed portion (e.g., 30 percent) of precipitation will penetrate daily and intermediate cover and permeate the solid waste layer. It is assumed that the moisture will be distributed in the three organic components (i.e., food, vegetation, and paper) in direct proportion to the dry mass of each organic component available to absorb and use it.

2. The wet-basis moisture content (W_{w_i}) will increase if precipitation penetrates the soil cover into the MSW. The original mass of water in the MSW components is found from Equation 4 to be expressed as:

$$m'_i = m_{d_i} W_{w_i} / (1 - W_{w_i}) \qquad (6)$$

3. Precipitation (P) is measured in inches per year. The mass of precipitation (m_p) falling on a column of unit mass of MSW that has a top area (A), and successfully infiltrating the landfill to be distributed throughout the three decomposable components is given by:

$$m_p/A = bPD'E \qquad (7)$$

where:

b = fraction of precipitation that infiltrates the landfill.
D' = density of water (62.4 lbs/cu ft).
E = exposure period (time that MSW layer is in topmost position).

4. Before precipitation infiltrates the surface of the landfill, the mass of MSW (m) underlying surface area (A) in the cell lift is given by:

$$m/A = D\,h \tag{8}$$

where:

D = density (or compaction) of solid waste (e.g., 1,200 lbs/cu yd).
h = depth (thickness) of the lift (e.g., 10 to 20 feet).

Both of these parameters must be specified by the user.

5. The mass of infiltrating precipitation per unit mass of solid waste from each inch of precipitation is determined by dividing Equation 7 by Equation 8, which yields the following expression:

$$m_p/m = (D'/D)(bPE/h) \tag{9}$$

The mass of precipitation (m_{p_i}) that will be added to a unit mass of each organic component is given by:

$$m_{p_i}/m = (D'/D)\,(bPE/h)\,(m_{d_i}/\sum_{i=1}^{i=3} m_{d_i})\quad i = 1,2,3 \tag{10}$$

where $\sum$ is the summation over the index i, and $m_{p4} = 0$.

6. Therefore, the total water in each component after precipitation m^*_i is given by:

$$m^*_i = m'_i + m_{p_i} \tag{11}$$

and the new wet-basis moisture content W^*_{wi} is given by:

$$W^*_{wi} = m^*_i/(m_{d_i} + m^*_i) = (m'_i + m_{p_i})/(m_{d_i} + m'_i + m_{p_i}) \tag{12}$$

7. Equation 5 can now be rewritten to include the effect of precipitation and is given by:

$$n_{CH4i} = (a_i/2)m_{d_i}\,W^*_{wi}\,/\,M_i \tag{13}$$

8. Based on the assumption that anaerobic decomposition of MSW results in one carbon dioxide molecule for each methane molecule generated, the total moles of LFG generated n_{LFG_i} can be determined by multiplying Equation 13 by two:

$$n_{LFG_i} = a_i m_{d_i}\,W^*_{wi}\,/\,M_i \tag{14}$$

9. The volume of methane (V_i) generated by each MSW component, and potentially released to the atmosphere at reference temperature (60° F = 15.6° C), and pressure (1 atmosphere = 14.7 psia) is related to the number of moles of methane by the equation:

$$V_i = k' \, n_{CH4i} \tag{15}$$

where k' = 379.8 cubic feet per pound-mole (volume of one mole of an ideal gas at reference temperature and pressure).

10. The total volume (V_{CH_4}) of methane generated by the three organic components is found by substituting Equation 13 into Equation 15 and summing the volumes over each of the decomposable waste components:

$$V_{CH_4} = \sum_{i=1}^{i=3} V_i = k' \sum_{i=1}^{i=3} n_{CH_4i} = (k'/2) \sum_{i=1}^{i=3} a_i m_{d_i} \, W^*_{W_i} / M_i \tag{16}$$

11. If G_{CH_4} is the total methane generated by a unit mass (m) of MSW, then:

$$G_{CH_4} = V_{CH_4}/m = (k'/2m) \sum_{i=1}^{i=3} a_i m_{d_i} \, W^*_{W_i} / M_i \tag{17}$$

and the total LFG generated by this same unit mass of MSW is given by:

$$G_{LFG} = 2G_{CH_4} = (k'/m) \sum_{i=1}^{i=3} a_i m_{d_i} \, W^*_{W_i} / M_i \tag{18}$$

3.1.2.2 Water Losses

1. Secondary mechanisms that remove water from the MSW include evaporation from the surface, breathing of the landfill, and extraction of saturated LFG. The original moisture in the top lift of MSW as received at the landfill is located at an average depth of 5 to 10 feet in a landfill of typical 10- to 20-foot thick lifts, plus an additional 6 inches to 1-foot for the thickness of the daily or intermediate cover. For water in the MSW to be lost by evaporation, water in the topmost lift must evaporate and diffuse an average distance of 6 to 11 feet to escape from the surface. Based on hydrologic data, the maximum soil depth from which losses by evaporation may occur ranges from 1 to 3 feet below ground surface, depending upon vegetative cover, solar radiation, and other variables. Therefore, GAS IA assumes that there is no significant loss of moisture by evaporation.

2. Breathing of the landfill is caused by atmospheric pressure changes. Typical changes associated with the passage of warm and cold fronts are about 5 mm Hg, which is 0.7 percent of one atmosphere. Decreasing atmospheric pressure causes LFG which is saturated with water vapor to be withdrawn from the landfill. Increasing atmospheric pressure causes ambient air to be pumped into the landfill. As compared to LFG within the landfill, ambient air is dry. The effect of pumping water-rich gas out of the landfill and water-poor air into the landfill is a net loss of water from the landfill estimated to have less than a one percent effect on the water balance..

3. LFG becomes saturated with water vapor at the temperature where the anaerobic decomposition occurs. This water comes from the MSW and is removed upon extraction of LFG. Such water loss is estimated to have less than a 5 percent effect on the water balance, but is not calculated herein.

3.1.2.3 Water Gains

1. The breathing or atmospheric pumping discussed in the previous section also introduces oxygen into the landfill. The oxygen may cause aerobic decomposition to occur in MSW located just under the cover soil. Water production by aerobic decomposition is estimated to have less than a one percent effect on the water balance.

2. It is assumed that the net effect on moisture content of these secondary processes of water loss and gain is negligible.

3.2 FORECAST MODULE

1. The preceding section discussed the characterization of MSW composition and moisture content, and derived Equation 18 to calculate the total potential LFG generation G_{LFG} for a unit mass of MSW. This section discusses integration of unit generation and waste disposal parameters into an established model to calculate generation of methane and LFG versus time for the whole landfill.

2. The Scholl Canyon model (EMCON, 1976, 1980), as reported by SWANA (1991) is considered one of the simplest of the published models to utilize (WMNA, 1992). It was selected for incorporation in the GAS IA because first order kinetics accurately describe many chemical reactions in which the rate is proportional to the remaining decomposable mass

Zison (1990). The Scholl Canyon model was also selected for use in the New Source Performance Standards for MSW landfills (EPA, 1996). A brief discussion of the Scholl Canyon model is presented here. A thorough discussion of the model derivation and limitations is presented in EMCON (1976) and EMCON (1980).

3. The Scholl Canyon model is based on the assumption that gas production for a unit mass of MSW peaks soon after its placement in the landfill. The short time lag during which oxygen in the MSW is depleted by aerobic decomposition is neglected in our calculations. After placement of the MSW in the landfill, the gas production rate for a unit mass of MSW is assumed to decrease according to first order kinetics (i.e., exponentially) as the amount of organic material remaining decreases.

4. By dividing a landfill into unit masses of MSW which are placed during a specified increment of time, and assuming that the MSW acceptance rate is constant over the length of time it takes to fill a specified portion, the implementation of the Scholl Canyon model used in GAS IA can be written as:

$$Q_{LFG} = G_{LFG}\, R\, (e^{-kN} - e^{-kt}) \qquad (19)$$

where:

Q_{LFG} = LFG generation rate at time t (ft^3/day)
G_{LFG} = total LFG generation capacity (ft^3/ton MSW)
R = MSW disposal rate (tons/day)
k = Decomposition rate constant (yr^{-1})
N = time since landfill closure (yr)
t = time since the initial MSW placement (yr)

5. G_{LFG} is calculated using Equation 18. N equals 0 when the landfill is active. The decomposition rate constant k is defined as:

$$k = \ln(2)/t_{1/2} = 0.693/t_{1/2} \qquad (20)$$

where $t_{1/2}$ is the decomposition half life (i.e., time necessary for a unit of MSW to exhaust one half of its LFG generation potential). The half life must be estimated on the basis of site-specific conditions such as moisture content, temperature, and waste composition.

4.0 MODEL USAGE INSTRUCTIONS

1. GAS IA has been implemented as two types of computer spreadsheets. The first type of spreadsheet calculates methane generation potential per unit of MSW in each phase of the landfill, and the second type of a spreadsheet prepares a methane/LFG generation forecast. The technical basis for these computational tools is discussed in Sections 2.0 and 3.0 of this document. The spreadsheets have been developed using Microsoft Excel on an Apple Macintosh computer system, but are transportable to other software/hardware environments. This section briefly discusses usage of the spreadsheets.

4.1 UNIT GENERATION SPREADSHEET

1. The purpose of the unit generation spreadsheet is to equip the user to estimate methane generation per unit of MSW for a given set of site-specific conditions. The user should create a unique unit generation spreadsheet for each discrete landfill phase because each phase may have different operational characteristics.

2. Example unit generation spreadsheets are presented in the case studies in Subattachments 1.B. and 1.C. The spreadsheet accounts for the changing waste composition caused by waste diversion (AB 939). The following parameters must be input by the user to the unit generation spreadsheet:
   - Site name.
   - Site location.
   - Landfill phase identification (e.g., name, number).
   - MSW compaction (pounds per cubic yard).
   - Exposure time of MSW layer in the topmost position of the landfill (years).
   - Height (thickness) of the MSW lift (feet).
   - Fraction of precipitation which infiltrates the landfill (percent).
   - Annual precipitation (inches per year).
   - Fraction of food, paper, and vegetation in the waste stream (percent).
   - Moisture content of food, paper, and vegetation in the waste stream (percent).

3. Based on the above input data, the spreadsheet is used to calculate total methane generation rate per unit MSW (cubic feet of methane per pound of wet MSW). This value must be entered by the user in the forecast spreadsheet, as described in the following section.

4.2 FORECAST SPREADSHEET

1. The purpose of the forecast spreadsheet is to estimate methane/LFG generation over time for a given set of site-specific conditions. As noted in Section 4.1, most landfills consist of discrete phases having differing operational characteristics. Therefore, the forecast spreadsheet is easily modified to allow entry of unit generation and operational parameters for multiple landfill phases. The spreadsheet calculates individual and cumulative time dependent methane/LFG generation for each landfill phase.

2. Example forecast spreadsheets are presented for the case studies in Subattachments 1.B. and 1.C. The following parameters must be input by the user to the forecast spreadsheet for each discrete landfill phase:
   - Start of landfilling operation (month, day, year).
   - End of landfilling operation (month, day, year).
   - Days of landfill operation per year.
   - Waste flowrate (tons per day).
   - Waste in place (million tons).
   - Methane half life (i.e., time required for a unit of MSW to emit one half of its potential methane.
   - Total methane generation rate per unit MSW (cubic feet of methane per pound of MSW). This value is calculated by the unit generation spreadsheet (Section 4.1).

3. Based on the above input data, the spreadsheet prepares a table of generation rates by landfill phase and month. The user may extract data presented in this table to prepare methane generation curves similar to those shown in Figures 1 and 2.

5.0 CASE STUDIES

1. To validate the model, GAS IA was applied to three existing landfills in California: Santa Clara in Ventura County, El Sobrante in Riverside County, and Miramar in San Diego County. The Santa Clara and Miramar Landfill case studies are discussed in Sections 5.1 and 5.3, respectively, in terms of LFG because collection rates were made available only for total gas. In contrast, the El Sobrante Landfill case study in Section 5.2 is presented in terms of methane because both LFG collection rate and methane concentration data were available. Methane is the preferred parameter because its collection rate is relatively independent of air intrusion, which can strongly affect the composition and collection rate of LFG.

5.1 SANTA CLARA LANDFILL

1. LFG generation data were supplied by Pacific Energy (PE) to the Ventura Regional Sanitation District (VRSD) for the Santa Clara Landfill (VRSD, 1993). The Santa Clara Landfill was operated between January 1961 and June 1982. It was selected because the landfill has been closed since 1982, and few modifications have been made to the LFG collection system since its installation. LFG produced by the landfill is collected and destroyed using internal combustion engines, and several years of LFG generation data are available.

2. Methane unit generation and LFG forecast spreadsheets developed for this analysis are provided in Subattachment 1.B. The Santa Clara Landfill was modeled in two discrete phases (January 1961 through June 1977, and July 1977 through June 1982) on the basis of differences in landfill operations between the two phases. Estimated methane half life was based on the observation that actual LFG recovery at the Santa Clara Landfill dropped by 50 percent after approximately 8.5 years. Other parameters for the spreadsheets were developed on the basis of PE records for operation of the Santa Clara Landfill. LFG collection data recorded for the Santa Clara Landfill between February 1988 and July 1993 are contained in Subattachment 1.B.

3. Figure 1 displays a comparison of estimated methane generation rate and actual methane collection rate for the Santa Clara Landfill, assuming that the LFG was approximately 40 percent (VRSD, 1997). Data summarized in the figure indicate that the GAS IA accurately estimates the trend observed in LFG collection assuming PE operates the collection system so

as to collect approximately 80 percent. Specific dates on which the collection rate exceeds the predicted generation rate may represent those limited time periods in which the system was collecting some "stored" LFG. Overall, the area under the collection curve, which is proportional to the total volume of collected methane, is 78 percent of the area under the generation curve, which is proportional to the total volume of generated methane.

5.2 EL SOBRANTE LANDFILL

1. MSW has been disposed at El Sobrante since July 1986, allowing the use of GAS IA to predict the methane and LFG generation rate from date of inception to the present, and further out to the limit of the permit.

2. The LFG control system began operation on June 23, 1993, from which date records have been kept of LFG collection rate and methane concentration. These parameters have been multiplied to calculate the methane collection rate since June 23, 1993.

3. The development of the El Sobrante Landfill has been divided into 12 "phases" for the purpose of calculating methane unit generation. Tables 1.C.1 through 1.C.12 in Subattachment 1.C contain the unit generation spreadsheets with these calculations.

4. The methane unit generation values are combined with waste disposal rates and time periods in methane forecast Table 1.C.13 in Subattachment 1.C. The methane generation rates at various dates between June 23, 1993 and the end of 1996 are taken from this table and used to create the methane generation curve in Figure 2.

5. The predicted methane generation rate and actual methane collection rate are plotted in Figure 2 for the time period of June 23, 1993 through December 31, 1996. The plot suggests that GAS IA has predicted the methane available for collection quite well, based on the assumed half life of 12 years as shown in the forecast table ion Subattachment 1.C. The apparent methane collection efficiency is approximately 42 percent for the entire period of time since June 23, 1993, and approximately 63 percent during the latter half of 1996.

5.3 MIRAMAR LANDFILL

1. MSW has been disposed at Miramar since December 7, 1959, allowing the use of GAS IA to predict the methane and LFG generation rate from date of inception to the present, and beyond. The LFG control system began operation in Spring 1996, from which date records have been kept of LFG collection rate and methane concentration.

2. The development of the Miramar Landfill has occurred in the following four parts: South Landfill, North Landfill, West Landfill Phase 1 and West Landfill Phase 2. Tables 1.D.1 through 1.D.3 in Subattachment 1.D contain the unit methane generation calculations spreadsheets for South, North and West Landfills, respectively.

3. Methane unit generations are combined with waste disposal rates and time periods in the methane and LFG forecast Table 1.D.4 in Subattachment 1.D. Methane generation rates at various dates between December 7, 1959 and the end of 1997 are taken from this table and used to create the methane generation curve in Figure 3.

4. LFG collection flow rates are not available for a extended period of time. Recently, though, the actual methane collection rate was estimated to be between 2280 and 2600 scfm as of September 1997 (SDAPCD, 1997). The predicted methane generation rate is 3159 scfm on August 31, 1997 as can be seen in Table 1.D.4. The collection efficiency appears to be approximately 72 to 82 percent, assuming a half life of 15 years (see Table 1.D.4). Such a range is expected for a landfill that was started in 1959 and does not include geomembrane as a final cover element.

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TABLE 1

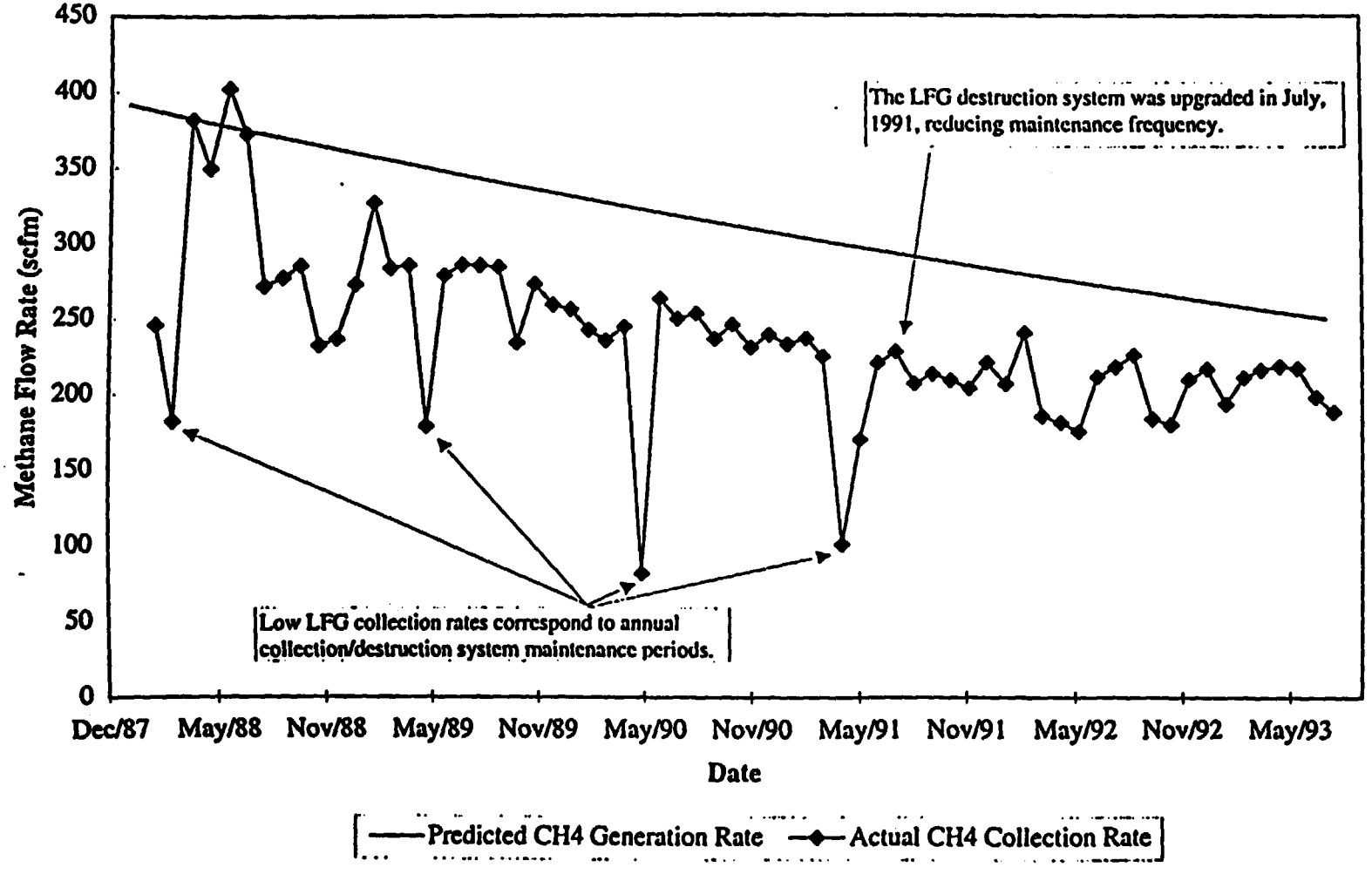
SIMPLIFIED COMPOSITION OF MUNICIPAL SOLID WASTE

COMPONENT	INDEX (I)	MOISTURE CONTENT(1) ON WET BASIS (%)	COMPONENT AMOUNT (%)		
			BASIC COMPOSITION (1)	25% Diversion (2)	50% Diversion (2)
Food Waste	1	70	10	13	20
Paper/Cardboard	2	6	40	31	20
Vegetative Waste	3	60	18	16	16
Remainder	4	6	32	40	44
TOTAL			100	100	100

91-296 (9/4/97/mc)

(1) SWANA, 1991.
(2) The California Integrated Solid Waste Management Act of 1989 (Assembly Bill [AB] 939) required 25 percent diversion of solid waste from landfills by 1995 and 50 percent diversion by the year 2000.

Figure 1
Comparison of Actual Methane Collection Rate and Predicted Methane Generation Rate Santa Clara Landfill Ventura County, California



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CH4 Forcast/Santa Clara.R2;Figure1

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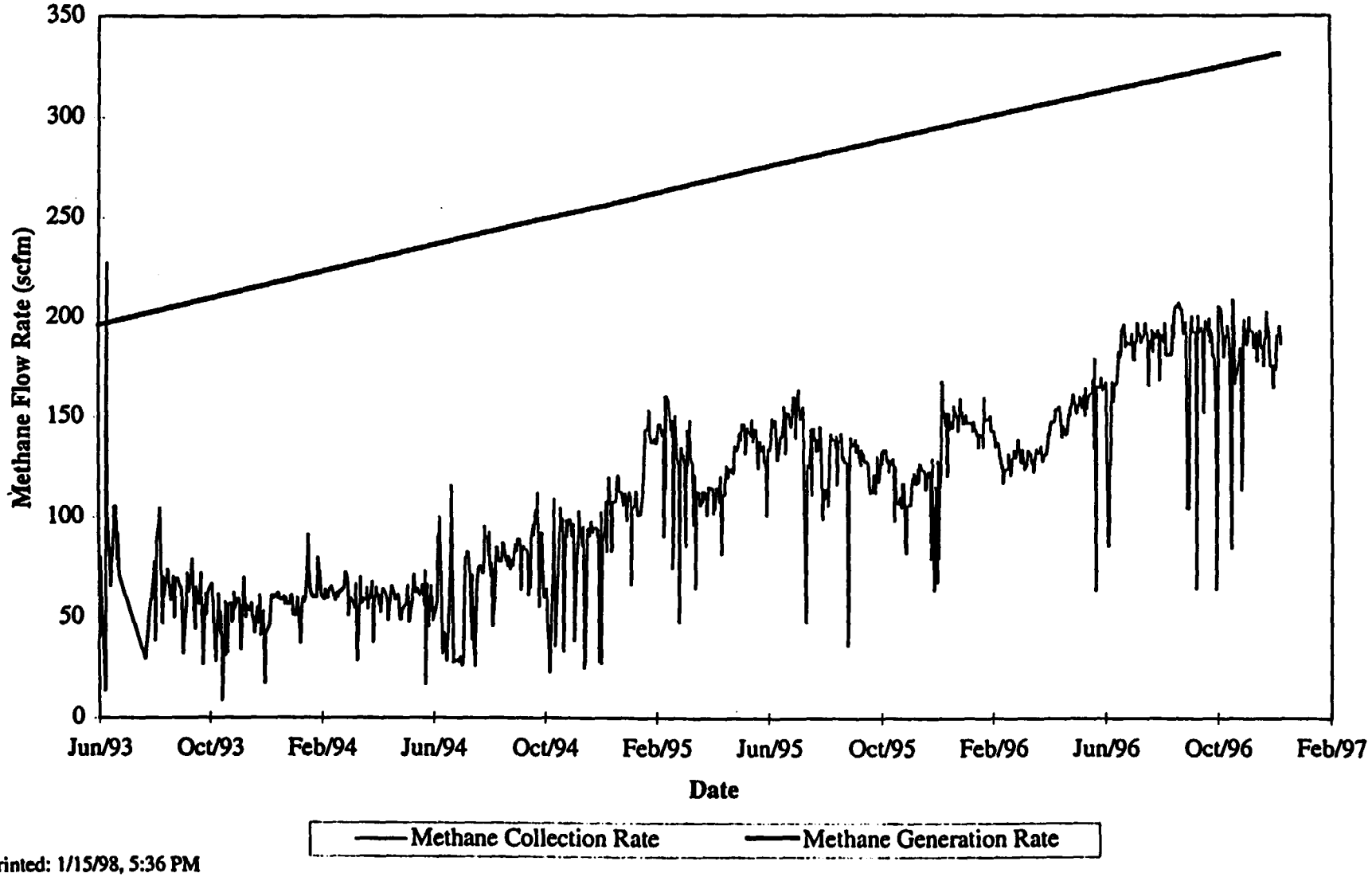
Figure 2
Comparison of Actual Methane Collection Rate And Predicted Methane Generation Rate
El Sobrante Landfill
Riverside County, California



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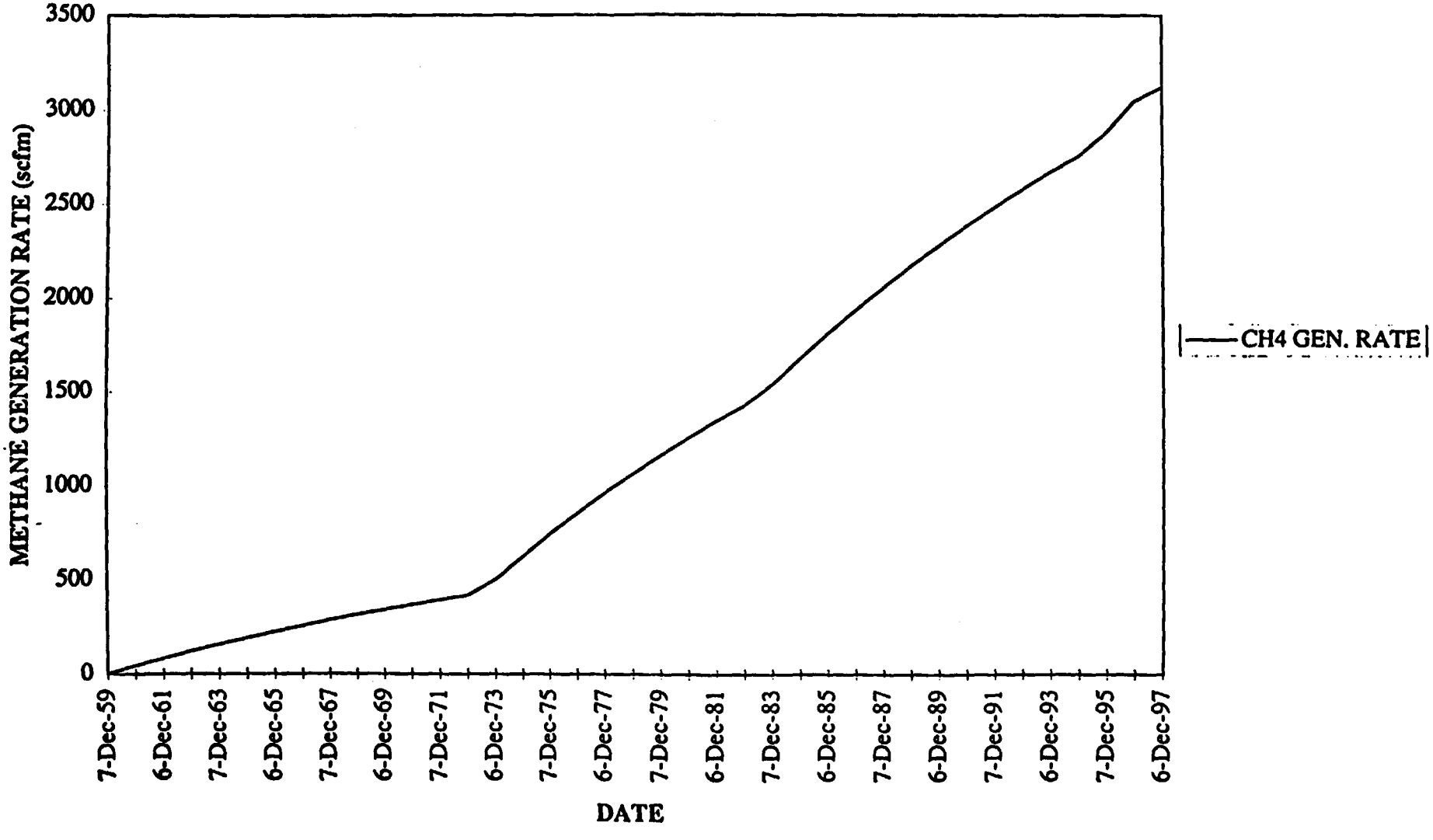
ELS CH4 Gen/Coll.R3, COMPARISON PLOT

FIGURE 3
METHANE GENERATION
MIRAMAR LANDFILL



SUBATTACHMENT 1.A

LIST OF SYMBOLS AND DIMENSIONS OF VARIABLES

SUBATTACHMENT 1.A

LIST OF SYMBOLS AND DIMENSIONS OF VARIABLES[1]

A	Unit area of topmost landfill level exposed to precipitation (L^2).
a_i	Number of carbon atoms in organic molecule representing MSW organic component i (--).
b	Fraction of precipitation falling on landfill that infiltrates cover into the MSW (--).
b_i	Number of hydrogen atoms in organic molecule representing MSW organic component i (--).
c_i	Number of oxygen atoms in organic molecule representing MSW organic component i (--).
D	Density of MSW (ML^{-3}).
D'	Density of water (ML^{-3}).
E	Period of time MSW layer in topmost position is exposed to precipitation (T).
G_{CH_4}	Total CH_4 generated by unit mass of MSW ($L^3 M^{-1}$).
G_{LFG}	Total landfill gas generated by unit mass of MSW ($L^3 M^{-1}$).
h	Depth (thickness) of landfill topmost layer during one year of precipitation (L).
i	Subscript indicating MSW component (e.g., food, vegetation, paper, or non-organic compounds).
k	Decomposition rate constant or coefficient of exponent in temporal curve for LFG generation (T^{-1}).
k'	Volume of one mole of ideal gas at reference temperature (60° F) and pressure (1 atmosphere = 14.7 psia) (L^3 $mole^{-1}$).
m	Unit mass of MSW (M).
m_p	Mass of precipitation falling on a column of unit mass of MSW that has a top area A during exposure period E (M).
m_{pi}	Precipitation that will be added to a unit mass of each organic component i (M).
m_{di}	Dry organic mass in unit mass of MSW component i.
m'_i	Mass of water in unit mass of MSW component i.
m^*_i	Mass of water in unit mass of MSW component after infiltration.
M_i	Molecular weight of MSW component i (M, $mole^{-1}$).
N	Time since landfill closure (years, T).
n_i	Number of moles of organic component i in unit mass of MSW available to react with water.
n_{CH4i}	Number of moles of methane (CH_4) generated by complete reaction of organic molecules in organic component i per unit mass of MSW.
n_{LFG}	Number of moles of LFG generated by complete reaction of organic molecules in organic component i per unit mass of MSW.
P	Annual precipitation on landfill (LT^{-1}).

(1) Dimension abbreviations: L = length, M = mass, T = time, -- = dimensionless.

SUBATTACHMENT 1.A

LIST OF SYMBOLS AND DIMENSIONS OF VARIABLES[1]
(Continued)

Q_{LFG}	Time dependent volume rate of total LFG generation ($L^3 T^{-1}$).
R	MSW disposal rate (tons/day, MT^{-1})
t	Time (T).
$t_{1/2}$	Half-life of decomposable organic matter (T).
V_{CH_4}	Total volume of methane generated by the three organic components (L^3).
V_i	Volume of CH_4 generated by each organic component i per unit mass MSW ($L^3 M^{-1}$).
W_{W_i}	Moisture proportion of MSW component i on wet basis (--).
W^*_{Wi}	Moisture proportion of MSW component i on wet basis after infiltration (--).

(1) Dimension abbreviations: L = length, M = mass, T = time, -- = dimensionless.

SUBATTACHMENT 1.B

CASE STUDY - SANTA CLARA LANDFILL,
VENTURA COUNTY, CALIFORNIA

MSW LANDFILL UNIT METHANE GENERATION RATE

I) SITE INFORMATION:

Parameter	Value
Site Name	Santa Clara
Site Location	Oxnard Ca.
Landfill Phase	Early Filling ('61 - 76)
Date	9/8/97
Notes	(1)

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	900	lb/cubic yard	(1),(2)
Exposure Time of MSW Layer in Topmost Position	8	years	(1),(2)
Height (thickness) of MSW Cell/Lift	15	feet	(1),(2)
Infiltration Fraction	45%	percent	(1)
Precipitation	14.5	inches/year	(1)

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total LFG Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (3)
A) Pre-1995 (Prior to Implementation of AB 939):														(4)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	6.37E-02	81.67	8.17E-04	0.16	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	3.99E-01	69.24	4.82E-03	0.93	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	7.65E-02	83.67	1.12E-03	0.22	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	5.39E-01	NA	6.75E-03	1.30	
B) 1995 - 1999 (25 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	13	0.13	70	0.04	0.09	9.71E-02	82.83	1.08E-03	0.21	
2	Paper	Half C6H10O5	162	6	31	0.31	6	0.15	0.02	3.63E-01	72.35	3.90E-03	0.75	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	7.97E-02	84.59	1.00E-03	0.19	
4	Remainder	Inorganic	NA	0	40	0.40	6	0.38	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.59	0.23	5.39E-01	NA	5.98E-03	1.15	
C) 2000, and Beyond (50 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	20	0.20	70	0.06	0.14	1.74E-01	83.96	1.68E-03	0.32	
2	Paper	Half C6H10O5	162	6	20	0.20	6	0.09	0.01	2.73E-01	75.17	2.62E-03	0.51	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	9.28E-02	85.51	1.01E-03	0.20	
4	Remainder	Inorganic	NA	0	44	0.44	6	0.41	0.03	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.60	0.27	5.39E-01	NA	5.31E-03	1.02	
Notes					(1)(5)		(1)(5)			(6)		(7)	(8)	

1) Parameters which must be entered by user.
2) MSW = Municipal Solid Waste.
3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".
4) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
5) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
6) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
7) LFG = Landfill Gas.
8) CH4 generation rate in volume at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TRC Environmental Solutions Inc.

MSW LANDFILL UNIT METHANE GENERATION RATE

I) SITE INFORMATION:

Parameter	Value
Site Name	Santa Clara
Site Location	Oxnard Ca.
Landfill Phase	Late Filling ('77 - '82)
Date	9/8/97
Notes	(1)

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,100	lb/cubic yard	(1),(2)
Exposure Time of MSW Layer in Topmost Position	1.75	years	(1),(2)
Height (thickness) of MSW Cell/Lift	15	feet	(1),(2)
Infiltration Fraction	30%	percent	(1)
Precipitation	14.5	inches/year	(1)

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww* =(m'+mp)/(md+m'+mp)]	Total LFG Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (3)
A) Pre-1995 (Prior to Implementation of AB 939):														(4)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	7.60E-03	72.12	7.21E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	4.76E-02	27.59	1.92E-03	0.37	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	9.12E-03	76.49	1.02E-03	0.20	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	6.44E-02	NA	3.66E-03	0.71	
B) 1995 - 1999 (25 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	13	0.13	70	0.04	0.09	1.16E-02	72.45	9.42E-04	0.18	
2	Paper	Half C6H10O5	162	6	31	0.31	6	0.15	0.02	4.33E-02	29.81	1.61E-03	0.31	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	9.50E-03	76.73	9.09E-04	0.18	
4	Remainder	Inorganic	NA	0	40	0.40	6	0.38	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.59	0.23	6.44E-02	NA	3.46E-03	0.67	
C) 2000, and Beyond (50 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	20	0.20	70	0.06	0.14	2.08E-02	72.82	1.46E-03	0.28	
2	Paper	Half C6H10O5	162	6	20	0.20	6	0.09	0.01	3.25E-02	32.14	1.12E-03	0.22	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	1.11E-02	76.99	9.12E-04	0.18	
4	Remainder	Inorganic	NA	0	44	0.44	6	0.41	0.03	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.60	0.27	6.44E-02	NA	3.49E-03	0.67	
Notes					(1)(5)		(1)(5)			(6)		(7)	(8)	

Notes:

1) Parameters which must be entered by user.
2) MSW = Municipal Solid Waste.
3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc Landfill Gas Generation Model GAS IA".
4) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
5) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
6) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
7) LFG = Landfill Gas.
8) CH4 generation rate in volume at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

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CH4 Gen/Santa Clara/Late;Late

TRC Environmental Solutions Inc.

LANDFILL GAS GENERATION FORECAST

I) GENERAL INFORMATION:

PARAMETER	VALUE
Analysis Title	CH4 & LFG Generation Santa Clara Sanitary Landfill
Date	8-Sep-97
Notes	(1)

II) CONSTANTS:

PARAMETER	VALUE	UNITS	NOTES
LFG Generation Date	15-May-98	date	(1),(2)
Fraction of CH4 in LFG	40%	Percentage	(3)

III) CALCULATIONS:

PARAMETER	UNITS	SANTA CLARA PHASE I	SANTA CLARA PHASE II	NOTES
Start of Landfilling	Date	1-Jan-61	1-Jul-77	(1)
End of Landfilling	Date	30-Jun-77	30-Jun-82	(1)
Landfilling Interval	years	16.50	5.00	
Time After Closure	years	20.89	15.88	
Landfilling Days/year	days	359	359	(3)
Waste Flowrate	tons per day	276	1,151	(1),(4)
Waste in Place	million tons	1.63	2.07	(1),(4)
Cumulative Waste In Place	million tons	1.63	3.70	
CH4 Per Unit MSW [G]	cu ft per lb	1.30	0.71	(1),(5)
CH4 & LFG Half-life	years	8.5	8.5	
LFG Generation Rate	scfm	132	204	(6)
CH4 Generation Rate	scfm	53	82	
Cumulative LFG Gen. Rate	scfm	132	336	
Cumulative CH4 Gen. Rate	scfm	53	134	

1) Parameters which must be entered by user.
2) LFG = Landfill Gas.
3) Based on VRSD records.
4) Calculation varies based on whether a total landfill volume or waste flowrate is known. Base calculation on number of days of landfill operation per year.
5) CH4 per unit MSW [G] is a "linked field" with the appropriate Unit Generation Rate spreadsheet.
6) Calculation of LFG Generation Rate is described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

LANDFILL GAS GENERATION FORECAST

IV) TIME SERIES ANALYSIS:

ESTIMATED CH4 GENERATION RATE (SCFM)				LFG COLLECTION RATE	CH4 COLLECTION RATE	Amount of CH4 Generated	Amount of CH4 Collected
DATE	SANTA CLARA PHASE I	SANTA CLARA PHASE II	TOTAL	(scfm)	(scfm)	(MMSCF)	(MMSCF)
1/1/88	154	238	392	#N/A	#N/A	52	
2/15/88	#N/A	#N/A	#N/A	615	246		12
3/15/88	#N/A	#N/A	#N/A	455	182		13
4/1/88	151	233	384	#N/A	#N/A	51	
4/15/88	#N/A	#N/A	#N/A	955	382		17
5/15/88	#N/A	#N/A	#N/A	874	350		17
6/15/88	#N/A	#N/A	#N/A	1006	402		18
7/1/88	148	228	376	#N/A	#N/A	50	
7/15/88	#N/A	#N/A	#N/A	931	372		19
8/15/88	#N/A	#N/A	#N/A	679	272		12
9/15/88	#N/A	#N/A	#N/A	693	277		12
10/1/88	145	223	368	#N/A	#N/A	49	
10/15/88	#N/A	#N/A	#N/A	713	285		14
11/15/88	#N/A	#N/A	#N/A	581	232		10
12/15/88	#N/A	#N/A	#N/A	592	237		11
1/1/89	142	219	361	#N/A	#N/A	47	
1/15/89	#N/A	#N/A	#N/A	682	273		13
2/15/89	#N/A	#N/A	#N/A	818	327		14
3/15/89	#N/A	#N/A	#N/A	710	284		13
4/1/89	139	215	354	#N/A	#N/A	47	
4/15/89	#N/A	#N/A	#N/A	714	286		15
5/15/89	#N/A	#N/A	#N/A	447	179		10
6/15/89	#N/A	#N/A	#N/A	697	279		12
7/1/89	136	210	347	#N/A	#N/A	46	
7/15/89	#N/A	#N/A	#N/A	715	286		13
8/15/89	#N/A	#N/A	#N/A	714	286		13
9/15/89	#N/A	#N/A	#N/A	711	284		13
10/1/89	134	206	339	#N/A	#N/A	45	
10/15/89	#N/A	#N/A	#N/A	586	234		11
11/15/89	#N/A	#N/A	#N/A	683	273		12
12/15/89	#N/A	#N/A	#N/A	649	260		12
1/1/90	131	202	333	#N/A	#N/A	44	
1/15/90	#N/A	#N/A	#N/A	641	256		12
2/15/90	#N/A	#N/A	#N/A	607	243		10
3/15/90	#N/A	#N/A	#N/A	589	236		11
4/1/90	128	198	326	#N/A	#N/A	43	
4/15/90	#N/A	#N/A	#N/A	612	245		14
5/15/90	#N/A	#N/A	#N/A	203	81		8
6/15/90	#N/A	#N/A	#N/A	659	264		12
7/1/90	126	194	319	#N/A	#N/A	43	
7/15/90	#N/A	#N/A	#N/A	625	250		11
8/15/90	#N/A	#N/A	#N/A	634	254		12
9/15/90	#N/A	#N/A	#N/A	592	237		10
10/1/90	123	190	313	#N/A	#N/A	42	
10/15/90	#N/A	#N/A	#N/A	616	246		11
11/15/90	#N/A	#N/A	#N/A	578	231		10
12/15/90	#N/A	#N/A	#N/A	599	240		11
1/1/91	121	186	307	#N/A	#N/A	40	
1/15/91	#N/A	#N/A	#N/A	583	233		10
2/15/91	#N/A	#N/A	#N/A	593	237		10
3/15/91	#N/A	#N/A	#N/A	563	225		13
4/1/91	118	182	300	#N/A	#N/A	40	
4/15/91	#N/A	#N/A	#N/A	251	100		6
5/15/91	#N/A	#N/A	#N/A	425	170		9
6/15/91	#N/A	#N/A	#N/A	552	221		10
7/1/91	116	179	294	#N/A	#N/A	39	
7/15/91	#N/A	#N/A	#N/A	571	228		11
8/15/91	#N/A	#N/A	#N/A	518	207		9
9/15/91	#N/A	#N/A	#N/A	534	214		9
10/1/91	113	175	288	#N/A	#N/A	39	
10/15/91	#N/A	#N/A	#N/A	523	209		9

LANDFILL GAS GENERATION FORECAST

IV) TIME SERIES ANALYSIS:

ESTIMATED CH4 GENERATION RATE (SCFM)				LFG COLLECTION RATE	CH4 COLLECTION RATE	Amount of CH4 Generated	Amount of CH4 Collected
DATE	SANTA CLARA PHASE I	SANTA CLARA PHASE II	TOTAL	(scfm)	(scfm)	(MMSCF)	(MMSCF)
11/15/91	#N/A	#N/A	#N/A	510	204		9
12/15/91	#N/A	#N/A	#N/A	552	221		10
1/1/92	111	171	283	#N/A	#N/A	37	
1/15/92	#N/A	#N/A	#N/A	517	207		10
2/15/92	#N/A	#N/A	#N/A	602	241		11
3/15/92	#N/A	#N/A	#N/A	464	186		8
4/1/92	109	168	277	#N/A	#N/A	37	
4/15/92	#N/A	#N/A	#N/A	453	181		8
5/15/92	#N/A	#N/A	#N/A	438	175		9
6/15/92	#N/A	#N/A	#N/A	529	212		9
7/1/92	107	165	271	#N/A	#N/A	36	
7/15/92	#N/A	#N/A	#N/A	545	218		10
8/15/92	#N/A	#N/A	#N/A	565	226		11
9/15/92	#N/A	#N/A	#N/A	459	184		8
10/1/92	105	161	266	#N/A	#N/A	36	
10/15/92	#N/A	#N/A	#N/A	450	180		9
11/15/92	#N/A	#N/A	#N/A	524	210		9
12/15/92	#N/A	#N/A	#N/A	542	217		10
1/1/93	102	158	260	#N/A	#N/A	34	
1/15/93	#N/A	#N/A	#N/A	484	194		9
2/15/93	#N/A	#N/A	#N/A	528	211		9
3/15/93	#N/A	#N/A	#N/A	540	216		10
4/1/93	100	155	255	#N/A	#N/A	34	
4/15/93	#N/A	#N/A	#N/A	546	218		9
5/15/93	#N/A	#N/A	#N/A	543	217		10
6/15/93	#N/A	#N/A	#N/A	495	198		9
7/1/93	98	152	250	#N/A	#N/A		
7/15/93	#N/A	#N/A	#N/A	471	188		
10/1/93	96	149	245	#N/A	#N/A		
1/1/94	94	146	240	#N/A	#N/A		
4/1/94	93	143	235	#N/A	#N/A		
7/1/94	91	140	230	#N/A	#N/A		
10/1/94	89	137	226	#N/A	#N/A		
1/1/95	87	134	221	#N/A	#N/A		
4/1/95	85	131	217	#N/A	#N/A		
7/1/95	84	129	212	#N/A	#N/A		
10/1/95	82	126	208	#N/A	#N/A		
1/1/96	80	124	204	#N/A	#N/A		
4/1/96	79	121	200	#N/A	#N/A		
7/1/96	77	119	196	#N/A	#N/A		
10/1/96	75	116	192	#N/A	#N/A		
1/1/97	74	114	188	#N/A	#N/A		
4/1/97	72	112	184	#N/A	#N/A		
7/1/97	71	109	180	#N/A	#N/A		
10/1/97	70	107	177	#N/A	#N/A		
1/1/98	68	105	173	#N/A	#N/A		
					Total	931	722

SUBATTACHMENT 1.C

CASE STUDY - EL SOBRANTE LANDFILL,
RIVERSIDE COUNTY, CALIFORNIA

TABLE 1.C.1
METHANE UNIT GENERATION RATE
PHASE I
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	I
Opening Date	23-Jul-86
Closing Date	10-Nov-87

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	7.8	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total Methane Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (2)
Pre-1995 (Prior to Implementation of AB 939):														(3)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	4.02E-04	70.12	3.51E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	2.52E-03	12.36	4.30E-04	0.17	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	4.82E-04	75.08	5.01E-04	0.19	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	3.40E-03	NA	1.28E-03	0.49	
Notes					(4)		(4)			(5)			(6)	

Notes:

1) MSW = Municipal Solid Waste.

3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.

4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).

5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.

6) Methane volume generation rates at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.2
METHANE UNIT GENERATION RATE
PHASE II
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	II
Opening Date	10-Nov-87
Closing Date	2-Sep-90
Notes	(1)

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	9.0	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole)	Carbon Atoms Per Molecule	Composition of Waste Stream (%)	Mass of Waste Component Per Unit Wet MSW (lb)	Wet Basis Moisture Content (%)	Dry Mass Per Unit MSW (lb)	Water Mass Per Unit MSW (lb)	Precipitation Mass Deposited on Unit Area (lb)	Wet Basis Moisture Content After Infiltration (%)	Total Methane Generated Per Unit MSW (moles)	CH4 Generated Per Unit MSW (cu ft/lb)	Notes
			[M]	[a]	[C]	[m = C/100]	[Ww]	[md = m * ((1-Ww)/100)]	[m' = m - md]	[mp]	[Ww*=(m'+mp)/(md+m'+mp)]	[n = a * md * Ww* / 100 / M]	[G]	(2)
Pre-1995 (Prior to Implementation of AB 939):														(3)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	4.63E-04	70.14	3.51E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	2.90E-03	12.52	4.36E-04	0.17	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	5.56E-04	75.10	5.01E-04	0.19	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	3.92E-03	NA	1.29E-03	0.50	
Notes					(4)		(4)			(5)			(6)	

Notes:

1) MSW = Municipal Solid Waste.

3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS 1A".

3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.

4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).

5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.

6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.3
METHANE UNIT GENERATION RATE
PHASE III/1/PARTIAL
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	III/1/Partial
Opening Date	2-Sep-90
Closing Date	31-Aug-92

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	15.4	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole)	Carbon Atoms Per Molecule	Composition of Waste Stream (%)	Mass of Waste Component Per Unit Wet MSW (lb)	Wet Basis Moisture Content (%)	Dry Mass Per Unit MSW (lb)	Water Mass Per Unit MSW (lb)	Precipitation Mass Deposited on Unit Area (lb)	Wet Basis Moisture Content After Infiltration (%)	Total Methane Generated Per Unit MSW (moles)	CH4 Generated Per Unit MSW (cu ft/lb)	Notes
			[M]	[a]	[C]	[m = C/100]	[Ww]	[md = m * ((1-Ww)/100)]	[m' = m - md]	[mp]	[Ww* = (m'+mp)/(md+m'+mp)]	[n = a * md * Ww* / 100 / M]	[G]	(2)
Pre-1995 (Prior to Implementation of AB 939):														(3)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	7.93E-04	70.24	3.51E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	4.97E-03	13.35	4.65E-04	0.18	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	9.52E-04	75.16	5.01E-04	0.19	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	6.71E-03	NA	1.32E-03	0.51	
Notes					(4)		(4)			(5)			(6)	

Notes:
1) MSW = Municipal Solid Waste.
2) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".
3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.4
METHANE UNIT GENERATION RATE
PHASE III/1/COMPLETION
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	III/1/Completion
Opening Date	31-Aug-92
Closing Date	15-Feb-93

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	66.3	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole)	Carbon Atoms Per Molecule	Composition of Waste Stream (%)	Mass of Waste Component Per Unit Wet MSW (lb)	Wet Basis Moisture Content (%)	Dry Mass Per Unit MSW (lb)	Water Mass Per Unit MSW (lb)	Precipitation Mass Deposited on Unit Area (lb)	Wet Basis Moisture Content After Infiltration (%)	Total Methane Generated Per Unit MSW (moles)	CH4 Generated Per Unit MSW (cu ft/lb)	Notes
			[M]	[a]	[C]	[m = C/100]	[Ww]	[md = m * ((1-Ww)/100)]	[m' = m - md]	[mp]	[Ww*=(m'+mp)/(md+m'+mp)]	[n = a * md * Ww* / 100 / M]	[G]	(2)
Pre-1995 (Prior to Implementation of AB 939):														(3)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	3.41E-03	70.99	3.55E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	2.14E-02	19.45	6.77E-04	0.26	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	4.10E-03	75.69	5.05E-04	0.19	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	2.89E-02	NA	1.54E-03	0.59	
Notes					(4)		(4)			(5)			(6)	

Notes:
1) MSW = Municipal Solid Waste.
2) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".
3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
6) LFG = Landfill Gas.
7) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.5
METHANE UNIT GENERATION RATE
PHASE III/2A
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	III/2A
Opening Date	15-Feb-93
Closing Date	1-Dec-93

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	2.5	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total Methane Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (2)
Pre-1995 (Prior to Implementation of AB 939):														(3)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	1.29E-04	70.04	3.50E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	8.07E-04	11.66	4.06E-04	0.16	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	1.54E-04	75.03	5.00E-04	0.19	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	1.09E-03	NA	1.26E-03	0.48	
Notes					(4)		(4)			(5)			(6)	

Notes:

1) MSW = Municipal Solid Waste.
2) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".
3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.6
METHANE UNIT GENERATION RATE
PHASE III-3A
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	III/3A
Opening Date	1-Dec-93
Closing Date	7-Oct-94

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	12.2	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww* = (m'+mp)/(md+m'+mp)]	Total Methane Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (2)
Pre-1995 (Prior to Implementation of AB 939):														(3)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	6.28E-04	70.19	3.51E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	3.94E-03	12.94	4.50E-04	0.17	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	7.54E-04	75.13	5.01E-04	0.19	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	5.32E-03	NA	1.30E-03	0.50	
Notes					(4)		(4)			(5)			(6)	

Notes:
1) MSW = Municipal Solid Waste.
2) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".
3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

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TABLE 1.C.7
METHANE UNIT GENERATION RATE
PHASE III-2B
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	III/2B
Opening Date	7-Oct-94
Closing Date	1-Jan-95

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	1.6	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole)	Carbon Atoms Per Molecule	Composition of Waste Stream (%)	Mass of Waste Component Per Unit Wet MSW (lb)	Wet Basis Moisture Content (%)	Dry Mass Per Unit MSW (lb)	Water Mass Per Unit MSW (lb)	Precipitation Mass Deposited on Unit Area (lb)	Wet Basis Moisture Content After Infiltration (%)	Total Methane Generated Per Unit MSW (moles)	CH4 Generated Per Unit MSW (cu ft/lb)	Notes
			[M]	[a]	[C]	[m = C/100]	[Ww]	[md = m * ((1-Ww)/100)]	[m' = m - md]	[mp]	[Ww*=(m'+mp)/(md+m'+mp)]	[n = a * md * Ww* / 100 / M]	[G]	(2)
Pre-1995 (Prior to Implementation of AB 939):														(3)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	8.24E-05	70.02	3.50E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	5.16E-04	11.54	4.02E-04	0.16	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	9.89E-05	75.02	5.00E-04	0.19	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	6.98E-04	NA	1.25E-03	0.48	
Notes					(4)		(4)			(5)			(6)	

Notes:

1) MSW = Municipal Solid Waste.

3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.

4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).

5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.

6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.8
METHANE UNIT GENERATION RATE
PHASE III-2A,2B,3A
PARTIAL
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	III/2A,2B,3A Partial
Opening Date	1-Jan-95
Closing Date	30-Nov-97

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	18.0	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total Methane Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (2)
1995 - 1999 (25 Percent Waste Reduction - AB 939):														(3)
1	Food	C6H12O6	180	6	13	0.13	70	0.04	0.09	1.41E-03	70.32	4.57E-04	0.18	
2	Paper	Half C6H10O5	162	6	31	0.31	6	0.15	0.02	5.28E-03	14.08	3.80E-04	0.15	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	1.16E-03	75.22	4.46E-04	0.17	
4	Remainder	Inorganic	NA	0	40	0.40	6	0.38	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.59	0.23	7.85E-03	NA	1.28E-03	0.50	
Notes					(4)		(4)			(5)			(6)	

Notes:

1) MSW = Municipal Solid Waste.

3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.

4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).

5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.

6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.9
METHANE UNIT GENERATION RATE
PHASE III-3B/IV-1
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	III/3B/IV-1
Opening Date	30-Nov-97
Closing Date	31-Dec-99

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	17.0	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total Methane Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (2)
1995 - 1999 (25 Percent Waste Reduction - AB 939):														(3)
1	Food	C6H12O6	180	6	13	0.13	70	0.04	0.09	1.33E-03	70.30	4.57E-04	0.18	
2	Paper	Half C6H10O5	162	6	31	0.31	6	0.15	0.02	4.98E-03	13.93	3.76E-04	0.15	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	1.09E-03	75.21	4.46E-04	0.17	
4	Remainder	Inorganic	NA	0	40	0.40	6	0.38	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.59	0.23	7.41E-03	NA	1.28E-03	0.49	
Notes					(4)		(4)			(5)		(6)	(7)	

Notes:

1) MSW = Municipal Solid Waste.

3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.

4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).

5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.

6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.10
METHANE UNIT GENERATION RATE
PHASE III-2A,2B,3A
COMPLETION
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	III/2A,2B,3A Completion
Opening Date	31-Dec-99
Closing Date	15-Aug-01

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	17	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total Methane Generated Per Unit MSW (moles) [a = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (2)
2000, and Beyond (50 Percent Waste Reduction - AB 939):														(3)
1	Food	C6H12O6	180	6	20	0.20	70	0.06	0.14	2.39E-03	70.35	7.04E-04	0.27	
2	Paper	Half C6H10O5	162	6	20	0.20	6	0.09	0.01	3.75E-03	14.35	2.50E-04	0.10	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	1.28E-03	75.25	4.46E-04	0.17	
4	Remainder	Inorganic	NA	0	44	0.44	6	0.41	0.03	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.60	0.27	7.41E-03	NA	1.40E-03	0.54	
Notes	MATED METHANE GENERATION RATE (SCFM)				(4)		(4)			(5)			(6)	

Notes:

1) MSW = Municipal Solid Waste.

3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.

4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).

5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.

6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.11
METHANE UNIT GENERATION RATE
PHASE IV-2
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	IV-2
Opening Date	15-Aug-01
Closing Date	15-Mar-06

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	17	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total Methane Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (2)
2000, and Beyond (50 Percent Waste Reduction - AB 939):														(3)
1	Food	C6H12O6	180	6	20	0.20	70	0.06	0.14	2.39E-03	70.35	7.04E-04	0.27	
2	Paper	Half C6H10O5	162	6	20	0.20	6	0.09	0.01	3.75E-03	14.35	2.50E-04	0.10	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	1.28E-03	75.25	4.46E-04	0.17	
4	Remainder	Inorganic	NA	0	44	0.44	6	0.41	0.03	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.60	0.27	7.41E-03	NA	1.40E-03	0.54	
Notes					(4)		(4)			(5)			(6)	

Notes:

1) MSW = Municipal Solid Waste.

3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.

4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).

5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.

6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.12
METHANE UNIT GENERATION RATE
PHASE V
EL SOBRANTE LANDFILL

I) SITE INFORMATION:

Parameter	Value
Site Name	El Sobrante Landfill
Site Location	Corona, California
Landfill Phase	V
Opening Date	15-Mar-06
Closing Date	24-Apr-06

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1)
Exposure Time of MSW Layer in Topmost Position	0.25	years	(1)
Height (thickness) of MSW Cell/Lift	20	feet	(1)
Infiltration Fraction	30%	percent	
Precipitation	17	inches/year	

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total Methane Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (2)
2000, and Beyond (50 Percent Waste Reduction - AB 939):														(3)
1	Food	C6H12O6	180	6	20	0.20	70	0.06	0.14	2.39E-03	70.35	7.04E-04	0.27	
2	Paper	Half C6H10O5	162	6	20	0.20	6	0.09	0.01	3.75E-03	14.35	2.50E-04	0.10	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	1.28E-03	75.25	4.46E-04	0.17	
4	Remainder	Inorganic	NA	0	44	0.44	6	0.41	0.03	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.60	0.27	7.41E-03	NA	1.40E-03	0.54	
Notes					(4)		(4)			(5)			(6)	

Notes:

1) MSW = Municipal Solid Waste.

3) Variables and equations shown in brackets are described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

3) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.

4) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).

5) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.

6) Methane volume generation rate at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.C.13
METHANE GENERATION FORECAST
FOR 9.41 MILLION TONS
EL SOBRANTE LANDFILL

I) GENERAL INFORMATION:

PARAMETER	VALUE
Analysis Title	Forecast of Methane Generation El Sobrante Landfill
Date	12/30/1997

II) CONSTANTS:

PARAMETER	VALUE	UNITS
Generation Date	24-Apr-06	date
Methane Half-life	12	years

III) CALCULATIONS:

PARAMETER	UNITS	PHASE I	PHASE II	PHASE III/ I/Partial	PHASE III/ I/Completion	PHASE III/ 2A	PHASE III/ 3A	PHASE III/ 2B	PARTIAL PHASE III/ 2A,2B,3A	PHASE III/ 3B/IV-1	COMPLETION PHASE III/ 2A,2B,3A	PHASE III/ IV-2	PHASE V	NOTES
Start of Landfilling	Date	23-Jul-86	10-Nov-87	2-Sep-90	31-Aug-92	15-Feb-93	1-Dec-93	7-Oct-94	1-Jan-95	30-Nov-97	31-Dec-99	15-Aug-01	15-Mar-06	
End of Landfilling	Date	10-Nov-87	2-Sep-90	31-Aug-92	15-Feb-93	1-Dec-93	7-Oct-94	1-Jan-95	30-Nov-97	31-Dec-99	15-Aug-01	15-Mar-06	24-Apr-06	
Landfilling Interval	years	1.30	2.81	2.00	0.46	0.79	0.85	0.24	2.92	2.08	1.62	4.58	0.11	
Time After Closure	years	18.47	15.65	13.66	13.20	12.40	11.56	11.32	8.40	6.32	4.70	0.11	0.00	
Landfilling Days/year	days	304	304	304	304	304	304	304	304	304	304	304	304	
Waste Flowrate	tons per day	733	1,076	955	1,072	1,579	1,588	1,675	1,636	2,000	2,000	2,000	2,000	(1)
Waste in Place	million tons	0.29	0.92	0.58	0.15	0.38	0.41	0.12	1.45	1.27	0.99	2.79	0.07	(1)
Cumulative Waste In Place	million tons	0.29	1.21	1.79	1.94	2.32	2.73	2.85	4.30	5.57	6.56	9.34	9.41	
Methane Per Unit MSW	scf per lb	0.49	0.50	0.51	0.59	0.48	0.50	0.48	0.50	0.49	0.54	0.54	0.54	(2)
Methane Generation Rate	scfm	10	38	28	9	19	23	7	89	90	85	289	8	(3)
Cumulative CH4 Gen. Rate	scfm	10	48	76	85	104	127	133	223	313	398	687	695	

Notes:

1) Calculation depends on total landfill mass or waste mass disposal flowrate.
2) Methane per unit MSW is a "linked field" with the appropriate CH4 Generation Rate spreadsheet.
3) Calculation of methane generation rate is described in "TRC Environmental Solutions, Inc. Landfill Gas Generation Model GAS IA".

Landfill Gas Collection Data
El Sobrante Landfill
Riverside County, California

DATE	LFG Collection Flow Rate (SCFM)	Corrected LFG Flow Rate for Intermittent Operation (scfm)	Methane Concentration (%)	Methane Collection Flow Rate (SCFM)	Corrected Methane Flow Rate for Intermittent Operation (scfm)	Vacuum Flare Station Inlet (in. w.c.)	Flare Operation Hours	GAS IA Predicted Methane Generation Rate (scfm)	Blower Outlet Pressure (in w.c.)	Barometric Pressure (in. Hg)	Amount of Methane Collected (MMSCF)	Amount of Methane Generated (MMSCF)
6/23/93	1070	312	30.0	321	94		7	196			0.10	2.26
6/24/93	1070	134	30.0	321	40		5	#N/A			0.09	
6/25/93	1070	268	30.0	321	80		6	#N/A			0.27	
6/29/93	1070	45	30.0	321	13		1	#N/A			0.02	
6/30/93	1058	44	33.4	353	15		1	#N/A			0.11	
7/1/93	1041	347	40.2	419	140		8	197			0.26	26.28
7/2/93	1053	636	35.7	376	227		14.5	#N/A			0.24	
7/3/93	1053	351	29.2	308	103		8	#N/A			0.36	
7/6/93	1053	219	30.0	316	66		5	#N/A			0.34	
7/9/93	1053	307	30.0	316	92		7	#N/A			0.14	
7/10/93	1053	351	30.0	316	105		8	#N/A			0.30	
7/12/93	1053	351	30.0	316	105		8	#N/A			0.13	
7/13/93	1053	263	30.0	316	79		6	#N/A			0.12	
7/14/93	1053	307	30.0	316	92		7	#N/A			0.12	
7/15/93	825	275	25.8	213	71		8	#N/A			2.09	
8/13/93	465	97	30.1	140	29		5	#N/A			0.38	
8/19/93	459	153	38.6	177	59		8	#N/A			0.08	
8/20/93	459	153	38.3	176	59		8	#N/A			0.29	
8/23/93	533	211	36.8	196	78		9.5	#N/A			0.08	
8/24/93	525	109	35.0	184	38		5	#N/A			0.07	
8/25/93	459	134	39.0	179	52		7	#N/A			0.10	
8/26/93	612	230	38.1	233	87		9	#N/A			0.55	
8/30/93	614	256	40.9	251	105		10	#N/A			0.12	
8/31/93	614	179	36.5	224	65		7	#N/A			0.08	
9/1/93	527	132	35.7	188	47		6	#N/A			0.08	
9/2/93	541	203	34.6	187	70		9	#N/A			0.09	
9/3/93	550	183	33.1	182	61		8	#N/A			0.39	
9/7/93	514	193	38.3	197	74		9	#N/A			0.10	
9/8/93	514	171	39.5	203	68		8	#N/A			0.09	
9/9/93	532	177	35.5	189	63		8	#N/A			0.09	
9/10/93	525	175	33.3	175	58		8	#N/A			0.28	
9/13/93	530	199	35.3	187	70		9	#N/A			0.09	
9/14/93	554	139	35.9	199	50		6	#N/A			0.08	
9/15/93	549	183	36.8	202	67		8	#N/A			0.10	
9/16/93	594	198	34.7	206	69		8	#N/A			0.10	
9/17/93	550	183	37.8	208	69		8	#N/A			0.29	
9/20/93	550	183	35.6	196	65		8	#N/A			0.09	
9/21/93	550	183	35.6	196	65		8	#N/A			0.09	
9/22/93	536	179	35.3	189	63		8	#N/A			0.07	
9/23/93	536	89	35.6	191	32		4	#N/A			0.25	
9/27/93	527	154	36.2	191	56		7	#N/A			0.09	
9/28/93	534	178	40.4	216	72		8	#N/A			0.19	
9/30/93	533	155	40.2	214	62		7	#N/A			0.41	
10/4/93	540	180	43.9	237	79		8	#N/A			0.10	
10/5/93	542	136	39.3	213	53		6	#N/A			0.08	
10/6/93	528	154	39.2	207	60		7	#N/A			0.08	
10/7/93	536	112	39.7	213	44		5	#N/A			0.08	
10/8/93	561	164	39.8	223	65		7	#N/A			0.26	
10/11/93	559	140	40.1	224	56		6	#N/A			0.18	
10/13/93	554	185	39.0	216	72		8	#N/A			0.10	
10/14/93	550	160	38.2	210	61		7	#N/A			0.06	
10/15/93	573	72	37.0	212	27		3	#N/A			0.19	
10/18/93	554	162	38.3	212	62		7	#N/A			0.08	
10/19/93	552	138	37.1	205	51		6	#N/A			0.08	
10/20/93	548	160	37.0	203	59		7	#N/A			0.18	
10/22/93	561	164	39.0	219	64		7	#N/A			0.28	
10/25/93	554	162	41.3	229	67		7	#N/A			0.27	
10/29/93	554	69	40.3	223	28		3	#N/A			0.19	
11/1/93	549	160	38.4	211	62		7	#N/A			0.08	
11/2/93	548	137	39.1	214	54		6	#N/A			0.07	
11/3/93	575	120	34.4	198	41		5	#N/A			0.07	
11/4/93	583	146	36.0	210	53		6	#N/A			0.04	
11/5/93	571	24	36.8	210	9		1	#N/A			0.14	
11/8/93	584	170	33.7	197	57		7	#N/A			0.06	
11/9/93	580	97	31.7	184	31		4	#N/A			0.06	

Landfill Gas Collection Data
El Sobrante Landfill
Riverside County, California

DATE	LFG Collection Flow Rate (SCFM)	Corrected LFG Flow Rate for Intermittent Operation (scfm)	Methane Concentration (%)	Methane Collection Flow Rate (SCFM)	Corrected Methane Flow Rate for Intermittent Operation (scfm)	Vacuum Flare Station Inlet (in. w.c.)	Flare Operation Hours	GAS IA Predicted Methane Generation Rate (scfm)	Blower Outlet Pressure (in w.c.)	Barometric Pressure (in. Hg)	Amount of Methane Collected (MMSCF)	Amount of Methane Generated (MMSCF)
11/10/93	583	170	33.1	193	56		7	#N/A			0.06	
11/11/93	588	98	32.8	193	32		4	#N/A			0.06	
11/12/93	585	171	32.8	192	56		7	#N/A			0.24	
11/15/93	587	171	33.2	195	57		7	#N/A			0.07	
11/16/93	619	155	30.5	189	47		6	#N/A			0.07	
11/17/93	613	153	31.8	195	49		6	#N/A			0.08	
11/18/93	622	207	29.9	186	62		8	#N/A			0.08	
11/19/93	617	180	30.1	186	54		7	#N/A			0.24	
11/22/93	625	182	32.2	201	59		7	#N/A			0.08	
11/23/93	614	179	33.1	203	59		7	#N/A			0.08	
11/24/93	614	179	31.9	196	57		7	#N/A			0.07	
11/25/93	550	138	24.5	135	34		6	#N/A			0.30	
11/29/93	606	202	34.5	209	70		8	#N/A			0.09	
11/30/93	596	174	33.2	198	58		7	#N/A			0.08	
12/1/93	627	157	31.7	199	50		6	#N/A			0.08	
12/2/93	602	176	31.7	191	56		7	#N/A			0.08	
12/3/93	602	176	30.7	185	54		7	#N/A			0.23	
12/6/93	625	156	33.8	211	53		6	#N/A			0.08	
12/7/93	615	179	31.7	195	57		7	#N/A			0.08	
12/8/93	610	153	32.6	199	50		6	#N/A			0.07	
12/9/93	610	153	31.8	194	49		6	#N/A			0.07	
12/10/93	559	140	30.1	168	42		6	#N/A			0.21	
12/13/93	629	157	34.8	219	55		6	#N/A			0.07	
12/14/93	619	129	36.2	224	47		5	#N/A			0.15	
12/16/93	608	177	34.2	208	61		7	#N/A			0.07	
12/17/93	608	127	32.2	196	41		5	#N/A			0.20	
12/20/93	609	152	34.8	212	53		6	#N/A			0.05	
12/21/93	594	50	34.2	203	17		2	#N/A			0.04	
12/22/93	617	129	32.1	198	41		5	#N/A			0.32	
12/27/93	562	141	33.6	189	47		6	#N/A			0.08	
12/28/93	561	187	31.7	178	59		8	#N/A			0.09	
12/29/93	561	187	32.4	182	61		8	#N/A			0.09	
12/30/93	561	187	32.4	182	61		8	#N/A			0.09	
12/31/93	561	187	31.7	178	59		8	#N/A			0.26	
1/3/94	561	187	32.7	183	61		8	#N/A			0.09	
1/4/94	561	187	31.6	177	59		8	#N/A			0.09	
1/5/94	561	187	33.2	186	62		8	#N/A			0.09	
1/6/94	561	187	32.7	183	61		8	#N/A			0.09	
1/7/94	561	187	31.3	175	58		8	#N/A			0.25	
1/10/94	561	187	31.5	177	59		8	#N/A			0.09	
1/11/94	555	185	32.4	180	60		8	#N/A			0.08	
1/12/94	555	185	30.6	170	57		8	#N/A			0.08	
1/13/94	555	185	32.3	179	60		8	#N/A			0.08	
1/14/94	555	185	30.6	170	57		8	#N/A			0.24	
1/17/94	555	185	30.4	169	56		8	#N/A			0.08	
1/18/94	555	185	31.8	176	59		8	#N/A			0.09	
1/19/94	564	188	32.1	181	60		8	#N/A			0.09	
1/20/94	530	177	34.3	182	61		8	#N/A			0.08	
1/21/94	482	161	32.0	154	51		8	#N/A			0.22	
1/24/94	500	167	30.3	151	50		8	#N/A			0.08	
1/25/94	564	188	30.1	170	57		8	#N/A			0.08	
1/26/94	534	178	33.6	179	60	-9.7	8	#N/A			0.21	
1/29/94	531	111	33.6	179	37		5	#N/A			0.14	
1/31/94	543	181	32.1	174	58		8	#N/A			0.08	
2/1/94	564	188	31.7	179	60	-2.6	8	#N/A			0.08	
2/2/94	564	188	30.4	171	57	-2.6	8	#N/A			0.17	
2/4/94	552	184	33.0	182	61		8	#N/A			0.33	
2/7/94	552	276	33.0	182	91		12	#N/A			0.11	
2/8/94	579	193	35.1	203	68	-2.7	8	#N/A			0.09	
2/9/94	579	193	32.7	189	63	-3	8	#N/A			0.09	
2/10/94	578	193	31.9	184	61	-3.1	8	#N/A			0.09	
2/11/94	579	193	31.0	179	60	-2.9	8	#N/A			0.34	
2/15/94	575	192	31.2	179	60	-2.8	8	#N/A			0.09	
2/16/94	578	193	31.2	180	60	-3.1	8	#N/A			0.10	
2/17/94	580	242	33.0	191	80	-3.1	10	#N/A			0.11	

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2/18/94	581	242	31.2	181	76	-2.7	10	#N/A			0.29	
2/21/94	561	187	32.2	181	60	-3	8	#N/A			0.26	
2/24/94	573	191	30.8	176	59	-2.7	8	#N/A			0.09	
2/25/94	576	192	33.2	191	64	-3	8	#N/A			0.09	
2/26/94	577	192	31.1	179	60	-3	8	#N/A			0.17	
2/28/94	574	191	31.0	178	59	-3	8	#N/A			0.09	
3/1/94	571	190	32.9	188	63	-3	8	#N/A			0.09	
3/2/94	567	189	33.8	192	64	-2.7	8	#N/A			0.19	
3/4/94	571	190	34.2	195	65	-2.7	8	#N/A			0.36	
3/8/94	560	187	31.2	175	58	-3	8	#N/A			0.09	
3/9/94	554	185	32.9	182	61	0	8	#N/A			0.09	
3/10/94	560	187	33.2	186	62	0	8	#N/A			0.09	
3/11/94	554	185	32.3	179	60	0	8	#N/A			0.27	
3/14/94	547	182	34.7	190	63	0	8	#N/A			0.09	
3/15/94	550	183	34.0	187	62	0	8	#N/A			0.18	
3/17/94	550	183	34.9	192	64	0	8	#N/A			0.09	
3/18/94	552	184	34.9	193	64	-5.2	8	#N/A			0.10	
3/19/94	564	188	38.4	217	72	-4.5	8	#N/A			0.20	
3/21/94	528	198	35.1	185	70	-4.6	9	#N/A			0.10	
3/22/94	521	174	37.6	196	65	-4.2	8	#N/A			0.08	
3/23/94	519	151	33.6	174	51	-4.2	7	#N/A			0.08	
3/24/94	505	168	35.3	178	59	-4.1	8	#N/A			0.09	
3/25/94	502	167	35.5	178	59	-4.1	8	#N/A			0.25	
3/28/94	498	166	33.7	168	56	-4.1	8	#N/A			0.08	
3/29/94	499	166	32.7	163	54	-3.3	8	#N/A			0.08	
3/30/94	554	185	32.3	179	60	-4.3	8	#N/A			0.09	
3/31/94	535	201	33.0	176	66	-4.4	9	#N/A			0.07	
4/1/94	510	85	33.0	168	28	-4.4	4	227			0.20	30.40
4/4/94	497	186	34.2	170	64	-4.6	9	#N/A			0.10	
4/5/94	512	213	32.7	167	70	-4.2	10	#N/A			0.09	
4/6/94	515	172	32.9	170	57	-4	8	#N/A			0.08	
4/7/94	516	172	33.1	171	57	-4.1	8	#N/A			0.08	
4/8/94	519	173	34.3	178	59	-4	8	#N/A			0.25	
4/11/94	524	175	33.2	174	58	-4	8	#N/A			0.09	
4/12/94	543	181	35.6	193	64	-4.1	8	#N/A			0.09	
4/13/94	532	155	34.9	186	54	-3.9	7	#N/A			0.08	
4/14/94	538	179	33.0	178	59	-3.9	8	#N/A			0.08	
4/15/94	540	180	32.7	176	59	-3.7	8	#N/A			0.27	
4/18/94	529	176	38.3	202	67	-3.6	8	#N/A			0.08	
4/19/94	509	106	35.5	181	38	-3.1	5	#N/A			0.07	
4/20/94	509	170	33.9	173	58	-3.4	8	#N/A			0.08	
4/21/94	528	176	34.0	180	60	-3.1	8	#N/A			0.09	
4/22/94	572	191	34.0	194	65	-3.4	8	#N/A			0.26	
4/25/94	510	170	33.0	168	56	-3.9	8	#N/A			0.08	
4/26/94	519	173	35.1	182	61	-3.9	8	#N/A			0.08	
4/27/94	516	151	34.7	179	52	-3.2	7	#N/A			0.08	
4/28/94	505	168	34.7	175	58	-3.3	8	#N/A			0.09	
4/29/94	553	184	34.6	191	64	-3.2	8	#N/A			0.27	
5/2/94	506	169	36.7	186	62	-3.9	8	#N/A			0.09	
5/3/94	507	169	35.7	181	60	-3.1	8	#N/A			0.08	
5/4/94	495	165	34.2	169	56	-3.1	8	#N/A			0.08	
5/5/94	483	141	34.2	165	48		7	#N/A			0.07	
5/6/94	503	168	33.2	167	56	-2.9	8	#N/A			0.26	
5/9/94	520	173	37.6	196	65	-2.9	8	#N/A			0.09	
5/10/94	534	178	35.6	190	63	-3	8	#N/A			0.09	
5/11/94	526	175	35.4	186	62	-3.3	8	#N/A			0.09	
5/12/94	508	169	34.6	176	59	-3.2	8	#N/A			0.08	
5/13/94	510	170	34.5	176	59	-2.8	8	#N/A			0.08	
5/14/94	510	170	34.5	176	59		8	#N/A			0.17	
5/16/94	513	171	35.7	183	61	-2.7	8	#N/A			0.08	
5/17/94	463	154	35.1	163	54	-2.8	8	#N/A			0.07	
5/18/94	463	135	36.2	167	49	-4.4	7	#N/A			0.07	
5/19/94	448	149	32.6	146	49	-2.2	8	#N/A			0.07	
5/20/94	449	150	35.8	161	54	-2.1	8	#N/A			0.08	
5/21/94	449	150	35.8	161	54	-2	8	#N/A			0.16	

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5/23/94	449	150	37.3	167	56	-2	8	#N/A			0.08	
5/24/94	447	149	37.4	167	56	-2	8	#N/A			0.08	
5/25/94	463	154	39.1	181	60	-1.7	8	#N/A			0.09	
5/26/94	464	155	42.3	196	65	-2.1	8	#N/A			0.09	
5/27/94	449	150	38.2	172	57	-1.6	8	#N/A			0.08	
5/28/94	431	144	33.0	142	47		8	#N/A			0.23	
5/31/94	448	149	39.1	175	58	-1.5	8	#N/A			0.09	
6/1/94	521	174	39.1	204	68	-1.4	8	#N/A			0.10	
6/2/94	556	185	38.2	213	71	-1.6	8	#N/A			0.10	
6/3/94	524	175	38.0	199	66	-2	8	#N/A			0.09	
6/4/94	516	172	35.9	185	62	-1.7	8	#N/A			0.18	
6/6/94	514	171	37.3	192	64	-1.7	8	#N/A			0.09	
6/7/94	508	169	36.5	185	62	-1.6	8	#N/A			0.09	
6/8/94	502	167	36.8	185	62	-1.5	8	#N/A			0.09	
6/9/94	509	170	35.6	181	60	-1.7	8	#N/A			0.09	
6/10/94	502	167	37.0	186	62	-1.6	8	#N/A			0.09	
6/11/94	521	174	38.0	198	66	-2	8	#N/A			0.18	
6/13/94	506	169	33.0	167	56		8	#N/A			0.09	
6/14/94	532	177	41.0	218	73	-2.3	8	#N/A			0.06	
6/15/94	349	44	38.0	133	17		3	#N/A			0.05	
6/16/94	366	137	39.5	145	54		9	#N/A			0.09	
6/17/94	502	167	39.6	199	66	-2.1	8	#N/A			0.08	
6/18/94	439	146	30.8	135	45	-1.4	8	#N/A			0.15	
6/20/94	475	158	38.3	182	61	-1.5	8	#N/A			0.09	
6/21/94	522	174	37.6	196	65	-1.9	8	#N/A			0.16	
6/23/94	366	122	39.4	144	48	-2.2	8	#N/A			0.07	
6/24/94	367	122	41.5	152	51	-1.2	8	#N/A			0.07	
6/25/94	371	124	42.0	156	52	-1.2	8	#N/A			0.16	
6/27/94	351	146	40.0	140	58		10	#N/A			0.11	
6/28/94	250	250	36.0	90	90		24	#N/A			0.13	
6/29/94	250	250	36.0	90	90		24	#N/A			0.14	
6/30/94	285	285	35.0	100	100	-1.1	24	#N/A			0.13	
7/1/94	330	220	35.8	118	79	-0.7	16	237			0.16	32.06
7/3/94	351	88	36.0	126	32		6	#N/A			0.11	
7/5/94	311	104	40.6	126	42	-0.5	8	#N/A			0.06	
7/6/94	311	104	38.5	120	40	-0.9	8	#N/A			0.05	
7/7/94	246	82	39.3	97	32	-0.5	8	#N/A			0.04	
7/8/94	238	69	39.3	97	28		7	#N/A			0.19	
7/11/94	214	152	39.3	84	60	-0.3	17	#N/A			0.10	
7/12/94	221	221	36.2	80	80	-0.3	24	#N/A			0.14	
7/13/94	505	316	36.6	185	116	-0.4	15	#N/A			0.21	
7/15/94	217	72	37.5	81	27	-0.6	8	#N/A			0.04	
7/16/94	223	74	37.1	83	28	-0.3	8	#N/A			0.08	
7/18/94	215	72	38.8	83	28	-0.3	8	#N/A			0.04	
7/19/94	217	72	38.7	84	28	0	8	#N/A			0.04	
7/20/94	223	74	38.7	86	29	0	8	#N/A			0.04	
7/21/94	212	71	38.7	82	27	0	8	#N/A			0.08	
7/23/94	222	74	40.9	91	30	0	8	#N/A			0.08	
7/25/94	197	66	39.1	77	26	0	8	#N/A			0.04	
7/26/94	201	67	40.9	82	27	0	8	#N/A			0.06	
7/27/94	196	139	42.7	84	59	0	17	#N/A			0.10	
7/28/94	195	195	40.8	79	79	0	24	#N/A			0.11	
7/29/94	197	197	40.2	79	79	0	24	#N/A			0.12	
7/30/94	200	200	41.2	82	82	0	24	#N/A			0.12	
7/31/94	200	200	41.2	82	82	0	24	#N/A			0.12	
8/1/94	205	196	39.9	82	78	0	23	#N/A			0.11	
8/2/94	198	190	37.5	74	71	0	23	#N/A			0.09	
8/3/94	205	128	39.2	80	50	0	15	#N/A			0.06	
8/4/94	196	98	39.0	76	38	0	12	#N/A			0.08	
8/5/94	185	178	39.8	74	71	0	23	#N/A			0.08	
8/6/94	195	114	36.8	72	42	-0.4	14	#N/A			0.10	
8/8/94	194	65	39.6	77	26	-0.3	8	#N/A			0.06	
8/9/94	194	138	40.6	79	56	-0.2	17	#N/A			0.09	
8/10/94	188	180	38.5	72	69	-0.3	23	#N/A			0.10	
8/11/94	188	188	39.0	73	73	-0.3	24	#N/A			0.11	

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8/12/94	190	190	39.0	74	74	-0.3	24	#N/A			0.11	
8/13/94	193	193	39.0	75	75	-0.2	24	#N/A			0.11	
8/14/94	193	193	39.0	75	75	-0.2	24	#N/A			0.11	
8/15/94	191	191	37.6	72	72	-0.3	24	#N/A			0.10	
8/16/94	212	203	35.1	75	71	-0.2	23	#N/A			0.11	
8/17/94	212	212	35.1	75	75	-0.2	24	#N/A			0.12	
8/18/94	240	240	39.6	95	95	-0.4	24	#N/A			0.13	
8/19/94	245	245	36.2	89	89	-0.6	24	#N/A			0.13	
8/20/94	249	249	35.8	89	89	-0.4	24	#N/A			0.13	
8/21/94	249	249	35.8	89	89	-0.4	24	#N/A			0.12	
8/22/94	233	213	37.6	88	80	-0.6	22	#N/A			0.12	
8/23/94	253	253	36.4	92	92	-0.7	24	#N/A			0.12	
8/24/94	204	161	43.4	88	70	-0.7	19	#N/A			0.10	
8/25/94	205	205	36.5	75	75	-0.4	24	#N/A			0.11	
8/26/94	206	206	37.0	76	76	-0.3	24	#N/A			0.09	
8/27/94	217	126	35.9	78	45	-0.4	14	#N/A			0.15	
8/29/94	218	155	38.9	85	60	-0.5	17	#N/A			0.10	
8/30/94	223	223	38.0	85	85	-0.2	24	#N/A			0.12	
8/31/94	249	228	36.6	91	84	-0.6	22	#N/A			0.12	
9/1/94	236	236	35.7	84	84	-0.6	24	#N/A			0.12	
9/2/94	236	217	35.7	84	77	-0.6	22	#N/A			0.11	
9/3/94	213	213	36.3	77	77	-0.6	24	#N/A			0.11	
9/4/94	213	213	36.3	77	77	-0.6	24	#N/A			0.11	
9/5/94	213	213	36.3	77	77	-0.6	24	#N/A			0.12	
9/6/94	219	219	38.7	85	85	-0.3	24	#N/A			0.12	
9/7/94	226	226	38.3	87	87	-0.3	24	#N/A			0.12	
9/8/94	215	215	39.0	84	84	-0.8	24	#N/A			0.12	
9/9/94	227	227	35.8	81	81	-0.2	24	#N/A			0.11	
9/10/94	215	215	36.1	78	78	-0.7	24	#N/A			0.11	
9/11/94	215	215	36.1	78	78	-0.7	24	#N/A			0.11	
9/12/94	212	212	35.3	75	75	-0.7	24	#N/A			0.11	
9/13/94	217	217	36.7	80	80	-0.4	24	#N/A			0.11	
9/14/94	213	213	35.9	77	77	-0.4	24	#N/A			0.11	
9/15/94	210	201	36.5	77	74	0.5	23	#N/A			0.11	
9/16/94	214	214	36.5	78	78	-0.4	24	#N/A			0.11	
9/17/94	223	223	33.5	75	75	-0.5	24	#N/A			0.11	
9/18/94	223	223	33.5	75	75	-0.5	24	#N/A			0.11	
9/19/94	226	226	35.6	81	81	-0.5	24	#N/A			0.12	
9/20/94	229	229	37.4	86	86	-0.4	24	#N/A			0.12	
9/21/94	229	229	35.9	82	82	-0.4	24	#N/A			0.12	
9/22/94	229	229	35.9	82	82	-0.4	24	#N/A			0.12	
9/23/94	233	233	37.9	88	88	-0.5	24	#N/A			0.13	
9/24/94	233	233	37.9	88	88	-0.5	24	#N/A			0.13	
9/25/94	233	233	37.9	88	88	-0.5	24	#N/A			0.12	
9/26/94	227	227	37.1	84	84	-0.6	24	#N/A			0.11	
9/27/94	227	170	37.1	84	63	-0.6	18	#N/A			0.10	
9/28/94	230	221	37.2	86	82	-0.5	23	#N/A			0.12	
9/29/94	230	230	36.9	85	85	-0.6	24	#N/A			0.12	
9/30/94	229	229	36.3	83	83	-0.5	24	#N/A			0.12	
10/1/94	229	229	36.3	83	83	-0.5	24	247			0.12	33.32
10/2/94	229	229	36.3	83	83	-0.5	24	#N/A			0.12	
10/3/94	223	223	37.1	83	83	-0.6	24	#N/A			0.12	
10/4/94	233	233	34.8	81	81	-0.7	24	#N/A			0.10	
10/5/94	233	175	34.8	81	61	-0.7	18	#N/A			0.09	
10/6/94	229	162	40.1	92	65	-0.3	17	#N/A			0.09	
10/7/94	264	182	35.4	94	64	-1.3	16.5	#N/A			0.11	
10/8/94	303	290	30.3	92	88	-1.8	23	#N/A			0.13	
10/9/94	303	303	30.3	92	92	-1.8	24	#N/A			0.14	
10/10/94	285	285	33.7	96	96	-0.9	24	#N/A			0.13	
10/11/94	285	285	31.6	90	90	-0.9	24	#N/A			0.14	
10/12/94	293	293	34.2	100	100	-0.9	24	#N/A			0.15	
10/13/94	294	294	35.1	103	103	-1.1	24	#N/A			0.15	
10/14/94	294	294	34.6	102	102	-1.6	24	#N/A			0.15	
10/15/94	369	323	34.6	128	112		21	#N/A			0.24	
10/17/94	268	162	34.0	91	55	-0.7	14.5	#N/A			0.11	

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10/18/94	252	252	36.2	91	91	-0.6	24	#N/A			0.13	
10/19/94	252	252	36.2	91	91	-0.7	24	#N/A			0.13	
10/20/94	252	252	36.2	91	91	-0.7	24	#N/A			0.12	
10/21/94	241	196	36.3	87	71	-0.7	19.5	#N/A			0.09	
10/22/94	263	148	39.9	105	59	-0.9	13.5	#N/A			0.17	
10/24/94	228	152	39.2	89	60	-4	16	#N/A			0.09	
10/25/94	258	183	34.8	90	64	-0.9	17	#N/A			0.08	
10/26/94	252	121	37.1	94	45	-1.3	11.5	#N/A			0.12	
10/28/94	261	98	36.0	94	35	-0.9	9	#N/A			0.04	
10/29/94	275	57	39.1	108	22	-0.8	5	#N/A			0.22	
11/1/94	258	194	40.6	105	79	-0.5	18	#N/A			0.13	
11/2/94	319	319	34.1	109	109	-0.6	24	#N/A			0.14	
11/3/94	275	275	30.8	85	85	-0.6	24	#N/A			0.09	
11/4/94	275	115	30.8	85	35	-0.6	10	#N/A			0.36	
11/8/94	319	239	37.7	120	90	-0.4	18	#N/A			0.14	
11/9/94	269	269	38.6	104	104	-1	24	#N/A			0.15	
11/10/94	269	269	38.6	104	104	-1	24	#N/A			0.14	
11/11/94	264	248	37.3	99	92	-1.1	22.5	#N/A			0.14	
11/12/94	264	264	37.3	99	99	-1.1	24	#N/A			0.09	
11/13/94	264	88	37.3	99	33	-1.1	8	#N/A			0.07	
11/14/94	264	138	42.2	112	58	-6.1	12.5	#N/A			0.11	
11/15/94	267	267	36.7	98	98	-6	24	#N/A			0.14	
11/16/94	273	273	34.4	94	94	-1.8	24	#N/A			0.13	
11/17/94	269	269	33.2	89	89	-1.9	24	#N/A			0.13	
11/18/94	273	273	35.9	98	98	-1.9	24	#N/A			0.14	
11/19/94	273	273	35.9	98	98	-1.9	24	#N/A			0.14	
11/20/94	273	273	35.9	98	98	-1.9	24	#N/A			0.14	
11/21/94	269	269	34.0	92	92	-4.5	24	#N/A			0.13	
11/22/94	258	258	34.7	90	90	-5.1	24	#N/A			0.13	
11/23/94	252	252	38.0	96	96	-4.7	24	#N/A			0.14	
11/24/94	252	252	38.0	96	96	-4.7	24	#N/A			0.10	
11/25/94	271	79	47.8	130	38	-3.8	7	#N/A			0.27	
11/28/94	238	238	36.1	86	86	-3.4	24	#N/A			0.12	
11/29/94	241	241	34.8	84	84	-3.1	24	#N/A			0.13	
11/30/94	278	266	38.4	107	102	-2.8	23	#N/A			0.14	
12/1/94	269	269	34.7	93	93	-2.6	24	#N/A			0.13	
12/2/94	271	260	34.9	95	91	-2.8	23	#N/A			0.13	
12/3/94	271	243	34.9	95	85		21.5	#N/A			0.13	
12/4/94	271	271	34.9	95	95		24	#N/A			0.14	
12/5/94	293	262	35.9	105	94	-2.9	21.5	#N/A			0.09	
12/6/94	293	85	28.6	84	24	-2.7	7	#N/A			0.04	
12/7/94	257	69	40.7	104	28	-2.8	6.5	#N/A			0.06	
12/8/94	267	145	41.0	109	59	-2.6	13	#N/A			0.11	
12/9/94	264	264	35.4	94	94	-2.5	24	#N/A			0.13	
12/10/94	264	264	35.4	94	94		24	#N/A			0.13	
12/11/94	264	264	35.4	94	94		24	#N/A			0.13	
12/12/94	264	253	35.5	94	90	-2.4	23	#N/A			0.13	
12/13/94	264	264	36.7	97	97	-2.7	24	#N/A			0.14	
12/14/94	264	264	35.2	93	93	-2.5	24	#N/A			0.13	
12/15/94	264	264	34.6	91	91	-2.2	24	#N/A			0.13	
12/16/94	264	264	35.5	94	94	-2.4	24	#N/A			0.14	
12/17/94	264	264	35.5	94	94	-2.4	24	#N/A			0.14	
12/18/94	264	264	35.5	94	94	-2.4	24	#N/A			0.14	
12/19/94	256	256	36.8	94	94	-1.1	24	#N/A			0.13	
12/20/94	258	258	34.7	90	90	-2.2	24	#N/A			0.13	
12/21/94	275	275	33.8	93	93	-2.3	24	#N/A			0.09	
12/22/94	284	77	35.8	102	28	-2.3	6.5	#N/A			0.07	
12/23/94	284	178	35.8	102	64		15	#N/A			0.12	
12/24/94	284	284	35.8	102	102		24	#N/A			0.09	
12/25/94	301	88	30.3	91	27	-2.3	7	#N/A			0.08	
12/26/94	297	223	38.9	116	87	-2.5	18	#N/A			0.13	
12/27/94	269	269	33.1	89	89	-3.9	24	#N/A			0.13	
12/28/94	273	273	35.7	97	97	-3.9	24	#N/A			0.15	
12/29/94	287	287	37.4	107	107	-4.2	24	#N/A			0.14	
12/30/94	301	245	33.6	101	82	-4	19.5	#N/A			0.12	

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12/31/94	301	220	39.9	120	88	-4	17.5	#N/A			0.15	
1/1/95	299	299	39.9	119	119	-4.0	24	256			0.17	33.83
1/2/95	299	299	39.9	119	119	-4.0	24	#N/A			0.16	
1/3/95	302	302	35.7	108	108	-4.0	24	#N/A			0.14	
1/4/95	308	244	33.8	104	82	-3.9	19	#N/A			0.12	
1/5/95	310	220	38.2	118	84	-4.4	17	#N/A			0.14	
1/6/95	313	313	34.2	107	107	-4.6	24	#N/A			0.15	
1/7/95	313	313	34.2	107	107	-4.6	24	#N/A			0.15	
1/8/95	313	313	34.2	107	107	-4.6	24	#N/A			0.15	
1/9/95	313	313	34.2	107	107	-4.6	24	#N/A			0.16	
1/10/95	308	308	38.0	117	117	-4.1	24	#N/A			0.17	
1/11/95	332	332	36.1	120	120	-5.1	24	#N/A			0.17	
1/12/95	340	340	34.9	119	119	-5.9	24	#N/A			0.17	
1/13/95	334	334	33.4	112	112	-5.8	24	#N/A			0.16	
1/14/95	334	334	33.4	112	112	-5.8	24	#N/A			0.16	
1/15/95	334	334	33.4	112	112	-5.8	24	#N/A			0.16	
1/16/95	324	324	33.6	109	109	-5.4	24	#N/A			0.15	
1/17/95	326	326	32.2	105	105	-5.3	24	#N/A			0.15	
1/18/95	326	326	33.2	108	108	-5.1	24	#N/A			0.16	
1/19/95	326	326	34.1	111	111	-5.1	24	#N/A			0.16	
1/20/95	341	341	32.0	109	109	-5.4	24	#N/A			0.15	
1/21/95	332	305	32.0	106	98	-5.0	22	#N/A			0.15	
1/22/95	332	332	32.0	106	106	-5.0	24	#N/A			0.16	
1/23/95	337	337	33.2	112	112	-5.0	24	#N/A			0.16	
1/24/95	332	332	33.0	110	110	-5.1	24	#N/A			0.16	
1/25/95	332	332	33.0	110	110	-5.1	24	#N/A			0.13	
1/26/95	341	199	33.0	113	66	-5.0	14	#N/A			0.12	
1/27/95	322	322	32.3	104	104	-5.3	24	#N/A			0.15	
1/28/95	322	322	32.3	104	104	-5.3	24	#N/A			0.15	
1/29/95	322	322	32.3	104	104	-5.3	24	#N/A			0.16	
1/30/95	324	324	34.7	112	112	-5.1	24	#N/A			0.16	
1/31/95	322	322	34.5	111	111	-5.1	24	#N/A			0.16	
2/1/95	315	315	33.3	105	105	-5.1	24	#N/A			0.15	
2/2/95	307	307	32.7	100	100	-5.4	24	#N/A			0.14	
2/3/95	307	307	32.8	101	101	-5.4	24	#N/A			0.14	
2/4/95	307	307	32.8	101	101	-5.4	24	#N/A			0.14	
2/5/95	307	307	32.8	101	101	-5.4	24	#N/A			0.15	
2/6/95	315	315	33.8	107	107	-5.1	24	#N/A			0.16	
2/7/95	337	337	32.3	109	109	-5.1	24	#N/A			0.16	
2/8/95	348	348	33.7	117	117	-5.3	24	#N/A			0.18	
2/9/95	391	391	33.9	133	133	-5.9	24	#N/A			0.20	
2/10/95	428	428	33.4	143	143	-5.7	24	#N/A			0.21	
2/11/95	428	428	33.4	143	143	-5.7	24	#N/A			0.21	
2/12/95	428	428	33.4	143	143	-5.7	24	#N/A			0.21	
2/13/95	442	442	33.1	146	146	-5.9	24	#N/A			0.22	
2/14/95	440	440	34.7	153	153	-6.5	24	#N/A		0	0.21	
2/15/95	425	425	33.1	141	141	-6.2	24	#N/A			0.20	
2/16/95	431	431	31.7	137	137	-6.8	24	#N/A			0.20	
2/17/95	431	431	31.7	137	137	-6.8	24	#N/A			0.20	
2/18/95	431	431	31.7	137	137	-6.8	24	#N/A			0.20	
2/19/95	431	431	31.7	137	137	-6.8	24	#N/A			0.20	
2/20/95	418	418	33.2	139	139	-7.2	24	#N/A		0	0.20	
2/21/95	423	423	32.2	136	136	-8.2	24	#N/A			0.20	
2/22/95	423	423	32.2	136	136	-8.2	24	#N/A			0.20	
2/23/95	464	464	30.1	140	140	-9.1	24	#N/A			0.21	
2/24/95	460	460	31.7	146	146	-10.2	24	#N/A			0.21	
2/25/95	460	460	31.7	146	146	-10.2	24	#N/A			0.21	
2/26/95	460	460	31.7	146	146	-10.2	24	#N/A			0.21	
2/27/95	471	471	30.3	143	143	-10.2	24	#N/A			0.20	
2/28/95	468	468	29.9	140	140	-10.2	24	#N/A			0.20	
3/1/95	461	461	31.1	143	143	-11.8	24	#N/A			0.17	
3/2/95	461	288	31.1	143	90	-11.8	15	#N/A			0.18	
3/3/95	448	448	35.7	160	160	-10.0	24	#N/A			0.20	
3/4/95	448	318	35.7	160	113	-10.0	17	#N/A			0.20	
3/5/95	448	448	35.7	160	160	-10.0	24	#N/A			0.23	
3/6/95	488	488	32.4	158	158	-12.3	24	#N/A			0.23	
3/7/95	499	499	31.6	158	158	-12.3	24	#N/A			0.22	
3/8/95	478	478	31.6	151	151	-12.5	24	#N/A			0.21	
3/9/95	466	466	30.6	143	143	-13.8	24	#N/A			0.21	
3/10/95	476	476	31.0	148	148	-12.9	24	#N/A			0.21	
3/11/95	476	476	31.0	148	148	-12.9	24	#N/A			0.16	
3/12/95	476	238	31.0	148	74	-12.9	12	#N/A			0.12	
3/13/95	476	297	31.0	148	92	-12.9	15	#N/A			0.17	
3/14/95	467	467	32.1	150	150	-11.8	24	#N/A			0.21	

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3/15/95	453	453	30.8	140	140	-12.3	24	#N/A			0.19	
3/16/95	433	433	29.9	130	130	-11.6	24	#N/A			0.18	
3/17/95	438	438	28.7	126	126	-12.2	24	#N/A			0.18	
3/18/95	438	438	28.7	126	126	-12.2	24	#N/A			0.12	
3/19/95	438	164	28.7	126	47	-12.2	9	#N/A			0.13	
3/20/95	436	436	30.8	134	134	-12.1	24	#N/A			0.19	
3/21/95	436	436	30.8	134	134	-12.1	24	#N/A			0.19	
3/22/95	410	410	31.6	130	130	-14.1	24	#N/A			0.18	
3/23/95	403	403	31.6	127	127	-13.6	24	#N/A			0.19	
3/24/95	426	426	30.6	130	130	-12.0	24	#N/A			0.17	
3/25/95	425	336	30.6	130	103	-13.0	19	#N/A			0.14	
3/26/95	425	283	30.0	127	85	-13.0	16	#N/A			0.16	
3/27/95	477	477	30.0	143	143	-14.3	24	#N/A			0.19	
3/28/95	484	484	25.9	125	125	-12.1	24	#N/A			0.19	
3/29/95	477	477	29.0	138	138	-10.4	24	#N/A			0.21	
3/30/95	495	495	29.8	148	148	-10.8	24	#N/A			0.20	
3/31/95	483	483	27.0	130	130	-10.6	24	#N/A			0.19	
4/1/95	463	463	27.4	127	127	-12.6	24	266			0.18	35.49
4/2/95	463	463	27.4	127	127	-12.6	24	#N/A			0.16	
4/3/95	463	348	27.4	127	95	-12.6	18	#N/A			0.16	
4/4/95	446	446	27.0	121	121	-13.3	24	#N/A			0.17	
4/5/95	441	423	27.7	122	117	-13.2	23	#N/A			0.13	
4/6/95	441	220	29.0	128	64	-13.9	12	#N/A			0.13	
4/7/95	421	421	26.5	112	112	-13.1	24	#N/A			0.16	
4/8/95	421	421	26.5	112	112	-13.1	24	#N/A			0.16	
4/9/95	421	421	26.5	112	112	-13.1	24	#N/A			0.16	
4/10/95	411	411	25.5	105	105	-12.0	24	#N/A			0.15	
4/11/95	412	412	25.4	105	105	-11.0	24	#N/A			0.15	
4/12/95	417	417	25.5	106	106	-10.3	24	#N/A			0.16	
4/13/95	430	430	26.0	112	112	-10.5	24	#N/A			0.16	
4/14/95	418	400	26.7	111	107	-10.2	23	#N/A			0.16	
4/15/95	418	418	26.7	111	111	-10.2	24	#N/A			0.16	
4/16/95	418	418	26.7	111	111	-10.2	24	#N/A			0.16	
4/17/95	444	444	24.4	108	108	-10.7	24	#N/A			0.15	
4/18/95	436	400	25.1	109	100	-10.7	22	#N/A			0.15	
4/19/95	428	428	25.2	108	108	-10.3	24	#N/A			0.16	
4/20/95	437	437	26.1	114	114	-10.8	24	#N/A			0.16	
4/21/95	426	426	26.6	113	113	-9.7	24	#N/A			0.16	
4/22/95	426	426	26.6	113	113	-9.7	24	#N/A			0.16	
4/23/95	426	426	26.6	113	113	-9.7	24	#N/A			0.16	
4/24/95	420	420	27.1	114	114	-9.8	24	#N/A			0.15	
4/25/95	406	406	24.9	101	101	-11.0	24	#N/A			0.15	
4/26/95	411	377	27.6	113	104	-9.9	22	#N/A			0.15	
4/27/95	402	402	25.7	103	103	-10.5	24	#N/A			0.16	
4/28/95	417	417	27.3	114	114	-9.9	24	#N/A			0.16	
4/29/95	417	417	27.3	114	114	-9.9	24	#N/A			0.16	
4/30/95	417	417	27.3	114	114	-9.9	24	#N/A			0.16	
5/1/95	392	392	27.2	107	107	-10.2	24	#N/A			0.16	
5/2/95	407	407	27.8	113	113	-9.2	24	#N/A			0.17	
5/3/95	434	434	27.5	119	119	-9.0	24	#N/A			0.14	
5/4/95	433	307	26.4	114	81	-9.0	17	#N/A			0.14	
5/5/95	430	430	25.6	110	110	-9.0	24	#N/A			0.16	
5/6/95	430	430	25.6	110	110	-9.0	24	#N/A			0.16	
5/7/95	430	430	25.6	110	110	-9.0	24	#N/A			0.16	
5/8/95	427	427	27.2	116	116	-9.0	24	#N/A			0.17	
5/9/95	443	443	28.2	125	125	-9.0	24	#N/A			0.18	
5/10/95	444	444	27.4	122	122	-9.0	24	#N/A			0.17	
5/11/95	438	438	27.1	119	119	-9.0	24	#N/A			0.17	
5/12/95	439	439	28.1	123	123	-9.0	24	#N/A			0.18	
5/13/95	439	439	28.1	123	123	-9.0	24	#N/A			0.18	
5/14/95	439	439	28.1	123	123	-9.0	24	#N/A			0.18	
5/15/95	444	444	27.4	122	122	-9.1	24	#N/A			0.18	
5/16/95	448	448	27.5	123	123	-9.0	24	#N/A			0.18	
5/17/95	463	463	26.2	121	121	-9.2	24	#N/A			0.18	
5/18/95	483	483	27.9	135	135	-8.9	24	#N/A			0.19	
5/19/95	481	481	27.6	133	133	-8.5	24	#N/A			0.19	
5/20/95	481	481	27.6	133	133	-8.5	24	#N/A			0.19	
5/21/95	481	481	27.6	133	133	-8.5	24	#N/A			0.19	
5/22/95	499	499	27.0	135	135	-10.0	24	#N/A			0.20	
5/23/95	513	513	27.3	140	140	-10.2	24	#N/A			0.20	
5/24/95	511	511	27.7	142	142	-10.1	24	#N/A			0.20	
5/25/95	503	503	27.4	138	138	-10.6	24	#N/A			0.20	
5/26/95	521	521	28.0	146	146	-11.1	24	#N/A			0.21	
5/27/95	521	521	28.0	146	146	-11.1	24	#N/A			0.21	

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DATE	LFG Collection Flow Rate (SCFM)	Corrected LFG Flow Rate for Intermittent Operation (scfm)	Methane Concentration (%)	Methane Collection Flow Rate (SCFM)	Corrected Methane Flow Rate for Intermittent Operation (scfm)	Vacuum Flare Station Inlet (in. w.c.)	Flare Operation Hours	GAS IA Predicted Methane Generation Rate (scfm)	Blower Outlet Pressure (in w.c.)	Barometric Pressure (in. Hg)	Amount of Methane Collected (MMSCF)	Amount of Methane Generated (MMSCF)
5/28/95	521	521	28.0	146	146	-11.1	24	#N/A			0.21	
5/29/95	521	521	28.0	146	146	-11.1	24	#N/A			0.20	
5/30/95	491	491	26.7	131	131	-11.0	24	#N/A			0.19	
5/31/95	501	501	27.3	137	137	-10.9	24	#N/A			0.20	
6/1/95	532	532	27.1	144	144	-11.0	24	#N/A			0.21	
6/2/95	526	526	26.9	142	142	-11.1	24	#N/A			0.20	
6/3/95	526	526	26.9	142	142	-11.1	24	#N/A			0.20	
6/4/95	526	526	26.9	142	142	-11.1	24	#N/A			0.20	
6/5/95	521	521	26.8	140	140	-11.2	24	#N/A			0.21	
6/6/95	517	517	28.6	148	148	-11.0	24	#N/A			0.20	
6/7/95	518	518	26.4	137	137	-11.2	24	#N/A			0.20	
6/8/95	535	535	26.3	141	141	-11.1	24	#N/A			0.20	
6/9/95	530	530	27.0	143	143	-10.8	24	#N/A			0.21	
6/10/95	530	530	27.0	143	143	-10.8	24	#N/A			0.21	
6/11/95	530	530	27.0	143	143	-10.8	24	#N/A			0.20	
6/12/95	478	478	27.5	132	132	-10.4	24	#N/A			0.18	
6/13/95	449	449	27.5	124	124	-11.0	24	#N/A			0.18	
6/14/95	479	479	27.3	131	131	-10.8	24	#N/A			0.19	
6/15/95	487	487	28.1	137	137	-10.8	24	#N/A			0.19	
6/16/95	499	499	26.5	132	132	-11.1	24	#N/A			0.19	
6/17/95	499	499	26.5	132	132	-11.1	24	#N/A			0.19	
6/18/95	499	499	26.5	132	132	-11.1	24	#N/A			0.19	
6/19/95	493	493	27.4	135	135	-11.2	24	#N/A			0.19	
6/20/95	476	476	26.7	127	127	-11.6	24	#N/A			0.18	
6/21/95	467	467	26.7	125	125	-12.0	24	#N/A			0.18	
6/22/95	467	467	26.7	125	125	-12.0	24	#N/A			0.16	
6/23/95	463	347	28.8	133	100	-10.7	18	#N/A			0.17	
6/24/95	463	463	28.8	133	133	-10.7	24	#N/A			0.19	
6/25/95	463	463	28.8	133	133	-10.7	24	#N/A			0.19	
6/26/95	464	464	28.6	133	133	-11.7	24	#N/A			0.19	
6/27/95	506	506	27.2	138	138	-11.2	24	#N/A			0.21	
6/28/95	518	518	28.6	148	148	-10.1	24	#N/A			0.21	
6/29/95	508	508	28.4	144	144	-10.0	24	#N/A			0.21	
6/30/95	530	530	27.8	147	147	-10.0	24	#N/A			0.21	
7/1/95	530	530	27.8	147	147	-10.0	24	276			0.21	37.16
7/2/95	530	530	27.8	147	147	-10.0	24	#N/A			0.20	
7/3/95	473	473	28.2	133	133	-10.2	24	#N/A			0.19	
7/4/95	473	453	28.2	133	128	-10.2	23	#N/A			0.19	
7/5/95	472	472	27.5	130	130	-11.2	24	#N/A			0.19	
7/6/95	465	465	28.4	132	132	-11.5	24	#N/A			0.20	
7/7/95	485	485	28.7	139	139	11.5	24	#N/A			0.20	
7/8/95	485	485	28.7	139	139	11.5	24	#N/A			0.20	
7/9/95	485	485	28.7	139	139	11.5	24	#N/A			0.21	
7/10/95	501	501	29.1	146	146	-11.5	24	#N/A			0.22	
7/11/95	524	524	29.5	154	154	-11.5	24	#N/A			0.22	
7/12/95	515	515	29.2	150	150	-11.7	24	#N/A			0.20	
7/13/95	457	457	28.7	131	131	-11.5	24	#N/A			0.20	
7/14/95	524	524	28.9	151	151	-12.5	24	#N/A			0.22	
7/15/95	524	524	28.9	151	151	-12.5	24	#N/A			0.22	
7/16/95	524	524	28.9	151	151	-12.5	24	#N/A			0.21	
7/17/95	511	511	28.5	146	146	-12.5	24	#N/A			0.21	
7/18/95	520	520	28.6	149	149	-12.7	24	#N/A			0.21	
7/19/95	520	520	27.7	144	144	-12.7	24	#N/A			0.21	
7/20/95	522	522	28.0	146	146	-12.7	24	#N/A			0.22	
7/21/95	524	524	30.4	159	159	-12.7	24	#N/A			0.23	
7/22/95	524	524	30.4	159	159	-12.7	24	#N/A			0.23	
7/23/95	524	524	30.4	159	159	-12.7	24	#N/A			0.21	
7/24/95	524	480	28.9	151	139	-12.6	22	#N/A			0.21	
7/25/95	518	518	29.4	152	152	-12.4	24	#N/A			0.22	
7/26/95	547	547	29.2	160	160	-11.4	24	#N/A			0.23	
7/27/95	561	561	29.1	163	163	-11.2	24	#N/A			0.22	
7/28/95	527	527	28.1	148	148	-11.2	24	#N/A			0.21	
7/29/95	527	527	28.1	148	148	-11.2	24	#N/A			0.21	
7/30/95	527	527	28.1	148	148	-11.2	24	#N/A			0.22	
7/31/95	520	520	29.3	152	152	-11.0	24	#N/A			0.22	

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8/1/95	542	542	28.5	154	154	-11.0	24	#N/A			0.18	
8/2/95	527	351	28.0	148	98	-11.2	16	#N/A			0.21	
8/4/95	447	168	28.0	125	47	-12.5	9	#N/A			0.12	
8/5/95	447	447	28.0	125	125	-12.5	24	#N/A			0.18	
8/6/95	447	447	28.0	125	125	-12.5	24	#N/A			0.18	
8/7/95	447	447	28.0	125	125	-12.5	24	#N/A			0.18	
8/8/95	457	419	29.4	134	123	-11.0	22	#N/A			0.19	
8/9/95	453	453	31.6	143	143	-14.5	24	#N/A			0.18	
8/10/95	453	349	31.6	143	110	-14.5	18.5	#N/A			0.18	
8/11/95	455	455	31.6	144	144	-14.5	24	#N/A			0.21	
8/12/95	455	455	31.6	144	144	-14.5	24	#N/A			0.21	
8/13/95	455	455	31.6	144	144	-14.5	24	#N/A			0.20	
8/14/95	457	457	29.8	136	136	-14.2	24	#N/A			0.19	
8/15/95	455	455	29.0	132	132	-14.7	24	#N/A			0.19	
8/16/95	466	466	29.6	138	138	-14.6	24	#N/A			0.19	
8/17/95	466	466	28.4	132	132	-14.1	24	#N/A			0.19	
8/18/95	483	463	29.9	144	138	-14.2	23	#N/A			0.20	
8/19/95	483	483	29.9	144	144	-14.2	24	#N/A			0.21	
8/20/95	483	483	29.9	144	144	-14.2	24	#N/A			0.19	
8/21/95	488	488	25.0	122	122	-14.0	24	#N/A			0.16	
8/22/95	487	447	22.0	107	98	-14.5	22	#N/A			0.15	
8/23/95	465	465	24.3	113	113	-12.0	24	#N/A			0.16	
8/24/95	474	474	22.8	108	108	-12.0	24	#N/A			0.16	
8/25/95	475	475	23.8	113	113	-12.0	24	#N/A			0.16	
8/26/95	475	475	23.8	113	113	-12.0	24	#N/A			0.16	
8/27/95	475	475	23.8	113	113	-12.0	24	#N/A			0.16	
8/28/95	469	430	24.4	114	105	-11.7	22	#N/A			0.16	
8/29/95	461	461	26.2	121	121	-11.7	24	#N/A			0.19	
8/30/95	455	455	30.2	137	137	-11.5	24	#N/A			0.20	
8/31/95	458	458	30.7	141	141	-11.6	24	#N/A			0.20	
9/1/95	465	465	29.6	138	138	-12.2	24	#N/A			0.20	
9/2/95	465	465	29.6	138	138	-12.2	24	#N/A			0.20	
9/3/95	465	465	29.6	138	138	-12.2	24	#N/A			0.20	
9/4/95	465	465	29.6	138	138	-12.2	24	#N/A			0.20	
9/5/95	460	460	29.1	134	134	-12.6	24	#N/A			0.20	
9/6/95	461	461	30.3	140	140	-12.6	24	#N/A			0.18	
9/7/95	460	441	26.2	121	116	-12.4	23	#N/A			0.18	
9/8/95	486	486	28.2	137	137	-11.1	24	#N/A			0.20	
9/9/95	486	486	28.2	137	137	-11.1	24	#N/A			0.20	
9/10/95	486	486	28.2	137	137	-11.1	24	#N/A			0.20	
9/11/95	471	471	29.9	141	141	-11.5	24	#N/A			0.19	
9/12/95	462	442	29.0	134	128	-12.1	23	#N/A			0.19	
9/13/95	446	446	29.0	129	129	-13.8	24	#N/A			0.19	
9/14/95	436	436	29.4	128	128	-14.3	24	#N/A			0.18	
9/15/95	436	436	29.0	126	126	-14.3	24	#N/A			0.18	
9/16/95	436	436	29.0	126	126	-14.3	24	#N/A			0.18	
9/17/95	436	436	29.0	126	126	-14.3	24	#N/A			0.12	
9/18/95	431	126	28.4	122	36	-15.0	7	#N/A			0.07	
9/19/95	450	169	33.1	149	56	-19.2	9	#N/A			0.12	
9/20/95	432	396	29.5	128	117	-18.3	22	#N/A			0.18	
9/21/95	461	461	30.1	139	139	-16.0	24	#N/A			0.20	
9/22/95	460	460	29.3	135	135	-16.7	24	#N/A			0.19	
9/23/95	460	460	29.3	135	135	-16.7	24	#N/A			0.19	
9/24/95	460	460	29.3	135	135	-16.7	24	#N/A			0.20	
9/25/95	463	463	29.5	137	137	-16.2	24	#N/A			0.20	
9/26/95	463	463	29.8	138	138	-16.3	24	#N/A			0.19	
9/27/95	458	458	28.7	131	131	-17.0	24	#N/A			0.19	
9/28/95	461	461	28.7	132	132	-16.7	24	#N/A			0.19	
9/29/95	461	461	29.3	135	135	-16.7	24	#N/A			0.19	
9/30/95	461	433	29.8	137	129	-16.7	23	#N/A			0.19	
10/1/95	461	433	29.8	137	129	-16.7	23	285			0.18	38.42
10/2/95	473	433	28.9	137	125	-14.3	22	#N/A			0.19	
10/3/95	474	474	28.0	133	133	-14.3	24	#N/A			0.19	
10/4/95	472	472	27.2	128	128	-14.3	24	#N/A			0.19	
10/5/95	479	479	27.3	131	131	-14.4	24	#N/A			0.19	

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10/6/95	469	469	27.0	127	127	-15.1	24	#N/A			0.18	
10/7/95	469	469	27.0	127	127	-15.1	24	#N/A			0.18	
10/8/95	469	469	27.0	127	127	-15.1	24	#N/A			0.18	
10/9/95	485	485	26.2	127	127	-14.5	24	#N/A			0.18	
10/10/95	483	483	26.0	126	126	-14.2	24	#N/A			0.18	
10/11/95	480	480	24.8	119	119	-15.4	24	#N/A			0.17	
10/12/95	468	468	23.8	111	111	-16.0	24	#N/A			0.16	
10/13/95	457	457	24.5	112	112	-16.0	24	#N/A			0.16	
10/14/95	457	457	24.5	112	112	-16.0	24	#N/A			0.16	
10/15/95	457	457	24.5	112	112	-16.0	24	#N/A			0.17	
10/16/95	478	478	25.2	121	121	-15.6	24	#N/A			0.17	
10/17/95	478	478	25.2	121	121	-15.6	24	#N/A			0.17	
10/18/95	472	472	23.6	111	111	-15.4	24	#N/A			0.16	
10/19/95	477	477	24.5	117	117	-15.5	24	#N/A			0.18	
10/20/95	489	489	26.5	130	130	-14.5	24	#N/A			0.18	
10/21/95	476	476	24.5	117	117	-14.5	24	#N/A			0.17	
10/22/95	476	476	24.5	117	117	-14.5	24	#N/A			0.17	
10/23/95	476	476	25.1	120	120	-13.9	24	#N/A			0.18	
10/24/95	487	487	26.0	127	127	-12.8	24	#N/A			0.19	
10/25/95	491	491	26.8	132	132	-12.8	24	#N/A			0.19	
10/26/95	493	493	25.5	126	126	-12.0	24	#N/A			0.19	
10/27/95	490	490	27.1	133	133	-11.8	24	#N/A			0.19	
10/28/95	490	490	27.1	133	133	-11.8	24	#N/A			0.19	
10/29/95	490	490	27.1	133	133	-11.8	24	#N/A			0.19	
10/30/95	508	508	26.1	133	133	-12.2	24	#N/A			0.19	
10/31/95	500	500	25.4	127	127	-12.8	24	#N/A			0.18	
11/1/95	508	508	25.2	128	128	-11.8	24	#N/A			0.18	
11/2/95	492	492	24.8	122	122	-14.0	24	#N/A			0.18	
11/3/95	485	485	26.3	128	128	-11.8	24	#N/A			0.18	
11/4/95	485	485	26.3	128	128	-11.8	24	#N/A			0.18	
11/5/95	485	485	26.3	128	128	-11.8	24	#N/A			0.18	
11/6/95	485	485	25.8	125	125	-12.3	24	#N/A			0.18	
11/7/95	484	484	26.5	128	128	-12.1	24	#N/A			0.16	
11/8/95	484	343	28.5	138	98	-12.8	17	#N/A			0.16	
11/9/95	489	468	26.6	130	125	-12.1	23	#N/A			0.17	
11/10/95	465	465	22.8	106	106	-15.9	24	#N/A			0.15	
11/11/95	465	465	22.8	106	106	-15.9	24	#N/A			0.15	
11/12/95	465	465	22.8	106	106	-15.9	24	#N/A			0.15	
11/13/95	463	463	22.9	106	106	-17.7	24	#N/A			0.15	
11/14/95	477	477	22.9	109	109	-17.2	24	#N/A			0.15	
11/15/95	467	467	22.6	106	106	-17.7	24	#N/A			0.15	
11/16/95	480	480	21.6	104	104	-17.5	24	#N/A			0.16	
11/17/95	490	490	23.7	116	116	-16.3	24	#N/A			0.17	
11/18/95	490	490	23.7	116	116	-16.3	24	#N/A			0.17	
11/19/95	490	490	23.7	116	116	-16.3	24	#N/A			0.14	
11/20/95	485	384	22.2	108	85	-17.2	19	#N/A			0.12	
11/21/95	458	344	23.7	109	81	-14.2	18	#N/A			0.13	
11/22/95	449	449	23.4	105	105	-14.0	24	#N/A			0.15	
11/23/95	449	449	23.4	105	105	-14.0	24	#N/A			0.15	
11/24/95	449	449	23.4	105	105	-14.0	24	#N/A			0.15	
11/25/95	449	449	23.4	105	105	-14.0	24	#N/A			0.15	
11/26/95	449	449	23.4	105	105	-14.0	24	#N/A			0.16	
11/27/95	470	470	23.9	112	112	-13.3	24	#N/A			0.17	
11/28/95	473	473	25.1	119	119	-12.3	24	#N/A			0.17	
11/29/95	465	465	25.4	118	118	-12.5	24	#N/A			0.17	
11/30/95	467	467	25.9	121	121	-12.5	24	#N/A			0.17	
12/1/95	469	469	24.7	116	116	-12.6	24	#N/A			0.17	
12/2/95	469	469	24.7	116	116	-12.6	24	#N/A			0.17	
12/3/95	469	469	24.7	116	116	-12.6	24	#N/A			0.17	
12/4/95	477	477	25.9	124	124	-12.7	24	#N/A			0.17	
12/5/95	466	466	25.0	117	117	-12.8	24	#N/A			0.17	
12/6/95	470	470	26.7	126	126	-12.6	24	#N/A			0.18	
12/7/95	481	481	25.9	125	125	-12.1	24	#N/A			0.18	
12/8/95	483	483	25.4	123	123	-12.4	24	#N/A			0.18	
12/9/95	483	483	25.4	123	123	-12.4	24	#N/A			0.18	

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DATE	LFG Collection Flow Rate (SCFM)	Corrected LFG Flow Rate for Intermittent Operation (scfm)	Methane Concentration (%)	Methane Collection Flow Rate (SCFM)	Corrected Methane Flow Rate for Intermittent Operation (scfm)	Vacuum Flare Station Inlet (in.-w.c.)	Flare Operation Hours	GAS IA Predicted Methane Generation Rate (scfm)	Blower Outlet Pressure (in w.c.)	Barometric Pressure (in. Hg)	Amount of Methane Collected (MMSCF)	Amount of Methane Generated (MMSCF)
12/10/95	483	483	25.4	123	123	-12.4	24	#N/A			0.18	
12/11/95	473	473	25.8	122	122	-12.3	24	#N/A			0.17	
12/12/95	483	452	25.0	121	113	-12.3	22.5	#N/A			0.17	
12/13/95	483	483	24.9	120	120	-12.3	24	#N/A			0.17	
12/14/95	471	471	24.1	113	113	-13.0	24	#N/A			0.17	
12/15/95	482	482	25.3	122	122	-13.0	24	#N/A			0.18	
12/16/95	482	482	25.3	122	122	-13.0	24	#N/A			0.18	
12/17/95	482	482	25.3	122	122	-13.0	24	#N/A			0.14	
12/18/95	482	310	25.3	122	78	-13.0	15.4	#N/A			0.13	
12/19/95	541	316	32.5	176	103	-13.6	14	#N/A			0.17	
12/20/95	524	402	32.0	168	129	-12.0	18.4	#N/A			0.15	
12/21/95	498	239	31.8	158	76	-11.9	11.5	#N/A			0.10	
12/22/95	516	194	32.7	169	63	-12.5	9	#N/A			0.13	
12/23/95	516	351	32.7	169	115	-12.5	16.3	#N/A			0.14	
12/24/95	516	258	32.7	169	84	-12.5	12	#N/A			0.11	
12/25/95	516	204	32.7	169	67	-12.5	9.5	#N/A			0.14	
12/26/95	510	408	31.2	159	127	-13.3	19.2	#N/A			0.15	
12/27/95	508	250	31.5	160	79	-13.2	11.8	#N/A			0.14	
12/28/95	527	380	31.5	166	120	-13.5	17.3	#N/A			0.17	
12/29/95	515	352	32.5	167	114	-15.5	16.4	#N/A			0.20	
12/30/95	515	515	32.5	167	167	-15.5	24	#N/A			0.24	
12/31/95	515	515	32.5	167	167	-15.5	24	#N/A			0.23	
1/1/96	532	532	29.0	155	155		24	295	6.2	28.90	0.22	39.22
1/2/96	526	526	28.3	149	149		24	#N/A	6.1	28.96	0.21	
1/3/96	542	497	29.2	158	145		22	#N/A	6.3	28.95	0.21	
1/4/96	529	529	28.6	151	151		24	#N/A	6.3	28.82	0.20	
1/5/96	533	400	30.0	160	120		18	#N/A	6.1	28.93	0.20	
1/6/96	520	520	29	151	151		24	#N/A	6.1	28.95	0.22	
1/7/96	520	520	29	151	151		24	#N/A	6.1	28.95	0.21	
1/8/96	507	507	28.2	143	143		24	#N/A	6.1	28.96	0.21	
1/9/96	512	512	28.2	145	145		24	#N/A	6.0	28.95	0.21	
1/10/96	515	515	28.6	147	147		24	#N/A	6.0	28.98	0.21	
1/11/96	507	507	28.4	144	144		24	#N/A	6.1	29.02	0.22	
1/12/96	513	513	30.2	155	155		24	#N/A	6.1	28.98	0.22	
1/13/96	509	509	30	152	152		24	#N/A	6.1	28.99	0.22	
1/14/96	509	509	30	152	152		24	#N/A	6.1	28.99	0.22	
1/15/96	505	505	29.5	149	149		24	#N/A	6.0	29.00	0.22	
1/16/96	507	507	29.6	150	150		24	#N/A	6.0	28.97	0.21	
1/17/96	508	508	28.1	143	143		24	#N/A	5.9	28.75	0.21	
1/18/96	538	538	28.0	151	151		24	#N/A	5.5	28.95	0.22	
1/19/96	530	530	29.9	158	158		24	#N/A	5.0	28.95	0.22	
1/20/96	531	531	29	152	152		24	#N/A	5.0	28.89	0.22	
1/21/96	531	531	29	152	152		24	#N/A	5.0	28.89	0.21	
1/22/96	532	532	27.4	146	146		24	#N/A	5.0	28.82	0.21	
1/23/96	532	532	27.7	147	147		24	#N/A	5.0	29.1	0.21	
1/24/96	532	532	27.5	146	146		24	#N/A	5.0	28.99	0.21	
1/25/96	529	529	28.4	150	150		24	#N/A	5.0	28.95	0.21	
1/26/96	513	513	29	146	146		24	#N/A	5.0	28.88	0.21	
1/27/96	513	513	29	146	146		24	#N/A	5.0	28.88	0.21	
1/28/96	513	513	29	146	146		24	#N/A	5.0	28.88	0.21	
1/29/96	513	513	29	146	146		24	#N/A	5.0	28.88	0.21	
1/30/96	513	513	29	146	146		24	#N/A	5.0	28.88	0.21	
1/31/96	513	513	29	146	146		24	#N/A	5.0	28.88	0.21	
2/1/96	513	513	29	146	146		24	#N/A	5.0	28.88	0.21	
2/2/96	496	496	28.7	142	142		24	#N/A	5.0	28.8	0.21	
2/3/96	509	509	29	147	147		24	#N/A	5.0	28.8	0.21	
2/4/96	496	496	29	143	143		24	#N/A	5.0	28.8	0.21	
2/5/96	496	496	29	143	143		24	#N/A	5.0	28.8	0.20	
2/6/96	483	483	29.1	141	141		24	#N/A	5.0	28.8	0.20	
2/7/96	480	480	29.3	141	141		24	#N/A	5.0	28.8	0.20	
2/8/96	481	481	27.9	134	134		24	#N/A	5.0	28.8	0.20	
2/9/96	484	484	29.1	141	141		24	#N/A	5.0	28.8	0.20	
2/10/96	484	484	29	140	140		24	#N/A	5.0	28.8	0.20	
2/11/96	484	484	29	140	140		24	#N/A	5.0	28.8	0.20	
2/12/96	483	483	28.9	140	140		24	#N/A	5.0	28.8	0.20	

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2/13/96	466	466	28.9	135	135		24	#N/A	5.0	28.8	0.21	
2/14/96	514	514	31.0	159	159		24	#N/A	5.0	28.8	0.22	
2/15/96	491	491	30.0	147	147		24	#N/A	5.0	28.8	0.21	
2/16/96	487	487	30	148	148		24	#N/A	5.0	28.8	0.21	
2/17/96	487	487	30	148	148		24	#N/A	5.0	28.8	0.21	
2/18/96	487	487	30	148	148		24	#N/A	5.0	28.8	0.21	
2/19/96	483	483	30.7	148	148		24	#N/A	5.0	28.8	0.21	
2/20/96	494	494	30.0	148	148		24	#N/A	5.0	28.8	0.21	
2/21/96	496	496	30.2	150	150		24	#N/A	5.0	28.8	0.21	
2/22/96	486	486	29	142	142		24	#N/A	4.0	28.8	0.20	
2/23/96	486	486	29	142	142		24	#N/A	4.0	28.8	0.20	
2/24/96	486	486	29	142	142		24	#N/A	4.0	28.8	0.20	
2/25/96	486	486	29	142	142		24	#N/A	4.0	28.8	0.20	
2/26/96	474	474	28.4	135	135		24	#N/A	3.0	28.72	0.19	
2/27/96	466	466	29	136	136		24	#N/A	3.5	28.79	0.20	
2/28/96	466	466	29	136	136		24	#N/A	3.5	28.79	0.20	
2/29/96	459	459	29.8	137	137		24	#N/A	4.0	28.86	0.20	
3/1/96	449	449	29.9	134	134		24	#N/A	3.0	28.76	0.19	
3/2/96	444	444	29	129	129		24	#N/A	2.5	28.82	0.19	
3/3/96	444	444	29	129	129		24	#N/A	2.5	28.82	0.18	
3/4/96	439	439	28.3	124	124		24	#N/A	2.0	28.88	0.18	
3/5/96	437	437	28.7	126	126		24	#N/A	2.7	28.92	0.17	
3/6/96	436	436	26.7	116	116		24	#N/A	3.0	28.96	0.17	
3/7/96	436	436	27.9	122	122		24	#N/A	3.0	29.03	0.18	
3/8/96	435	435	28	123	123		24	#N/A	3.0	28.97	0.18	
3/9/96	435	435	28	123	123		24	#N/A	3.0	28.97	0.18	
3/10/96	435	435	28	123	123		24	#N/A	3.0	28.97	0.18	
3/11/96	432	432	28.7	124	124		24	#N/A	3.0	28.97	0.18	
3/12/96	432	432	30.3	131	131		24	#N/A	3.0	28.9	0.19	
3/13/96	422	422	30.1	127	127		24	#N/A	2.5	28.6	0.18	
3/14/96	421	421	28.6	121	121		24	#N/A	2.0	28.85	0.18	
3/15/96	428	428	29.2	125	125		24	#N/A	2.8	29.02	0.18	
3/16/96	441	441	29	129	129		24	#N/A	2.9	28.96	0.19	
3/17/96	441	441	29	129	129		24	#N/A	2.9	28.96	0.19	
3/18/96	454	454	29.2	133	133		24	#N/A	3.0	28.9	0.19	
3/19/96	437	437	29.7	130	130		24	#N/A	3.2	28.4	0.19	
3/20/96	448	448	28.7	129	129		24	#N/A	3.7	28.82	0.19	
3/21/96	456	456	28.8	131	131		24	#N/A	3.6	28.81	0.19	
3/22/96	467	467	29.6	138	138		24	#N/A	3.5	28.78	0.20	
3/23/96	476	476	28	133	133		24	#N/A	3.9	28.8	0.19	
3/24/96	476	476	28	133	133		24	#N/A	3.9	28.8	0.19	
3/25/96	486	486	26.3	128	128		24	#N/A	4.2	28.82	0.18	
3/26/96	458	458	27.6	126	126		24	#N/A	4.0	28.8	0.19	
3/27/96	443	443	30.1	133	133		24	#N/A	3.5	28.82	0.19	
3/28/96	462	462	28	129	129		24	#N/A	3.9	28.81	0.18	
3/29/96	438	438	28.2	123	123		24	#N/A	2.8	28.83	0.18	
3/30/96	432	432	29	125	125		24	#N/A	2.7	28.83	0.18	
3/31/96	432	432	29	125	125		24	#N/A	2.7	28.83	0.18	
4/1/96	426	426	29.6	126	126		24.0	304	2.5	28.82	0.19	40.41
4/2/96	434	434	30.6	133	133		24.0	#N/A	3.0	28.76	0.19	
4/3/96	443	443	29.8	132	132		24.0	#N/A	3.2	28.82	0.19	
4/4/96	443	443	29.6	131	131		24.0	#N/A	3.0	28.82	0.19	
4/5/96	444	444	29.6	131	131		24.0	#N/A	3.0	28.92	0.19	
4/6/96	433	433	29	127	127		24.0	#N/A	3.0	28.87	0.18	
4/7/96	433	433	29	127	127		24.0	#N/A	3.0	28.87	0.18	
4/8/96	422	422	29.0	122	122		24.0	#N/A	3.1	28.82	0.18	
4/9/96	453	453	28.1	127	127		24.0	#N/A	3.2	28.95	0.19	
4/10/96	445	445	29.2	130	130		24.0	#N/A	2.4	28.8	0.19	
4/11/96	445	445	30.0	134	134		24.0	#N/A	1.8	28.82	0.19	
4/12/96	437	437	30.1	132	132		24.0	#N/A	1.9	28.81	0.19	
4/13/96	439	439	30	131	131		24.0	#N/A	1.9	28.86	0.19	
4/14/96	439	439	30	131	131		24.0	#N/A	1.9	28.86	0.19	
4/15/96	441	441	29.8	131	131		24.0	#N/A	1.9	28.9	0.19	
4/16/96	439	439	30.7	135	135		24.0	#N/A	1.5	28.8	0.19	
4/17/96	431	431	30.0	129	129		24.0	#N/A	2.0	28.82	0.18	

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4/18/96	432	432	29.5	128	128		24.0	#N/A	1.5	28.95	0.18	
4/19/96	433	433	29.8	129	129		24.0	#N/A	1.7	28.97	0.19	
4/20/96	430	430	30	131	131		24.0	#N/A	1.8	28.94	0.19	
4/21/96	430	430	30	131	131		24.0	#N/A	1.8	28.94	0.19	
4/22/96	428	428	30.8	132	132		24.0	#N/A	1.9	28.9	0.19	
4/23/96	441	441	30.8	136	136		24.0	#N/A	2.6	28.95	0.20	
4/24/96	445	445	31.8	141	141		24.0	#N/A	2.7	28.87	0.20	
4/25/96	442	442	31.8	140	140		24.0	#N/A	2.7	28.8	0.21	
4/26/96	453	453	31.8	144	144		24.0	#N/A	3.3	28.8	0.21	
4/27/96	466	466	32	147	147		24.0	#N/A	3.3	28.80	0.21	
4/28/96	466	466	32	147	147		24.0	#N/A	3.3	28.80	0.21	
4/29/96	466	466	32	147	147		24.0	#N/A	3.3	28.80	0.21	
4/30/96	466	466	32	147	147		24.0	#N/A	3.3	28.80	0.21	
5/1/96	478	477	31.3	150	149		23.9	#N/A	3.4	28.79	0.22	
5/2/96	482	482	31.8	153	153		24.0	#N/A	3.5	28.8	0.22	
5/3/96	482	482	31.8	153	153		24.0	#N/A	3.5	28.8	0.22	
5/4/96	482	482	32	154	154		24.0	#N/A	3.5	28.8	0.22	
5/5/96	482	482	32	154	154		24.0	#N/A	3.5	28.8	0.22	
5/6/96	481	481	32.2	155	155		24.0	#N/A	3.5	28.8	0.22	
5/7/96	486	486	30.5	148	148		24.0	#N/A	3.5	28.8	0.21	
5/8/96	483	483	30.3	146	146		24.0	#N/A	3.5	28.8	0.21	
5/9/96	483	483	28.9	140	140		24.0	#N/A	3.5	28.81	0.21	
5/10/96	481	481	30.2	145	145		24.0	#N/A	3.8	28.9	0.21	
5/11/96	482	482	30	143	143		24.0	#N/A	3.8	28.9	0.21	
5/12/96	482	482	30	143	143		24.0	#N/A	3.8	28.9	0.20	
5/13/96	483	483	29.1	141	141		24.0	#N/A	3.8	28.88	0.20	
5/14/96	492	492	28.7	141	141		24.0	#N/A	3.8	28.8	0.20	
5/15/96	489	489	29.2	143	143		24.0	#N/A	4.4	28.81	0.21	
5/16/96	510	510	29.6	151	151		24.0	#N/A	5.0	28.8	0.22	
5/17/96	523	523	28.7	150	150		24.0	#N/A	5.4	28.85	0.22	
5/18/96	530	530	29	155	155		24.0	#N/A	5.5	28.83	0.22	
5/19/96	530	530	29	155	155		24.0	#N/A	5.5	28.83	0.23	
5/20/96	536	536	29.7	159	159		24.0	#N/A	5.6	28.8	0.23	
5/21/96	527	527	30.5	161	161		24.0	#N/A	5.6	28.79	0.23	
5/22/96	523	523	30.0	157	157		24.0	#N/A	5.6	28.8	0.23	
5/23/96	534	534	29.4	157	157		24.0	#N/A	5.5	28.79	0.22	
5/24/96	537	537	28.2	151	151		24.0	#N/A	5.5	28.6	0.22	
5/25/96	535	525	29	156	153		23.5	#N/A	5.6	28.70	0.22	
5/26/96	535	535	29	156	156		24.0	#N/A	5.6	28.70	0.22	
5/27/96	535	535	29	156	156		24.0	#N/A	5.6	28.70	0.23	
5/28/96	534	534	30.0	160	160		24.0	#N/A	5.8	28.8	0.45	
5/30/96	525	525	29.4	154	154		24.0	#N/A	5.4	28.8	0.22	
5/31/96	525	525	29.9	157	157		24.0	#N/A	5.8	28.8	0.23	
6/1/96	526	526	31	161	161		24.0	#N/A	5.9	28.84	0.22	
6/2/96	526	494	31	161	151		22.5	#N/A	5.9	28.84	0.23	
6/3/96	528	528	31.1	164	164		24.0	#N/A	6.0	28.88	0.23	
6/4/96	518	518	29.7	154	154		24.0	#N/A	5.9	28.8	0.22	
6/5/96	519	519	29.8	154	154		24.0	#N/A	5.9	28.8	0.23	
6/6/96	526	526	30.4	160	160		24.0	#N/A	5.8	28.8	0.23	
6/7/96	524	524	30.7	161	161		24.0	#N/A	5.8	28.8	0.23	
6/8/96	526	526	31	161	161		24.0	#N/A	5.9	28.80	0.23	
6/9/96	526	526	31	161	161		24.0	#N/A	5.9	28.80	0.23	
6/10/96	527	527	30.7	162	162		24.0	#N/A	6.0	28.8	0.24	
6/11/96	531	531	31.7	168	168		24.0	#N/A	5.8	28.8	0.22	
6/12/96	557	393	34.1	190	134		16.9	#N/A	5.9	28.81	0.23	
6/13/96	538	538	33.2	179	179		24.0	#N/A	5.6	28.8	0.17	
6/14/96	519	200	31.7	164	63		9.2	#N/A	4.8	28.8	0.16	
6/15/96	527	527	31	165	165		24.0	#N/A	5.2	28.81	0.24	
6/16/96	527	527	31	165	165		24.0	#N/A	5.2	28.81	0.24	
6/17/96	535	535	30.8	165	165		24.0	#N/A	5.6	28.82	0.24	
6/18/96	526	526	31.2	164	164		24.0	#N/A	5.0	28.7	0.24	
6/19/96	512	512	32.3	165	165		24.0	#N/A	5.0	28.75	0.24	
6/20/96	523	523	32.4	169	169		24.0	#N/A	4.9	28.75	0.24	
6/21/96	527	527	31.0	163	163		24.0	#N/A	4.8	28.7	0.24	
6/22/96	527	527	31	164	164		24.0	#N/A	4.8	28.75	0.24	

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6/23/96	527	527	31	164	164		24.0	#N/A	4.8	28.75	0.24	
6/24/96	526	526	31.3	165	164		24.0	#N/A	4.8	28.8	0.24	
6/25/96	519	519	32.2	167	167		24.0	#N/A	5.0	28.75	0.20	
6/26/96	468	468	24.4	114	114		24.0	#N/A	2.1	28.75	0.14	
6/27/96	352	352	24.2	85	85		24.0	#N/A	0.0	28.82	0.13	
6/28/96	357	357	26.1	93	93		24.0	#N/A	5.3	28.85	0.16	
6/29/96	424	424	30	126	126		24.0	#N/A	5.3	28.83	0.18	
6/30/96	424	424	30	126	126		24.0	#N/A	5.3	28.83	0.21	
7/1/96	490	490	33.5	164	164		24	313	5.3	28.80	0.24	42.05
7/2/96	501	501	33.4	167	167		24	#N/A	5.5	28.75	0.23	
7/3/96	519	519	30.3	157	157		24	#N/A	5.3	28.78	0.23	
7/4/96	526	526	31.55	166	166		24	#N/A	5.6	28.74	0.24	
7/5/96	526	526	31.55	166	166		24	#N/A	5.6	28.74	0.24	
7/6/96	526	526	31.55	166	166		24	#N/A	5.6	28.74	0.24	
7/7/96	526	526	31.55	166	166		24	#N/A	5.6	28.74	0.25	
7/8/96	533	533	32.8	175	175		24	#N/A	5.8	28.70	0.26	
7/9/96	543	543	33.6	182	182		24	#N/A	6.1	28.70	0.26	
7/10/96	552	552	32.5	179	179		24	#N/A	7.0	28.82	0.26	
7/11/96	559	559	32.3	181	181		24	#N/A	7.1	28.85	0.27	
7/12/96	579	579	33.0	191	191		24	#N/A	7.6	28.83	0.28	
7/13/96	597	597	32	194	194		24	#N/A	8.0	28.83	0.28	
7/14/96	597	597	32	194	194		24	#N/A	8.0	28.83	0.28	
7/15/96	614	614	31.9	196	196		24	#N/A	8.3	28.83	0.27	
7/16/96	595	595	31.1	185	185		24	#N/A	8.3	28.80	0.27	
7/17/96	593	593	31.4	186	186		24	#N/A	8.2	28.80	0.27	
7/18/96	591	591	31.7	187	187		24	#N/A	8.1	28.80	0.27	
7/19/96	590	590	31.6	187	187		24	#N/A	8.3	28.80	0.27	
7/20/96	591	591	31.5	186	186		24	#N/A	8.3	28.85	0.27	
7/21/96	591	591	31.5	186	186		24	#N/A	8.3	28.85	0.27	
7/22/96	592	592	31.4	186	186		24	#N/A	8.3	28.90	0.27	
7/23/96	605	605	31.6	191	191		24	#N/A	8.1	28.92	0.27	
7/24/96	592	592	31.5	187	187		24	#N/A	7.9	28.8	0.26	
7/25/96	578	578	30.9	179	179		24	#N/A	7.6	28.79	0.26	
7/26/96	578	578	30.9	179	179		24	#N/A	7.6	28.79	0.26	
7/27/96	584	584	32.2	188	188		24	#N/A	8.1	28.82	0.27	
7/28/96	584	584	32.2	188	188		24	#N/A	8.1	28.82	0.28	
7/29/96	590	590	33.4	197	197		24	#N/A	8.5	28.85	0.28	
7/30/96	580	580	33.4	194	194		24	#N/A	8.5	28.8	0.28	
7/31/96	569	569	33.5	191	191		24	#N/A	8.5	28.79	0.28	
8/1/96	591	591	32.4	191	191		24	#N/A	8.5	28.78	0.27	
8/2/96	585	585	32.0	187	187		24	#N/A	8.5	28.79	0.27	
8/3/96	591	591	32.0	189	189		24	#N/A	8.5	28.80	0.27	
8/4/96	591	591	32.0	189	189		24	#N/A	8.5	28.80	0.27	
8/5/96	597	597	32.0	191	191		24	#N/A	8.5	28.8	0.28	
8/6/96	593	593	32.5	193	193		24	#N/A	8.4	28.85	0.28	
8/7/96	585	585	33.6	197	197		24	#N/A	8.3	28.81	0.28	
8/8/96	586	581	33.0	193	192		23.8	#N/A	8.3	28.82	0.28	
8/9/96	585	585	32.5	190	190		24	#N/A	8.5	28.8	0.26	
8/10/96	588	520	31.9	187	165		21.2	#N/A	8.8	28.80	0.25	
8/11/96	588	588	31.9	187	187		24	#N/A	8.8	28.80	0.27	
8/12/96	591	591	31.2	184	184		24	#N/A	9.1	28.8	0.27	
8/13/96	585	585	31.8	186	186		24	#N/A	9.3	28.8	0.27	
8/14/96	596	596	32.5	194	194		24	#N/A	9.1	28.8	0.27	
8/15/96	581	581	31.4	183	183		24	#N/A	9.1	28.81	0.27	
8/16/96	583	583	32.9	192	192		24	#N/A	8.8	28.8	0.27	
8/17/96	589	584	32.4	191	189		23.8	#N/A	8.7	28.81	0.27	
8/18/96	589	589	32.4	191	191		24	#N/A	8.7	28.81	0.27	
8/19/96	595	595	31.8	189	189		24	#N/A	8.5	28.82	0.27	
8/20/96	594	582	33.0	196	192		23.5	#N/A	8.8	28.85	0.28	
8/21/96	590	590	32.8	194	194		24	#N/A	8.8	28.8	0.26	
8/22/96	591	512	32.9	194	168		20.8	#N/A	8.9	28.75	0.26	
8/23/96	584	584	32.7	191	191		24	#N/A	8.8	28.700	0.27	
8/24/96	584	584	32.7	191	191		24	#N/A	8.8	28.700	0.27	
8/25/96	584	584	32.7	191	191		24	#N/A	8.8	28.700	0.27	
8/26/96	577	577	32.5	188	188		24	#N/A	8.6	28.65	0.27	

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8/27/96	573	573	32.7	187	187		24	#N/A	8.6	28.65	0.28	
8/28/96	614	614	32.1	197	197		24	#N/A	8.6	28.65	0.27	
8/29/96	564	564	32.1	181	181		24	#N/A	8.6	28.65	0.26	
8/30/96	564	564	32.1	181	181		24	#N/A	8.6	28.65	0.26	
8/31/96	564	564	32.1	181	181		24	#N/A	8.6	28.65	0.26	
9/1/96	564	564	32.1	181	181		24	#N/A	8.6	28.65	0.26	
9/2/96	564	564	32.1	181	181		24	#N/A	8.6	28.65	0.26	
9/3/96	564	564	32.1	181	181		24	#N/A	8.6	28.65	0.26	
9/4/96	564	564	32.1	181	181		24	#N/A	8.6	28.65	0.27	
9/5/96	597	597	32.8	196	196		24	#N/A	9.4	28.62	0.28	
9/6/96	592	592	32.0	190	190		24	#N/A	9.5	28.62	0.28	
9/7/96	597	597	33.6	200	200		24	#N/A	9.3	28.69	0.29	
9/8/96	594	594	34.4	205	205		24	#N/A	9.3	28.69	0.29	
9/9/96	594	590	34.8	207	205		23.8	#N/A	9.3	28.69	0.30	
9/10/96	594	594	34.55	205	205		24	#N/A	9.3	28.69	0.30	
9/11/96	594	594	34.425	205	205		24	#N/A	9.3	28.69	0.30	
9/12/96	601	601	34.4625	207	207		24	#N/A	9.0	28.75	0.30	
9/13/96	579	579	35.2	204	204		24	#N/A	9.3	28.65	0.29	
9/14/96	579	579	35.2	204	204		24	#N/A	9.3	28.65	0.29	
9/15/96	579	579	35.2	204	204		24	#N/A	9.3	28.65	0.29	
9/16/96	581	581	34.3	199	199		24	#N/A	9.0	28.7	0.28	
9/17/96	558	558	34.3	191	191		24	#N/A	9.0	28.84	0.28	
9/18/96	563	563	34.5	194	194		24	#N/A	9.2	28.83	0.28	
9/19/96	563	563	34.5	194	194		24	#N/A	9.2	28.83	0.28	
9/20/96	569	569	34.7	197	197		24	#N/A	9.3	28.82	0.22	
9/21/96	300	300	34.7	104	104		24	#N/A	9.3	28.82	0.15	
9/22/96	300	300	34.7	104	104		24	#N/A	9.3	28.82	0.15	
9/23/96	300	300	34.7	104	104		24	#N/A	9.3	28.82	0.21	
9/24/96	587	587	32.2	189	189		24	#N/A	9.2	28.8	0.28	
9/25/96	591	591	33.2	196	196		24	#N/A	9.0	28.8	0.29	
9/26/96	576	576	34.8	201	201		24	#N/A	9.3	28.78	0.28	
9/27/96	521	521	37.0	192	192		24	#N/A	9.3	28.78	0.28	
9/28/96	521	521	37.0	192	192		24	#N/A	9.3	28.78	0.28	
9/29/96	521	521	37.0	192	192		24	#N/A	9.3	28.78	0.28	
9/30/96	521	521	37.0	192	192		24	#N/A	9.3	28.78	0.18	
10/1/96	521	174	37.0	192	64		8	322	9.3	28.78	0.18	42.78
10/2/96	583	583	31.7	185	185		24	#N/A	9.1	28.82	0.28	
10/3/96	598	598	33.5	200	200		24	#N/A	10.8	28.78	0.28	
10/4/96	629	629	30.5	192	192		24	#N/A	12.5	28.70	0.28	
10/5/96	623	623	31.0	193	193		24	#N/A	12.4	28.75	0.28	
10/6/96	623	623	31.0	193	193		24	#N/A	12.4	28.75	0.28	
10/7/96	619	619	31.4	194	194		24	#N/A	12.3	28.79	0.26	
10/8/96	607	567	30.4	185	172		22.4	#N/A	12.8	28.78	0.23	
10/9/96	635	489	31.1	197	152		18.5	#N/A	12.5	28.80	0.25	
10/10/96	635	635	29.9	190	190		24	#N/A	12.5	28.87	0.28	
10/11/96	645	645	30.7	198	198		24	#N/A	12.6	28.82	0.28	
10/12/96	642	642	30.2	194	194		24	#N/A	12.6	28.82	0.28	
10/13/96	642	642	30.2	194	194		24	#N/A	12.6	28.82	0.28	
10/14/96	641	641	29.7	191	191		24	#N/A	12.5	28.82	0.28	
10/15/96	624	624	31.9	199	199		24	#N/A	12.5	28.78	0.28	
10/16/96	631	631	29.7	187	187		24	#N/A	12.0	28.78	0.27	
10/17/96	630	630	30.7	193	193		24	#N/A	12.5	28.80	0.28	
10/18/96	632	632	29.9	189	189		24	#N/A	12.3	28.81	0.27	
10/19/96	630	630	28.7	180	180		24	#N/A	12.1	28.91	0.26	
10/20/96	630	630	28.7	181	181		24	#N/A	12.1	28.91	0.25	
10/21/96	627	627	27.4	172	172		24	#N/A	11.8	29.00	0.24	
10/22/96	635	582	27.2	173	158		22	#N/A	11.8	29.00	0.16	
10/23/96	648	211	30.4	197	64		7.8	#N/A	12.0	28.70	0.13	
10/24/96	624	299	37.2	232	111		11.5	#N/A	7.0	28.78	0.23	
10/25/96	626	626	32.8	205	205		24	#N/A	7.0	28.75	0.29	
10/26/96	626	626	32.6	204	204		24	#N/A	7.0	28.85	0.29	
10/27/96	626	626	32.6	204	204		24	#N/A	7.0	28.85	0.29	
10/28/96	625	625	32.3	202	202		24	#N/A	7.0	28.95	0.82	
10/31/96	609	609	29.5	180	180		24	#N/A	6.5	28.92	0.26	
11/1/96	618	618	30.0	185	185		24	#N/A	7.4	28.95	0.27	

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11/2/96	632	632	30.1	190	190		24	#N/A	8.1	28.89	0.27	
11/3/96	633	633	30.1	190	190		24	#N/A	8.1	28.89	0.28	
11/4/96	647	647	30.2	195	195		24	#N/A	8.8	28.82	0.28	
11/5/96	640	640	30.0	192	192		24	#N/A	9.0	28.85	0.27	
11/6/96	624	624	29.5	184	184		24	#N/A	8.5	28.95	0.22	
11/7/96	635	410	30.2	192	124		15.5	#N/A	8.8	29.02	0.15	
11/8/96	650	217	39.0	253	84		8	#N/A	8.3	29.00	0.21	
11/9/96	626	626	33.3	209	209		24	#N/A	7.7	28.98	0.30	
11/10/96	626	626	33.3	209	209		24	#N/A	7.7	28.98	0.29	
11/11/96	626	593	33.3	209	197		22.7	#N/A	7.7	28.98	0.26	
11/12/96	602	602	27.6	166	166		24	#N/A	7.0	28.95	0.24	
11/13/96	611	611	28.0	171	171		24	#N/A	7.0	28.90	0.25	
11/14/96	611	611	28.0	171	171		24	#N/A	7.0	28.90	0.25	
11/15/96	620	620	28.4	176	176		24	#N/A	7.0	28.85	0.25	
11/16/96	619	612	29.1	180	178		23.7	#N/A	7.2	28.92	0.26	
11/17/96	619	619	29.1	180	180		24	#N/A	7.2	28.92	0.26	
11/18/96	619	619	29.8	184	184		24	#N/A	7.4	28.98	0.21	
11/19/96	620	380	29.9	185	114		14.7	#N/A	7.3	28.85	0.18	
11/20/96	628	406	33.7	212	137		15.5	#N/A	5.8	28.80	0.24	
11/21/96	629	629	30.3	191	191		24	#N/A	5.8	28.78	0.28	
11/22/96	614	614	32.3	198	198		24	#N/A	5.5	28.78	0.28	
11/23/96	616	616	31.3	192	192		24	#N/A	5.6	28.88	0.28	
11/24/96	616	616	31.3	193	193		24	#N/A	5.6	28.88	0.27	
11/25/96	617	617	30.2	186	186		24	#N/A	5.6	28.97	0.27	
11/26/96	619	619	30.5	189	189		24	#N/A	5.6	28.90	0.28	
11/27/96	622	622	32.1	200	200		24	#N/A	5.5	29.00	0.28	
11/28/96	624	624	30.9	193	193		24	#N/A	5.8	28.96	0.28	
11/29/96	624	624	30.9	193	193		24	#N/A	5.8	28.96	0.28	
11/30/96	624	624	30.9	193	193		24	#N/A	5.8	28.96	0.28	
12/1/96	624	624	30.9	193	193		24	#N/A	5.8	28.96	0.27	
12/2/96	626	621	29.7	186	184		23.8	#N/A	6.1	28.92	0.27	
12/3/96	652	646	29.5	192	191		23.8	#N/A	7.3	28.85	0.27	
12/4/96	655	655	28.1	184	184		24	#N/A	7.3	28.95	0.27	
12/5/96	668	668	28.7	192	192		24	#N/A	7.1	28.97	0.27	
12/6/96	661	661	26.9	178	178		24	#N/A	7.1	28.82	0.26	
12/7/96	659	659	28.2	186	186		24	#N/A	6.9	28.81	0.27	
12/8/96	660	660	28.2	186	186		24	#N/A	6.9	28.81	0.27	
12/9/96	657	657	29.4	193	193		24	#N/A	6.6	28.80	0.27	
12/10/96	645	645	28.6	184	184		24	#N/A	6.6	28.90	0.27	
12/11/96	646	646	28.6	185	185		24	#N/A	6.6	28.90	0.27	
12/12/96	646	646	28.6	185	185		24	#N/A	6.6	28.90	0.26	
12/13/96	633	633	27.7	175	175		24	#N/A	6.5	29.00	0.26	
12/14/96	647	647	29.2	189	189		24	#N/A	6.8	29.01	0.27	
12/15/96	647	647	29.2	189	189		24	#N/A	6.8	29.01	0.28	
12/16/96	660	660	30.7	203	203		24	#N/A	7.0	29.02	0.29	
12/17/96	663	663	29.4	195	195		24	#N/A	6.9	29.00	0.28	
12/18/96	663	663	29.4	195	195		24	#N/A	6.9	29.02	0.27	
12/19/96	667	667	28.0	187	187		24	#N/A	6.8	28.98	0.26	
12/20/96	657	657	26.7	175	175		24	#N/A	6.8	29.00	0.25	
12/21/96	657	657	26.7	175	175		24	#N/A	6.8	29.00	0.25	
12/22/96	657	657	26.7	175	175		24	#N/A	6.8	29.00	0.24	
12/23/96	648	648	25.4	165	165		24	#N/A	6.8	29.01	0.24	
12/24/96	657	657	26.7	176	176		24	#N/A	6.9	28.90	0.25	
12/25/96	658	658	26.7	176	176		24	#N/A	6.9	28.90	0.25	
12/26/96	666	619	28.0	186	173		22.3	#N/A	7.0	28.78	0.26	
12/27/96	664	664	28.7	191	191		24	#N/A	7.0	28.82	0.27	
12/28/96	664	664	28.7	191	191		24	#N/A	7.0	28.82	0.27	
12/29/96	664	664	28.7	191	191		24	#N/A	7.0	28.82	0.28	
12/30/96	664	664	29.4	195	195		24	#N/A	7.0	28.85	0.27	
12/31/96	666	641	29.1	194	186		23.1	331	7.3	28.95	0.27	
										Total	202	489

SUBATTACHMENT 1.D
CASE STUDY - MIRAMAR LANDFILL
SAN DIEGO COUNTY, CALIFORNIA

Table 1.D.1
Unit Methane Generation
South Miramar Landfill

I) SITE INFORMATION:

Parameter	Value
Site Name	Miramar
Site Location	San Diego County
Landfill Phase	South Landfill ('59 - '73)
Date	25-Nov-97
Notes	(1)

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,190	lb/cubic yard	(1),(2)
Exposure Time of Topmost MSW Lift	9.9	years	(1),(2)
Height (thickness) of MSW Cell/Lift	10	feet	(1),(2)
Infiltration Fraction	45%	percent	(1)
Precipitation	9.9	inches/year	(1)

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total LFG Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (3)
A) Pre-1995 (Prior to Implementation of AB 939):														(4)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	6.10E-02	81.37	8.14E-04	0.16	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	3.82E-01	68.37	4.76E-03	0.92	
3 -	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	7.32E-02	83.43	1.11E-03	0.21	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	5.17E-01	NA	6.69E-03	1.29	
Notes					(1)(5)		(1)(5)			(6)		(7)	(8)	

1) Parameters which must be entered by user.
2) MSW = Municipal Solid Waste.
3) Variables and equations shown in brackets are described in Section 3.0.
4) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
5) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
6) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
7) LFG = Landfill Gas.
8) CH4 generation rate in volume at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

Table 1.D.2
Unit Methane Generation
North Miramar Landfill

I) SITE INFORMATION:

Parameter	Value
Site Name	Miramar
Site Location	San Diego County
Landfill Phase	North Landfill (73-83)
Date	25-Nov-97
Notes	(1)

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1.200	lb/cubic yard	(1),(2)
Exposure Time of MSW Layer in Topmost Position	3.9	years	(1),(2)
Height (thickness) of MSW Cell/Lift	15	feet	(1),(2)
Infiltration Fraction	45%	percent	(1)
Precipitation	9.9	inches/year	(1)

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total LFG Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (3)
A) Pre-1995 (Prior to Implementation of AB 939):														(4)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	1.60E-02	74.13	7.41E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	1.00E-01	39.76	2.77E-03	0.53	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	1.92E-02	77.94	1.04E-03	0.20	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	1.35E-01	NA	4.55E-03	0.88	
Notes					(1)(5)		(1)(5)			(6)		(7)	(8)	

1) Parameters which must be entered by user.
2) MSW = Municipal Solid Waste.
3) Variables and equations shown in brackets are described in Section 3.0.
4) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
5) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
6) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
7) LFG = Landfill Gas.
8) CH4 generation rate in volume at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

Table 1.D.3
Unit Methane Generation
West Miramar Landfill

I) SITE INFORMATION:

Parameter	Value
Site Name	Miramar
Site Location	San Diego County
Landfill Phase	West Landfill ('83-present)
Date	25-Nov-97
Notes	(1)

II) CONSTANTS:

Parameter	Value	Units	Notes
MSW Compaction	1,200	lb/cubic yard	(1),(2)
Exposure Time of MSW Layer in Topmost Position	6.8	years	(1),(2)
Height (thickness) of MSW Cell/Lift	20	feet	(1),(2)
Infiltration Fraction	40%	percent	(1)
Precipitation	9.9	inches/year	(1)

III) CALCULATIONS:

Component Index	Waste Component	Molecular Formula	Molecular Weight (lb/mole) [M]	Carbon Atoms Per Molecule [a]	Composition of Waste Stream (%) [C]	Mass of Waste Component Per Unit Wet MSW (lb) [m = C/100]	Wet Basis Moisture Content (%) [Ww]	Dry Mass Per Unit MSW (lb) [md = m * ((1-Ww)/100)]	Water Mass Per Unit MSW (lb) [m' = m - md]	Precipitation Mass Deposited on Unit Area (lb) [mp]	Wet Basis Moisture Content After Infiltration (%) [Ww*=(m'+mp)/(md+m'+mp)]	Total LFG Generated Per Unit MSW (moles) [n = a * md * Ww* / 100 / M]	CH4 Generated Per Unit MSW (cu ft/lb) [G]	Notes (3)
A) Pre-1995 (Prior to Implementation of AB 939):														(4)
1	Food	C6H12O6	180	6	10	0.10	70	0.03	0.07	1.84E-02	74.66	7.47E-04	0.14	
2	Paper	Half C6H10O5	162	6	40	0.40	6	0.19	0.02	1.15E-01	42.57	2.96E-03	0.57	
3	Vegetation	Half C6H10O5	162	6	18	0.18	60	0.04	0.11	2.21E-02	78.32	1.04E-03	0.20	
4	Remainder	Inorganic	NA	0	32	0.32	6	0.30	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.55	0.22	1.56E-01	NA	4.75E-03	0.92	
B) 1995 - 1999 (25 Percent Waste Reduction - AB 939):														(4)
1	Food	C6H12O6	180	6	13	0.13	70	0.04	0.09	2.80E-02	75.32	9.79E-04	0.19	
2	Paper	Half C6H10O5	162	6	31	0.31	6	0.15	0.02	1.05E-01	45.85	2.47E-03	0.48	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	2.30E-02	78.81	9.34E-04	0.18	
4	Remainder	Inorganic	NA	0	40	0.40	6	0.38	0.02	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.59	0.23	1.56E-01	NA	4.39E-03	0.85	
C) 2000, and Beyond (50 Percent Waste Reduction - AB 939)														(4)
1	Food	C6H12O6	180	6	20	0.20	70	0.06	0.14	5.03E-02	76.03	1.52E-03	0.29	
2	Paper	Half C6H10O5	162	6	20	0.20	6	0.09	0.01	7.87E-02	49.12	1.71E-03	0.33	
3	Vegetation	Half C6H10O5	162	6	16	0.16	60	0.03	0.10	2.68E-02	79.33	9.40E-04	0.18	
4	Remainder	Inorganic	NA	0	44	0.44	6	0.41	0.03	0.00E+00	6.00	0	0.00	
SUM	MSW Residue	NA	NA	NA	100	1.00	NA	0.60	0.27	1.56E-01	NA	4.17E-03	0.80	
Notes					(1)(5)		(1)(5)			(6)		(7)	(8)	

1) Parameters which must be entered by user.
2) MSW = Municipal Solid Waste.
3) Variables and equations shown in brackets are described in Section 3.0.
4) AB 939 = California Assembly Bill 939, Integrated Solid Waste Management Act of 1989.
5) Percentage of MSW residue components [C] and moisture content [Ww] are based on Solid Waste Association of North America's (SWANA's) course for Managers of Landfill Operations (1991).
6) Estimation of precipitation deposited on unit area [mp] based on the constants listed in Section II.
7) LFG = Landfill Gas.
8) CH4 generation rate in volume at reference temperature = 20 °C and atmospheric pressure = 1 atmosphere.

TABLE 1.D.4
METHANE AND LANDFILL GAS GENERATION FORECAST
MIRAMAR LANDFILL

I) GENERAL INFORMATION:

PARAMETER	VALUE
Analysis Title	CH4 & LFG Generation
Location	Miramar Landfill
Date	25-Nov-97
Notes	(1)

II) CONSTANTS:

PARAMETER	VALUE	UNITS	NOTES
Generation Date	31-Aug-97	Date	(1),(2)
Halflife	15	Years	(3)
Fraction of CH4 in LFG	40%	Percentage	(3)

III) CALCULATIONS:

PARAMETER	UNITS	South Landfill ('59 - '73)	North Landfill ('73-'83)	West Phase 1 ('83-'95)	West Phase 2 ('95 - present)	NOTES
Start of Landfilling	Date	7-Dec-59	6-May-73	16-Jun-83	1-Jul-95	(1)
End of Landfilling	Date	5-May-73	15-Jun-83	1-Jul-95	31-Aug-97	(1)
Landfilling Interval	years	13.42	10.12	12.05	2.17	
Time After Closure	years	24.34	14.22	2.17	0.00	
Landfilling Days/year	days	361	361	361	361	(3)
Waste Flowrate	tons per day	516	2,670	3,644	5,626	(1),(4)
Waste in Place	million tons	2.50	9.75	15.85	4.41	(1),(4)
Cumulative Waste In Place	million tons	2.50	12.25	28.10	32.51	
CH4 Per Unit MSW [G]	cu ft per lb	1.29	0.88	0.92	0.85	(1),(5)
CH4 & LFG Half-life	years	15.0	15.0	15.0	15.0	
CH4 Generation Rate	scfm	137	623	1774	624	(6)
LFG Generation Rate	scfm	343	1558	4435	1561	
Cumulative CH4 Gen. Rate	scfm	137	760	2534	3159	
Cumulative LFG Gen. Rate	scfm	343	1901	6336	7897	

1) Parameters which must be entered by user.
2) LFG = Landfill Gas.
3) Based on SDAPCD records.
4) Calculation varies based on whether a total landfill volume or waste flowrate is known.
   Base calculation on number of days of landfill operation per year.
5) CH4 per unit MSW [G] is a "linked field" with the appropriate Unit Methane Generation in Tables 1.D.1 through 1.D.3.
6) Calculation of methane and LFG Generation Rate is described in Section 3.0.

ATTACHMENT B.2

TRC

TRC

By [illegible] Date 11Feb98 Subject METHANE GENERATION RATE AT WDI Sheet No. ____ of ____

Chkd. By ____ Date ____ Proj. No. 94-256

The following spreadsheet is organized by sample number in which the columns contain the following information:

COLUMN	CONTENTS
1	C for carbon number
2	Lower limit of number of carbon atoms in the petroleum alkane.
3	Upper limit of carbon atoms in the petroleum alkane.
5	Concentration of carbon subrange in soil sample in units of mg/kg as shown in laboratory analyses in Attachment B.7.
4	Arithmetic mean of lower and upper limits
6	Weighted product of mean carbon number and concentration (divided by total concentration of carbon subrange).

Recyclable and made from recycled paper.

			AVERAGE	SAMPLE NO.	WEIGHTED AVERAGE
				12-056-12	
C	20	23	21.5	41	0.91
	24	27	25.5	87	2.29
	28	31	29.5	180	5.49
	32	35	33.5	200	6.92
	36	39	37.5	230	8.91
	40	43	41.5	230	9.86
				968	34.38
				12-056-15	
C	10	11	10.5	3600	0.45
	12	13	12.5	7600	1.14
	14	15	14.5	8600	1.49
	16	17	16.5	8100	1.60
	18	19	18.5	7600	1.68
	20	23	21.5	12000	3.08
	24	27	25.5	9600	2.92
	28	31	29.5	9000	3.17
	32	35	33.5	6600	2.64
	36	39	37.5	11000	4.93
				83700	23.10
				12-056-18	
C	10	11	10.5	5400	1.25
	12	13	12.5	5800	1.60
	14	15	14.5	4900	1.57
	16	17	16.5	4200	1.53
	18	19	18.5	3800	1.55
	20	23	21.5	5500	2.61
	24	27	25.5	4300	2.42
	28	31	29.5	3900	2.54
	32	35	33.5	3500	2.59
	36	39	37.5	2500	2.07
	40	43	41.5	1500	1.37
				45300	21.10
				12-103-18	
C	10	11	10.5	1800	0.72
	12	13	12.5	3200	1.52
	14	15	14.5	3500	1.93
	16	17	16.5	3500	2.20
	18	19	18.5	3000	2.11
	20	23	21.5	3500	2.86
	24	27	25.5	2400	2.33
	28	31	29.5	2400	2.69
	32	35	33.5	1800	2.29
	36	39	37.5	1200	1.71
				26300	20.36
				12-103-15	
C	12	13	12.5	1500	0.38
	14	15	14.5	2300	0.68
	16	17	16.5	3500	1.18
	18	19	18.5	4600	1.74
	20	23	21.5	9300	4.08
	24	27	25.5	8800	4.58
	28	31	29.5	8900	5.36
	32	35	33.5	6300	4.31
	36	39	37.5	3800	2.91
				49000	25.21

			AVERAGE	SAMPLE NO.	WEIGHTED AVERAGE
				12-103-19	
C	10	11	10.5	34	0.45
	12	13	12.5	76	1.21
	14	15	14.5	72	1.33
	16	17	16.5	73	1.53
	18	19	18.5	85	2.00
	20	23	21.5	120	3.28
	24	27	25.5	100	3.24
	28	31	29.5	100	3.75
	32	35	33.5	77	3.28
	36	39	37.5	49	2.34
				786	22.42
				12-103-21	
C	10	11	10.5	1200	0.79
	12	13	12.5	1700	1.32
	14	15	14.5	1600	1.45
	16	17	16.5	1600	1.65
	18	19	18.5	1500	1.73
	20	23	21.5	2300	3.08
	24	27	25.5	1900	3.02
	28	31	29.5	2000	3.68
	32	35	33.5	1400	2.92
	36	39	37.5	840	1.96
				16040	21.60
				12-103-24	
C	12	13	12.5	110	0.43
	14	15	14.5	130	0.59
	16	17	16.5	160	0.83
	18	19	18.5	210	1.22
	20	23	21.5	420	2.84
	24	27	25.5	540	4.34
	28	31	29.5	390	3.62
	32	35	33.5	450	4.75
	36	39	37.5	410	4.84
	40	43	41.5	270	3.53
	44	+	44	84	1.16
				3174	28.18
				12-103-26	
C	10	11	10.5	2500	0.69
	12	13	12.5	3600	1.18
	14	15	14.5	3600	1.37
	16	17	16.5	3500	1.52
	18	19	18.5	6800	3.31
	20	23	21.5	5200	2.94
	24	27	25.5	4100	2.75
	28	31	29.5	3900	3.03
	32	35	33.5	2900	2.56
	36	39	37.5	1900	1.88
				38000	21.23

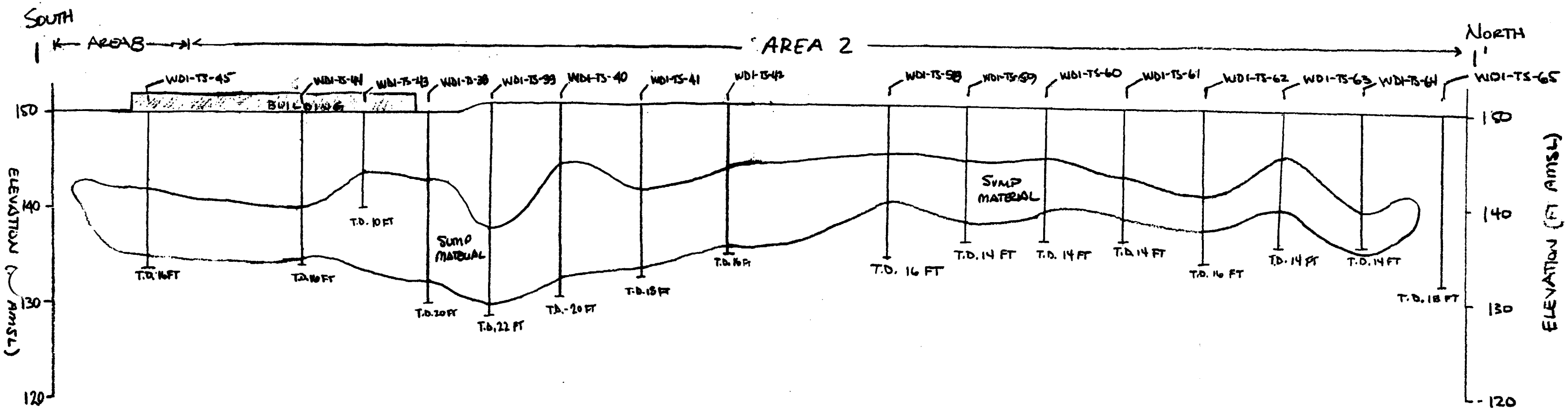
			AVERAGE	SAMPLE NO.	WEIGHTED AVERAGE
				12-146-12	
C	10	11	10.5	1000	0.31
	12	13	12.5	2100	0.78
	14	15	14.5	2900	1.24
	16	17	16.5	3500	1.71
	18	19	18.5	3800	2.08
	20	23	21.5	6000	3.82
	24	27	25.5	4800	3.62
	28	31	29.5	4600	4.01
	32	35	33.5	3100	3.07
	36	39	37.5	2000	2.22
				33800	22.86
				12-146-15	
C	12	13	12.5	22	0.75
	14	15	14.5	34	1.35
	16	17	16.5	36	1.62
	18	19	18.5	66	3.34
	20	23	21.5	58	3.41
	24	27	25.5	58	4.04
	28	31	29.5	45	3.63
	32	35	33.5	35	3.20
	36	39	37.5	12	1.23
				366	22.57
				12-226-9	
C	10	11	10.5	170	0.71
	12	13	12.5	280	1.39
	14	15	14.5	270	1.56
	16	17	16.5	260	1.71
	18	19	18.5	250	1.84
	20	23	21.5	380	3.25
	24	27	25.5	320	3.25
	28	31	29.5	330	3.88
	32	35	33.5	250	3.34
				2510	20.94
				12-226-13	
C	10	11	10.5	540	0.76
	12	13	12.5	690	1.15
	14	15	14.5	610	1.18
	16	17	16.5	600	1.32
	18	19	18.5	560	1.38
	20	23	21.5	840	2.41
	24	27	25.5	710	2.42
	28	31	29.5	790	3.11
	32	35	33.5	640	2.86
	36	39	37.5	1300	6.51
	40	43	41.5	210	1.16
				7490	24.27

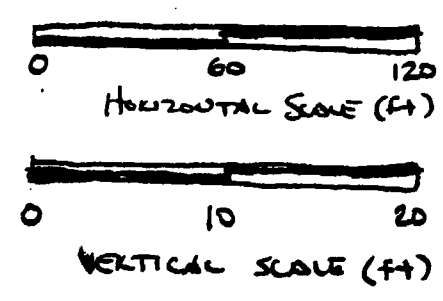
			AVERAGE	SAMPLE NO.	WEIGHTED AVERAGE
				12-304-7	
C	10	11	10.5	720	0.48
	12	13	12.5	1100	0.87
	14	15	14.5	1200	1.10
	16	17	16.5	1300	1.35
	18	19	18.5	1400	1.63
	20	23	21.5	2400	3.26
	24	27	25.5	2200	3.54
	28	31	29.5	2100	3.91
	32	35	33.5	1700	3.59
	36	39	37.5	1100	2.60
	40	43	41.5	630	1.65
				15850	23.98
				12-304-10	
C	24	27	25.5	60	2.22
	28	31	29.5	140	6.00
	32	35	33.5	140	6.82
	36	39	37.5	160	8.72
	40	43	41.5	140	8.44
	44	+	44	48	3.07
				688	35.28

AVERAGE OF WEIGHTED AVERAGED POINTS:	24.50

ATTACHMENT B.3

TRC





DRAFT

WASTE DISPOSAL, INC.

A. Isby
11/1/97
94-256

ATTACHMENT B.4

TRC

DENSITIES OF SELECTED SUBSTANCES

Substance	Density	
Fuels Diesel		7.085 lb/gal
Crude Oil	874 kg/m^3	7.3 lb/gal
Residual Oil	944 kg/m^3	7.88 lb/gal
Distillate Oil	845 kg/m^3	7.05 lb/gal
Gasoline	739 kg/m^3	6.17 lb/gal
Natural Gas	673 kg/m^3	1 lb/23.8 ft^3
Butane	579 kg/m^3	4.84 lb/gal (liquid)
Propane	507 kg/m^3	4.24 lb/gal (liquid)
Wood (Air dried)		
Elm	561 kg/m^3	35 lb/ft^3
Fir, Douglas	513 kg/m^3	32 lb/ft^3
Fir, Balsam	400 kg/m^3	25 lb/ft^3
Hemlock	465 kg/m^3	29 lb/ft^3
Hickory	769 kg/m^3	48 lb/ft^3
Maple, Sugar	689 kg/m^3	43 lb/ft^3
Maple, White	529 kg/m^3	33 lb/ft^3
Oak, Red	673 kg/m^3	42 lb/ft^3
Oak, White	769 kg/m^3	48 lb/ft^3
Pine, Southern	641 kg/m^3	40 lb/ft^3
Agricultural Products		
Corn	25.4 kg/bu	56 lb/bu
Milo	25.4 kg/bu	56 lb/bu
Oats	14.5 kg/bu	32 lb/bu
Barley	21.8 kg/bu	48 lb/bu
Wheat	27.2 kg/bu	60 lb/bu
Cotton	226 kg/bale	500 lb/bale
Mineral Products		
Brick	2.95 kg/brick	6.5 lb/brick
Cement	170 kg/bbl	375 lb/bbl
Cement	1483 kg/m^3	2500 lb/yd^3 = 93 lb/ft^3
Concrete	2373 kg/m^3	4000 lb/yd^3 = 150 "
Glass, Common	2595 kg/m^3	162 lb/ft^3
Gravel, Dry Packed	1600-1920 kg/m^3	100-120 lb/ft^3
Gravel, Wet	2020 kg/m^3	126 lb/ft^3
Gypsum, Calcined	880-960 kg/m^3	55-60 lb/ft^3
Lime, Pebble	850-1025 kg/m^3	53-64 lb/ft^3
Sand, Gravel (Dry, loose)	1440-1680 kg/m^3	90-105 lb/ft^3

From:
AP-42 - A compilation of Air Pollution Emission Factors. USEPA, 1985. Appendix A - Miscellaneous Data.

ATTACHMENT B.5

TRC

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
HEADQUARTERS
9150 Flair Drive, El Monte, California 91731

A CLIMATOLOGICAL/ AIR QUALITY PROFILE

CALIFORNIA SOUTH COAST AIR BASIN

By
Ralph W. Keith
Senior Meteorologist

November, 1980
Second Printing - December, 1981

An
Air Programs Division
Report

Sanford M. Weiss
Director of Air Programs Division

A Paper Presented at the
American Meteorological Society 60th Annual Meeting
Biltmore Hotel, Los Angeles, California
January, 1980

TABLE III

SOUTH COAST AIR BASIN
CLIMATOLOGICAL TEMPERATURE DATA

Average Temperature In Degrees F. By Month		Location: Los Angeles County											
		Burbank	Culver City	Long Beach	Los Angeles	LAX	Mount Wilson a)	No Hollywood	Pasadena	Pomona	Sandberg a)	San Fernando	San Gabriel
Years of Record		30	25	30	30	30	19	21	53	55	30	42	21
Jan.	Max	65	66	65	67	64	40	65	65	64	46	64	67
	Min	42	43	43	47	45	34	38	40	38	34	42	40
Feb.	Max	66	66	66	68	64	50	67	66	65	49	66	68
	Min	44	45	45	49	47	34	40	42	40	35	42	42
Mar.	Max	69	67	68	69	64	52	69	69	68	52	70	71
	Min	47	47	47	50	49	35	43	44	42	36	44	44
Apr.	Max	72	69	71	71	66	59	73	72	73	58	75	74
	Min	51	50	51	53	52	41	47	47	45	40	46	48
May	Max	75	71	74	73	68	64	76	75	77	66	79	77
	Min	54	53	54	56	55	46	50	51	49	46	49	52
June	Max	79	73	77	77	70	73	79	81	84	75	85	82
	Min	57	57	58	60	59	54	53	54	53	53	52	55
July	Max	86	77	83	83	75	80	88	88	91	85	93	89
	Min	61	60	62	64	62	64	57	58	57	63	56	59
Aug.	Max	87	78	84	84	76	79	88	88	91	84	92	89
	Min	62	61	63	64	63	62	57	58	57	62	55	59
Sept.	Max	86	78	83	83	76	77	88	86	89	79	89	88
	Min	60	59	60	63	62	59	55	56	55	59	54	57
Oct.	Max	79	75	78	78	73	67	80	79	81	68	81	81
	Min	54	54	56	59	58	49	49	51	50	50	50	52
Nov.	Max	74	73	73	73	70	58	75	74	74	55	74	76
	Min	47	48	48	52	51	42	41	45	43	41	48	45
Dec.	Max	68	69	67	68	67	53	69	67	66	48	66	70
	Min	44	45	45	48	47	38	41	42	39	36	46	42
Annual	Max	75	72	74	74	69	63	76	76	77	64	78	78
	Min	52	52	53	55	54	47	48	49	47	46	49	50
	Average	64	62	63	65	62	55	62	63	62	55	64	64
Record	Max	106	111	111	110	110	98	112	113	114	102	113	111
Record	Min	32	24	25	28	23	10	18	21	19	3	23	22

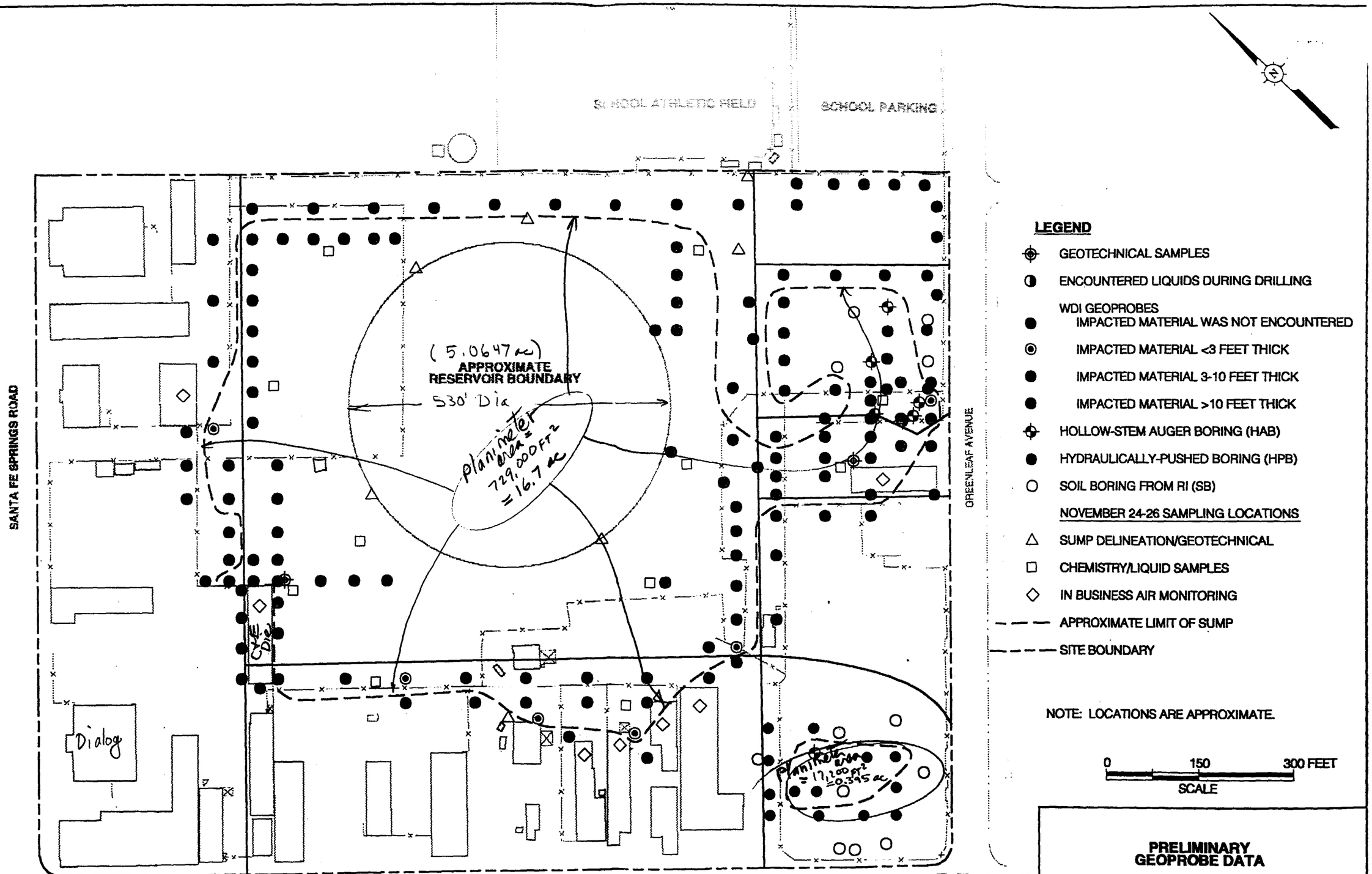
a) mountain location

(Continued)

ATTACHMENT B.6

TRC

94-256PRES11/19/97-08 REV. 11/19/97



PRELIMINARY GEOPROBE DATA

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

ATTACHMENT B.7

TRC

WDI Total Hydrocarbon Matrix
Arithmetic Mean Calculation
CONCENTRATION (mg/kg)

LAB REPORT	USED IN MEAN CALC.
970	970
<50	25
84000	84000
<50	25
45000	45000
<50	25
26000	26000
<10000	5000
790	790
16000	16000
<50	25
3200	3200
38000	38000
34000	34000
<50	25
370	370
2500	2500
<50	25
7500	7500
16000	16000
690	690
<50	25
<50	25
	12,183.48 mg/kg

LOG NO: G97-12-056

Received: 02 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-056-11	WDI-TS-127-3.4-4.8	02 DEC 97
12-056-12	WDI-TS-127-8.11-9.11	02 DEC 97
12-056-13	WDI-TS-127-18.4-19.8	02 DEC 97
12-056-14	WDI-TS-128-3.6-4.8	02 DEC 97
12-056-15	WDI-TS-128-12.0-13.0	02 DEC 97

PARAMETER	12-056-11	12-056-12	12-056-13	12-056-14	12-056-15
Simulated Distillation (D2887)					
Sample Amount, g	10G	10G	10G	10G	10G
Extract Volume, mL	10ML	10ML	10ML	10ML	10ML
Dilution Factor, Times	100	5	1	20	1
C10-C11, mg/kg	<500	<30	<5	<100	3600
C12-C13, mg/kg	<500	<30	<5	<100	7600
C14-C15, mg/kg	<500	<30	<5	<100	8600
C16-C17, mg/kg	<500	<30	<5	100	8100
C18-C19, mg/kg	<500	<30	<5	200	7600
C20-C23, mg/kg	2800	41	<5	610	12000
C24-C27, mg/kg	5400	87	<5	670	9600
C28-C31, mg/kg	6000	180	<5	660	9000
C32-C35, mg/kg	4400	200	<5	390	6600
C36-C39, mg/kg	3100	230	<5	220	11000
C40-C43, mg/kg	1600	230	<5	<100	<5
C44+, mg/kg	<500	<30	<5	<100	<5
Total Hydrocarbon Matrix, mg/kg	23000	970	<50	2900	84000
Other Simulated Distillation (D2887)	---	---	---	---	---
Surrogates **					
Naphthalene Reported, mg/kg	0 NC	6.58	8.18	0 NC	0 NC
Naphthalene Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0
o-Terphenyl Reported, mg/kg	0 NC	7.03	7.12	0 NC	0 NC
o-Terphenyl Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0

LOG NO: G97-12-056

Received: 02 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-056-16	WDI-TS-128-18.0-19.0	02 DEC 97
12-056-17	WDI-TS-129-3.6-3.8	02 DEC 97
12-056-18	WDI-TS-129-8.6-9.85	02 DEC 97
12-056-19	WDI-TS-129-16.4-17.5	02 DEC 97

PARAMETER	12-056-16	12-056-17	12-056-18	12-056-19
Simulated Distillation (D2887)				
Sample Amount, g	10G	10G	10G	10G
Extract Volume, mL	10ML	10ML	10ML	10ML
Dilution Factor, Times	1	1	100	1
C10-C11, mg/kg	<5	<5	5400	<5
C12-C13, mg/kg	<5	<5	5800	<5
C14-C15, mg/kg	<5	<5	4900	<5
C16-C17, mg/kg	<5	<5	4200	<5
C18-C19, mg/kg	<5	<5	3800	<5
C20-C23, mg/kg	<5	<5	5500	<5
C24-C27, mg/kg	<5	<5	4300	<5
C28-C31, mg/kg	<5	<5	3900	<5
C32-C35, mg/kg	<5	<5	3500	<5
C36-C39, mg/kg	<5	<5	2500	<5
C40-C43, mg/kg	<5	<5	1500	<5
C44+, mg/kg	<5	<5	<500	<5
Total Hydrocarbon Matrix, mg/kg	<50	<50	45000	<50
Other Simulated Distillation (D2887)	---	---	---	---
Surrogates **				
Naphthalene Reported, mg/kg	11.0	8.49	0 NC	11.1
Naphthalene Theoretical, mg/kg	10.0	10.0	10.0	10.0
o-Terphenyl Reported, mg/kg	9.32	7.21	0 NC	9.42
o-Terphenyl Theoretical, mg/kg	10.0	10.0	10.0	10.0

LOG NO: G97-12-103

Received: 03 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-103-14	WDI-TS-130-3.8-4.10	03 DEC 97
12-103-15	WDI-TS-130-12-13	03 DEC 97
12-103-16	WDI-TS-131-2.6-3.0	03 DEC 97
12-103-17	WDI-TS-132-2.9-3.10	03 DEC 97
12-103-18	WDI-TS-132-10-11	03 DEC 97

PARAMETER	12-103-14	12-103-15	12-103-16	12-103-17	12-103-18
Simulated Distillation (D2887)					
Sample Amount, g	10G	10G	10G	10G	10G
Extract Volume, mL	10ML	10ML	10ML	10ML	10ML
Dilution Factor, Times	10	100	1	50	200
C10-C11, mg/kg	<50	1800	<5	<300	<1000
C12-C13, mg/kg	<50	3200	<5	<300	1500
C14-C15, mg/kg	<50	3500	<5	<300	2300
C16-C17, mg/kg	<50	3500	<5	<300	3500
C18-C19, mg/kg	82	3000	<5	370	4600
C20-C23, mg/kg	280	3500	<5	1000	9300
C24-C27, mg/kg	560	2400	<5	1200	8800
C28-C31, mg/kg	490	2400	<5	1600	8900
C32-C35, mg/kg	570	1800	<5	1200	6300
C36-C39, mg/kg	510	1200	<5	880	3800
C40-C43, mg/kg	340	<500	<5	<300	<1000
C44+, mg/kg	<50	<500	<5	<300	<1000
Total Hydrocarbon Matrix, mg/kg	2900	26000	<50	6500	<10000
Other Simulated Distillation (D2887)	---	---	---	---	---
Surrogates **					
1,3-Dichlorobenzene Reported, mg/kg	---	---	---	---	4900
Naphthalene Reported, mg/kg	0 NC	0 NC	6.58	0 NC	0 NC
Naphthalene Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0
o-Terphenyl Reported, mg/kg	0 NC	0 NC	6.86	0 NC	0 NC

LOG NO: G97-12-103

Received: 03 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-103-19	WDI-TS-132-17.2-18	03 DEC 97
12-103-20	WDI-TS-133-3.8-4.8	03 DEC 97
12-103-21	WDI-TS-133-10.5-11.2	03 DEC 97
12-103-22	WDI-TS-133-19.3-20	03 DEC 97
12-103-23	WDI-TS-134-2.8-3.8	03 DEC 97

PARAMETER	12-103-19	12-103-20	12-103-21	12-103-22	12-103-23
Simulated Distillation (D2887)					
Sample Amount, g	10G	10G	10G	10G	10G
Extract Volume, mL	10ML	10ML	10ML	10ML	10ML
Dilution Factor, Times	2	1	50	1	1
C10-C11, mg/kg	34	<5	1200	<5	<5
C12-C13, mg/kg	76	8.0	1700	<5	56
C14-C15, mg/kg	72	12	1600	<5	70
C16-C17, mg/kg	73	16	1600	<5	120
C18-C19, mg/kg	85	19	1500	<5	160
C20-C23, mg/kg	120	43	2300	<5	310
C24-C27, mg/kg	100	67	1900	<5	540
C28-C31, mg/kg	100	50	2000	<5	560
C32-C35, mg/kg	77	57	1400	<5	800
C36-C39, mg/kg	49	50	840	<5	920
C40-C43, mg/kg	<10	38	<300	<5	710
C44+, mg/kg	<10	13	<300	<5	180
Total Hydrocarbon Matrix, mg/kg	790	370	16000	<50	4400
Other Simulated Distillation (D2887)	---	---	---	---	---
Surrogates **					
Naphthalene Reported, mg/kg	6.38	7.57	0 NC	9.99	0 NC
Naphthalene Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0
o-Terphenyl Reported, mg/kg	7.98	7.48	0 NC	9.42	0 NC
o-Terphenyl Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0

LOG NO: G97-12-103

Received: 03 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-103-24	WDI-TS-134-11.3-12	03 DEC 97
12-103-25	WDI-TS-135-2.4-3.6	03 DEC 97
12-103-26	WDI-TS-135-12-13	03 DEC 97

PARAMETER	12-103-24	12-103-25	12-103-26
Simulated Distillation (D2887)			
Sample Amount, g	10G	10G	10G
Extract Volume, mL	10ML	10ML	10ML
Dilution Factor, Times	10	10	1
C10-C11, mg/kg	<50	<50	2500
C12-C13, mg/kg	110	<50	3600
C14-C15, mg/kg	130	<50	3600
C16-C17, mg/kg	160	<50	3500
C18-C19, mg/kg	210	75	6800
C20-C23, mg/kg	420	200	5200
C24-C27, mg/kg	540	330	4100
C28-C31, mg/kg	390	260	3900
C32-C35, mg/kg	450	320	2900
C36-C39, mg/kg	410	350	1900
C40-C43, mg/kg	270	260	<5
C44+, mg/kg	84	89	<5
Total Hydrocarbon Matrix, mg/kg	3200	1900	38000
Other Simulated Distillation (D2887)	---	---	---
Surrogates **			
Naphthalene Reported, mg/kg	0 NC	0 NC	0 NC
Naphthalene Theoretical, mg/kg	10.0	10.0	10.0
o-Terphenyl Reported, mg/kg	0 NC	0 NC	0 NC
o-Terphenyl Theoretical, mg/kg	10.0	10.0	10.0

LOG NO: G97-12-146

Received: 04 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-146-11	WDI-TS-136-2.6-3.3	04 DEC 97
12-146-12	WDI-TS-136-12-13	04 DEC 97
12-146-13	WDI-TS-136-18-19	04 DEC 97
12-146-14	WDI-TS-137-3.15-4	04 DEC 97
12-146-15	WDI-TS-137-10-11	04 DEC 97

PARAMETER	12-146-11	12-146-12	12-146-13	12-146-14	12-146-15
Simulated Distillation (D2887)					
Sample Amount, g	10G	10G	10G	10G	10G
Extract Volume, mL	10ML	10ML	10ML	10ML	10ML
Dilution Factor, Times	10	100	1	10	2
C10-C11, mg/kg	<50	1000	<5	<50	<10
C12-C13, mg/kg	53	2100	<5	<50	22
C14-C15, mg/kg	90	2900	<5	<50	34
C16-C17, mg/kg	130	3500	<5	<50	36
C18-C19, mg/kg	170	3800	<5	<50	66
C20-C23, mg/kg	350	6000	<5	73	58
C24-C27, mg/kg	330	4800	<5	250	58
C28-C31, mg/kg	320	4600	<5	550	45
C32-C35, mg/kg	220	3100	<5	530	35
C36-C39, mg/kg	150	2000	<5	580	12
C40-C43, mg/kg	<50	<500	<5	420	<10
C44+, mg/kg	<50	<500	<5	<50	<10
Total Hydrocarbon Matrix, mg/kg	1800	34000	<50	2400	370
Other Simulated Distillation (D2887)	---	---	---	---	---
Surrogates **					
Naphthalene Reported, mg/kg	0 NC	0 NC	7.20	0 NC	7.01
Naphthalene Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0
o-Terphenyl Reported, mg/kg	0 NC	0 NC	6.92	0 NC	7.43
o-Terphenyl Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0

LOG NO: G97-12-226

Received: 05 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-226-8	WDI-TS-139 2.8-3.9	05 DEC 97
12-226-9	WDI-TS-139 8-8.6	05 DEC 97
12-226-10	WDI-TS-139 15-16	05 DEC 97
12-226-11	WDI-TS-139 Z	05 DEC 97
12-226-12	WDI-TS-140 3.3-4	05 DEC 97

PARAMETER	12-226-8	12-226-9	12-226-10	12-226-11	12-226-12
Simulated Distillation (D2887)					
Sample Amount, g	10G	10G	10G	10G	10G
Extract Volume, mL	10ML	10ML	10ML	10ML	10ML
Dilution Factor, Times	5	10	1	10	10
C10-C11, mg/kg	<30	170	<5	170	<50
C12-C13, mg/kg	<30	280	<5	280	<50
C14-C15, mg/kg	<30	270	<5	260	<50
C16-C17, mg/kg	<30	260	<5	240	<50
C18-C19, mg/kg	87	250	<5	220	<50
C20-C23, mg/kg	140	380	<5	330	200
C24-C27, mg/kg	190	320	<5	270	410
C28-C31, mg/kg	180	330	<5	260	820
C32-C35, mg/kg	180	250	<5	200	860
C36-C39, mg/kg	100	<50	<5	130	850
C40-C43, mg/kg	<30	<50	<5	<50	610
C44+, mg/kg	<30	<50	<5	<50	<50
Total Hydrocarbon Matrix, mg/kg	880	2500	<50	2400	3800
Other Simulated Distillation (D2887)	---	---	---	---	---
Surrogates **					
Naphthalene Reported, mg/kg	8.55	0 NC	6.71	0 NC	0 NC
Naphthalene Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0
o-Terphenyl Reported, mg/kg	11.2	0 NC	6.78	0 NC	0 NC
o-Terphenyl Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0

LOG NO: G97-12-226

Received: 05 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-226-13	WDI-TS-140 10.6-11	05 DEC 97
12-226-14	WDI-TS-140 Z	05 DEC 97

PARAMETER	12-226-13	12-226-14
Simulated Distillation (D2887)		
Sample Amount, g	10G	10G
Extract Volume, mL	10ML	10ML
Dilution Factor, Times	20	20
C10-C11, mg/kg	540	230
C12-C13, mg/kg	690	620
C14-C15, mg/kg	610	650
C16-C17, mg/kg	600	690
C18-C19, mg/kg	560	750
C20-C23, mg/kg	840	1200
C24-C27, mg/kg	710	990
C28-C31, mg/kg	790	1000
C32-C35, mg/kg	640	760
C36-C39, mg/kg	1300	550
C40-C43, mg/kg	210	160
C44+, mg/kg	<100	<100
Total Hydrocarbon Matrix, mg/kg	7500	7600
Other Simulated Distillation (D2887)	---	---
Surrogates **		
Naphthalene Reported, mg/kg	0 NC	0 NC
Naphthalene Theoretical, mg/kg	10.0	10.0
o-Terphenyl Reported, mg/kg	0 NC	0 NC
o-Terphenyl Theoretical, mg/kg	10.0	10.0

LOG NO: G97-12-304

Received: 10 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-304-7	WDI-TS-141-15.6-16	10 DEC 97
12-304-10	WDI-TS-141-19-20	10 DEC 97
12-304-13	WDI-TS-142-4-5	10 DEC 97
12-304-19	WDI-TS-142-7	10 DEC 97
12-304-22	WDI-TS-142-17-18	10 DEC 97

PARAMETER	12-304-7	12-304-10	12-304-13	12-304-19	12-304-22
Simulated Distillation (D2887)					
Sample Amount, g	10G	10G	10G	10G	10.0G
Extract Volume, mL	10ML	10ML	10ML	10ML	10.0ML
Dilution Factor, Times	40	2	1	5	1
C10-C11, mg/kg	720	<10	<5	140	<5
C12-C13, mg/kg	1100	<10	<5	270	<5
C14-C15, mg/kg	1200	<10	<5	270	<5
C16-C17, mg/kg	1300	<10	<5	270	<5
C18-C19, mg/kg	1400	<10	<5	240	<5
C20-C23, mg/kg	2400	<10	<5	390	<5
C24-C27, mg/kg	2200	60	5.2	340	<5
C28-C31, mg/kg	2100	140	17	360	<5
C32-C35, mg/kg	1700	140	23	350	<5
C36-C39, mg/kg	1100	160	23	300	<5
C40-C43, mg/kg	630	140	12	180	<5
C44+, mg/kg	<200	48	<5	<30	<5
Total Hydrocarbon Matrix, mg/kg	16000	690	80	3100	<50
Other Simulated Distillation (D2887)	---	---	---	---	---
Surrogates **					
Naphthalene Reported, mg/kg	0 NC	6.35	11.3	10.4	8.20
Naphthalene Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0
o-Terphenyl Reported, mg/kg	0 NC	6.14	9.63	12.2	7.24
o-Terphenyl Theoretical, mg/kg	10.0	10.0	10.0	10.0	10.0

LOG NO: G97-12-304

Received: 10 DEC 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-304-16	WDI-TS-142-12.6-13	10 DEC 97
12-304-3	WDI-TS-141-2-3	10 DEC 97

PARAMETER	12-304-16	12-304-3
Simulated Distillation (D2887)		
Sample Amount, g	10G	10G
Extract Volume, mL	10ML	10ML
Dilution Factor, Times	1	5
C10-C11, mg/kg	<5	<30
C12-C13, mg/kg	<5	<30
C14-C15, mg/kg	<5	<30
C16-C17, mg/kg	<5	<30
C18-C19, mg/kg	<5	<30
C20-C23, mg/kg	<5	58
C24-C27, mg/kg	<5	190
C28-C31, mg/kg	<5	370
C32-C35, mg/kg	<5	410
C36-C39, mg/kg	<5	420
C40-C43, mg/kg	<5	420
C44+, mg/kg	<5	250
Total Hydrocarbon Matrix, mg/kg	<50	2100
Other Simulated Distillation (D2887)	---	---
Surrogates **		
Naphthalene Reported, mg/kg	11.2	7.18
Naphthalene Theoretical, mg/kg	10.0	10.0
o-Terphenyl Reported, mg/kg	9.46	8.34
o-Terphenyl Theoretical, mg/kg	10.0	10.0

ATTACHMENT B.8

TRC

PTS Laboratories, Inc.

Environmental Solutions, Inc.
PTS FILE NO: 27317

PHYSICAL PROPERTIES DATA

(METHODOLOGY: ASTM D2216, API RP40)

PROJECT NAME: Waste Disposal, Inc.
PROJECT NO: 94-256

MEDIUM	SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENT. (1)	MOISTURE CONTENT (% wt)	DENSITY BULK (g/cc)	DENSITY GRAIN (g/cc)	EFFECTIVE POROSITY, % Vb	PORE FLUID SATURATION, % Pv WATER (2)	PORE FLUID SATURATION, % Pv HYDROCARBON (3)	25.0 PSI CONFINING STRESS NATIVE PERMEABILITY TO AIR (millidarcy)	25.0 PSI CONFINING STRESS NATIVE AIR CONDUCTIVITY (cm/s)
FILL	WDI-TS-25A	0-3	V	19.4	1.52	2.66	43.0	67.6	2.71	21.3	1.14E-03
SUMP	WDI-TS-25B	7-10	V	30.3	1.56	2.67	41.8	87.5	6.77	0.021	1.86E-06
FILL	WDI-TS-56A	2-4	V							0.0125	1.11E-06
SUMP	WDI-TS-56B	12-14	V							0.0012	1.06E-07

(1) Sample Orientation: H = Horizontal; V = Vertical

(2) 0.9986 gm/cc used for calculation

(3) 0.7500 gm/cc used for calculation

Vb = Bulk Volume, cc
Pv = Pore Volume, cc

ATTACHMENT B.9

TRC

ENVIRONMENTAL SOLUTIONS, INC.

By TWW Date 7/5/95 Subject WDI Flux Box Test Sheet No. 1 of 11
Chkd. By EJW Date 21Jul95 Calcs. Proj. No. 94-256

Purpose: The purpose of these calculations is to determine a rate of surface emissions from measurements acquired by flux box techniques applied to six surface locations over the WDI superfund site.

Principle: Gaseous emissions migrating through the sub surface formation that evolve through the surface are collected by isolating a representative surface area with an enclosure called a flux box. A flow of ultra pure "sweep" air introduced in a manner to maximize mixing acts as a carrier gas to convey the emissions through an exit port where, at discrete time intervals, the diluted concentration is measured using a portable flame ionization detector (FID) calibrated to methane. The emission rate is calculated based on area of surface isolated, sweep air flow rate and measured emission concentration.

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ENVIRONMENTAL SOLUTIONS, INC.

By TWW Date 7/5/95 Subject WDI FLUX BOX TEST Sheet No. 2 of 11
Chkd. By GW Date 21Jul95 CALCS Proj. No. 94-256

Method: As described in TM No. 1, a modified program of surface emission measurement was conducted over the WDI site, focusing on areas where elevated surface gas emissions might logically be anticipated. Based on the results of these measurements, six sites for flux box testing were identified (Flux Measurement 01 - 06). These locations are shown on Figure 1, attached.

Two identical flux boxes were employed and two tests per day were conducted over an eight hour period. Descrete measurement intervals were kept to 1 hour or less.

Background readings taken during the preliminary emissions survey indicated that surface emission concentrations would be quite low. Therefore a Foxboro 128 Flame Ionization Detector (FID) was selected to measure the concentration of emissions in the flux

ENVIRONMENTAL SOLUTIONS, INC.

By TWW Date 7/5/95 Subject WDI Flux Box Test Sheet No. 3 of 11
Chkd. By [illegible] Date 21Jul95 Calcs Proj. No. 94-256

Method: (cont'd)

box discharge. The 128 measures the concentration of combustible gases using 3 linear ranges of 0-10, 0-100, or 0-1000 parts per million (ppm) by volume.

- The FID was calibrated each day prior to the start of flux box testing using zero (ultra pure) air, 10 ppm, and 102 ppm methane calibration gasses.

- Calibration gases were repeatedly measured during the course of the flux box tests to monitor the continuing state of instrument calibration and provide information with which emission measurements could be adjusted based on instrument "drift" over the eight hour sampling period.

- Two 8 hour flux tests were conducted for each of 3 days. After the FID was calibrated, The first flux box was set upon the chosen site.

ENVIRONMENTAL SOLUTIONS, INC.

By TWW Date 7/5/95 Subject WDI FLUX BOX TEST Sheet No. 4 of 11
Chkd. By GW Date 21Jul95 CALCS Proj. No. 94-256

method: (cont'd)

- The site had been prepared such that the edges of the box would make a good seal with the ground and no tall weeds, rocks, or other large surface projection would interfere with emission area or sweep air mixing. Efforts were made to keep the ground surface intact (ie not pull up weeds or dislodge large stones to facilitate box placement).
- Dirt borrowed from an area at least 10 feet from the test location was piled around the outer edges of the box to enhance the isolation of the target surface.
- After the box was in place, prior to initiation of sweep air flow, the first FID reading was taken from the flux box sample port. An ambient background (Bkg) reading was also taken close, but external to the flux box.

ENVIRONMENTAL SOLUTIONS, INC.

By TWW Date 7/5/95 Subject WDI Flux Box Test Sheet No. 5 of 11
Chkd. By GW Date 21Jul95 Calcs Proj. No. 94-256

Method: (cont'd)

- After the static measurement was recorded, the sweep air was turned on and adjusted to a flow rate of 5 Liters per minute. The sweep air source was a cylinder of ultra pure air pressure regulated to the flow control rotameter on the flux box. Prior to use each cylinder was tested using the FID to determine the purity of its contents.
- During the first ½ hour after initiating sweep air flow, the flux box was continuously monitored until the methane conc. stabilized. After the initial start-up period the flux box concentration was measured at least once each hour for the balance of the test.
- Flux box internal temperature, ambient temperature, sweep air flow, and atmospheric pressure were also monitored and recorded when the box was monitored.

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By TWW Date 7/5/95 Subject WDI Flux Box Test Sheet No. 6 of 11
Chkd. By GW Date 21Jul95 Calcs Proj. No. 94-256

Method: (cont'd)

- After the first test for a given day was started and the first half-hour of continuous monitoring completed, the second flux test was initiated in an identical manner.
- Because the calibration range of the FID tended to drift between measurements, the zero air and 10 ppm methane calibration gases were measured frequently just after a flux box measurement so the reading could be adjusted to reflect the current calibration range. It should be noted that the drift was generally in the range of ± 1-3 ppm.
- At some point during the test, after initial stabilization, a summa cannister of gas was drawn from the flux box sample port and sent to the analytical laboratory for analysis. The sample size was 6 liters and rate about 1 LPM. Samples were analyzed for methane and TO-14 compounds.

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ENVIRONMENTAL SOLUTIONS, INC.

By TWW Date 7/5/95 Subject WDI FLUX BOX TEST Sheet No. 7 of 11
Chkd. By EJW Date 21Jul95 CALCS Proj. No. 94-256

Assumptions:

1. Volumetric contribution of surface emission gas is negligible.
2. Temperature of inlet air is substantially the same as the ambient air temperature around the gas bottle.
3. All detectable methane is emitted from the surficial area covered by the flux box.
4. The sweep air introduced into the flux box mixes thoroughly with any surface emissions prior to being drawn through the sample port for measurement.
5. All sweep air is ultrapure zero air and contains no compounds detectible by the Foxboro 128 FID. (This will be confirmed by testing prior to use of each bottle.)

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ENVIRONMENTAL SOLUTIONS, INC.

By TWD Date 7/5/95 Subject CWDI FLUX BOX TEST Sheet No. 8 of 11
Chkd. By EJW Date 21 Jul 95 CALCS. Proj. No. 94-256

Sample Calculation:

Surface emission rate can be determined by using the following equation:

$$E = \frac{CQ}{A}$$

Where E = Methane emission rate, $ft^3/min\text{-}ft^2$ (CFM/SF)
C = Concentration of methane due to surface emissions, by volume (L^3/L^3).
Q = Volumetric flow rate of air entering the box (sweep air), std. ft^3/min (SCFM)
A = Surface area covered by the flux box, ft^2 (SF)

Highest measured emission rates for each flux box location (Due to the low emission rates measured these values are uncorrected for Temp. or Instrument calibration drift)

FM 01

Highest measured concentration after stabilization C_H

$C_H = 2.9$ ppm $\approx 2.9 \times 10^{-6}$;
$Q = 5$ LPM $\times .0353 \frac{CF}{L} \approx 0.177$ CFM

$A = 1.4$ SF

$$E_H = \frac{C_H Q}{A} = \frac{(2.9 \times 10^{-6})(0.177 \text{ CFM})}{1.4 \text{ SF}} = \boxed{3.7 \times 10^{-7} \text{ CFM/SF}}$$

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ENVIRONMENTAL SOLUTIONS, INC.

By TWW Date 7/5/95 Subject WDI Flux Box Test Sheet No. 9 of 11
Chkd. By [illegible] Date 21Jul95 Calcs Proj. No. 94-256

Sample Calculations: (cont'd)

FM 02

$C_H = 1.5 \text{ ppm} \approx 1.5 \times 10^{-6}$
$Q = 5 \text{ LPM} = 0.177 \text{ CFM}$
$A = 1.4 \text{ SF} =$

$$E_H = \frac{C_H Q}{A} = \frac{(1.5 \times 10^{-6})(0.177 \text{ CFM})}{1.4 \text{ SF}} = \boxed{1.9 \times 10^{-7} \text{ CFM/SF}}$$

FM 03

$C_H = 1.3 \text{ ppm} \approx 1.3 \times 10^{-6}$
$Q = 5 \text{ LPM} = 0.177 \text{ CFM}$
$A = 1.4 \text{ SF}$

$$E_H = \frac{C_H Q}{A} = \frac{(1.3 \times 10^{-6})(0.177 \text{ CFM})}{1.4 \text{ SF}} = \boxed{1.6 \times 10^{-7} \text{ CFM/SF}}$$

FM 04

$C_H = 3.0 \text{ ppm} \approx 3 \times 10^{-6}$
$Q = 5 \text{ LPM} \approx 0.177 \text{ CFM}$
$A = 1.4 \text{ SF}$

$$E_H = \frac{C_H Q}{A} \approx \frac{(3 \times 10^{-6})(0.177 \text{ CFM})}{1.4 \text{ SF}} = \boxed{3.8 \times 10^{-7} \text{ CFM/SF}}$$

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ENVIRONMENTAL SOLUTIONS, INC.

By TLW Date 7/5/95 Subject WDI FLUX BOX TEST Sheet No. 10 of 11
Chkd. By [illegible] Date 21Jul95 CALCS Proj. No. 94-256

Sample Calculations: (cont'd)

FM 05

$C_H' = 2.4 ppm \approx 2.4 \times 10^{-6}$
$Q = 5 LPM \approx 0.177 CFM$
$A = 1.4 SF$

$$E_H = \frac{C_H Q}{A} \approx \frac{(2.4 \times 10^{-6})(0.177 CFM)}{1.4 SF} = \boxed{3.0 \times 10^{-7} CFM/SF}$$

FM 06

$C_H = 0.9 ppm \approx 9 \times 10^{-7}$
$Q = 5 LPM \approx 0.177 CFM$
$A = 1.4 SF$

$$E_H = \frac{C_H Q}{A} \approx \frac{(9 \times 10^{-7})(0.177 CFM)}{1.4 SF} = \boxed{1.1 \times 10^{-7} CFM/SF}$$

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ENVIRONMENTAL SOLUTIONS, INC.

By TWW Date 7/5/95 Subject WDI Flux Box Test Sheet No. 11 of 11
Chkd. By [illegible] Date 21Jul95 Calcs Proj. No. 94-256

BENCH TEST Box B

TEST GAS CONC. 979 ppmv Methane

FLOW RATE INTO FLUX BOX @ 0.2 LPM

SWEEP AIR FLOW RATE = 5 LPM

Conc. In Box calculated = C_c

$$C_c = \frac{(979\ ppmv)(0.2\ LPM)}{5.2\ LPM}$$

$$C_c = 37.6\ ppmv$$

Measured Conc. at equilibrium = C_{Eq} = 39 ppmv

Flux Box A Recovery = $\frac{39}{37.6} \times 100 = 103.5\%$

BENCH TEST Box A

Test Gas Conc. = 979 ppmv CH_4

Flow Rate into Box @ 0.2 LPM

Sweep Air Flow Rate = 5 LPM

C_c = 37.6 ppmv

$C_{Eq.}$ = 42.0 ppmv

Flux Box A Recovery = $\frac{42.0}{37.6}$ = 111.7% Recovery

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CALCULATION OF AIR CONDUCTIVITY
WASTE DISPOSAL, INC.

PARAMETER	DIMENSIONS	UNITS	SAMPLE NO.																		NOTES
			FILL WDI-TS-25A 0-3	SLUDGE WDI-TS-25B 7-10	FILL WD-TS-56A 2-4	SLUDGE WDI-TS-56B 12-14	SLUDGE WDI-TS-136 10.0-11.0	SLUDGE WDI-TS-136 17.0-18.0	SLUDGE WD-TS-137 8.5-9.2	SLUDGE WD-TS-137 31.5-32.2	SLUDGE WD-TS-138 11.3-12.0	SLUDGE WD-TS-138 25.1-25.8	SLUDGE WD-TS-139 6.0-7.0	SLUDGE WD-TS-139 14.0-15.0	FILL WD-TS-141 15.0-15.6	SLUDGE WD-TS-141 18.0-19.0	SLUDGE WD-TS-142 11.0-12.0	SLUDGE WD-TS-142 16.0-17.0	FILL WD-TS-148 3.0-5.0	SLUDGE WD-TS-148 10.0-12.0	
Volume of air advected (V)	L^3	cubic centimeters	20.0	2.0	2.0	1.0	0.100	100.0	50.0	100.0	0.100	100.0	0.100	2.000	10.0	0.700	1.000	2.000	5.000	1.000	Volume of air advected through sample under pressure.
Density of fluid, average [1]	M/L^3	grams / cubic centimeters	1.21E-03	2.00E-03	2.00E-03	2.00E-03	1.81E-03	1.81E-03	1.70E-03	1.20E-03	1.81E-03	1.20E-03	1.81E-03	1.81E-03	1.30E-03	1.81E-03	1.81E-03	1.81E-03	1.81E-03	1.81E-03	Note lower density for lower experimental inlet pressure.
Diameter, sample	L	centimeters	2.50	2.37	2.95	2.58	2.77	2.96	2.27	2.93	2.44	2.89	2.67	2.99	2.60	2.92	2.92	2.82	2.80	2.92	Sample submitted to lab. is subcored, wrapped in Teflon tape, and the resulting nonuniform diameter is measured with calipers at several places.
Area, sample (A)	L^2	square centimeters	4.91	4.41	6.83	5.23	6.03	6.88	4.05	6.74	4.68	6.56	5.60	7.02	5.31	6.70	6.70	6.25	6.16	6.70	A=PI*(D^2)/4
Time (t)	T	seconds	513	592	609	4475	226.27	56.99	177.28	57.45	663.74	113.43	257.95	127.78	102.43	239.60	99.31	205.32	202.73	94.52	Time for air volume to advect through soil.
Length, sample (L)	L	centimeters	3.30	3.41	3.26	3.48	3.50	3.62	3.12	4.90	3.94	3.74	3.52	2.97	3.43	3.38	3.37	4.00	3.40	3.50	
Pressure, inlet, gauge (P1)	M/L/T^2	psig	0.328	20	20	20	15.00	15.00	12.27	0.0535	15.00	0.0397	15.00	15.00	2.510	15.00	15.00	15.00	15.00	15.00	Atmospheric pressure (lb/sq.in) = 14.695
Pressure, outlet, gauge (P2)	M/L/T^2	psig	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Outlet of sample at ambient pressure.
Air conductivity (Ka) [2]	L/T	cm/sec	1.38E-06	3.71E-09	2.23E-09	2.11E-10	4.41E-10	1.59E-06	4.28E-07	4.04E-04	2.18E-10	2.16E-04	4.19E-10	1.14E-08	4.65E-07	2.53E-09	8.70E-09	1.07E-08	2.34E-08	9.50E-09	Acceleration of gravity (cm/s^2) = 980

[1] Density of air at a pressure of 1 atm (g/cc) = 1.20E-03

[2] Ka = V x density x g L / (A t x (P1-P2))

94-256/RPT/PrelSup (3/23/98/cl)

TRC

ATTACHMENT C.3

UPWARD FLUX

(Appendix C: February 13, 1998 Transmittal to EPA)

TRC

TRC ENVIRONMENTAL SOLUTIONS, INC.

By EAW Date 2Dec97 Subject FLUX FROM SUBSURFACE Sheet No. 1 of 9
Chkd By TLP Date 1/28/98 AT WDI Proj. No. 94-256

PURPOSE

Calculate upward flux of methane, benzene and vinyl chloride from subsurface. Estimate resulting health significance to workers in Brothers Building.

APPROACH

Define parameters needed to calculate flux, both advective and diffusive. Assign realistic values to these parameters, chosen to be more conservative where uncertainty is higher.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 2Dec97 Subject FLUX FROM SUBSURFACE Sheet No. 2 of 8
Chkd. By TLP Date 1/28/98 AT WDI Proj. No. 94-256

THEORY

Advective flux in terms of volume transferred per unit time through a unit area is given by the following form of the Darcy equation for fluid flow in a porous medium:

$$F_{Av} = -\frac{k}{\mu}\frac{dp}{dl} \qquad (1)$$

where variables are defined in Sub attachment C.1

In terms of flux as number of moles transferred per unit time through a unit area, the following is the relationship between volume flux and molar flux:

$$F_{Av} = F_{Am}\,\beta \qquad (2)$$

where F_{Am} = advective molar flux [moles $L^{-2}\,T^{-1}$]
(g mole $cm^{-2}\,s^{-1}$)

β = molar volume of an ideal gas [L^3 mole^{-1}] (cm^3 gmole^{-1})

Brackets [ ] give dimensions of a variable where L = length, M = mass and T = time.

Parantheses ( ) give example units for a variable (e.g., centimeter gram second [cgs] system).

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THEORY (continued)

We combine Equations 1 and 2 to get an expression for advective molar flux as follows:

$$F_{Am} = -\frac{k}{\mu\beta}\frac{dp}{dl} \qquad (3)$$

To get an expression for diffusive molar flux, we combine Equations 1 and 2 in Subattachment C.1 as follows

$$F_{Dm} = -\frac{\epsilon_a^{10/3}}{\epsilon_T^2} D_a \frac{dC}{dl} \qquad (4)$$

Using consistent notation for vertical upward molar flux of constituent i, we can combine Equations 3 and 4 to get the following expression

$$F_{mi} = F_{Ami} + F_{Dmi}$$

$$F_{mi}(z) = -\left(\frac{k}{\mu\beta}\frac{dp_i(z)}{dz} + \frac{\epsilon_a^{10/3}}{\epsilon_T^2} D_{ai}\frac{dC_i(z)}{dz}\right) \qquad (5)$$

For a fluid, Equation 3 in Attachment A can be combined with Equation 5 to obtain the following expression:

$$F_{mi}(z) = -\left(\frac{K}{\rho g\beta}\frac{dp_i(z)}{dz} + \frac{\epsilon_a^{10/3}}{\epsilon_T^2} D_{ai}\frac{dC_i(z)}{dz}\right) \qquad (6)$$

Note that $p_i(z) = p(z)\,C_i^*$

where C_i^* = concentration of constituent i, dimensionless [-] (-)

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By EMW Date 13Dec97 Subject FLUX FROM SUBSURFACE Sheet No. 4 of 8
Chkd. By TL Date 1/28/98 AT WDI Proj. No. 94-256

ASSUMPTIONS

- Use same assumptions as in Subattachment C.1 for the following variables:
  - maximum concentrations of constituents, except for benzene, which is 19,590 ug/kg (Subattachment C.2)
  - depth of maximum concentrations
  - diffusion coefficients in free air
  - porous properties of fill and sludge material
  - characteristics of Brothers Building
  - background concentrations of constituents in free air
- Actual air conductivity in fill is based on samples WDI-TS-25A and WDI-TS-56A, taken from depths of 0-3 and 2-4 feet, respectively (Subattachment A.1 in Attachment A).
- Samples WDI-TS-25B and WDI-TS-56B are representative of sludge material.
- Maximum and average actual air conductivities are the following (see Attachment A, Table 1):

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By [illegible] Date 13 Dec 97 Subject FLUX FROM SUBSURFACE AT WDI Sheet No. 5 of 8
Chkd. By [illegible] Date 1/28/98 Proj. No. 94-256

ASSUMPTIONS (continued)

MATERIAL	ACTUAL AIR CONDUCTIVITY (cm/s)	
	ARITHMETIC MEAN	MAXIMUM
FILL	3.9×10^{-6}	1.42×10^{-5}
SLUDGE	4.7×10^{-9}	1.40×10^{-8}

- Maximum and average gas pressures measured in the subsurface are as follows (see Subattachment C.3):

MATERIAL	SUBSURFACE TOTAL PRESSURE (in. W.C)	
	ARITHMETIC MEAN	MAXIMUM
FILL	0.005	0.01
SLUDGE	1.3	14.5

- Average density will be calculated as shown in the calculation for Attachment A.
- Differentials in Equation 6 can be satisfactorily approximated by differences.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By EGW Date 26Dec97 Subject FLUX FROM SUBSURFACE Sheet No. 6 of 8
Chkd. By TLP Date 1/28/98 AT WDI Proj. No. 94-256

CALCULATIONS

Use Eq. 6 in its two separate terms to calculate advective and diffusive flux. Table 1 contains the resulting fluxes, calculated as shown in the following example for vinyl chloride on average.

$$F_A m_{VC}(1.25\,ft) = -\frac{3.9\times10^{-6}\ cm/s}{1.2\times10^{-3}\ g/cm^3 \times 980\ \frac{cm}{s^2} \times 23{,}872\ \frac{cm^3\ soil\ gas}{g\text{-}mole\ soil\ gas}}$$

$$\times \frac{0.005\ in.WC}{2.5\,ft \cdot 12\ \frac{in}{ft} \times 2.54\ \frac{cm}{in}} \quad \frac{1.01325\times10^6\ dyne\ cm^{-2}}{406.8\ in.W.C.} \quad \frac{1\ g\ cm\ s^{-2}}{dyne}$$

$$\times \frac{266.3\ g\text{-}mole\ VC}{10^9\ "\ soil\ gas} = -6.05\times10^{-18}\ \frac{g\text{-}mole\ VC}{cm^2\ sec}$$

$$F_D m_{VC}(7.5\,ft) = -\frac{0.43^{10/3}}{0.5^2} \cdot 0.106\ \frac{cm^2}{s}\ \frac{(266.3-0)\ g\text{-}mole\ VC}{10^9\ g\text{-}mole\ soil\ gas}$$

$$\times \frac{1}{15\,ft \times 12\ \frac{in}{ft} \times 2.54\ \frac{cm}{in}} \times \frac{1\ g\text{-}mole\ soil\ gas}{23{,}872\ cm^3\ soil\ gas}$$

$$= -6.21\times10^{-16}\ \frac{g\text{-}mole\ VC}{cm^2\ sec}$$

where the minus sign indicates upward flux because the z (vertical) coordinate is pointed downward.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 26Dec97 Subject FLUX FROM SUBSURFACE Sheet No. 7 of 8
Chkd. By TLP Date 1/28/98 AT WDI Proj. No. 94-256

CONCLUSIONS

Diffusive flux is larger than advective flux by a ratio between 14 and 739. Therefore, the diffusive flux and health risk calculations in Attachment C.1 would not change much by including advective flux.

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BY: E DATE: 1/28/98
CHKD BY [illegible] DATE: [illegible]

WASTE DISPOSAL, INC.

SHEET NO. 8 OF [illegible]
PROJECT NO. 94-256

TABLE 1
UPWARD SUBSURFACE FLUX

PARAMETER	DIMENSIONS	UNITS	VINYL CHLORIDE		BENZENE		METHANE		NOTES
			AVERAGE	MAXIMUM	AVERAGE	MAXIMUM	AVERAGE	MAXIMUM	
Concentration	-	ppbv or g-mole/1E9 g-mole	266.3	1039	2.0	19590	2.17E+08	3.60E+08	
Density of fluid, average	M/L^3	grams / cubic centimeters	1.20E-03	1.20E-03	1.25E-03	1.79E-03	1.25E-03	1.79E-03	5,6
Pressure, below slab, gauge (P1)	M/L/T^2	inches of water column	0	0	0	0	0	0	4
Pressure, subsurface, gauge (P2)	M/L/T^2	inches of water column	0.005	0.01	1.3	14.5	1.3	14.5	4,7
Soil gas conductivity (K)	L/T	cm/sec	3.90E-06	1.42E-05	4.68E-09	1.40E-08	4.68E-09	1.40E-08	
Diffusion coefficient in free air (Dai)	L^2/T	sq.cm/sec	0.106	0.106	0.088	0.088	0.203	0.203	
Medium, dominant	-	-	Fill	Fill	Sludge	Sludge	Sludge	Sludge	
Porosity, air-filled	-	-	0.43	0.43	0.418	0.418	0.418	0.418	
Porosity, total	-	-	0.5	0.5	0.45	0.45	0.45	0.45	
Advective flux	mole/L^2/T	g-mole/ sq.cm/sec	-6.05E-18	-1.72E-16	-1.36E-20	-3.10E-15	-1.47E-12	-5.69E-11	1,2,3
Diffusive flux	mole/L^2/T	g-mole/ sq.cm/sec	-6.21E-16	-2.42E-15	-4.35E-18	-4.26E-14	-1.09E-09	-1.81E-09	
Ratio of diffusive to advective flux	-	-	103	14	320	14	739	32	
Total flux	mole/L^2/T	g-mole/ sq.cm/sec	-6.27E-16	-2.59E-15	-4.36E-18	-4.57E-14	-1.09E-09	-1.86E-09	

1) Subsurface temperature, assumed (degrees F) = 64
2) Molar volume of ideal gas (cc/g-mole) = 23872
3) Acceleration of gravity (cm/s^2) = 980
4) Pressure unit conversion: 1.01E+06 dynes/sq.cm = 406.800 inches of water column
5) Density of air at a pressure of 1 atm (g/cc) = 1.20E-03
6) Atmospheric pressure (lb/sq.in) = 14.695
7) Vinyl chloride located in fill layer, while benzene and methane located in sludge material layer where higher pressures were measured.

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VERSION (1/28/98, 10:09 AM)
Flux calc, Flux

ATTACHMENT C.1

TRC

TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 31Oct97 Subject DIFFUSIVE FLUX FROM Sheet No. 1 of 13
Chkd. By ZP Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

PURPOSE

Calculate upward diffusive flux of methane, benzene and vinyl chloride from subsurface. Determine resulting health significance to workers in building above.

APPROACH

Define parameters needed to calculate diffusive flux. Assign conservative values to these parameters.

THEORY

The fundamental diffusive flux equation is the following:

$$F_i(z) = -D_{ei}\frac{dC_i(z)}{dz} \qquad (1)$$

where $F_i(z)$ = diffusive flux of constituent i in terms of moles per unit area per unit time $[\text{moles } L^{-2} T^{-1}]$ (g moles $m^{-2} s^{-1}$)

D_{ei} = effective diffusion coefficient of constituent i in porous medium $[L^2 T^{-1}]$ ($cm^2 s^{-1}$)

Brackets [ ] give dimensions where L = length, T = time and M = mass.
Parantheses ( ) give example units (e.g. metric system).

THEORY (continued)

$C_i(z)$ = concentration of constituent i on moles per volume basis [mole L^{-3}] (g mole m^{-3})

z = vertical coordinate oriented downward from bottom of concrete slab under building as shown in Figure 1 [L] (m)

Dimension check on Eq. 1 gives the following:

$$\text{moles } L^{-2} T^{-1} = \frac{L^2 T^{-1} \text{ mole } L^{-3}}{L}$$

$$\text{mole } L^{-2} T^{-1} = \text{mole } L^{-2} T^{-1} \quad \checkmark \text{ checks!}$$

Effective diffusion in a porous medium is related to diffusion in the open atmosphere (free air) as follows (EPA, 1994): (see ~~Attachment A4~~ C.1.1)

$$D_{ei} = D_{ai} \frac{\epsilon_a^{10/3}}{\epsilon_T^2} \qquad (2)$$

where D_{ai} = free air diffusion coefficient for constituent i [$L^2 T^{-1}$] ($cm^2 s^{-1}$)

ϵ_a = air filled porosity of porous medium [$L^3 L^{-3}$] (–)

ϵ_T = total (water free or dry) porosity of medium [$L^3 L^{-3}$] (–)

THEORY (continued)

If the slab is assumed to have cracks with a total area of A, then the concentration resulting in the building is found from the following expression (Conservation of Mass):

Moles or Mass in = Moles or Mass out (see Figure 2)

$$FR_a C_{ia} + F_i A = C_{iB} FR_a \qquad (3)$$

where A = area of cracks in slab $[L^2]$ (m^2)

C_{iB} = moles per volume concentration of constituent i in building $[moles\ L^{-3}]$ $(g\ mole\ m^{-3})$

FR_a = air flow rate through the building $[L^3 T^{-1}]$ $(m^3\ s^{-1})$

C_{ia} = moles per volume concentration of constituent i in background air $[moles\ L^{-3}]$ $(g\text{-}mole\ m^{-3})$

Combining Equations 1 and 3 with $C_{ia} = 0$, we get:

$$C_{iB} = C_{ia} - \frac{D_{ei} A}{FR_a} \frac{\Delta C_i}{\Delta z} = C_{ia} - \frac{D_{ei} A}{FR_a} \frac{(C_{i2} - C_{i1})}{(z_2 - z_1)} \qquad (4)$$

where the differential $\frac{dC_i(z)}{dz}$ that depends on position z has been simplified to a linear difference $\frac{\Delta C_i}{\Delta z}$ that is independent of position z. This simplification is conservative because of the S shape to the diffusing front (Freeze and Cherry, 1979).

TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 1Nov97 Subject DIFFUSIVE FLUX FROM Sheet No. 4 of 13
Chkd. By [illegible] Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

ASSUMPTIONS

- Maximum concentrations of benzene and methane exist at depth of 15' below ground surface (bgs), hence near middle of sump layer (see Figure 1).
- Maximum vinyl chloride concentration assumed to exist at the mid-plane of the fill layer (z = 2.5' in Figure 1)
- Maximum measured concentrations are 1039 ppbv, 3782 ppbv and 36% for vinyl chloride, benzene and methane, respectively (see Attachment ~~A~~ C.1.2).
- Diffusion coefficients in free air are as follows:

CONSTITUENT	DIFF. COEF ($cm^2 s^{-1}$)	REFERENCE
Vinyl chloride	0.106	EPA (1994)
Benzene	0.088	EPA (1994)
Methane	0.203	Attachment ~~AB~~ C.1.3

- Sump is clay material similar to HELP Model Texture 29 with total porosity = 0.45 as shown in Attachment ~~B~~ C.1.4.
- Fill is silty sand/sandy silt similar to HELP Model Texture 9 with total porosity = 0.5 as shown in Attachment ~~B~~ C.1.4.
- Air-filled or effective porosity of sump material = 0.418

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ASSUMPTIONS (continued)

according to WDI data in Attachment C.1.5.

- Air-filled or effective porosity of fill material = 0.430 according to Attachment C.1.5.
- Assume building is 40' wide, 140' long and 20' high (see Attachment C.1.6).
- Assume area of cracks in slab based on 4 cracks that travel full width of building, each with a width of 0.5 cm.
- Assume air exchange rate = 25 building volume per hour, based on Wright (1997), as shown in Attachment C.1.6.
- Although flux is a variable function that depends on the position along the varying concentration gradient, it is simplified to a constant that depends on the overall change in concentration from that measured at a specified depth to zero at the bottom of the slab (top of the fill material)
- Concentration of methane, vinyl chloride and benzene in background air is negligible (~0) (i.e., $C_{ia} = 0$).

TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 2Nov97 Subject DIFFUSIVE FLUX FROM Sheet No. 6 of 13
Chkd. By TLP Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-356

ASSUMPTIONS (continued)

- Concern over methane is related to its explosivity in building spaces.
- Concern over vinyl chloride and benzene is related to their carcinogenic and non carcinogenic health risk potentials.
- Flux calculated from the overall concentration gradient in the porous subsurface is applied to the opening area of the assumed cracks in the slab. This flux is multiplied by the area of the cracks to calculate the mass transfer into the building without accounting for the actually occurring slower diffusion through the air in the cracks.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By EJW Date 1 Nov 97 Subject DIFFUSIVE FLUX FROM Sheet No. 7 of 13
Chkd. By TLP Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

CALCULATIONS

The effective diffusion coefficients are calculated using Equation 2 as follows:

i	Constituent	D_{ai} (cm²/s)	Layer	ϵ_a (v/v)	ϵ_T (v/v)	D_{ei} (cm²/s)
1	Vinyl chloride	0.106	F	0.43	0.5	0.0255
2	Benzene	0.088	F	0.43	0.5	0.0212
		"	S	0.413	0.45	0.024
3	Methane	0.203	F	0.43	0.5	0.0489
		"	S	0.413	0.45	0.055

F = Fill, S = sump

The air flow rate into and out of the building is found from

$$FR_a = 25\ V_B \text{ per hour}$$
$$= 25\,(40')\times 140' \times 20'$$
$$= 778\ \frac{ft^3}{s}\left(0.3048\ \frac{m}{ft}\right)^3 = 22.0\ m^3\ s^{-1}$$

Crack area $A = 4\cdot 40\,ft \cdot 0.5\,cm\left(\frac{1\,m}{100\,cm}\right)^2 12\,\frac{in}{ft}\ 2.54\,\frac{cm}{in} = 0.244\,m^2$

Using Equation 4 with the constituent concentration approximately 0 at the bottom of the slab, we get:

$$C_{1B} = C_{VC,B} = -\frac{0.0255\ \frac{cm^2}{s}\ 0.244\,m^2}{22.0\ m^3/s}\ \frac{(0-1039\ ppbv)\ \frac{1\,m^2}{10^4\,cm^2}}{2.5\,ft\left(0.3048\ \frac{m}{ft}\right)}$$

VC = vinyl chloride
B = building

$$C_{VC,B} = 3.85\times 10^{-5}\ ppbv = 0.04\ ppbv$$

$$C_{2B} = C_{B,B} = -\frac{0.024\ \frac{cm^2}{s}\cdot 0.244\,m^2}{22.0\ m^3/s}\ \frac{(0-3782\ ppbv)}{15\,ft} = 0.02\ ppbv$$

B = benzene (higher D used to be conservative)

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By EJW Date 1 Nov 97 Subject DIFFUSIVE FLUX FROM SUBSURFACE AT WDI Sheet No. 8 of 13
Chkd. By TLP Date 11/10/97 Proj. No. 94-256

CALCULATIONS (continued)

$$C_{3B} = C_{CH_4,B} = \frac{-0.055\ cm^2/s\ \ 0.244\ m^2\ (0-36\ \%)}{22.0\ m^3/s\ \ 15\ ft}$$

CH_4 = methane

$$= 5\ ppbv$$

This methane concentration is far below its lower explosive limit of 5 %. (= 50,000 ppmv), its regulatory limit of 5 % (= 50,000 ppmv) in the subsurface at the property line of a facility (see Attachment ~~E~~ C.1.7), or its regulatory limit of 1.25 % (= 12,500 ppmv) within on-site structures (see Attachment ~~E~~ C.1.7).

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By [illegible] Date 1 NOV 97 Subject DIFFUSIVE FLUX FROM SUBSURFACE AT WDI Sheet No. 9 of 13
Chkd. By [illegible] Date 11/10/97 Proj. No. 94-256

CALCULATIONS (continued)

HEALTH RISK, CARCINOGENIC

i	Constituent	Carcinogen Unit Risk Factor (1) $(\mu g/m^3)^{-1}$	C_{iB} ppbv	C_{iB} $\mu g/m^3$	Worker Carcinogenic Risk (10^{-6})
1	Vinyl chloride	$7.8 \cdot 10^{-5}$	$3.85 \cdot 10^{-5}$	$9.86 \cdot 10^{-5}$	0.002
2	Benzene	$2.9 \cdot 10^{-5}$	$2.2 \cdot 10^{-5}$	$7.10 \cdot 10^{-5}$	0.0005
3	Methane	NA	5	--	NA

(1) CAPCOA (1993). Attachment ~~F~~.C.1.8

Correction factor for workers exposure parameters included as follows:

$$\frac{\text{Worker exposure}}{\text{Residential exposure}} = \frac{46\ \text{yrs}}{70\ \text{yrs}} \cdot \frac{8\ \text{hr/dy}}{24\ \text{hr/dy}} = 0.22$$

HEALTH RISK, NONCARCINOGENIC, CHRONIC

i	Constituent	C_{iB} $(\mu g/m^3)$	REL (2) $(\mu g/m^3)$	CHRONIC HEALTH HAZARD INDEX
1	Vinyl Chloride	$9.86 \cdot 10^{-5}$	71	$1.4 \cdot 10^{-6}$
2	Benzene	$7.10 \cdot 10^{-5}$	26	$2.7 \cdot 10^{-6}$

(2) Reference exposure level (CAPCOA, 1993). Attachment ~~F~~. C.1.8

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 2NOV97 Subject DIFFUSIVE FLUX FROM SUBSURFACE AT WDI Sheet No. 10 of 13
Chkd. By TU Date 11/10/97 Proj. No. 94-256

FINDINGS AND CONCLUSIONS

The vinyl chloride maximum potential concentration in the building of 0.04 ppbv is only 4×10^{-8} of the OSHA (NIOSH, 1994) standard of 1 ppmv and would create a maximum potential health risk orders of magnitude below limits of 10^{-6} carcinogenic and 1.0 chronic health hazard index.

The benzene maximum potential concentration in the building of 0.02 ppbv is only 2×10^{-7} of the OSHA (NIOSH, 1994) standard of 0.1 ppmv and would create a maximum potential health risk orders of magnitude below health risk limits of 10^{-6} for carcinogenic and a chronic health hazard index of 1.0.

The methane maximum potential concentration in the building of .5 ppbv would be only 4×10^{-7} of the allowable limit of 1.25%.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By EJW Date 1NOV97 Subject DIFFUSIVE FLUX FROM Sheet No. 11 of 13
Chkd. By TLP Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

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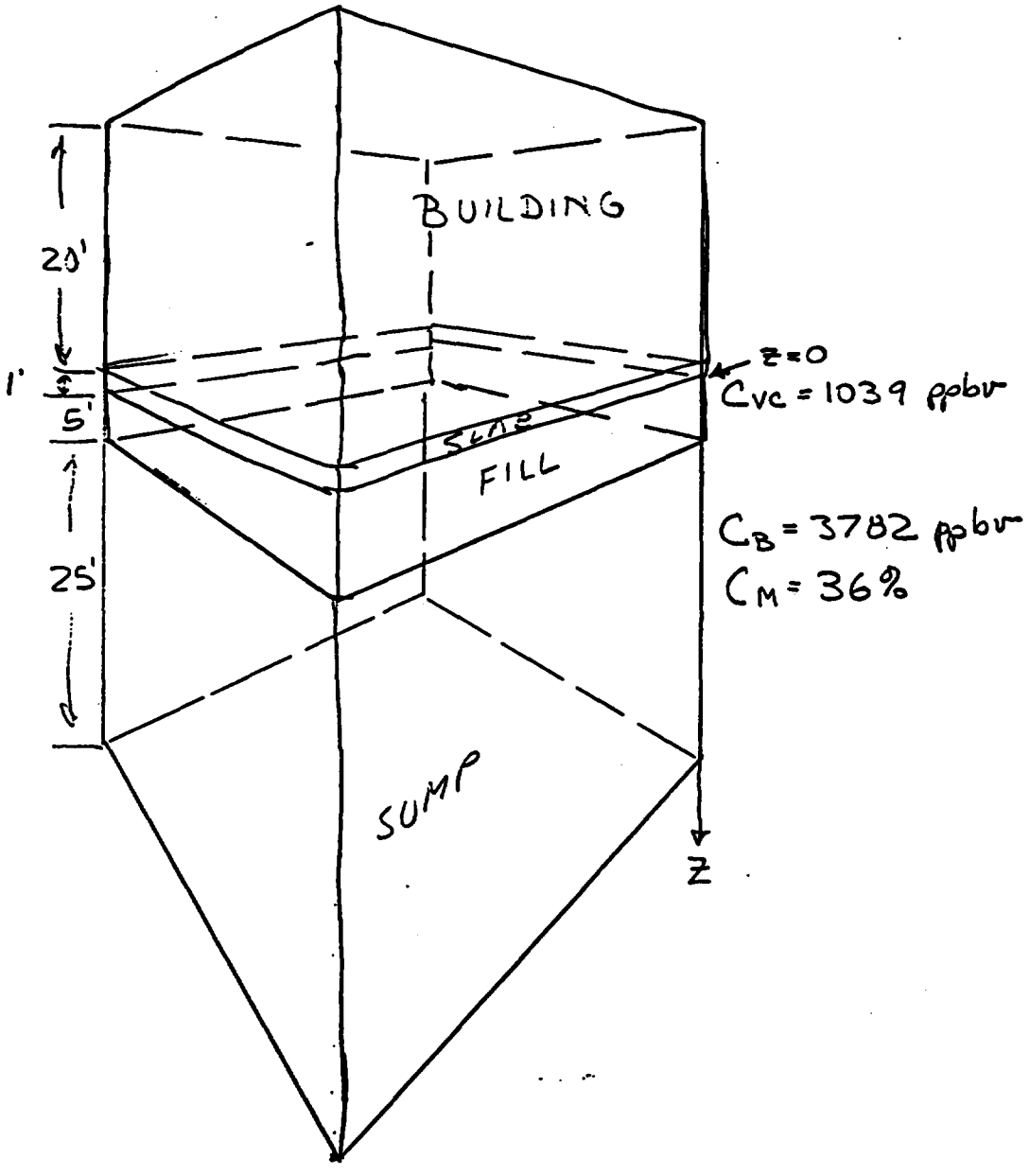
TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 31 Oct 97 Subject DIFFUSIVE FLUX FROM SUBSURFACE AT WDI Sheet No. 12 of 13

Chkd. By TLP Date 11/10/97 Proj. No. 94-256

FIGURE 1
CROSS SECTION OF SUMP PROFILE



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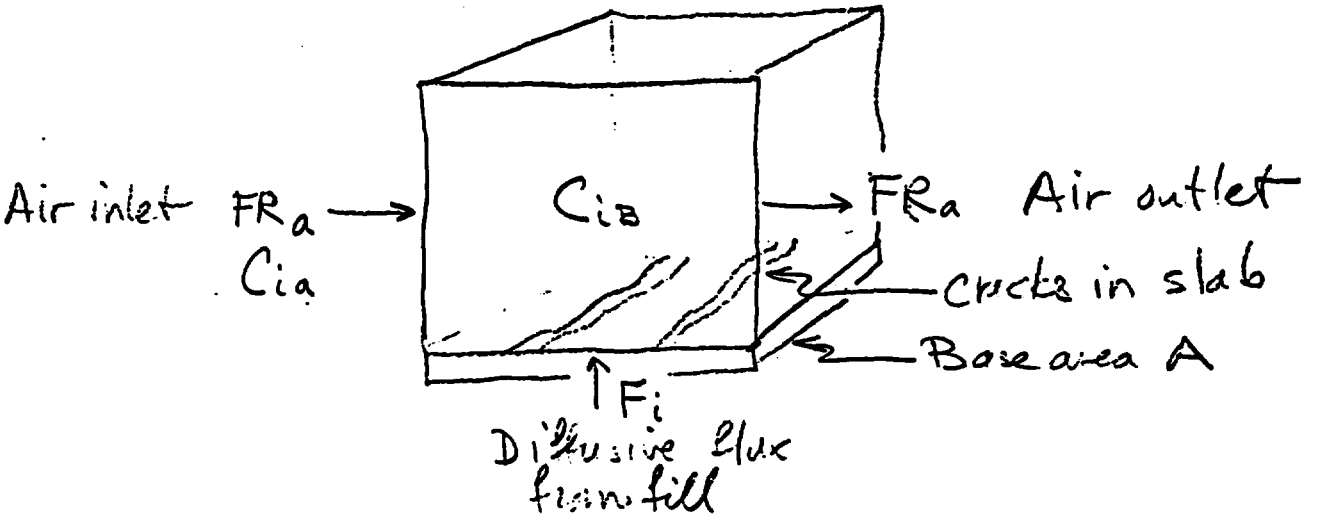
By BJW Date 1 Nov 97 Subject DIFFUSIVE FLUX FROM Sheet No. 13 of 13
Chkd. By TLP Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

FIGURE 2
BUILDING MASS BALANCE



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ATTACHMENT C.1.1

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EPA-453/R-94-080A

AIR EMISSIONS MODELS FOR WASTE AND WASTEWATER

U.S. EPA Contract No. 68D10118

November 1994

prepared for the
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park
North Carolina 27711

waste. It is important to specify the molecular weight of this separate organic phase for this Raoult's law calculation of Keq.

7.2.1.4 Estimation of effective diffusivity. The diffusivity of specific compounds, as reported in the literature, assumes that the diffusion occurs in free air. In a land treatment operation, diffusion of vapors out of the soil must take place within the confines of the air-filled voids within the soil. This characteristic of soil is referred to as the air porosity. The ratio of effective diffusivity of a constituent in the soil to its diffusivity in air can be described by the following equation:[6]

$$\frac{D_e}{D_a} = \frac{\epsilon_a^{10/3}}{\epsilon_T^2} ,$$

where,

D_e = effective diffusivity of constituent in soil;

D_a = diffusivity of constituent in air;

ϵ_a = air porosity of soil; and

ϵ_T = total porosity of soil.

When air porosity and total porosity are the same (i.e., for dry soil), this equation reduces to:

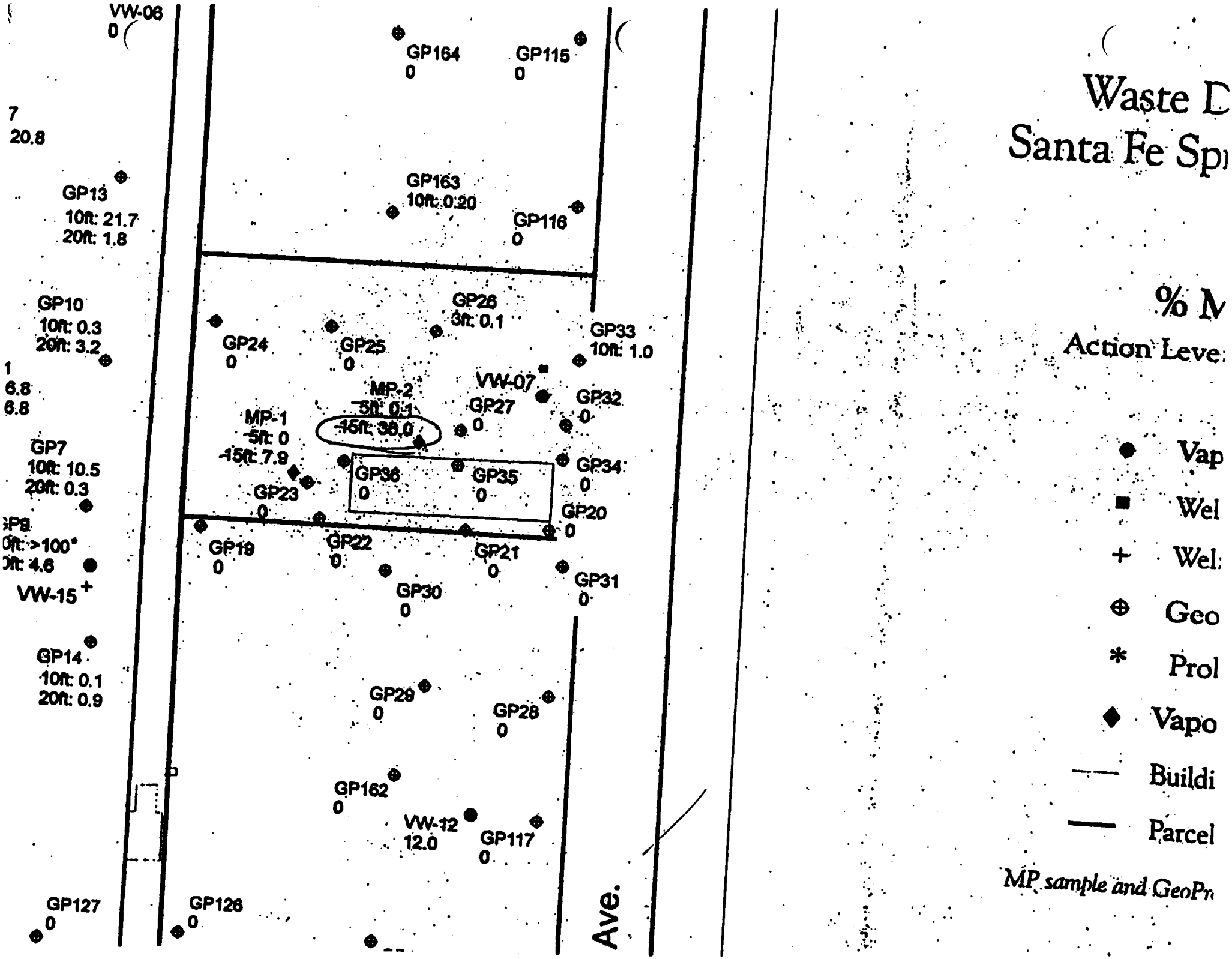
$$\frac{D_e}{D_a} = \epsilon_a^{4/3} .$$

Total porosity refers to the fraction of the land treatment medium that is made up of nonsoil (or nonsolid) materials, i.e., the sum of the void space, water-filled space, and space occupied by the oil in the applied waste.

Soil air porosity undergoes substantial changes over time as soil dries out and when moisture is added by rainfall or by watering. As a result, accurately accounting for soil porosity in an analytical model is difficult. The use of average or

ATTACHMENT C.1.2

TRC


Waste D
Santa Fe Sp
% M
Action Leve
Vap
Wel
Wel
Geo
Prol
Vapo
Buildi
Parcel
MP sample and GeoPr
VW-06
0
GP164
0
GP115
0
7
20.8
GP13
10ft: 21.7
20ft: 1.8
GP163
10ft: 0.20
GP116
0
GP10
10ft: 0.3
20ft: 3.2
GP26
3ft: 0.1
GP33
10ft: 1.0
GP24
0
GP25
0
VW-07
GP27
0
GP32
0
1
6.8
6.8
MP-2
5ft: 0.1
15ft: 36.0
MP-1
5ft: 0
15ft: 7.9
GP7
10ft: 10.5
20ft: 0.3
GP36
0
GP35
0
GP34
0
GP23
0
GP20
0
GP19
0
GP22
0
GP21
0
GP31
0
GP30
0
VW-15
GP14
10ft: 0.1
20ft: 0.9
GP29
0
GP28
0
GP162
0
VW-12
12.0
GP117
0
GP127
0
GP126
0
Ave.

PA REGION 9 - FIELD ANALYTICAL SUPPORT PROJECT
UMMARY OF UNVALIDATED RESULTS

Case Number:
Site: CDM
SDG: 1
Date: 08/12/97

Analysis: FAS
Matrix: Soil

Station Location	MP-1-05		MP-1-15		MP-2-05		MP-2-15	
Sample I.D.	N/A		N/A		N/A		N/A	
Date of Collection	08/07/97		08/07/97		08/07/97		08/07/97	
Time of Collection	16:25		16:18		16:50		16:40	
Date of Analysis	08/07/97		08/07/97		08/07/97		08/08/97	
Time of Analysis	17:46		21:09		21:43		01:02	
Units	ppbv		ppbv		ppbv		ppbv	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q
C022 Dichlorodifluoromethane	74	U	74	U	74	U	74	U
C010 Chloromethane	178	U	214		1971		178	U
C020 Vinyl Chloride	144	U	280		1039		144	U
C015 Bromomethane	95	U	95	U	95	U	95	U
C025 Chloroethane	139	U	139	U	139	U	139	U
C021 Trichlorofluoromethane	65	U	65	U	65	U	65	U
C045 1,1-Dichloroethane	93	U	93	U	93	U	93	U
C035 Acetone	894	B	2247	B	592	BJ	6414	B
C040 Carbon Disulfide	118	U	118	U	118	U	118	U
C030 Methylene Chloride	106	U	169		106	U	106	U
C055 trans-1,2-Dichloroethene	93	U	93	U	93	U	93	U
C050 1,1-Dichloroethane	91	U	658		91	U	91	U
C054 cis-1,2-Dichloroethene	93	U	93	U	93	U	93	U
C110 2-Butanone	623	U	623	U	623	U	623	U
C060 Chloroform	75	U	617		75	U	75	U
C065 1,2-Dichloroethane	91	U	91	U	91	U	91	U
C115 1,1,1-Trichloroethane (TCA)	67	U	67	U	67	U	67	U
C120 Carbon Tetrachloride	58	U	58	U	58	U	58	U
C165 Benzene	115	U	3782		256		1513	
C150 Trichloroethene (TCE)	68	U	626		1817		68	U
C140 1,2-Dichloropropane	81	U	81	U	81	U	81	U
C130 Bromodichloromethane	55	U	239		55	U	336	
C142 cis-1,3-Dichloropropene	81	U	81	U	81	U	81	U
C172 trans-1,3-Dichloropropene	81	U	81	U	81	U	81	U
C160 1,1,2-Trichloroethane	67	U	67	U	67	U	67	U
C155 Dibromochloromethane	43	U	43	U	43	U	43	U
C205 4-Methyl-2-Pentanone	449	U	449	U	449	U	449	U
C230 Toluene	98	U	575		98	U	98	U
C220 Tetrachloroethene	54	U	620		221		54	U
C074 1,3-Dichloropropene	80	U	80	U	80	U	80	U
C210 2-Hexanone	449	U	449	U	449	U	449	U
C102 1,2-Dibromoethane (EDB)	48	U	285		48	U	48	U
C235 Chlorobenzene	80	U	423		80	U	80	U
C240 Ethylbenzene	85	U	42	J	85	U	165	
C251 p & m- Xylene	85	U	44	J	262		518	
C250 o-Xylene	85	U	85	U	85	U	85	U
C245 Styrene	86	U	86	U	86	U	86	U
C180 Bromoform	36	U	36	U	36	U	36	U
C225 1,1,2,2-Tetrachloroethane	54	U	54	U	54	U	54	U
C081 1,2,3-Trichloropropane	61	U	61	U	61	U	61	U
C335 1,3-Dichlorobenzene	122	U	122	U	122	U	122	U
C340 1,4-Dichlorobenzene	61	U	61	U	61	U	61	U
C380 1,2-Dichlorobenzene	61	U	61	U	61	U	61	U
C090 1,2-Dibromo-3-chloropropane (D	38	U	38	U	38	U	38	U

Q-Laboratory Data Qualifiers
Refer to EPA Region 9 Laboratory Qualifier Definitions

ATTACHMENT C.1.3

TRC

TRC ENVIRONMENTAL SOLUTIONS, INC.

By EJW Date 10Nov97 Subject DIFFUSION COEFFICIENT OF METHANE Sheet No. 1 of 3
Chkd. By JLP Date 11/10/97 Proj. No. 94-256

PURPOSE

Calculate the diffusion coefficient for methane in free air.

APPROACH

Use the method of Fuller, Schettler and Giddings (FSG Method) as described in Lyman et al (1990). See Appendix A.

THEORY

The basic equation for the diffusion coefficient of molecule B (e.g., methane) into a carrier gas A (e.g., air) is:

$$D_{BA} = \frac{10^{-3} T^{1.75} \sqrt{W}}{P\left(V_A^{1/3} + V_B^{1/3}\right)^2} \qquad (1)$$

where D_{BA} = diffusion coefficient of molecule B into gas A $[L^2 T^{-1}]$ $(cm^2 s^{-1})$

T = temperature, absolute of gas A $[\theta]$ (°K)

Brackets [ ] give dimensions where L = length, T = time, θ = temperature and M = mass.

Parantheses ( ) give example units (e.g., CGS system of centimeter, grams and seconds).

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 10 Nov 97 Subject DIFFUSION COEFFICIENT OF METHANE Sheet No. 2 of 3
Chkd. By TLP Date 11/10/97 Proj. No. 94-256

THEORY (continued)

W = molecular weight factor of the mixture

$$= \frac{m_A + m_B}{m_A m_B} \quad [\text{mole } M^{-1}] \ (\text{g-mole } g^{-1})$$

Assume $m_A = 28.97$ g/g-mole (Lyman et al, 1990).

P = pressure of total mixture $[M L^{-1} T^{-2}]$ (atm)

Assume P = 1 atm.

V = molar volume of a molecule $[L^3 \text{ mole}^{-1}]$ (cm^3 g-mole^{-1})

$V_{air} = 20.1$ cm^3/g-mole (Lyman et al, 1990).

CALCULATION

Equation 1 is applied to the diffusion of methane into air at a temperature of 64°F (average for Los Angeles) (= 17.8°C).

$$D_{CH_4,air} = \frac{10^{-3} \, 291^{1.75} \sqrt{\frac{28.97+16}{28.97 \times 16}}}{1\left(20.1^{1/3} + 24.42^{1/3}\right)^2}$$ } See Appendix A.

$$= 0.203 \text{ cm}^2 \text{ s}^{-1}$$

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By EJW Date 10Nov97 Subject DIFFUSION COEFFICIENT Sheet No. 3 of 3
Chkd. By TLP Date 11/10/97 OF METHANE Proj. No. 94-256

REFERENCE

Lyman, Warren J., William F. Reehl and David H. Rosenblatt, Handbook of Chemical Property Estimation Methods: Environmental Behavior of Organic Compounds, American Chemical Society, Washington, DC, 1990.

Recyclable and made from recycled paper

HANDBOOK OF CHEMICAL PROPERTY ESTIMATION METHODS

Environmental Behavior of Organic Compounds

Warren J. Lyman, Ph.D.
William F. Reehl
Arthur D. Little, Inc., Cambridge, Massachusetts

David H. Rosenblatt, Ph.D.
U.S. Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, Frederick, Maryland

American Chemical Society,
Washington, DC
1990

17-4 SELECTED METHODS OF ESTIMATING GASEOUS DIFFUSION COEFFICIENTS OF ORGANICS IN AIR

The criteria for choosing a specific estimation technique include (1) ease of use, (2) availability of input data, and (3) accuracy of results for a general chemical population. Of those listed in Table 17-1, only the first two fulfill all of these requirements. Both methods estimate the gaseous diffusion coefficient from the structure of the chemical, although neither can distinguish between isomers.

The FSG method is much easier and less time-consuming than the WL method and is reportedly applicable to non-polar gases at low to moderate temperatures. Jarvis and Lugg [6] state that the method is most accurate for chlorinated aliphatics and that aromatics, alkanes, and ketones deviate ±5% from the measured value. It does not give accurate estimates for esters and alcohols higher than C_6 and C_7 respectively. The reported average absolute error of 7.6% is based on values of the atomic diffusion volume, a parameter which is derived from measured diffusion coefficient values.

The WL method, as mentioned earlier, is very similar to the theoretical expression derived by Chapman and Enskog and is applicable to many kinds of compounds over a fairly wide temperature range. It is a much more tedious computation, since parameters such as the collision integral and characteristic length must be calculated by additional approximations. However, as shown in Table 17-2, the average errors obtained with this method are considerably less than those of the FSG method for some classes of chemicals, particularly nitriles, glycols, and aromatic esters.

FSG Method. The method of Fuller, Schettler and Giddings [4] is most accurate for non-polar gases at low to moderate temperatures. Its accuracy is poorest with the polar acids and glycols (Table 17-2); minimal error is associated with the aliphatics and aromatics. The method is based on the following correlation:

$$\mathcal{D}_{BA} = \frac{10^{-3}\, T^{1.75} \sqrt{M_r}}{P\,(V_A^{1/3} + V_B^{1/3})^2} \qquad (17\text{-}12)$$

TABLE 17-3

Some Physical Properties of Air

M_A	28.97 g/mol
V_A	20.1 cm^3/mol
ε/k	78.6 K
σ_A	3.711 Å

Source: Jarvis and Lugg [6]. Values of ε/k and σ_A obtained from Lennard-Jones 12-6 potential function.

TABLE 17-4

Atomic and Structural Diffusion Volume Increments[a] (cm^3/mol)

	ΔV_B
C	16.5
H	1.98
O	5.48
N	(5.69)
Cl	(19.5)
S	(17.0)
Aromatic and heterocyclic rings	−20.2

a. Values in parentheses are based upon few data points.

Source: Fuller, Schettler, and Giddings [4]. *(Reprinted with permission from the American Chemical Society.)*

TABLE 17-5

Additive Volume Increments for Calculating LeBas Molar Volume, V_B'

Atom	Increment (cm^3/mol)	Atom	Increment (cm^3/mol)
C	14.8	Br	27.0
H	3.7	Cl	24.6
O (except as noted below)	7.4	F	8.7
In methyl esters and ethers	9.1	I	37.0
In ethyl esters and ethers	9.9	S	25.6
In higher esters and ethers	11.0	Ring	
In acids	12.0	3-Membered	− 6.0
Joined to S, P, N	8.3	4-Membered	− 8.5
N		5-Membered	−11.5
Double bonded	15.6	6-Membered	−15.0
In primary amines	10.5	Naphthalene	−30.0
In secondary amines	12.0	Anthracene	−47.5

Source: Reid, *et al.* [17]. *(Reprinted with permission from McGraw-Hill Book Co.)*

(4) Calculate V_B by adding the incremental values for the atoms listed in Table 17-4; for molecules containing atoms not listed in this table (except P), calculate the LeBas volume, V'_B, from Table 17-5 and use 87.5% of this value as the atomic diffusion volume.

(5) Calculate $\mathcal{D}_{BA}$ using Eq. 17-12 for the temperature and pressure (P) of interest. P will usually be 1 atm.

Example 17-1 Calculate the diffusion coefficient of *m*-chlorotoluene (C_7H_7Cl) into air at 25°C and 1 atm, given M_B = 126.59 g/mol.

CH4
64°F 1atm.
M=16 g/g-mol

(1) From Table 17-3,

M_A = 28.97 g/mol and V_A = 20.1 cm³/mol

(2) Calculate M_r

$$M_r = (28.97 + 126.59)/(28.97)(126.59) = 0.0424$$

$$M_{r_{CH_4}} = \frac{28.97+16}{28.97*16} = 0.097$$

(3) Calculate V_B for *m*-chlorotoluene from Table 17-4:

7(C)	=	7(16.5)
7(H)	=	7(1.98)
1(Cl)	=	1(19.5)
1(Ring)	=	1(−20.2)
V_B	=	128.7 cm³/mol

1 C = 16.5
4 H = 4·1.98
24.42

(4) Using Eq. 17-12,

$$\mathcal{D}_{BA} = \frac{10^{-3}\,(298)^{1.75}\,\sqrt{0.0424}}{1\cdot\left[(20.1)^{1/3} + (128.7)^{1/3}\right]^2} = 7.31 \times 10^{-3}\ \text{cm}^2/\text{s}$$

$$\frac{10^{-3}\,291^{1.75}\sqrt{0.097}}{(20.1^{1/3}+24.42^{1/3})^2} = 0.2026\ \text{cm}^2/\text{s}$$

The deviation is +13% from the literature value, 6.45×10^{-2} cm²/s [6].

Example 17-2 Calculate the diffusion coefficient of isopropyl iodide ($(CH_3)_2CHI$) into air at 25°C and 1 atm, given M_B = 169.9 g/mol.

(1) Since M_A = 28.97 g/mol (Table 17-3), M_r is:

$$M_r = (28.97 + 169.9)/(28.97)(169.9) = 0.0404$$

(2) V_B of $(CH_3)_2CHI$ cannot be determined by using Table 17-4. The LeBas volume (Table 17-5) is:

3(C) = 3(14.8)
7(H) = 7(3.7)

ATTACHMENT C.1.4

TRC

United States
Environmental Protection
Agency

Office of Research and
Development
Washington DC 20460

EPA/600/R-94/168b
September 1994

EPA

The Hydrologic Evaluation of Landfill Performance (HELP) Model

Engineering Documentation for Version 3

EPA/600/R-94/168b
September 1994

THE HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE (HELP) MODEL

ENGINEERING DOCUMENTATION FOR VERSION 3

by

Paul R. Schroeder, Tamsen S. Dozier, Paul A. Zappi,
Bruce M. McEnroe, John W. Sjostrom and R. Lee Peyton
Environmental Laboratory
U.S. Army Corps of Engineers
Waterways Experiment Station
Vicksburg, MS 39180-6199

Interagency Agreement No. DW21931425

Project Officer

Robert E. Landreth
Waste Minimization, Destruction and Disposal Research Division
Risk Reduction Engineering Laboratory
Cincinnati, Ohio 45268

RISK REDUCTION ENGINEERING LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

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TABLE 1. DEFAULT LOW DENSITY SOIL CHARACTERISTICS

Soil Texture Class			Total Porosity vol/vol	Field Capacity vol/vol	Wilting Point vol/vol	Saturated Hydraulic Conductivity cm/sec
HELP	USDA	USCS				
1	CoS	SP	0.417	0.045	0.018	1.0×10^{-2}
2	S	SW	0.437	0.062	0.024	5.8×10^{-3}
3	FS	SW	0.457	0.083	0.033	3.1×10^{-3}
4	LS	SM	0.437	0.105	0.047	1.7×10^{-3}
5	LFS	SM	0.457	0.131	0.058	1.0×10^{-3}
6	SL	SM	0.453	0.190	0.085	7.2×10^{-4}
7	FSL	SM	0.473	0.222	0.104	5.2×10^{-4}
8	L	ML	0.463	0.232	0.116	3.7×10^{-4}
9	SiL	ML	0.501	0.284	0.135	1.9×10^{-4}
10	SCL	SC	0.398	0.244	0.136	1.2×10^{-4}
11	CL	CL	0.464	0.310	0.187	6.4×10^{-5}
12	SiCL	CL	0.471	0.342	0.210	4.2×10^{-5}
13	SC	SC	0.430	0.321	0.221	3.3×10^{-5}
14	SiC	CH	0.479	0.371	0.251	2.5×10^{-5}
15	C	CH	0.475	0.378	0.251	2.5×10^{-5}
21	G	GP	0.397	0.032	0.013	3.0×10^{-1}

a = constant representing the effects of various fluid constants and gravity, 21 cm^3/sec

ϕ = total porosity, vol/vol

θ_r = residual volumetric water content, vol/vol

ψ_b = bubbling pressure, cm

λ = pore-size distribution index, dimensionless

A more detailed explanation of Equation 11 can be found in Appendix A of the HELP program Version 3 User's Guide and the cited references.

TABLE 2. MODERATE AND HIGH DENSITY DEFAULT SOILS

Soil Texture Class			Total Porosity vol/vol	Field Capacity vol/vol	Wilting Point vol/vol	Saturated Hydraulic Conductivity cm/sec
HELP	USDA	USCS				
22	L (Moderate)	ML	0.419	0.307	0.180	1.9×10^{-5}
23	SiL (Moderate)	ML	0.461	0.360	0.203	9.0×10^{-6}
24	SCL (Moderate)	SC	0.365	0.305	0.202	2.7×10^{-6}
25	CL (Moderate)	CL	0.437	0.373	0.266	3.6×10^{-6}
26	SiCL (Moderate)	CL	0.445	0.393	0.277	1.9×10^{-6}
27	SC (Moderate)	SC	0.400	0.366	0.288	7.8×10^{-7}
28	SiC (Moderate)	CH	0.452	0.411	0.311	1.2×10^{-6}
29	C (Moderate)	CH	0.451	0.419	0.332	6.8×10^{-7}
16	Liner Soil (High)		0.427	0.418	0.367	1.0×10^{-7}
17	Bentonite (High)		0.750	0.747	0.400	3.0×10^{-9}

3.5.2 Default Waste Characteristics

Table 4 provides a summary of default moisture retention values for various waste layers. Municipal waste properties provided in Tchobanoglous et al. (1977) and Equations 6 and 7 were used to determine the total porosity, field capacity, and wilting point of a well compacted municipal waste. The field capacity and wilting point were calculated using Tchobanoglous et al.'s high and low water content values, respectively. Oweis et al. (1990) provided information on the in-situ saturated hydraulic conductivity of municipal waste. Zeiss and Major (1993) described the moisture flow through

TABLE 3. DEFAULT SOIL TEXTURE ABBREVIATIONS

US Department of Agriculture	Definition
G	Gravel
S	Sand
Si	Silt
C	Clay
L	Loam (sand, silt, clay, and humus mixture)
Co	Coarse
F	Fine
Unified Soil Classification System	**Definition**
G	Gravel
S	Sand
M	Silt
C	Clay
P	Poorly Graded
W	Well Graded
H	High Plasticity or Compressibility
L	Low Plasticity or Compressibility

municipal waste and the effective moisture retention of municipal waste, providing information on waste with dead zones and channeling. In addition, Toth et al. (1988) provided information on compacted coal-burning electric plant ash, Poran and Ahtchi-Ali (1989) provided information on compacted municipal solid waste ash, and Das et al. (1983) provided information on fine copper slag.

The total porosities of the ash and slag wastes were determined using a phase relationship at maximum dry density. The field capacities and wilting points of the ash and slag wastes were calculated using the following empirical equations reported by Brakensiek et al. (1984):

ATTACHMENT C.1.5

TRC

PHYSICAL PROPERTIES DATA

(METHODOLOGY: ASTM D2216, API RP40)

PROJECT NAME: Waste Disposal, Inc.
PROJECT NO: 94-256

SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENT. (1)	MOISTURE CONTENT (% wt)	DENSITY BULK (g/cc)	DENSITY GRAIN (g/cc)	EFFECTIVE POROSITY, % Vb	PORE FLUID SATURATION, % Pv WATER (2)	PORE FLUID SATURATION, % Pv HYDROCARBON (3)	25.0 PSI CONFINING STRESS NATIVE PERMEABILITY TO AIR (millidarcy)	25.0 PSI CONFINING STRESS NATIVE AIR CONDUCTIVITY (cm/s)
WDI-TS-25A	0-3	V	19.4	1.52	2.66	43.0	67.6	2.71	21.3	1.14E-03
WDI-TS-25B	7-10	V	30.3	1.56	2.67	41.8	87.5	6.77	0.021	1.86E-06
WDI-TS-56A	2-4	V							0.0125	1.11E-06
WDI-TS-56B	12-14	V							0.0012	1.06E-07

(1) Sample Orientation: H = Horizontal; V = Vertical

(2) 0.9986 gm/cc used for calculation
(3) 0.7500 gm/cc used for calculation

Vb = Bulk Volume, cc
Pv = Pore Volume, cc
ND = Not Detected

ATTACHMENT C.1.6

TRC

Wright Engineering Associates
505 E. Commonwealth Ave., Ste. J
Fullerton, CA 92832
Phone (714) 738-4143
Fax (714) 738-4144

November 5, 1997

TRC Environmental Solutions, Inc.
221 Technology Drive
Irvine, CA 92618

Roberto Puga, R.G.
Project Manager

Re: Ventilation Assessment

Brother's Machine and Tool, Inc.
9843 S. Greenleaf Ave.
Santa Fe Springs, CA

Roberto -

SUMMARY

A natural gravity ventilation system is installed in this building. The ventilation air exchange ratings for the system exceed recommended rates for industrial machine shop environments. There is no perceived need for additional mechanical ventilation.

SITE INSPECTION OBSERVATIONS

Building -
The subject building we inspected this morning is 40' wide x 140' long, a prefab metal building structure with corrugated sheet steel siding and roof. Roof ridge is on the 140' length with minimum clearance 16' (low point south and north walls) and peak ridge elevation 24'. Small single story offices with open mezzanine above are located at the front (east) end of the building. The building houses a machine shop with manually operated metal lathes and machining equipment. The building footprint is 5,600 square feet; the volume 112,000 cubic feet.

Ave height = $\frac{16+24}{2} = 20'$

Air Inlets -
A 12'w x 16' full height rollup door is located on the south wall and is kept open during all operating hours for equipment access, shipping and receiving, ambient light and inlet ventilation air, according to the owner, Enrique. There is an additional 3' x 6'8" man door on the west wall which is also maintained open. These inlets represents 212 square feet of open area.

Roof Ridge Ventilators -
The roof is provided with a natural gravity roof ridge ventilator. The ridge ventilator is continuous for the first 100' of building; the west 40' section (a later addition) is provided with (3) 4' ridge ventilator sections. The "throat width" of the ridge vent appears to be 18". This totals 112' of 18" ridge vent; 168 square feet of open area.

Ridge Ventilator Ratings -
The 18" ridge ventilator is rated for a minimum of 497 cubic feet per minute (CFM) at 20' stack height and 10F temperature differential, as shown in the manufacturer's ridge ventilator ratings included in the attachments. Thus, 112' of ridge vent is rated at

- 112' @ 497 = 55,664 CFM.

Recommended Ventilation Rates -
Also included in the attachments is a summary of "Recommended Air Changes" for industrial ventilation applications. For machine shops, the recommendation is 3 to 6 minutes per change (10 to 20 air changes per hour). For building volume of 112,000 cubic feet, those recommendations result in:

- 3 min/air ch. (20 air ch. per hour) = 37,300 CFM
- 6 min/air ch. (10 air ch per hour) = 18,700 CFM

VENTILATION SUMMARY

- Recommended - 18,700 to 37,300 CFM

- Existing Gravity Ventilation -
  - rated at 100% ridge vent 55,664 CFM (2.0 minutes/air change)
  - rated at 150% inlet air opening 46,828 CFM (2.4 minutes/air change)

CONCLUSION
The existing gravity ventilation system is more than adequate to meet recommended ventilation rates with the rollup door wide open. No additional ventilation system is considered necessary, unless driven by other IAQ issues.

Please do call if I can be of further assistance.

Best Regards,

Jim Wright

James D. Wright, P. E.
Principal

California License M16502

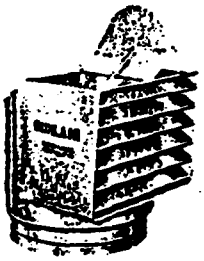
Attachments: (3)

THE ROMLAIR FAMILY OF VENTILATORS AND EXHAUSTERS

MODELS RR

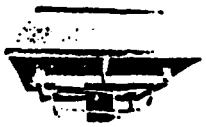
MODEL RS

MODEL ST



MODEL DV

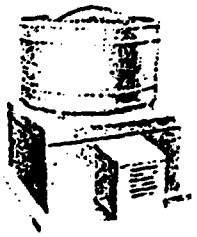
MODEL PFD, APB, SPF



MODELS LLD, LS, LSS

MODELS TB, TD

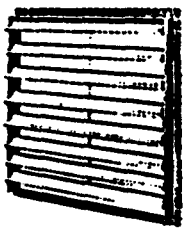
MODELS VED, VB, VBS



MODEL VBO

MODEL RDF

MODEL CBF



MODELS #556, #611

INDEX

MODEL	PG.	MODEL	PG.	MODEL	PG.
RR	3-4	VB	8-9	VBO	16
B	4	VED	8-9	PBS	17
DD	4	LS	10-11	VBS	17
C	4	LLD	10-11	LSS	17
RS	5	TD	12-13	SPF, RDF, CBF	18
ST	6	TB	12-13	#611	19
DV	7	APB	14-15	#1500	19
SPECIAL				#556	19
PRODUCTS	7	PFD	14-15	AB	20

ROMLAIR VENTILATORS

USEFUL INFORMATION

DEFINITIONS

STACK HEIGHT - Distance in ft. from middle of intake area to roof ventilator.

WIND SPEED - Average wind speed in miles per hour for a given locale.

TEMPERATURE DIFFERENTIAL - Average difference in degrees fahrenheit of inside and outside temperature.

CFM - Ventilator performance rating measured in cubic feet per minute.

FPM - Air velocity measured in feet per minute

STATIC PRESSURE - The measure of force (expressed in inches of water) exerted by a fan to overcome the resistance of a ventilating system.

RECOMMENDED AIR CHANGES

INSTALLATION	*MINUTES PER CHANGE*
Bakeries	3-5
Galvanizing Plants	1-3
Garages	5-15
Generator Rooms	2-5
Glass Plants	1-2
Heat Treating Rooms	½-1
Machine Shops	3-6
Plating Rooms	1-5
Shops (Light Mfg.)	5-10
Shops (Heavy Mfg.)	1-5
Shops (Plant)	1-3
Warehouse	10-30
Woodshops	3-6

USEFUL SIZING FORMULAS

$$\frac{\text{Bldg. content (cu. ft.)}}{\text{Air change (in min.)}} = \text{Total CFM req.}$$

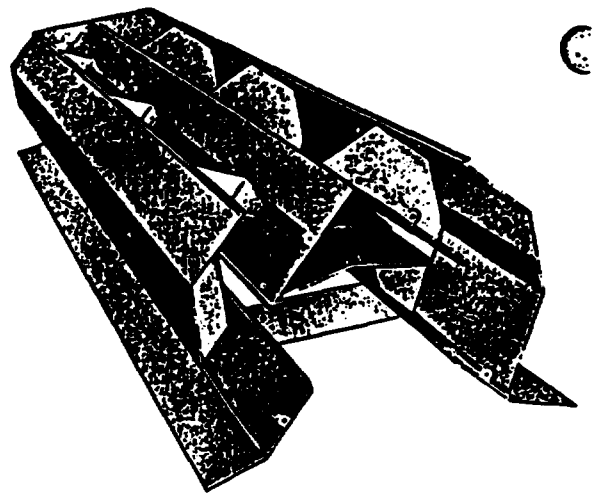
$$\frac{\text{Bldg. content (cu. ft.)}}{\text{CFM proposed}} = \text{Air change in min.}$$

$$\frac{\text{CFM}}{\text{Sq. ft. opening}} = \text{FPM}$$

$$\frac{\text{FPM}}{88} = \text{MPH}$$

ROMLAIR

RIDGE VENTILATORS



RV and RCV SERIES

Romla Ridge Ventilators are ideal for steel buildings and other applications requiring an inconspicuous high volume exhaust vent. Install on peaks, flat roofs or on curbs.

The RV Series is a standard 10' section, complete with end caps for single unit installations. The RCV Series is a continuous ventilator, and the 10' sections are spliced together with Join Plates to provide any required length. All assembly is easily performed from the roof except for joining the damper operator bars.

Knocked down construction is available for overseas or distant shipping points. Complete drawings and installation instructions are provided for both K.D. and assembled units.

ACCESSORIES

Optional dampers can be provided as illustrated on the opposite page. Operators of both types #1 and #2 are trouble free and damper raises and lowers to any position.

BIRD SCREENS

Removable bird screens are available at ½" mesh x GA. galvanized wire or .051 expanded aluminum.

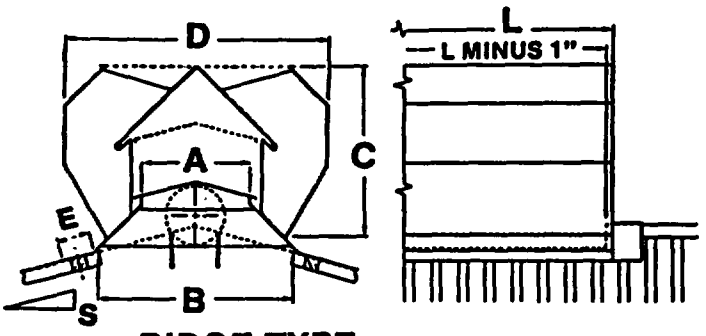
PAINTING

Optional high adhesion white enamel and other colors available at extra cost.

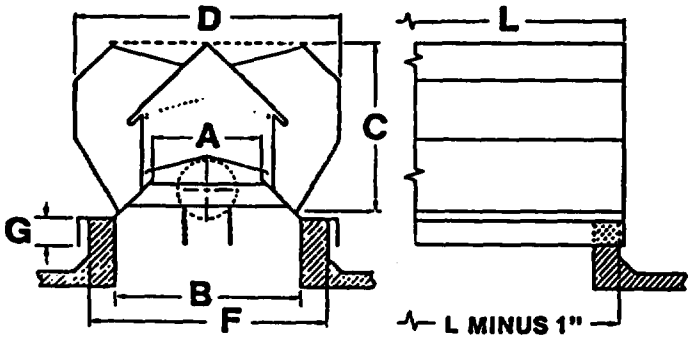
★CAPACITY — CFM PER LINEAL FOOT

STACK HEIGHT	TEMP. DIFF.	RV-4	RV-6	RV-9	RV-12	RV-15	RV-18	RV-24
10'	10	103	155	232	310	387	465	620
	15	108	162	243	325	406	487	650
	20	110	165	248	331	413	496	662
	25	112	167	250	334	417	501	668
	30	115	173	260	347	433	520	694
20'	10	109	166	248	331	414	497	662
	15	114	173	259	345	431	519	690
	20	119	180	270	360	449	540	720
	25	121	185	277	369	461	554	738
	30	128	194	291	388	484	581	776
30'	10	114	173	259	345	431	519	690
	15	120	181	272	363	454	545	726
	20	128	194	291	388	484	582	776
	25	133	201	303	403	505	605	806
	30	140	213	320	427	532	640	854
40'	10	119	180	270	359	449	540	718
	15	128	194	291	388	484	582	776
	20	134	204	306	408	510	612	816
	25	145	220	331	441	552	661	882
	30	154	234	351	468	585	703	936

★Based on 5 mile wind conditions and 150% inlet area of building to ventilator area



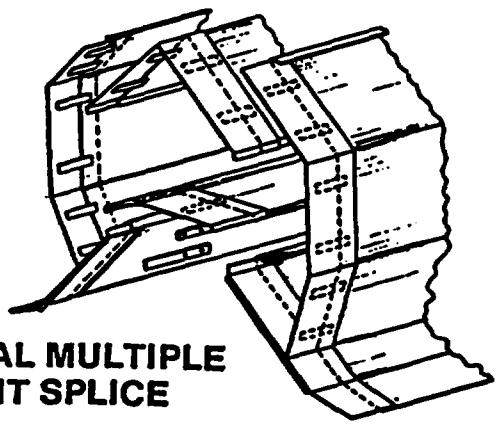
RIDGE TYPE



CURB TYPE

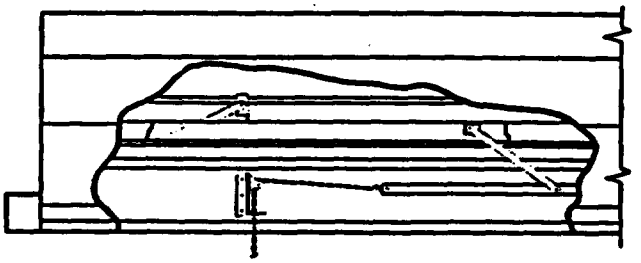
MODEL	A	B	C	D	E	F MAX.	G	*GALV. GA.
RV-4	4	11-⅛	7	10-¾	2-⅞	15-⅛	2	24
RV-6	6	13-⅛	10-¼	15	2-78	17-⅛	2	24
RV-9	9	16-⅛	14-¼	22	2-⅞	20-⅛	2	24
RV-12	12	22-½	18-¼	28-¾	3-¼	26-½	2	24
RV-15	15	25-⅝	24	36	3	29-⅝	2	22
RV-18	18	35-½	30	44	4	43-½	3	20/22
RV-24	24	44	38-½	58	5	52	3	20/22
*Inner Support Structures are 18 and 20 GA.								

Slip type Join Plates provide a unique arrangement for joining RCV series units. Romlair's method permits sections to telescope together without the need for separate fasteners.

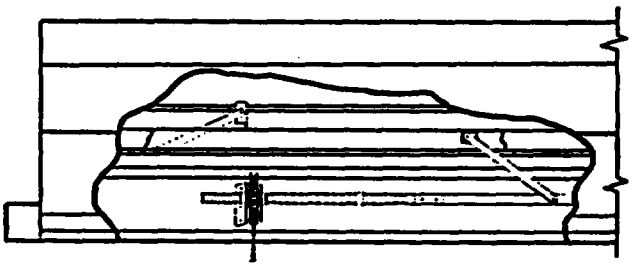


TYPICAL MULTIPLE UNIT SPLICE

DAMPER OPERATORS



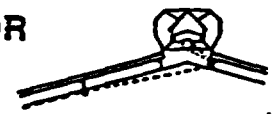
Type 1 is a pull to open, release to close operator for RV series single units. A chain catch is provided in the ventilator with 20' chain as standard length. Not to be used for more than one 10' section.



Type 2 damper is for continuous RCV series. The chain sprocket gear operates an Acme threaded screw to provide added leverage for operating many sections. See schedule below. Standard chain lengths is 40' (20' loop).

MAXIMUM LENGTH PER OPERATOR TYPE 2 ONLY						
RV-4	RV-6	RV-9	RV-12	RV-15	RV-18	RV-24
100'	100'	100'	70'	50'	50'	30'
WEIGHT PER 10' SECTION						
68	86	108	169	253	294	462

OPTIONAL OPERATOR ARRANGEMENT



When standard below the unit operation of dampers is prohibitive, optional remote damper controls can be supplied. This is accomplished by diverting the chain to column or sidewall with idler pulleys. Type 1 operator requires single wheel pulleys and chain catch. Type 2 operator requires a chain diverting assembly and double wheel pulleys. Idler pulleys should be spaced approximately 10 feet apart and also where a change of direction is required.

SHORT FORM SPECIFICATIONS

Furnish and install where indicated on drawings, ROMLAIR Model (*RV or RCV) Ridge ventilators as manufactured by Romla Company, Gardena, California. Specify if dampers or screen is required.

*Preceding the throat width is the Model number indicating RV for single units or RCV for continuous ventilators.

ATTACHMENT C.1.7

TRC

Barclays Official

CALIFORNIA CODE OF REGULATIONS

Title 27. Environmental Protection

Complete Title

Vol. 37

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San Francisco, CA 94111
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JUL 29 1997

(2) new postclosure activities that may jeopardize the integrity of previously closed sites or pose a threat to public health and safety or the environment.

NOTE: Authority cited: Sections 40502 and 45020, Public Resources Code; and Section 66796.22(d), Government Code. Reference: Sections 43021 and 43103, Public Resources Code; and Section 66796.22(d), Government Code.

HISTORY

1. New section filed 6-18-97; operative 7-18-97 (Register 97, No. 25).

§ 20921. CIWMB — Gas Monitoring and Control During Closure and Postclosure. (T14:§17783)

(a) To provide for the protection of public health and safety and the environment, the operator shall ensure that landfill gases generated at a disposal site are controlled in accordance with the following requirements:

(1) The concentration of methane gas must not exceed 1.25% by volume in air within on-site structures.

(2) The concentration of methane gas migrating from the landfill must not exceed 5% by volume in air at the facility property boundary or an alternative boundary approved in accordance with §20925.

(3) Trace gases shall be controlled to prevent adverse acute and chronic exposure to toxic and/or carcinogenic compounds.

(b) The program implemented pursuant to §§20921 – 20937 shall continue for a period of thirty (30) years or until the operator receives written authorization to discontinue by the EA with concurrence by the CIWMB pursuant to 40 CFR 258.61(b). Authorization to cease gas monitoring and control shall be based on a demonstration by the operator that there is no potential for gas migration beyond the property boundary or into on-site structures. Demonstration of this proposal shall be supported by data collected and any additional studies.

(c) The gas monitoring program required pursuant to §§20921 – 20937, shall be described as part of the preliminary and final postclosure maintenance plan.

(d) Gas monitoring and control systems shall be modified, during the closure and postclosure maintenance period, to reflect changing on-site and adjacent land uses. Postclosure land use at the site shall not interfere with the function of gas monitoring and control systems. The operator may request a reduction of monitoring or control activities based upon the results of monitoring data collected. The request for reduction of monitoring or control activities shall be submitted in writing to the EA.

NOTE: Authority cited: Sections 40502 and 45020, Public Resources Code; and Section 66796.22(d), Government Code. Reference: Sections 43021 and 43103, Public Resources Code; and Section 66796.22(d), Government Code.

HISTORY

1. New section filed 6-18-97; operative 7-18-97 (Register 97, No. 25).

§ 20923. CIWMB — Monitoring (T14:§17783.3)

(a) To ensure that the conditions of §20921 are met, the operator shall implement a gas monitoring program at the disposal site in accordance with the following requirements:

(1) the gas monitoring network shall be designed by a registered civil engineer or a certified engineering geologist, and shall ensure detection of the presence of landfill gas migrating beyond the landfill property boundary and also into on-site structures; and

(2) The monitoring network shall be designed to account for the following specific site characteristics and potential migration pathways or barriers, including, but not limited to:

(A) local soil and rock conditions;

(B) hydrogeological conditions at the disposal site;

(C) locations of buildings and structures relative to the waste disposal area;

(D) adjacent land use, and inhabitable structures within 1000 feet of the disposal site property boundary;

(E) man-made pathways, such as underground construction; and

(F) the nature and age of waste and its potential to generate landfill gas.

NOTE: Authority Cited: Sections 40502 and 45020, Public Resources Code; and Section 66796.22(d), Government Code. Reference: Sections 43201 and 43103, Public Resources Code; and Section 66796.22(d), Government Code.

HISTORY

1. New section filed 6-18-97; operative 7-18-97 (Register 97, No. 25).

§ 20925. CIWMB — Perimeter Monitoring Network. (T14:§17783.5)

(a) Location

(1) Perimeter subsurface monitoring wells shall be installed around the waste deposit perimeter but not within refuse. The entire perimeter of the disposal site may not warrant the installation of monitoring wells. In this case, the operator shall demonstrate to the satisfaction of the EA that gas migration could not occur due to geologic barriers and that no inhabitable structure or other property such as agricultural lands within 1,000 feet of the property boundary are threatened by gas migration.

(2) Perimeter monitoring wells shall be located at or near the disposal site property boundary. The operator may establish an alternate boundary closer to the waste deposit area based on a knowledge of the site factors in §20923(a)(2). When compliance levels are exceeded at the alternate boundary, the operator shall install additional monitoring wells closer to the property boundary, pursuant to §20937.

(b) Spacing

(1) The lateral spacing between adjacent monitoring wells shall not exceed 1,000 feet, unless it can be established to the satisfaction of the EA, in §20923(a)(2).

(2) The spacing of monitoring wells shall be determined based upon, but not limited to: the nature of the structure to be protected and its proximity to the refuse. Wells shall be spaced to align with gas permeable structural or stratigraphic features, such as dry sand or gravel, off-site or on-site structures, and areas of dead or stressed vegetation that might be due to gas migration.

(3) Probe spacing shall be reduced as necessary to protect persons and structures threatened by landfill gas migration.

(c) Depth

(1) The depth of the wellbore shall equal the maximum depth of waste as measured within 1,000 feet of the monitoring point. The number and depths of monitoring probes within the wellbore shall be installed in accordance with the following criteria, except as specified in ¶(c)(2).

(A) a shallow probe shall be installed 5 to 10 feet below the surface;

(B) an intermediate probe shall be installed at or near half the depth of the waste;

(C) a deep probe shall be set at or near the depth of the waste;

(D) the specified depths of monitoring probes within the wellbore shall be adjusted, based on geologic data obtained during drilling, and probes shall be placed adjacent to soils which are most conductive to gas flow;

(E) All probes shall be installed above the permanent low seasonal water table, above and below perched ground water, and above bedrock; and

(F) When the depth of the waste does not exceed 30 feet, the operator may reduce the number of probes to two, with one probe located in the shallow zone as indicated above, and the other located adjacent to permeable soils at or near the depth of the waste.

(2) Exclusions or modifications to ¶(c)(1) may be requested for certain disposal sites (i.e., filled pits, cut and trench, and canyon fills). When conditions limit the practicality or do not warrant the installation depth criteria, the operator shall propose an alternate system of equivalent probe depths. The proposal must demonstrate to the satisfaction of the EA, that probes located at these depths are sufficient to detect migrating landfill gas and provide protection to public health and safety and the environment.

(3) The EA may require an increase in the number of monitoring probes, the depth of the wellbore, or modify the depths of monitoring probes within a wellbore to ensure compliance with §20921(a). The operator is not precluded from utilizing existing gas monitoring probes of an alternate design, when the operator demonstrates to the satisfaction of the EA, that such probes have been installed in a manner that ensures the detection of landfill gas migrating from the disposal site.

(d) Monitoring Well Construction

ATTACHMENT C.1.8

TRC

CAPCOA

Air Toxics "Hot Spots" Program

Revised 1992
Risk Assessment Guidelines

Prepared by the:

Toxics Committee of the California Air
Pollution Control Officers Association (CAPCOA),
in consultation with the

Air Toxicology Unit
Air Toxicology and Epidemiology Section
Office of Environmental Health Hazard Assessment

and the

Special Projects Section
Toxic Air Contaminant Identification Branch
Air Resources Board

October 1993

PROPERTY OF

Table III-6

OEHHA and U.S. EPA Cancer Potency Values

Substance		Unit Risk (ug/m^3)$^{-1}$		Reference[c]
Acetaldehyde	2.2E-6	2.7E-6	IRIS	OEHHA-ATES/ARB
Acrylamide		1.3E-3		IRIS/OEHHA-RCHAS
Acrylonitrile		2.9E-4		OEHHA-RCHAS
Arsenic		3.3E-3		OEHHA-ATES/ARB
Arsenic compounds (inorganic)		3.3E-3		OEHHA-ATES/ARB
Asbestos		[1.9E-4/100 fibers/m^3][a]		OEHHA-ATES/ARB
Benzene		2.9E-5		OEHHA-RCHAS
Benzidine (and its salts)		1.4E-1		OEHHA-RCHAS
Beryllium		2.4E-3		IRIS
Bis(chloromethyl)ether		1.3E-2		OEHHA-RCHAS
1,3-Butadiene	2.8E-4	1.7E-4	IRIS	OEHHA-ATES/ARB
Cadmium		4.2E-3		OEHHA-RCHAS
Cadmium compounds		4.2E-3		OEHHA-ATES/ARB
Carbon tetrachloride		4.2E-5		OEHHA-RCHAS,ATES
Chlorinated dibenzo-p-dioxins[b] (as 2,3,7,8-equivalents)		3.8E+1		OEHHA-RCHAS,ATES/ARB
Chlorinated dibenzofurans[b] (as 2,3,7,8-equivalents)		3.8E+1		OEHHA-RCHAS,ATES/ARB
Chloroform		5.3E-6		OEHHA-ATES/ARB
Chlorophenols				
Pentachlorophenol		4.6E-6		OEHHA-RCHAS
2,4,6-Trichlorophenol		2.0E-5		OEHHA-RCHAS
Chloroprene		1.3E-7		OEHHA-RCHAS
Chromium (hexavalent)		1.4E-1		OEHHA-RCHAS
Coke oven emissions		6.2E-4		IRIS
1,2-Dibromo-3-chloropropane (DBCP)		2.0E-3		OEHHA-RCHAS
p-Dichlorobenzene (1,4-Dichlorobenzene)		1.1E-5		OEHHA-RCHAS
3,3'-Dichlorobenzidene		3.4E-4		OEHHA-RCHAS
Di(2-ethylhexyl)phthalate (DEHP)		2.4E-6		OEHHA-RCHAS
1,4-Dioxane		7.7E-6		OEHHA-RCHAS
Dioxins (chlorinated)[b] (see chlorinated dibenzo-p-dioxins)				
Epichlorohydrin		2.3E-5		OEHHA-RCHAS
Ethylene dibromide (1,2-Dibromoethane)		7.1E-5		OEHHA-RCHAS,ATES/ARB
Ethylene dichloride (1,2-Dichloroethane)		2.0E-5		OEHHA-RCHAS,ATES/ARB
Ethylene oxide		8.8E-5		OEHHA-ATES/ARB
Formaldehyde	1.3E-5	6.0E-6	IRIS	OEHHA-ATES/ARB

Table III-6 (continued)

OEHHA and U.S. EPA Cancer Potency Values

Substance		Unit Risk (ug/m^3)$^{-1}$		Reference[c]
Furans (chlorinated)[b]		(see chlorinated dibenzofurans)		
Gasoline vapors		1.2E-6[3.6-3ppm^{-1}]		OEHHA-RCHAS
Hexachlorobenzene		5.1E-4		OEHHA-RCHAS
Hexachlorocyclohexanes		1.1E-3		OEHHA-RCHAS
Hydrazine		4.9E-3		IRIS
Methylene chloride (Dichloromethane)		1.0E-6		OEHHA-ATES/ARB
Nickel and nickel compounds		2.6E-4		OEHHA-ATES/ARB
N-Nitrosodiethylamine		1.0E-2		OEHHA-RCHAS
N-Nitrosodimethylamine		4.6E-3		OEHHA-RCHAS
p-Nitrosodiphenylamine		2.6E-6		OEHHA-RCHAS
N-Nitrosodi-n-butylamine		3.1E-3		OEHHA-RCHAS
N-Nitrosomethylethylamine		6.3E-3		IRIS/OEHHA-RCHAS
N-Nitrosodi-n-propylamine		2.0E-3		OEHHA-RCHAS
N-Nitrosopyrrolidine		6.0E-4		IRIS/OEHHA-RCHAS
PCBs (Polychlorinated biphenyls)		1.4E-3		OEHHA-RCHAS
PAHs (Polycyclic aromatic hydrocarbons) including, but not limited to:				
Benz[a]anthracene		1.7E-3		Ref.1
Benzo[b]fluoranthene		1.7E-3		Ref.1
Benzo[k]fluoranthene		1.7E-3		Ref.1
Benzo[a]pyrene		1.7E-3		Ref.1
Dibenz[a,h]anthracene		1.7E-3		Ref.1
Indeno[1,2,3-cd]pyrene		1.7E-3		Ref.1
Perchloroethylene (Tetrachloroethylene)	5.8E-7	5.9E-6	EPA/Ref.2,3	OEHHA-ATES/ARB
Propylene oxide		3.7E-6		IRIS
Trichloroethylene		2.0E-6		OEHHA-ATES/ARB
Urethane		2.9E-4		OEHHA-RCHAS
Vinyl chloride		7.8E-5		OEHHA-ATES/ARB

a - A conversion factor of 100 fibers/0.003 micrograms can be multiplied by a receptor concentration of asbestos expressed in terms of micrograms per cubic meter (ug/m^3) to yield fibers/m^3 (EPA, 1985. Airborne Asbestos Health Risk Assessment Update). Unless other information necessary to estimate the concentration (fibers/m^3) of asbestos at receptors of interest is available, the use of the aforementioned conversion factor is an option.

b - See Appendix G for the methodology for calculating 2,3,7,8-equivalents for Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans.

Table III-8

Noncancer Acceptable Reference Exposure Levels (Chronic)

Substance	Inhalation[a] (ug/m^3)	Reference[b]
Acetaldehyde	9.0E+0	IRIS
Acrolein	2.0E-2	IRIS
Acrylamide	{7.0E-1}	IRIS
Acrylonitrile	2.0E+0	IRIS
Ammonia	1.0E+2	IRIS
Arsenic[c]	5.0E-1	TLV'
Benzene[c]	7.1E+1	TLV
Benzidine (and its salts)	{1.0E+1}	IRIS
Benzyl chloride	1.2E+1	TLV'
Beryllium[d]	4.8E-3	TLV'
Bromine	1.7E+0	TLV'
Bromine compounds		
Hydrogen bromide	2.4E+1	TLV'
Bromine pentafluoride	1.7E+0	TLV'
Cadmium[c]	{3.5E+0}	IRIS
Carbon tetrachloride[c]	{2.4E+0}	IRIS
Chlorinated dibenzo-p-dioxins[c,d] (as 2,3,7,8-equivalents)	{3.5E-6}	Ref.1
Chlorinated dibenzofurans[c] (as 2,3,7,8-equivalents)	{3.5E-6}	Ref.1
Chlorine	7.1E+0	TLV'
Chlorobenzene (monochlorobenzene)	{7.0E+1}	IRIS
Chlorofluorocarbons	{7.0E+2}	IRIS
Chloroform[c]	{3.5E+1}	IRIS
Chlorophenols		
2-Chlorophenol	1.8E+1	IRIS
Pentachlorophenol	2.0E-1	DTSC
Tetrachlorophenols	8.8E+1	DTSC
Chloropicrin	1.7E+0	TLV'
Chloroprene	1.0E+0	HEAST
Chromium (hexavalent)[c]	2.0E-3	HEAST
Copper	2.4E+0	TLV'
Cresols (o, m, p)	1.8E+2	IRIS
Dibenzodioxins (chlorinated) (see chlorinated dibenzo-p-dioxins)		
Dibenzofurans (chlorinated) (see chlorinated dibenzofurans)		
1,2-Dibromo-3-chloropropane (DBCP)	2.0E-1	IRIS

Table III-8 (continued)

Noncancer Acceptable Reference Exposure Levels (Chronic)

Substance	Inhalation[a] (ug/m^3)	Reference[b]
Methanol	6.2E+2	TLV
Methyl bromide	6.0E+0	HEAST
Methyl chloroform (1,1,1-TCA)	{3.2E+2}	IRIS
Methylene chloride[c]	3.0E+3	HEAST
4,4'-Methylene dianiline (and its dichloride)	1.9E+0	TLV'
Methyl mercury	{1.0E+0}	IRIS
Methyl methacrylate	9.8E+2	TLV'
Mineral fibers (< 1% free silica)	2.4E+1	TLV'
Naphthalene	{1.4E+1}	HEAST
Nickel and nickel compounds[c]	2.4E-1	TLV'
Nitrobenzene	{1.7E+0}	IRIS
Nitrogen dioxide	4.7E+2	CAAQS
2-Nitropropane	2.0E+1	IRIS
Ozone	1.8E+2	CAAQS
Perchloroethylene[c] (Tetrachloroethylene)	{3.5E+1}	IRIS
Phenol	4.5E+1	TLV
Phosphine	{1.0E+1}	IRIS
Phosphorous (white)	{7.0E-2}	IRIS
Phthalic anhydride	{7.0E+3}	IRIS
PCBs (Polychlorinated biphenyls)	1.2E+0	TLV'
Propylene oxide	3.0E+1	IRIS
Selenium compounds	5.0E-1	TLV'
~~Silica (respirable, crystalline)~~[e]	~~1.2E+0~~	~~TLV'~~
Sodium hydroxide	4.8E+0	TLV'
Styrene	{7.0E+2}	IRIS
Sulfates	2.5E+1	CAAQS
Sulfur dioxide	6.6E+2	CAAQS
Toluene	2.0E+2	DTSC
Trichloroethylene[c]	6.4E+2	TLV
Vinyl chloride[c]	2.6E+1	CAAQS
Vinylidene chloride	{3.2E+1}	IRIS
Xylenes	3.0E+2	HEAST
Zinc compounds	3.5E+1	SPHEM

a - Values in {} have been converted from oral acceptable exposure levels (mg/kg/day) by assuming a 70 kg person breathes 20 m^3 per day and equal absorption occurs by the inhalation and oral routes.

ATTACHMENT C.2

TRC

ANALYTICAL REPORT

LOG NO: G97-12-103

Received: 03 DEC 97

Mailed:

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
12-103-1	WDI-TS-130-4.10A	03 DEC 97
12-103-2	WDI-TS-130-13A	03 DEC 97
12-103-3	WDI-TS-131-3.8A	03 DEC 97
12-103-4	WDI-TS-132-3.10A	03 DEC 97
12-103-5	WDI-TS-132-11A	03 DEC 97

RAMETER	12-103-1	12-103-2	12-103-3	12-103-4	12-103-5
Volatile Organics (8260A)					
Date Analyzed	12/10/97	12/11/97	12/11/97	12/11/97	12/11/97
Dilution Factor, Times	100	100	100	100	100
1,1,1-Trichloroethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
1,1,2,2-Tetrachloroethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
1,1,2-Trichloroethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
1,1-Dichloroethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
1,1-Dichloroethene, mg/kg	<0.5	<0.5	<0.5	0	<0.5
1,2-Dibromoethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
1,2-Dichloroethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
1,2-Dichloropropane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
2-Chloroethylvinylether, mg/kg	<4	<4	<4	0	<4
2-Hexanone, mg/kg	<5	<5	<5	0	<5
Acetone, mg/kg	<10	<10	<10	0	<10
Bromodichloromethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
Bromomethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
Benzene, mg/kg	<0.5	19.59	0.804	0	7.75
Bromoform, mg/kg	<0.5	<0.5	<0.5	0	<0.5
Carbon Tetrachloride, mg/kg	<0.5	<0.5	<0.5	0	<0.5
Chloroethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
Chloroform, mg/kg	<0.5	<0.5	<0.5	0	<0.5
Chloromethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5
Carbon Disulfide, mg/kg	<1	<1	<1	0	<1
'bromochloromethane, mg/kg	<0.5	<0.5	<0.5	0	<0.5

ATTACHMENT C.3

TRC

ENVIRONMENTAL SOLUTIONS, INC.

By D.A. Date 11/18/92 Subject Vadose Well Pressure Measurements (inches water column) Sheet No. 1 of 1

Chkd. By ___ Date ___ Proj. No. 94-256

Well ID	Rds 1	Rds 2	Estimated time for well to reach atmospheric pressure when valve is left open (Manual detection)	Rds 3 (after leaving valve open for 1min)	
MP-1 @ 5'	0.010	0.010	—	0	
@ 15'	14.5	12.0	5 sec	0	
MP-2 @ 5'	0	0	—	—	
@ 15	11.5	11.0	6 sec	0.5	
VW-25	0	0			
VW-24	0.025	0.025	10 sec	0.025	
VW-11	0.36	0.35	5 sec	0.35	
VW-4	0.010	0.010	—	—	(removed gas valve to obtain rdgs)
VW-9	0.005	0	—	—	
VW-2	0.215	0.215	still flowing @ 1 min	0.215	
VW-6	0.085	0.02	—	0	
VW-5	0	0	—		
VW-10	0.235	0.240	5 sec	0.230	
VW-17	0.040	0.040	2 sec	0.030	
VW-16	0	0			
VW-18	0.125	0.120	2 sec	0.120	(stop cock open on arrival)
VW-8	0.31	0.30	30 sec	0.30	
VW-1	0.035	0.035	—	0	
VW-3	0.15	—	—	—	(well needs stop cock)
VW-7	—				(Buried)
VW-12	0	0			
VW-21	0	0			
VW-22	0.060	0.060	—	0.060	
VW-15	—	—	—	—	Buried

ARITH. MEAN = 0.092" WC

ARITH. MEAN = 0.083" WC

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APPENDIX D

VENTILATION STUDIES AND TM NO. 9

TRC

ATTACHMENT D.1

VENTILATION STUDIES

TRC

WASTE DISPOSAL INC. SUPERFUND SITE

Project Coordinator

November 10, 1997 Project No. 94-256

Ms. Andria Benner
U.S. Environmental Protection Agency
75 Hawthorne Street, #H-7-2
San Francisco, California 94105-3901

Ventilation Requirements Assessment
Facility at 9843 South Greenleaf Avenue
Waste Disposal Inc. Superfund Site

Dear Ms. Benner:

Pursuant to the request in your October 21, 1997 letter, the Waste Disposal, Inc. Group (WDIG) has performed an assessment of ventilation requirements for the site facility at 9843 South Greenleaf Avenue. WDIG retained Wright Engineering Associates to evaluate the ventilation of the facility, including the following items:

- Building Conditions (dimensions, etc.)
- Air Inlets (doors, windows)
- Roof Ridge Ventilation (type, effectiveness)

Enclosed please find a copy of the Ventilation Assessment Report for the facility prepared by Wright Engineering.

Based on the observed facility conditions, an air exchange rate of one air change per 2.0 to 2.4 minutes (25 to 30 air changes per hour) was estimated by Wright Engineering. This air exchange rate is several orders of magnitude greater than typical risk assessment default air exchange rates (e.g., 1 air exchange per day to 1 air change per 5 days).

Given the large estimated air exchange rates for this building, Wright Engineering concluded that an additional ventilation system for this building would not significantly increase the building's ventilation. Within the office area and restrooms, adequate ventilation is provided by large windows. If additional ventilation in this area is required, this could be accomplished by installation of a small room ventilator. It is important to note that the observations from the ongoing geoprobe activities at the site indicate that the office and restroom area of the facility are not underlain by impacted material.

As part of the assessment of the facility, the utility connections were identified by TRC personnel. The facility has the following utility connections:

- Electrical Service: Provided by overhead connections.
- Natural Gas: No connection.

- Water: Provided by underground connection to the facility restroom, where it is then distributed throughout the facility using aboveground connections.
- Sewer Service: Sewer service connects only to the facility restroom.

Inspection of the facility foundation revealed only minimal cracks and areas for potential subsurface migration of soil gas into the building.

Also enclosed is a draft calculation of diffusive flux from subsurface soil to the facility foundation slab. This calculation addresses the potential for migration of gases to diffuse into the building. The preliminary findings of this calculation, which indicate that there should not be health risks in the building due to diffusive transport of soil gases, were presented at our November 3, 1997 Technical Exchange Meeting in Santa Fe Springs, California. As was discussed at the meeting, the enclosed calculation does not model advective flow. When and if pressure gradients are measured in the subsurface, advective flow will be considered.

The results of the evaluation indicate:

- Additional ventilation would not significantly increase the building air exchange rates.
- Diffusion of subsurface soils do not pose a health risk.
- The results of EPA's ambient air monitoring in the building did not indicate the presence of constituents of concern.

Therefore, it is recommended that additional ambient air monitoring be performed in the building, to assure that conditions in the facility remain acceptable.

If you have any questions or comments, please call me at (562) 692-4535.

Sincerely,

Ian Webster RP

Ian Webster
WDIG Project Coordinator

IW/BG:ks
Enclosures

cc: James Barton, COE
Keith Elliott, RWQCB
Shawn Haddad, DTSC
Pat Hotra, SCAQMD
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Neal Navarro, COE
Shelby Moore, Esq., WDIG
Bill Nelson, ATSDR
Darryl Petker, CIWMB
Roberto Puga, TRC
Stan Smucker, Ph.D., EPA
Kathy Steuer, Esq., EPA, ORC
Dave Taylor, EPA
Marilyn Underwood, Ph.D., CDM Federal
John Wondolleck, CDM Federal
WDIG Members

ATTACHMENTS

TRC

DIFFUSIVE FLUX CALCULATION

TRC

TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 31Oct97 Subject DIFFUSIVE FLUX FROM SUBSURFACE AT WDI Sheet No. 1 of 13
Chkd. By LP Date 11/10/97 Proj. No. 94-256

PURPOSE

Calculate upward diffusive flux of methane, benzene and vinyl chloride from subsurface. Determine resulting health significance to workers in building above.

APPROACH

Define parameters needed to calculate diffusive flux. Assign conservative values to those parameters.

THEORY

The fundamental diffusive flux equation is the following:

$$F_i(z) = -D_{ei}\frac{dC_i(z)}{dz} \qquad (1)$$

where $F_i(z)$ = diffusive flux of constituent i in terms of moles per unit area per unit time $[\text{moles } L^{-2} T^{-1}]$ (g moles $m^{-2} s^{-1}$)

D_{ei} = effective diffusion coefficient of constituent i in porous medium $[L^2 T^{-1}]$ ($cm^2 s^{-1}$)

Brackets [ ] give dimensions where L = length, T = time and M = mass.
Parantheses ( ) give example units (e.g. metric system).

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THEORY (continued)

$C_i(z)$ = concentration of constituent i on moles per volume basis [mole L^{-3}] (g mole m^{-3})

z = vertical coordinate oriented downward from bottom of concrete slab under building as shown in Figure 1 [L] (m)

Dimension check on Eq. 1 gives the following:

$$\text{moles } L^{-2} T^{-1} = \frac{L^2 T^{-1} \text{ mole } L^{-3}}{L}$$

$$\text{mole } L^{-2} T^{-1} = \text{mole } L^{-2} T^{-1} \quad \checkmark \text{ checks!}$$

Effective diffusion in a porous medium is related to diffusion in the open atmosphere (free air) as follows (EPA, 1994): (see Attachment AA)

$$D_{ei} = D_{ai} \frac{\epsilon_a^{10/3}}{\epsilon_T^2} \qquad (2)$$

where D_{ai} = free air diffusion coefficient for constituent i [$L^2 T^{-1}$] ($cm^2 s^{-1}$)

ϵ_a = air filled porosity of porous medium [$L^3 L^{-3}$] (–)

ϵ_T = total (water free or dry) porosity of medium [$L^3 L^{-3}$] (–)

THEORY (continued)

If the slab is assumed to have cracks with a total area of A, then the concentration resulting in the building is found from the following expression (Conservation of Mass):

Moles or Mass in = Moles or Mass out (see Figure 2)

$$FR_a C_{ia} + F_i A = C_{iB} FR_a \qquad (3)$$

where A = area of cracks in slab $[L^2]$ (m^2)

C_{iB} = moles per volume concentration of constituent i in building $[\text{moles } L^{-3}]$ $(g\text{ mole } m^{-3})$

FR_a = air flow rate through the building $[L^3 T^{-1}]$ $(m^3 s^{-1})$

C_{ia} = moles per volume concentration of constituent i in background air $[\text{moles } L^{-3}]$ $(g\text{-mole } m^{-3})$

Combining Equations 1 and 3 with $C_{ia} = 0$, we get:

$$C_{iB} = C_{ia} - \frac{D_{ei} A}{FR_a} \frac{\Delta C_i}{\Delta z} = C_{ia} - \frac{D_{ei} A}{FR_a} \frac{(C_{i2} - C_{i1})}{(z_2 - z_1)} \qquad (4)$$

where the differential $\frac{dC_i(z)}{dz}$ that depends on position z has been simplified to a linear difference $\frac{\Delta C_i}{\Delta z}$ that is independent of position z. This simplification is conservative because of the S shape to the diffusing front (Freeze and Cherry, 1979).

TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 1Nov97 Subject DIFFUSIVE FLUX FROM Sheet No. 4 of 13
Chkd. By [illegible] Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

ASSUMPTIONS

- Maximum concentrations of benzene and methane exist at depth of 15' below ground surface (bgs), hence near middle of sump layer (see Figure 1).
- Maximum vinyl chloride concentration assumed to exist at the mid-plane of the fill layer (z = 2.5' in Figure 1)
- Maximum measured concentrations are 1039 ppbv, 3782 ppbv and 36% for vinyl chloride, benzene and methane respectively (see Attachment A).
- Diffusion coefficients in free air are as follows:

CONSTITUENT	DIFF. COEF ($cm^2 s^{-1}$)	REFERENCE
Vinyl chloride	0.106	EPA (1994)
Benzene	0.088	EPA (1994)
Methane	0.203	Attachment AB

- Sump is clay material similar to HELP Model Texture 29 with total porosity = 0.45 as shown in Attachment B.
- Fill is silty sand/sandy silt similar to HELP Model Texture 9 with total porosity = 0.5 as shown in Attachment B.
- Air-filled or effective porosity of sump material = 0.418

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ASSUMPTIONS (continued)

according to WDI data in Attachment C.

- Air-filled or effective porosity of fill material = 0.430 according to Attachment C.
- Assume building is 40' wide, 140' long and 20' high (see Attachment D).
- Assume area of cracks in slab based on 4 cracks that travel full width of building, each with a width of 0.5 cm.
- Assume air exchange rate = 25 building volume per hour, based on Wright (1997), as shown in Attachment D.
- Although flux is a variable function that depends on the position along the varying concentration gradient, it is simplified to a constant that depends on the overall change in concentration from that measured at a specified depth to zero at the bottom of the slab (top of the fill material)
- Concentration of methane, vinyl chloride and benzene in background air is negligible (~0) (i.e., $C_{ia} = 0$).

TRC ENVIRONMENTAL SOLUTIONS, INC.

By GW Date 2Nov97 Subject DIFFUSIVE FLUX FROM Sheet No. 6 of 13
Chkd. By TLP Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-356

ASSUMPTIONS (continued)

- Concern over methane is related to its explosivity in building spaces.
- Concern over vinyl chloride and benzene is related to their carcinogenic and noncarcinogenic health risk potentials.
- Flux calculated from the overall concentration gradient in the porous subsurface is applied to the opening area of the assumed cracks in the slab. This flux is multiplied by the area of the cracks to calculate the mass transfer into the building without accounting for the actually occurring slower diffusion through the air in the cracks.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By EHW Date 1 Nov 97 Subject DIFFUSIVE FLUX FROM Sheet No. 7 of 13
Chkd. By TLP Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

CALCULATIONS

The effective diffusion coefficients are calculated using Equation 2 as follows:

i	Constituent	D_{ai} (cm²/s)	Loc.	ϵ_a (v/v)	ϵ_T (v/v)	D_{ei} (cm²/s)
1	Vinyl chloride	0.106	F	0.43	0.5	0.0255
2	Benzene	0.088	F	0.43	0.5	0.0212
		"	S	0.413	0.45	0.024
3	Methane	0.203	F	0.43	0.5	0.0489
		"	S	0.413	0.45	0.055

F = Fill, S = sump

The air flow rate into and out of the building is found from

$$FR_a = 25\ V_B \text{ per hour}$$
$$= 25\,(40')\times 140'\times 20'$$
$$= 778\ \frac{ft^3}{s}\left(0.3048\ \frac{m}{ft}\right)^3 = 22.0\ m^3\ s^{-1}$$

Crack area $A = 4\cdot 40\,ft\cdot 0.5\,cm\left(\frac{1\,m}{100\,cm}\right)^2 12\,\frac{in}{ft}\ 2.54\,\frac{cm}{in} = 0.244\,m^2$

Using Equation 4 with the constituent concentration approximately 0 at the bottom of the slab, we get:

$$C_{1B} = C_{VC,B} = -\frac{0.0255\ \frac{cm^2}{s}\ 0.244\,m^2}{22.0\ m^3/s}\ \frac{(0-1039\ ppbv)\ \frac{1\,m^2}{10^4\,cm^2}}{2.5\,ft\left(0.3048\ \frac{m}{ft}\right)}$$

VC = vinyl chloride
B = building

$$C_{VC,B} = 3.85\times 10^{-5}\ ppbv = 0.04\ ppbv$$

$$C_{2B} = C_{B,B} = -\frac{0.024\ \frac{cm^2}{s}\cdot 0.244\,m^2\ (0-3792\ ppbv)}{22.0\ m^3/s\ \ 15\,ft} = 0.02\ ppbv$$

B = benzene (higher D used to be conservative)

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CALCULATIONS (continued)

$$C_{3B} = C_{CH4,B} = \frac{-0.055\ cm^2/s\ \ 0.244\ m^2\ (0-36\ \%)}{22.0\ m^3/s\ \ 15\ ft}$$

CH_4 = methane

$$= 5\ ppbv$$

This methane concentration is far below its lower explosive limit of 5 %. (= 50,000 ppmv), its regulatory limit of 5 % (= 50,000 ppmv) in the subsurface at the property line of a facility (see Attachment E), or its regulatory limit of 1.25 % (= 12,500 ppmv) within on-site structures (see Attachment E).

TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 1 NOV 97 Subject DIFFUSIVE FLUX FROM Sheet No. 9 of 13
Chkd. By [illegible] Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

CALCULATIONS (continued)

HEALTH RISK, CARCINOGENIC

i	Constituent	Carcinogen Unit Risk Factor (1) $(\mu g/m^3)^{-1}$	C_{iB} ppbv	C_{iB} $\mu g/m^3$	Workers Carcinogenic Risk (10^{-6})
1	Vinyl chloride	$7.8 \cdot 10^{-5}$	$3.85 \cdot 10^{-5}$	$9.86 \cdot 10^{-5}$	0.002
2	Benzene	$2.9 \cdot 10^{-5}$	$2.2 \cdot 10^{-5}$	$7.10 \cdot 10^{-5}$	0.0005
3	Methane	NA	5	--	NA

(1) CAPCOA (1993). Attachment F.

Correction factor for workers exposure parameters included as follows:

$$\frac{\text{Workers exposure}}{\text{Residential exposure}} = \frac{46\ \text{yrs}}{70\ \text{yrs}} \cdot \frac{8\ \text{hr/dy}}{24\ \text{hr/dy}} = 0.22$$

HEALTH RISK, NONCARCINOGENIC, CHRONIC

i	Constituent	C_{iB} $(\mu g/m^3)$	REL (2) $(\mu g/m^3)$	CHRONIC HEALTH HAZARD INDEX
1	Vinyl Chloride	$9.86 \cdot 10^{-5}$	71	$1.4 \cdot 10^{-6}$
2	Benzene	$7.10 \cdot 10^{-5}$	26	$2.7 \cdot 10^{-6}$

(2) Reference exposure level (CAPCOA, 1993). Attachment F.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 2Nov97 Subject DIFFUSIVE FLUX FROM SUBSURFACE AT WDI Sheet No. 10 of 13
Chkd. By TCL Date 11/10/97 Proj. No. 94-256

FINDINGS AND CONCLUSIONS

The vinyl chloride maximum potential concentration in the building of 0.04 ppbv is only 4×10^{-8} of the OSHA (NIOSH, 1994) standard of 1 ppmv and would create a maximum potential health risk orders of magnitude below limits of 10^{-6} carcinogenic and 1.0 chronic health hazard index.

The benzene maximum potential concentration in the building of 0.02 ppbv is only 2×10^{-7} of the OSHA (NIOSH, 1994) standard of 0.1 ppmv and would create a maximum potential health risk orders of magnitude below health risk limits of 10^{-6} for carcinogenic and a chronic health hazard index of 1.0.

The methane maximum potential concentration in the building of .5 ppbv would be only 4×10^{-7} of the allowable limit of 1.25%.

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 1 NOV 97 Subject DIFFUSIVE FLUX FROM Sheet No. 11 of 13
Chkd. By [illegible] Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

REFERENCES

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American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE). Ventilation for Acceptable Indoor Air Quality, an American National Standard, ANSI/ASHRAE 62-1989, 1991.

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Wright Engineering Associates. Ventilation Assessment, Brother's Machine and Tool, Inc., November 5, 1997

Freeze, R. Allan and John A. Cherry. Groundwater, Prentice-Hall Inc., 1979.

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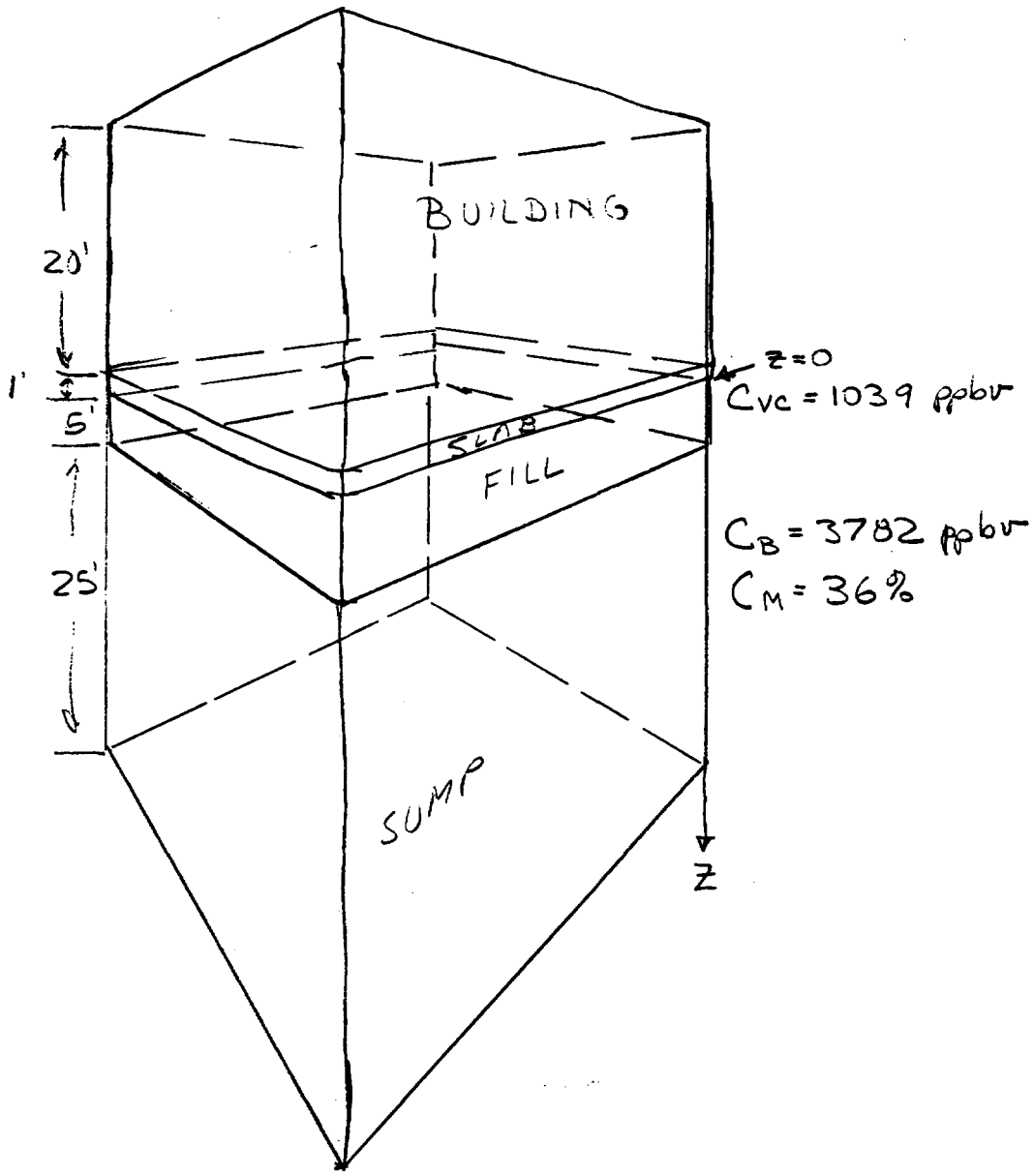
TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 31 Oct 97 Subject DIFFUSIVE FLUX FROM Sheet No. 12 of 13
Chkd. By [illegible] Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

FIGURE 1
CROSS SECTION OF SUMP PROFILE



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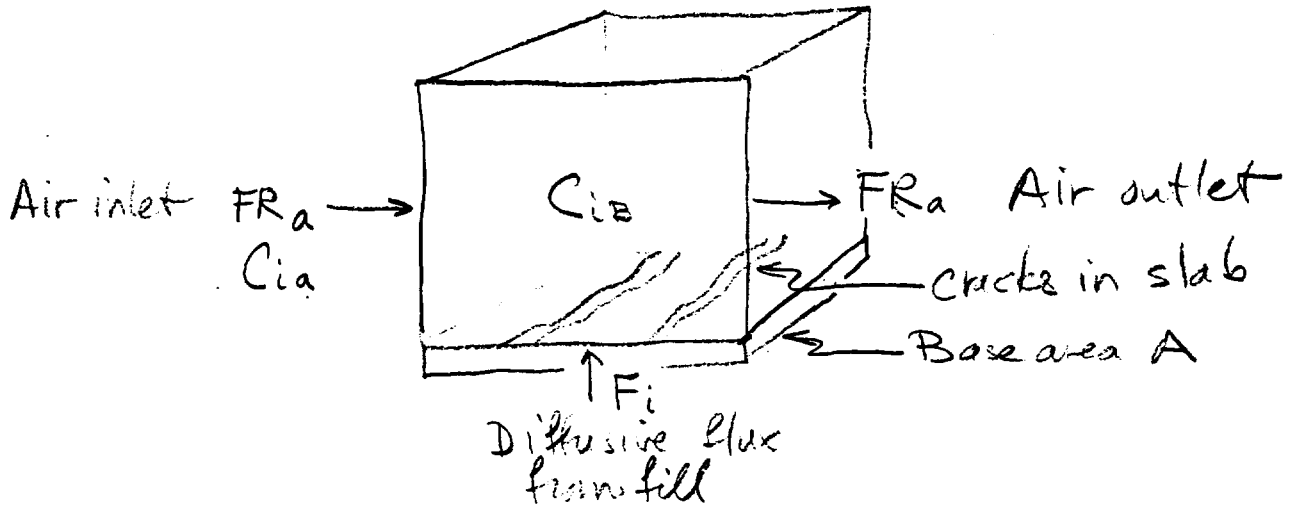
TRC ENVIRONMENTAL SOLUTIONS, INC.

By BJW Date 1 Nov 97 Subject DIFFUSIVE FLUX FROM Sheet No. 13 of 13
Chkd. By TLP Date 11/10/97 SUBSURFACE AT WDI Proj. No. 94-256

FIGURE 2
BUILDING MASS BALANCE



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ATTACHMENT AA

EPA-453/R-94-080A

AIR EMISSIONS MODELS FOR WASTE AND WASTEWATER

U.S. EPA Contract No. 68D10118

November 1994

prepared for the
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park
North Carolina 27711

waste. It is important to specify the molecular weight of this separate organic phase for this Raoult's law calculation of Keq.

7.2.1.4 Estimation of effective diffusivity. The diffusivity of specific compounds, as reported in the literature, assumes that the diffusion occurs in free air. In a land treatment operation, diffusion of vapors out of the soil must take place within the confines of the air-filled voids within the soil. This characteristic of soil is referred to as the air porosity. The ratio of effective diffusivity of a constituent in the soil to its diffusivity in air can be described by the following equation:[6]

$$\frac{D_e}{D_a} = \frac{\epsilon_a^{10/3}}{\epsilon_T^2} ,$$

where,

D_e = effective diffusivity of constituent in soil;

D_a = diffusivity of constituent in air;

ϵ_a = air porosity of soil; and

ϵ_T = total porosity of soil.

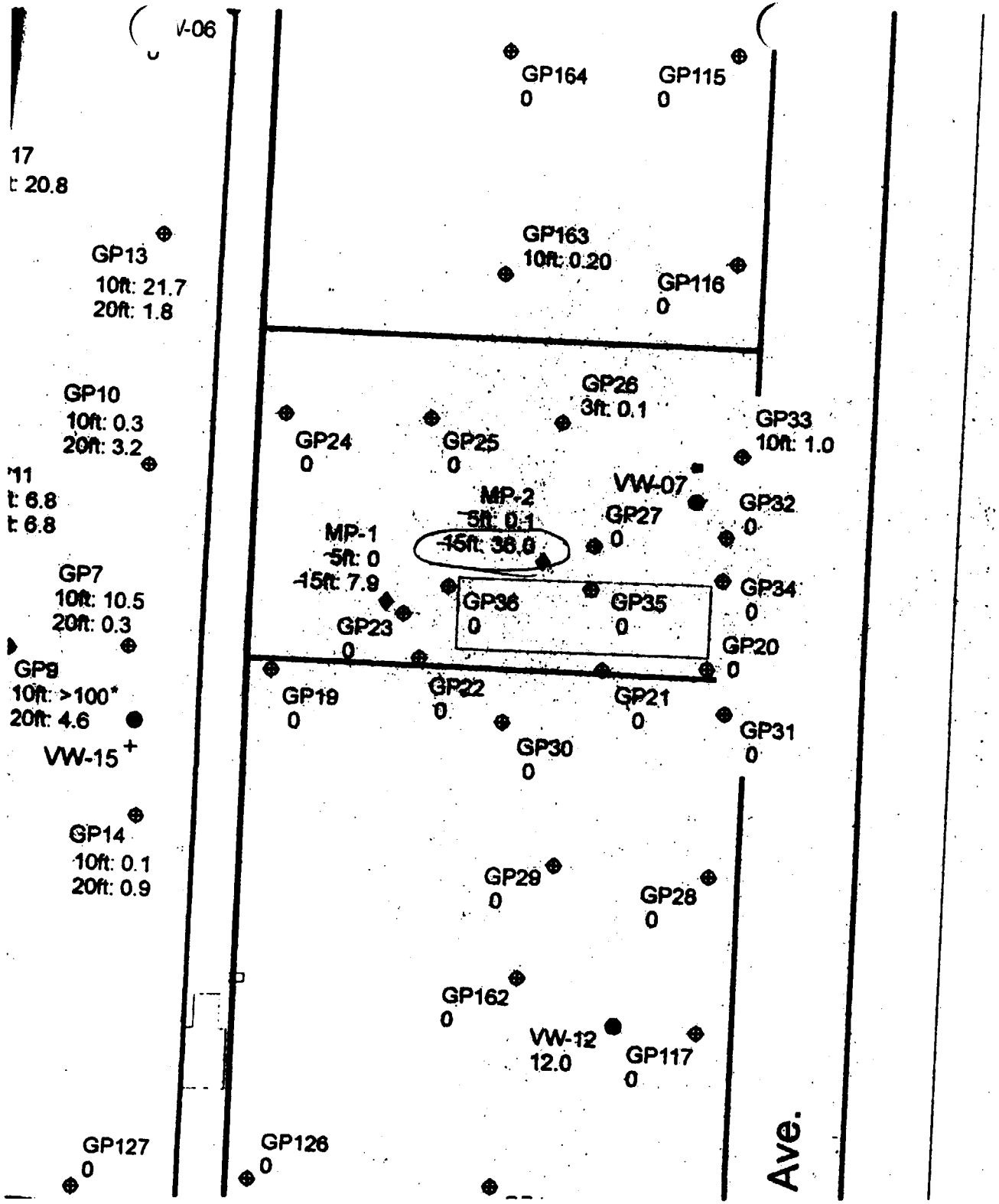
When air porosity and total porosity are the same (i.e., for dry soil), this equation reduces to:

$$\frac{D_e}{D_a} = \epsilon_a^{4/3} .$$

Total porosity refers to the fraction of the land treatment medium that is made up of nonsoil (or nonsolid) materials, i.e., the sum of the void space, water-filled space, and space occupied by the oil in the applied waste.

Soil air porosity undergoes substantial changes over time as soil dries out and when moisture is added by rainfall or by watering. As a result, accurately accounting for soil porosity in an analytical model is difficult. The use of average or

ATTACHMENT A



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Parcel

MP sample and GeoPr

PA REGION 9 - FIELD ANALYTICAL SUPPORT PROJECT
UMMARY OF UNVALIDATED RESULTS

Case Number:
Site: CDM
SDG: 1
Date: 08/12/97

Analysis: EAS
Matrix: Soil

Station Location	MP-8-05		MP-8-05		MP-8-05		MP-8-05	
Sample I.D.	N/A		N/A		N/A		N/A	
Date of Collection	08/07/97		08/07/97		08/07/97		08/07/97	
Time of Collection	14:25		14:10		14:50		15:40	
Date of Analysis	08/07/97		08/07/97		08/07/97		08/08/97	
Time of Analysis	17:45		21:00		21:43		01:02	
Units	ppbv		ppbv		ppbv		ppbv	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q
C012 Dichlorodifluoromethane	74	U	74	U	74	U	74	U
C010 Chloromethane	178	U	214		1971		178	U
C020 Vinyl Chloride	144	U	280		1039		144	U
C015 Bromomethane	95	U	95	U	95	U	95	U
C025 Chloroethane	139	U	139	U	139	U	139	U
C021 Trichlorofluoromethane	65	U	65	U	65	U	65	U
C045 1,1-Dichloroethene	93	U	93	U	93	U	93	U
C035 Acetone	894	B	2247	B	592	BJ	6414	B
C040 Carbon Disulfide	118	U	118	U	118	U	118	U
C030 Methylene Chloride	106	U	169		106	U	106	U
C055 trans-1,2-Dichloroethene	93	U	93	U	93	U	93	U
C050 1,1-Dichloroethane	91	U	658		91	U	91	U
C054 cis-1,2-Dichloroethene	93	U	93	U	93	U	93	U
C110 2-Butanone	623	U	623	U	623	U	623	U
C060 Chloroform	75	U	617		75	U	75	U
C065 1,2-Dichloroethane	91	U	91	U	91	U	91	U
C115 1,1,1-Trichloroethane (TCA)	67	U	67	U	67	U	67	U
C120 Carbon Tetrachloride	58	U	58	U	58	U	58	U
C145 Benzene	115	U	3782		256		1513	
C150 Trichloroethene (TCE)	68	U	828		1817		68	U
C140 1,2-Dichloropropane	81	U	81	U	81	U	81	U
C130 Bromodichloromethane	55	U	239		55	U	336	
C143 cis-1,3-Dichloropropene	81	U	81	U	81	U	81	U
C172 trans-1,3-Dichloropropene	81	U	81	U	81	U	81	U
C160 1,1,2-Trichloroethane	67	U	67	U	67	U	67	U
C155 Dibromochloromethane	43	U	43	U	43	U	43	U
C205 4-Methyl-2-Pentanone	449	U	449	U	449	U	449	U
C220 Toluene	98	U	575		98	U	98	U
C220 Tetrachloroethene	54	U	620		221		54	U
C074 1,3-Dichloropropane	80	U	80	U	80	U	80	U
C210 2-Hexanone	449	U	449	U	449	U	449	U
C102 1,2-Dibromoethane (EDB)	48	U	285		48	U	48	U
C235 Chlorobenzene	80	U	423		80	U	80	U
C249 Ethylbenzene	85	U	42	J	85	U	165	
C251 p & m- Xylene	85	U	44	J	262		518	
C250 o-Xylene	85	U	85	U	85	U	85	U
C245 Styrene	86	U	86	U	86	U	86	U
C180 Bromoform	36	U	36	U	36	U	36	U
C225 1,1,2,2-Tetrachloroethane	54	U	54	U	54	U	54	U
C081 1,2,3-Trichloropropane	61	U	61	U	61	U	61	U
C335 1,3-Dichlorobenzene	122	U	122	U	122	U	122	U
C340 1,4-Dichlorobenzene	61	U	61	U	61	U	61	U
C180 1,2-Dichlorobenzene	61	U	61	U	61	U	61	U
C080 1,2-Dibromo-3-chloropropane (D	38	U	38	U	38	U	38	U

Q-Laboratory Data Qualifier
Refer to EPA Region 9 Laboratory Qualifier Definitions

ATTACHMENT AB

X0002)

TRC ENVIRONMENTAL SOLUTIONS, INC.

By EJW Date 10Nov97 Subject DIFFUSION COEFFICENT OF METHANE Sheet No. 1 of 3
Chkd. By JLP Date 11/10/97 Proj. No. 94-256

PURPOSE

Calculate the diffusion coefficient for methane in free air.

APPROACH

Use the method of Fuller, Schettler and Giddings (FSG Method) as described in Lyman et al (1990). See Appendix A.

THEORY

The basic equation for the diffusion coefficient of molecule B (e.g., methane) into a carrier gas A (e.g., air) is:

$$D_{BA} = \frac{10^{-3} T^{1.75} \sqrt{W}}{P\left(V_A^{1/3} + V_B^{1/3}\right)^2} \qquad (1)$$

where D_{BA} = diffusion coefficient of molecule B into gas A $[L^2 T^{-1}]$ $(cm^2 s^{-1})$

T = temperature, absolute of gas A $[\theta]$ (°K)

Brackets [ ] give dimensions where L = length, T = time, θ = temperature and M = mass.

Parantheses ( ) give example units (e.g., CGS system of centimeter, grams and seconds).

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By [illegible] Date 10Nov97 Subject DIFFUSION COEFFICIENT OF METHANE Sheet No. 2 of 3
Chkd. By TLP Date 11/10/97 Proj. No. 94-256

THEORY (continued)

W = molecular weight factor of the mixture

$$= \frac{m_A + m_B}{m_A m_B} \quad [\text{mole } M^{-1}] \ (\text{g-mole } g^{-1})$$

Assume $m_A = 28.97$ g/g-mole (Lyman et al, 1990).

P = pressure of total mixture $[M L^{-1} T^{-2}]$ (atm)

Assume P = 1 atm.

V = molar volume of a molecule $[L^3 \text{ mole}^{-1}]$ (cm^3 g-mole^{-1})

$V_{air} = 20.1$ cm^3/g-mole (Lyman et al, 1990).

CALCULATION

Equation 1 is applied to the diffusion of methane into air at a temperature of 64°F (average for Los Angeles) (= 17.8°C).

$$D_{CH_4,air} = \frac{10^{-3}\ 291^{1.75} \sqrt{\frac{28.97+16}{28.97 \times 16}}}{1\left(20.1^{1/3} + 24.42^{1/3}\right)^2}$$ } See Appendix A.

$$= 0.203 \text{ cm}^2 \text{ s}^{-1}$$

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TRC ENVIRONMENTAL SOLUTIONS, INC.

By EJW Date 10NOV97 Subject DIFFUSION COEFFICIENT Sheet No. 3 of 3
Chkd. By TLP Date 11/10/97 OF METHANE Proj. No. 94-256

REFERENCE

Lyman, Warren J., William F. Reehl and David H. Rosenblatt, Handbook of Chemical Property Estimation Methods: Environmental Behavior of Organic Compounds, American Chemical Society, Washington, DC, 1990.

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APPENDIX A

HANDBOOK OF CHEMICAL PROPERTY ESTIMATION METHODS

Environmental Behavior of Organic Compounds

Warren J. Lyman, Ph.D.
William F. Reehl
Arthur D. Little, Inc., Cambridge, Massachusetts

David H. Rosenblatt, Ph.D.
U.S. Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, Frederick, Maryland

American Chemical Society,
Washington, DC
1990

17-4 SELECTED METHODS OF ESTIMATING GASEOUS DIFFUSION COEFFICIENTS OF ORGANICS IN AIR

The criteria for choosing a specific estimation technique include (1) ease of use, (2) availability of input data, and (3) accuracy of results for a general chemical population. Of those listed in Table 17-1, only the first two fulfill all of these requirements. Both methods estimate the gaseous diffusion coefficient from the structure of the chemical, although neither can distinguish between isomers.

The FSG method is much easier and less time-consuming than the WL method and is reportedly applicable to non-polar gases at low to moderate temperatures. Jarvis and Lugg [6] state that the method is most accurate for chlorinated aliphatics and that aromatics, alkanes, and ketones deviate ±5% from the measured value. It does not give accurate estimates for esters and alcohols higher than C_5 and C_7 respectively. The reported average absolute error of 7.6% is based on values of the atomic diffusion volume, a parameter which is derived from measured diffusion coefficient values.

The WL method, as mentioned earlier, is very similar to the theoretical expression derived by Chapman and Enskog and is applicable to many kinds of compounds over a fairly wide temperature range. It is a much more tedious computation, since parameters such as the collision integral and characteristic length must be calculated by additional approximations. However, as shown in Table 17-2, the average errors obtained with this method are considerably less than those of the FSG method for some classes of chemicals, particularly nitriles, glycols, and aromatic esters.

FSG Method. The method of Fuller, Schettler and Giddings [4] is most accurate for non-polar gases at low to moderate temperatures. Its accuracy is poorest with the polar acids and glycols (Table 17-2); minimal error is associated with the aliphatics and aromatics. The method is based on the following correlation:

$$\mathcal{D}_{BA} = \frac{10^{-3}\, T^{1.75} \sqrt{M_r}}{P\,(V_A^{1/3} + V_B^{1/3})^2} \qquad (17\text{-}12)$$

TABLE 17-3

Some Physical Properties of Air

M_A	28.97 g/mol
V_A	20.1 cm^3/mol
ε/k	78.6 K
σ_A	3.711 Å

Source: Jarvis and Lugg [6]. Values of ε/k and σ_A obtained from Lennard-Jones 12-6 potential function.

TABLE 17-4

Atomic and Structural Diffusion Volume Increments[a] (cm^3/mol)

	ΔV_B
C	16.5
H	1.98
O	5.48
N	(5.69)
Cl	(19.5)
S	(17.0)
Aromatic and heterocyclic rings	−20.2

a. Values in parentheses are based upon few data points.

Source: Fuller, Schettler, and Giddings [4]. *(Reprinted with permission from the American Chemical Society.)*

TABLE 17-5

Additive Volume Increments for Calculating LeBas Molar Volume, V_B'

Atom	Increment (cm^3/mol)	Atom	Increment (cm^3/mol)
C	14.8	Br	27.0
H	3.7	Cl	24.6
O (except as noted below)	7.4	F	8.7
In methyl esters and ethers	9.1	I	37.0
In ethyl esters and ethers	9.9	S	25.6
In higher esters and ethers	11.0	Ring	
In acids	12.0	3-Membered	− 6.0
Joined to S, P, N	8.3	4-Membered	− 8.5
N		5-Membered	−11.5
Double bonded	15.6	6-Membered	−15.0
In primary amines	10.5	Naphthalene	−30.0
In secondary amines	12.0	Anthracene	−47.5

Source: Reid, *et al.* [17]. *(Reprinted with permission from McGraw-Hill Book Co.)*

(4) Calculate V_B by adding the incremental values for the atoms listed in Table 17-4; for molecules containing atoms not listed in this table (except P), calculate the LeBas volume, V_B', from Table 17-5 and use 87.5% of this value as the atomic diffusion volume.

(5) Calculate $\mathcal{D}_{BA}$ using Eq. 17-12 for the temperature and pressure (P) of interest. P will usually be 1 atm.

Example 17-1 Calculate the diffusion coefficient of *m*-chlorotoluene (C_7H_7Cl) into air at 25°C and 1 atm, given M_B = 126.59 g/mol.

CH_4
64°F 1atm.
M = 16 g/g-mol

(1) From Table 17-3,

M_A = 28.97 g/mol and V_A = 20.1 cm³/mol

(2) Calculate M_r

$$M_r = (28.97 + 126.59)/(28.97)(126.59) = 0.0424$$

$$M_{r_{CH_4}} = \frac{28.97+16}{28.97*16} = 0.097$$

(3) Calculate V_B for *m*-chlorotoluene from Table 17-4:

7(C) = 7(16.5)
7(H) = 7(1.98)
1(Cl) = 1(19.5)
1(Ring) = 1(−20.2)
V_B = 128.7 cm³/mol

1 C = 16.5
4 H = 4 · 1.98
24.42

(4) Using Eq. 17-12,

$$\mathcal{D}_{BA} = \frac{10^{-3}\,(298)^{1.75}\,\sqrt{0.0424}}{1\cdot\left[(20.1)^{1/3} + (128.7)^{1/3}\right]^2} = 7.31 \times 10^{-2}\ \text{cm}^2/\text{s}$$

$$\frac{10^{-3}\,291^{1.75}\,\sqrt{0.097}}{(20.1^{1/3} + 24.42^{1/3})^2} = 0.2026\ \text{cm}^2/\text{s}$$

The deviation is +13% from the literature value, 6.45 x 10⁻² cm²/s [6].

Example 17-2 Calculate the diffusion coefficient of isopropyl iodide ($(CH_3)_2CHI$) into air at 25°C and 1 atm, given M_B = 169.9 g/mol.

(1) Since M_A = 28.97 g/mol (Table 17-3), M_r is:

$$M_r = (28.97 + 169.9)/(28.97)(169.9) = 0.0404$$

(2) V_B of $(CH_3)_2CHI$ cannot be determined by using Table 17-4. The LeBas volume (Table 17-5) is:

3(C) = 3(14.8)
7(H) = 7(3.7)

ATTACHMENT B

United States
Environmental Protection
Agency

Office of Research and
Development
Washington DC 20460

EPA/600/R-94/168b
September 1994

EPA

The Hydrologic Evaluation of Landfill Performance (HELP) Model

Engineering Documentation for Version 3

EPA/600/R-94/168b
September 1994

THE HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE (HELP) MODEL

ENGINEERING DOCUMENTATION FOR VERSION 3

by

Paul R. Schroeder, Tamsen S. Dozier, Paul A. Zappi,
Bruce M. McEnroe, John W. Sjostrom and R. Lee Peyton
Environmental Laboratory
U.S. Army Corps of Engineers
Waterways Experiment Station
Vicksburg, MS 39180-6199

Interagency Agreement No. DW21931425

Project Officer

Robert E. Landreth
Waste Minimization, Destruction and Disposal Research Division
Risk Reduction Engineering Laboratory
Cincinnati, Ohio 45268

RISK REDUCTION ENGINEERING LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

Printed on Recycled Paper

TABLE 1. DEFAULT LOW DENSITY SOIL CHARACTERISTICS

Soil Texture Class			Total Porosity vol/vol	Field Capacity vol/vol	Wilting Point vol/vol	Saturated Hydraulic Conductivity cm/sec
HELP	USDA	USCS				
1	CoS	SP	0.417	0.045	0.018	1.0×10^{-2}
2	S	SW	0.437	0.062	0.024	5.8×10^{-3}
3	FS	SW	0.457	0.083	0.033	3.1×10^{-3}
4	LS	SM	0.437	0.105	0.047	1.7×10^{-3}
5	LFS	SM	0.457	0.131	0.058	1.0×10^{-3}
6	SL	SM	0.453	0.190	0.085	7.2×10^{-4}
7	FSL	SM	0.473	0.222	0.104	5.2×10^{-4}
8	L	ML	0.463	0.232	0.116	3.7×10^{-4}
9	SiL	ML	0.501	0.284	0.135	1.9×10^{-4}
10	SCL	SC	0.398	0.244	0.136	1.2×10^{-4}
11	CL	CL	0.464	0.310	0.187	6.4×10^{-5}
12	SiCL	CL	0.471	0.342	0.210	4.2×10^{-5}
13	SC	SC	0.430	0.321	0.221	3.3×10^{-5}
14	SiC	CH	0.479	0.371	0.251	2.5×10^{-5}
15	C	CH	0.475	0.378	0.251	2.5×10^{-5}
21	G	GP	0.397	0.032	0.013	3.0×10^{-1}

a = constant representing the effects of various fluid constants and gravity, 21 cm^3/sec

ϕ = total porosity, vol/vol

θ_r = residual volumetric water content, vol/vol

ψ_b = bubbling pressure, cm

λ = pore-size distribution index, dimensionless

A more detailed explanation of Equation 11 can be found in Appendix A of the HELP program Version 3 User's Guide and the cited references.

TABLE 2. MODERATE AND HIGH DENSITY DEFAULT SOILS

Soil Texture Class			Total Porosity vol/vol	Field Capacity vol/vol	Wilting Point vol/vol	Saturated Hydraulic Conductivity cm/sec
HELP	USDA	USCS				
22	L (Moderate)	ML	0.419	0.307	0.180	1.9×10^{-5}
23	SiL (Moderate)	ML	0.461	0.360	0.203	9.0×10^{-6}
24	SCL (Moderate)	SC	0.365	0.305	0.202	2.7×10^{-6}
25	CL (Moderate)	CL	0.437	0.373	0.266	3.6×10^{-6}
26	SiCL (Moderate)	CL	0.445	0.393	0.277	1.9×10^{-6}
27	SC (Moderate)	SC	0.400	0.366	0.288	7.8×10^{-7}
28	SiC (Moderate)	CH	0.452	0.411	0.311	1.2×10^{-6}
29	C (Moderate)	CH	0.451	0.419	0.332	6.8×10^{-7}
16	Liner Soil (High)		0.427	0.418	0.367	1.0×10^{-7}
17	Bentonite (High)		0.750	0.747	0.400	3.0×10^{-9}

3.5.2 Default Waste Characteristics

Table 4 provides a summary of default moisture retention values for various waste layers. Municipal waste properties provided in Tchobanoglous et al. (1977) and Equations 6 and 7 were used to determine the total porosity, field capacity, and wilting point of a well compacted municipal waste. The field capacity and wilting point were calculated using Tchobanoglous et al.'s high and low water content values, respectively. Oweis et al. (1990) provided information on the in-situ saturated hydraulic conductivity of municipal waste. Zeiss and Major (1993) described the moisture flow through

TABLE 3. DEFAULT SOIL TEXTURE ABBREVIATIONS

US Department of Agriculture	Definition
G	Gravel
S	Sand
Si	Silt
C	Clay
L	Loam (sand, silt, clay, and humus mixture)
Co	Coarse
F	Fine
Unified Soil Classification System	**Definition**
G	Gravel
S	Sand
M	Silt
C	Clay
P	Poorly Graded
W	Well Graded
H	High Plasticity or Compressibility
L	Low Plasticity or Compressibility

municipal waste and the effective moisture retention of municipal waste, providing information on waste with dead zones and channeling. In addition, Toth et al. (1988) provided information on compacted coal-burning electric plant ash, Poran and Ahtchi-Ali (1989) provided information on compacted municipal solid waste ash, and Das et al. (1983) provided information on fine copper slag.

The total porosities of the ash and slag wastes were determined using a phase relationship at maximum dry density. The field capacities and wilting points of the ash and slag wastes were calculated using the following empirical equations reported by Brakensiek et al. (1984):

PTS Laboratories, Inc.

Environmental Solutions, Inc.
PTS FILE NO: 27317

ATTACHMENT C

PHYSICAL PROPERTIES DATA

(METHODOLOGY: ASTM D2216, API RP40)

PROJECT NAME: Waste Disposal, Inc.
PROJECT NO: 94-256

SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENT. (1)	MOISTURE CONTENT (% wt)	DENSITY BULK (g/cc)	DENSITY GRAIN (g/cc)	EFFECTIVE POROSITY, % Vb	PORE FLUID SATURATION, % Pv WATER (2)	PORE FLUID SATURATION, % Pv HYDROCARBON (3)	25.0 PSI CONFINING STRESS NATIVE PERMEABILITY TO AIR (millidarcy)	25.0 PSI CONFINING STRESS NATIVE AIR CONDUCTIVITY (cm/s)
WDI-TS-25A	0-3	V	19.4	1.52	2.66	43.0	67.6	2.71	21.3	1.14E-03
WDI-TS-25B	7-10	V	30.3	1.56	2.67	41.8	87.5	6.77	0.021	1.86E-06
WDI-TS-56A	2-4	V							0.0125	1.11E-06
WDI-TS-56B	12-14	V							0.0012	1.06E-07

(1) Sample Orientation: H = Horizontal; V = Vertical

(2) 0.9986 gm/cc used for calculation
(3) 0.7500 gm/cc used for calculation

Vb = Bulk Volume, cc
Pv = Pore Volume, cc
ND = Not Detected

ATTACHMENT D

Wright Engineering Associates

505 E. Commonwealth Ave., Ste. J
Fullerton, CA 92832
Phone (714) 738-4143
Fax (714) 738-4144

November 5, 1997

TRC Environmental Solutions, Inc.
221 Technology Drive
Irvine, CA 92618

Roberto Puga, R.G.
Project Manager

Re: **Ventilation Assessment**

Brother's Machine and Tool, Inc.
9843 S. Greenleaf Ave.
Santa Fe Springs, CA

Roberto -

SUMMARY

A natural gravity ventilation system is installed in this building. The ventilation air exchange ratings for the system exceed recommended rates for industrial machine shop environments. There is no perceived need for additional mechanical ventilation.

SITE INSPECTION OBSERVATIONS

Building -

The subject building we inspected this morning is 40' wide x 140' long, a prefab metal building structure with corrugated sheet steel siding and roof. Roof ridge is on the 140' length with minimum clearance 16' (low point south and north walls) and peak ridge elevation 24'. Small single story offices with open mezzanine above are located at the front (east) end of the building. The building houses a machine shop with manually operated metal lathes and machining equipment. The building footprint is 5,600 square feet; the volume 112,000 cubic feet.

Avg height = $\frac{16+24}{2} = 20'$

Air Inlets -

A 12'w x 16' full height rollup door is located on the south wall and is kept open during all operating hours for equipment access, shipping and receiving, ambient light and inlet ventilation air, according to the owner, Enrique. There is an additional 3' x 6'8" man door on the west wall which is also maintained open. These inlets represents 212 square feet of open area.

Roof Ridge Ventilators -

The roof is provided with a natural gravity roof ridge ventilator. The ridge ventilator is continuous for the first 100' of building; the west 40' section (a later addition) is provided with (3) 4' ridge ventilator sections. The "throat width" of the ridge vent appears to be 18". This totals 112' of 18" ridge vent; 168 square feet of open area.

Ridge Ventilator Ratings -
The 18" ridge ventilator is rated for a minimum of 497 cubic feet per minute (CFM) at 20' stack height and 10F temperature differential, as shown in the manufacturer's ridge ventilator ratings included in the attachments. Thus, 112' of ridge vent is rated at

- 112' @ 497 = 55,664 CFM.

Recommended Ventilation Rates -
Also included in the attachments is a summary of "Recommended Air Changes" for industrial ventilation applications. For machine shops, the recommendation is 3 to 6 minutes per change (10 to 20 air changes per hour). For building volume of 112,000 cubic feet, those recommendations result in:

- 3 min/air ch. (20 air ch. per hour) = 37,300 CFM
- 6 min/air ch. (10 air ch per hour) = 18,700 CFM

VENTILATION SUMMARY

- Recommended - 18,700 to 37,300 CFM

- Existing Gravity Ventilation -
  - rated at 100% ridge vent 55,664 CFM (2.0 minutes/air change)
  - rated at 150% inlet air opening 46,828 CFM (2.4 minutes/air change)

CONCLUSION
The existing gravity ventilation system is more than adequate to meet recommended ventilation rates with the rollup door wide open. No additional ventilation system is considered necessary, unless driven by other IAQ issues.

Please do call if I can be of further assistance.

Best Regards,

Jim Wright

James D. Wright, P. E.
Principal

California License M16502

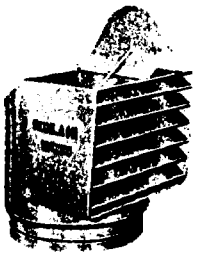
Attachments: (3)

THE ROMLAIR FAMILY OF VENTILATORS AND EXHAUSTERS

MODELS RR

MODEL RS

MODEL ST

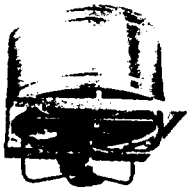


MODEL DV

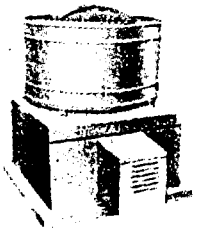
MODEL PFD, APB, SPF

MODELS LLD, LS, LSS

MODELS TB, TD

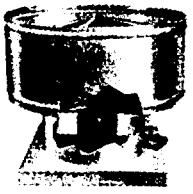


MODELS VED, VB, VBS

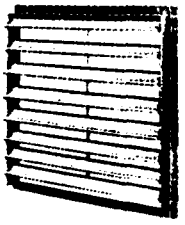


MODEL VBO

MODEL RDF



MODEL CBF



MODELS #556, #611

INDEX

MODEL	PG.	MODEL	PG.	MODEL	PG.
RR	3-4	VB	8-9	VBO	16
B	4	VED	8-9	PBS	17
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ROMLAIR VENTILATORS ®

USEFUL INFORMATION

DEFINITIONS

STACK HEIGHT - Distance in ft. from middle of intake area to roof ventilator.

WIND SPEED - Average wind speed in miles per hour for a given locale.

TEMPERATURE DIFFERENTIAL - Average difference in degrees fahrenheit of inside and outside temperature.

CFM - Ventilator performance rating measured in cubic feet per minute.

FPM - Air velocity measured in feet per minute

STATIC PRESSURE - The measure of force (expressed in inches of water) exerted by a fan to overcome the resistance of a ventilating system.

RECOMMENDED AIR CHANGES

INSTALLATION	*MINUTES PER CHANGE*
Bakeries	3-5
Galvanizing Plants	1-3
Garages	5-15
Generator Rooms	2-5
Glass Plants	1-2
Heat Treating Rooms	½-1
Machine Shops	3-6
Plating Rooms	1-5
Shops (Light Mfg.)	5-10
Shops (Heavy Mfg.)	1-5
Shops (Plant)	1-3
Warehouse	10-30
Woodshops	3-6

USEFUL SIZING FORMULAS

$$\frac{\text{Bldg. content (cu. ft.)}}{\text{Air change (in min.)}} = \text{Total CFM req.}$$

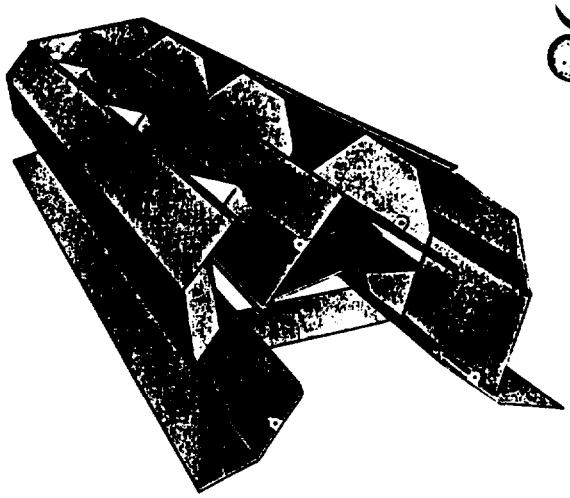
$$\frac{\text{Bldg. content (cu. ft.)}}{\text{CFM proposed}} = \text{Air change in min.}$$

$$\frac{\text{CFM}}{\text{Sq. ft. opening}} = \text{FPM}$$

$$\frac{\text{FPM}}{88} = \text{MPH}$$

ROMLAIR

RIDGE VENTILATORS



RV and RCV SERIES

Romla Ridge Ventilators are ideal for steel buildings and other applications requiring an inconspicuous high volume exhaust vent. Install on peaks, flat roofs or on curbs.

The RV Series is a standard 10' section, complete with end caps for single unit installations. The RCV Series is a continuous ventilator, and the 10' sections are spliced together with Join Plates to provide any required length. All assembly is easily performed from the roof except for joining the damper operator bars.

Knocked down construction is available for overseas or distant shipping points. Complete drawings and installation instructions are provided for both K.D. and assembled units.

ACCESSORIES

Optional dampers can be provided as illustrated on the opposite page. Operators of both types #1 and #2 are trouble free and damper raises and lowers to any position.

BIRD SCREENS

Removable bird screens are available at ½" mesh x 19 GA. galvanized wire or .051 expanded aluminum.

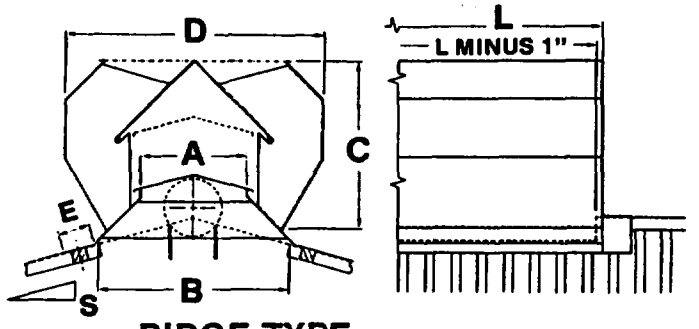
PAINTING

Optional high adhesion white enamel and other colors available at extra cost.

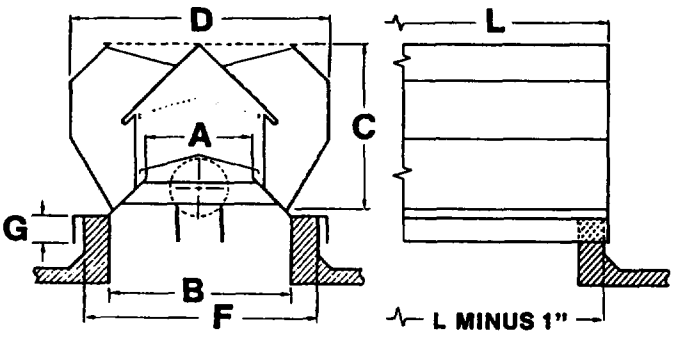
★CAPACITY — CFM PER LINEAL FOOT

STACK HEIGHT	TEMP. DIFF.	RV-4	RV-6	RV-9	RV-12	RV-15	RV-18	RV-24
10'	10	103	155	232	310	387	465	620
	15	108	162	243	325	406	487	650
	20	110	165	248	331	413	496	662
	25	112	167	250	334	417	501	668
	30	115	173	260	347	433	520	694
20'	10	109	166	248	331	414	497	662
	15	114	173	259	345	431	519	690
	20	119	180	270	360	449	540	720
	25	121	185	277	369	461	554	738
	30	128	194	291	388	484	581	776
30'	10	114	173	259	345	431	519	690
	15	120	181	272	363	454	545	726
	20	128	194	291	388	484	582	776
	25	133	201	303	403	505	605	806
	30	140	213	320	427	532	640	854
40'	10	119	180	270	359	449	540	718
	15	128	194	291	388	484	582	776
	20	134	204	306	408	510	612	816
	25	145	220	331	441	552	661	882
	30	154	234	351	468	585	703	936

★Based on 5 mile wind conditions and 150% inlet area of building to ventilator area



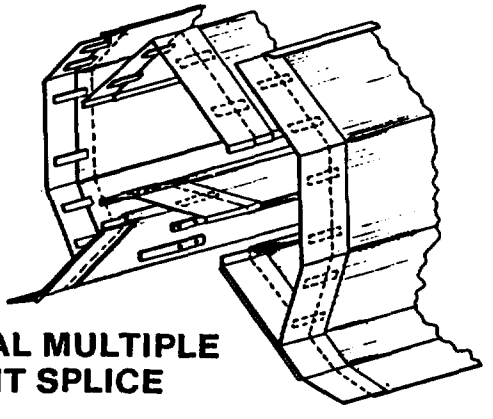
RIDGE TYPE



CURB TYPE

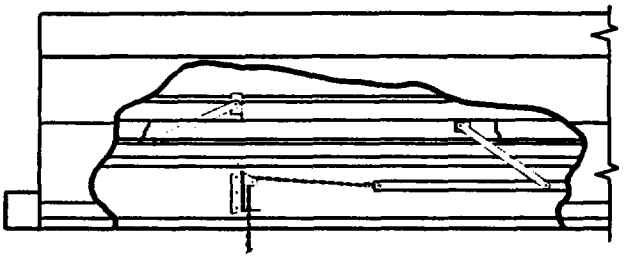
MODEL	A	B	C	D	E	F MAX.	G	*GALV. GA.
RV-4	4	11-⅛	7	10-¾	2-⅞	15-⅛	2	24
RV-6	6	13-⅛	10-¼	15	2-78	17-⅛	2	24
RV-9	9	16-⅛	14-¼	22	2-⅞	20-⅛	2	24
RV-12	12	22-½	18-¼	28-¾	3-¼	26-½	2	24
RV-15	15	25-⅝	24	36	3	29-⅝	2	22
RV-18	18	35-½	30	44	4	43-½	3	20/22
RV-24	24	44	38-½	58	5	52	3	20/22
*Inner Support Structures are 18 and 20 GA.								

Slip type Join Plates provide a unique arrangement for joining RCV series units. Romlair's method permits sections to telescope together without the need for separate fasteners.

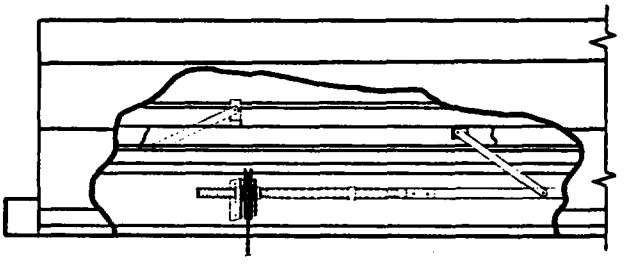


TYPICAL MULTIPLE UNIT SPLICE

DAMPER OPERATORS



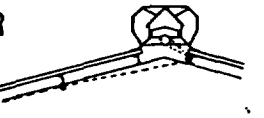
Type 1 is a pull to open, release to close operator for RV series single units. A chain catch is provided in the ventilator with 20' chain as standard length. Not to be used for more than one 10' section.

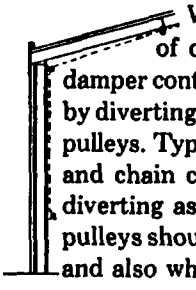


Type 2 damper is for continuous RCV series. The chain sprocket gear operates an Acme threaded screw to provide added leverage for operating many sections. See schedule below. Standard chain lengths is 40' (20' loop).

MAXIMUM LENGTH PER OPERATOR TYPE 2 ONLY						
RV-4	RV-6	RV-9	RV-12	RV-15	RV-18	RV-24
100'	100'	100'	70'	50'	50'	30'
WEIGHT PER 10' SECTION						
68	86	108	169	253	294	462

OPTIONAL OPERATOR ARRANGEMENT





When standard below the unit operation of dampers is prohibitive, optional remote damper controls can be supplied. This is accomplished by diverting the chain to column or sidewall with idler pulleys. Type 1 operator requires single wheel pulleys and chain catch. Type 2 operator requires a chain diverting assembly and double wheel pulleys. Idler pulleys should be spaced approximately 10 feet apart and also where a change of direction is required.

SHORT FORM SPECIFICATIONS

Furnish and install where indicated on drawings, ROMLAIR Model (*RV or RCV) Ridge ventilators as manufactured by Romla Company, Gardena, California. Specify if dampers or screen is required.

*Preceding the throat width is the Model number indicating RV for single units or RCV for continuous ventilators.

ATTACHMENT E

Barclays Official

CALIFORNIA CODE OF REGULATIONS

Title 27. Environmental Protection

Complete Title

Vol. 37

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JUL 29 1997

(2) new postclosure activities that may jeopardize the integrity of previously closed sites or pose a threat to public health and safety or the environment.

NOTE: Authority cited: Sections 40502 and 45020, Public Resources Code; and Section 66796.22(d), Government Code. Reference: Sections 43021 and 43103, Public Resources Code; and Section 66796.22(d), Government Code.

HISTORY

1. New section filed 6-18-97; operative 7-18-97 (Register 97, No. 25).

§ 20921. CIWMB — Gas Monitoring and Control During Closure and Postclosure. (T14:§17783)

(a) To provide for the protection of public health and safety and the environment, the operator shall ensure that landfill gases generated at a disposal site are controlled in accordance with the following requirements:

(1) The concentration of methane gas must not exceed 1.25% by volume in air within on-site structures.

(2) The concentration of methane gas migrating from the landfill must not exceed 5% by volume in air at the facility property boundary or an alternative boundary approved in accordance with §20925.

(3) Trace gases shall be controlled to prevent adverse acute and chronic exposure to toxic and/or carcinogenic compounds.

(b) The program implemented pursuant to §§20921 – 20937 shall continue for a period of thirty (30) years or until the operator receives written authorization to discontinue by the EA with concurrence by the CIWMB pursuant to 40 CFR 258.61(b). Authorization to cease gas monitoring and control shall be based on a demonstration by the operator that there is no potential for gas migration beyond the property boundary or into on-site structures. Demonstration of this proposal shall be supported by data collected and any additional studies.

(c) The gas monitoring program required pursuant to §§20921 – 20937, shall be described as part of the preliminary and final postclosure maintenance plan.

(d) Gas monitoring and control systems shall be modified, during the closure and postclosure maintenance period, to reflect changing on-site and adjacent land uses. Postclosure land use at the site shall not interfere with the function of gas monitoring and control systems. The operator may request a reduction of monitoring or control activities based upon the results of monitoring data collected. The request for reduction of monitoring or control activities shall be submitted in writing to the EA.

NOTE: Authority cited: Sections 40502 and 45020, Public Resources Code; and Section 66796.22(d), Government Code. Reference: Sections 43021 and 43103, Public Resources Code; and Section 66796.22(d), Government Code.

HISTORY

1. New section filed 6-18-97; operative 7-18-97 (Register 97, No. 25).

§ 20923. CIWMB — Monitoring (T14:§17783.3)

(a) To ensure that the conditions of §20921 are met, the operator shall implement a gas monitoring program at the disposal site in accordance with the following requirements:

(1) the gas monitoring network shall be designed by a registered civil engineer or a certified engineering geologist, and shall ensure detection of the presence of landfill gas migrating beyond the landfill property boundary and also into on-site structures; and

(2) The monitoring network shall be designed to account for the following specific site characteristics and potential migration pathways or barriers, including, but not limited to:

(A) local soil and rock conditions;

(B) hydrogeological conditions at the disposal site;

(C) locations of buildings and structures relative to the waste disposal area;

(D) adjacent land use, and inhabitable structures within 1000 feet of the disposal site property boundary;

(E) man-made pathways, such as underground construction; and

(F) the nature and age of waste and its potential to generate landfill gas.

NOTE: Authority Cited: Sections 40502 and 45020, Public Resources Code; and Section 66796.22(d), Government Code. Reference: Sections 43201 and 43103, Public Resources Code; and Section 66796.22(d), Government Code.

HISTORY

1. New section filed 6-18-97; operative 7-18-97 (Register 97, No. 25).

§ 20925. CIWMB — Perimeter Monitoring Network. (T14:§17783.5)

(a) Location

(1) Perimeter subsurface monitoring wells shall be installed around the waste deposit perimeter but not within refuse. The entire perimeter of the disposal site may not warrant the installation of monitoring wells. In this case, the operator shall demonstrate to the satisfaction of the EA that gas migration could not occur due to geologic barriers and that no inhabitable structure or other property such as agricultural lands within 1,000 feet of the property boundary are threatened by gas migration.

(2) Perimeter monitoring wells shall be located at or near the disposal site property boundary. The operator may establish an alternate boundary closer to the waste deposit area based on a knowledge of the site factors in §20923(a)(2). When compliance levels are exceeded at the alternate boundary, the operator shall install additional monitoring wells closer to the property boundary, pursuant to §20937.

(b) Spacing

(1) The lateral spacing between adjacent monitoring wells shall not exceed 1,000 feet, unless it can be established to the satisfaction of the EA, in §20923(a)(2).

(2) The spacing of monitoring wells shall be determined based upon, but not limited to: the nature of the structure to be protected and its proximity to the refuse. Wells shall be spaced to align with gas permeable structural or stratigraphic features, such as dry sand or gravel, off-site or on-site structures, and areas of dead or stressed vegetation that might be due to gas migration.

(3) Probe spacing shall be reduced as necessary to protect persons and structures threatened by landfill gas migration.

(c) Depth

(1) The depth of the wellbore shall equal the maximum depth of waste as measured within 1,000 feet of the monitoring point. The number and depths of monitoring probes within the wellbore shall be installed in accordance with the following criteria, except as specified in ¶(c)(2).

(A) a shallow probe shall be installed 5 to 10 feet below the surface;

(B) an intermediate probe shall be installed at or near half the depth of the waste;

(C) a deep probe shall be set at or near the depth of the waste;

(D) the specified depths of monitoring probes within the wellbore shall be adjusted, based on geologic data obtained during drilling, and probes shall be placed adjacent to soils which are most conductive to gas flow;

(E) All probes shall be installed above the permanent low seasonal water table, above and below perched ground water, and above bedrock; and

(F) When the depth of the waste does not exceed 30 feet, the operator may reduce the number of probes to two, with one probe located in the shallow zone as indicated above, and the other located adjacent to permeable soils at or near the depth of the waste.

(2) Exclusions or modifications to ¶(c)(1) may be requested for certain disposal sites (i.e., filled pits, cut and trench, and canyon fills). When conditions limit the practicality or do not warrant the installation depth criteria, the operator shall propose an alternate system of equivalent probe depths. The proposal must demonstrate to the satisfaction of the EA, that probes located at these depths are sufficient to detect migrating landfill gas and provide protection to public health and safety and the environment.

(3) The EA may require an increase in the number of monitoring probes, the depth of the wellbore, or modify the depths of monitoring probes within a wellbore to ensure compliance with §20921(a). The operator is not precluded from utilizing existing gas monitoring probes of an alternate design, when the operator demonstrates to the satisfaction of the EA, that such probes have been installed in a manner that ensures the detection of landfill gas migrating from the disposal site.

(d) Monitoring Well Construction

ATTACHMENT F

CAPCOA

Air Toxics "Hot Spots" Program

Revised 1992
Risk Assessment Guidelines

Prepared by the:

Toxics Committee of the California Air
Pollution Control Officers Association (CAPCOA),
in consultation with the

Air Toxicology Unit
Air Toxicology and Epidemiology Section
Office of Environmental Health Hazard Assessment

and the

Special Projects Section
Toxic Air Contaminant Identification Branch
Air Resources Board

October 1993

PROPERTY OF
ENVIRONMENTAL SOLUTIONS, INC.

Table III-6

OEHHA and U.S. EPA Cancer Potency Values

Substance	Unit Risk (ug/m^3)$^{-1}$			Reference[c]
Acetaldehyde	2.2E-6	2.7E-6	IRIS	OEHHA-ATES/ARB
Acrylamide		1.3E-3		IRIS/OEHHA-RCHAS
Acrylonitrile		2.9E-4		OEHHA-RCHAS
Arsenic		3.3E-3		OEHHA-ATES/ARB
Arsenic compounds (inorganic)		3.3E-3		OEHHA-ATES/ARB
Asbestos	[1.9E-4/100 fibers/m^3][a]			OEHHA-ATES/ARB
Benzene		2.9E-5		OEHHA-RCHAS
Benzidine (and its salts)		1.4E-1		OEHHA-RCHAS
Beryllium		2.4E-3		IRIS
Bis(chloromethyl)ether		1.3E-2		OEHHA-RCHAS
1,3-Butadiene	2.8E-4	1.7E-4	IRIS	OEHHA-ATES/ARB
Cadmium		4.2E-3		OEHHA-RCHAS
Cadmium compounds		4.2E-3		OEHHA-ATES/ARB
Carbon tetrachloride		4.2E-5		OEHHA-RCHAS,ATES
Chlorinated dibenzo-p-dioxins[b] (as 2,3,7,8-equivalents)		3.8E+1		OEHHA-RCHAS,ATES/ARB
Chlorinated dibenzofurans[b] (as 2,3,7,8-equivalents)		3.8E+1		OEHHA-RCHAS,ATES/ARB
Chloroform		5.3E-6		OEHHA-ATES/ARB
Chlorophenols				
Pentachlorophenol		4.6E-6		OEHHA-RCHAS
2,4,6-Trichlorophenol		2.0E-5		OEHHA-RCHAS
Chloroprene		1.3E-7		OEHHA-RCHAS
Chromium (hexavalent)		1.4E-1		OEHHA-RCHAS
Coke oven emissions		6.2E-4		IRIS
1,2-Dibromo-3-chloropropane (DBCP)		2.0E-3		OEHHA-RCHAS
p-Dichlorobenzene (1,4-Dichlorobenzene)		1.1E-5		OEHHA-RCHAS
3,3'-Dichlorobenzidene		3.4E-4		OEHHA-RCHAS
Di(2-ethylhexyl)phthalate (DEHP)		2.4E-6		OEHHA-RCHAS
1,4-Dioxane		7.7E-6		OEHHA-RCHAS
Dioxins (chlorinated)[b] (see chlorinated dibenzo-p-dioxins)				
Epichlorohydrin		2.3E-5		OEHHA-RCHAS
Ethylene dibromide (1,2-Dibromoethane)		7.1E-5		OEHHA-RCHAS,ATES/ARB
Ethylene dichloride (1,2-Dichloroethane)		2.0E-5		OEHHA-RCHAS,ATES/ARB
Ethylene oxide		8.8E-5		OEHHA-ATES/ARB
Formaldehyde	1.3E-5	6.0E-6	IRIS	OEHHA-ATES/ARB

Table III-6 (continued)

OEHHA and U.S. EPA Cancer Potency Values

Substance	Unit Risk $(ug/m^3)^{-1}$		Reference[c]
Furans (chlorinated)[b]	(see chlorinated dibenzofurans)		
Gasoline vapors	1.2E-6[3.6-3ppm^{-1}]		OEHHA-RCHAS
Hexachlorobenzene	5.1E-4		OEHHA-RCHAS
Hexachlorocyclohexanes	1.1E-3		OEHHA-RCHAS
Hydrazine	4.9E-3		IRIS
Methylene chloride (Dichloromethane)	1.0E-6		OEHHA-ATES/ARB
Nickel and nickel compounds	2.6E-4		OEHHA-ATES/ARB
N-Nitrosodiethylamine	1.0E-2		OEHHA-RCHAS
N-Nitrosodimethylamine	4.6E-3		OEHHA-RCHAS
p-Nitrosodiphenylamine	2.6E-6		OEHHA-RCHAS
N-Nitrosodi-n-butylamine	3.1E-3		OEHHA-RCHAS
N-Nitrosomethylethylamine	6.3E-3		IRIS/OEHHA-RCHAS
N-Nitrosodi-n-propylamine	2.0E-3		OEHHA-RCHAS
N-Nitrosopyrrolidine	6.0E-4		IRIS/OEHHA-RCHAS
PCBs (Polychlorinated biphenyls)	1.4E-3		OEHHA-RCHAS
PAHs (Polycyclic aromatic hydrocarbons) including, but not limited to:			
Benz[a]anthracene	1.7E-3		Ref.1
Benzo[b]fluoranthene	1.7E-3		Ref.1
Benzo[k]fluoranthene	1.7E-3		Ref.1
Benzo[a]pyrene	1.7E-3		Ref.1
Dibenz[a,h]anthracene	1.7E-3		Ref.1
Indeno[1,2,3-cd]pyrene	1.7E-3		Ref.1
Perchloroethylene (Tetrachloroethylene)	5.8E-7	5.9E-6	EPA/Ref.2,3 OEHHA-ATES/ARB
Propylene oxide	3.7E-6		IRIS
Trichloroethylene	2.0E-6		OEHHA-ATES/ARB
Urethane	2.9E-4		OEHHA-RCHAS
Vinyl chloride	7.8E-5		OEHHA-ATES/ARB

a - A conversion factor of 100 fibers/0.003 micrograms can be multiplied by a receptor concentration of asbestos expressed in terms of micrograms per cubic meter (ug/m^3) to yield fibers/m^3 (EPA, 1985. Airborne Asbestos Health Risk Assessment Update). Unless other information necessary to estimate the concentration (fibers/m^3) of asbestos at receptors of interest is available, the use of the aforementioned conversion factor is an option.

b - See Appendix G for the methodology for calculating 2,3,7,8-equivalents for Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans.

Table III-8

Noncancer Acceptable Reference Exposure Levels (Chronic)

Substance	Inhalation[a] (ug/m^3)	Reference[b]
Acetaldehyde	9.0E+0	IRIS
Acrolein	2.0E-2	IRIS
Acrylamide	{7.0E-1}	IRIS
Acrylonitrile	2.0E+0	IRIS
Ammonia	1.0E+2	IRIS
Arsenic[c]	5.0E-1	TLV'
Benzene[c]	7.1E+1	TLV
Benzidine (and its salts)	{1.0E+1}	IRIS
Benzyl chloride	1.2E+1	TLV'
Beryllium[d]	4.8E-3	TLV'
Bromine	1.7E+0	TLV'
Bromine compounds		
Hydrogen bromide	2.4E+1	TLV'
Bromine pentafluoride	1.7E+0	TLV'
Cadmium[c]	{3.5E+0}	IRIS
Carbon tetrachloride[c]	{2.4E+0}	IRIS
Chlorinated dibenzo-p-dioxins[c,d] (as 2,3,7,8-equivalents)	{3.5E-6}	Ref.1
Chlorinated dibenzofurans[c] (as 2,3,7,8-equivalents)	{3.5E-6}	Ref.1
Chlorine	7.1E+0	TLV'
Chlorobenzene (monochlorobenzene)	{7.0E+1}	IRIS
Chlorofluorocarbons	{7.0E+2}	IRIS
Chloroform[c]	{3.5E+1}	IRIS
Chlorophenols		
2-Chlorophenol	1.8E+1	IRIS
Pentachlorophenol	2.0E-1	DTSC
Tetrachlorophenols	8.8E+1	DTSC
Chloropicrin	1.7E+0	TLV'
Chloroprene	1.0E+0	HEAST
Chromium (hexavalent)[c]	2.0E-3	HEAST
Copper	2.4E+0	TLV'
Cresols (o, m, p)	1.8E+2	IRIS
Dibenzodioxins (chlorinated) (see chlorinated dibenzo-p-dioxins)		
Dibenzofurans (chlorinated) (see chlorinated dibenzofurans)		
1,2-Dibromo-3-chloropropane (DBCP)	2.0E-1	IRIS

Table III-8 (continued)

Noncancer ~~Acceptable~~ Reference Exposure Levels (Chronic)

Substance	Inhalation[a] (ug/m^3)	Reference[b]
Methanol	6.2E+2	TLV
Methyl bromide	6.0E+0	HEAST
Methyl chloroform (1,1,1-TCA)	{3.2E+2}	IRIS
Methylene chloride[c]	3.0E+3	HEAST
4,4'-Methylene dianiline (and its dichloride)	1.9E+0	TLV'
Methyl mercury	{1.0E+0}	IRIS
Methyl methacrylate	9.8E+2	TLV'
Mineral fibers (< 1% free silica)	2.4E+1	TLV'
Naphthalene	{1.4E+1}	HEAST
Nickel and nickel compounds[c]	2.4E-1	TLV'
Nitrobenzene	{1.7E+0}	IRIS
Nitrogen dioxide	4.7E+2	CAAQS
2-Nitropropane	2.0E+1	IRIS
Ozone	1.8E+2	CAAQS
Perchloroethylene[c] (Tetrachloroethylene)	{3.5E+1}	IRIS
Phenol	4.5E+1	TLV
Phosphine	{1.0E+1}	IRIS
Phosphorous (white)	{7.0E-2}	IRIS
Phthalic anhydride	{7.0E+3}	IRIS
PCBs (Polychlorinated biphenyls)	1.2E+0	TLV'
Propylene oxide	3.0E+1	IRIS
Selenium compounds	5.0E-1	TLV'
~~Silica (respirable, crystalline)~~[e]	~~1.2E+0~~	~~TLV'~~
Sodium hydroxide	4.8E+0	TLV'
Styrene	{7.0E+2}	IRIS
Sulfates	2.5E+1	CAAQS
Sulfur dioxide	6.6E+2	CAAQS
Toluene	2.0E+2	DTSC
Trichloroethylene[c]	6.4E+2	TLV
Vinyl chloride[c]	2.6E+1	CAAQS
Vinylidene chloride	{3.2E+1}	IRIS
Xylenes	3.0E+2	HEAST
Zinc compounds	3.5E+1	SPHEM

a - Values in {} have been converted from oral acceptable exposure levels (mg/kg/day) by assuming a 70 kg person breathes 20 m^3 per day and equal absorption occurs by the inhalation and oral routes.

WRIGHT ENGINEERING ASSOCIATES REPORT

TRC

Wright Engineering Associates
505 E. Commonwealth Ave., Ste. J
Fullerton, CA 92832
Phone (714) 738-4143
Fax (714) 738-4144

November 5, 1997

TRC Environmental Solutions, Inc.
221 Technology Drive
Irvine, CA 92618

Roberto Puga, R.G.
Project Manager

Re: **Ventilation Assessment**

Brother's Machine and Tool, Inc.
9843 S. Greenleaf Ave.
Santa Fe Springs, CA

Roberto -

SUMMARY

A natural gravity ventilation system is installed in this building. The ventilation air exchange ratings for the system exceed recommended rates for industrial machine shop environments. There is no perceived need for additional mechanical ventilation.

SITE INSPECTION OBSERVATIONS

Building -
The subject building we inspected this morning is 40' wide x 140' long, a prefab metal building structure with corrugated sheet steel siding and roof. Roof ridge is on the 140' length with minimum clearance 16' (low point south and north walls) and peak ridge elevation 24'. Small single story offices with open mezzanine above are located at the front (east) end of the building. The building houses a machine shop with manually operated metal lathes and machining equipment. The building footprint is 5,600 square feet; the volume 112,000 cubic feet.

Air Inlets -
A 12'w x 16' full height rollup door is located on the south wall and is kept open during all operating hours for equipment access, shipping and receiving, ambient light and inlet ventilation air, according to the owner, Enrique. There is an additional 3' x 6'8" man door on the west wall which is also maintained open. These inlets represents 212 square feet of open area.

Roof Ridge Ventilators -
The roof is provided with a natural gravity roof ridge ventilator. The ridge ventilator is continuous for the first 100' of building; the west 40' section (a later addition) is provided with (3) 4' ridge ventilator sections. The "throat width" of the ridge vent appears to be 18". This totals 112' of 18" ridge vent; 168 square feet of open area.

Ridge Ventilator Ratings -
The 18" ridge ventilator is rated for a minimum of 497 cubic feet per minute (CFM) at 20' stack height and 10F temperature differential, as shown in the manufacturer's ridge ventilator ratings included in the attachments. Thus, 112' of ridge vent is rated at

- 112' @ 497 = 55,664 CFM.

Recommended Ventilation Rates -
Also included in the attachments is a summary of "Recommended Air Changes" for industrial ventilation applications. For machine shops, the recommendation is 3 to 6 minutes per change (10 to 20 air changes per hour). For building volume of 112,000 cubic feet, those recommendations result in:

- 3 min/air ch. (20 air ch. per hour) = 37,300 CFM
- 6 min/air ch. (10 air ch per hour) = 18,700 CFM

VENTILATION SUMMARY

- Recommended - 18,700 to 37,300 CFM

- Existing Gravity Ventilation -
  - rated at 100% ridge vent 55,664 CFM (2.0 minutes/air change)
  - rated at 150% inlet air opening 46,828 CFM (2.4 minutes/air change)

CONCLUSION
The existing gravity ventilation system is more than adequate to meet recommended ventilation rates with the rollup door wide open. No additional ventilation system is considered necessary, unless driven by other IAQ issues.

Please do call if I can be of further assistance.

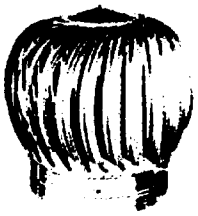
Best Regards,

James D. Wright, P. E.
Principal

California License M16502

Attachments: (3)

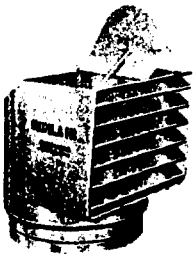
THE ROMLAIR FAMILY OF VENTILATORS AND EXHAUSTERS



MODELS RR

MODEL RS

MODEL ST

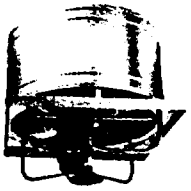


MODEL DV

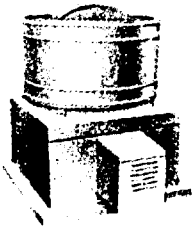
MODEL PFD, APB, SPF

MODELS LLD, LS, LSS

MODELS TB, TD

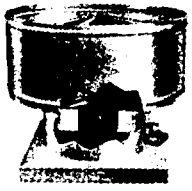


MODELS VED, VB, VBS

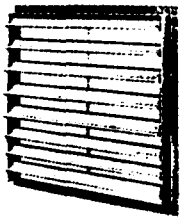


MODEL VBO

MODEL RDF



MODEL CBF



MODELS #556, #611

INDEX

MODEL	PG.	MODEL	PG.	MODEL	PG.
RR	3-4	VB	8-9	VBO	16
B	4	VED	8-9	PBS	17
DD	4	LS	10-11	VBS	17
C	4	LLD	10-11	LSS	17
RS	5	TD	12-13	SPF, RDF, CBF	18
ST	6	TB	12-13	#611	19
DV	7	APB	14-15	#1500	19
SPECIAL				#556	19
PRODUCTS	7	PFD	14-15	AB	20

ROMLAIR® VENTILATORS

USEFUL INFORMATION

DEFINITIONS

STACK HEIGHT - Distance in ft. from middle of intake area to roof ventilator.

WIND SPEED - Average wind speed in miles per hour for a given locale.

TEMPERATURE DIFFERENTIAL - Average difference in degrees fahrenheit of inside and outside temperature.

CFM - Ventilator performance rating measured in cubic feet per minute.

FPM - Air velocity measured in feet per minute

STATIC PRESSURE - The measure of force (expressed in inches of water) exerted by a fan to overcome the resistance of a ventilating system.

RECOMMENDED AIR CHANGES

INSTALLATION	*MINUTES PER CHANGE*
Bakeries	3-5
Galvanizing Plants	1-3
Garages	5-15
Generator Rooms	2-5
Glass Plants	1-2
Heat Treating Rooms	½-1
Machine Shops	3-6
Plating Rooms	1-5
Shops (Light Mfg.)	5-10
Shops (Heavy Mfg.)	1-5
Shops (Plant)	1-3
Warehouse	10-30
Woodshops	3-6

USEFUL SIZING FORMULAS

$$\frac{\text{Bldg. content (cu. ft.)}}{\text{Air change (in min.)}} = \text{Total CFM req.}$$

$$\frac{\text{Bldg. content (cu. ft.)}}{\text{CFM proposed}} = \text{Air change in min.}$$

$$\frac{\text{CFM}}{\text{Sq. ft. opening}} = \text{FPM}$$

$$\frac{\text{FPM}}{88} = \text{MPH}$$

ROMLAIR

RIDGE VENTILATORS

RV and RCV SERIES

Romla Ridge Ventilators are ideal for steel buildings and other applications requiring an inconspicuous high volume exhaust vent. Install on peaks, flat roofs or on curbs.

The RV Series is a standard 10' section, complete with end caps for single unit installations. The RCV Series is a continuous ventilator, and the 10' sections are spliced together with Join Plates to provide any required length. All assembly is easily performed from the roof except for joining the damper operator bars.

Knocked down construction is available for overseas or distant shipping points. Complete drawings and installation instructions are provided for both K.D. and assembled units.

ACCESSORIES

Optional dampers can be provided as illustrated on the opposite page. Operators of both types #1 and #2 are trouble free and damper raises and lowers to any position.

BIRD SCREENS

Removable bird screens are available at ½" mesh x 19 GA. galvanized wire or .051 expanded aluminum.

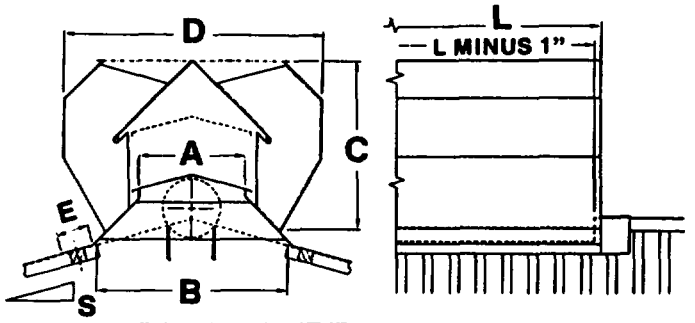
PAINTING

Optional high adhesion white enamel and other colors available at extra cost.

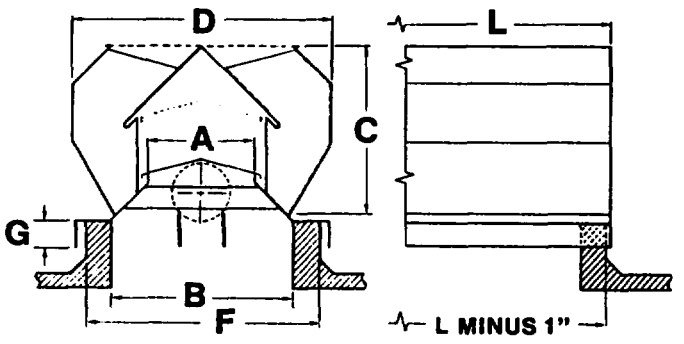
★CAPACITY — CFM PER LINEAL FOOT

STACK HEIGHT	TEMP. DIFF.	RV-4	RV-6	RV-9	RV-12	RV-15	RV-18	RV-24
10'	10	103	155	232	310	387	465	620
	15	108	162	243	325	406	487	650
	20	110	165	248	331	413	496	662
	25	112	167	250	334	417	501	668
	30	115	173	260	347	433	520	694
20'	10	109	166	248	331	414	497	662
	15	114	173	259	345	431	519	690
	20	119	180	270	360	449	540	720
	25	121	185	277	369	461	554	738
	30	128	194	291	388	484	581	776
30'	10	114	173	259	345	431	519	690
	15	120	181	272	363	454	545	726
	20	128	194	291	388	484	582	776
	25	133	201	303	403	505	605	806
	30	140	213	320	427	532	640	854
40'	10	119	180	270	359	449	540	718
	15	128	194	291	388	484	582	776
	20	134	204	306	408	510	612	816
	25	145	220	331	441	552	661	882
	30	154	234	351	468	585	703	936

★Based on 5 mile wind conditions and 150% inlet area of building to ventilator area



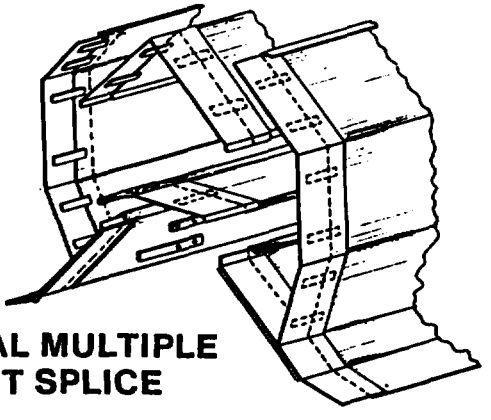
RIDGE TYPE



CURB TYPE

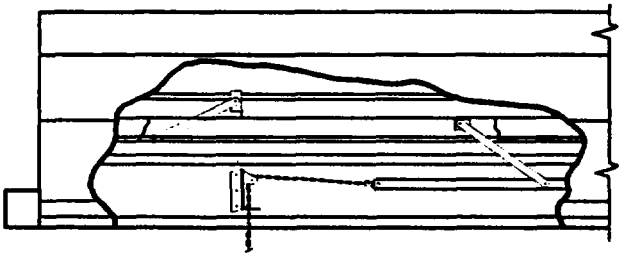
MODEL	A	B	C	D	E	F MAX.	G	*GALV. GA.
RV-4	4	11-⅛	7	10-¾	2-⅞	15-⅛	2	24
RV-6	6	13-⅛	10-¼	15	2-78	17-⅛	2	24
RV-9	9	16-⅛	14-¼	22	2-⅞	20-⅛	2	24
RV-12	12	22-½	18-¼	28-¾	3-¼	26-½	2	24
RV-15	15	25-⅝	24	36	3	29-⅝	2	22
RV-18	18	35-½	30	44	4	43-½	3	20/22
RV-24	24	44	38-½	58	5	52	3	20/22
*Inner Support Structures are 18 and 20 GA.								

Slip type Join Plates provide a unique arrangement for joining RCV series units. Romlair's method permits sections to telescope together without the need for separate fasteners.

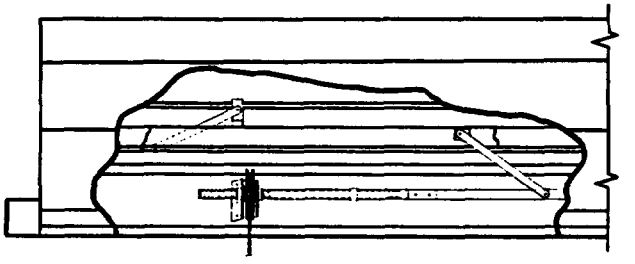


TYPICAL MULTIPLE UNIT SPLICE

DAMPER OPERATORS



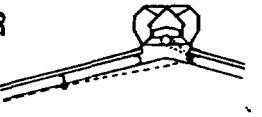
Type 1 is a pull to open, release to close operator for RV series single units. A chain catch is provided in the ventilator with 20' chain as standard length. Not to be used for more than one 10' section.

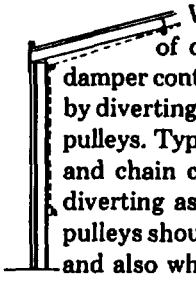


Type 2 damper is for continuous RCV series. The chain sprocket gear operates an Acme threaded screw to provide added leverage for operating many sections. See schedule below. Standard chain lengths is 40' (20' loop).

MAXIMUM LENGTH PER OPERATOR TYPE 2 ONLY						
RV-4	RV-6	RV-9	RV-12	RV-15	RV-18	RV-24
100'	100'	100'	70'	50'	50'	30'
WEIGHT PER 10' SECTION						
68	86	108	169	253	294	462

OPTIONAL OPERATOR ARRANGEMENT





When standard below the unit operation of dampers is prohibitive, optional remote damper controls can be supplied. This is accomplished by diverting the chain to column or sidewall with idler pulleys. Type 1 operator requires single wheel pulleys and chain catch. Type 2 operator requires a chain diverting assembly and double wheel pulleys. Idler pulleys should be spaced approximately 10 feet apart and also where a change of direction is required.

SHORT FORM SPECIFICATIONS

Furnish and install where indicated on drawings, ROMLAIR Model (*RV or RCV) Ridge ventilators as manufactured by Romla Company, Gardena, California. Specify if dampers or screen is required.

*Preceding the throat width is the Model number indicating RV for single units or RCV for continuous ventilators.

ATTACHMENT D.2

TM NO - 9

TRC

WASTE DISPOSAL INC. SUPERFUND SITE

Project Coordinator

March 13, 1998 Project No. 94-256

Ms. Cynthia Wetmore
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
Technical Memorandum TM-9 (Rev. 1.0)
Gas Parameter Tests
Waste Disposal, Inc.

Dear Cynthia:

The purpose of this transmittal is to provide you with Revision 1.0 of Technical Memorandum TM-9, describing tests to be conducted at selected locations at the Waste Disposal, Inc. (WDI) site on specific gas parameters. This second draft contains more detail on rationale, planned measurements and calculations.

The SVE testing is proposed at five different areas, two of which (i.e., C&E Die and Brothers Machine) are currently of special interest for EPA and DTSC.

This revision is intended to continue discussion among the gas subgroup participants and to elicit further comments from reviewers as needed. The comments will be utilized to develop the next, perhaps final, version of the technical memorandum. One important site condition that should be considered during subsequent review and discussion is the currently saturated state of the fill layer. This condition may affect the performance of the test.

Please let us know if you have questions on this transmittal.

Sincerely,

Ian Webster / RP
Ian Webster
WDIG Project Coordinator

IW/MG:ks
Enclosure: Technical Memorandum TM-9 (Rev. 1.0)

cc: John Wondolleck, CDM
Tim Crist, CIWMB
Roberto Puga, TRC
Dave Becker, ACOE
Theodore Tsotsis, USC
Bill Stephanatos, Weston

TECHNICAL MEMORANDUM NO. 9 (REV. 1.0)
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT:	Gas Parameter Tests	**DATE:**	March 13, 1998
SUBMITTED TO:	Cynthia Wetmore, U.S. EPA	**PROJECT NO.:**	94-256
SUBMITTED BY:	Ian Webster, WDIG Project Coordinator		
CC:	John Wondolleck, CDM Tim Crist, CIWMB Roberto Puga, TRC Dave Becker, U.S. Army Theodore Tsotsis, USC Bill Stephanatos, Weston		

1.0 DESCRIPTION OF DESIGN MODIFICATIONS:

1. This Technical Memorandum (TM) No. 9 (Rev. 1.0) - Gas Parameter Tests, describes the field, laboratory and analytical procedures proposed to evaluate soil vapor extraction (SVE) technology, and in-situ and laboratory measurements of gas generation rates. These additional gas parameter tests are based on recent vapor well/probe data. Data from the latest Quarterly Vapor Well Monitoring Program is currently being received and reviewed, which will add measured concentrations of several constituents to the database which previously indicated potentially high methane concentrations in various wells/probes located onsite.

2. The fundamental parameters of gas generation, conductivity, advection and diffusion have been calculated for the specific conditions in the fill and sludge material layers at the Waste Disposal, Inc. (WDI) Superfund site. These calculations were transmitted to EPA on February 13, 1998. The purpose of this TM is to describe three types of tests that will be used to develop additional field data on various gas parameters, including gas generation rates and conductivity. The three types of tests are; 1) SVE from the layer adjacent to the sludge material layer (i.e., separately from either the fill layer above the sludge material layer or from the native soil layer beneath); 2) in-situ evaluation of gas generation rates from a controlled volume of sludge material; and 3) laboratory tests of gas generation parameters measured on small samples of sludge material taken from the field.

3. This TM is arranged to first discuss the rationale for each type of test, followed by a description of the specific procedure for each and a description of the calculations that will be performed. This revision contains more detailed rationale, and descriptions of field procedures and analysis of results. Field activities are expected to proceed with a design/build structure in which changes will be made real-time in experimental parameters as new information is obtained in the field.

2.0 RATIONALE FOR SPECIFIC TESTS:

1. The rationale for each of the three different types of test is described in the following separate subsections. Each test is intended to provide different, yet complementary, information on the rate of generation of various gas constituents and the total gas as well as the ability of these gases to migrate within and/or to be removed from either the fill layer overlying or the native soil beneath the sludge material.

2.1 SVE TEST

1. The SVE tests will determine the ability of an induced vacuum to withdraw soil gas from five locations selected to represent the different combinations of proximity between sludge material and on-site buildings. The SVE tests will be conducted separately in the fill layer above the sludge material and in the native soil layer beneath. These two more permeable layers are postulated to be potential pathways for gas, generated in the sludge material to migrate toward buildings and the ground surface.

2. More specifically, gas emitted from the top of the sludge material would be expected to migrate upwards towards the ground surface and potentially to the bottom of slabs beneath commercial/industrial buildings. In contrast, gas emitted from the bottom surface of the sludge material would be expected to migrate laterally until it reaches the edge of the sludge. At that point, migration could proceed both laterally outwards and vertically upwards towards the surface.

3. The five locations for these tests are based on the presence of sludge material near potential surface receptors such as commercial/industrial buildings. The volume flow rates achieved in the extraction well from specified vacuum levels applied by the blower will provide an indication of the air conductivity of each of these two layers at each of the five test locations. Constituent concentrations and volume flow rates will provide information on the constituent generation rate from the sludge material into the collection layer for the area of influence as indicated by the responses at the surrounding monitoring wells.

2.2 CONTROLLED-VOLUME IN-SITU PIPE TEST

1. In-situ gas generation testing is based on creating a vertical gas impermeable boundary around a volume of sludge material to prevent lateral migration and measuring the gas generation migrating vertically away from this volume of sludge material. Such a test offers an opportunity to determine the rate at which gas is generated in a known volume of sludge material. This test will be conducted using a large diameter (e.g., 12 inch) cylinder (pipe) which will be driven into the soil to a predetermined depth that includes the fill layer, sludge material layer, and native soil beneath.

2. Methods to install the 12" diameter pipe, including the vibracore technique or direct push processes are currently being evaluated.

2.3 LABORATORY TEST

1. The laboratory gas generation testing will be used to more precisely measure the total and constituent gas generation rate of a specific volume of sludge material that has been removed from selected locations at the site. Samples of the sludge material will be placed in a laboratory apparatus specially designed to allow measurement of the identity and rate at which constituent gas is generated by the sludge material under anaerobic and dark conditions.

3.0 DESCRIPTION AND PROCEDURES FOR TESTS

1. The procedure and conditions for each of the three tests are described in the following sections. Enough detail is provided to describe the scale and sequence of activities in each test. Some test conditions will be adjusted in the field based on early results from tests conducted on a design/build basis.

2. The results of the tests will be used to calculate the following gas parameters:
   - Air conductivity (from SVE)
   - Methane and total organic compound generation rate
   - Benzene and vinyl chloride emission rate

   By employing three discrete testing methods, an independent cross comparison of gas generation rate data may be possible.

3.1 SVE TEST

1. The approximate location for each of the five soil vapor extraction tests are shown in Figure 1. These locations were selected in joint meetings of the EPA and the WDIG based on the vapor well data and the location of sump materials. A summary of the locations and well information is provided in Table 1. Attachment A provides a list of existing vapor wells, construction data, and latest constituent concentrations measured. These concentrations indicate the relative amount of subsurface contaminants, both at locations chosen and not chosen for SVE.

2. At each of the five test locations an existing vapor well will be used as a monitoring well or, if the vapor well is not in the proper location or configuration, a new vapor extraction well will be installed. In either case, the extraction well

will be surrounded with a specific geometric pattern of zone of influence monitoring wells. In the native soil, air injection wells will also be installed. The depth of the perforations in the air injection and influence monitoring wells will be similar to that in the extraction well (see Figures 2 and 3).

3. Example configurations of the extraction, injection and influence-monitoring wells for SVE in the fill and native soil layers surrounding the sludge material are shown in Figures 2 and 3, respectively. The dimensions shown in each of these figures are estimated separately for the different depth range of these two SVE test layers. Four injection wells are arranged in a square geometry to determine the area potentially swept by the SVE test. This area, multiplied by the length of slotted interval of the extraction well, determines the subsurface volume subjected to extraction.

4. The zone of influence monitoring wells are placed at increasing distances in different directions (see Figures 2 and 3) to provide the ability of determining the maximum distance at which the extraction vacuum, can be detected. Zone of Influence calculations contained in Attachment B have been used to theoretically estimated appropriate distances. In general, the calculations indicate that the appropriate separation distances for both the injection and monitoring wells are higher in more permeable layers and smaller in less permeable layers. Based on the results of the first SVE test, the distance of the influence monitoring wells may need to be adjusted.

5. The SVE test will be started with a low vacuum that that is slowly increased at a rate consistent with being able to measure the first appearance of vacuum in each of the zone of influence monitoring wells. The distances to these monitoring wells will be estimated by the calculation contained in Attachment B. The goal is to obtain a mild vacuum (e.g., 0.1-inch water column [WC]) in the most distant well at a vacuum and flow rate that can be sustained by the blower.

6. At the beginning of this test period, the concentrations of the following constituents will be measured in the extraction flow:
   - Methane
   - Total nonmethane organic compounds
   - Benzene
   - Vinyl chloride

   These concentrations will be measured daily during the initial 2 to 3 days of the test, and weekly thereafter if the SVE test is run longer at each location.

7. After equilibrium is achieved in the vacuum and flow fields, the SVE test will be run under constant conditions for up to one week. The rate at which each constituent is removed will be calculated in terms of mass per unit time (e.g., pounds per day) after each interval when concentrations and extraction flow rates are measured. The mass removal rates will be used to help determine when the test will be ended. Each test will be terminated at the end of one week if each of the mass removal rates for total nonmethane organic compounds and methane is less than 0.1 pound per day. This rate is judged to be the threshold below which no significant benefit would be derived from extending the test. At the end of this period, the system will be sampled, and then shut off to allow measurement of the rate of recovery of the system.

8. A schematic of the construction of a typical SVE test well is shown in Figure 4. The slotted interval will adjust to fit in the fill layer or the native soil layer beneath the sludge material layer. As indicated above, where possible, existing vapor monitoring wells will be used, as indicated in Table 1.

9. A schematic of the typical SVE test equipment that is expected to be used is shown in Figure 5. The particulate filter and water knockout is placed before the blower to prevent damage to its impeller blades, especially from a slug of water that might be extracted from the subsurface saturated with recent rainwater infiltration. The catalytic oxidizer after the blower will destroy the volatile organic compounds, while the acid gas neutralizer will remove the hydrogen chloride gas that is produced by the oxidizer. General specifications for the SVE test equipment are provided in Table 2.

10. For purposes of this testing, South Coast Air Quality Management District (SCAQMD) a permitted skid-mounted treatment unit will be used. Additionally, a SCAQMD permit to construct and operate under Rule 441 for research operations will be obtained. A copy of this rule is included in Attachment C.

3.2 CONTROLLED-VOLUME IN-SITU PIPE TEST

1. To implement the in-situ gas generation study, a pipe will be driven into the soil to isolate a known soil and sludge volume as shown in Figure 6. The gas generated by the sludge material will then be extracted from above and below the waste to allow measurement of the gas generation rate. Calculations indicate that a sludge thickness of 0.6 feet will produce sufficient methane to allow measurements of an increase of 5 ppmv, using current field instruments. Total non-methane organic compounds will also be analyzed during this testing.

2. As shown in Figure 5, each of the layers surrounding the sludge material layer will be equipped with two sampling probes. One probe in each pair will be installed with its slots near the top of the layer (fill or native soil) and the other probe in each pair will have its slots near the bottom of the layer (a predetermined depth for the native soil). This arrangement will allow the measurement of gradients in each layer.

3. After installation of the pipe and the four probes an initial round of the following measurements will be made:
   - Pressure
   - Concentration:
     - Total nonmethane organic compounds
     - Methane
     - Benzene
     - Vinyl chloride

   This set of measurements will be repeated after one week, monthly for the first three months and then at six months.

3.3 LABORATORY TEST

1. Selected sludge material samples will be collected from five wells drilled into the test areas shown in Figure 1. These samples will be removed using a Shelby tube, sealed at the top and bottom, and transported to the University of Southern California (USC) Department of Chemical Engineering. USC will conduct the laboratory test; the test apparatus is shown in Figure 7. It is designed to measure gas generation rates under anaerobic conditions.

2. Samples of the soil will be analyzed initially for the following parameters:
   - Moisture content
   - Bacterial populations
   - Total organic compounds
   - Nitrogen and Phosphorus content

   Procedures for the sampling and analysis of the materials are included in the existing SAP and QAPP and will be adhered to in this excercise.

3. Gas generation rates will be measured under anaerobic conditions for 10 samples over a period of 1 month. Each sample of approximately 2 liters in volume will be placed in a 3-liter glass jar. The soil sample will be transferred from the sampling tube to the test jar in an environmental chamber to avoid exposure to air.

4. Upon placement of the soil sample into the glass jar a predetermined atmosphere will be generated to fill the empty space in the jar. The test atmosphere will start as 100 percent nitrogen so that any appearance of other gases (e.g., CO_2, CH_4) will indicate the products of an ongoing reactions such as anaerobic decomposition. Upon placement of the test atmosphere, the glass jars will be transferred into an incubator in order to maintain constant temperature biodegradation conditions. The samples will be left unperturbed and in the dark in order to simulate conditions found in the WDI site itself.

5. Gas generation will be monitored weekly by noting changes in total pressure through the aid of an attached side manometer containing an inert silicone oil (precautions will be taken to eliminate exposure of the manometer fluid to atmospheric air).

6. It is estimated that the laboratory measurement technique will be sensitive to gas generation rates of 6.0×10^{-14} grams gas/(cm^3 waste/sec), which is over an order of magnitude less than generation rates calculated for the site.[1]

7. At the end of the 1-month test period the gas headspace in each individual glass jar will be analyzed by GC/MS for its composition.

4.0 EVALUATION/ANALYSIS OF TEST DATA

1. This section describes how the data derived from the tests will be used to calculate gas parameters.

4.1 EVALUATION OF SVE TEST DATA

1. During the SVE test the following data will be recorded:
   - Blower vacuum
   - Blower flow rate
   - Concentrations of:
     - Methane
     - Benzene
     - Vinyl chloride
     - Total nonmethane organic compounds
   - Vacuum in each zone of influence monitoring well

2. These recorded data will be used to calculate the following gas parameters:
   - Extraction rate (mass per unit time) of each gas constituent
   - Extraction (influenced) volume of soil

3. Vacuum measured in the zone of influence monitoring wells will be used to calculate the area of influence. The volume of influence will be equal to the area of influence in each layer multiplied by the length of the slotted interval of the extraction well in the fill or in the native soil.

4. After the SVE system is turned off, the rate of increase of constituent concentrations will provide a measure of system "rebound" or recovery rate. During this "rebound" phase the following data will be recorded:
   - Concentration of:
     - Methane
     - Benzene
     - Vinyl chloride
     - Total nonmethane organic compounds
   - Vacuum in each zone of influence monitoring well

4.2 ANALYSIS OF CONTROLLED-VOLUME IN-SITU PIPE TEST DATA

1. Pressure gradients that are potentially measured in each layer surrounding the sludge material layer can be used to calculate advective flux of soil gas from the following relationship:

$$F_{AMi} = \frac{k}{\mu\beta}\frac{dp_i}{dl} \qquad (1)$$

where F_{AMi} = molar flux of soil gas constituent in advecting down the pressure gradient (i.e., towards lower pressure in terms of moles per unit time per unit area perpendicular to the flow direction [moles $L^{-2}T^{-1}$](g-mole $cm^{-2}sec^{-1}$).

[1] Calculated gas generation rate was forwarded to the U.S. EPA in the February 13, 1998 transmittal from TRC.

k = intrinsic permeability of the porous medium $[L^2](cm^2)$.

μ = absolute (dynamic) viscosity of the soil gas $[ML^{-1}T^{-1}]$(centipoise).

β = molar volume of an ideal gas $[L^3mole^{-1}](cm^3g\text{-}mole^{-1})$.

p_i = partial pressure of soil gas constituent i in pore spaces $[ML^{-1}T^{-2}]$(cm of water column).

l = length or distance along pressure gradient [L](cm).

The minus sign indicates that the direction of flow is opposite the pressure gradient, and the partial pressure of constituent i can be found from the total pressure and constituent concentration with the following relation:

$$p_i = pc_i^* \tag{2}$$

where p = total pressure of soil gas in pore spaces $[ML^{-1}\ T^{-2}]$(cm of water column).

C_i^* = concentration of constituent i, dimensionless $[vol\ vol^{-1}]$(ppbv).

2. Concentration gradients that are potentially measures in each layer surrounding the sludge material layer can be used to calculate the diffusive flux of individual soil gas. Diffusive volume flux can be calculated from the measured concentration gradient with the following relationship:

$$F_{DM_i} = \frac{E_a^{10/3}}{E_T^2} D_{ai} \frac{dC_i}{dl} \tag{3}$$

where F_{DMi} = molar flux of constituent i, diffusing down the concentration gradient (i.e., towards lower concentration) in terms of moles per unit time per unit area perpendicular to the diffusive flow direction $[moles\ L^{-2}T^{-1}](g\text{-}moles\ cm^{-2}\ sec^{-1})$.

E_a = air filled porosity of porous medium $[L^3L^{-3}](-)$.

E_T = total (water free or dry) porosity of the medium $[L^3L^{-3}](-)$.

D_{ai} = free-air diffusion coefficient of constituent i $[L^2T^{-1}](cm^2sec^{-1})$.

C_i = concentration of constituent i in terms of moles per unit volume $[mole\ L^{-3}]$ $(g\text{-}mole\ cm^{-3})$.

4.3 ANALYSIS OF LABORATORY MEASUREMENTS

1. The overall evolution of gas will be calculated from the pressure measurements through use of the ideal gas law as follows:

$$p_1V_1 = n_1R^*T \tag{4}$$
$$\text{and } p_2V_2 = n_2R^*T \tag{5}$$

Brackets [ ] give dimensions were L = length, T = time, M = mass, and Θ = temperature.

Parentheses ( ) give example units.

where:

V = volume of gas in test jar $[L^3](cm^3)$.

n = number of moles of soil gas + inert atmosphere [moles] (g-moles).

R^* = universal gas constant of an ideal gas $[MT^{-2}L^2moles^{-1}\theta^{-1}]$ (erg $g\text{-}mole^{-1}K^{-1}$).

T = absolute temperature of the test jar atmosphere $[\theta](^\circ K)$.

Because the test jar contains a fixed volume, $V_1 = V_2 = V$. (6)

Equations 4, 5 and 6 are combined to develop the following relationship:

$$\frac{p_2}{p_1} = \frac{n_2}{n_1} \tag{7}$$

because the temperature is kept constant through use of an incubator.

The total gas volume V consists of two parts: the volume of pore spaces in the soil sample and the volume of jar outside the soil sample:

$$V = V_j - \left[\frac{\Pi D_s^2}{4h}(1 - E_a)\right]$$

Where V_j = total volume of test jar $[L^3](cm^3)$.

D_s = diameter of soil sample $[L^3](cm)$.

h = height or length of soil sample [L](cm).

Equation 4 can be solved for the initial number of moles of soil gas plus inert atmosphere, and combined with Equation 8 as follows:

$$n_1 = \frac{p_1\left\{V_i - \left[\frac{\Pi D_s^2}{4h}(1 - E_a)\right]\right\}}{R^* T} \tag{9}$$

where p_1 = 1 atmosphere to start $[ML^{-1}T^{-2}]$(cm of water column).

The change in number of moles can be found by combining Equations 7 and 9 as follows:

$$\Delta n = n_2 - n_1 = \left(\frac{p_2}{p_1} - 1\right) n_1$$

$$= \frac{(p_2 - p_1)}{R \cdot T}\left\{V_j - \left[\frac{\Pi D_s^2 (1 - E_a)}{4h}\right]\right\} \tag{10}$$

If the generation rate of gas is desired per unit time per unit weight (wet) of soil sample, then the following relation can be used:

$$G_M = \frac{\Delta n}{\Delta t\, V_s} \tag{11}$$

where G_M = soil gas generation rate (moles $L^{-3}T^{-1}$](g-mole $cm^{-3}sec^{-1}$).

Δt = time interval between measurements of pressure [T](sec).

V_s = overall volume of soil sample [L^3](cm^3).

$$V_s = \frac{\Pi D_s^2}{4h} \tag{12}$$

In terms of volume generation rate, the relation is:

$$G_V = \frac{\Delta n \beta}{\Delta t V_s} \tag{13}$$

Combining Equations 10, 12 and 13, we get the following:

$$G_v = \frac{4\beta h}{\Delta t \, \Pi D s^2} \frac{(p_2 - p_1)}{R * T} \left\{ V_j - \left[\frac{\Pi D s^2}{4h} (1 - E_a) \right] \right\} \tag{14}$$

5.0 SCHEDULE OF TESTS

1. Figure 8 provides a schedule of activities. As indicated, approximately 23 weeks will be required to complete the field activities and reporting requirements after approval of the TM and supporting documents.

6.0 AMENDMENTS TO QAPP AND FSAP TO REFLECT MODIFICATIONS

1. No QAPP or FSAP modifications are required to complete the SVE technology evaluation or the in-situ gas generation tests, since these procedures have already been provided in Appendix C of the Remedial Design (RD) Investigative Workplan.

2. The laboratory gas generation tests will be conducted using the methods indicated in Appendix C of the RD Investigative Workplan.

RPM APPROVAL STATUS:

BY: _____ **DATE:** _____

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

TABLE 1

PROPOSED SVE TESTING LOCATIONS

AREA	EXISTING VAPOR WELL NO.(6)	MONITORING INTERVAL (ft. bgs)	PROPOSED SVE TEST INTERVAL	COMMENTS
5	VW-51	5-8 13-18 23-30	√ (1) √	Well placed through impacted material at Brothers "considered high profile zone by EPA."
8	VW-49	5-10 15-18 25-30	√ √ √	Well outside of impacted area on edge of waste material. SVE trial of three zones.
7	VW-50	5-8 13-18 30-35	(2) (2) (2)	No analytical data available until 2/25/98. VW-50 well was installed as perimeter compliance well to monitor Area 7 sump.
7	VW-25	5-35 TBD(3) TBD(3)	√ √ √	Screened through all zones. Planned to be supplemented with a triple-completion vapor monitoring well.
2	VW-48	5-8 12-17 30-35	√ (4) √	Liquid present in well may be problematic. Area considered high profile by EPA because of liquids concerns. Activities may be implemented later in program, as additional field data is collected.(5)
2	VW-45	7.5-12.5 18.5-21.5 27-30	√ √	Liquid present in well may be problematic. Area considered high profile by EPA because of liquids concerns. Activities may be implemented later in program, as additional field data is collected.

94-256/TMs/TM#9(Rev. 1.0) (3/13/98/cl)

(1) This interval is excluded because its native air conductivity = 2E-10 cm/sec, which is too low to support SVE. Data is provided in Attachment B.
(2) This vapor monitoring well was dropped because it would potentially draw soil gas contaminants to the site boundary.
(3) These depths will be determined at time of installation of the triple-completion vapor monitoring well.
(4) This probe depth was excluded because it is completed in the waste zone.
(5) This area is considered analogous to PB/PW-2.
(6) See Figure 1 for locations.

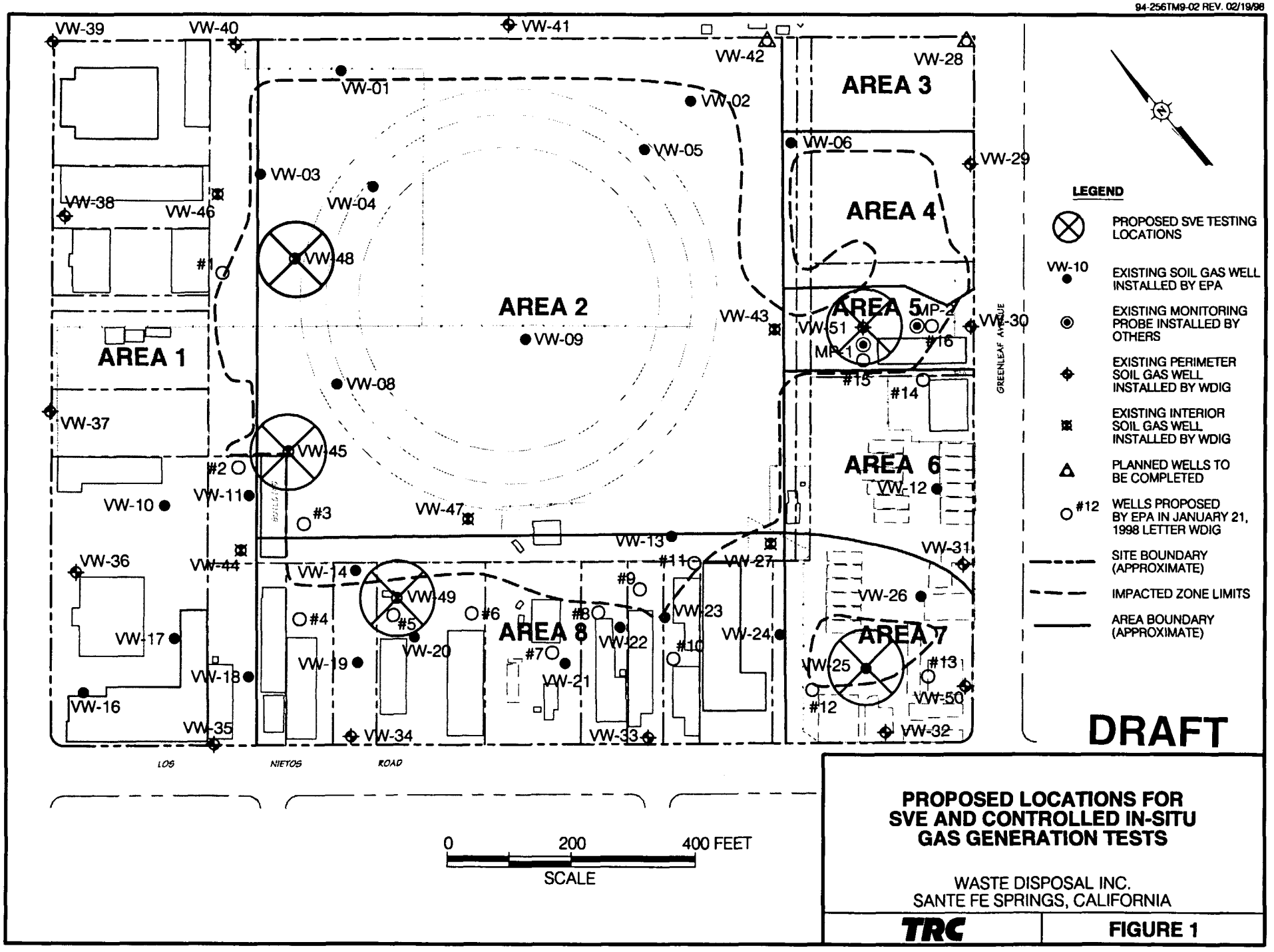
TABLE 2

SVE UNIT COMPONENT REQUIREMENTS
WASTE DISPOSAL, INC. SUPERFUND SITE

COMPONENT	REQUIREMENTS
Particulate Filter	Removal of Particulates > 200 µm
Blower System	100 scfm (at 6 inches of Mercury vacuum)
Catalytic oxidizer	Capable of chlorinated hydrocarbon and methane destruction > 99 percent Permitted in SCAQMD Region
Process Controls	Vacuum indicator/controller Discharge pressure indicator Discharge temperature indicator Process gas flow indicator VOC monitoring ports (inlet and outlet to catalytic oxidizer) Low flow limit switch Dilution air valve/controller High and low temperature shutoff control and temperature indicator for catalytic oxidizer
Acid Gas Neutralizer	Permitted in SCAQMD region to reduce acid gas emissions below 4 lbs/day
• Extraction Wells • Vacuum Monitoring/ Air Inlet Wells	Installed and screened such that appropriate subsurface zones are treated and/or monitored

94-256 TM/TM#9(Rev. 1.0) (3/13/98/cl)

94-256TM9-02 REV. 02/19/98



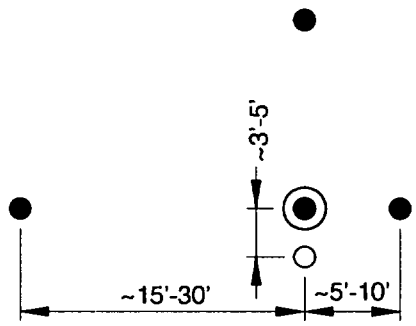
PROPOSED LOCATIONS FOR SVE AND CONTROLLED IN-SITU GAS GENERATION TESTS

WASTE DISPOSAL INC.
SANTE FE SPRINGS, CALIFORNIA

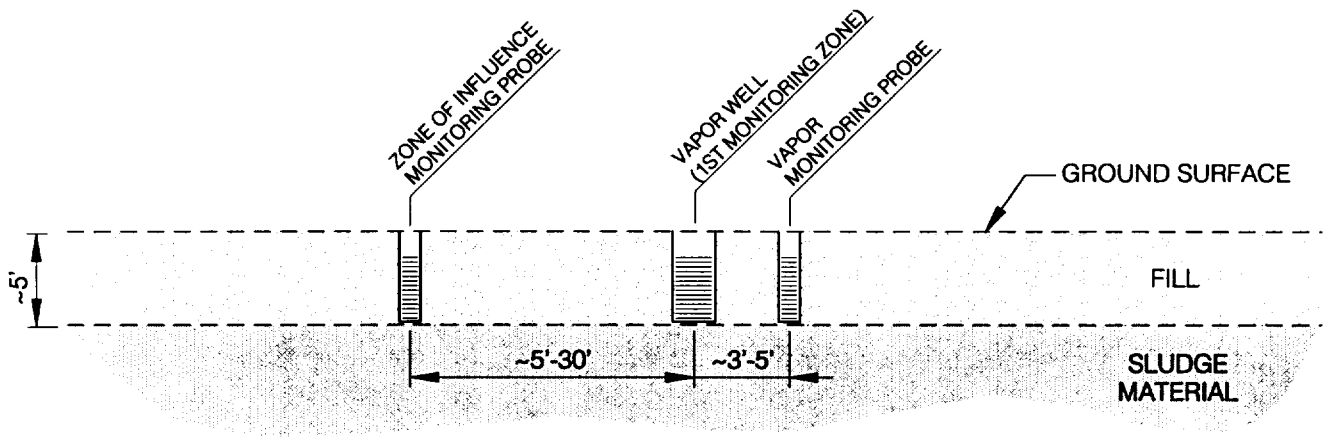
TRC

FIGURE 1

94-256TM9-07 3/13/98



PLAN VIEW



CROSS SECTION

0 20 40 FEET
SCALE

LEGEND

- VAPOR WELL
- AIR INJECTION VENT
- ZONE OF INFLUENCE MONITORING PROBE
- VAPOR MONITORING PROBE

DRAFT

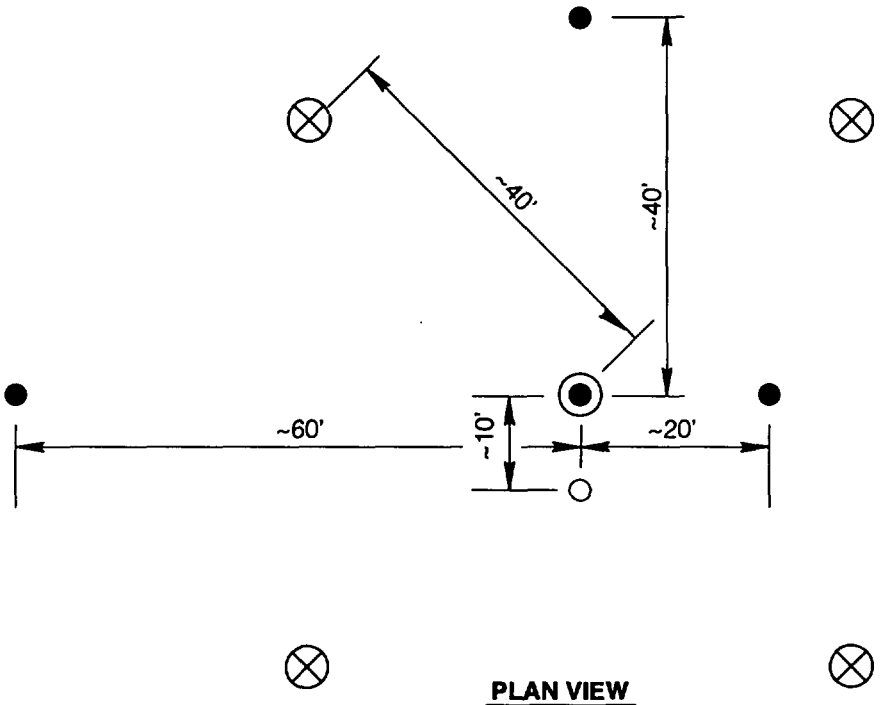
EXAMPLE SVE TEST WELL CONFIGURATION IN FILL LAYER

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

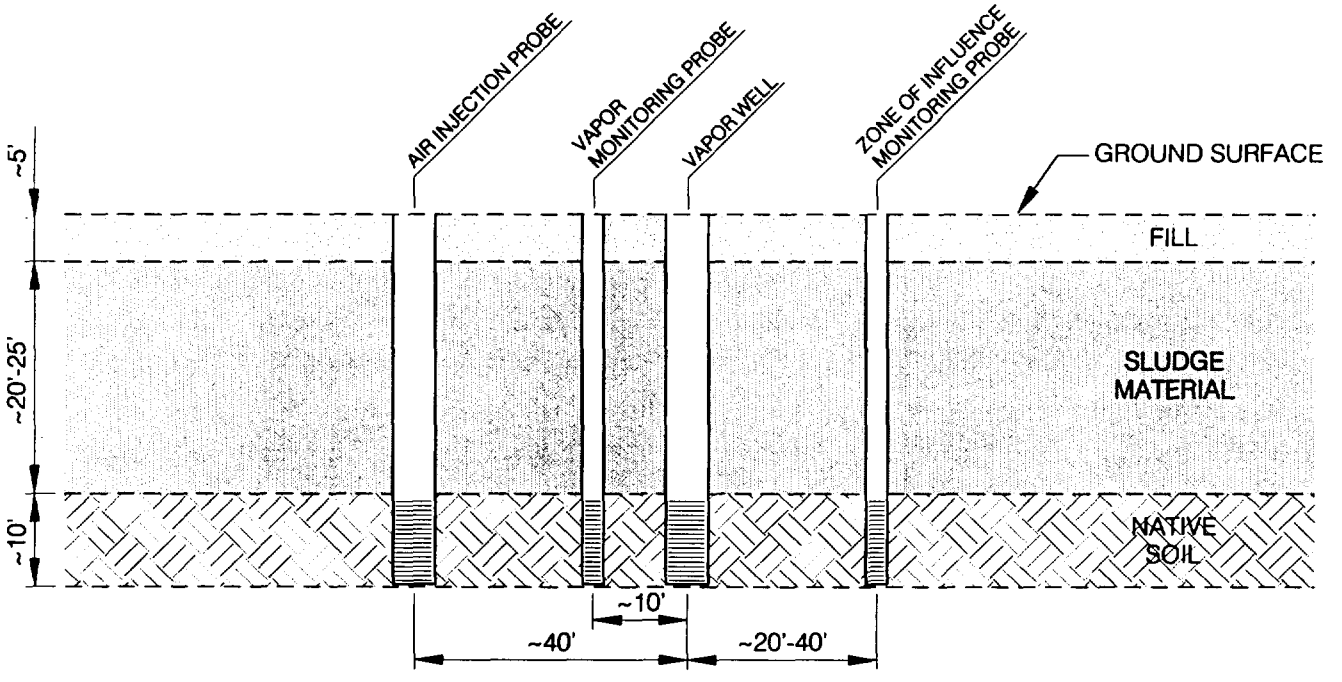
TRC

FIGURE 2

94-256TM9-03 3/13/98



PLAN VIEW



CROSS SECTION

0 20 40 FEET
SCALE

LEGEND

- VAPOR WELL
- AIR INJECTION VENT
- ZONE OF INFLUENCE MONITORING PROBE
- VAPOR MONITORING PROBE

DRAFT

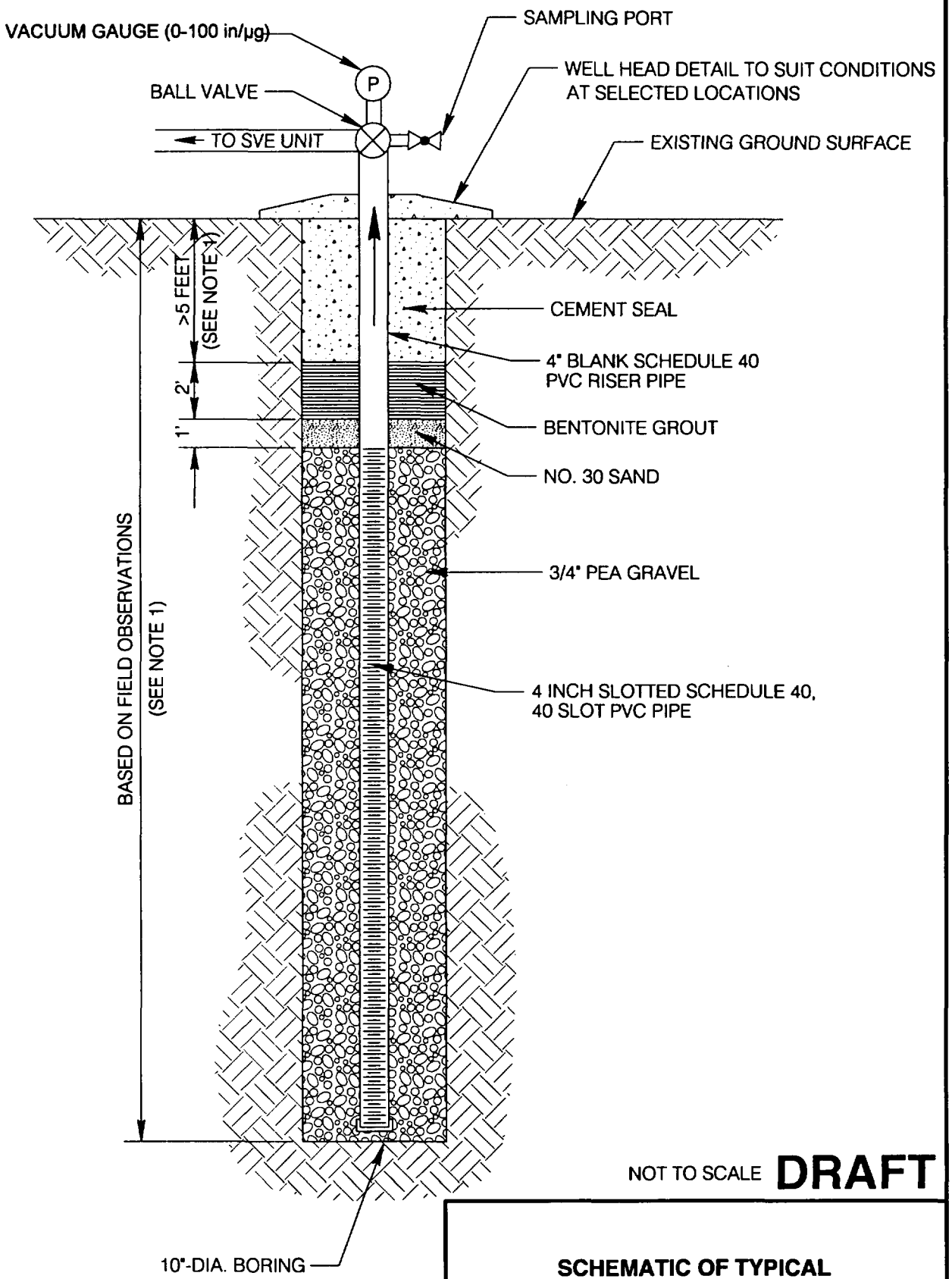
EXAMPLE SVE TEST WELL CONFIGURATION IN THE NATIVE SOIL BENEATH THE SLUDGE MATERIAL LAYER

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3

94-256TM9-04 02/18/98



NOT TO SCALE **DRAFT**

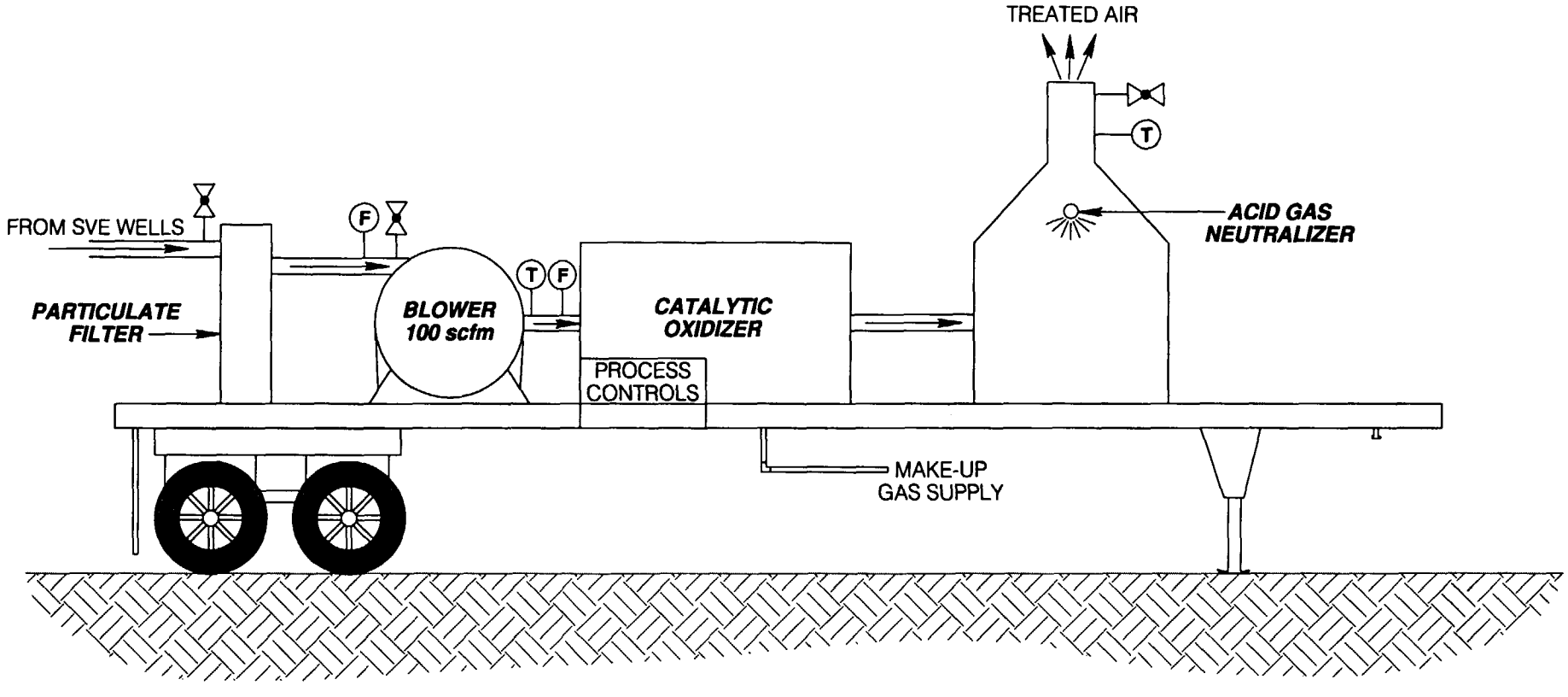
SCHEMATIC OF TYPICAL SVE TEST WELL CONSTRUCTION

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

(1) THE DEPTH OF THIS SEAL AND SCREENED INTERVAL WILL BE DETERMINED ON A WELL BY WELLBASIS BASED ON ENCOUNTERED LITHOLOGY.

TRC | FIGURE 4

94-256TM9-05 3/13/98



NOT TO SCALE **DRAFT**

LEGEND

- (F) FLOWMETER
- (T) TEMPERATURE PROBE
- SAMPLE PORT

NOTE: FOR SPECIFICATIONS SEE TABLE 2.

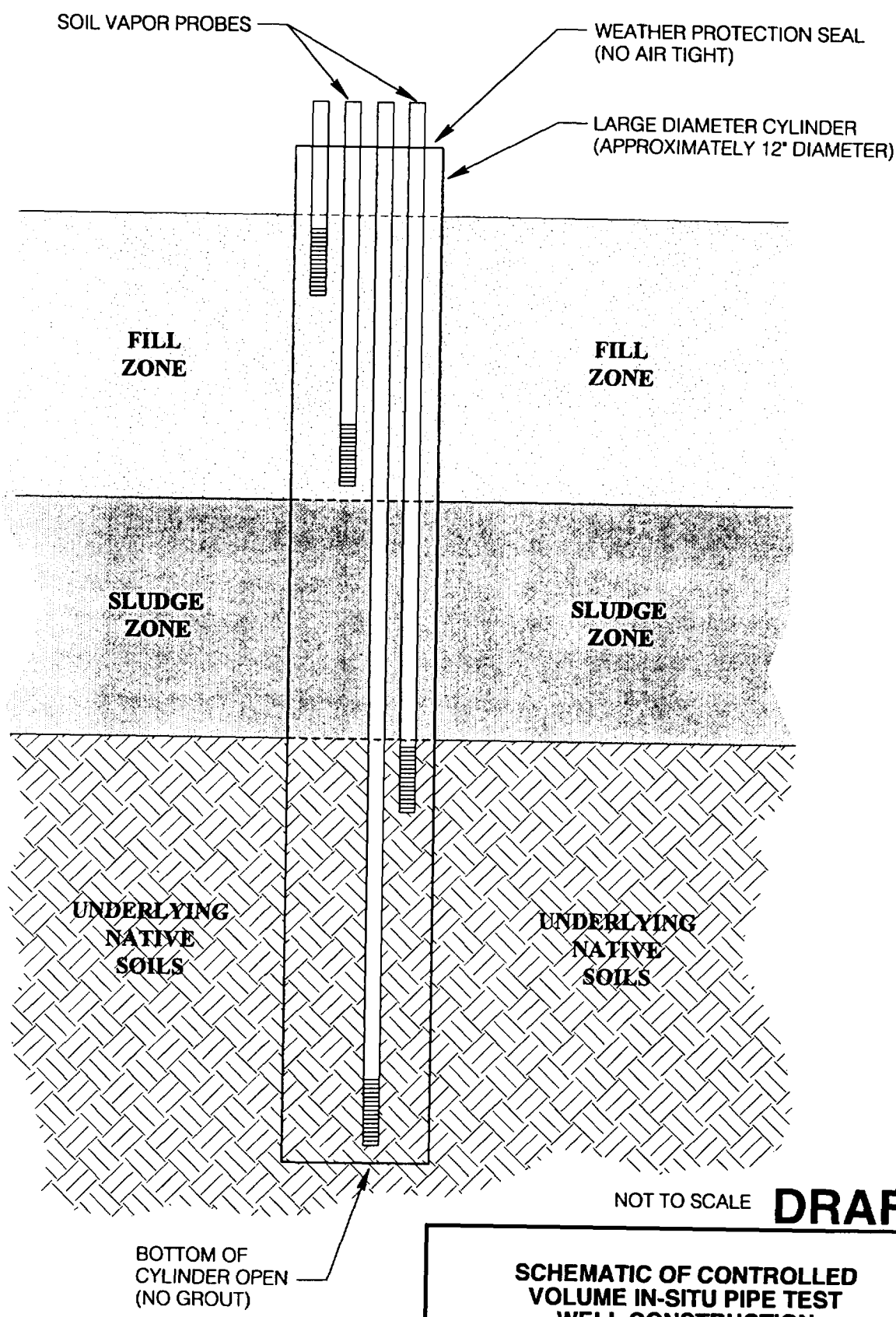
SCHEMATIC OF TYPICAL SVE TEST EQUIPMENT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 5

94-256TM9-06 REV. 3/13/98



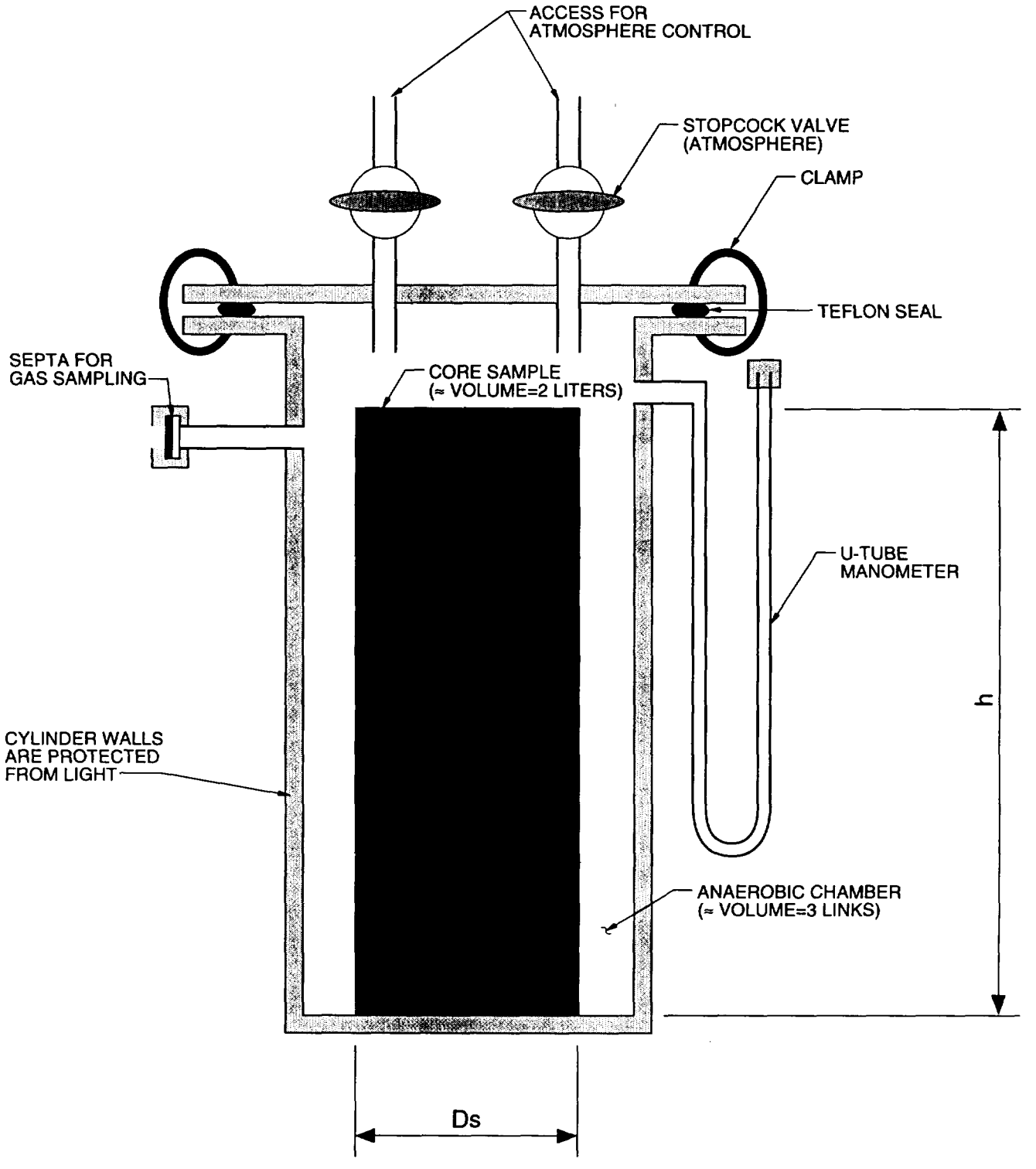
NOT TO SCALE **DRAFT**

SCHEMATIC OF CONTROLLED VOLUME IN-SITU PIPE TEST WELL CONSTRUCTION

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 6**

94-256TM9-01 REV.3/13/98



DRAFT

SCHEMATIC OF LABORATORY TEST EQUIPMENT

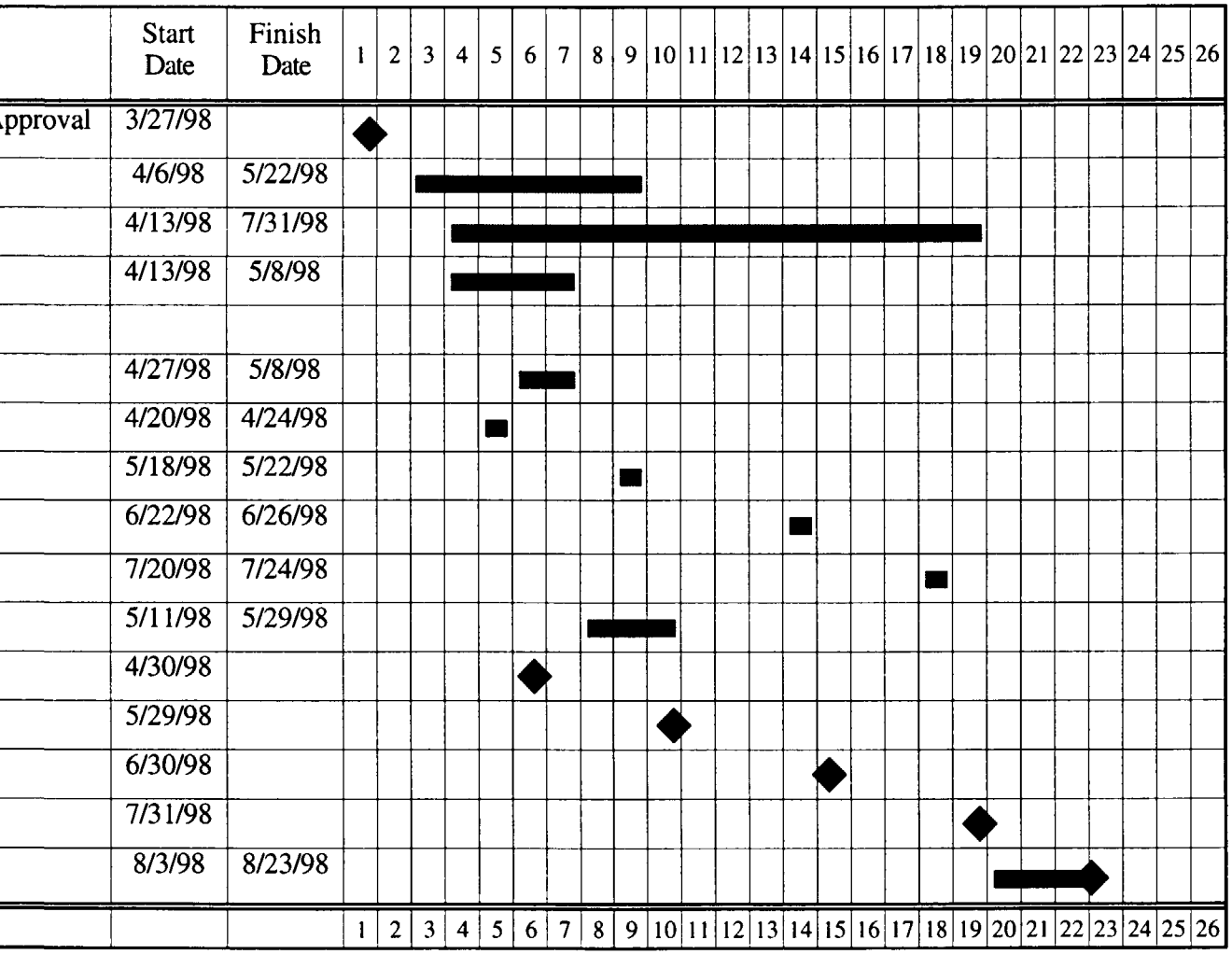
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 7

FIGURE 8

GAS PARAMETER TEST SCHEDULE (IN WEEKS)
WASTE DISPOSAL, INC. SUPERFUND SITE

TASK	Start Date	Finish Date
1. Gas Parameter Test Workplan Approval	3/27/98	
2. SVE Tests	4/6/98	5/22/98
3. In-Situ Tests	4/13/98	7/31/98
4. Laboratory Tests	4/13/98	5/8/98
5. Results Analysis		
5.1 SVE Tests	4/27/98	5/8/98
5.2 In-Situ Tests	4/20/98	4/24/98
	5/18/98	5/22/98
	6/22/98	6/26/98
	7/20/98	7/24/98
5.3 Laboratory Tests	5/11/98	5/29/98
6.0 Interim Reports	4/30/98	
	5/29/98	
	6/30/98	
	7/31/98	
7. Final Report of Findings	8/3/98	8/23/98



Rev. 1.0,

DRAFT

Mar 13, 1998

ATTACHMENT A

OVERVIEW OF EXISTING VAPOR WELL DATA
(TO BE PROVIDED)

TRC

ATTACHMENT B

CALCULATIONS
(TO BE PROVIDED)

TRC

ATTACHMENT C

SCAQMD RULE 441

TRC

(Adopted May 7, 1976)

RULE 441. RESEARCH OPERATIONS

The provisions of Regulation IV except Rule 402 shall not apply to experimental research operations when the following requirements are met:

(a) The purpose of the operation is to permit investigation, experiment, or research to advance the state of knowledge or the state of the art; and

(b) The Air Pollution Control Officer has given written prior approval which shall include limitation of time.

The Air Pollution Control Officer shall not grant approval unless the operation is conducted in a manner to minimize emissions into the atmosphere to the maximum extent possible.

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APPENDIX E

SEPTIC TANK PERMITTING DOCUMENTATION

76A642D
S & E-663 3-55

APPLICATION FOR PERMIT

SEWER—SEWAGE DISPOSAL

1

DIVISION OF BUILDING AND SAFETY
Department of County Engineer
County of Los Angeles
WM. J. FOX, COUNTY ENGINEER
CASSATT D. GRIFFIN, SUP'T OF BUILDING

BUILDING ADDRESS 9951 Greenleaf
LOCALITY S. W. Whittier
NEAREST CROSS ST. Los Nietos
OWNER Whittier Area Dis.
MAIL ADDRESS same
CITY TEL. NO.

DISTRICT NO. 11 GROUP G MAP BK PG

FOR APPLICANT TO FILL IN

LEGAL DESCRIPTION LOT NO. M + B.
BLOCK TRACT
SIZE OF LOT NO. OF BLDGS. NOW ON LOT 3
USE OF BUILDINGS shop.
CONTRACTOR H. C. Nogle & Sons Inc.
ADDRESS 12025 Front St.
CITY Norwalk TEL. NO.
REGISTRATION NO. 245679 ☒ STATE ☐ COUNTY

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER	@ $ 3.50		
	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	1.00		
	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	1.00		
	ALTER OR REPAIR EXISTING SEWER OR DISPOSAL SYSTEM	1.00		
	DISCONNECT AND ABANDON SEWER AND/OR DISPOSAL SYSTEM	1.00		
	SEPTIC TANK, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	3.00		
1	CESSPOOL - DRYWELL SPECIAL CONDITIONS ONLY	2.00	2	00
	PERMIT	$	1	00
	TOTAL FEE		3	00

OWNER'S AUTHORIZATION

I HAVE THIS DATE CONTRACTED WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER

SIGNED THIS _____ DAY OF _____ 19__

OWNER OR OWNERS AGENT _____

ADDRESS _____

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE ABOVE IS CORRECT AND AGREE TO COMPLY WITH ALL COUNTY ORDINANCES AND STATE LAWS REGULATING PLUMBING AND SEWERS.

I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND/OR LICENSED AS REQUIRED BY LOS ANGELES COUNTY AND STATE OF CALIFORNIA OR THAT I AM THE LEGAL OWNER OF THE ABOVE DESCRIBED RESIDENTIAL PROPERTY.

SIGNATURE OF PERMITTEE Vernon Nogle

CONNECTION DATA

STATION DEPTH
MANHOLE REFERENCE UPPER LOWER
Y. TYPE OF CONNECTION CURB P.L. LENGTH FROM M.L. TO P.L.
CO. IMP. NO. P. C. NO. JOB NO.
TRUNK PERMIT NO. ROAD PERMIT NO.
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL
CHARGES
CONNECTION CHARGE FEE
REIMBURSEMENT FEE

APPROVALS	DATE	INSPECTOR'S SIGNATURE
NEW HOUSE SEWER	11-14-57	[signature]
CONNECT ADDITIONAL BUILDING OR WORK		
SEPTIC TANK, SEEP. PIT(S) AND/OR DRAINFIELD		
CESSPOOL ☐ DRYWELL ☐		
ALTER, REPAIR, SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP. PIT(S) ☐ CESSPOOLS ☐		

WILLIAM J. FOX, COUNTY ENGINEER VALIDATION R. A. WOOD, CHIEF PLBG. INSPECTOR

LAC 51425 FEB 13 4 3.00

(2)

CITY OF SANTA FE SPRINGS

76A642D
S & E-663 11-55

APPLICATION FOR PERMIT

DIVISION OF BUILDING AND SAFETY
Department of County Engineer
County of Los Angeles
JOHN A. LAMBIE, COUNTY ENGINEER
CASSATT D. GRIFFIN, SUP'T OF BUILDING

SEWER—SEWAGE DISPOSAL 1

BUILDING ADDRESS 9943 Greenleaf
LOCALITY Santa Fe Springs
NEAREST CROSS ST. Los Nietos
OWNER W. T. Carter
MAIL ADDRESS same
CITY TEL. NO.

FOR APPLICANT TO FILL IN

LEGAL DESCRIPTION LOT NO. M+B Par 45
BLOCK TRACT
SIZE OF LOT NO. OF BLDGS. NOW ON LOT 6
USE OF BUILDINGS shop
CONTRACTOR H. W. Nogle & Bros
ADDRESS 12025 Front St
CITY Norwalk TEL. NO.
REGISTRATION NO. 145678 ☐ STATE ☐ COUNTY

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER	@ $ 3.00		
	SEPTIC TANK, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	@ $ 3.00		
1	OVERFLOW SEEPAGE PIT, DRAINFIELD EXTN., CESSPOOL, DRYWELL ~~MANHOLE~~	@ $ 2.00	2	—
	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	@ $ 1.00		
	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	@ $ 1.00		
	ALTER, REPAIR OR ABANDON HOUSE SEWER OR DISPOSAL SYSTEM	@ $ 1.00		

OWNER'S AUTHORIZATION			
	PERMIT	$ 2	00
	TOTAL FEE	2	—

I HAVE AT THIS DATE A CONTRACT WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER.

SIGNED THIS _____ DAY OF _____ 19__
OWNER OR OWNERS AGENT _____
ADDRESS _____

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE ABOVE IS CORRECT AND AGREE TO COMPLY WITH ALL COUNTY ORDINANCES AND STATE LAWS REGULATING PLUMBING AND SEWERS.

I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND/OR LICENSED AS REQUIRED BY LOS ANGELES COUNTY AND STATE OF CALIFORNIA OR THAT I AM THE LEGAL OWNER OF THE ABOVE DESCRIBED RESIDENTIAL PROPERTY.

SIGNATURE OF PERMITTEE Vernon Nogle

DISTRICT NO. 4.06 GROUP I MAP BK PG

CONNECTION DATA

STATION DEPTH
MANHOLE REFERENCE UPPER LOWER
TYPE OF CONNECTION Y. CURB P.L. LENGTH FROM M.L. TO P.L.
CO. IMP. NO. P. C. NO. JOB NO.
TRUNK PERMIT NO. ROAD PERMIT NO.
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL

CHARGES
CONNECTION CHARGE FEE
REIMBURSEMENT FEE

APPROVALS	DATE	INSPECTOR'S SIGNATURE
NEW HOUSE SEWER		
CONNECT ADDITIONAL BUILDING OR WORK		
SEPTIC TANK, SEEP, PIT(S) AND/OR DRAINFIELD		
CESSPOOL ☐ DRYWELL ☐		
ALTER, REPAIR, SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP. PIT(S) ☐ CESSPOOLS ☐	12/12/58	[signature]

JOHN A. LAMBIE, COUNTY ENGINEER VALIDATION ROBERT A. WOOD, CHIEF PLBG. INSPECTOR

CK. M. O. CASH
LACo 1136 58 DEC 11 10 C 4.00 58

[signature]

REQUIRED INFORMATION

1. INDICATE ALL BUILDINGS ON PROPERTY.
2. INDICATE AND DIMENSION SEWAGE DISPOSAL SYSTEM WITH TIE DISTANCES TO BUILDINGS AND PROPERTY LINES.
3. INDICATE SIZE OF SEPTIC TANK—DEPTH OF SEEPAGE PIT(S)—SIZE OF CESSPOOL(S).
4. INDICATE NORTH DIRECTION ON PLOT.
5. INDICATE BOTH STREETS IF CORNER.

FIELD NOTES

3

CITY OF SANTA FE SPRINGS

76A642D
S & E-663 11-55

APPLICATION FOR PERMIT

DIVISION OF BUILDING AND SAFETY — **SEWER—SEWAGE DISPOSAL** 1

Department of County Engineer
County of Los Angeles
JOHN A. LAMBIE, COUNTY ENGINEER
CASSATT D. GRIFFIN, SUP'T OF BUILDING

BUILDING ADDRESS: 9925 1/2 So. Greenleaf
LOCALITY: Santa Fe Springs
NEAREST CROSS ST.: Los Nietoes Rd
OWNER: D. L. Carter
MAIL ADDRESS: 8306 Ocean View
CITY: Whittier TEL. NO. OX 35079

DISTRICT NO.	GROUP	MAP BK	PG
4.05	G		

FOR APPLICANT TO FILL IN

LEGAL DESCRIPTION — LOT NO. Legal on File
BLOCK — TRACT
SIZE OF LOT — NO. OF BLDGS. NOW ON LOT
USE OF BUILDINGS
CONTRACTOR: Don A. Moore
ADDRESS: 12609 E. Foxley Dr
CITY: Whittier TEL. NO. OX 61761
REGISTRATION NO. 98994 — ☒ STATE ☐ COUNTY

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER	@ $ 3.50		
	SEPTIC TANK, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	@ $ 3.00		
	OVERFLOW SEEPAGE PIT, DRAINFIELD EXTN., CESSPOOL, DRYWELL, MANHOLE	@ $ 2.00		
1	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	@ $ 1.00	1	—
	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	@ $ 1.00		
	ALTER, REPAIR OR ABANDON HOUSE SEWER OR DISPOSAL SYSTEM	@ $ 1.00		

OWNER'S AUTHORIZATION			
	PERMIT	$	1 00
	TOTAL FEE		2 —

I HAVE AT THIS DATE A CONTRACT WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER.

SIGNED THIS _____ DAY OF _____ 19__
OWNER OR OWNERS AGENT _____
ADDRESS _____

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE ABOVE IS CORRECT AND AGREE TO COMPLY WITH ALL COUNTY ORDINANCES AND STATE LAWS REGULATING PLUMBING AND SEWERS.

I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND/OR LICENSED AS REQUIRED BY LOS ANGELES COUNTY AND STATE OF CALIFORNIA OR THAT I AM THE LEGAL OWNER OF THE ABOVE DESCRIBED RESIDENTIAL PROPERTY.

SIGNATURE OF PERMITTEE: Don A. Moore

CONNECTION DATA

STATION — DEPTH
MANHOLE REFERENCE — UPPER / LOWER
TYPE OF CONNECTION Y. CURB P.L. — LENGTH FROM M.L. TO P.L.
CO. IMP. NO. — P. C. NO. JOB NO.
TRUNK PERMIT NO. — ROAD PERMIT NO.
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL

CHARGES
CONNECTION CHARGE FEE
REIMBURSEMENT FEE

APPROVALS	DATE	INSPECTOR'S SIGNATURE
NEW HOUSE SEWER	4/22/58	[signature]
CONNECT ADDITIONAL BUILDING OR WORK		
SEPTIC TANK, SEEP, PIT(S) AND/OR DRAINFIELD		
CESSPOOL ☐ DRYWELL ☐		
ALTER, REPAIR, SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP. PIT(S) ☐ CESSPOOLS ☐		

JOHN A. LAMBIE, COUNTY ENGINEER — VALIDATION — ROBERT A. WOOD, CHIEF PLBG. INSPECTOR

CK M.O. CASH
LA Co 49328 APR 21 4 C 2.00

D. B[illegible]

CITY OF SANTA FE SPRINGS

(4) 1

76A 642D – CE808 – 9/73

APPLICATION FOR PERMIT

COUNTY OF LOS ANGELES
DEPARTMENT OF COUNTY ENGINEER
BUILDING AND SAFETY DIVISION

SEWER–SEWAGE DISPOSAL

BUILDING ADDRESS 9929 Greenleaf
LOCALITY SFS
NEAREST CROSS ST. Los Nitos
OWNER
MAIL ADDRESS
CITY TEL. NO.

DISTRICT NO.	GROUP	MAP BK	MAP PS	PROCESSED BY
405				Hoop

FOR APPLICANT TO FILL IN

LEGAL DESCRIPTION LOT NO.
BLOCK TRACT
SIZE OF LOT NO. OF BLDGS. NOW ON LOT
USE OF BUILDINGS
CONTRACTOR Joes Plumbing
ADDRESS 15405 Calverton Dr.
CITY La Mirada TEL. NO. 5228733
STATE LICENSE NO. 295282 LIC CLASS

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER	@ $7.00		
	SEPTIC TANK, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	@ $10.00		
	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	@ $3.00		
1	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	@ $3.00	3	00
	OVERFLOW SEEPAGE PIT, DRAINFIELD EXTN., CESSPOOL, DRYWELL	@ $5.00		
1	ALTER, REPAIR OR ABANDON HOUSE SEWER OR DISPOSAL SYSTEM	@ $3.00	3	00
	MANHOLE	@ $7.00		

OWNER'S AUTHORIZATION			
PERMIT	$	3	00
TOTAL FEE		9	00

I HAVE AT THIS DATE A CONTRACT WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER.

SIGNED THIS _____ DAY OF _____ 19___

OWNER OR OWNERS AGENT _____

ADDRESS _____

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE ABOVE IS CORRECT AND AGREE TO COMPLY WITH ALL COUNTY ORDINANCES AND STATE LAWS REGULATING PLUMBING AND SEWERS.

I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND/OR LICENSED AS REQUIRED BY LOS ANGLES COUNTY AND STATE OF CALIFORNIA OR THAT I AM THE LEGAL OWNER OF, AND INTEND TO RESIDE IN, THE ABOVE DESCRIBED RESIDENTIAL PROPERTY.

SIGNATURE OF PERMITTEE Joseph Zipp

CONNECTION DATA

STATION DEPTH
MANHOLE REFERENCE UPPER / LOWER
TYPE OF CONNECTION Y. CURB P.L. LENGTH FROM M.L. TO P.L.
CO. IMP. NO. P.C. NO. JOB NO.
TRUNK PERMIT NO. ROAD PERMIT NO.

AFFIDAVIT	WAIVER	EASEMENT	RECORD. INSTR. NO.	DATE

HWY. OR ST. WIDENING
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL

CHARGES

CONNECTION CHARGE FEE
REIMBURSEMENT FEE

APPROVALS	DATE	INSPECTOR'S SIGNATURE
NEW HOUSE SEWER		
CONNECT ADDITIONAL BUILDING OR WORK	1-15	Cano
SEPTIC TANK, SEEP. PIT(S) AND/OR DRAINFIELD		
CESSPOOL ☐ DRYWELL ☐		
ALTER. REPAIR. SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP. PIT(S) ☐ CESSPOOLS ☐		

INSPECTOR COPY

Plan over

VALIDATION CK. M.O. CASH

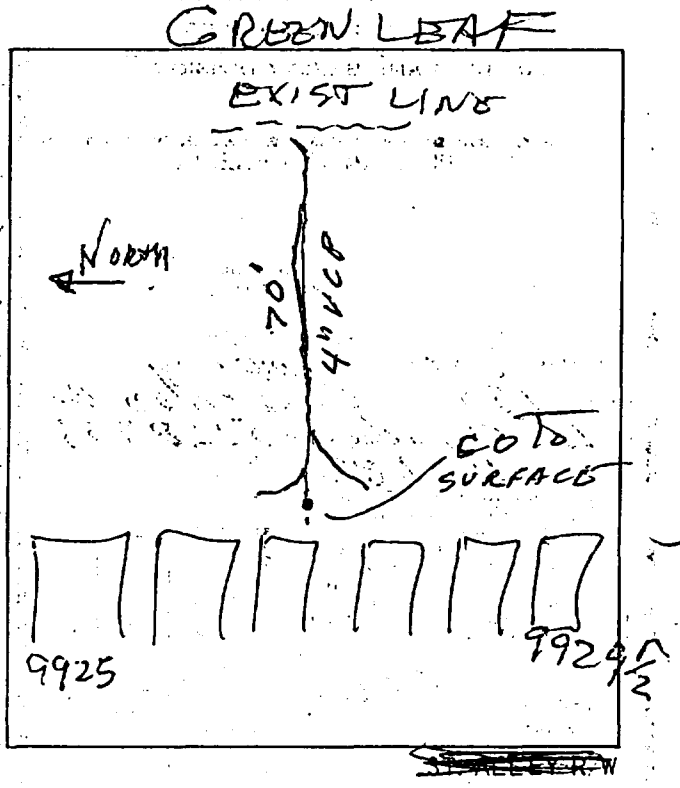
NC 091-9 76 JAN 14 10 9.00

Hoop

FOR DEPARTMENT USE

REQUIRED INFORMATION

1. INDICATE ALL BUILDINGS ON PROPERTY.
2. INDICATE AND DIMENSION SEWAGE DISPOSAL SYSTEM WITH TIE DISTANCES TO BUILDINGS AND PROPERTY LINES.
3. INDICATE SIZE OF SEPTIC TANK-DEPTH OF SEEPAGE PIT(S)-SIZE OF CESSPOOL(S).
4. INDICATE NORTH DIRECTION ON PLOT.
5. INDICATE BOTH STREETS IF CORNER.



9929-29½, 31

GREENLEAF

FIELD NOTES

(4)

76A642D
B & E-683 3-55

APPLICATION FOR PERMIT

(3) 1

DIVISION OF BUILDING AND SAFETY

Department of County Engineer
County of Los Angeles
WM. J. FOX, COUNTY ENGINEER
CASSATT D. GRIFFIN, SUP'T OF BUILDING

SEWER—SEWAGE DISPOSAL

BUILDING ADDRESS 9923 Greenleaf
LOCALITY S. W. Whittier
NEAREST CROSS ST. Los Nietos Rd.
OWNER Whittier Area Dis.
MAIL ADDRESS same
CITY TEL. NO.

DISTRICT NO. 11 | GROUP 6 | MAP BK PG

FOR APPLICANT TO FILL IN

LEGAL DESCRIPTION LOT NO. On Site
BLOCK TRACT
SIZE OF LOT NO. OF BLDGS. NOW ON LOT 3
USE OF BUILDINGS shop
CONTRACTOR H. O. Noyle Ferns Inc
ADDRESS 12025 Front St
CITY Norwalk TEL. NO.
REGISTRATION NO. 145679 ☐ STATE ☐ COUNTY

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER	@ $ 3.50		
1	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	1.00	1	00
	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	1.00		
	ALTER OR REPAIR EXISTING SEWER OR DISPOSAL SYSTEM	1.00		
	DISCONNECT AND ABANDON SEWER AND/OR DISPOSAL SYSTEM	1.00		
1	SEPTIC TANK, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	2.00	2	00
	CESSPOOL - DRYWELL SPECIAL CONDITIONS ONLY	2.00		

OWNER'S AUTHORIZATION

PERMIT $ 1 00
TOTAL FEE 4 00

I HAVE THIS DATE CONTRACTED WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER.

SIGNED THIS _____ DAY OF _____ 19__

OWNER OR OWNERS AGENT _____

ADDRESS _____

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE ABOVE IS CORRECT AND AGREE TO COMPLY WITH ALL COUNTY ORDINANCES AND STATE LAWS REGULATING PLUMBING AND SEWERS.

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SIGNATURE OF PERMITTEE Vernon Noyle

CONNECTION DATA

STATION DEPTH
MANHOLE REFERENCE UPPER LOWER
Y. TYPE OF CONNECTION CURB P.L. LENGTH FROM M.L. TO P.L.
CO. IMP. NO. P. C. NO. JOB NO.
TRUNK PERMIT NO. ROAD PERMIT NO.
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL
CHARGES
CONNECTION CHARGE FEE
REIMBURSEMENT FEE

APPROVALS	DATE	INSPECTOR'S SIGNATURE
NEW HOUSE SEWER		
CONNECT ADDITIONAL BUILDING OR WORK		
SEPTIC TANK, SEEP. PIT(S) AND/OR DRAINFIELD	8/3/55	[illegible]
CESSPOOL ☐ DRYWELL ☐		
ALTER, REPAIR, SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP. PIT(S) ☐ CESSPOOLS ☐		

WILLIAM J. FOX, COUNTY ENGINEER — VALIDATION — R. A. WOOD, CHIEF PLBG. INSPECTOR

AC 9590 JUL 15 4 4.00

[signature]

REQUIRED INFORMATION

1. INDICATE ALL BUILDINGS ON PROPERTY.
2. INDICATE AND DIMENSION SEWAGE DISPOSAL SYSTEM WITH TIE DISTANCES TO BUILDINGS AND PROPERTY LINES.
3. INDICATE SIZE OF SEPTIC TANK—DEPTH OF SEEPAGE PIT(S)—SIZE OF CESSPOOL(S).
4. INDICATE NORTH DIRECTION ON PLOT.
5. INDICATE BOTH STREETS IF CORNER.

ST. ALLEY R/W

9923 -23 1/4, 23 1/2, 23 3/4

GREENLEAF

FIELD NOTES

(5)

DEPARTMENT OF COUNTY ENGINEER
DIVISION OF BUILDING AND SAFETY
COUNTY OF LOS ANGELES
WILLIAM J. FOX, COUNTY ENGINEER

SEWER—SEWAGE DISPOSAL (2) PERMIT APPLICATION

1

FOR APPLICANT TO FILL IN

BUILDING ADDRESS 9917½ Greenleaf
LOCALITY S.W. Whittier
NEAREST CROSS ST. Los Nietos Rd.
OWNER Whittier Area Dis.
MAIL ADDRESS same
CITY TEL. NO.
CONTRACTOR H. D. Noyle & Sons Inc.
ADDRESS 12025 Front St.
CITY Norwalk TEL. NO.
REGISTRATION NO. 145679 ☐ STATE ☐ COUNTY
LEGAL DESCRIPTION LOT NO.
BLOCK TRACT
SIZE OF LOT NO. OF BLDGS. NOW ON LOT 2
USE OF BUILDINGS shop

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER	@ $ 3.50		
1	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	1.00	1	00
	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	1.00		
	ALTER OR REPAIR EXISTING SEWER OR DISPOSAL SYSTEM	1.00		
	DISCONNECT AND ABANDON SEWER AND/OR DISPOSAL SYSTEM	1.00		
1	SEPTIC TANK, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	2.00	2	00
	CESSPOOL—DRYWELL SPECIAL CONDITIONS ONLY	2.00		

OWNERS AUTHORIZATION			
	PERMIT	$ 1	00
	TOTAL FEE	4	00

I HAVE THIS DATE CONTRACTED WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER

SIGNED THIS _____ DAY OF _____ 19__

OWNER OR OWNERS AGENT _____

ADDRESS _____

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SIGNATURE OF PERMITTEE Vernon Noyle

76A642D S&E 663 4/54

BUILDING ADDRESS 9917½ S Greenleaf
LOCALITY
NEAREST CROSS ST.

DISTRICT NO.	Ready for Inspection	PERMIT NO.
11		40294 S

RECEIVED BY	DATE	ISSUED BY	DATE
		Matthews	1/27/55

USE ZONE	OCCUPANCY	MAP BK	MAP PG
M2	G.	—	

CO. IMP. NO.
JOB. NO.
TRUNK PERMIT NO.
ROAD PERMIT NO.
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL

CHARGES

CONNECTION CHARGE FEE
REIMBURSEMENT FEE

RECEIPT NO.	DATE	BY

EXCEPTION RECORDED

NO.	DATE	BY

CONNECTION DATA

STATION DEPTH

MANHOLE REFERENCE UPPER LOWER

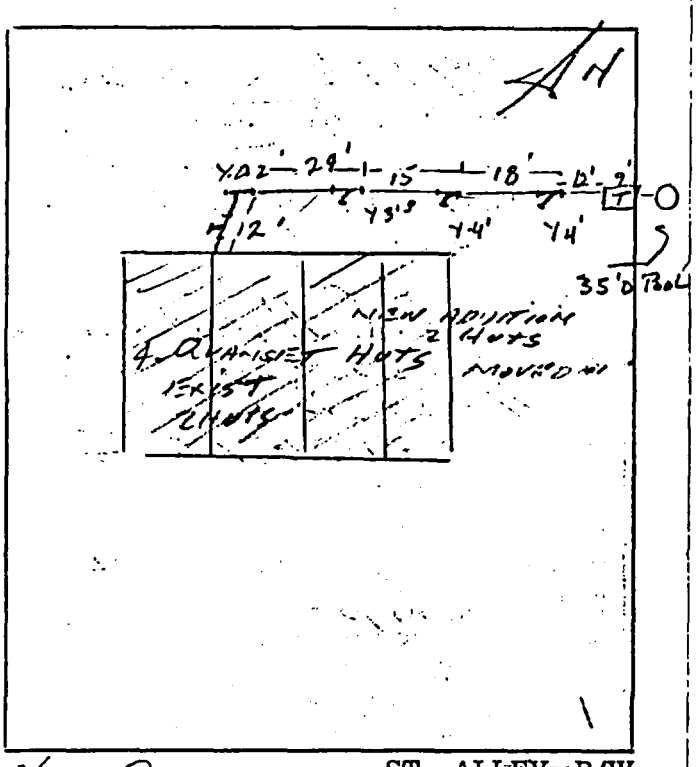
TYPE OF CONNECTION Y. CURB P.L. LENGTH FROM M.L. TO P.L.

APPROVALS	INSPECTOR'S SIGNATURE	DATE
NEW HOUSE SEWER		
CONNECT ADDITIONAL BUILDING OR WORK		
SEPTIC TANK, SEEP. PIT(S) AND/OR DRAINFIELD	[illegible]	1-27-55
CESSPOOL ☐ DRYWELL ☐		
ALTER, REPAIR, SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP. PIT(S) ☐ CESSPOOLS ☐		

FOR DEPARTMENT USE

REQUIRED INFORMATION

1. INDICATE ALL BUILDINGS ON PROPERTY.
2. INDICATE AND DIMENSION SEWAGE DISPOSAL SYSTEM WITH TIE DISTANCES TO BUILDINGS AND PROPERTY LINES.
3. INDICATE SIZE OF SEPTIC TANK—DEPTH OF SEEPAGE PIT(S)—SIZE OF CESSPOOL(S)
4. INDICATE NORTH DIRECTION ON PLOT.
5. INDICATE BOTH STREETS IF CORNER.



9917½ - Greenleaf. ST. ~~ALLEY R~~/W

LEGAL DESCRIPTION

9917, 17½, 19, 19½, 21, 21½
GREENLEAF

FIELD NOTES

DEPARTMENT OF COUNTY ENGINEER
DIVISION OF BUILDING AND SAFETY
COUNTY OF LOS ANGELES
WILLIAM J. FOX, COUNTY ENGINEER

SEWER—SEWAGE DISPOSAL PERMIT APPLICATION

1

FOR APPLICANT TO FILL IN

BUILDING ADDRESS 9905 Greenleaf
LOCALITY S.G. Lutter
NEAREST CROSS ST. Rivera Rd.
OWNER Carter
MAIL ADDRESS same
CITY TEL. NO.
CONTRACTOR H.D. Mott & Son
ADDRESS 12025 Florence Ave
CITY Norwalk TEL. NO.
REGISTRATION NO. 126832 ☐ STATE ☐ COUNTY
LEGAL DESCRIPTION LOT NO.
BLOCK TRACT
SIZE OF LOT NO. OF BLDGS. NOW ON LOT
USE OF BUILDINGS Shop

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER @ $	3.50		
1	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	1.00	1	00
	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	1.00		
	ALTER OR REPAIR EXISTING SEWER OR DISPOSAL SYSTEM	1.00		
	DISCONNECT AND ABANDON SEWER AND/OR DISPOSAL SYSTEM	1.00		
1	SEPTIC TANK, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	2.00		
	CESSPOOL—DRYWELL SPECIAL CONDITIONS ONLY	2.00		

OWNERS AUTHORIZATION			
	PERMIT $	1	00
	TOTAL FEE	4	00

I HAVE THIS DATE CONTRACTED WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER

SIGNED THIS ..... DAY OF ..... 19 ....

OWNER OR OWNERS AGENT .....

ADDRESS .....

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE ABOVE IS CORRECT AND AGREE TO COMPLY WITH ALL COUNTY ORDINANCES AND STATE LAWS REGULATING PLUMBING AND SEWERS.

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SIGNATURE OF PERMITTEE Norman Mott

76A642A 663 7/53

BUILDING ADDRESS
LOCALITY
NEAREST CROSS ST.

DISTRICT NO.	SERIAL NO.	PERMIT NO.
11	A	17635 S
RECEIVED BY	**Ready for Inspection**	**DATE ISSUED**
		4
USE ZONE	**OCCUPANCY**	**MAP BK PG**
1-2	G	

CO. IMP. NO.
JOB NO.
TRUNK PERMIT NO.
ROAD PERMIT NO.
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL

CHARGES

CONNECTION CHARGE FEE
REIMBURSEMENT FEE

RECEIPT NO.	DATE	BY

EXCEPTION RECORDED

NO.	DATE	BY

CONNECTION DATA

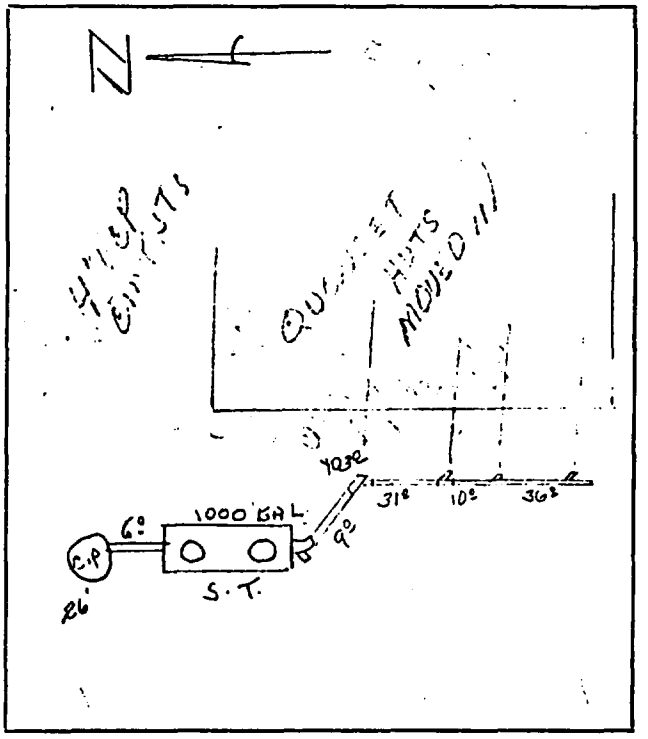
STATION DEPTH
MANHOLE REFERENCE UPPER LOWER
TYPE OF CONNECTION Y. CURB P.L. LENGTH FROM M.L. TO P.L.

APPROVALS	INSPECTOR'S SIGNATURE	DATE
NEW HOUSE SEWER		
CONNECT ADDITIONAL BUILDING OR WORK		
SEPTIC TANK, SEEP. PIT(S) AND/OR DRAINFIELD	[illegible]	[illegible]
CESSPOOL ☒ DRYWELL ☐	[illegible]	/ /
ALTER, REPAIR, SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP.PIT(S) ☐ CESSPOOLS ☐		

FOR DEPARTMENT USE

REQUIRED INFORMATION

1. INDICATE ALL BUILDINGS ON PROPERTY.
2. INDICATE AND DIMENSION SEWAGE DISPOSAL SYSTEM WITH TIE DISTANCES TO BUILDINGS AND PROPERTY LINES.
3. INDICATE SIZE OF SEPTIC TANK—DEPTH OF SEEPAGE PIT(S)—SIZE OF CESSPOOL(S)
4. INDICATE NORTH DIRECTION ON PLOT.
5. INDICATE BOTH STREETS IF CORNER.



ST. ALLEY R/W

LEGAL DESCRIPTION

9905, 07, 09, 11, 13, 15

FIELD NOTES

(7)

76A642D
S & E-663 3-57

APPLICATION FOR PERMIT

SEWER—SEWAGE DISPOSAL

1

DIVISION OF BUILDING AND SAFETY
Department of County Engineer
County of Los Angeles
WM. J. FOX, COUNTY ENGINEER
CASSATT D. GRIFFIN, SUP'T OF BUILDING

BUILDING ADDRESS 9929 Greenleaf
LOCALITY S. W. Whittier
NEAREST CROSS ST. Los Nutos Dr.
OWNER Whittier Area Dis
MAIL ADDRESS same
CITY TEL. NO.

DISTRICT NO.	GROUP	MAP BK	MAP PG
11	I		

FOR APPLICANT TO FILL IN

LEGAL DESCRIPTION LOT NO.
BLOCK TRACT
SIZE OF LOT NO. OF BLDGS. NOW ON LOT 2
USE OF BUILDINGS Shop
CONTRACTOR H. D. Hughes Sanitary
ADDRESS 12025 Front St.
CITY Norwalk TEL. NO.
REGISTRATION NO. 145679 ☐ STATE ☐ COUNTY

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER	@ $ 3.50		
	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	1.00		
	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	1.00		
	ALTER OR REPAIR EXISTING SEWER OR DISPOSAL SYSTEM	1.00		
	DISCONNECT AND ABANDON SEWER AND/OR DISPOSAL SYSTEM	1.00		
1	~~SEPTIC TANK~~, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	3.00	3	00
	CESSPOOL - DRYWELL SPECIAL CONDITIONS ONLY	2.00		

OWNER'S AUTHORIZATION	PERMIT	$	1	00
	TOTAL FEE		4	00

I HAVE THIS DATE CONTRACTED WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER

SIGNED THIS _____ DAY OF _____ 19__

OWNER OR OWNERS AGENT _____

ADDRESS _____

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SIGNATURE OF PERMITTEE Vernon Hyde

CONNECTION DATA

STATION DEPTH
MANHOLE REFERENCE UPPER / LOWER
Y. TYPE OF CONNECTION CURB P.L. LENGTH FROM M.L. TO P.L.
CO. IMP. NO. P. C. NO. JOB NO.
TRUNK PERMIT NO. ROAD PERMIT NO.
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL
CHARGES
CONNECTION CHARGE FEE
REIMBURSEMENT FEE

APPROVALS	DATE	INSPECTOR'S SIGNATURE
NEW HOUSE SEWER		
CONNECT ADDITIONAL BUILDING OR WORK		
~~SEPTIC TANK~~, SEEP. PIT(S) AND/OR DRAINFIELD	6-27-56	Leviwaker
CESSPOOL ☐ DRYWELL ☐		
ALTER, REPAIR, SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP. PIT(S) ☐ CESSPOOLS ☐		

WILLIAM J. FOX, COUNTY ENGINEER **VALIDATION** R. A. WOOD, CHIEF PLBG. INSPECTOR

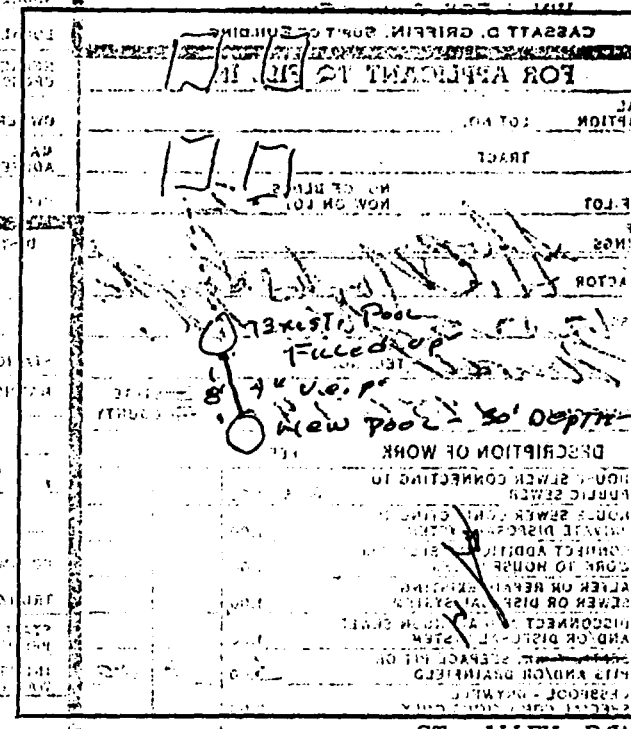
LAC 6 4 0 8 JUN 27 4 4.00

Smith

FOR DEPARTMENT USE

REQUIRED INFORMATION

1. INDICATE ALL BUILDINGS ON PROPERTY.
2. INDICATE AND DIMENSION SEWAGE DISPOSAL SYSTEM WITH TIE DISTANCES TO BUILDINGS AND PROPERTY LINES.
3. INDICATE SIZE OF SEPTIC TANK—DEPTH OF SEEPAGE PIT(S)—SIZE OF CESSPOOL(S)
4. INDICATE NORTH DIRECTION ON PLOT.
5. INDICATE BOTH STREETS IF CORNER.



ST. ALLEY R/W

9929 GREENLEAF (ADDITIONAL)

FIELD NOTES

(8)

DEPARTMENT OF COUNTY ENGINEER
DIVISION OF BUILDING AND SAFETY
COUNTY OF LOS ANGELES
WILLIAM J. FOX, COUNTY ENGINEER

SEWER—SEWAGE DISPOSAL PERMIT APPLICATION

1

FOR APPLICANT TO FILL IN

BUILDING ADDRESS: 9933 S. Greenleaf
LOCALITY: S. Whittier
NEAREST CROSS ST.: Los Nietos Rd.
OWNER: Carter
MAIL ADDRESS: same
CITY: TEL. NO.
CONTRACTOR: H. D. NOGLE & SONS
ADDRESS: 12025 E. Front Street
CITY: Norwalk, Calif. TEL. NO. OXford 6-0813
REGISTRATION NO.: 126832 ☐ STATE ☐ COUNTY
LEGAL DESCRIPTION: LOT NO.
BLOCK: TRACT
SIZE OF LOT: NO. OF BLDGS. NOW ON LOT: 2
USE OF BUILDINGS: Shop

NO.	DESCRIPTION OF WORK	FEE		
	HOUSE SEWER CONNECTING TO PUBLIC SEWER @ $ 3.50			
1	HOUSE SEWER CONNECTING TO PRIVATE DISPOSAL SYSTEM	1.00		
	CONNECT ADDITIONAL BLDG. OR WORK TO HOUSE SEWER	1.00		
	ALTER OR REPAIR EXISTING SEWER OR DISPOSAL SYSTEM	1.00		
	DISCONNECT AND ABANDON SEWER AND/OR DISPOSAL SYSTEM	1.00		
1	SEPTIC TANK, SEEPAGE PIT OR PITS AND/OR DRAINFIELD	2.00		
	CESSPOOL—DRYWELL SPECIAL CONDITIONS ONLY	2.00		
	PERMIT	$	1	00
	TOTAL FEE			

OWNERS AUTHORIZATION

I HAVE THIS DATE CONTRACTED WITH THE HEREIN NAMED CONTRACTOR TO CONNECT THE ABOVE DESCRIBED EXISTING DWELLING TO THE PUBLIC SEWER

SIGNED THIS.....DAY OF.....19....

OWNER OR OWNERS AGENT.....

ADDRESS.....

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE ABOVE IS CORRECT AND AGREE TO COMPLY WITH ALL COUNTY ORDINANCES AND STATE LAWS REGULATING PLUMBING AND SEWERS.

I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND/OR LICENSED AS REQUIRED BY LOS ANGELES COUNTY AND STATE OF CALIFORNIA OR THAT I AM THE LEGAL OWNER OF THE ABOVE DESCRIBED RESIDENTIAL PROPERTY.

SIGNATURE OF PERMITTEE: H D Nogle

BUILDING ADDRESS: 9933 S. GREENLEAF
LOCALITY: S. WHITTIER
NEAREST CROSS ST.: LOS NIETOS RD

DISTRICT NO.	SERIAL NO.	PERMIT NO.
11	A	14437 S

RECEIVED BY	Ready for Inspection	DATE ISSUED
ARTUKOVICH		9-2-53

USE ZONE	OCCUPANCY	MAP BK PG
—	RES	

CO. IMP. NO.
JOB. NO.
TRUNK PERMIT NO.
ROAD PERMIT NO.
STATE ENCROACHMENT PERMIT NO.
INDUSTRIAL WASTE APPROVAL

CHARGES

CONNECTION CHARGE FEE
REIMBURSEMENT FEE

RECEIPT NO.	DATE	BY

EXCEPTION RECORDED

NO	DATE	BY

CONNECTION DATA

STATION: DEPTH:
MANHOLE REFERENCE UPPER: LOWER:
Y. TYPE OF CONNECTION CURB P.L. LENGTH FROM M.L. TO P.L.

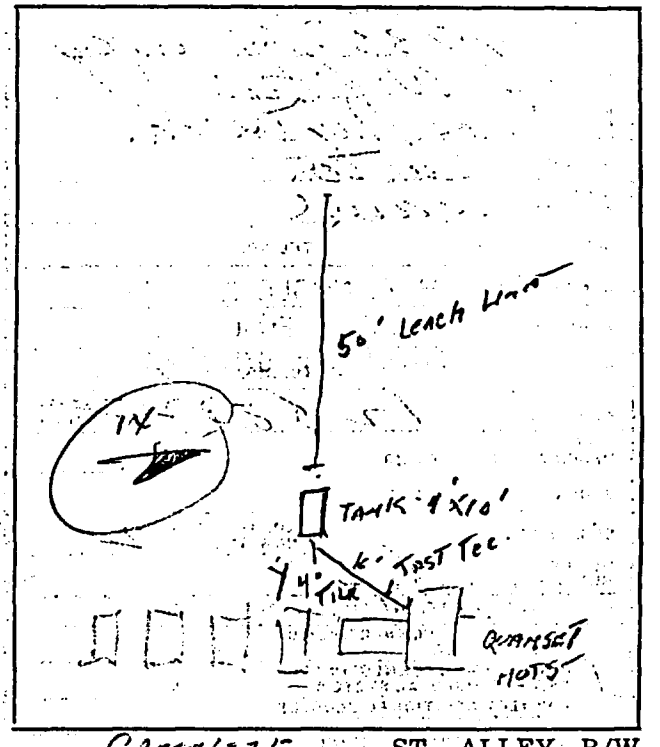
APPROVALS	INSPECTOR'S SIGNATURE	DATE
NEW HOUSE SEWER	[illegible]	9-17-53
CONNECT ADDITIONAL BUILDING OR WORK		
SEPTIC TANK, SEEP. PIT(S) AND/OR DRAINFIELD	[illegible]	9-17-53
CESSPOOL ☐ DRYWELL ☐		
ALTER, REPAIR, SEWER OR SEWAGE DISPOSAL SYSTEM		
DISCONNECT PLUG AND ABANDON HOUSE SEWER		
BACKFILL SEPTIC TANKS ☐ SEEP. PIT(S) ☐ CESSPOOLS ☐		
	[illegible]	9-17-53

76A642D 663 1/53

FOR DEPARTMENT USE

REQUIRED INFORMATION

1. INDICATE ALL BUILDINGS ON PROPERTY.
2. INDICATE AND DIMENSION SEWAGE DISPOSAL SYSTEM WITH TIE DISTANCES TO BUILDINGS AND PROPERTY LINES.
3. INDICATE SIZE OF SEPTIC TANK—DEPTH OF SEEPAGE PIT(S)—SIZE OF CESSPOOL(S)
4. INDICATE NORTH DIRECTION ON PLOT.
5. INDICATE BOTH STREETS IF CORNER.



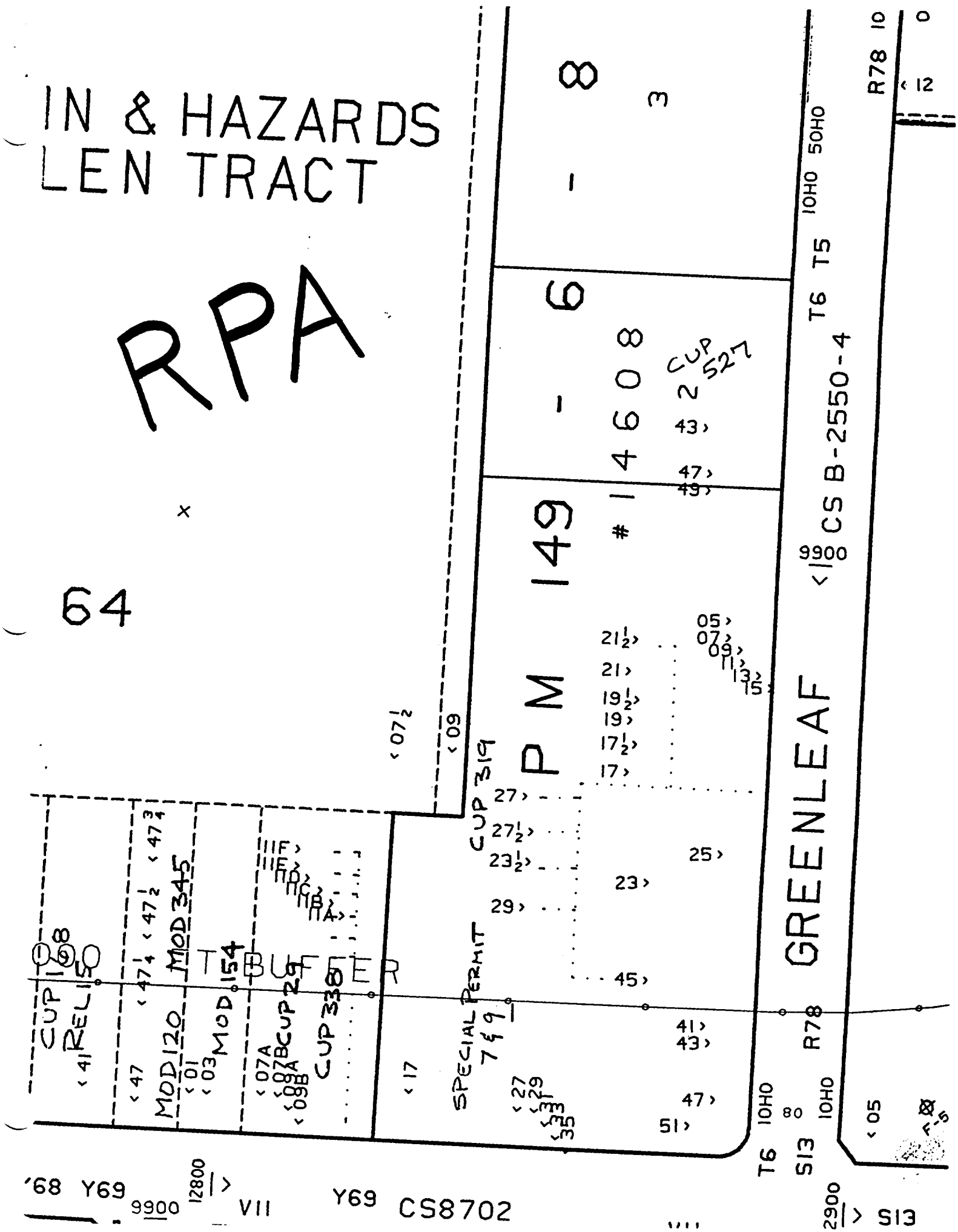
GREENLEAF ST. ALLEY R/W

LEGAL DESCRIPTION

5955, 55½, 55

GREENLEAF

FIELD NOTES


IN & HAZARDS
LEN TRACT
RPA
64
PM 149 - 6 - 8
14608
CUP 527
CUP 319
CUP 1068
REL 15
MOD 120
MOD 345
MOD 154
CUP 29
CUP 338
SPECIAL PERMIT 7 & 9
GREENLEAF
CS B-2550-4
T6 T5
R78
10HO 50HO
9900
12800
Y69
CS8702
V11
S13
2900

cyclable and made from recycled paper.

APPENDIX F

STORMWATER MANAGEMENT SYSTEM

TRC

WASTE DISPOSAL INC. SUPERFUND SITE

Project Coordinator

March 5, 1998 Project No. 94-256

Mr. Mark Filippini
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
Summary of Stormwater Related Activities
Waste Disposal, Inc. Superfund Site

Dear Mr. Filippini:

As requested in EPA's February 25, 1998 letter, provided herein is a summary of the various activities the WDIG has implemented to mitigate stormwater related issues at the site. Figure 1 shows a site plot plan which indicates the site areas where these activities have been performed. The following summarizes the stormwater related actions that have been implemented at each of the site locations indicated:

- C&E Die (12637 B Los Nietos Road, Location [1]):
  - To prevent flooding of the C&E Die building, a drainage system was constructed on February 13, February 16, and March 2, 1998 along the north and east sides of the building (see Figures 2A and B).
  - The drainage system has been designed to pump surface water adjacent to the building directly to three onsite Baker Tanks. The water is collected in four sumps and then pumped to the tanks using automatic sump pumps.
  - The collected water is sampled and analyzed using Regional Water Quality Control Board (RWQCB) procedures. The water is then discharged to a storm drain in compliance with RWQCB and Santa Fe Springs Fire Department (SFSFD) standards.
- Buffalo Bullet (12637 A Los Nietos Road, Location [2]):
  - The trench for the drainage system at C&E Die was extended to the south approximately 20 feet on February 27, 1998 along the east wall of Buffalo Bullet to prevent reoccurrence of flooding of the interior space (see Figures 2A and B). Trenched soils were retained onsite and covered by visqueen.
  - Electrical service for the pumps for both C&E Die and Buffalo Bullet have been fitted with ground fault interpreters to help prevent a public health and safety risk.

- WDIG has assisted Buffalo Bullet in removing the water, and replacing water damaged tile and carpet.
- WDIG is evaluating potential long term modification to the collection system.

- H&H Contractors (12811 E and F Los Nietos Road, Location [3]):
  - A collection trench and french drain system was installed on March 2, 1998 approximately 10 feet to the north of H&H Contractors building. Figure 3 shows the drainage system construction details. Water collected in this trench will be pumped and contained in a Baker Tank for analysis prior to discharging into a storm drain.
- Mersits Equipment Rental (9640 Santa Fe Springs Road, Location [4]):
  - Sandbags have been placed on the east side of the Mersits Property to divert the stormwater runoff to the north onto the paved driveway to facilitate drainage.
- Gold Coast Refractory (9630 Santa Fe Springs Road, Location [5]):
  - Sandbags have been provided to the building owners to facilitate any potential stormwater issues.
- St. Paul's High School (North Boundary of Site, Location [6]):
  - During a major storm event the site will be monitored for runoff onto the school's property. If necessary, sandbags will be placed along the north side to direct runoff towards Greenleaf Avenue.
- Greenleaf Avenue (East Boundary of Site, Location [7]):
  - Sandbags have been placed in an area where significant runoff has been observed. The sandbags will facilitate in reducing the volume of runoff in a concentrated area.

Collected stormwater monitoring has been performed according to agreements between EPA and WDIG. The following bullets summarize the stormwater monitoring that has been performed and proposed site monitoring during major storm events:

- Analysis of Stormwater Contained in Baker Tanks:
  - Stored water contained in the three onsite Baker Tanks adjacent to C&E Die was sampled and analyzed for the following constituents: oil and grease, specific conductance, suspended solids, metals, priority pollutants, and pH.
  - Analytical results indicated the water was acceptable to discharge to the storm drain (see Attachment 1).
  - The results of the analyses were submitted to EPA, RWQCB and the SFSFD for review on February 27, 1998.

- The stored water was discharged on March 3 and 4, 1998 to the storm drain located at the corner of Greenleaf Avenue and Los Nietos Road.

- Site Wide Monitoring
  - During major storm events (i.e. greater than 2" precipitation during a 24-hour period), the site will be monitored at approximately 4-hour intervals to assure the control systems are functioning properly.
  - During major storm events, the site will be monitored for runoff problems and slope movement. If problems are observed EPA will be contacted.

Please call with any questions or comments you may have at (562) 692-4535.

Sincerely,

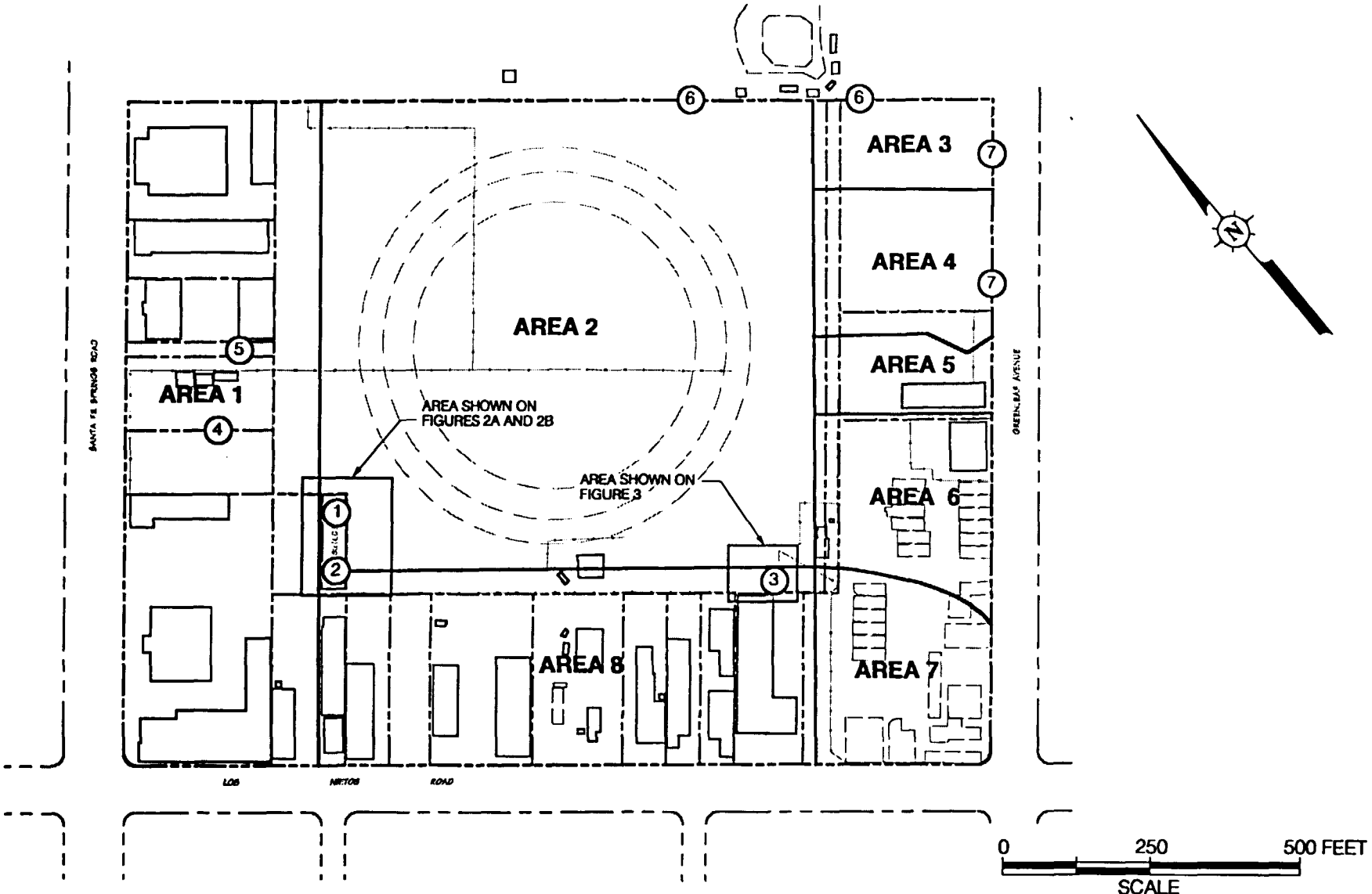
Ian Webster /kp

Ian Webster
WDIG Project Coordinator

IW/MG:js
Attachments

cc: Andria Benner, EPA
Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Clement Walsh, CADHS
Roberto Puga, TRC
Kathy Steuer, Esq., EPA, ORC
Cynthia Wetmore, EPA
Tim Crist, CIWMB
Shawn Haddad, DTSC
Bill Nelson, ATSDR
Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
John Wondolleck, CDM Federal
Shelby Moore, Esq., WDIG
Bill Stephanatos, Ph.D., Weston
Mike Montgomery, EPA

94-256LTR3/5/98-01 REV. 3/5/98



LEGEND

SITE BOUNDARY (APPROXIMATE)

AREA BOUNDARY (APPROXIMATE)

(1) SITE AREA WHERE STORMWATER RELATED ACTIVITIES WERE PERFORMED

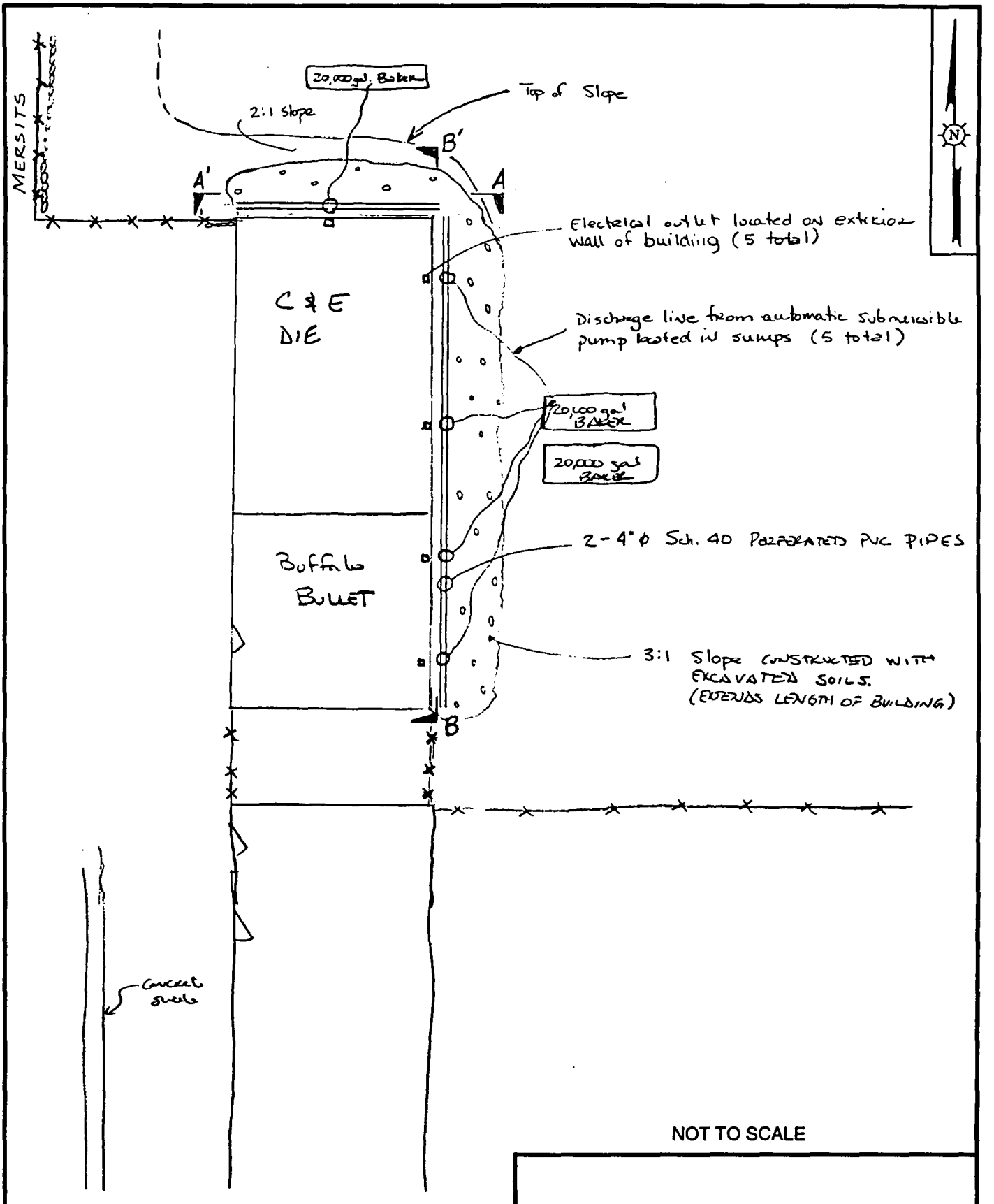
LOCATION OF STORMWATER IMPROVEMENTS

WASTE DISPOSAL INC.
SANTE FE SPRINGS, CALIFORNIA

TRC

FIGURE 1

94-256LTR 3/5/98 REV. 3/5/98



NOT TO SCALE

LEGEND

SAND BAGS

VISQUEEN

NOTE: SEE FIGURE 2B FOR CROSS SECTIONS

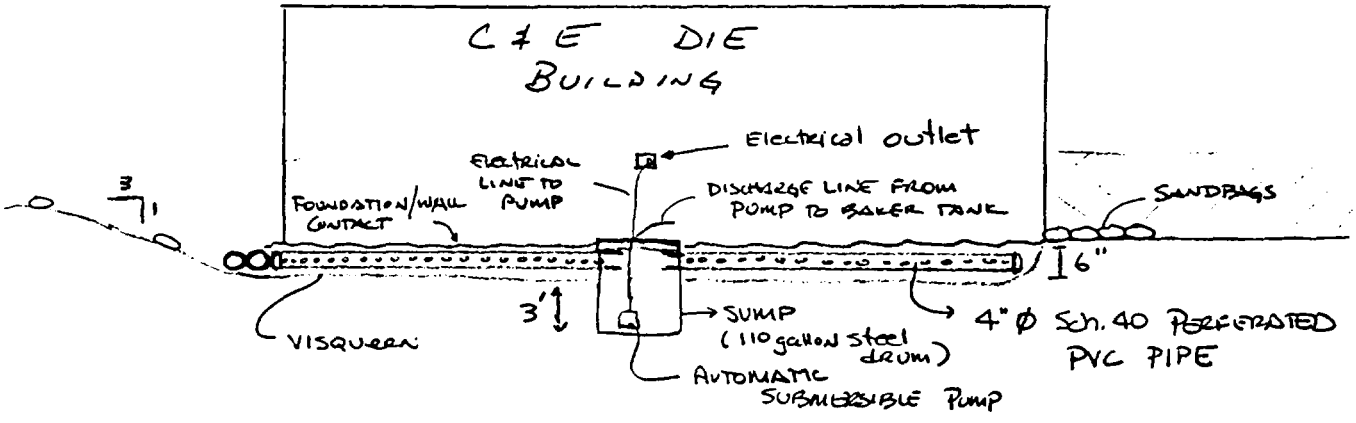
STORMWATER IMPROVEMENTS TO 12637 A & B LOS NIETOS ROAD

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

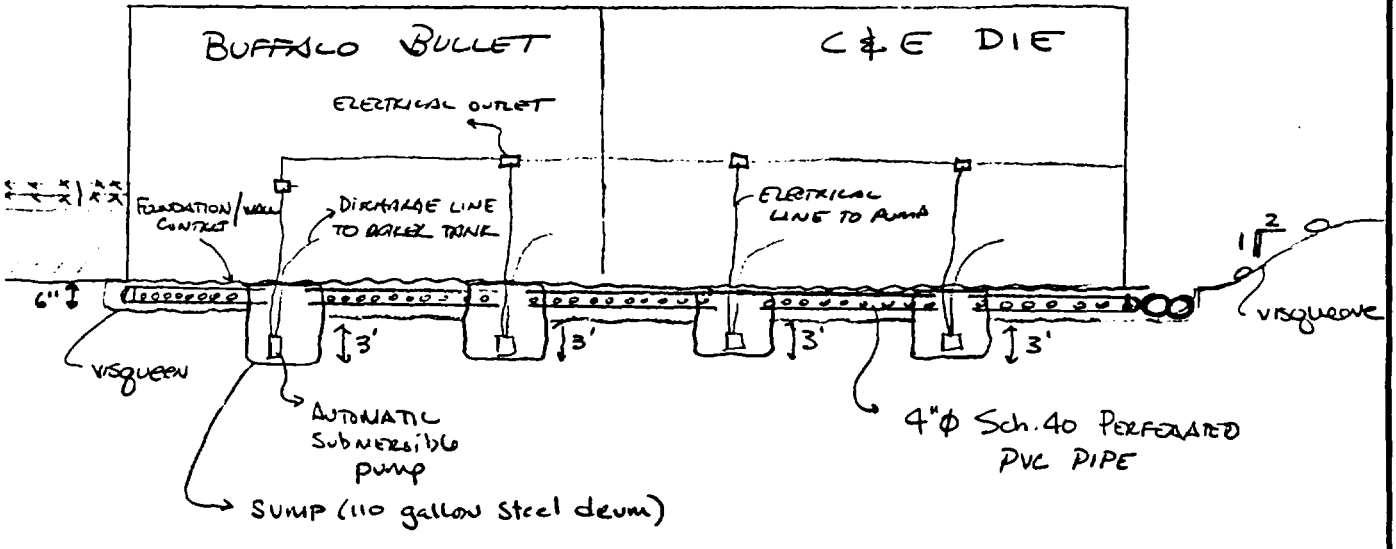
TRC

FIGURE 2A

94-256LTR 3/5/98 REV. 3/5/98



CROSS SECTION A-A'



CROSS SECTION B-B'

NOT TO SCALE

CROSS SECTIONS OF DRAINAGE SYSTEM

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

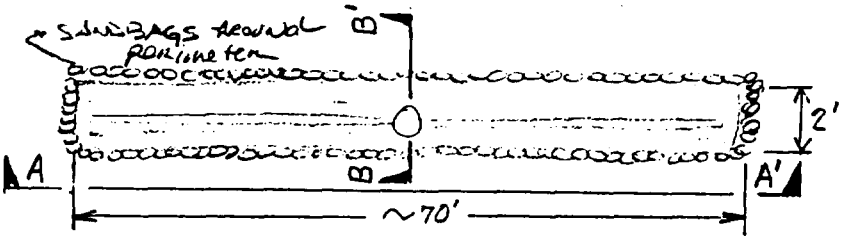
NOTE: SEE FIGURE 2A FOR CROSS SECTION LOCATIONS

TRC

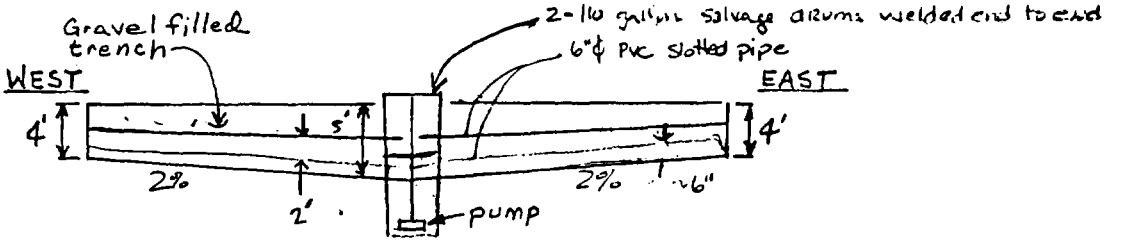
FIGURE 2B

94-256LTR 3/5/98 REV. 3/5/98

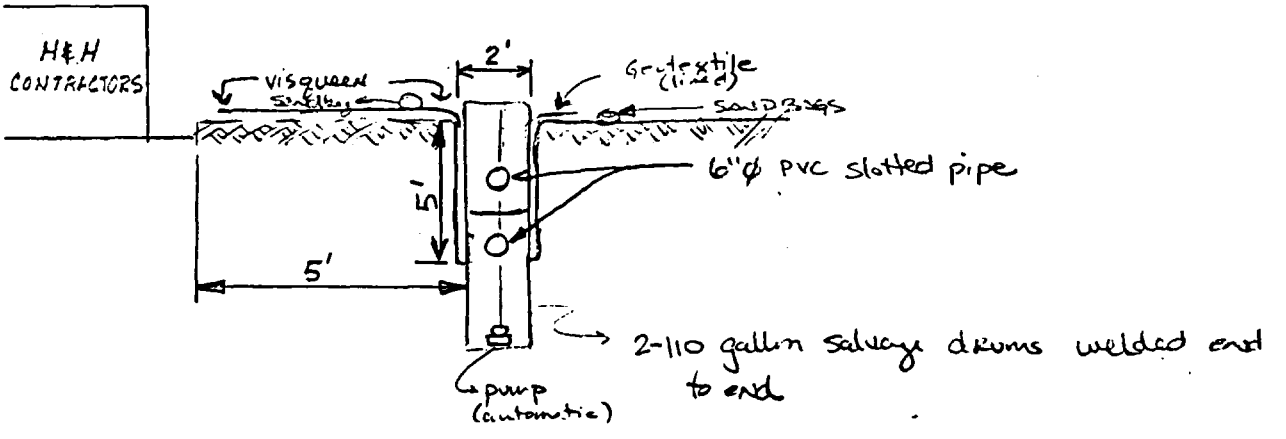
BAKER TANK



PLAN VIEW OF TRENCH TO NORTH OF H&H



CROSS SECTION A-A'



CROSS SECTION B-B'

NOT TO SCALE

DIMENSIONS & MATERIALS

- 5' DEEP x 2' WIDE x ~70' LENGTH
- LINE TRENCH WITH POROUS GEOTEXTILE WITH 1' OVERHANG ON EACH SIDE
- TWO 6" DIAMETER PERFORATED PVC PIPES
- TWO 110 GALLON DRUMS WELDED END TO END
- ONE AUTOMATIC PUMP
- ONE 20,000 GALLON BAKER TANK
- VISQUEEN
- SAND BAGS

NOTE: MINIMIZED COLLECTING SURFACE WATER RUNOFF BY SANDBAGGING AROUND TRENCH

STORMWATER IMPROVEMENTS TO 12811 E & F LOS NIETOS ROAD

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3

G

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APPENDIX G

PREVIOUS REPORT SOILS DATA

TRC

ATTACHMENT G.1

FS REPORT FIGURE

TRC

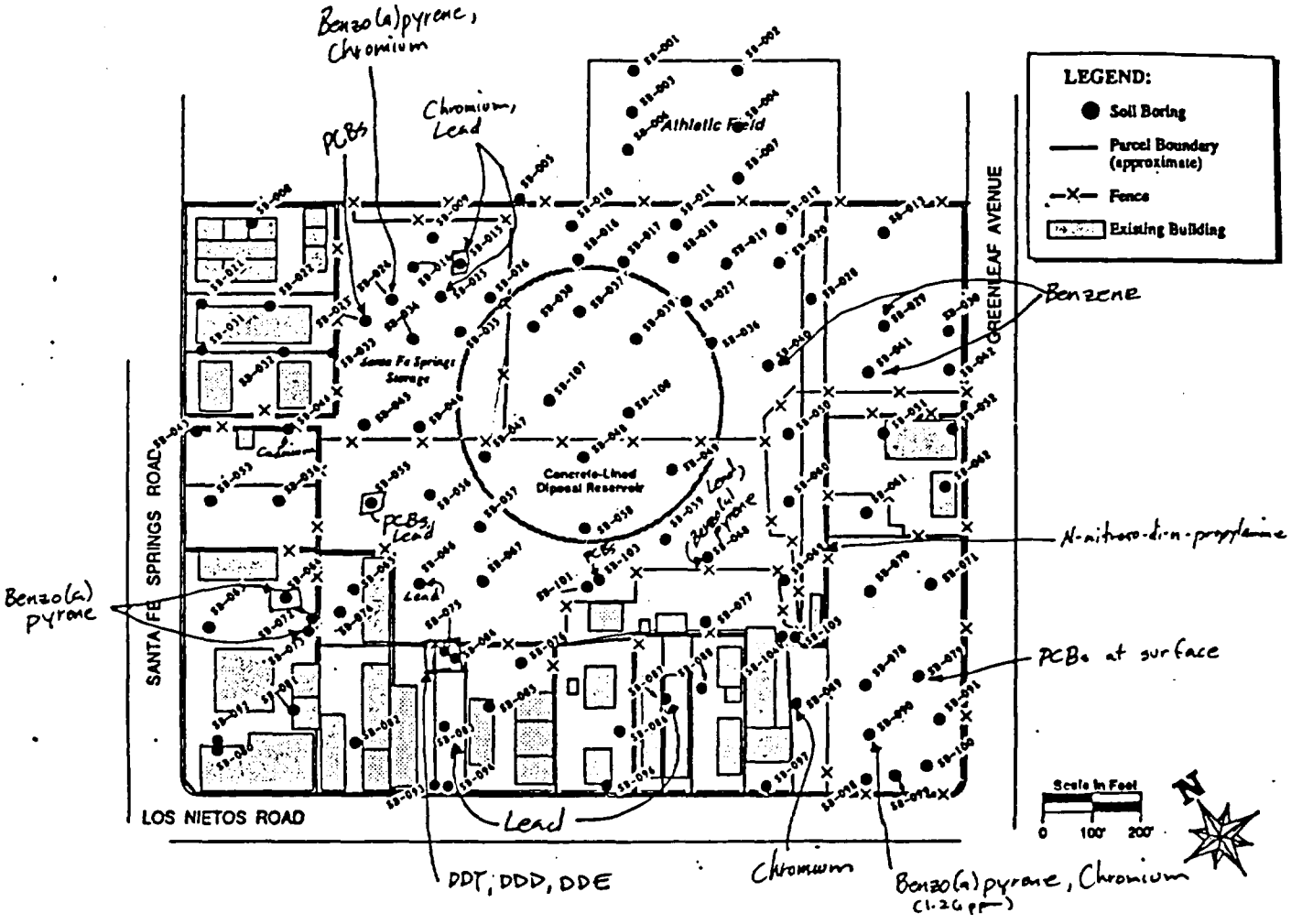


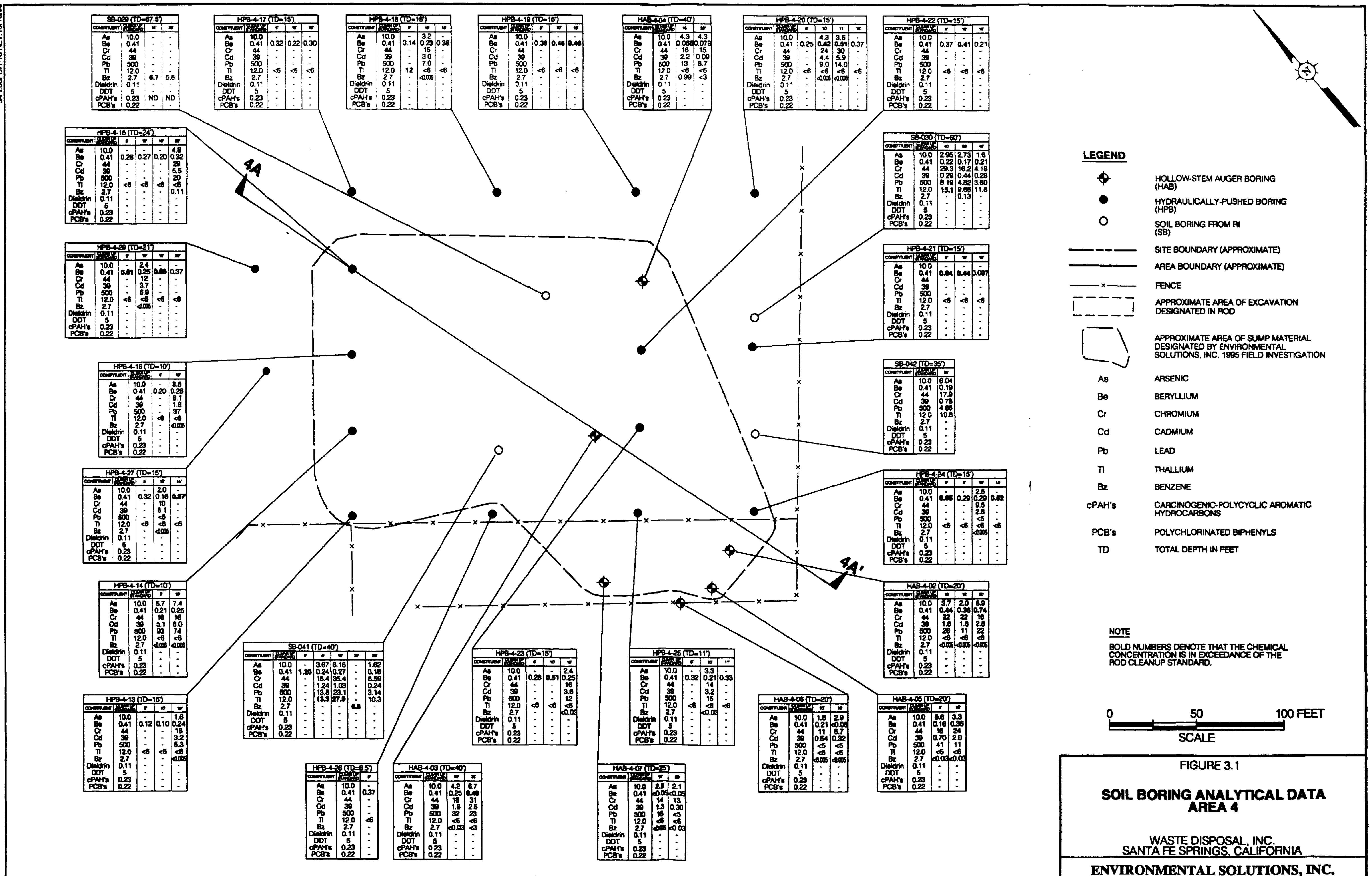
Figure 2-1, Soil Borings Outside Reservoir Exceeding PRGs

ATTACHMENT G.2

PREDESIGN/INTERMEDIATE (60%)
DESIGN REPORT FIGURES

TRC

94-256PDR-10 REV.10/13/95



SB-029 (TD=67.5')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]
As	10.0	-	-
Be	0.41	-	-
Cr	44	-	-
Cd	39	-	-
Pb	500	-	-
Tl	12.0	-	-
Bz	2.7	**6.7**	5.6
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	ND	ND
PCB's	0.22	-	-

HPB-4-17 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	-	-	-
Be	0.41	0.32	0.22	0.30
Cr	44	-	-	-
Cd	39	-	-	-
Pb	500	-	-	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HPB-4-18 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	-	3.2	-
Be	0.41	0.14	0.23	0.38
Cr	44	-	15	-
Cd	39	-	3.0	-
Pb	500	-	7.0	-
Tl	12.0	**12**	<6	<6
Bz	2.7	-	<0.005	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HPB-4-19 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	-	-	-
Be	0.41	0.38	**0.45**	**0.46**
Cr	44	-	-	-
Cd	39	-	-	-
Pb	500	-	-	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HAB-4-04 (TD=40')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]
As	10.0	4.3	4.3
Be	0.41	0.068	0.079
Cr	44	16	15
Cd	39	2.2	0.09
Pb	500	13	8.7
Tl	12.0	<6	<6
Bz	2.7	0.99	<3
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	-	-
PCB's	0.22	-	-

HPB-4-20 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	10'	11'	[illegible]
As	10.0	-	4.3	3.6	-
Be	0.41	0.25	**0.42**	**0.51**	0.37
Cr	44	-	24	30	-
Cd	39	-	4.4	5.9	-
Pb	500	-	9.0	14.0	-
Tl	12.0	<6	<6	<6	<6
Bz	2.7	-	<0.005	<0.005	-
Dieldrin	0.11	-	-	-	-
DDT	5	-	-	-	-
cPAH's	0.23	-	-	-	-
PCB's	0.22	-	-	-	-

HPB-4-22 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	-	-	-
Be	0.41	0.37	**0.41**	0.21
Cr	44	-	-	-
Cd	39	-	-	-
Pb	500	-	-	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HPB-4-16 (TD=24')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]	[illegible]
As	10.0	-	-	-	4.8
Be	0.41	0.28	0.27	0.20	0.32
Cr	44	-	-	-	29
Cd	39	-	-	-	5.5
Pb	500	-	-	-	20
Tl	12.0	<6	<6	<6	<6
Bz	2.7	-	-	-	0.11
Dieldrin	0.11	-	-	-	-
DDT	5	-	-	-	-
cPAH's	0.23	-	-	-	-
PCB's	0.22	-	-	-	-

SB-030 (TD=60')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	2.95	2.73	1.6
Be	0.41	0.22	0.17	0.21
Cr	44	29.3	16.2	4.18
Cd	39	0.29	0.44	0.28
Pb	500	8.19	4.82	3.60
Tl	12.0	**15.1**	9.66	11.8
Bz	2.7	-	0.13	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HPB-4-29 (TD=21')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]	[illegible]
As	10.0	-	2.4	-	-
Be	0.41	**0.61**	0.25	**0.66**	0.37
Cr	44	-	12	-	-
Cd	39	-	3.7	-	-
Pb	500	-	6.9	-	-
Tl	12.0	<6	<6	<6	<6
Bz	2.7	-	<0.005	-	-
Dieldrin	0.11	-	-	-	-
DDT	5	-	-	-	-
cPAH's	0.23	-	-	-	-
PCB's	0.22	-	-	-	-

HPB-4-21 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	-	-	-
Be	0.41	**0.84**	**0.44**	0.097
Cr	44	-	-	-
Cd	39	-	-	-
Pb	500	-	-	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HPB-4-15 (TD=10')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]
As	10.0	-	8.5
Be	0.41	0.20	0.28
Cr	44	-	8.1
Cd	39	-	1.8
Pb	500	-	37
Tl	12.0	<6	<6
Bz	2.7	-	<0.005
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	-	-
PCB's	0.22	-	-

SB-042 (TD=35')

CONSTITUENT	CLEANUP STANDARD	[illegible]
As	10.0	6.04
Be	0.41	0.19
Cr	44	17.9
Cd	39	0.78
Pb	500	4.66
Tl	12.0	10.6
Bz	2.7	-
Dieldrin	0.11	-
DDT	5	-
cPAH's	0.23	-
PCB's	0.22	-

HPB-4-27 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	-	2.0	-
Be	0.41	0.32	0.16	**0.57**
Cr	44	-	10	-
Cd	39	-	5.1	-
Pb	500	-	<5	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	<0.005	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HPB-4-24 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]	[illegible]
As	10.0	-	-	2.5	-
Be	0.41	**0.86**	0.29	0.29	**0.82**
Cr	44	-	-	9.5	-
Cd	39	-	-	2.6	-
Pb	500	-	-	<5	-
Tl	12.0	<6	<6	<6	<6
Bz	2.7	-	-	<0.005	-
Dieldrin	0.11	-	-	-	-
DDT	5	-	-	-	-
cPAH's	0.23	-	-	-	-
PCB's	0.22	-	-	-	-

HPB-4-14 (TD=10')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]
As	10.0	5.7	7.4
Be	0.41	0.21	0.25
Cr	44	16	16
Cd	39	5.1	8.0
Pb	500	93	74
Tl	12.0	<6	<6
Bz	2.7	<0.005	<0.005
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	-	-
PCB's	0.22	-	-

HAB-4-02 (TD=20')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	3.7	2.0	6.9
Be	0.41	**0.44**	0.36	**0.74**
Cr	44	22	22	16
Cd	39	1.6	1.6	2.8
Pb	500	26	11	22
Tl	12.0	<6	<6	<6
Bz	2.7	<0.005	<0.005	<0.005
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

SB-041 (TD=40')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
As	10.0	-	3.67	6.16	-	1.62
Be	0.41	**1.20**	0.24	0.27	-	0.18
Cr	44	-	18.4	35.4	-	6.59
Cd	39	-	1.24	1.03	-	0.24
Pb	500	-	13.8	23.1	-	3.14
Tl	12.0	-	**13.3**	**27.9**	-	10.3
Bz	2.7	-	-	-	**6.8**	-
Dieldrin	0.11	-	-	-	-	-
DDT	5	-	-	-	-	-
cPAH's	0.23	-	-	-	-	-
PCB's	0.22	-	-	-	-	-

HPB-4-23 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	-	-	2.4
Be	0.41	0.28	**0.51**	0.25
Cr	44	-	-	16
Cd	39	-	-	3.6
Pb	500	-	-	12
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	<0.03
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HPB-4-25 (TD=11')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	11'
As	10.0	-	3.3	-
Be	0.41	0.32	0.21	0.33
Cr	44	-	14	-
Cd	39	-	3.2	-
Pb	500	-	15	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	<0.03	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HAB-4-06 (TD=20')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]
As	10.0	1.8	2.9
Be	0.41	0.21	<0.05
Cr	44	11	6.7
Cd	39	0.54	0.32
Pb	500	<5	<5
Tl	12.0	<6	<6
Bz	2.7	<0.005	<0.005
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	-	-
PCB's	0.22	-	-

HAB-4-05 (TD=20')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]
As	10.0	8.6	3.3
Be	0.41	0.16	0.36
Cr	44	16	24
Cd	39	0.70	2.0
Pb	500	41	11
Tl	12.0	<6	<6
Bz	2.7	<0.03	<0.03
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	-	-
PCB's	0.22	-	-

HPB-4-13 (TD=15')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]	[illegible]
As	10.0	-	-	1.6
Be	0.41	0.12	0.10	0.24
Cr	44	-	-	18
Cd	39	-	-	3.2
Pb	500	-	-	6.3
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	<0.005
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	-	-	-
PCB's	0.22	-	-	-

HPB-4-26 (TD=8.5')

CONSTITUENT	CLEANUP STANDARD	[illegible]
As	10.0	-
Be	0.41	0.37
Cr	44	-
Cd	39	-
Pb	500	-
Tl	12.0	<6
Bz	2.7	-
Dieldrin	0.11	-
DDT	5	-
cPAH's	0.23	-
PCB's	0.22	-

HAB-4-03 (TD=40')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]
As	10.0	4.2	6.7
Be	0.41	0.25	**0.48**
Cr	44	18	31
Cd	39	1.8	2.6
Pb	500	32	23
Tl	12.0	<6	<6
Bz	2.7	<0.03	<3
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	-	-
PCB's	0.22	-	-

HAB-4-07 (TD=25')

CONSTITUENT	CLEANUP STANDARD	[illegible]	[illegible]
As	10.0	2.9	2.1
Be	0.41	<0.05	<0.05
Cr	44	14	13
Cd	39	1.3	0.30
Pb	500	15	<5
Tl	12.0	<6	<6
Bz	2.7	[illegible]	<0.03
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	-	-
PCB's	0.22	-	-

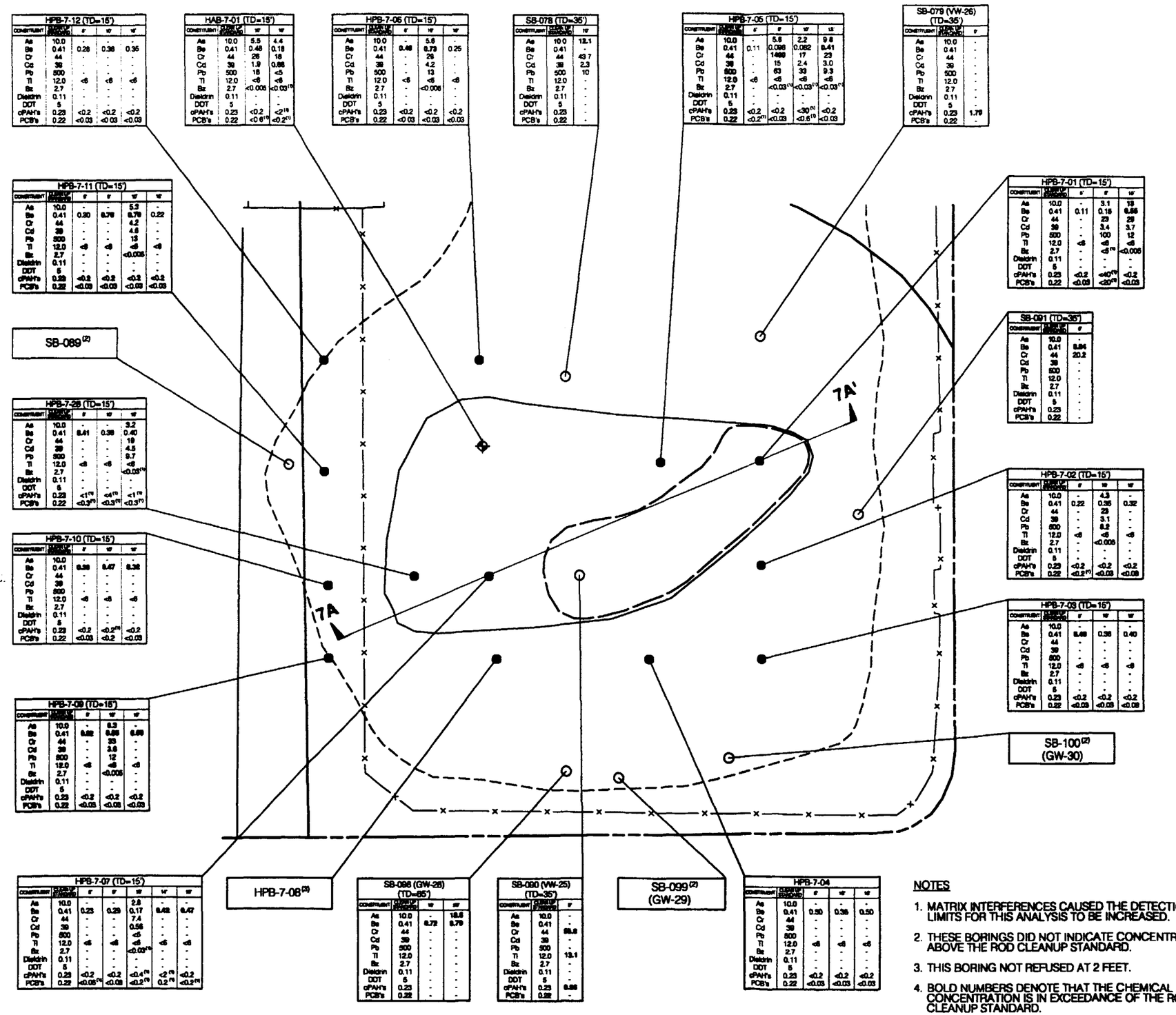
FIGURE 3.1

SOIL BORING ANALYTICAL DATA AREA 4

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

ENVIRONMENTAL SOLUTIONS, INC.

94-256PDR-12 REV. 10/13/95



HPB-7-12 (TD=15')	CLEANUP STANDARD	6'	10'	14'
As	10.0	-	-	-
Be	0.41	0.28	0.38	0.35
Cr	44	-	-	-
Cd	39	-	-	-
Pb	500	-	-	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<0.2	<0.2	<0.2
PCB's	0.22	<0.03	<0.03	<0.03

HAB-7-01 (TD=15')	CLEANUP STANDARD	10'	14'
As	10.0	5.5	4.4
Be	0.41	0.48	0.18
Cr	44	26	18
Cd	39	1.9	0.88
Pb	500	18	<5
Tl	12.0	<6	<6
Bz	2.7	<0.006	<0.03(1)
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	<0.2	<2(1)
PCB's	0.22	<0.6(1)	<0.2(1)

HPB-7-06 (TD=15')	CLEANUP STANDARD	6'	10'	14'
As	10.0	-	5.6	-
Be	0.41	0.48	0.73	0.25
Cr	44	-	26	-
Cd	39	-	4.2	-
Pb	500	-	13	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	<0.006	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<0.2	<0.2	<0.2
PCB's	0.22	<0.03	<0.03	<0.03

SB-078 (TD=35')	CLEANUP STANDARD	10'
As	10.0	12.1
Be	0.41	-
Cr	44	43.7
Cd	39	2.3
Pb	500	10
Tl	12.0	-
Bz	2.7	-
Dieldrin	0.11	-
DDT	5	-
cPAH's	0.23	-
PCB's	0.22	-

HPB-7-05 (TD=15')	CLEANUP STANDARD	6'	8'	10'	12'
As	10.0	-	5.6	2.2	9.8
Be	0.41	0.11	0.096	0.082	0.41
Cr	44	-	1460	17	23
Cd	39	-	15	2.4	3.0
Pb	500	-	63	33	9.3
Tl	12.0	<6	<6	<6	<6
Bz	2.7	-	<0.03(1)	<0.03(1)	<0.03(1)
Dieldrin	0.11	-	-	-	-
DDT	5	-	-	-	-
cPAH's	0.23	<0.2	<0.2	<30(1)	<0.2
PCB's	0.22	<0.2(1)	<0.03	<0.6(1)	<0.03

SB-079 (VW-26) (TD=35')	CLEANUP STANDARD	6'
As	10.0	-
Be	0.41	-
Cr	44	-
Cd	39	-
Pb	500	-
Tl	12.0	-
Bz	2.7	-
Dieldrin	0.11	-
DDT	5	-
cPAH's	0.23	1.79
PCB's	0.22	-

HPB-7-11 (TD=15')	CLEANUP STANDARD	6'	8'	10'	12'
As	10.0	-	-	5.3	-
Be	0.41	0.30	0.76	0.78	0.22
Cr	44	-	-	4.2	-
Cd	39	-	-	4.6	-
Pb	500	-	-	13	-
Tl	12.0	<6	<6	<6	<6
Bz	2.7	-	-	<0.006	-
Dieldrin	0.11	-	-	-	-
DDT	5	-	-	-	-
cPAH's	0.23	<0.2	<0.2	<0.2	<0.2
PCB's	0.22	<0.03	<0.03	<0.03	<0.03

HPB-7-01 (TD=15')	CLEANUP STANDARD	6'	8'	10'
As	10.0	-	3.1	13
Be	0.41	0.11	0.16	0.66
Cr	44	-	23	23
Cd	39	-	3.4	3.7
Pb	500	-	100	12
Tl	12.0	<6	<6	<6
Bz	2.7	-	<6(1)	<0.006
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<0.2	<40(1)	<0.2
PCB's	0.22	<0.03	<20(1)	<0.03

SB-091 (TD=35')	CLEANUP STANDARD	6'
As	10.0	-
Be	0.41	0.84
Cr	44	20.2
Cd	39	-
Pb	500	-
Tl	12.0	-
Bz	2.7	-
Dieldrin	0.11	-
DDT	5	-
cPAH's	0.23	-
PCB's	0.22	-

HPB-7-28 (TD=15')	CLEANUP STANDARD	6'	10'	14'
As	10.0	-	-	3.2
Be	0.41	0.41	0.38	0.40
Cr	44	-	-	19
Cd	39	-	-	4.5
Pb	500	-	-	9.7
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	<0.03(1)
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<1(1)	<4(1)	<1(1)
PCB's	0.22	<0.3(1)	<0.3(1)	<0.3(1)

HPB-7-02 (TD=15')	CLEANUP STANDARD	6'	10'	14'
As	10.0	-	4.3	-
Be	0.41	0.22	0.36	0.32
Cr	44	-	29	-
Cd	39	-	3.1	-
Pb	500	-	8.2	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	<0.006	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<0.2	<0.2	<0.2
PCB's	0.22	<0.2(1)	<0.03	<0.03

HPB-7-10 (TD=15')	CLEANUP STANDARD	6'	10'	14'
As	10.0	-	-	-
Be	0.41	0.38	0.47	0.32
Cr	44	-	-	-
Cd	39	-	-	-
Pb	500	-	-	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<0.2	<0.2(1)	<0.2
PCB's	0.22	<0.03	<0.2	<0.03

HPB-7-03 (TD=15')	CLEANUP STANDARD	6'	10'	14'
As	10.0	-	-	-
Be	0.41	0.49	0.38	0.40
Cr	44	-	-	-
Cd	39	-	-	-
Pb	500	-	-	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<0.2	<0.2	<0.2
PCB's	0.22	<0.03	<0.03	<0.03

HPB-7-09 (TD=15')	CLEANUP STANDARD	6'	10'	14'
As	10.0	-	8.3	-
Be	0.41	0.82	0.89	0.69
Cr	44	-	33	-
Cd	39	-	3.6	-
Pb	500	-	12	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	<0.006	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<0.2	<0.2	<0.2
PCB's	0.22	<0.03	<0.03	<0.03

HPB-7-07 (TD=15')	CLEANUP STANDARD	6'	8'	10'	12'	14'
As	10.0	-	-	2.8	-	-
Be	0.41	0.23	0.29	0.17	0.42	0.47
Cr	44	-	-	7.4	-	-
Cd	39	-	-	0.58	-	-
Pb	500	-	-	<5	-	-
Tl	12.0	<6	<6	<6	<6	<6
Bz	2.7	-	-	<0.03(1)	-	-
Dieldrin	0.11	-	-	-	-	-
DDT	5	-	-	-	-	-
cPAH's	0.23	<0.2	<0.2	<0.4(1)	<2(1)	<0.2
PCB's	0.22	<0.03(1)	<0.03	<0.2(1)	0.2(1)	<0.2(1)

SB-098 (GW-28) (TD=65')	CLEANUP STANDARD	10'	20'
As	10.0	-	18.6
Be	0.41	0.72	0.79
Cr	44	-	-
Cd	39	-	-
Pb	500	-	-
Tl	12.0	-	-
Bz	2.7	-	-
Dieldrin	0.11	-	-
DDT	5	-	-
cPAH's	0.23	-	-
PCB's	0.22	-	-

SB-090 (VW-25) (TD=35')	CLEANUP STANDARD	6'
As	10.0	-
Be	0.41	-
Cr	44	55.8
Cd	39	-
Pb	500	-
Tl	12.0	13.1
Bz	2.7	-
Dieldrin	0.11	-
DDT	5	-
cPAH's	0.23	-
PCB's	0.22	0.86

HPB-7-04	CLEANUP STANDARD	6'	10'	14'
As	10.0	-	-	-
Be	0.41	0.50	0.38	0.50
Cr	44	-	-	-
Cd	39	-	-	-
Pb	500	-	-	-
Tl	12.0	<6	<6	<6
Bz	2.7	-	-	-
Dieldrin	0.11	-	-	-
DDT	5	-	-	-
cPAH's	0.23	<0.2	<0.2	<0.2
PCB's	0.22	<0.03	<0.03	<0.03

NOTES

1. MATRIX INTERFERENCES CAUSED THE DETECTION LIMITS FOR THIS ANALYSIS TO BE INCREASED.
2. THESE BORINGS DID NOT INDICATE CONCENTRATIONS ABOVE THE ROD CLEANUP STANDARD.
3. THIS BORING NOT REFUSED AT 2 FEET.
4. BOLD NUMBERS DENOTE THAT THE CHEMICAL CONCENTRATION IS IN EXCEEDANCE OF THE ROD CLEANUP STANDARD.

LEGEND

- HOLLOW-STEM AUGER BORING (HAB)
- HYDRAULICALLY-PUSHED BORING (HPB)
- SOIL BORING FROM RI (SB)
- FENCE
- SITE BOUNDARY (APPROXIMATE)
- AREA BOUNDARY (APPROXIMATE)
- APPROXIMATE AREA OF EXCAVATION DESIGNATED IN ROD
- APPROXIMATE AREA OF SUMP MATERIAL DESIGNATED BY ENVIRONMENTAL SOLUTIONS, INC. 1995 FIELD INVESTIGATION
- APPROXIMATE AREA OF HIGH SOIL GAS AND NON ROD REGULATED VOCs AND SVOCs

As	ARSENIC
Be	BERYLLIUM
Cr	CHRONIUM
Cd	CADNIUM
Pb	LEAD
Tl	THALLIUM
Bz	BENZENE
cPAH's	CARCINOGENIC-POLYCYCLIC AROMATIC HYDROCARBONS
PCB's	POLYCHLORINATED BIPHENYLS
TD	TOTAL DEPTH IN FEET

0 50 100 FEET
SCALE

FIGURE 3.3

SOIL BORING ANALYTICAL DATA AREA 7

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

ENVIRONMENTAL SOLUTIONS, INC.