FINAL CLOSURE PLAN
LOPEZ CANYON SANITARY LANDFILL
LAKE VIEW TERRACE, CALIFORNIA

VOLUME II OF IV
PARTIAL CLOSURE PLAN
(APPENDICES)

Prepared for

Bureau of Sanitation
Department of Public Works
City of Los Angeles
419 South Spring Street, Suite 800
Los Angeles, California 90013

Prepared by

Bryan A. Stirrat & Associates
1360 Valley Vista Drive
Diamond Bar, California 91765

1 February 1994

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APPENDIX A

EVALUATING COVER SYSTEMS FOR SOLID AND HAZARDOUS WASTE

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EVALUATING COVER SYSTEMS FOR SOLID AND HAZARDOUS WASTE (REVISED)

(U.S.) Army Engineer Waterways Experiment Station, Vicksburg, MS

Sep 82

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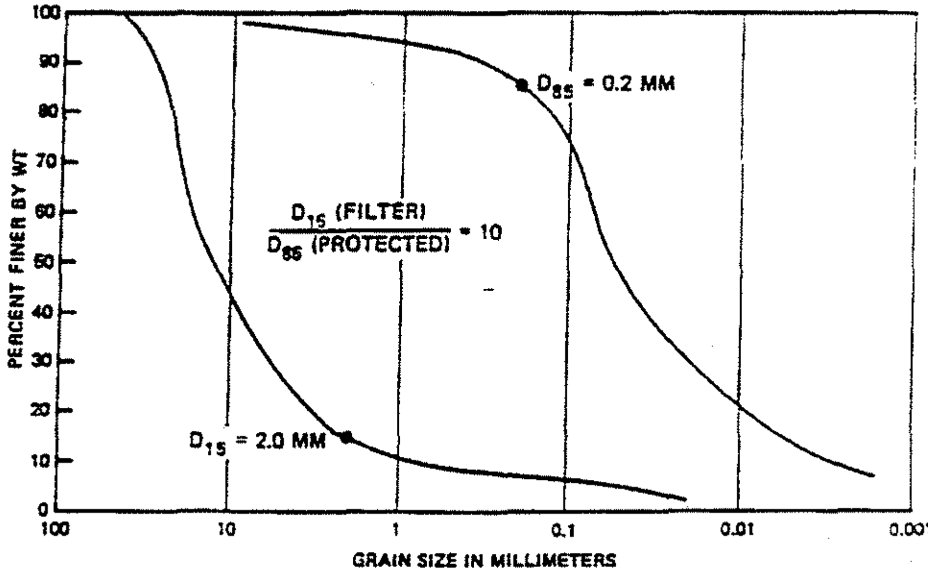

Figure 18. Hypothetical size gradation of ineffective filter soil.

Gas drainage layers and channels may have granular consistency and interconnections and general configuration similar to those of the water drainage layer or channel. Both layer types function to transmit preferentially. The position in the cover system is a main distinction. The gas drainage layer is placed on the lower side (Figure 19) to intercept gases rising from waste cells, whereas the drain for water is positioned on the upper side to intercept water percolating from the surface.

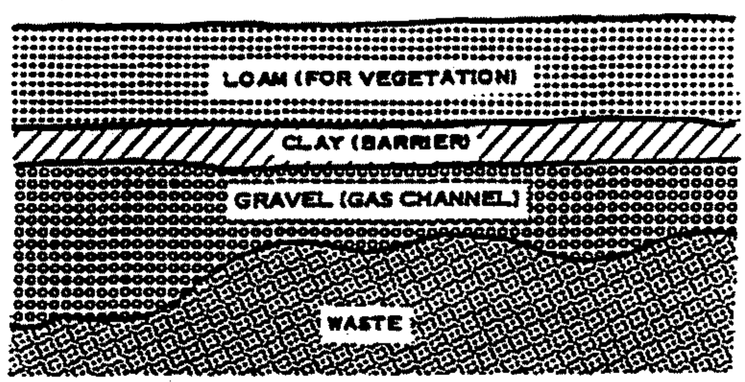

Figure 19. Cover layering suitable for conveying gases to vents.

<u>Evaluate Topsoil</u> <u>Step 16</u>

A topsoil or a subsoil made amenable to supporting vegetation frequently forms the top of a layered cover system. Untreated subsoils are seldom suitable directly, so it has been necessary frequently to supplement subsoil with fertilizers, conditioners, etc., as explained elsewhere (Steps 26-28), to obtain the desired result. Loams or USCS types GM, GC, SM, SC, ML, and CL (Figure 3) are recommended, but agronomic considerations usually prevail. The upper lift should be placed in a loose condition and not compacted.

Evaluate Time of Construction — Step 17

Better results in placement of cover can often be achieved at certain times (seasons) of the year. For this reason, the permit application may need to have the time of cover construction bracketed. The dominant consideration is commonly the season appropriate to establishing vegetation, and the subject is discussed in more detail in Steps 31 and 32. The presence of snow or a condition of frozen soil and waste interferes with proper placement in many northern states. Later, the spring thaw can produce temporary problems in handling and control of wet soil. On the other hand, hot, dry summer weather can create construction problems of excessive drying and cracking, wind erosion, and dust generation. As general guidance, it is usually preferable to place cover in the spring or early fall (and to a lesser degree through the summer). Departures from the two preferred intervals should be justified in the application.

Review Proposed Construction Techniques — Step 18

The application should be carefully reviewed for conformance to the following general recommendations for layering (from the bottom up):

a. Make buffer layer below barrier thick and dense enough to provide smooth, stable base for compacting in c below.

b. Compact all layers except topsoil and top lift of upper buffer.

c. In barrier layer, consider striving for 90 percent of maximum dry density according to 5- or 15-blow compaction test where solid waste is soft or according to standard 25-blow compaction test where solid waste is granular and soil-like.

d. Cover barrier layer soon enough to prevent excessive drying and cracking.

e. Provide sufficient design thickness to assure performance of layer function; specifying a 6- to 12-inch minimum should prevent excessively thin spots resulting from poor spreading techniques.

f. Construct in plots small enough to allow rapid completion.

g. Consider seeding topsoil at time of spreading.

CONFIGURATION EVALUATION PROCEDURE

The concern for the configuration of the cover surface is driven mostly by a desire to avoid excessive erosion or excessive infiltration.

Not only is erosion objectionable in itself but erosion can degrade the cover and seriously reduce its effectiveness.

Evaluate Erosion Potential Step 19

The USDA universal soil loss equation (USLE) is a convenient tool for use in evaluating erosion potential. The USLE predicts average annual soil loss as the product of six quantifiable factors. The equation is:

$$A = R\,K\,L\,S\,C\,P$$

where A = average annual soil loss, in tons/acre
R = rainfall and runoff erosivity index
K = soil erodibility factor, tons/acre
L = slope-length factor
S = slope-steepness factor
C = cover-management factor
P = practice factor

The data necessary as input to this equation are available to the evaluator in a figure and tables included below. Note that the evaluations in Step 8 on soil composition and Steps 25-32 on vegetation all impact on the evaluation of erosion also.

Factor R in the USLE can be calculated empirically from climatological data. For average annual soil loss determinations, however, R can be obtained directly from Figure 20. Factor K, the average soil loss for a given

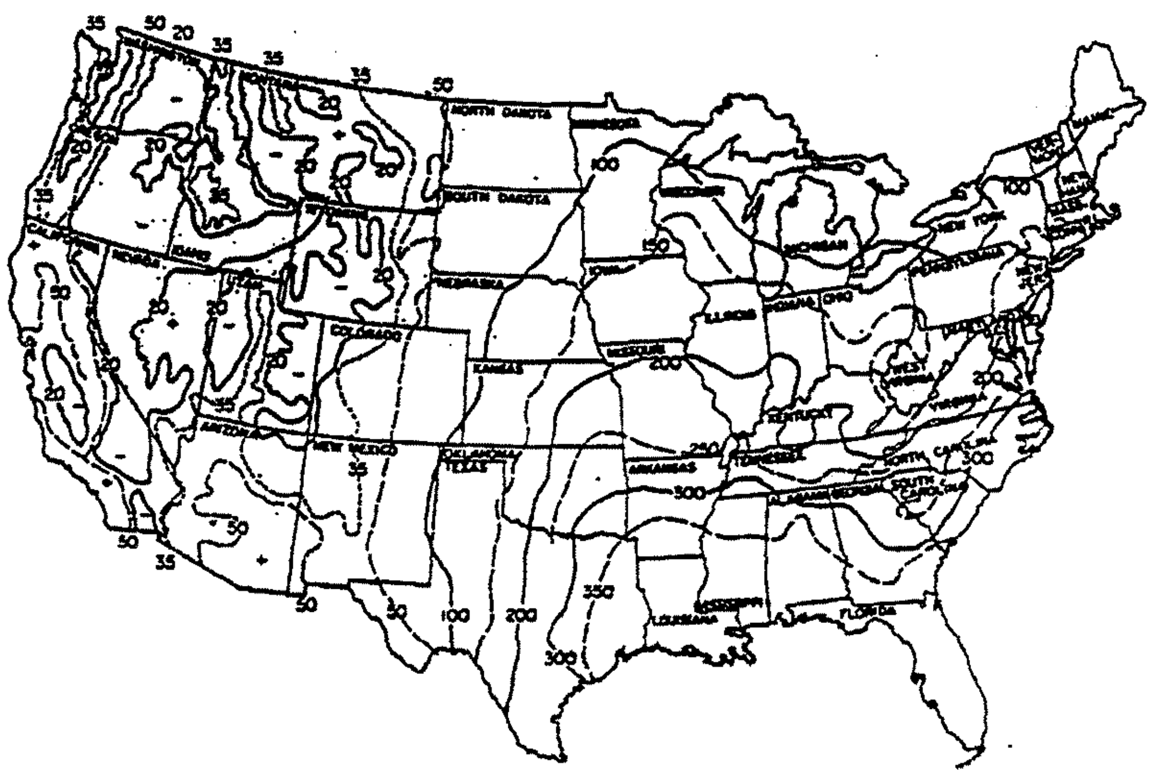

Figure 20. Average annual values of rainfall-erosivity factor R.[11]

soil in a unit plot, pinpoints differences in erosion according to differences in soil type. Long-term plot studies under natural rainfall have produced K values generalized in Table 5 for the USDA soil types.

TABLE 5. APPROXIMATE VALUES OF FACTOR K FOR USDA TEXTURAL CLASSES[11]

Texture class	Organic matter content <0.5% K	2% K	4% K
Sand	0.05	0.03	0.02
Fine sand	.16	.14	.10
Very fine sand	.42	.36	.28
Loamy sand	.12	.10	.08
Loamy fine sand	.24	.20	.16
Loamy very fine sand	.44	.38	.30
Sandy loam	.27	.24	.19
Fine sandy loam	.35	.30	.24
Very fine sandy loam	.47	.41	.33
Loam	.38	.34	.29
Silt loam	.48	.42	.33
Silt	.60	.52	.42
Sandy clay loam	.27	.25	.21
Clay loam	.28	.25	.21
Silty clay loam	.37	.32	.26
Sandy clay	.14	.13	.12
Silty clay	.25	.23	.19
Clay		0.13–0.29	

The values shown are estimated averages of broad ranges of specific-soil values. When a texture is near the borderline of two texture classes, use the average of the two K values.

The evaluator must next consider the shape of the slope in terms of length and inclination. The appropriate LS factor is obtained from Table 6. A nonlinear slope may have to be evaluated as a series of segments, each with uniform gradient. Two or three segments should be sufficient for most engineered landfills, provided the segments are selected so that they are also of equal length (Table 6 can be used, with certain adjustments). Enter Table 6 with the total slope length and read LS values corresponding to the percent slope of each segment. For three segments, multiply the chart LS values for the upper, middle, and lower segments by 0.58, 1.06, and 1.37, respectively. The average of the three products is a good estimate of the

TABLE 6. VALUES OF THE FACTOR LS FOR SPECIFIC COMBINATIONS OF SLOPE LENGTH AND STEEPNESS[11]

% Slope	Slope length (feet)											
	25	50	75	100	150	200	300	400	500	600	800	1000
0.5	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.19	0.20
1	0.09	0.10	0.12	0.13	0.15	0.16	0.18	0.20	0.21	0.22	0.24	0.26
2	0.13	0.16	0.19	0.20	0.23	0.25	0.28	0.31	0.33	0.34	0.38	0.40
3	0.19	0.23	0.26	0.29	0.33	0.35	0.40	0.44	0.47	0.49	0.54	0.57
4	0.23	0.30	0.36	0.40	0.47	0.53	0.62	0.70	0.76	0.82	0.92	1.0
5	0.27	0.38	0.46	0.54	0.66	0.76	0.93	1.1	1.2	1.3	1.5	1.7
6	0.34	0.48	0.58	0.67	0.82	0.95	1.2	1.4	1.5	1.7	1.9	2.1
8	0.50	0.70	0.86	0.99	1.2	1.4	1.7	2.0	2.2	2.4	2.8	3.1
10	0.69	0.97	1.2	1.4	1.7	1.9	2.4	2.7	3.1	3.4	3.9	4.3
12	0.90	1.3	1.6	1.8	2.2	2.6	3.1	3.6	4.0	4.4	5.1	5.7
14	1.2	1.6	2.0	2.3	2.8	3.3	4.0	4.6	5.1	5.6	6.5	7.3
16	1.4	2.0	2.5	2.8	3.5	4.0	4.9	5.7	6.4	7.0	8.0	9.0
18	1.7	2.4	3.0	3.4	4.2	4.9	6.0	6.9	7.7	8.4	9.7	11.0
20	2.0	2.9	3.5	4.1	5.0	5.8	7.1	8.2	9.1	10.0	12.0	13.0
25	3.0	4.2	5.1	5.9	7.2	8.3	10.0	12.0	13.0	14.0	17.0	19.0
30	4.0	5.6	6.9	8.0	9.7	11.0	14.0	16.0	18.0	20.0	23.0	25.0
40	6.3	9.0	11.0	13.0	16.0	18.0	22.0	25.0	28.0	31.0	--	--
50	8.9	13.0*	15.0	18.0	22.0	25.0	31.0	--	--	--	--	--
60	12.0	16.0	20.0	23.0	28.0	--	--	--	--	--	--	--

Values given for slopes longer than 300 feet or steeper than 18% are extrapolations beyond the range of the research data and, therefore, less certain than the others.

overall effective LS value. If two segments are sufficient, multiply by 0.71 and 1.29.

Factor C in the USLE is the ratio of soil loss from land cropped under specified conditions to that from clean-tilled, continuous fallow. Therefore, C combines effects of vegetation, crop sequence, management, and agricultural (as opposed to engineering) erosion-control practices. On landfills, freshly covered and without vegetation or special erosion-reducing procedures of cover placement, C will usually be about unity. Where there is vegetative cover or significant amounts of gravel, roots, or plant residues or where cultural practices increase infiltration and reduce runoff velocity, C is much less than unity. Estimate C by reference to Table 7 for anticipated cover management, but also consider changes that may take place in time. Meadow values are usually most appropriate. See Reference 1 for additional guidance.

Factor P in the USLE is similar to C except that it accounts for additional erosion-reducing effects of land management practices that are superimposed on the cultural practices, e.g., contouring, terracing, and contour strip-cropping. Approximate values of P, related only to slope steepness,

TABLE 7. GENERALIZED VALUES OF FACTOR C FOR STATES EAST OF THE ROCKY MOUNTAINS[11]

Crop, rotation, and management	Productivity level: High	Productivity level: Mod.
	C value	
Base value: continuous fallow, tilled up and down slope	1.00	1.00
CORN		
C, RdR, fall TP, conv	0.54	0.62
C, RdR, spring TP, conv	.50	.59
C, RdL, fall TP, conv	.42	.52
C, RdR, wc seeding, spring TP, conv	.40	.49
C, RdL, standing, spring TP, conv	.38	.48
C-W-M-M, RdL, TP for C, disk for W	.039	.074
C-W-M-M-M, RdL, TP for C, disk for W	.032	.061
C, no-till pl in c-k sod, 95-80% rc	.017	.053
COTTON		
Cot. conv (Western Plains)	0.42	0.49
Cot. conv (South)	.34	.40
MEADOW		
Grass & Legume mix	0.004	0.01
Alfalfa, lespedeza or Sericia	.020	
Sweet clover	.025	
SORGHUM, GRAIN (Western Plains)		
RdL, spring TP, conv	0.43	0.53
No-till pl in shredded 70-50% rc	.11	.18
SOYBEANS		
B, RdL, spring TP, conv	0.48	0.54
C-B, TP annually, conv	.43	.51
B, no-till pl	.22	.28
C-B, no-till pl, fall shred C stalks	.18	.22
WHEAT		
W-F, fall TP after W	0.38	
W-F, stubble mulch, 500 lbs rc	.32	
W-F, stubble mulch, 1000 lbs rc	.21	

Abbreviations defined:

B - soybeans
C - corn
c-k - chemically killed
conv - conventional
cot - cotton
F - fallow
M - grass & legume hay
pl - plant
W - wheat
wc - winter cover

lbs rc - pounds of crop residue per acre remaining on surface after new crop seeding
% rc - percentage of soil surface covered by residue mulch after new crop seeding
70-50% rc - 70% cover for C values in first column; 50% for second column
RdR - residues (corn stover, straw, etc.) removed or burned
RdL - all residues left on field (on surface or incorporated)
TP - turn plowed (upper 5 or more inches of soil inverted, covering residues)

are listed in Table 8. These values are based on rather limited field data, but P has a narrower range of possible values than the other five factors.

TABLE 8. VALUES OF FACTOR P[11]

Practice	Land slope (percent)				
	1.1-2	2.1-7	7.1-12	12.1-18	18.1-24
	(Factor P)				
Contouring (P_c)	0.60	0.50	0.60	0.80	0.90
Contour strip cropping (P_{sc})					
R-R-M-M[1]	0.30	0.25	0.30	0.40	0.45
R-W-M-M	0.30	0.25	0.30	0.40	0.45
R-R-W-M	0.45	0.38	0.45	0.60	0.68
R-W	0.52	0.44	0.52	0.70	0.90
R-O	0.60	0.50	0.60	0.80	0.90
Contour listing or ridge planting (P_{cl})	0.30	0.25	0.30	0.40	0.45
Contour terracing (P_t)[2]	[3] $0.6/\sqrt{n}$	$0.5/\sqrt{n}$	$0.6/\sqrt{n}$	$0.8/\sqrt{n}$	$0.9/\sqrt{n}$
No support practice	1.0	1.0	1.0	1.0	1.0

[1] R = rowcrop, W = fall-seeded grain, O = spring-seeded grain, M = meadow. The crops are grown in rotation and so arranged on the field that rowcrop strips are always separated by a meadow or winter-grain strip.

[2] These P_t values estimate the amount of soil eroded to the terrace channels and are used for conservation planning. For prediction of off-field sediment, the P_t values are multiplied by 0.2.

[3] n = number of approximately equal-length intervals into which the field slope is divided by the terraces. Tillage operations must be parallel to the terraces.

Example: An owner/operator proposes to close one section of his small landfill with a sandy clay subsoil cover having the surface configuration shown in Figure 21. The factor R has been established as 200 for this locality. The evaluator questions anticipated erosion along the steep side and assigns the following values to the other factors in the USLE after inspecting Tables 5 through 8:

$$K = 0.14 \quad LS = 8.3 \quad C = 1.00 \quad P = 0.90$$

The rate of erosion for the steep slope of the landfill is calculated as follows:

$$A = 200\ (0.14\ \text{tons/acre})\ (8.3)\ (1.00)\ (0.90) = 209\ \text{tons/acre}$$

This erosion not only exceeds a limit recommended by the permitting authority but also indicates a potential exposure of solid waste in that side of the landfill. The evaluator therefore recommends that the owner/operator review his plan of closure to reduce the potential erosion. One way that the operator might accomplish this reduction in erosion is by placing additional solid waste along the steep slope in an overlapping wedge as indicated in the figure. Although the new cover would have a greater slope length, the overall effect is to reduce the factor LS and the amount of erosion.

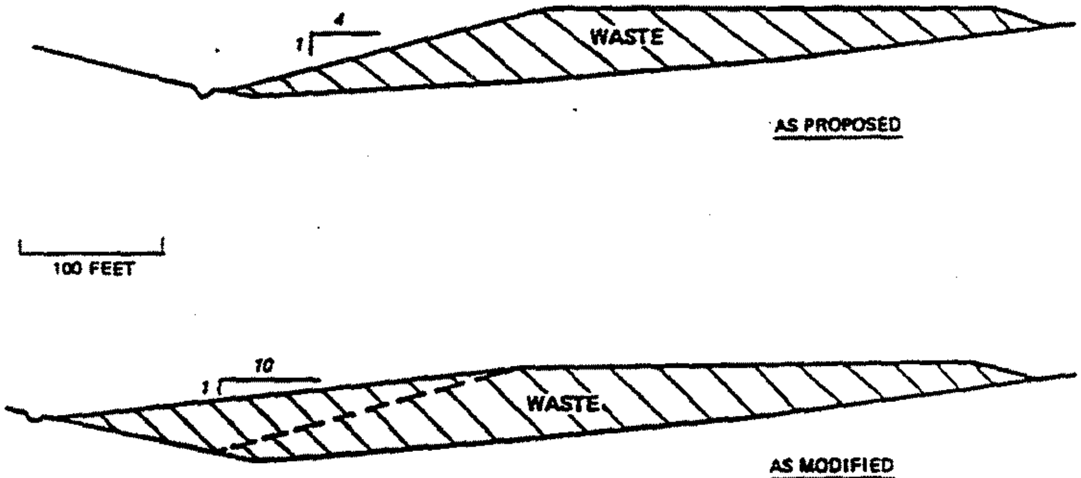

Figure 21. Hypothetical landfill configuration and modification.

Evaluate Surface Slope Inclination **Step 20**

Rainfall runoff is increased by increases in inclination of the surface, and accordingly, infiltration is decreased. Since erosion also increases with increasing inclination (Step 19), the balance between these opposing considerations often must be carefully evaluated. On slopes of less than 3 percent, the irregularities of the surface and vegetation commonly act as traps for detention of runoff. The value 5 percent has been suggested and used in grounds maintenance[13] as an approximation of an inclination sufficient to facilitate runoff without risking excessive erosion. A quantitative evaluation of the erosional effect of inclination is outlined for factor LS under Step 19.

Not only is erosion more serious as inclination is increased, but slope mass stability can become a factor on relatively steep side slopes of landfills and surface impoundments. Usually the evaluator will do well to seek assistance from technical agencies experienced in analyzing slope stability since varied strength properties and seepage conditions can greatly complicate the mass stability. As a rough guide, however, the evaluator can usually count on the rule of thumb that not exceeding 1V (vertical) on 4H (horizontal) or other inclination shown by experience or analysis to be relatively stable would assure satisfactory slope performance in most cases.

The vulnerability of knoll-like configurations to wind erosion can be evaluated by the use of Figure 22. An adjustment factor is obtained as an erosion loss percentage of 100 or more in comparison with erosion loss from a similar flat surface. This factor should be used to estimate the effects of sides of landfills that may present a knoll-like configuration toward the prevailing winds.

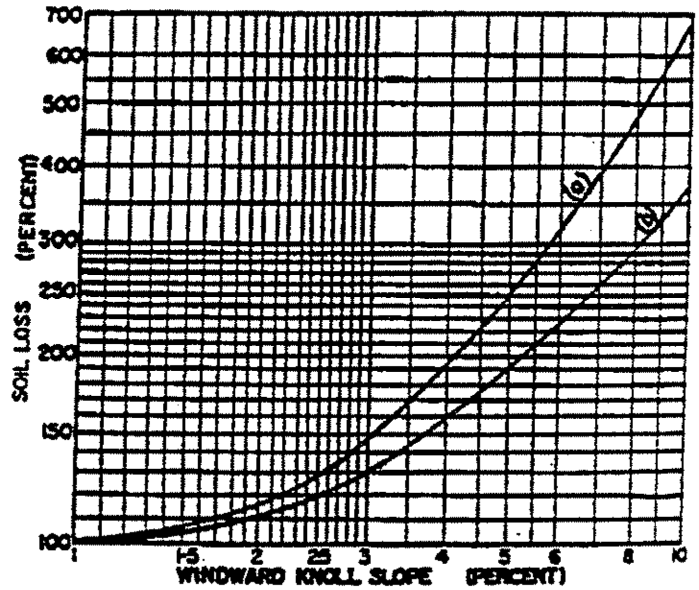

Figure 22. Knoll adjustment (a) from top of knoll and (b) from upper third of slope.[14] (Reproduced by permission of Soil Science Society of America.)

Another general rule of thumb[15] provides that 1V on 2H is the maximum slope on which vegetation can be established and maintained, assuming ideal soil with low erodibility and adequate moisture-holding capacity. In soils less than ideal, maximum vegetative stability cannot be attained on slopes steeper than about 1V on 3H. Optimum vegetative stability generally requires slopes of 1V on 4H or flatter. Similarly, there are limits to the inclination where mowing maintenance is planned. The limit can be as low as IV on 6H for grassed ditches where two slopes meet at the bottom, but more commonly the limit is about IV on 3H.

DRAINAGE EVALUATION PROCEDURE

Check Overall Surface Drainage System — Step 21

Examine the documentation to establish that drainage of surface runoff from the covered area and surroundings has been thoroughly addressed. Maps presenting topography or other descriptions of surface configuration should be carefully reviewed to see that rainfall or snow melt on any part of the site is free to move downslope without encountering obstacles that might lead to ponding or excessive erosion. At the same time, a check should be made to see that the slope is not anywhere in excess of the slopes for flat surfaces and for ditches provided in the regulations. In those places such as the edge of the landfill where slopes may of necessity be relatively steep, a check for adverse effects in the form of excessive erosion should be made as explained elsewhere (Step 19).

Evaluate Ditch Design — Step 22

To confirm the adequacy of drainage ditches, the evaluator should formally check the hydraulic calculations on which design for ditch cross sections are based. This step can be important but for many landfills may only be necessary where diversion ditches convey runoff from beyond the site around its edge. Calculation should not usually be necessary on the landfill cover itself unless an overflow situation would have serious consequences.

Design (and evaluation) of a ditch is routinely accomplished using the Rational equation (Step 7) and Manning's equation. It was explained in Section 2 that calculations of discharge Q for design storm or storms should be included with the documentation supplied with the application for closure. Q in cubic feet/second is used to calculate ditch cross sections in Manning's equation:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$$

where n = coefficient of roughness
A = area, square feet
R = hydraulic radius, feet
S = energy gradient, feet/foot

The Manning's n value is usually obtained from a table and that authoritative reference should be cited in the application to facilitate checking. For a rough check, use n = 0.02. The S in the equation is simply the longitudinal inclination of the ditch.

The design amounts to a manipulation of the remaining unknowns A and R within certain constraints. Numerous tables have been developed and are available for assistance in design; again these references should be identified when used. The cross-sectional area A of the waterfilled ditch is affected by the choice of shape, e.g., between triangular and trapezoidal. The hydraulic radius R is also affected since it is by definition the area divided by the wetted perimeter formed by the ditch. A final constraint is the requirement that erosion in the ditch be limited by limiting discharge velocity Q/A to an appropriate maximum from among those determined as critical for the range of soil types (Table 9).

Evaluate Culvert Design — Step 23

Evaluations of culverts and other closed structures that may occasionally be used as a part of the surface drainage system are approached in approximately the same way as Step 22. An added complication is the capacity

TABLE 9. THRESHOLD VELOCITY FOR EROSION IN DITCHES

Soil	V_{max}, feet/second
GP	7-8
GW, GC	5-7
GM	2-5
SC	3-4
SM	2-3
SW, SP	1-2
CL, CH	2-3
ML, MH	3-5

of the structure to transmit the water. Where the capacity is too small, water will back up and form a pond, at least temporarily.

Check Gas Drainage Step 24

Municipal waste usually generates methane and carbon dioxide. Industrial and hazardous wastes may also produce these gases and may contain sufficient other volatile components to be of concern (see Step 11). Depending on location, land use, and the proximity of buildings, there may be a need for a careful review of the routes of gas drainage.* Methane leakage occasionally threatens human life by potential for explosion. Volatile compounds such as HCB and PCB may present a health or environmental problem. More commonly landfill gases pose a serious threat to the success of vegetation in the long-term.[16] Guidance on the best soils for blocking gas or, at the other extreme, for conveying gas is given in Step 8. The effects of water content, thickness, and layering of cover are discussed in Steps 11 and 15. What remains is commonly to connect the broad collecting layers to surface vents, sometimes through linear drainage features consisting of gravel-filled trenches in which perforated collector pipes are embedded. See Step 15 for criteria on gravelly drains. Details of the system should be submitted with the permit application and should include the features for venting. Reference 17 reviews the passive and induced (pumped) venting systems.

VEGETATION EVALUATION PROCEDURE

Rapid establishment and maintenance of vegetation can be accomplished on soil covering solid waste only by carefully addressing soil type,

* Step 24 is unnecessary for wastes containing no garbage or volatile chemicals.

APPENDIX B

APPENDIX A EXPLORATION AND LABORATORY TEST RESULTS OF THE VOLUME II, REPORT OF DESIGN LOPEZ CANYON LANDFILL

APPENDIX A
OF THE
EXPLORATION
AND
LABORATORY TEST DATA
OF
VOLUME II, REPORT OF DESIGN
LOPEZ CANYON LANDFILL

DATE JULY 23, 1991

APPENDIX A

EXPLORATIONS

The subsurface conditions were recently explored by drilling ten borings at the locations shown on Plate 1. The borings were drilled to depths of 5 to 100 feet below the existing grade using 24-inch-diameter bucket-type drilling equipment. Raveling of the boring walls occurred in Boring 6 during drilling; casing or drilling mud was not used to extend the borings to the depths drilled. Boring 2 was terminated at 36 feet due to hard and difficult drilling.

The materials encountered were logged by our field technician, and undisturbed and bulk samples were obtained for laboratory inspection and testing. The logs of the borings are presented on Plates A-1.1 through A-1.8; the depths at which undisturbed samples were obtained are indicated to the left of the boring logs. The energy required to drive the sampler twelve inches is indicated on the logs. The overburden soils are classified in accordance with the Unified Soil Classification System described on Plate A-2.

LABORATORY TESTS

The field moisture content and dry density of the soils encountered were determined by performing tests on the undisturbed samples. The results of the tests are shown to the left of the boring logs.

Direct shear tests were performed on selected undisturbed samples to determine the strength of the soils and bedrock materials. The tests were performed at field and increased (saturated) moisture contents and at various surcharge pressures. Bedrock materials were sheared and resheared across the natural bedding orientations. Tests were also performed on remolded samples compacted to 90%. The shear strength values and the resheared shear strength of the bedrock materials determined from the direct shear tests are presented on Plate A-3.1, Direct Shear Test Data; results of tests on remolded material are presented on Plate 3.2.

The optimum moisture content and maximum dry density of the materials were determined by performing compaction tests on samples obtained from Borings 8, 9, and 10 and on samples for the liner/cover study. The tests were performed in accordance with the ASTM Designation D1557-70 method of compaction. After completion of the compaction tests, California Bearing Ratio tests were performed on the samples from the borings in accordance with the ASTM Designation D1883-73 method. The results of the tests are presented on Plate A-4.1 through A-4.13, Compaction Test Data and on Plate A-4.14, Compaction and C.B.R. Test Data.

The liquid limit and plasticity index of selected samples were determined. The results of the Atterberg Limit tests are presented in Table 2, Summary of Laboratory Tests for Liner/Cover Study.

Mechanical analyses were performed on representative samples to determine the particle size distribution of the on-site materials. Tests were performed also on potential low permeability and pervious materials for landfill construction. The results are partly presented on Plates A-5.1 through A-5.11, Particle Size Distribution and partly in Table 2.

Permeability tests were performed on 14 undisturbed samples to determine the coefficient of permeability of the soils and bedrock materials. In addition, permeability tests were performed on field compacted and laboratory remolded samples to determine the coefficient of permeability of potential low-permeability on-site materials for the liner/cover study; bentonite was added to some of the samples to evaluate the effectiveness of bentonite on the materials. The samples were tested under a confining pressure of 200 pounds per square foot. The test results on the undisturbed samples are presented on Plate A-6, Permeability Test Data. The test results on the field compacted and laboratory remolded samples are presented in Table 2.

EXPLANATION OF LABORATORY TESTING FOR LOW PERMEABILITY SOIL IDENTIFICATION

Phase 1 laboratory testing (Locations 8701 to 8706) followed our major geologic mapping and, from our subjective observations, was intended to identify the less permeable materials that might have potential use for liner or cover. It was a broad brush sampling of materials that by visual classification appeared to have potential low-permeability application.

Phase 2 laboratory testing was a somewhat more focused follow-up of the Phase 1 testing in a further attempt to identify materials with favorable clay content, since our Phase 1 samples tested yielded fairly low passing No. 200 sieve results, low or non-plasticity indexes and marginal permeability results. The intent of Phase 2 was to identify such materials, if any, by Atterberg limits and percent passing No. 200 sieve tests. Only some material was found with clay content. Of these samples, Samples 8709A, B, and C looked promising for further field and laboratory testing for low permeability and liner cover use.

Materials identified in Samples 8709A, B, and C were used for borrow to construct infiltration test pads to "prove" the material for use as low-permeability liner and cover. Two test pads were constructed, one using native material compacted to about 90% of the laboratory maximum dry density as determined by ASTM Designation D1557-70 and one using native material plus 5% by weight of bentonite, field mixed and compacted to about 90%. The native material pad was designated Test Pad 2 and the native material plus 5% bentonite was designated Test Pad 1. Phase 3 and 4 laboratory testing consisted of tests on undisturbed and bulk samples from the surface and from six inches deep in the test pads. Phase 3 tests are on the native material from Test Pad 2. Phase 4 testing is on the native material with 5% bentonite added from Test Pad 1. It is noted here that tests with bentonite added were also run in Phase 3, but the mixture was laboratory controlled compared to field controlled in Phase 4 tests.

Results of the laboratory test for liner/cover study are summarized in Table 2 under the several phases discussed above.

Table 3, Summary of Field Infiltrometer Test Results, summarizes the infiltration rate results obtained in the field tests on the test pads for comparison to laboratory tests on the same materials. In general, the field tests yield more favorable results than the laboratory method. In our experience, we have found this to be the more common situation.

Because of difficulty in stockpiling the select materials from the test pad borrow area, additional laboratory testing was conducted (Phase 5 of Table 2) to determine permeability on "average" mixtures of typical on-site materials from the ridge top and Canyon C stockpiles. Test pads are currently being constructed with these materials for field permeability testing.

FIELD SEALED DOUBLE-RING INFILTROMETER TESTS

The method described by ASTM Designation D-3385-75, Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometers, was chosen for use at Lopez Canyon to determine soil infiltration rates. The infiltration rate obtained with this method may be used to calculate the hydraulic conductivity (coefficient of permeability) of the soil.

The infiltrometer consists of two metal rings (12 and 24 inches in diameter) 20 inches in height, which are placed concentrically and embedded a few inches into the undisturbed soil. The rings were initially filled with water to a depth of approximately six inches. This initial water level was maintained throughout the duration of the tests by monitoring the levels periodically and recording the volume of water required to restore the initial water levels (± 0.2 mm). Between readings, the rings were tightly covered and shaded in order to minimize evaporative loss. The tests were continued until a resonable constant infiltration rate was achieved.

The final infiltration rate of water from the inner ring was used to calculate the hydraulic conductivity of the soil by the technique presented in Day and Daniel (1985). A value of one was assumed for the lateral spreading factor. The hydraulic gradient was calculated by the method in Smedema and Rycroft (1983).

The results of the sealed doubled-ring infiltrometer tests are presented in Table 3, Summary of Field Infiltrometer Test Results.

REFERENCES

Day, S.R. and Daniel, D.E., "Field Permeability Test for Clay Liners," Hydraulic Barriers in Soil and Rock, ASTM STP 874, Johnson, A.I., Frobel, R.K., Carolli, N.J., and Pettersson, C.B., Eds., American Society for Testing and Materials, Philadelphia, 1985, pp. 276-288.

Smedema, L.K., and Rycroft, D.W., 1983, Chapter 16: Determination of the Hydraulic Conductivity, in Land Drainage, Cornell University Press, Ithaca, New York.

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BORING 1

DATE DRILLED: October 8, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1600 *

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	DESCRIPTION
							SANDSTONE - fine grained, some Silt, light brown
			5.4	114	16		
			6.4	116	19		
1595	5						
			5.1	109	16		Layer of Clayey Sandstone, brown
			5.0	125	22		Light grey
1590	10						
			12.0	122	38		
							SILTSTONE - interbedded Sandstone, greyish brown
1585	15		17.7	113	16		
1580	20		14.9	119	22		
							Some Clay
1575	25		14.5	116	19		
1570	30		13.5	122	24		Light grey
							SANDSTONE - fine grained, light grey and brown
1565	35		4.1	121	48		
1560	40		4.4	126	48		Fine to medium Sand

* Elevations refer to datum of reference topographic map; see Plate 1.

(CONTINUED ON FOLLOWING PLATE)

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

BORING 1 (Continued)

DATE DRILLED: October 8, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	Description
1555	45		4.2	123	56	■	Brown and grey
1550	50		4.5	121	48	■	Light grey
1545	55		4.5	128	48	■	Some Silt
1540	60		6.7	122	48	■	
							Cemented layer
							SILTSTONE - interbedded Sandstone, brownish grey
1535	65		15.0	118	48	■	
1530	70		15.8	112	40	■	
1525	75		13.6	111	35	■	Brown
1520	80		13.7	111	31	■	SANDSTONE - fine to medium grained, brown

(CONTINUED ON FOLLOWING PLATE)

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

BORING 1 (Continued)

DATE DRILLED: October 8, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	
							Light greyish brown
1515	85		6.5	112	30	■	
							Claystone and Sandstone interbeds
1510	90		9.5	101	24	■	
							Grey
1505	95		5.9	113	34	■	
1500	100		9.7	115	30	■	

NOTE: Water not encountered. No caving.

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 2

DATE DRILLED: October 12, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1650

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.
			19.5	109	32	■
			17.3	113	58	■
1645	5					
			19.5	109	46	■
			21.5	100	46	■
1640	10					
			20.5	105	46	■
			18.4	106	54	■
1635	15					
			24.9	94	38	■
1630	20					
			23.8	99	19	■
1625	25					
			16.0	109	23	■
1620	30					
			3.0	118	86	■
1615	35					
1610	40					

SILTSTONE - Claystone interbeds, brown

Black

SHALE - black

Brown

Dark grey and brown

Layer of Siltstone

Claystone interbeds, seams of gypsum, dark brown

SANDSTONE - medium to coarse grained, reddish brown and light brown

(BORING TERMINATED DUE TO HARD AND DIFFICULT DRILLING)

NOTE: Water not encountered. No caving.

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

PLATE A - 1.2

BORING 3

DATE DRILLED: October 10, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1565

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	DESCRIPTION
							SHALE - light brown
			23.2	99	6		
			18.4	110	13		Layer of Sandstone, brown
1560	5						
			25.0	98	10		Grey and brown
							SILTSTONE - seams of gypsum, brown
			19.7	111	16		
1555	10						
			21.0	104	10		Layer of Sandstone, grey
1550	15		21.3	105	13		
1545	20		24.4	96	6		Dark brown
							SHALE - interbedded Siltstone,seams of gypsum, brown and grey
1540	25		17.1	109	13		
1535	30		21.2	101	6		Greyish brown
1530	35		20.3	107	6		
1525	40		19.5	108	6		

(CONTINUED ON FOLLOWING PLATE)

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

PLATE A - 1.3a

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

BORING 3 (Continued)

DATE DRILLED: October 10, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	Description
1520	45		9.7	105	48	■	Cemented layer, oxide stains
1515	50		22.8	99	32	■	Grey
1510	55		21.1	101	14	■	Greyish brown
1505	60		18.6	102	16	■	
1500	65		16.7	106	26	■	Interbedded layers of Sandstone, grey and reddish brown
1495	70		16.7	108	22	■	Grey and brown
1490	75		18.9	108	24	■	
1485	80		18.4	110	19	■	

(CONTINUED ON FOLLOWING PLATE)

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

BORING 3 (Continued)

DATE DRILLED: October 10, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	
1480	85		20.5	103	13	■	Oxide stains, grey
1475	90		20.6	105	18	■	Grey and brown
1470	95		21.9	107	19	■	
1465	100		20.0	107	19	■	

NOTE: Water not encountered. No caving.

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

BORING 4

DATE DRILLED: October 9, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1600

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	DESCRIPTION
							SHALE - light brown and brown
			16.5	111	22	■	
							Some caliche
			29.3	90	16	■	
1595	5						
			26.6	87	12	■	
			19.2	106	12	■	
							Grey
1590	10						
			20.8	104	23	■	
1585	15		24.6	99	12	■	Seam of gypsum
1580	20		19.2	96	4	■	Clay gouge zone
1575	25		26.2	96	15	■	Some caliche
1570	30		22.8	104	19	■	Greyish brown
1565	35		30.2	91	15	■	
1560	40		16.9	113	21	■	

(CONTINUED ON FOLLOWING PLATE)

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

BORING 4 (Continued)

DATE DRILLED: October 9, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	Description
1555	45		29.0	96	21	■	Interbedded Sandstone
1550	50		28.3	89	15	■	
1545	55		22.9	100	16	■	
1540	60		24.6	96	13	■	
1535	65		19.2	101	21	■	Layer of Siltstone
1530	70		23.4	81	17	■	Seams of gypsum
1525	75		24.7	94	48	■	
1520	80		24.1	97	72	■	Dark brown

(CONTINUED ON FOLLOWING PLATE)

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD ____

BORING 4 (Continued)

DATE DRILLED: October 8, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	
1515	85		23.7	91	29	■	
			18.0	103	58	■	Dark grey
1510	90						
1505	95		18.9	101	72	■	
1500	100		19.0	98	72	■	

NOTE: Water not encountered. No caving.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

PLATE A - 1.4c

BORING 5

DATE DRILLED: October 13, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1480

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	
							SANDSTONE - fine grained, some Silt, light brown
			13.4	118	29	■	
			12.9	120	31	■	Light grey
1475	5		14.3	115	31	■	Brown
			15.0	117	31	■	Greyish brown
1470	10		11.8	122	31	■	
1465	15						

NOTE: Water not encountered. No caving.

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

BORING 6

DATE DRILLED: October 13, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1425

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.
			4.3	118	6	■
1420	5		6.8	126	13	■
			4.3	136	13	■
			15.2	107	10	■
1415	10		20.1	101	6	■
			8.1	121	16	■
1410	15		6.8	139	16	■
			15.6	107	6	■
1405	20		12.6	101	3	■
1400	25		6.9	117	16	■

SM — FILL - SILTY SAND - some Clay, about 30% Gravel, reddish brown

Brown

SM — YOUNGER ALLUVIUM (Qal) - SILTY SAND - fine, greyish brown

SC — CLAYEY SAND - about 15% Gravel, some organic matter, greyish brown

Brown

Some rootlets

SM — SILTY SAND - medium to coarse, light brown

NOTE: Water not encountered. Raveling throughout (to 3-1/2' in diameter).

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 7

DATE DRILLED: October 13, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1375

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.
			6.1	107	13	■
			19.3	107	6	■
1370	5					
			11.8	121	10	■
			18.3	108	6	■
1365	10					
			18.8	79	6	■
1360	15					

6" Asphaltic Paving

SM FILL - SILTY SAND - fine to medium, some Gravel, reddish brown

CL FILL - SANDY CLAY - some Silt, greyish brown

Some rootlets

Brown

NOTE: Water not encountered. No caving.

BORING 8

DATE DRILLED: October 12, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1670

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.
			6.5	118	29	■
			11.5	119	26	■
1665	5					
			10.3	121	31	■
1660	10					
1655	15					

SANDSTONE - fine grained, interbedded Shale and Siltstone, grey
Grey and brown

NOTE: Water not encountered. No caving.

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

BORING 9

DATE DRILLED: October 12, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1625

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.
			15.8	109	16	
			5.3	110	38	
1620	5					
1615	10					
1610	15					

SANDSTONE - fine grained, some Silt, light brown

NOTE: Water not encountered. No caving.

BORING 10

DATE DRILLED: October 12, 1987
EQUIPMENT USED: 24" - Diameter Bucket

ELEVATION 1625

ELEVATION (ft.)	DEPTH (ft.)		MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.
			15.4	110	10	
			2.9	109	16	
1620	5					
1615	10					
1610	15					

SILTSTONE - interbedded Sandstone, light brown

Light reddish brown

NOTE: Water not encountered. No caving.

Note : The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

JOB AE-86425-L DATE 11/3/87 F.T. JMK DR. dmh O.E. SK W.P. dmh CHKD

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

NO. 200 NO. 40 NO. 10 NO. 4 3/4 in. 3 in. (12 in.)

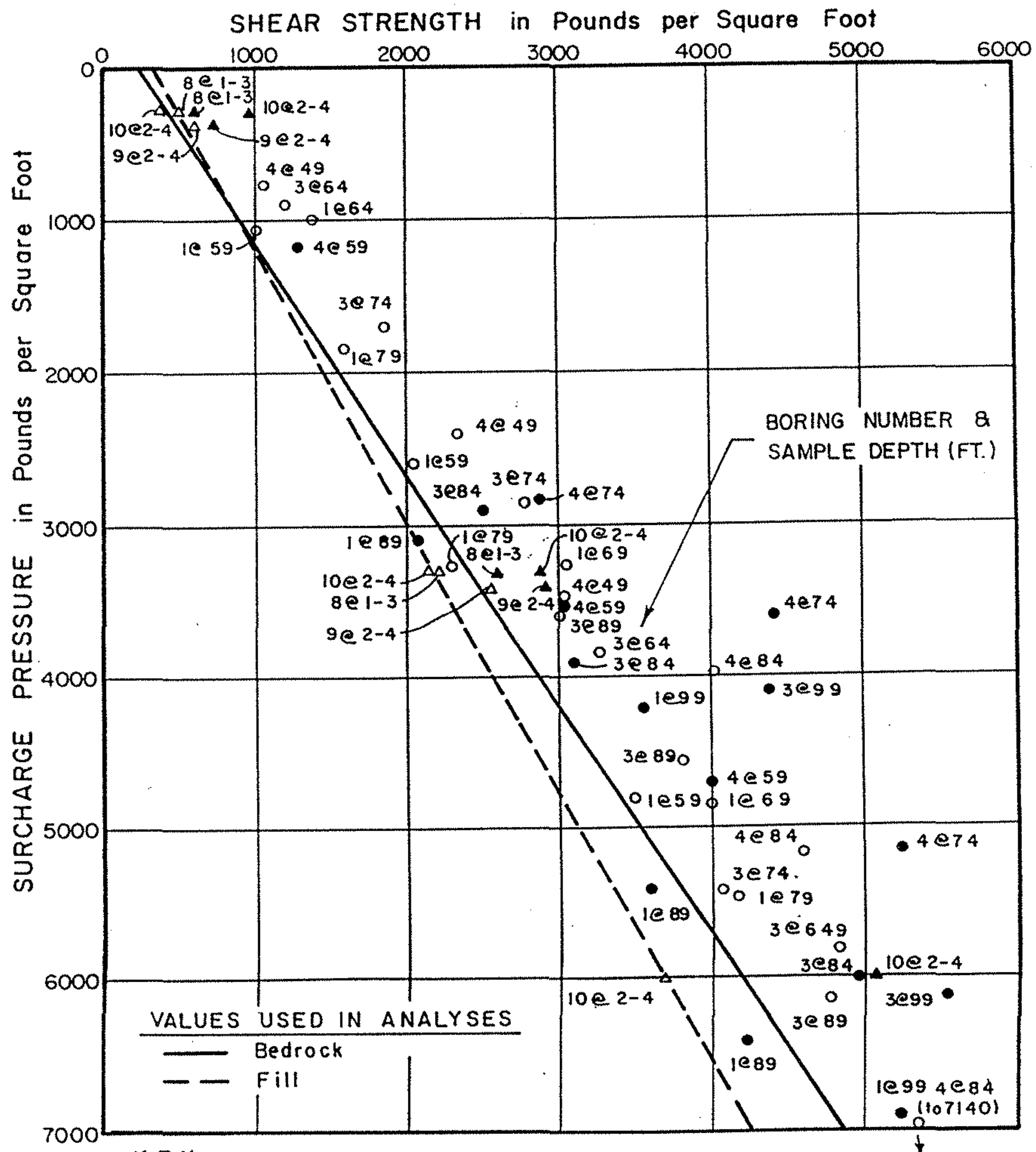
U. S. STANDARD SIEVE SIZE

UNIFIED SOIL CLASSIFICATION SYSTEM

Reference :
The Unified Soil Classification System, Corps of Engineers, U. S. Army Technical Memorandum No. 3-357, Vol. I, March, 1953. (Revised April, 1960)

LeROY CRANDALL AND ASSOCIATES

PLATE A-2



KEY

▲ ● Tests at field moisture content

△ ○ Tests at increased moisture content

Natural soils

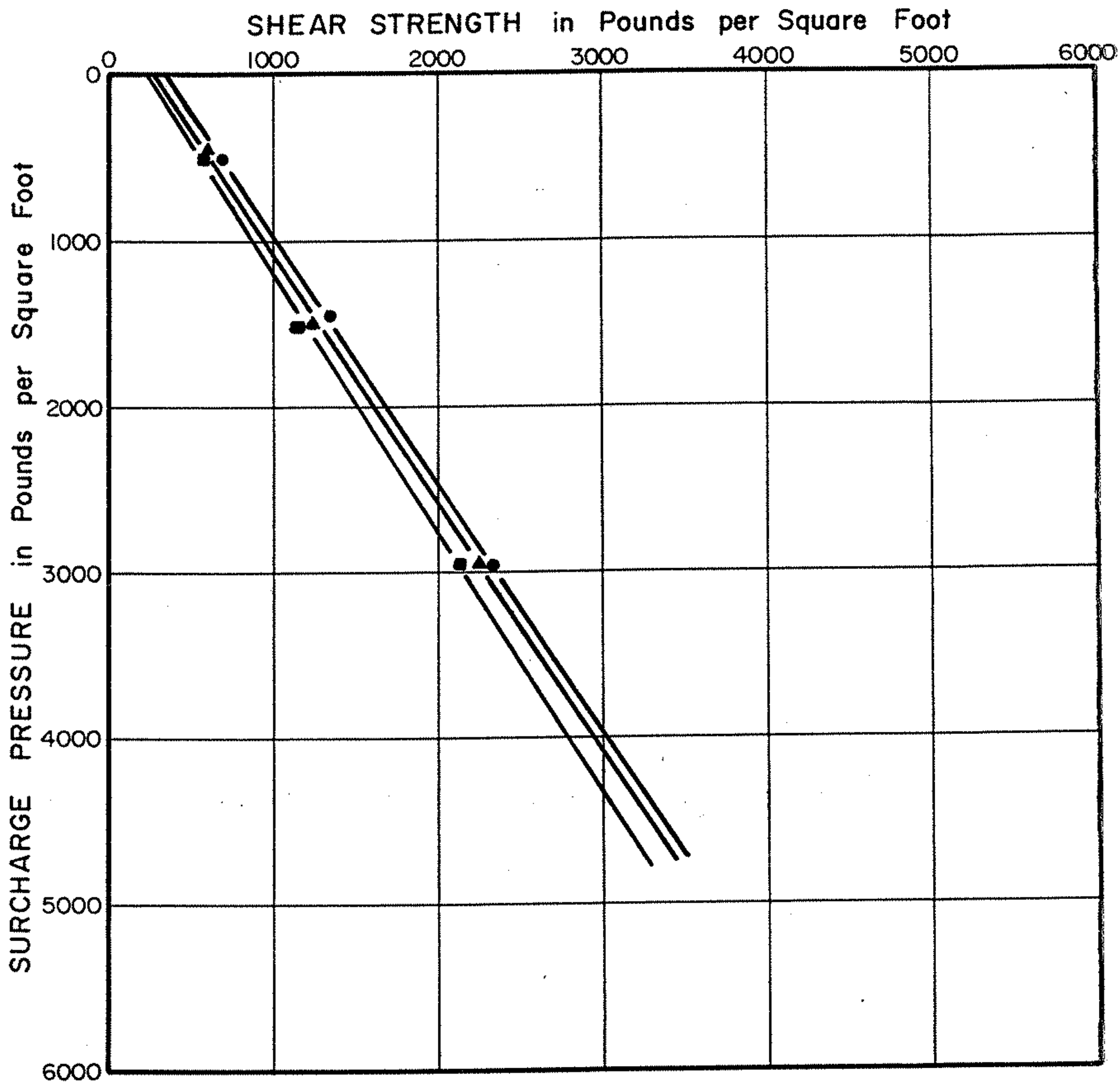
Remolded samples compacted to 90%

DIRECT SHEAR TEST DATA

LeROY CRANDALL & ASSOCIATES

PLATE A-3.1

JOB AE-86425-L DATE 3/29/88 BY JOHN O.E. ______ CHKD. ______



KEY

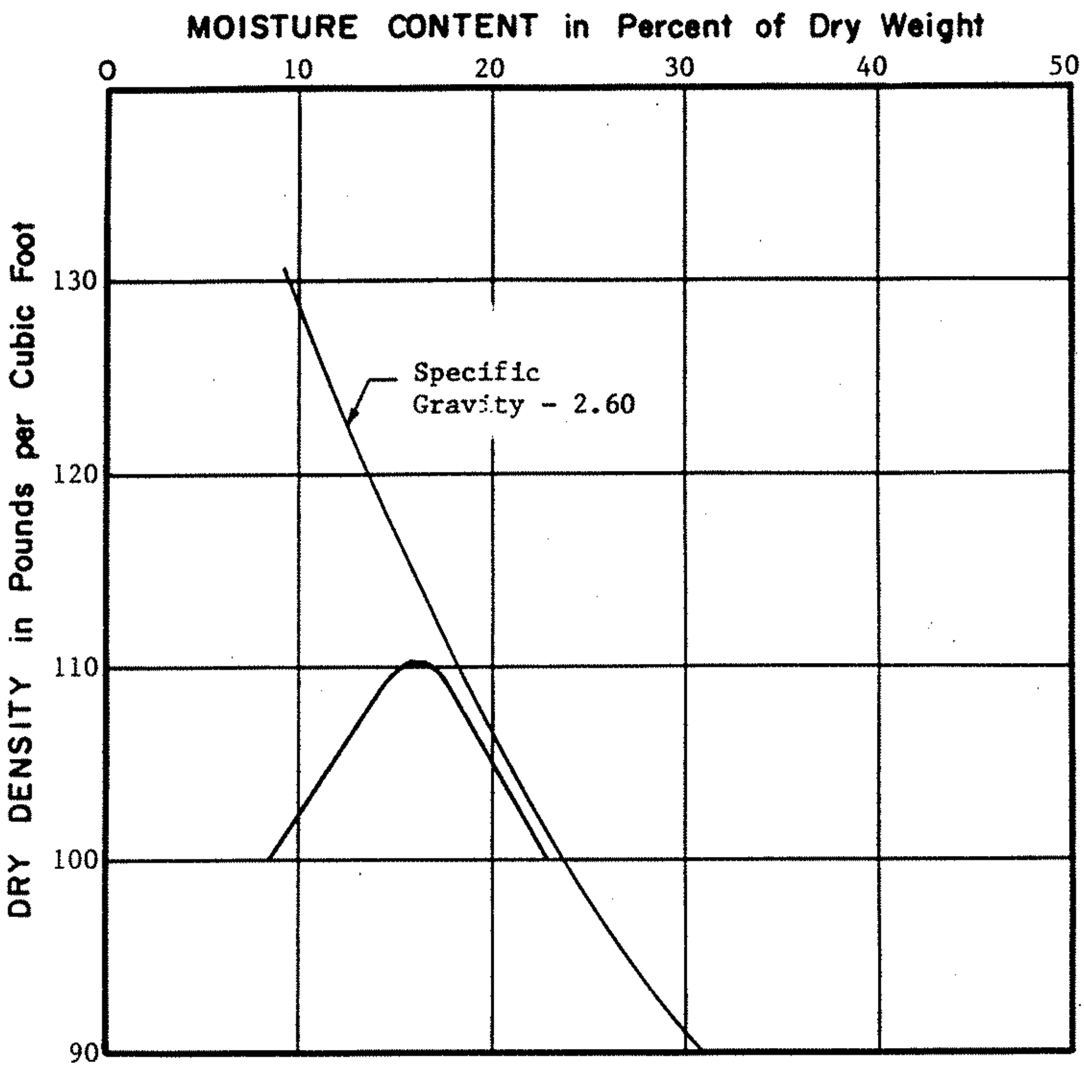
- ● + 0% Bentonite
- ▲ + 5% Bentonite
- ■ + 10% Bentonite
- └ Mixture A: Composite mixture of typical onsite siltstone, sandstone, and shale
  Remolded to 90% compaction

DIRECT SHEAR TEST DATA

LEROY CRANDALL & ASSOCIATES

PLATE A-3.2

JOB E-86425-C DATE 11-27-81 DR. [illegible] O.E. CHKD.



SOURCE: Sample No. 8701A

SOIL TYPE: Grey Silty Shale/Sandstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 110.5 pcf

OPTIMUM MOISTURE CONTENT: 16.5%

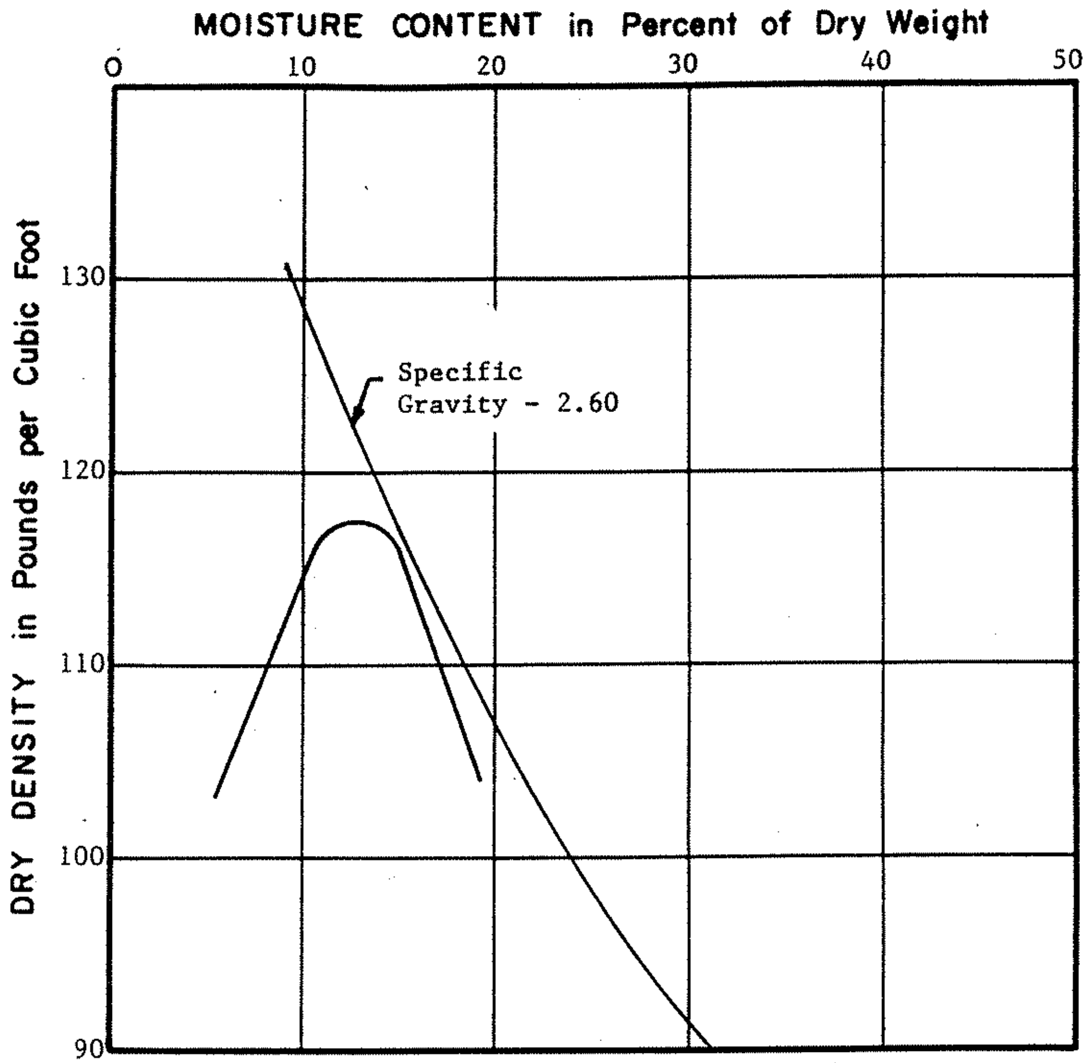
TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LeROY CRANDALL & ASSOCIATES

PLATE A-4.1



SOURCE: Sample No. 8702A

SOIL TYPE: Grey Siltstone/Sandstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 117.5 pcf

OPTIMUM MOISTURE CONTENT: 13.0%

TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

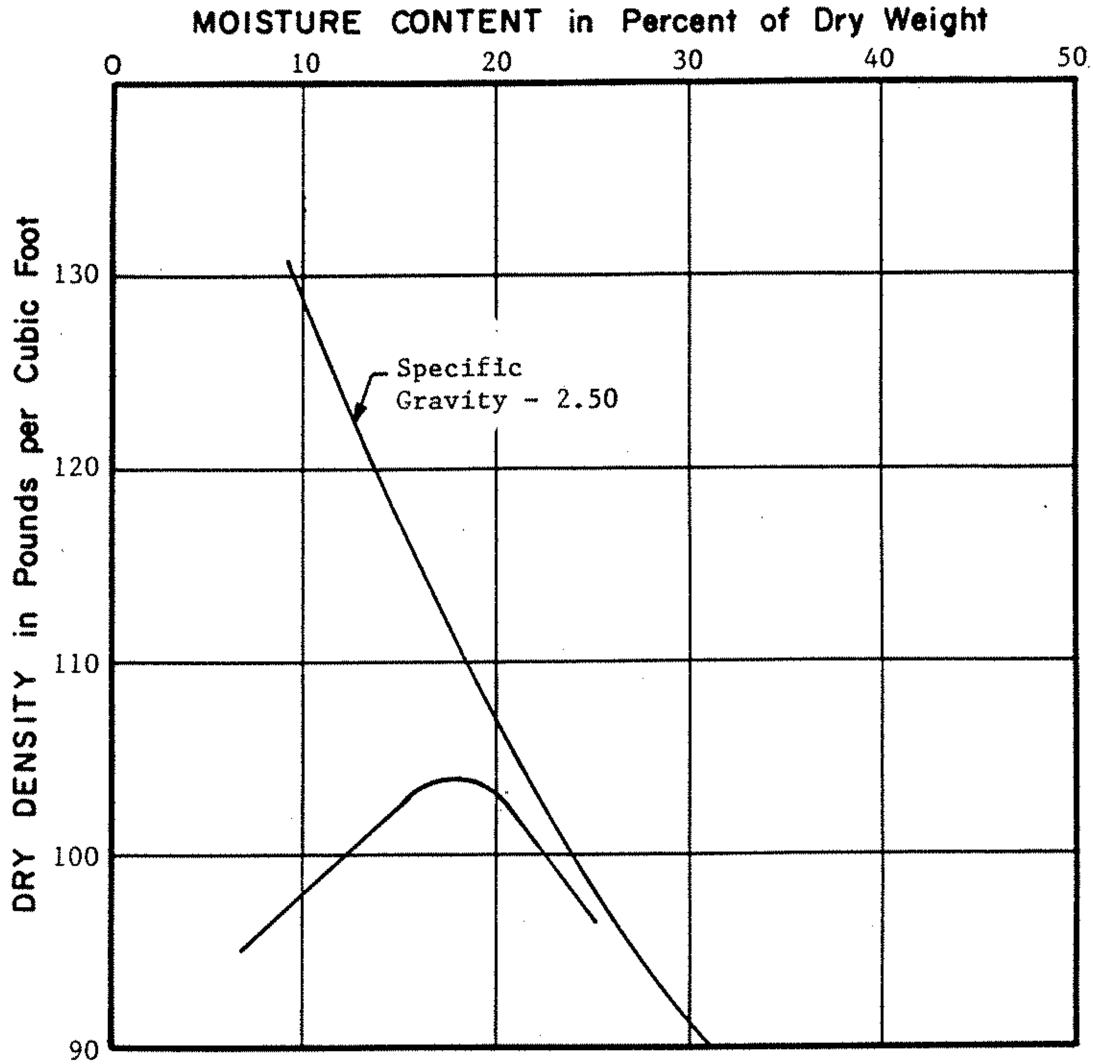
COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

PLATE A-4.2

JOB DATE DR. O.E. CHKD.

JOB E-86425-0 DATE 7-29-8 DR. SANDY O.E. CHKD.



SOURCE: 8703A

SOIL TYPE: Reddish brown Silty/Sandy Shale (Modelo Formation)

MAXIMUM DRY DENSITY: 104.0 pcf

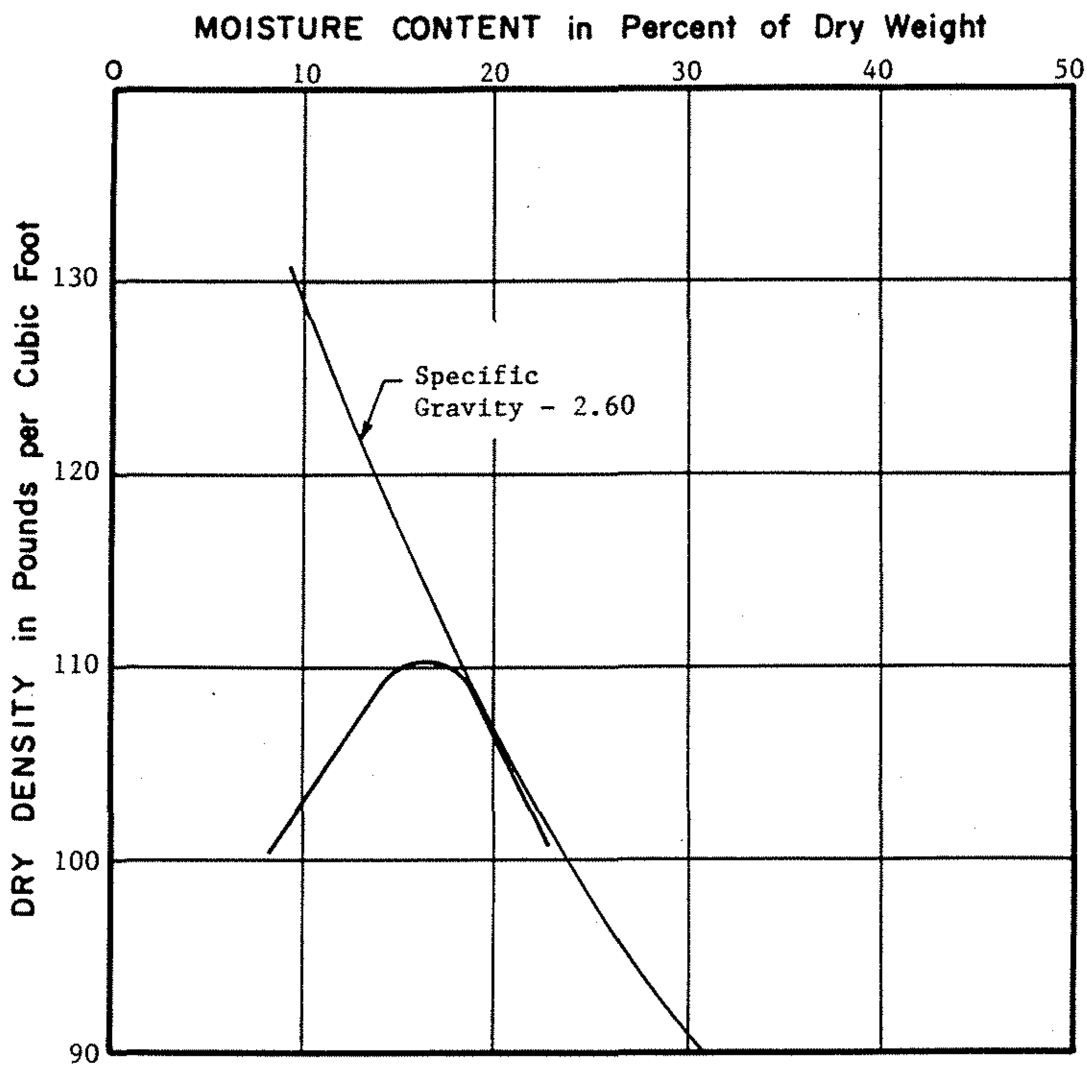
OPTIMUM MOISTURE CONTENT: 18.5%

TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES



SOURCE: Sample No. 8704A

SOIL TYPE: Brown Siltstone/Sandstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 110.5 pcf

OPTIMUM MOISTURE CONTENT: 17.0%

TEST METHOD: ASTM Designation D1557-70

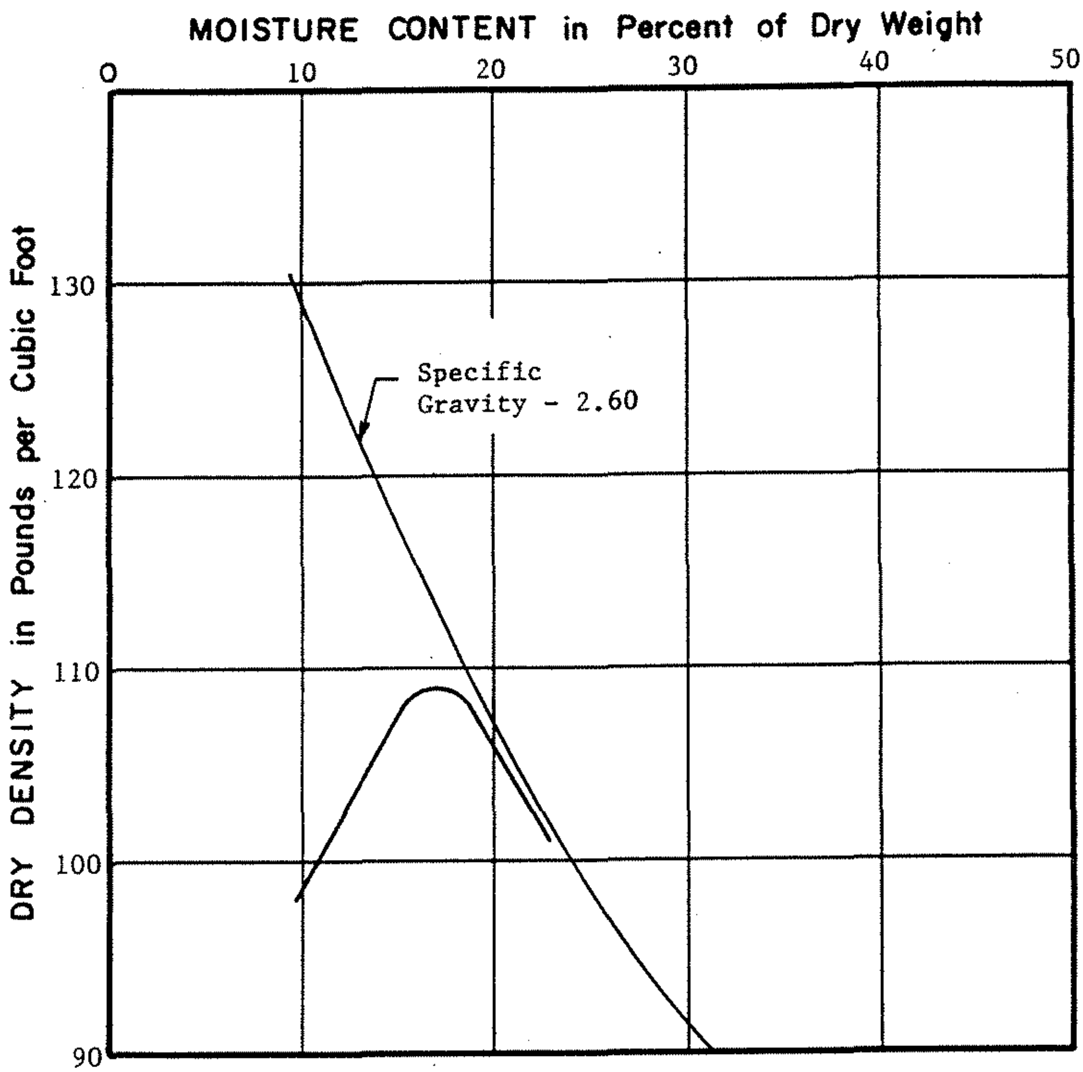
This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

PLATE A-4.4

JOB E-86445-C DATE 7-29-8 DR. SANDY O.E. ____ CHKD. ____



SOURCE: Sample No. 8704B

SOIL TYPE: Brown Siltstone/Sandstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 109.0 pcf

OPTIMUM MOISTURE CONTENT: 17.0%

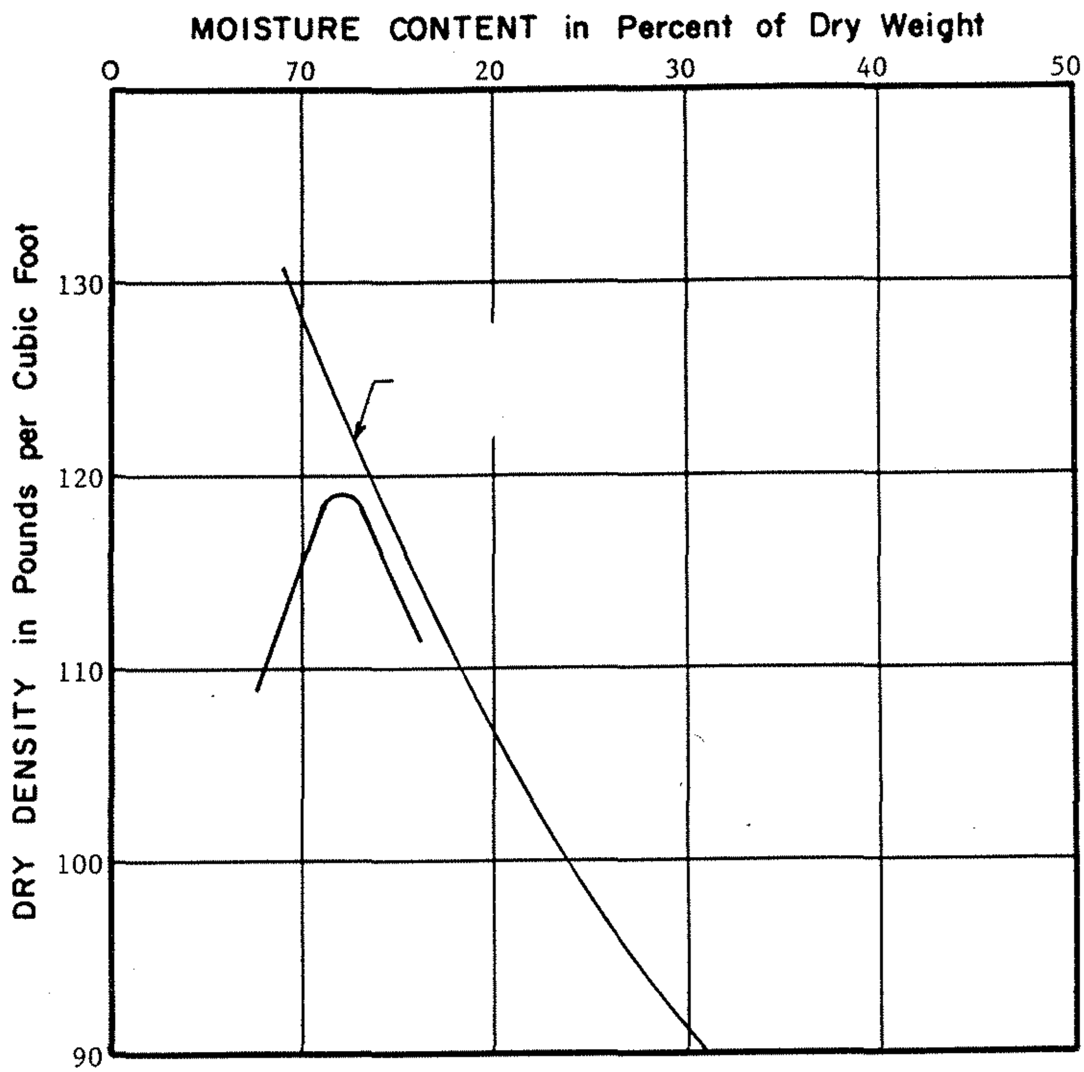
TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

PLATE A-4.5



SOURCE: Sample No. 8705A

SOIL TYPE: Grey to brown Siltstone/Sandstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 119 pcf

OPTIMUM MOISTURE CONTENT: 12.0%

TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

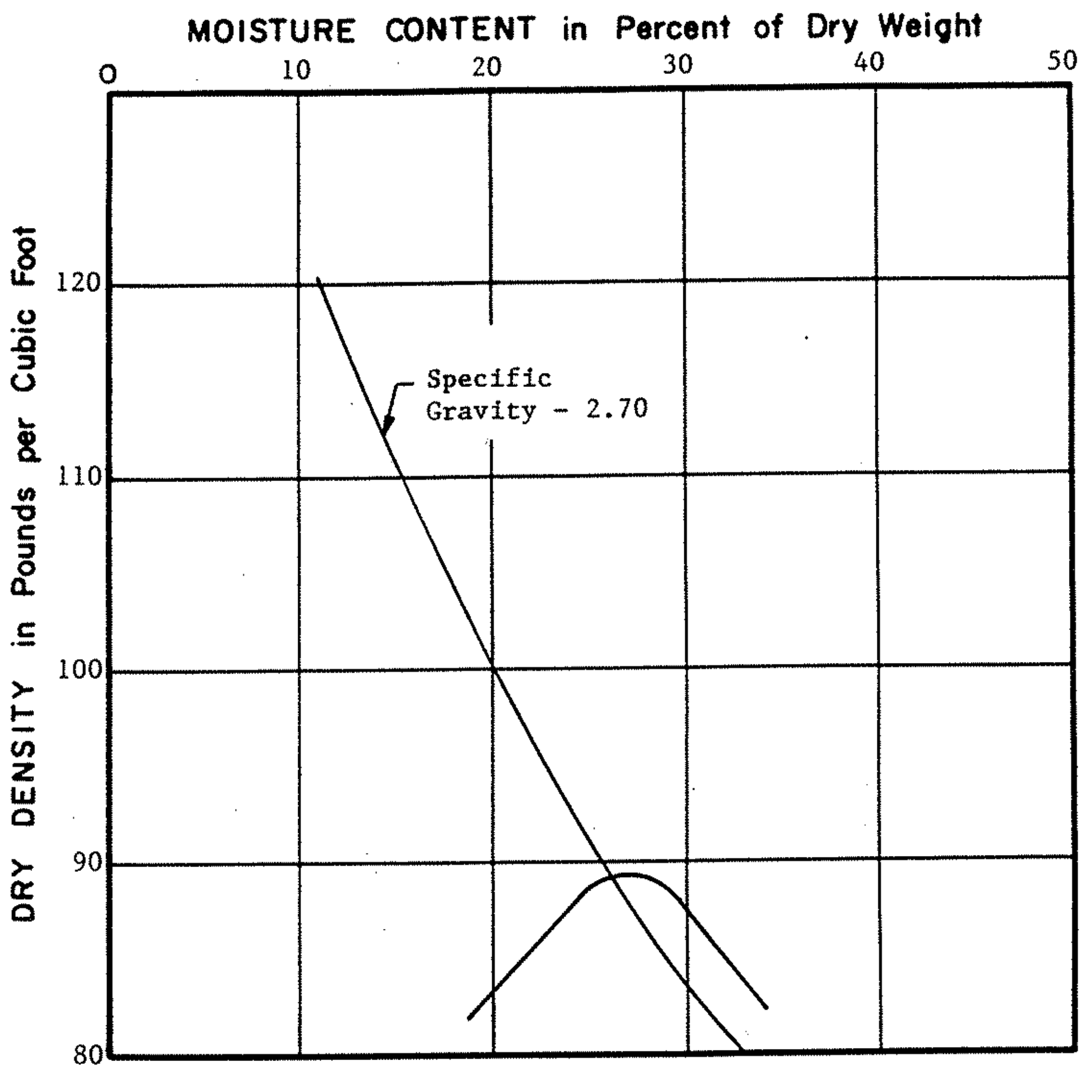
COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

PLATE A-4.6

JOB E-81445-0 DATE 7/29/81 DR. SANDY O.E. CHKD.

JOB E-86465-0 DATE 1-29-87 DR. SANDY O.E. CHKD.



SOURCE: Sample No. 8706A

SOIL TYPE: Gray shale (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 89.5 pcf

OPTIMUM MOISTURE CONTENT: 27.5%

TEST METHOD: ASTM Designation D1557-70

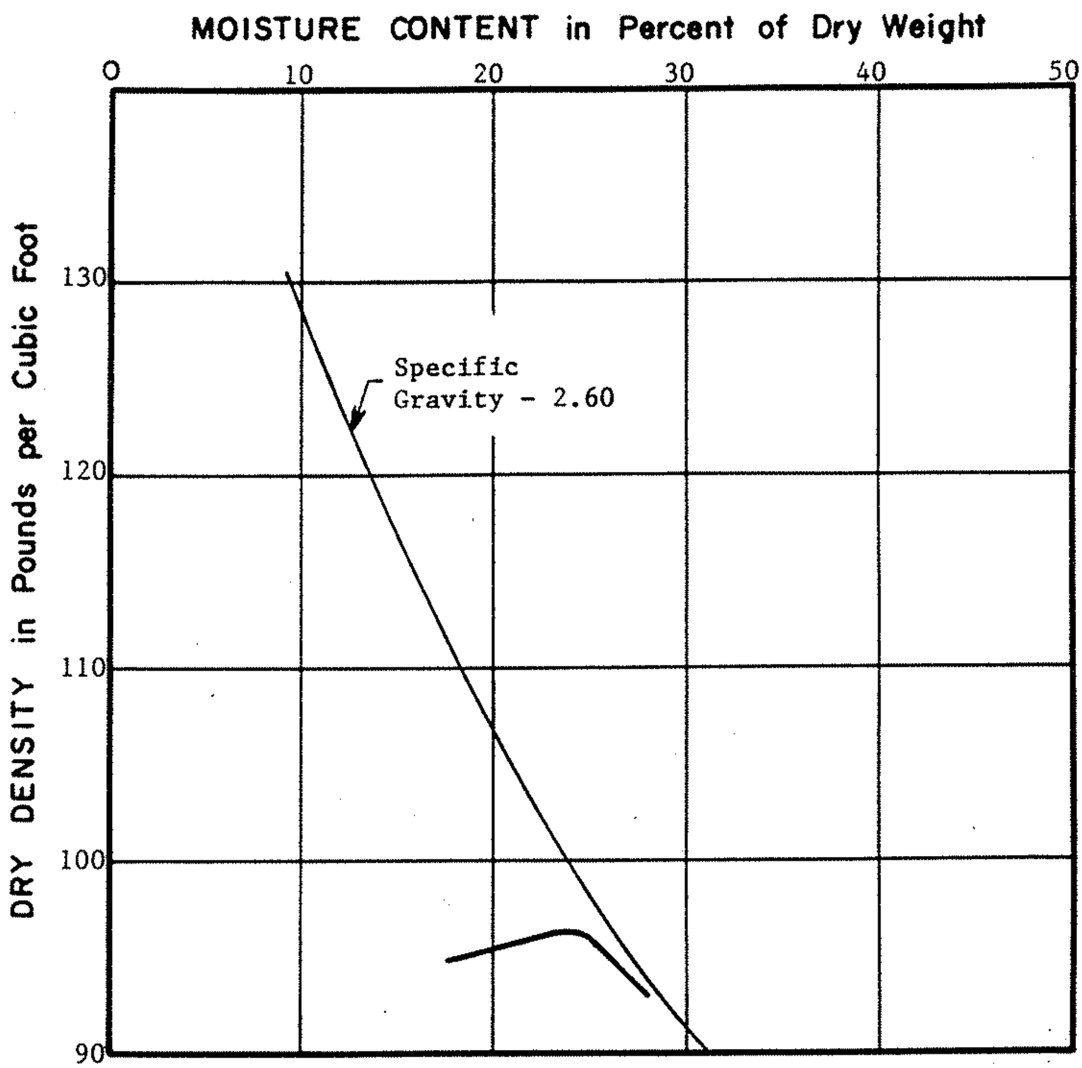
This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

PLATE A-4.7

JOB E-86445-0 DATE 7-7-8 DR. SANDY O.E. CHKD.



SOURCE: Sample No 8707

SOIL TYPE: Brown to Grey Siltstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 96.5 pcf

OPTIMUM MOISTURE CONTENT: 24.5%

TEST METHOD: ASTM Designation D1557-70

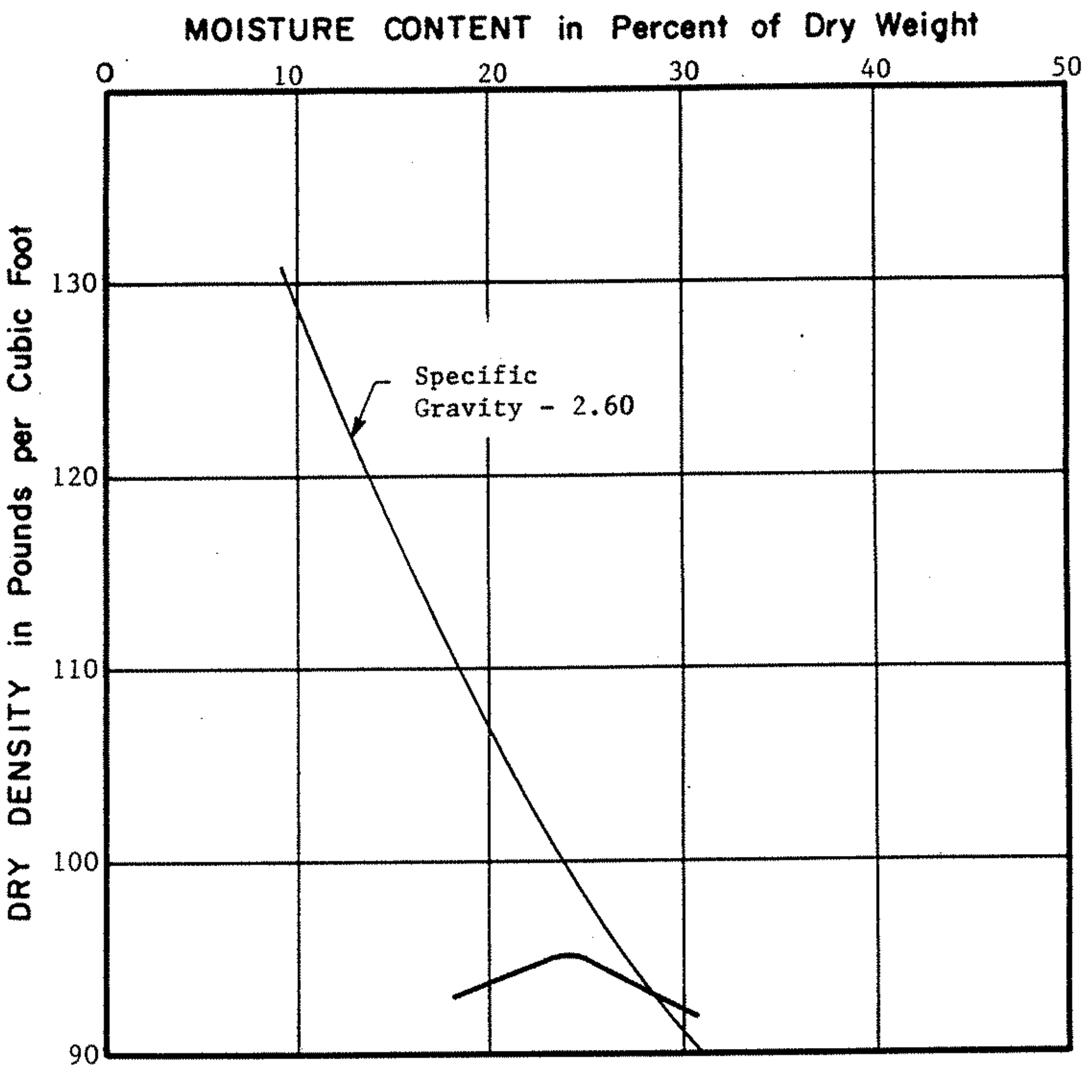
This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

PLATE A-4.8

JOB E-86425-0 DATE 9-4-86 DR. SANDY O.E. CHKD.



SOURCE: Sample No. 8709A

SOIL TYPE: Brown to Grey Siltstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 95.0 pcf

OPTIMUM MOISTURE CONTENT: 23.5%

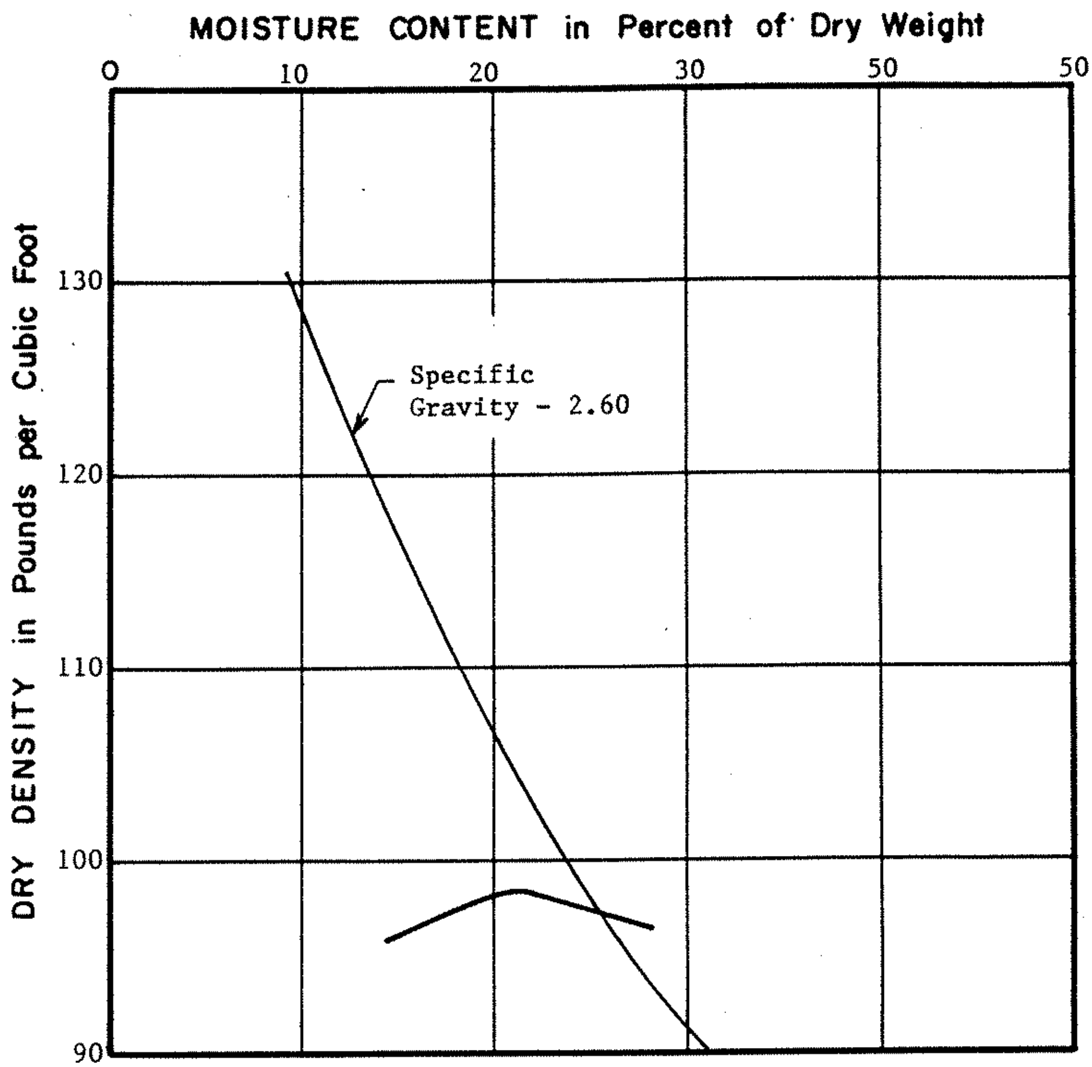
TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

JOB E-86425-0 DATE 4-4-87 DR. SANDY O.E. CHKD.



SOURCE: Sample No. 8709B

SOIL TYPE: Brown to Grey Siltstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 98.0 pcf

OPTIMUM MOISTURE CONTENT: 21.0%

TEST METHOD: ASTM Designation D1557-70

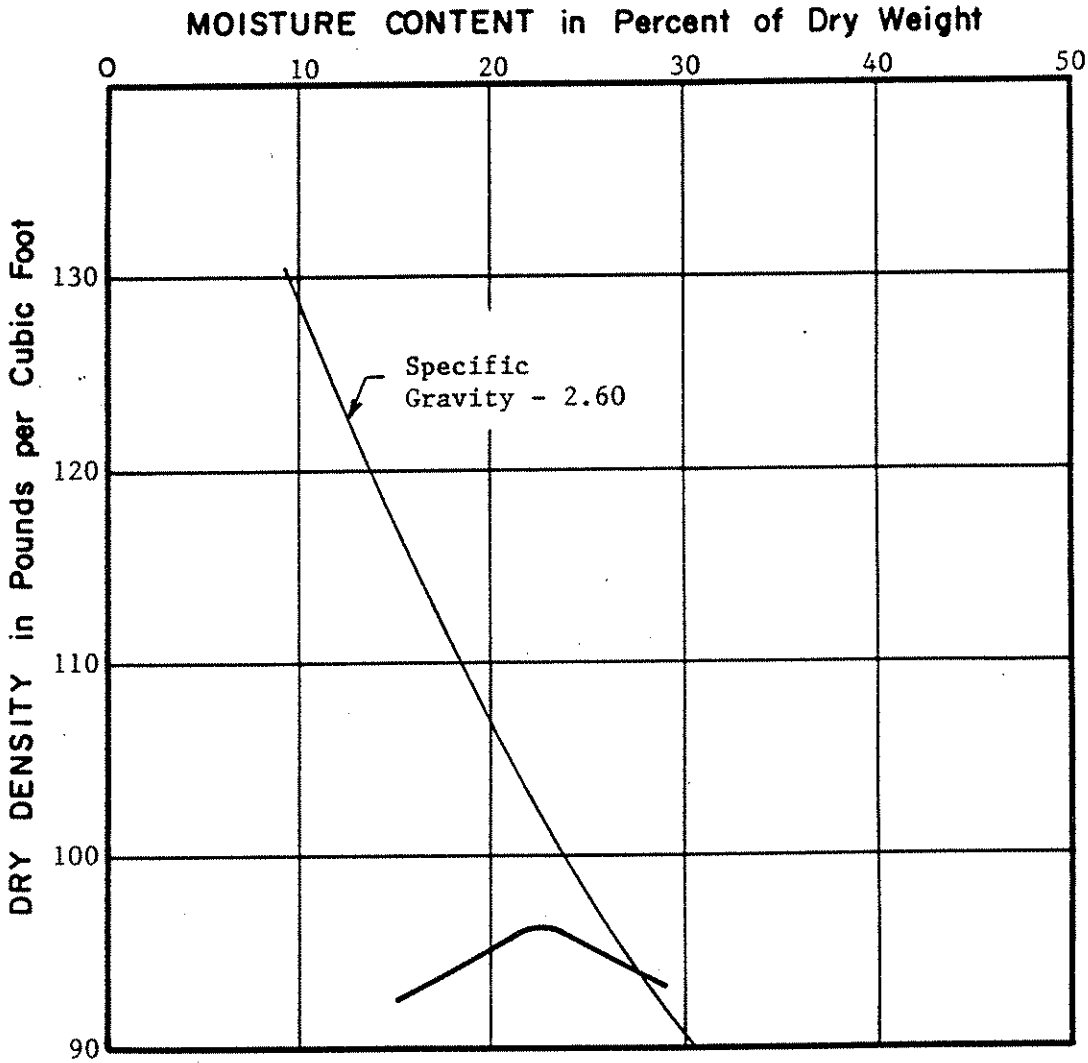
This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

PLATE A-4.10

JOB E-86425-0 DATE 9-4-87 DR. SANDY O.E. CHKD.



SOURCE: Sample No. 8709C

SOIL TYPE: Brown to Grey Siltstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 96.0 pcf

OPTIMUM MOISTURE CONTENT: 22.5%

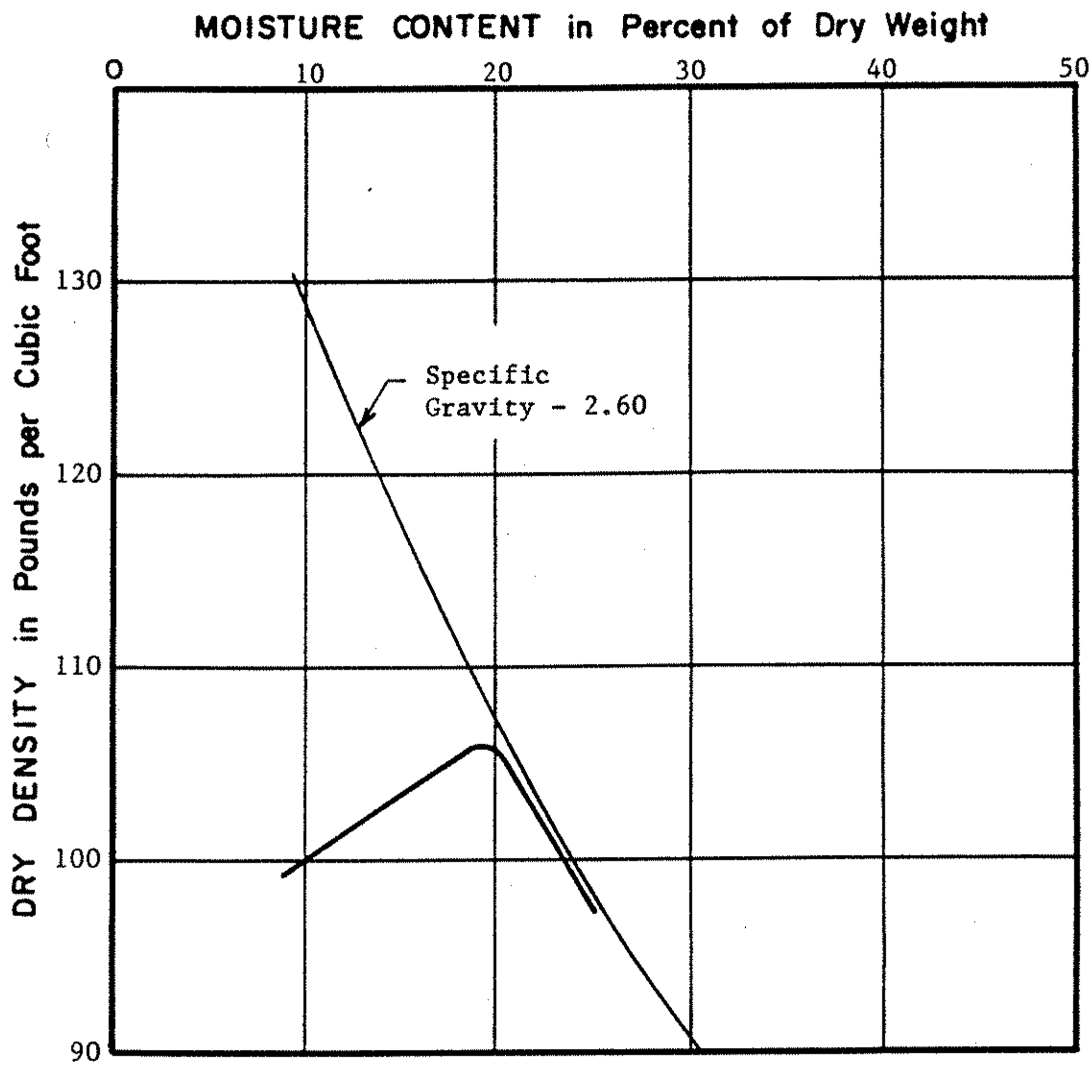
TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

JOB E-86425-C DATE DR. DANDY O.E. CHKD.



SOURCE: Sample No. 8710

SOIL TYPE: Brown to Grey Siltstone (Towsley and/or Pico Formation)

MAXIMUM DRY DENSITY: 106.0 pcf

OPTIMUM MOISTURE CONTENT: 19.5%

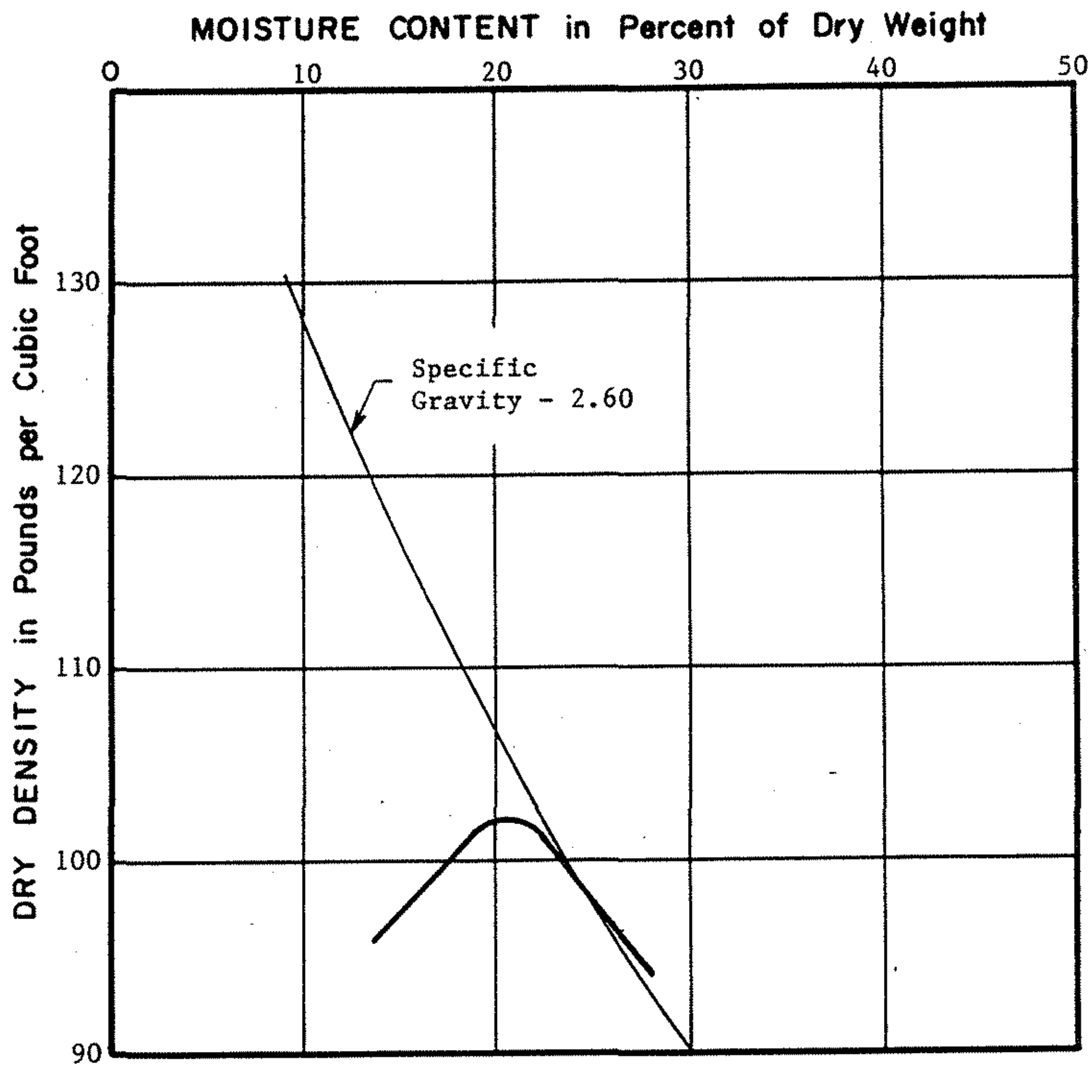
TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LeROY CRANDALL & ASSOCIATES

JOB E-86425-O DATE 4-4-87 DR. SANDY O.E. CHKD.



SOURCE: Sample No. 8711

SOIL TYPE: Brown/Grey Siltstone and Shale (Modelo Formation)

MAXIMUM DRY DENSITY: 102.0 pcf

OPTIMUM MOISTURE CONTENT: 21.0 %

TEST METHOD: ASTM Designation D1557-70

This method utilizes a 1/30-cubic-foot mold, in which each of five layers of soil is compacted by 25 blows of a 10-pound hammer falling 18 inches.

COMPACTION TEST DATA

LEROY CRANDALL & ASSOCIATES

BORING NUMBER AND SAMPLE DEPTH:	8 at 1' to 3'	9 at 2' to 4'	10 at 2' to 4'
SOIL TYPE:	SANDSTONE	SANDSTONE	SILTSTONE
MAXIMUM DRY DENSITY*: (lbs./cu. ft.)	121	124	117
OPTIMUM MOISTURE CONTENT*: (% of dry wt.)	14	12	14
EXPANSION (%): (From optimum to saturated moisture content)	0.6	0.2	1.3
C. B. R. ** (% of standard)			
AT 90% COMPACTION:	31	38	14
AT 95% COMPACTION:	55	98	31

* TEST METHOD: ASTM Designation D 1557 - 70.

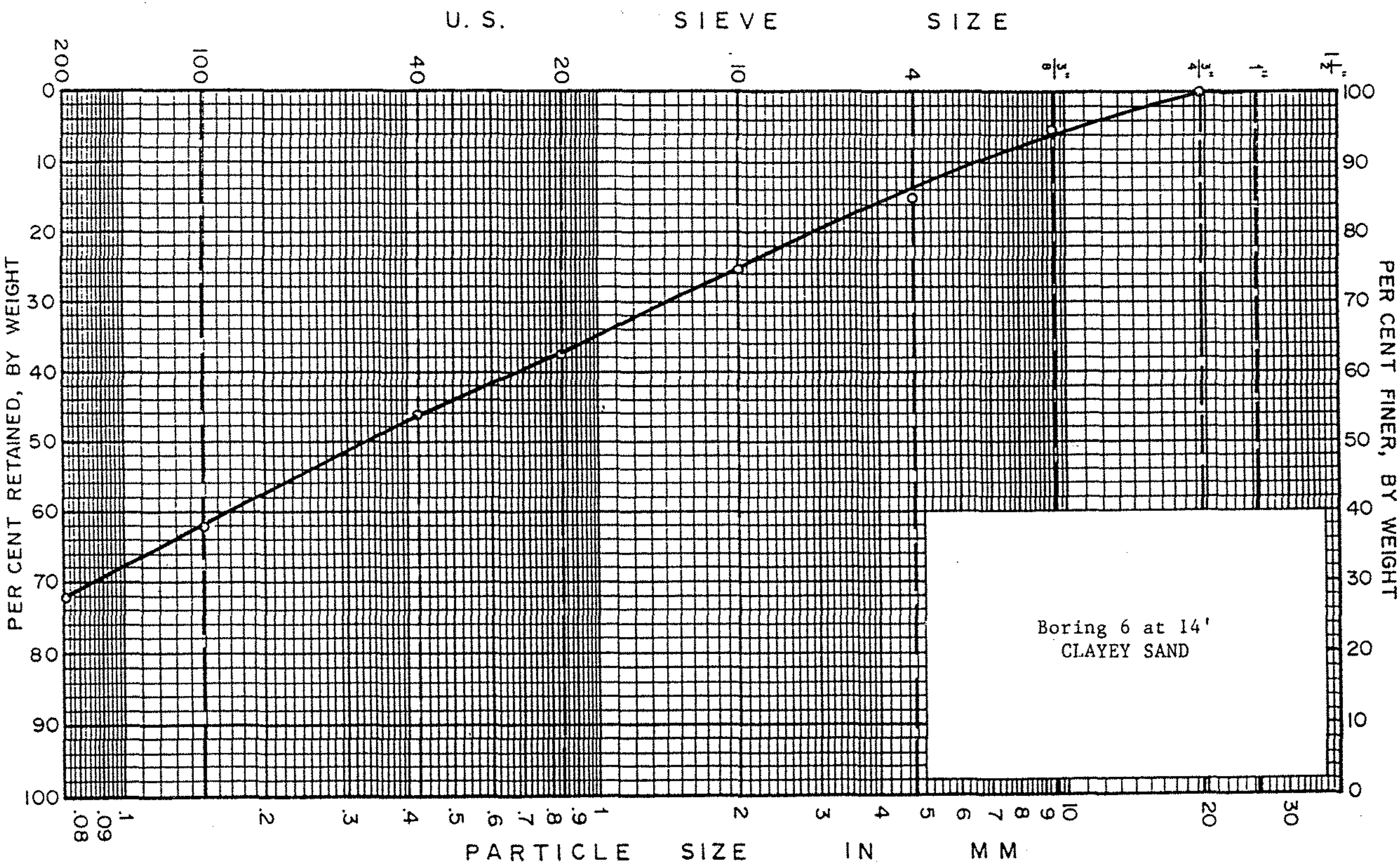
** TEST METHOD: ASTM Designation D 1883 - 73.

COMPACTION AND C. B. R. TEST DATA

JOB AE-86425-L DATE 11/17/87 W.P. dmh O.E. SK CHKD

LeROY CRANDALL AND ASSOCIATES

FORM JOB AE-86425-L DATE 11/17/87 DR. JOHN SK SK W.P. JP CHKD. EF



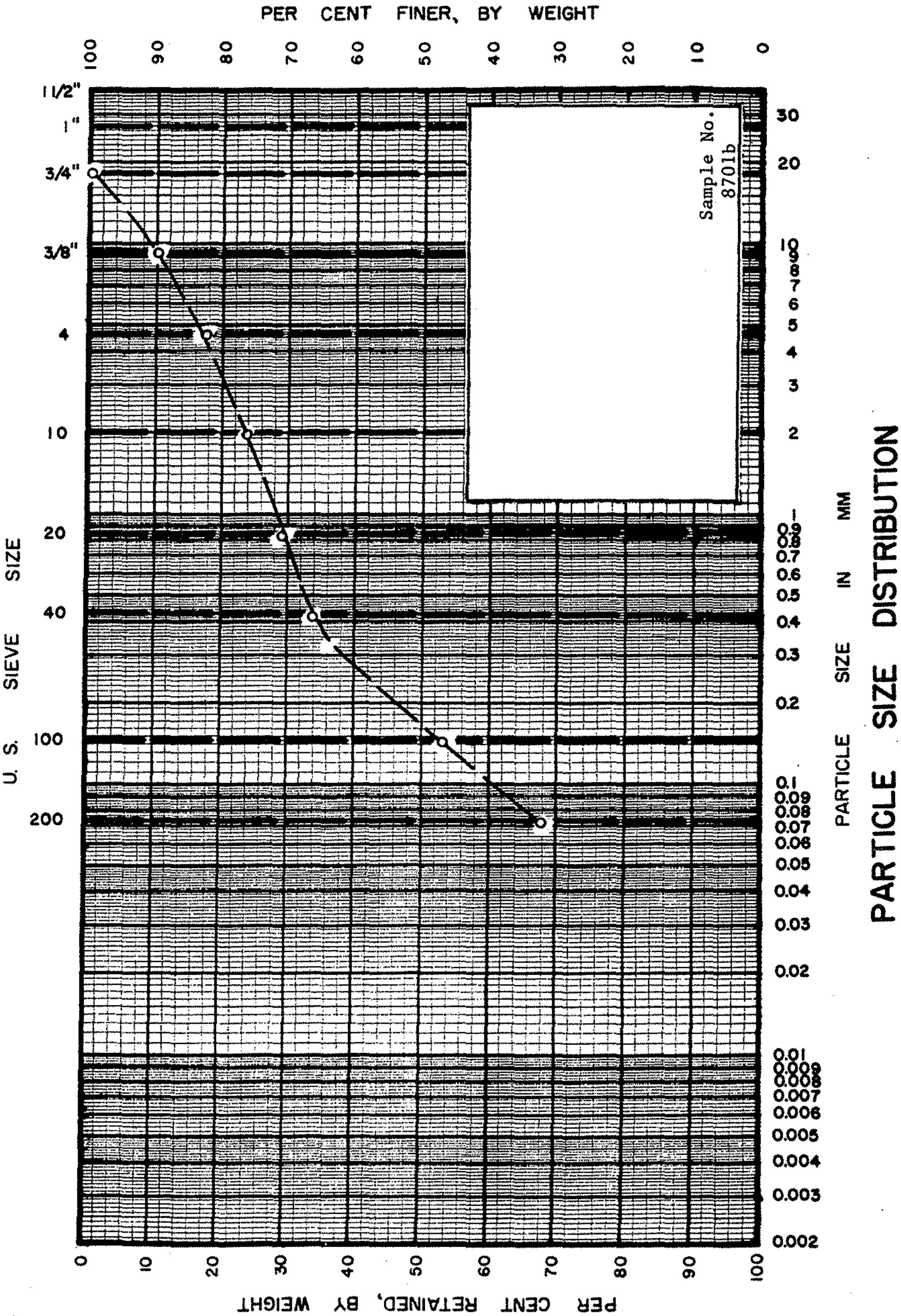
PARTICLE SIZE DISTRIBUTION

LeROY CRANDALL AND ASSOCIATES

PLATE A-5.1

JOB E-86425-0 DATE 7 82 BY SANDY CHECKED ______

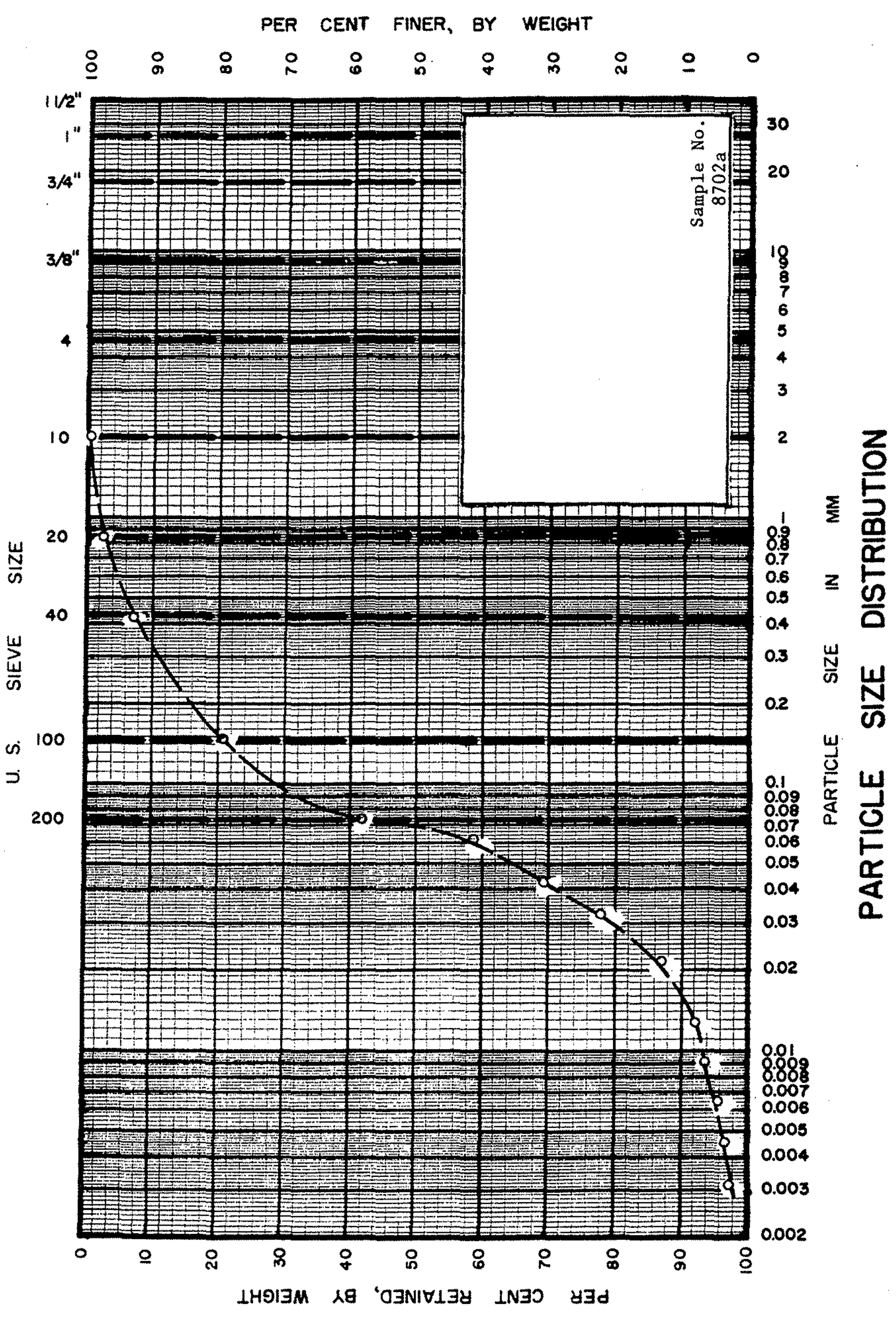
For 22



LEROY CRANDALL AND ASSOCIATES

PLATE A-5.2

For 22 JOB E-86425-C DATE 7- -87 BY SANDY CHECKED



LEROY CRANDALL AND ASSOCIATES

JOB E-86425-0 DATE 7/ 87 BY SANDY CHECKED

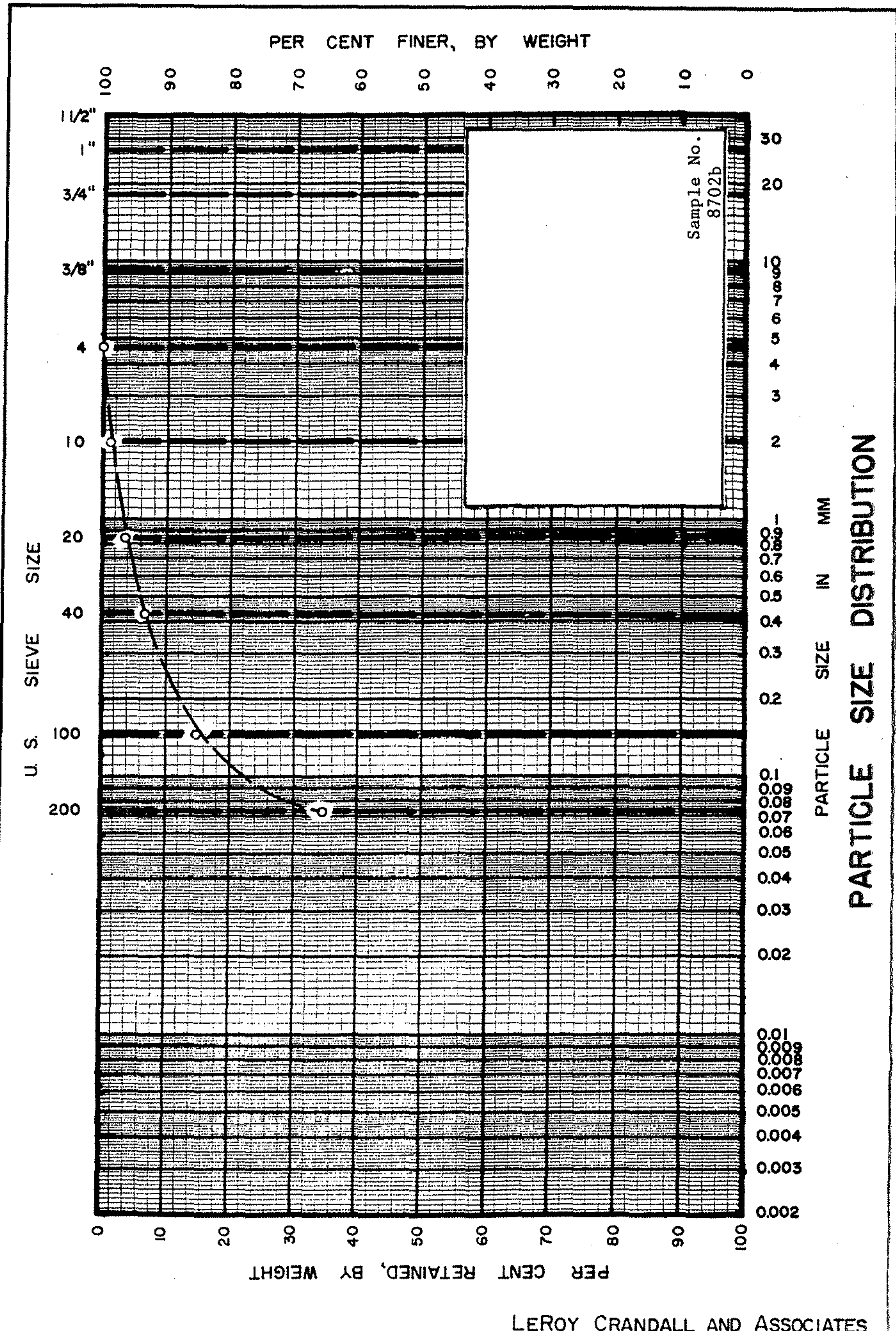
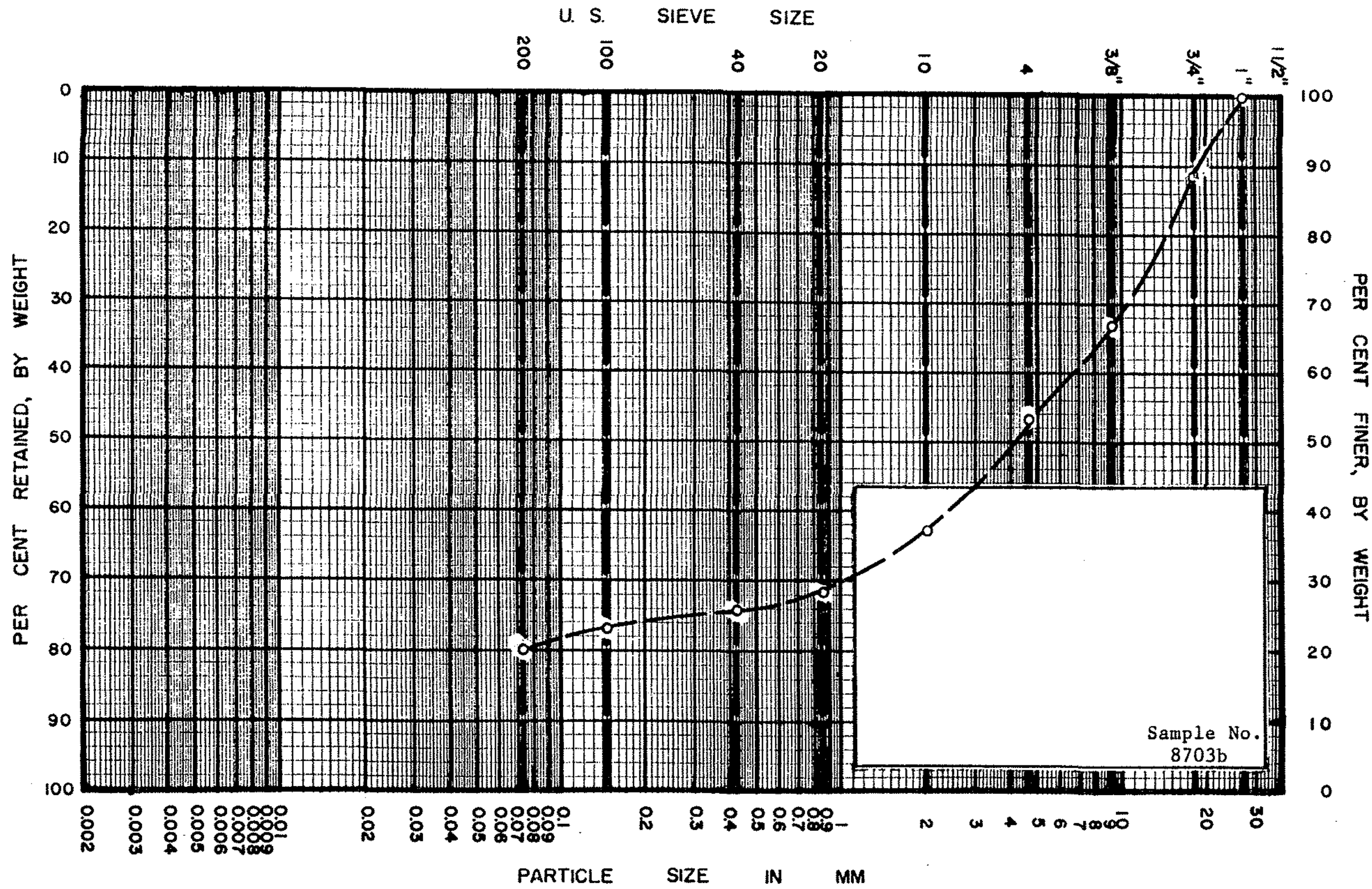


PLATE A-5.4

For 2

For 22 JOB E-86425-0 DATE 7/ /87 BY SANDY CHECKED ______

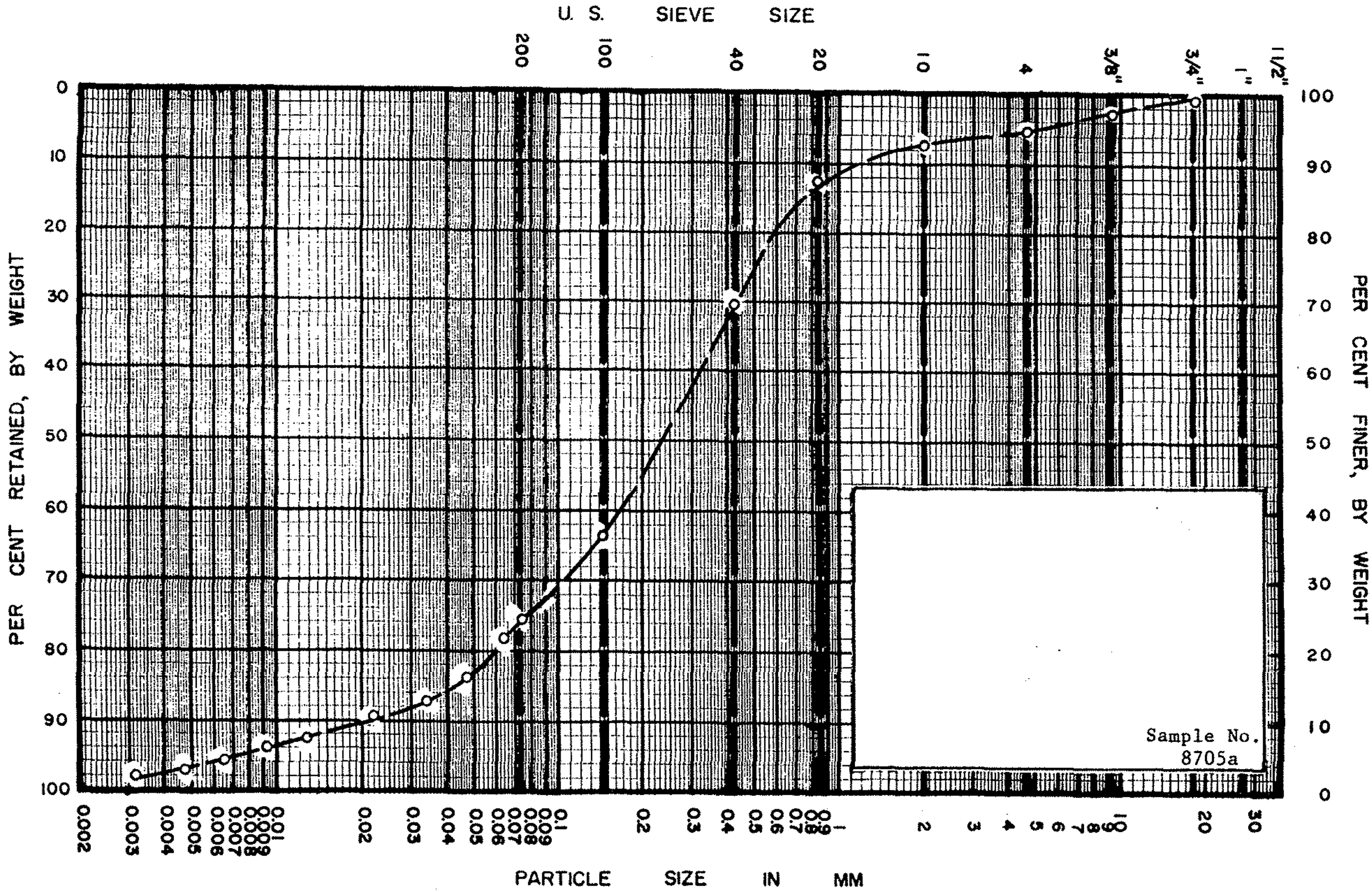


PARTICLE SIZE DISTRIBUTION

LEROY CRANDALL AND ASSOCIATES

PLATE A-5.5

For 22 JOB E-86425-0 DATE 7/ 87 BY SANDY CHECKED



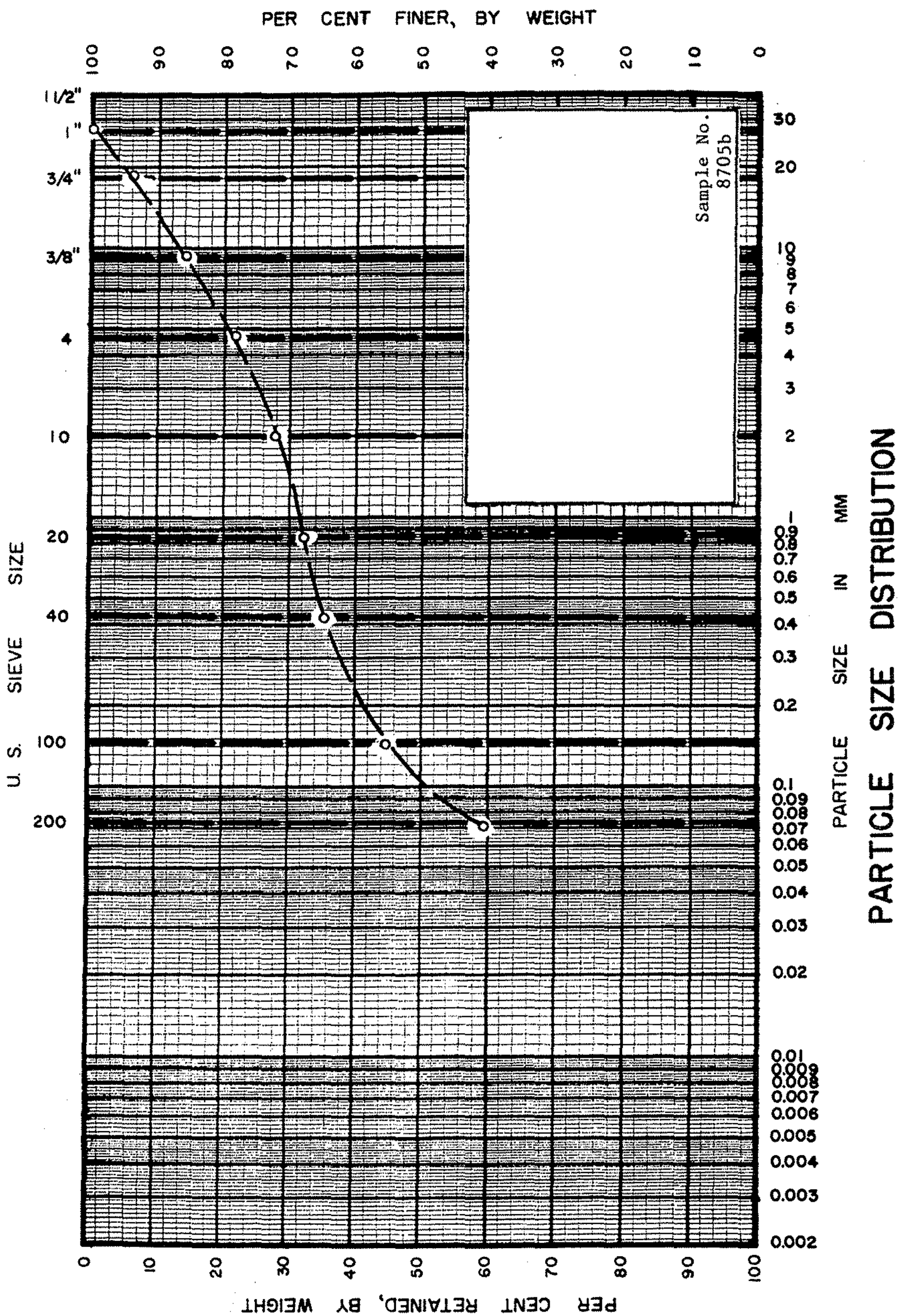
PARTICLE SIZE DISTRIBUTION

LEROY CRANDALL AND ASSOCIATES

PLATE A-5.6

JOB E-86425-0 DATE 7/ 87 BY SANDY CHECKED

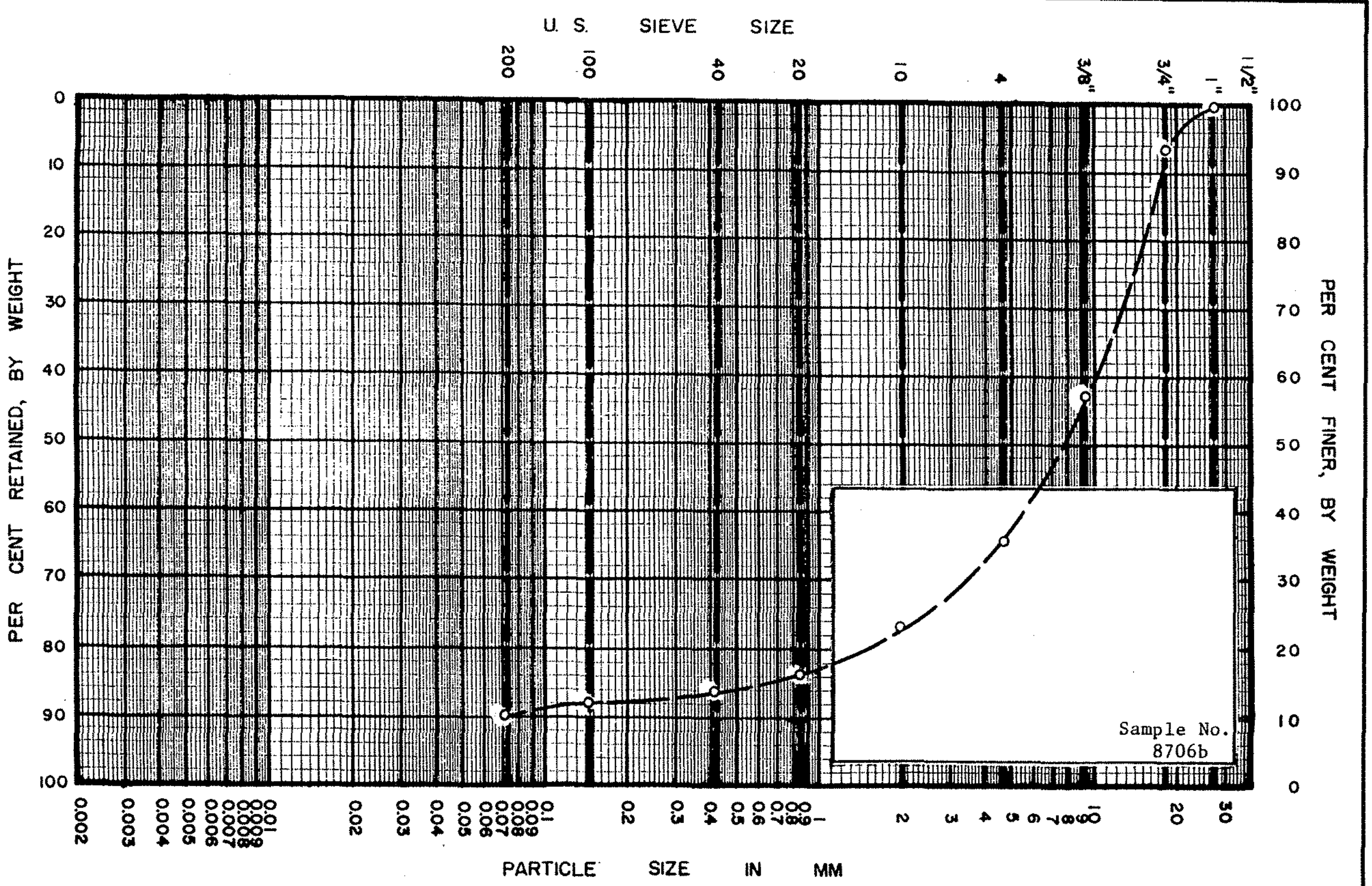
Form 22



LEROY CRANDALL AND ASSOCIATES

PLATE A-5.7

Fo 22 JOB E-86425-0 DATE 7 /87 BY SANDY CHECKED

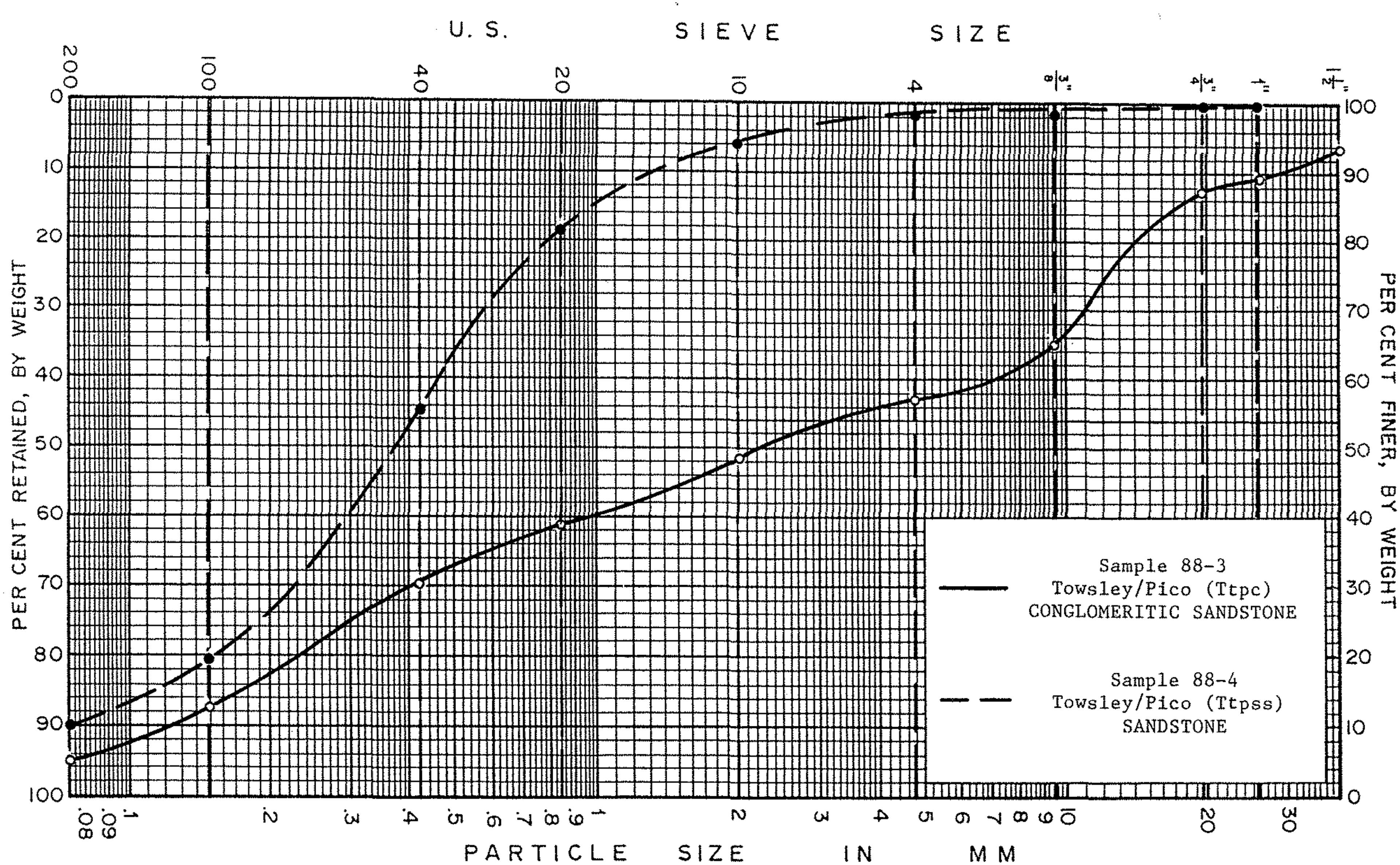


PARTICLE SIZE DISTRIBUTION

LEROY CRANDALL AND ASSOCIATES

PLATE A-5.8

FO 21 JOB AE-86425 DATE 4/6/88 DR. JOHN E. FF W.P. lp CHKD.

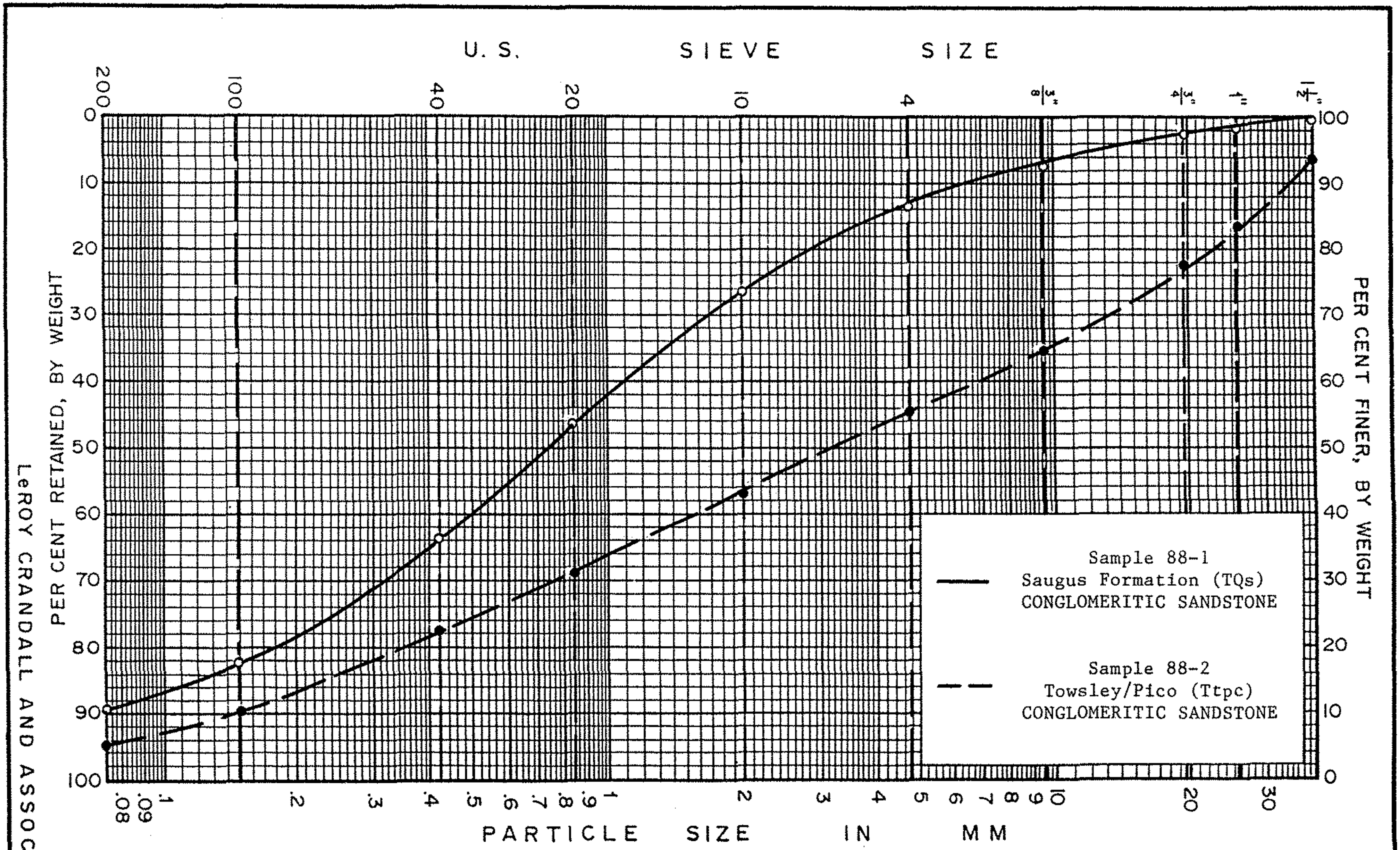


PARTICLE SIZE DISTRIBUTION

LeROY CRANDALL AND ASSOCIATES

PLATE A-5.9

FO 121 JOB AE-86425 DATE 4/6/88 DR. JOHN E. FF W.P. lp CHKD.

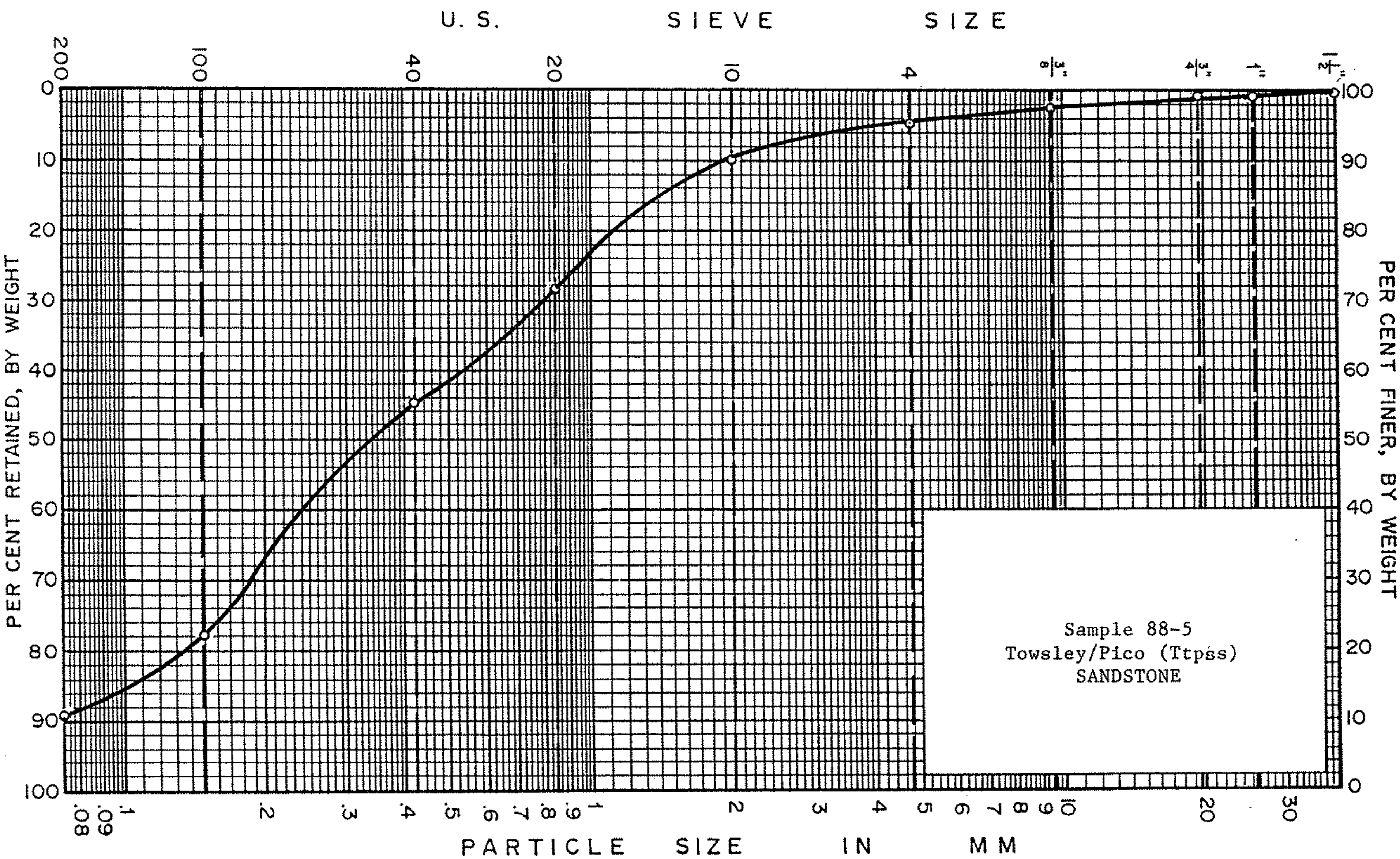


PARTICLE SIZE DISTRIBUTION

LeROY CRANDALL AND ASSOCIATES

PLATE A-5.10

FOR. 21 JOB AE-86425 DATE 4/6/88 DR. JOHN FF W.P. 1p CHKD.



PARTICLE SIZE DISTRIBUTION

LeROY CRANDALL AND ASSOCIATES

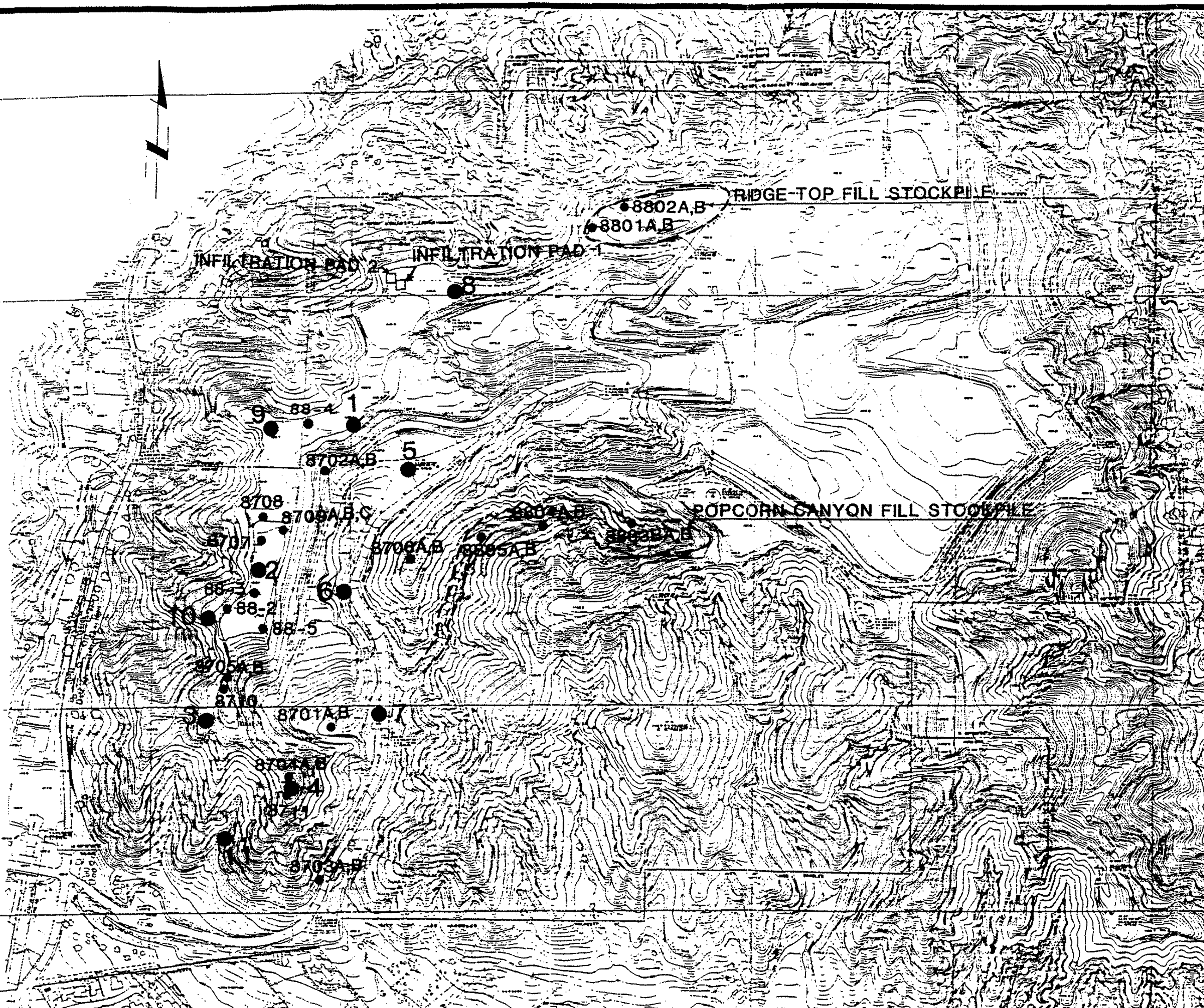
PLATE A-5.11

BORING NUMBER AND SAMPLE DEPTH	SOIL TYPE	COEFFICIENT OF PERMEABILITY (Cm/Sec)
1 at 39'	SANDSTONE	8.7×10^{-5}
2 at 34'	SANDSTONE	1.3×10^{-3}
3 at 100'	SHALE	5.1×10^{-6}
4 at 100'	SHALE	6.5×10^{-6}
5 at 1'	SANDSTONE	1.2×10^{-6}
5 at 3'	SANDSTONE	7.4×10^{-7}
5 at 5'	SANDSTONE	1.0×10^{-6}
6 at 2'	FILL - SILTY SAND	1.8×10^{-5}
6 at 8'	SILTY SAND	1.6×10^{-6}
6 at 12'	CLAYEY SAND	2.0×10^{-5}
7 at 1'	FILL - SILTY SAND	2.8×10^{-5}
7 at 3'	FILL - SANDY CLAY	1.3×10^{-7}
7 at 7'	FILL - SANDY CLAY	6.7×10^{-8}
8 at 5'	SANDSTONE	4.0×10^{-5}

PERMEABILITY TEST DATA

(Tests on Undisturbed Materials From Borings)

JOB AE-86425-L DATE 11/23/87 W.P. dmh O.E. SK/FF CHKD



BORING AND SAMPLE LOCATIONS

LOPEZ CANYON LANDFILL

EXPLANATION:

● 5 BORING LOCATION

• 8714 SAMPLE LOCATION

SCALE: 1″=500′

LeROY CRANDALL AND ASSOCIATES

PLATE 1

APPENDIX C

FINAL REPORT FOR BORROW SOURCE AND TEST PAD EVALUATION, LOPEZ CANYON LANDFILL DEVELOPMENT AREA C

FINAL REPORT for
BORROW SOURCE AND
TEST PAD EVALUATION
LOPEZ CANYON LANDFILL
DEVELOPMENT AREA C

Prepared for

Bryan A. Stirrat & Associates
1360 Valley Vista Drive
Diamond Bar, California 91765
(714) 860-7777

Prepared by

Vector Engineering, Inc.
12438 Loma Rica Drive, Suite C
Grass Valley, California 95945
(916) 272-2448

Project No. 911108.3
October 1992

SIGNATURE PAGE

Based on our observation and analyses of the borrow source and test pad installations at the Lopez Canyon Landfill Development Area C, it is our opinion that the on-site segregated shale material will meet the low permeability liner requirements of Title 23, Division 3, Chapter 15 of the California Code of Regulations. This report was prepared in accordance with generally accepted soils and geotechnical engineering practices applicable at the time the report was prepared. Vector Engineering, Inc. makes no other warranties, either expressed or implied, as to the professional advice provided under the terms of this agreement, and as described in this report. Our recommendations consist of professional opinions and conclusions, based on our testing and inspection program during installation of the test pads.

VECTOR ENGINEERING, INC.

Scott Purdy

Scott Purdy, C.E.G. No. 1532
Vice President, Director of Solid Waste Engineering

REGISTERED GEOLOGIST
SCOTT D. PURDY
Scott Purdy
NO. 1532
CERTIFIED
ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

TABLE OF CONTENTS

1.0 INTRODUCTION

In order to meet the requirements for low permeability liner material mandated by Title 23, Chapter 15 of the California Code of Regulations (CCR), the City of Los Angeles has proposed the installation of a composite liner system in the Development Area C at the Lopez Canyon Landfill. The composite liner system will be composed of a low permeability soil liner overlain by a high density polyethylene geomembrane. It is desirable to use existing or native low permeability soil that is presently on-site to minimize the cost of having to purchase and transport material to the project. The potential for utilizing on-site material was originally evaluated during an investigation conducted by LeRoy Crandall and Associates in 1988. This investigation titled "Supplemental Field and Laboratory Investigation of Potential Low-Permeability On-Site Material, Lopez Canyon Landfill", evaluated the suitability of a mixture of on-site sand/shale materials (alone and with an admixture of bentonite) for use as a low permeability liner. The investigation concluded that the non-segregated material would require enrichment of bentonite to satisfy the permeability requirements of Chapter 15.

Subsequent to the above investigation, excavation in the Development Area C uncovered a unit of shale that was potentially suitable as a low permeability liner without bentonite addition. This material was stockpiled by the City at the direction of Law/Crandall, Inc. In order to determine if the on-site stockpiled segregated shale material was suitable, BAS (in association with Vector and Law\Crandall, Inc.) prepared the "Revised Workplan for Clay Test Pad Installation and Related Engineering Services for the Lopez Canyon Landfill, Development Area C", dated May 28, 1992. This workplan was submitted to the City and to the Los Angeles Regional Water Quality Control Board (RWQCB). Following receipt of a June 8, 1992 approval letter from the RWQCB, the evaluation of the low permeability soil at the Lopez Canyon Landfill was initiated.

The following report describes the portions of the evaluation conducted by Vector. This work included laboratory borrow source testing and analyses, test pad installation (including laboratory testing, field testing, and a comparison of permeability test methods), and the testing and evaluation of a "modified test pad" following the identification of potential construction difficulties with the original test pad. In addition, non-segregated sand/shale materials were amended with bentonite and evaluated in the laboratory for use as potential cover material under the requirements of Title 14, CCR.

2.0 BORROW SOURCE EVALUATION

The purpose of the borrow source investigation was to determine if the on-site shale material satisfies the regulatory requirements for use as a low permeability soil liner. The borrow source material was sampled in three different locations (designated sample 1, sample 2, and sample 3) and a complete evaluation of the soil characteristics for each location was performed. The tests that were conducted included: modified proctor test (ASTM D-1557), particle size analysis (ASTM D-422), Atterberg limits (ASTM D-4318), hydraulic conductivity (ASTM D-5084), and expansion index (ASTM D-4829).

In order to determine if the native soil was suitable for the intended application, each of the three samples (1A/1B, 2A/2B, 3A/3B) was analyzed to determine the soil characteristics. Two five gallon buckets of soil (designated "A" and "B") were obtained from each sample location. The results from these tests provided a basis to determine if this soil was suitable or if other sources of material or bentonite amendment would be required.

The modified Proctor test was used to determine the optimum moisture content and maximum density of the soil samples. The results of these tests are presented in Appendix 1. The modified proctor test was conducted in accordance with ASTM D-1557.

The particle size analysis is a mechanical analysis which uses the sieve and hydrometer to determine the grain size distribution of a soil sample. The grain size distribution was plotted for each sample. The particle size analysis was conducted in accordance with ASTM D-422. A graphical representation of the grain size distributions is presented in Appendix 1.

The Atterberg limits test was used to determine the liquid limit and plasticity index for the given soil samples. Along with the particle size analyses, this information was used to classify the type of soil within the Unified Soil Classification System (ASTM D-2487). The on-site soil was classified as a ML (inorganic silt). The liquid limit (LL) and plasticity index (PI) obtained for the three samples is provided on the grain size analyses in Appendix 1 and were as follows: Sample 1A/1B, LL 35% and PI 6%; Sample 2A/2B, LL 36% and PI 7%; and Sample 3A/3B LL 35% and PI 6%. The Atterberg limits testing was conducted in accordance with ASTM D-4318.

The evaluation of the soil properties from the three sample locations was fairly consistent across the site. Material from sample location 1 was selected for hydraulic conductivity analysis. In order to determine the effect of moisture content on the hydraulic conductivity (permeability), the moisture content of the soil was varied while the relative compaction remained uniform. Four permeability tests were conducted at a relative compaction of 90% and moisture contents of optimum, 2% above optimum, 4% above optimum, and 6% above optimum. The tests were conducted in triaxial cells according to ASTM D-5084.

The results of the permeability analysis indicated that as the moisture content increases, the permeability decreases. Samples evaluated at optimum moisture and 2% above optimum had permeabilities of 5×10^{-6} cm/sec and 2×10^{-6} cm/sec, respectively. Samples evaluated at 4% and 6% above optimum had permeabilities of 6×10^{-7} cm/sec and 1×10^{-7} cm/sec, respectively. Based on the results of the laboratory evaluation, the on-site soils would be required to be equal or above 4% wet of optimum at 90% compaction to meet the required permeability. The results of the permeability testing are provided in Table 1.

In order to determine the effect of bentonite addition to the on-site soils, four additional permeability tests were conducted on the material. In these four tests, 1% and 5% bentonite was added to samples of the on-site soils compacted to 90% at moisture contents 2% and 4% above optimum. As was expected, the addition of bentonite lowered the permeability significantly. Samples evaluated at 2% and 4% above optimum with 1% bentonite had permeabilities of 1.5×10^{-7} cm/sec and 1×10^{-7} cm/sec, respectively. Samples evaluated at 2% and 4% above optimum with 5% bentonite had permeabilities of 9×10^{-8} cm/sec and 7×10^{-8} cm/sec, respectively. These results are also provided on Table 1.

The final permeability test conducted on the borrow source material involved using leachate as the permeant. Chapter 15, Title 23, CCR requires that the low permeability liner be analyzed with leachate to determine if any adverse effects on the liner integrity are found. Leachate from the Toyon Landfill was shipped to Vector by BAS and a sample compacted to 90% at a moisture content 6% above optimum was analyzed. The sample using the leachate showed no significant change in permeability as compared to the sample that was evaluated using water as the permeant. The results of this test are shown on Table 1.

The results of the expansion index (EI) test are also shown on Table 1. Soils with an EI less than 20 are considered to have a very low potential for expansion while soils with an EI greater than 130 have a very high potential for expansion. Based on an EI value of 23.6, the potential for expansion of the low permeability soil is low. However, some very minor expansion is expected which is desirable so that any small cracks in the liner would self seal.

Based on the results of the permeability evaluation, the native soil at the landfill site should be acceptable for use as liner material if the moisture content is kept between 4% and 6% above optimum. Another acceptable option would be to add bentonite to the soil with a moisture content between 2% and 4%. Due to the

TABLE 1

LABORATORY PERMEABILITY TEST SUMMARY

Sample ID	Relative Compaction %	Moisture Content %	Sample Dia/Ht (cm)	Chamber Press. (psi)	Inlet Press. (psi)	Outlet Press. (psi)	Temp. (°c)	Permeability K (cm/sec)
1A/1B @ Optimum Moist.	90	15.9	6.2/8.0	70	63	60	20	5×10^{-6}
1A/1B @ Opt. +2%	90	17.9	6.2/8.0	70	63	60	20	2×10^{-6}
1A/1B @ Opt. +4%	90	19.9	6.2/8.0	70	63	60	20	6×10^{-7}
1A/1B @ Opt. +6%	90	21.1	6.2/8.0	70	63	60	20	1×10^{-7}
1A/1B @ Opt. +6% W/Leachate	90	21.1	6.2/8.0	70	63	60	20	2×10^{-7}
1A/1B @ Opt. +2% W/1% Bentonite	90	17.9	6.2/8.0	70	63	60	20	1.5×10^{-7}
1A/1B @ Opt. +4% W/1% Bentonite	90	19.9	6.2/8.0	70	63	60	20	1×10^{-7}
1A/1B @ Opt. +2% W/5% Bentonite	90	17.9	6.2/8.0	70	63	60	20	9×10^{-8}
1A/1B @ Opt. +4% W/5% Bentonite	90	19.9	6.2/8.0	70	63	60	20	7×10^{-8}

Note: Permeability testing was performed utilizing the flexible wall method with samples remolded to 90% relative compaction at the indicated moisture content, as determined by test method ASTM D-1557. Bentonite was added as a percentage of the dry weight of soil.

EXPANSION INDEX
ASTM D-4829

Sample ID	Description	Initial Moist. %	Final Moist. %	Dry Density (pcf)	Saturation %	Expansion Index
1A/1B	Gray clayey Silt	13.1	26.8	97.6	50.0	23.6

high cost of bentonite addition, it was recommended to build a test pad using on-site soils with a moisture content between 4% and 6% above optimum.

3.0 TEST PAD EVALUATION

Vector's role in the test pad installation consisted primarily of a field permeability evaluation and a permeability test method comparison. The geotechnical inspection and testing of the installation was conducted by Law/Crandall and was submitted to BAS under separate cover. A certified engineering geologist from Vector arrived at the Lopez Canyon Landfill on June 29, 1992. Our geologist observed the screening, moisture addition, and test pad installation techniques. Daily field construction reports were compiled on the procedures and observations. These reports are included in Appendix 2.

Following completion of the test pad, a sealed double ring infiltrometer (SDRI) was installed. The SDRI was manufactured by Trautwein Soil Testing Equipment of Houston, Texas. The SDRI consists of a 12 foot by 12 foot outer ring and a sealed 5 foot by 5 foot inner ring.

The outer ring was assembled and a 4 inch wide, 18 inch deep trench was cut into the test pad. The outer ring was then lowered into the trench and grouted into place using Volclay grout. The inner ring was placed in a 1 inch wide, 5 inch deep trench and also grouted into place.

The following day, three sets of tensiometers were placed between the outer and inner rings. At each of the three sets, tensiometers were installed to depths of 6, 12, and 18 inches. The inner ring was then partially filled with water and observed for leaks. After no leaks were detected, the outer ring was filled with water. Vector personnel were not responsible for recording data from the SDRI. This information will be obtained by BAS and the City. The installation and operational procedures provided with the SDRI by the manufacturer are included in Appendix 3.

Following completion of the SDRI installation, four sealed single ring infiltrometer (SSRI) permeability tests were conducted. The SSRI test apparatus uses a 1/4 inch thick steel ring nominally 12 inches in diameter by 14 inches high. A top or "seal" made of 3/8 inch thick polycarbonate plastic is clamped to the rim of the ring using C-clamps. A rubber O-ring creates an air-tight seal between the steel and the polycarbonate top. A center valve in the top is connected by flexible plastic tubing to a buret mounted on a post next to the ring. The buret is marked in increments to measure outflow during the test. The entire apparatus is insulated to guard against temperature fluctuations.

The setup time, date, and initial temperature of the water were recorded at the time saturation of the test area began. The SSRI was allowed to saturate for a minimum of 16 to 24 hours before running the test. After this initial saturation period, timed infiltration measurements were taken. The buret was filled with water and timed readings were taken as the water level dropped. The time between readings was generally 10 minutes but varied according to the outflow. The infiltration rate, I, was calculated as follows:

$$I = Q/(A_c \times t)$$

where:
- A_r = area of the buret
- Q = (initial buret reading - final buret reading) x A_r
- A_c = area of the permeameter cylinder
- t = time

Timed readings were continued until the infiltration rate stabilized. Once the infiltration rate stabilized, the temperature of the water was recorded, the cover was removed, and the swell gage monitored. The ring was then removed from the test pad and the water emptied from the ring. The depth of the wetted front was then measured. This depth, D, was used to calculate the hydraulic gradient, i, using the following equation:

i = (total height of water in buret at time zero + D)/D

The permeability of the test pad was determined by dividing the infiltration rate (I) by the hydraulic gradient (i). The effect of temperature on the infiltration of water was obtained by multiplying the permeability by a temperature-viscosity correction factor to determine the final permeability.

Of the four tests conducted on the test pad, one had a small leak that occurred due to a bent rim on the steel ring. Although this leak increased the infiltration rate (and therefore the permeability), the results were 1×10^{-7} cm/sec which still met the minimum regulatory requirements. The remaining three tests were conducted with undamaged steel rings and the results were very consistent. Two of the tests resulted in permeabilities of 5×10^{-8} cm/sec and the remaining test had a permeability of 3×10^{-8} cm/sec. The field data sheets for the SSRI tests are provided in Appendix 4.

In addition to the SDRI and SSRI tests, three BAT *in situ* hydraulic conductivity tests were run on the test pad. The BAT permeameter consists of a plastic tip containing a cylindrical porous filter. The plastic tip was attached to a steel pipe and driven into the test pad. After determining the static pore pressure, an outflow device was lowered into the pipe and brought in contact with the porous filter using a hypodermic needle and septum. A pressure transducer was then used to monitor the gas pressure change in the outflow device as water exits the system. By measuring the gas pressure change in the outflow device and applying Boyle's Law, the permeability of the test pad was determined.

Vector conducted one BAT permeameter test on July 8, 1992 with a calculated permeability of 4×10^{-8} cm/sec. Because of equipment problems, the remaining two tests were run on July 14, 1992 by Moore and Taber Consultants. These tests both had calculated permeabilities of 1×10^{-7} cm/sec. The computer print-outs for the BAT tests are provided in Appendix 4.

Following completion of the field permeability testing, four thin walled (shelby tube) drive samplers were pushed into the test pad and relatively undisturbed samples were shipped to Vector's Grass Valley laboratory. These samples were removed from the tubes and placed in flexible wall, triaxial test cells and the permeability was determined according to ASTM D-5084. The four test results ranged from 1.5 x 10^{-8} cm/sec to 8 x 10^{-8} cm/sec. Table 2 presents the details of the laboratory permeability testing for the test pad.

TABLE 2

UNDISTURBED LABORATORY PERMEABILITY TEST SUMMARY

Test Method: ASTM D-5084 Permeant Liquid: De-Aired Water

Sample ID	Dry Density (pcf)	Moisture Content %	Sample Dia./Ht. (cm)	Chamber Press. (psi)	Inlet Press. (psi)	Outlet Press. (psi)	Temp. (°c)	Permeability K (cm/sec)
Sample #1 -4"	99.5	21.0	7.2/9.3	70	63	60	20°	5.1×10^{-8}
Sample #2 -4"	94.5	20.8	7.2/9.1	70	63	60	20°	2.7×10^{-8}
Sample #3 -4"	97.5	21.6	7.2/9.1	70	63	60	20°	8.3×10^{-8}
Sample #4 -4"	96.2	20.4	7.2/9.2	70	63	60	20°	1.5×10^{-8}

Note: Permeability testing was performed utilizing the flexible wall method with relatively undisturbed samples.

4.0 MODIFIED TEST PAD EVALUATION

Although the field and laboratory permeability evaluations of the test pad proved to be less than 1 x 10^{-6} cm/sec as required by the regulations, moderate to severe pumping of the material was observed when equipment drove on the test pad. Since pumping of the material would make placement of an overlying geomembrane extremely difficult, a meeting was held between the City, BAS, Vector, and Law/Crandall to discuss the potential problem. At the meeting, it was decided that reducing the moisture content of the material while increasing the compactive effort may result in a liner that meets the required permeability and does not pump.

In order to determine the effect of increased compactive effort on the on-site material, Vector was authorized to conduct eight remolded laboratory permeability tests using a relative compaction of 95%. Two samples each were evaluated at optimum moisture, 1% above, 2% above, and 3% above optimum. The results of the laboratory testing, as shown on Table 3, ranged from 1×10^{-7} cm/sec to 5×10^{-7} cm/sec. Based on these results, it was recommended that a small scale or "modified test pad" be conducted to evaluate the constructibility of the material.

On August 5, 1992, BAS submitted to the RWQCB a letter titled "Request for Approval, Mini-Test Pad for Field Permeability Testing, Phase I, Disposal Area "C" Liner, Lopez Canyon Landfill, Los Angeles, California". Since a SDRI was currently being conducted on the original test pad, the RWQCB gave approval for the modified test pad to be installed without a SDRI.

The purpose of the modified test pad was to evaluate field construction techniques at lower moisture contents and determine if the permeability requirements were met. In addition, close observation was conducted to ensure that the material did not exhibit pumping under equipment traffic. Daily reports prepared by Vector's engineering geologist during field analysis of the modified test pad are presented in Appendix 5.

In order to determine the permeability of the modified test pad, Vector conducted two SSRI's, two BAT tests, and took two shelby tube samples for laboratory evaluation. As discussed above, no SDRI was installed on the modified test pad. Instead, the results of the other field tests will be correlated to the SDRI conducted on the full scale test pad.

The SSRI tests conducted on the modified test pad had results of 2×10^{-7} cm/sec and 4×10^{-8} cm/sec. The results of the second SSRI test (4×10^{-8} cm/sec), may not be representative because the initial test leaked and the ring was reset and tested without the minimum saturation period. The two BAT permeameter tests conducted on the modified test pad indicated *in situ* permeabilities of 5×10^{-8} cm/sec and 7×10^{-8} cm/sec. The data sheets for the BAT tests and SSRI's are provided in Appendix 6.

In addition to the field permeability evaluations, two relatively undisturbed shelby tube drive samples were obtained from the modified test pad. These samples were transported to Vector's soils laboratory and evaluated for permeability using ASTM D-5084. The shelby tube samples yielded permeabilities of 2×10^{-7} cm/sec and 3×10^{-7} cm/sec as shown in Table 4.

5.0 COVER SOIL BORROW SOURCE EVALUATION

In addition to conducting the test pad evaluation on the proposed on-site segregated shale material, Vector evaluated the potential for using other materials at the Lopez Canyon Landfill as cover for closure of the site. BAS obtained samples of unsegregated representative sand/shale material and shipped them to Vector's laboratory for analysis. After screening out particles greater than 3/4-inch, a modified Proctor test was conducted on the material which had a maximum density of 120.3 pounds per cubic foot and an optimum moisture of 12.8%. The results of this laboratory analysis are provided in Appendix 7.

In order to be used as a low permeability cover, the proposed material must have a permeability of less than or equal to 1×10^{-6} cm/sec. Previous testing of the existing materials by Law/Crandall (other than the segregated shale unit) indicated that the required permeability could not be achieved without the addition of bentonite. Based on this previous testing, Vector added 4% and 8% bentonite to the proposed cover material remolded to 90% of the maximum density at moisture contents of optimum and 3% above optimum. These samples were then placed in

TABLE 3

REMOLDED LABORATORY PERMEABILITY TEST SUMMARY

Test Method:ASTM D-5084 Permeant Liquid:De-Aired Water

Sample ID	Relative Compaction %	Moisture Content %	Sample Dia/Ht (cm)	Chamber Press. (psi)	Inlet Press. (psi)	Outlet Press. (psi)	Temp. (°c)	Permeability K (cm/sec)
Stockpile Optimum Moist.	95	14.8	6.2/6.3	90	83	80	20°	2.2×10^{-7}
Stockpile Optimum Moist.*	95	14.8	6.2/6.3	90	83	80	20°	2.8×10^{-7}
Stockpile Opt. +1%	95	15.8	6.2/6.3	90	83	80	20°	1.7×10^{-7}
Stockpile Opt. +1%*	95	15.8	6.2/6.3	90	83	80	20°	2.1×10^{-7}
Stockpile Opt. +2%	95	16.8	6.2/6.3	90	83	80	20°	3.0×10^{-7}
Stockpile Opt. +2%*	95	16.8	6.2/6.3	90	83	80	20°	5.3×10^{-7}
Stockpile Opt. +3%	95	17.8	6.2/6.3	90	83	80	20°	3.6×10^{-7}
Stockpile Opt. +3%*	95	17.8	6.2/6.3	90	83	80	20°	1.4×10^{-7}

Note: Permeability testing was performed utilizing the flexible wall method with samples remolded to 95% relative compaction at the indicated moisture content, as determined by test method ASTM D-1557.

TABLE 4

MODIFIED TEST PAD UNDISTURBED LABORATORY PERMEABILITY

Test Method:ASTM D-5084 Permeant Liquid:De-Aired Water

Sample ID	Dry Density (pcf)	Moisture Content %	Sample Dia./Ht. (cm)	Chamber Press. (psi)	Inlet Press. (psi)	Outlet Press. (psi)	Temp. (°c)	Permeability K (cm/sec)
Sample #1 -4"	99.2	17.2	7.2/8.0	70	63	60	20°	1.9×10^{-7}
Sample #2 -4"	97.1	16.4	7.2/7.1	70	63	60	20°	3.0×10^{-7}

Note: Permeability testing was performed utilizing the flexible wall method with relatively undisturbed samples.

TABLE 5

COVER SOIL LABORATORY PERMEABILITY TEST SUMMARY

Test Method: ASTM D-5084 Permeant Liquid: De-Aired Water

Sample ID	Moist. % Dry Density, (pcf)	Sample Dia/Ht (cm)	Chamber Press. (psi)	Inlet Press. (psi)	Outlet Press. (psi)	Temp. (°c)	Permeability K (cm/sec)
Opt. Moist. w/ 4% Bentonite	12.8/109.3	6.2/6.3	70	63	60	20°	4.1×10^{-7}
Opt. Moist. w/ 8% Bentonite	11.9/110.7	6.2/6.3	70	63	60	20°	9.2×10^{-8}
Opt. Moist. + 3% w/ 4% Bentonite	15.8/109.3	7.2/9.0	70	63	60	20°	2.2×10^{-7}
Opt. Moist. + 3% w/ 8% Bentonite	14.9/110.7	7.2/9.0	70	63	60	20°	7.6×10^{-8}

Note: Permeability testing was performed utilizing the flexible wall method with remolded samples. Bentonite was added as a percentage of the dry weight.

triaxial cells and the permeability was evaluated. The results ranged from 4×10^{-7} cm/sec to 8×10^{-8} cm/sec and are shown on Table 5.

6.0 CONCLUSIONS

As described previously, the purpose of the test pad evaluation was threefold: to determine if the liner materials meet the requirements of the regulations, to determine the constructibility of the liner material in the field, and to correlate the various field and laboratory permeability test methods to each other. In addition to the evaluation of the test pad, the suitability of other on-site materials for use as final cover was determined.

6.1 Regulatory Requirements

Based on the results of the borrow source evaluation, the on-site shale unit at the Lopez Canyon Landfill will be suitable as a low permeability liner material. The material meets or exceeds the requirements set forth in Chapter 15, Section 2541 of the California Administrative Code with the exception of the material designation under the Unified Soil Classification System. Chapter 15 states that materials shall be fine-grained soils with a significant clay content and without organic matter, in the "SC" (clayey sand), "CL" (clay, sandy or silty clay), or "CH" (clay, sandy clay) classes of the Unified Soil Classification System.

The on-site material proposed for use as the low permeability liner was classified as a silt (ML) during the borrow source laboratory testing. While the material was not classified as a clay, all other criteria were met including greater than 30% of the material passing a No. 200 U.S. Standard sieve and a calculated permeability of less than 1 x 10^{-6} cm/sec. Low permeability liners have been constructed with ML material at other sites in Southern California (such as the Calabasas Landfill) and have performed well. Based on this performance, BAS and Vector recommended using the material for the Development Area C liner soil.

6.2 Constructibility

Following approval of the borrow source, a test pad was installed in order to evaluate construction methods and to conduct a comparison of the available permeability test methods. The borrow source analysis indicated that the required permeability could be obtained if the material was compacted to 90% of the maximum density at a moisture content between 4% and 6% above optimum. The borrow material was pre-moistened to 6% in a mixing area and transported to the test pad and compacted.

Although the material was compacted to greater than the 90% minimum required, it was noted that moderate to severe pumping was occurring when machinery drove on the liner. This pumping occurred because of the amount of moisture present in the material. The procedures used to place the synthetic geomembrane in the Disposal Area C will require traffic to traverse the soil liner.

Because of this, it was determined that the proposed material would present construction difficulties at the compaction and moisture content specified.

The borrow soil was then tested in the laboratory at a compaction of 95% and a moisture content ranging from optimum to 3% above optimum and found to be within the required permeability. A second, modified test pad was constructed at the higher compaction and lower moisture content. This pad did not exhibit pumping during installation and was determined to be suitable from a constructibility standpoint.

6.3 Permeability Correlation

Four test methods were used to determine the permeability of the in-place test pad liner. These methods consisted of the sealed double ring infiltrometer (SDRI), the sealed single ring infiltrometer (SSRI), the BAT permeameter, and undisturbed laboratory triaxial permeability tests. BAS is conducting the SDRI test and will correlate the results with the other methods discussed within this report.

All of the field and laboratory permeability tests conducted on the test pad and modified test pad gave results that satisfy the regulatory requirements for clay liners at Class III landfills. A comparison of the results using the different methods is given in Table 6.

For the test pad, the average measured permeability using the SSRI was 5.7×10^{-8} cm/sec, for the BAT permeameter was 1.0×10^{-7} cm/sec, and for the laboratory triaxial testing was 4.4×10^{-8} cm/sec. For the modified test pad, the average measured permeability using the SSRI was 1.4×10^{-7} cm/sec, for the BAT permeameter was 6.1×10^{-8} cm/sec, and for the laboratory triaxial testing was 2.4×10^{-7} cm/sec. Based on the results from the test pad and modified test pad, it appears that the SSRI and the laboratory triaxial permeability test methods correlate very well. In general, the BAT permeameter permeability results were about one half of a magnitude of order different than the SSRI or Laboratory results. For the test pad, the BAT permeameter gave results that were more permeable than the SSRI and laboratory results and for the modified test pad, the BAT results were less permeable.

TABLE 6

COMPARISON OF FIELD AND LABORATORY TEST METHODS

Sample ID	Single Ring Permeability K (cm/sec)	BAT Probe Permeability K (cm/sec)	Laboratory Permeability K (cm/sec)
Test Pad Sample Location 1	3.4×10^{-8}	3.8×10^{-8}	5.1×10^{-8}
Test Pad Sample Location 2	1.0×10^{-7}	1.4×10^{-7}	2.7×10^{-8}
Test Pad Sample Location 3	4.8×10^{-8}	1.3×10^{-7}	8.3×10^{-8}
Test Pad Sample Location 4	4.6×10^{-8}	--	1.5×10^{-8}
Mini-Test Pad Sample Location 1	2.4×10^{-7}	5.3×10^{-8}	1.9×10^{-7}
Mini-Test Pad Sample Location 2	3.7×10^{-8}	7.0×10^{-8}	3.0×10^{-7}

Since the production clay liner will be installed at the same compaction and moisture content as that of the modified test pad, it is recommended that the permeability correlations obtained from the modified test pad be used. Following the results of the sealed double ring infiltrometer (SDRI) analysis being conducted by BAS, the other permeability test methods conducted during this investigation will be correlated to the SDRI. This correlation will be used when analyzing the results of the field and laboratory tests conducted on the production clay liner to determine that the specified permeabilities have been met.

6.4 Cover Soil Borrow Source Investigation

The purpose of the cover soil borrow source investigation was to determine if unsegregated on-site sand/shale materials would be suitable for use as a low permeability cover soil. The results of the laboratory permeability testing on the on-site soils with the addition of bentonite resulted in values ranging from 4.1×10^{-7} cm/sec to 7.6×10^{-8} cm/sec. Based on these values, it appears that bentonite amended on-site materials will satisfy the regulatory requirements for Class III low permeability cover soils.

APPENDIX D

QA/QC PLAN

QUALITY ASSURANCE - QUALITY CONTROL FOR PLACEMENT OF COMPACTED CLAY BARRIER AND FINAL COVER

INTRODUCTION

Construction projects of any complexity need both Quality Assurance and Quality Control.

A Quality Assurance (QA) program consists of selected testing and inspection of the final cover to provide to the Owner/Agencies and evaluation of whether the completed item is of the specified quality. Unlike many manufactured items, soil fill becomes a finished product uniformly and consistently throughout the time of construction. As a result, it is both inefficient and impractical to withhold QA testing until completion of the project. Rather, it is most effective to conduct the QA program during the grading.

A Quality Control (QC) program consists of selected tests and inspections during production which assist the Owner/Constructor in producing the quality product required of him. Since Quality Control influences the Constructors daily operations and can affect his progresss and profitability, the Constructor (in this case also the Owner) should not undertake the QC function directly.

Owing to similarity of intent and procedure, QA and QC functions for grading projects are typically combined and left under the objective authority of a single team of design professionals. The following discussions are therefore presented as a description of the combined QA/QC procedures which are proposed for the placement of the final cover on the Lopez Canyon Landfill site.

PURPOSE

The purpose of a final cover is to provide long-term minimization of migration of liquids through the post-closure period of the landfill, control and venting of gas generated in the facility, isolate the wastes from the subsurface and surface with minimum maintenance, promote drainage and collection of leachate and minimize erosion or abrasion of the cover, accommodate settlement and subsidence so that the cover's integrity is maintained, and provide a permeability suitable to minimize or prevent infiltration of runoff and excess irrigation water.

The primary purpose of the QA/QC program is to provide evidence that satisfactory materials and good practices are used in accordance with the design specifications. Any deviations from the design or specifications should be reported to the Design Professional in order that he may evaluate their effects with respect to the design and ultimate performance of the cover or other barrier and drainage systems.

ELEMENTS OF PLAN

The basic elements of a QA/QC program are: objective, responsibility, personnel qualifications, inspection activities, requirements, and documentation. A brief description of each follows:

OBJECTIVE

To assure that the final cover are placed in accordance with the plan approved by the applicable agencies.

RESPONSIBILITY AND AUTHORITY (tentative)

A. Surveying -	City of Los Angeles Department of Public Works Bureau of Sanitation 200 North Spring Street, Room 1410 Los Angeles, California 90012
B. Inspection -	Bryan A. Stirrat & Associates 1360 Valley Vista Drive Diamond Bar, California 91765
C. Geotechnical -	Law/Crandall, Inc. 200 Citadel Drive Los Angeles, California 90040
D. Borrow Area Review -	Law/Crandall, Inc. 200 Citadel Drive Los Angeles, California 90040
E. Test Pad Construction -	Law/Crandall, Inc. 200 Citadel Drive Los Angeles, California 90040
F. Design -	Bryan A. Stirrat & Associates 1360 Valley Vista Drive Diamond Bar, California 91765
G. Permeability and Soil Property Testing -	Law/Crandall, Inc. 200 Citadel Drive Los Angeles, California 90040
H. Overall Certification -	Principal Sanitary Engineer Solid Waste Management Bureau of Sanitation City of Los Angeles

PERSONNEL QUALIFICATIONS

A. Survey - City of Los Angeles
B. Construction Inspection - Bryan A. Stirrat & Associates
C. Geotechnical Inspection - Law/Crandall, Inc.
D. Design - Ed Schrandt (Bryan A. Stirrat & Associates)
E. Project Engineer - Bryan A. Stirrat & Associates

INSPECTION ACTIVITIES (tentative)

The observations and tests that will be used to monitor the installation of the liner material and Final Cover:

A. Survey - City of Los Angeles
B. Construction Inspection - Bryan A. Stirrat & Associates
C. Geotechnical Inspection - Law/Crandall, Inc.
D. Design Review - Law/Crandall, Inc., and Bryan A. Stirrat & Associates

REQUIREMENTS FOR LOW PERMEABILITY COVER

The requirements for the final cover system have been generally set forth in State of California, Title 23, Chapter 3, Subchapter 15, Articles 3, 4, and 8. In order to satisfy these requirements for a final cover system, we propose:

- A three layer system which will be not less than five feet in thickness. On side slopes of 2:1 (horizontal to vertical), the horizontal width of the cover may be wide as about 12 to 15 feet. This width results in a thickness of about 5 to 6 1/2 feet normal to the slope. While the above sloping configuration is an increase from the Closure Plan, it is a result of the minimum width necessary to effectively operate construction and compaction equipment and bench widths;

- o Final grade of the cover will be a minimum of 3% to prevent ponding;
- o Slopes steeper than 10% shall be designed to be protected from water and wind erosion;
- o Tests to be performed are discussed in detail below.

DOCUMENTATION

The City has informed consultants Law/Crandall, Inc. and BAS that complete documentation of their construction activities shall be maintained for Agencies review. The information will be tabulated on a weekly basis and submitted monthly.

The following items will be maintained:

1. Daily Reports - All field personnel's description of site activities.
2. Field Test Results.
3. Laboratory Test Results.
4. Sampling Location Map - Sample locations will be maintained on site during all active grading.
5. Survey Notes (Available on request).

FINAL COVER EARTHWORK SPECIFICATIONS

These earthwork specifications present the generally accepted standards and minimum requirements for earthwork grading operations to be used in development of the project. These specifications shall be the project guidelines for earthwork except where specifically superseded in subsequent soils reports, or be prevailing guidance documents of the controlling agency.

GENERAL

A. The Constructor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

B. The project Construction Inspector, Geotechnical Engineer, Engineering Geologist, and Design Engineer are City's representatives and shall provide engineering and geologic inspection and testing services.

C. All clearing, grubbing, stripping, and site preparation for the project shall be accomplished by the Constructor to the satisfaction of the City and Geotechnical Engineer.

D. It is the Constructor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the City and to place, spread, mix, water, and compact the fill in accordance with the job specifications and as recommended by the Geotechnical Engineer. The Constructor shall also remove all material considered by the Geotechnical Engineer to be unsuitable for use in the construction of the final cover.

E. The Constructor will have suitable and sufficient compaction equipment on the job site to handle the amount of fill being placed. If necessary, excavation equipment will be shut down temporarily in order to permit proper compaction of fills to be achieved. Sufficient watering apparatus will also be provided by the Constructor, with due consideration to the type of the fill material, rate of placement, moisture-temperature conditions, and time of year.

F. A final report shall be issued by the Geotechnical Engineer attesting to the Constructors conformance with these specifications. The map used in this final report will be the "As-Built" plan prepared by the Design Engineer.

SITE PREPARATION

A. Equipment used in the installation compaction of cover materials will be state-of-the-art grading machinery of known specifications suitable for performing the required work in a timely and efficient manner. All clay barrier material shall be compacted using sheepsfoot tampers, which promote interlayer bonding between successive fill lifts.

B. Excess vegetation and all deleterious material shall be disposed of off-site (or taken to an approved area elsewhere on the site), as required by the Geotechnical Engineer. This removal must be concluded prior to placing fill or excavating in the active part of the borrow area.

C. Soil, alluvium, or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from grading the site. All materials incorporated as a part of a compacted fill must be inspected and observed by the Geotechnical Engineer.

D. The ground surface prepared to receive fill shall be scarified, disced, or bladed by the Constructor until it is uniform and free from uneven features which may prevent uniform compaction. The scarified ground surface shall then be brought to 110 to 120% of optimum moisture content, mixed as required, and compacted as specified. If the scarified zone is greater that 12 inches in depth, the excess shall be removed and placed in lifts to 6 to 8 inches in thickness. Prior to placing fill, the ground surface to receive fill shall be inspected and tested by the Geotechnical Engineer and Engineering Geologist as appropriate.

COMPACTED FILLS CONSTRUCTION

A. Selected material excavated on the property will be utilized in the final cover systems provided each material has been deemed to be suitable by the Geotechnical Engineer. Deleterious material not disposed of during clearing and grubbing or demolition shall be removed from the fill as directed by the Geotechnical Engineer.

B. Irreducible rock or rock fragments less than six inches in the largest dimension will be utilized in the construction of the 2:1 (horizontal to vertical) slopes and bench network, provided they are not placed in concentrated pockets and do not constitute more than 5 to 10% of the total fill volume. Rock or rock fragments less than three inches in largest dimension will be utilized in the construction of low-permeability fill construction.

C. Material that is considered unsuitable by the Geotechnical Engineer shall not be used in the compacted fill.

D. Representative samples of on-site material to be used for final cover have been tested in the laboratory in order to determine the physical characteristics of the material. During grading operations, no other soils or soil types other than those previously analyzed may be used by the Constructor, unless the Geotechnical Engineer documents the suitability of these soils, with appropriate testing.

E. The fill material shall be placed by the Constructor in thin lifts with a maximum uncompacted thickness of eight inches. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain a near uniform condition of material in each layer. The minimum compaction is specified as 90% maximum density as determined by ASTM Test Designation D1557-78.

F. At the beginning of each grading day, the active fill area will be watered as needed and processed in preparation for receiving additional fill lifts.

G. At the end of each grading day, the active fill pad will be watered. In addition, at the end of each grading day, the active borrow area will be ripped and watered thoroughly to allow some "curing" time for the future cover materials.

H. Where the moisture content of the fill material is below the limit specified by the Geotechnical Engineer, water shall be added until the moisture content is within the limits required so as to assure and adequate bonding and compaction of all fill materials. Where the moisture content of the fill material is above the limits specified by the Geotechnical Engineer, the fill material shall be aerated by blading or other satisfactory methods until the moisture content is within the limits specified. The specified limits of moisture content will be fully determined during the installation of the approved test pads.

I. Drainage terraces and subdrainage devices shall be constructed in compliance with the recommendations of the Design Engineer as shown in the Civil Design Plans.

J. All fill slopes will be planted to protect from erosion in accordance with an approved Landscaping Plan.

Compacted Fill Inspection

A. Inspection of the fill placement for cover systems shall be provided by the Construction Inspector and Geotechnical Engineer during the progress of grading. Field tests shall be made by the Geotechnical Engineer to evaluate the compaction and permeability for the fill. The following test schedule will be implemented:

1. Density tests - Four field density tests shall be performed for each 1,000 cubic yards of material placed, or at a minimum of four tests per day or at intervals not to exceed two feet of fill height, whichever occurs first. Fill density testing will be completed using either sand cone (ASTM D1556-32), drive cylinder (ASTM D2937-83) or nuclear densometer (ASTM D2922-81) methods. At a minimum, sand cone tests will constitute 20% of the specified density testing.

2. Five layer compaction curves (ASTM D1557-78) shall be performed on low-permeability materials in cover design at a rate of once per week and/or for every 5,000 cubic yards of material placed.

3. Atterberg limits (ASTM D4318-84) shall be performed once per week and/or for every 5,000 $yards^3$ of material placed.

4. Laboratory tests will be taken of cover at the frequency previously indicated and field infiltration tests will be conducted in accordance with 14 CCR 17774 h (2) (C) in accordance with the required equation $I = Q/(tA)$.

5. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Soil tests shall be taken in the compacted material below the disturbed surface.

B. Where tests indicate the density of any layer of fill or portion thereof is below the required relative compaction, the particular layer or portion shall be reworked until the required density has been attained. No additional fill shall be placed over an area until the last placed lift of fill has been tested and found to meet the density requirements by the Geotechnical Engineer.

C. Inspection by the Geotechnical Engineer shall be conducted continuously during the filling and compacting operations so that he can state that in his opinion all cut and filled areas are graded in accordance with the approved specifications.

D. Where the work is interrupted by heavy rains, fill operations shall not be resumed until the field tests by the Geotechnical Engineer indicate the moisture contend and density of the fill are within the limits previously specified.

E. The Geotechnical Engineer's field representative will be a fully qualified soils technician experienced in observation and compaction testing during grading operations.

F. The Geotechnical Engineer on the low-permeability fill placement site will observe fill materials being hauled to the site and reject materials that include deleterious material such as large rocks, debris, or granular materials of SP, SM, SW, or coarser classifications.

G. Conversely, in placement of fill for drainage blankets or dendritic drainage systems, fill materials with deleterious fines or oversize rock shall be rejected.

<u>Borrow Area Construction and Inspection</u>

A. The Engineering Geologist shall inspect all permanent cut slopes which may be affected by geologic conditions at vertical intervals not exceeding 10 feet.

B. The borrow cut area will be manned during grading operations with an individual qualified and authorized to evaluate borrow cut excavations. His function will be to segregate more clayey, shaley materials from granular, clastic materials that will not qualify for low-permeability final cover. At present, it is anticipated that visual observation will be supplemented by Plasticity Index to estimate the suitability of borrow materials for use in cover construction. The coarser materials may be used in daily cover; as road material or as fills intended for other purposes where suitable for the intended use.

C. If any conditions of an adverse or potentially adverse nature not anticipated are encountered during grading, the Engineering Geologist and Geotechnical Engineer shall investigate, analyze, and make recommendations to treat these problems.

D. Permanent cut slopes that face in the same direction as the prevailing drainage shall be protected from slope wash by a non-erosive interceptor swale placed at the top of the slope.

E. Unless otherwise specified in the soils and geological report, no permanent cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.

F. Drainage terraces shall be constructed in compliance with the recommendations of the Civil Design Engineer and appropriate Governmental requirements.

G. A system of signals will be utilized for communication between the director of borrow cut excavations and equipment operators to avoid sending cut materials to the wrong destinations. These signals may include such signs as a "thumbs-up" sign for material which appears to be acceptable cover fill and a "cut-throat" sign for unsuitable soils to be taken and used elsewhere within the landfill.

Protection of Work

During construction, the Constructor shall properly grade all excavated surfaces to provide good drainage and prevent ponding of water. He shall control surface water to avoid damage to adjoining properties or to finish work on the site.

In addition, to minimize the potential for "shrinkage" cracks developing in finish cover areas, exposed surfaces and slope faces will be kept moist until covered in accordance with designs or until permanent vegetation and moisture control procedures can be implemented, respectively.

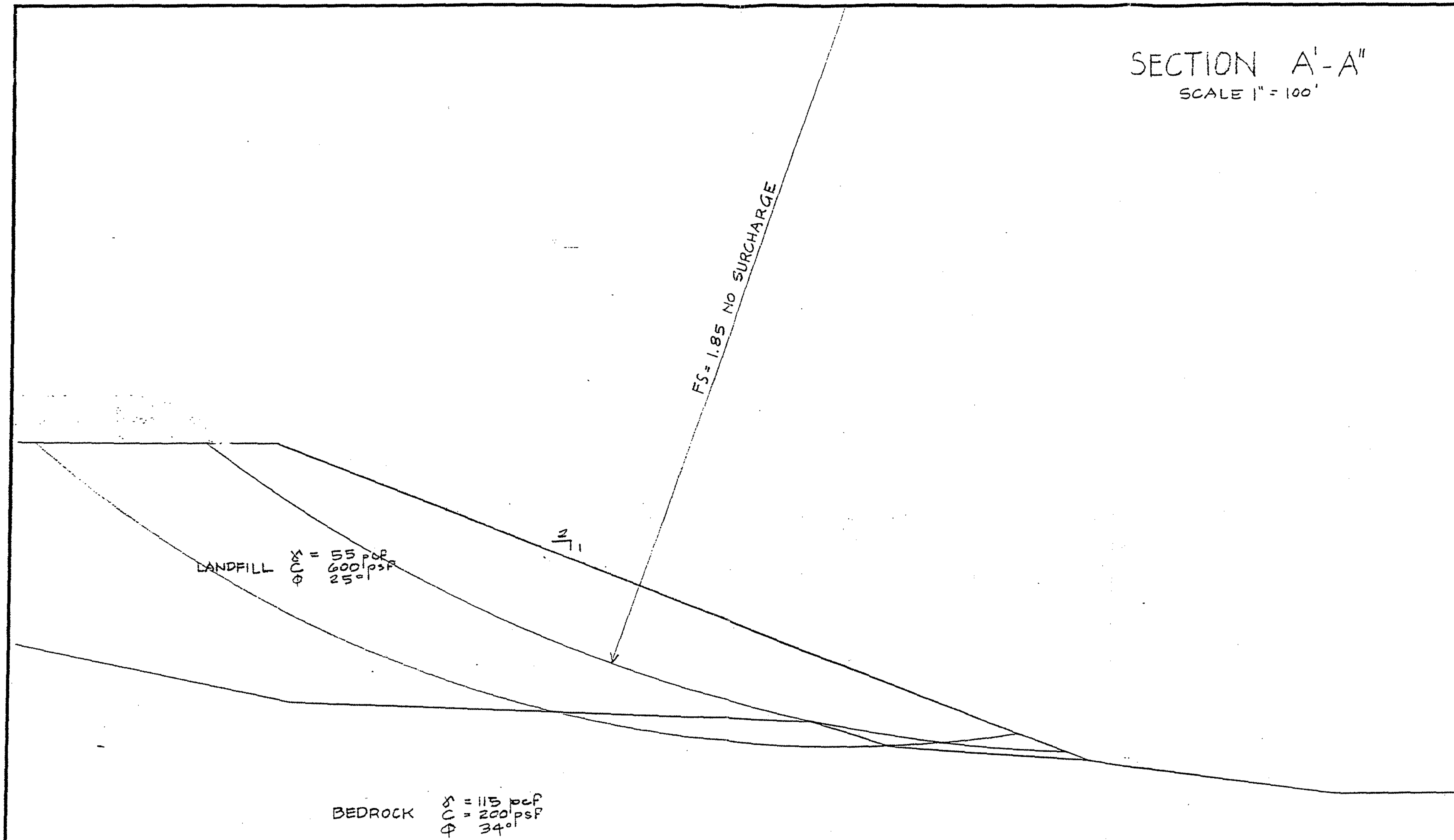
For repair, settlement cracks will be excavated by hand to the full depth of the crack and will extend one foot on each side. The soil will be removed and recompacted by hand tamping. Additional borrow material will be added as needed from the designated borrow areas.

APPENDIX E

SLOPE STABILITY ANALYSIS

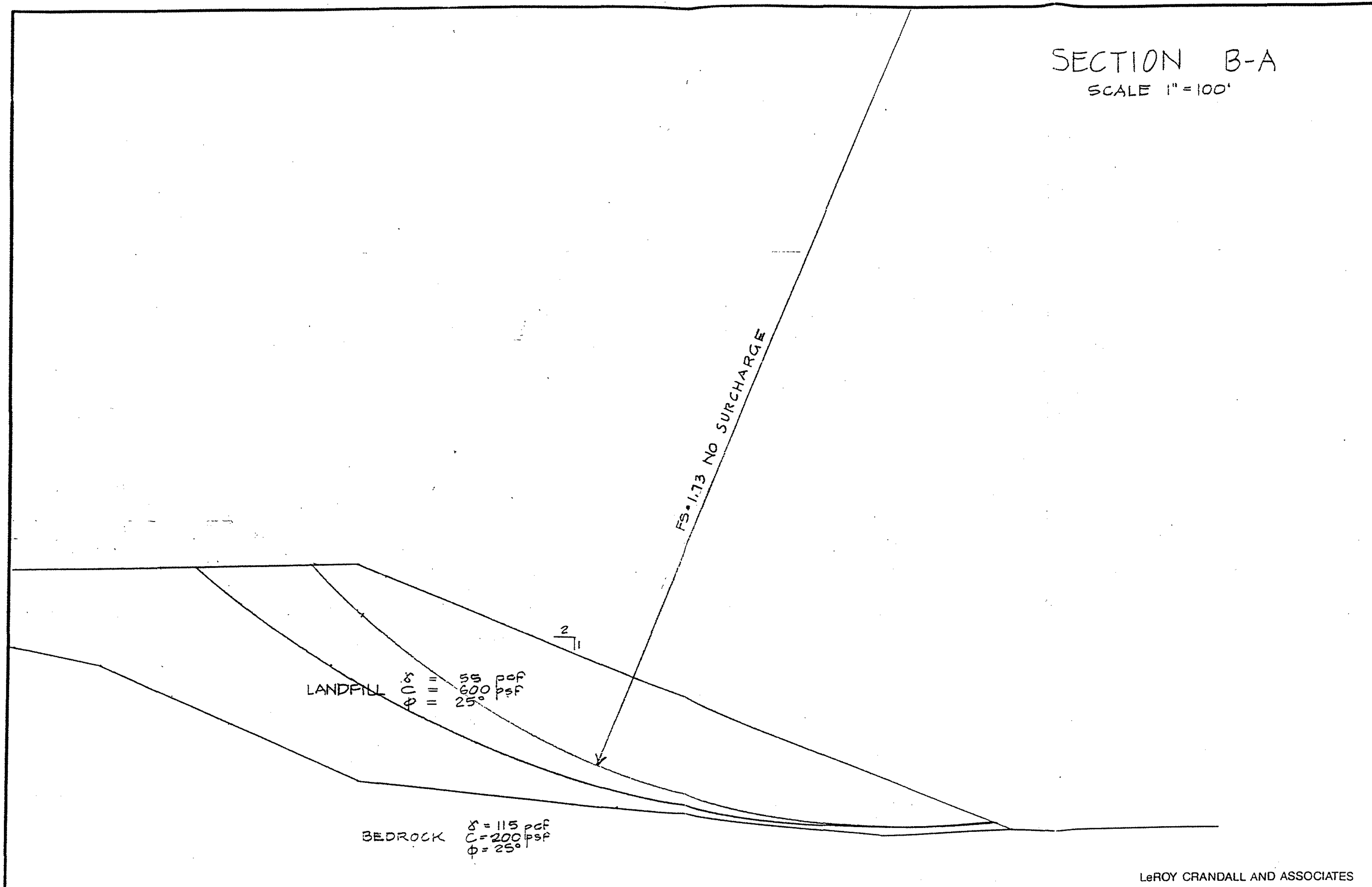
SECTION A'-A"

SCALE 1" = 100'

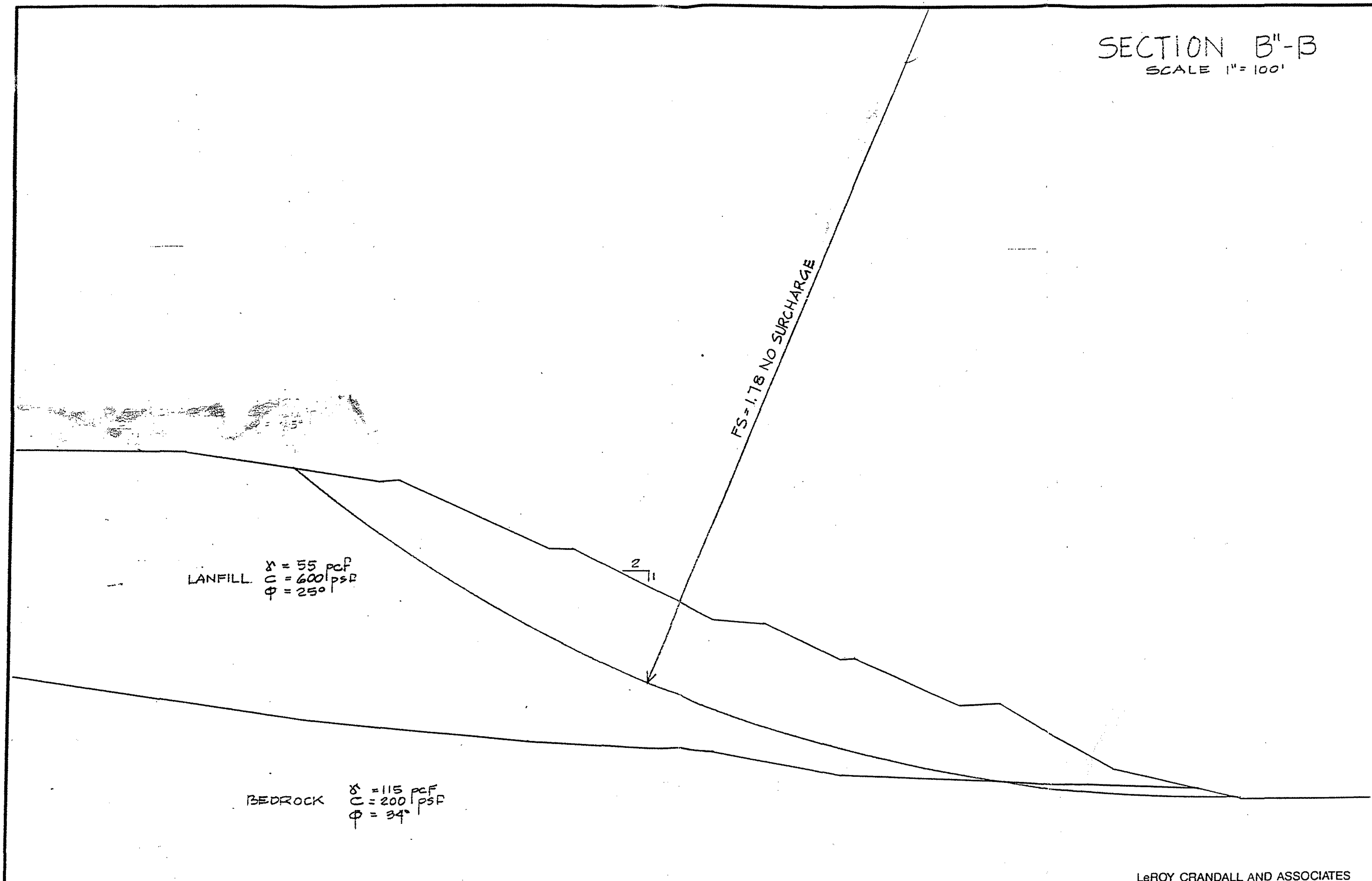


LeROY CRANDALL AND ASSOCIATES

FORM 137-A



LeROY CRANDALL AND ASSOCIATES



JOB AE-84105-2 DATE 2/11/91 DR CHKD.

FORM 137-A

LeROY CRANDALL AND ASSOCIATES

****
EI CANYON LANDFILL A'-A''
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****
LYSIS BY BISHOP'S SIMPLIFIED METHOD
****

ETRY

SECTIONS	700.00	1144.00	1728.00	1813.00	2032.00	2300.00	2700.00
T. CRACKS	1120.00	1120.00	1342.29	1374.64	1458.00	1494.00	1494.00
R IN CRACK	1120.00	1120.00	1342.29	1374.64	1458.00	1494.00	1494.00
BOUNDARY 1	1120.00	1120.00	1342.29	1374.64	1458.00	1494.00	1494.00
BOUNDARY 2	1370.00	1396.00	1415.00	1440.00	1458.00	1494.00	1494.00
BOUNDARY 3	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00

_ PROPERTIES

LAYER	DENSITY	COHESION	FRICTION ANGLE	DELTA PHI
1	55.00	600.00	25.00	.00
2	115.00	200.00	34.00	.00

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ULTS
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TH LIMITING TANGENT NO. 1 AT Y = 1450.00
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ER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
	1450.0	1690.0	2070.0	-240.0	1.848
	1450.0	1690.0	2050.0	-240.0	1.859
	1450.0	1710.0	2070.0	-260.0	1.849
	1450.0	1690.0	2090.0	-240.0	1.868
	1450.0	1670.0	2070.0	-220.0	1.849
	1450.0	1690.0	2060.0	-240.0	1.853
	1450.0	1700.0	2070.0	-250.0	1.848
	1450.0	1690.0	2080.0	-240.0	1.856
	1450.0	1680.0	2070.0	-230.0	1.848
	1450.0	1700.0	2060.0	-250.0	1.854
	1450.0	1700.0	2080.0	-250.0	1.855
	1450.0	1680.0	2080.0	-230.0	1.858
	1450.0	1680.0	2060.0	-230.0	1.851

MINIMUM= 1.848 FOR THE CIRCLE OF CENTER (2070.0,-240.0)

PLATE B

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ER TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
1450.0	1760.0	2070.0	-310.0	1.035
1450.0	1750.0	2040.0	-300.0	1.039
1450.0	1770.0	2060.0	-320.0	1.036
1450.0	1750.0	2080.0	-300.0	1.037
1450.0	1730.0	2060.0	-280.0	1.036
1450.0	1750.0	2050.0	-300.0	1.037
1450.0	1740.0	2060.0	-290.0	1.036
1450.0	1760.0	2050.0	-310.0	1.037
1450.0	1760.0	2070.0	-310.0	1.035
1450.0	1740.0	2070.0	-290.0	1.035
1450.0	1740.0	2050.0	-290.0	1.037
1450.0	1770.0	2070.0	-320.0	1.035
1450.0	1760.0	2080.0	-310.0	1.036
1450.0	1770.0	2060.0	-320.0	1.036
1450.0	1780.0	2070.0	-330.0	1.035
1450.0	1770.0	2080.0	-320.0	1.035
1450.0	1780.0	2060.0	-330.0	1.036
1450.0	1790.0	2070.0	-340.0	1.035
1450.0	1780.0	2080.0	-330.0	1.035
1450.0	1790.0	2060.0	-340.0	1.036
1450.0	1800.0	2070.0	-350.0	1.035
1450.0	1790.0	2080.0	-340.0	1.034
1450.0	1800.0	2080.0	-350.0	1.034
1450.0	1790.0	2090.0	-340.0	1.040
1450.0	1780.0	2090.0	-330.0	1.035
1450.0	1800.0	2070.0	-350.0	1.035
1450.0	1810.0	2090.0	-360.0	1.034
1450.0	1800.0	2090.0	-350.0	1.039
1450.0	1810.0	2070.0	-360.0	1.035
1450.0	1820.0	2080.0	-370.0	1.034
1450.0	1810.0	2090.0	-360.0	1.038
1450.0	1820.0	2070.0	-370.0	1.035
1450.0	1830.0	2080.0	-380.0	1.034

MINIMUM= 1.034 FOR THE CIRCLE OF CENTER (2090.0,-380.0) AND SEISMIC COEFFICIENT = .24893

IAL SEISMIC COEFFICIENT = .24893

PLATE B-

****
EE CANYON LANDFILL A'-A'' WITH 50 FOOT SURCHARGE
****

****
LYSIS BY BISHOP'S SIMPLIFIED METHOD
****

ETRY

SECTIONS	10.00	995.00	1095.00	1144.00	1728.00	1813.00	2032.00	2300.00	3500.00
T. CRACKS	1070.00	1070.00	1120.00	1120.00	1342.29	1374.64	1458.00	1494.00	1494.00
R IN CRACK	1070.00	1070.00	1120.00	1120.00	1342.29	1374.64	1458.00	1494.00	1494.00
BOUNDARY 1	1070.00	1070.00	1120.00	1120.00	1342.29	1374.64	1458.00	1494.00	1494.00
BOUNDARY 2	1120.00	1120.00	1120.00	1120.00	1342.29	1374.64	1458.00	1494.00	1494.00
BOUNDARY 3	1370.00	1392.58	1394.88	1396.00	1415.00	1440.00	1458.00	1494.00	1494.00
BOUNDARY 4	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00

PROPERTIES

LAYER	DENSITY	COHESION	FRICTION ANGLE	DELTA PHI
1	120.00	50.00	20.00	.00
2	55.00	600.00	25.00	.00
3	115.00	200.00	34.00	.00

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ULTS
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TH LIMITING TANGENT NO. 1 AT Y = 1400.00
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ER TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
1400.0	1310.0	1760.0	90.0	1.658
1400.0	1310.0	1740.0	90.0	1.660
1400.0	1330.0	1760.0	70.0	1.659
1400.0	1310.0	1780.0	90.0	1.662
1400.0	1290.0	1760.0	110.0	1.659
1400.0	1310.0	1750.0	90.0	1.659
1400.0	1320.0	1760.0	80.0	1.658
1400.0	1310.0	1770.0	90.0	1.659
1400.0	1300.0	1760.0	100.0	1.658
1400.0	1320.0	1750.0	80.0	1.659
1400.0	1320.0	1770.0	80.0	1.659
1400.0	1300.0	1770.0	100.0	1.660
1400.0	1300.0	1750.0	100.0	1.658

MINIMUM= 1.658 FOR THE CIRCLE OF CENTER (1760.0, 90.0)

PLATE B-

****
ERATION ON SEISMIC COEFFICIENT
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ER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
	1400.0	1420.0	1770.0	-20.0	1.016
	1400.0	1410.0	1740.0	-10.0	1.017
	1400.0	1430.0	1760.0	-30.0	1.016
	1400.0	1410.0	1780.0	-10.0	1.017
	1400.0	1390.0	1760.0	10.0	1.016
	1400.0	1410.0	1750.0	-10.0	1.016
	1400.0	1400.0	1760.0	.0	1.016
	1400.0	1420.0	1750.0	-20.0	1.017
	1400.0	1420.0	1770.0	-20.0	1.016
	1400.0	1400.0	1770.0	.0	1.016
	1400.0	1400.0	1750.0	.0	1.016
	1400.0	1430.0	1770.0	-30.0	1.016
	1400.0	1420.0	1780.0	-20.0	1.016
	1400.0	1430.0	1760.0	-30.0	1.016
	1400.0	1440.0	1770.0	-40.0	1.016

MINIMUM= 1.016 FOR THE CIRCLE OF CENTER (1770.0, -40.0) AND SEISMIC COEFFICIENT = .20644

ICAL SEISMIC COEFFICIENT = .20644

PLATE I

****
:I CANYON LANDFILL B'-B''
****

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..SIS BY BISHOP'S SIMPLIFIED METHOD
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:TRY

:ECTIONS	900.00	1095.00	1230.00	1325.00	1345.00	1520.00	1545.00	1710.00	1775.00	1860.00	1877.00	2000.00
. CRACKS	1050.00	1050.00	1070.54	1085.00	1082.00	1160.00	1160.00	1240.00	1245.00	1287.00	1283.00	1340.00
IN CRACK	1050.00	1050.00	1070.54	1085.00	1082.00	1160.00	1160.00	1240.00	1245.00	1287.00	1283.00	1340.00
:OUNDARY 1	1050.00	1050.00	1070.54	1085.00	1082.00	1160.00	1160.00	1240.00	1245.00	1287.00	1283.00	1340.00
:OUNDARY 2	1320.00	1347.44	1360.00	1366.19	1369.91	1385.00	1385.66	1390.00	1403.00	1420.00	1420.81	1426.67
:OUNDARY 3	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00

:ECTIONS	2045.00	2180.00	2280.00	2330.00	2600.00
. CRACKS	1338.00	1415.00	1440.00	1450.00	1450.00
IN CRACK	1338.00	1415.00	1440.00	1450.00	1450.00
:OUNDARY 1	1338.00	1415.00	1440.00	1450.00	1450.00
:OUNDARY 2	1423.81	1435.24	1440.00	1450.00	1450.00
:OUNDARY 3	1600.00	1600.00	1600.00	1600.00	1600.00

PROPERTIES

LAYER	DENSITY	COHESION	FRICTION ANGLE	DELTA PHI
1	55.00	600.00	25.00	.00
2	115.00	200.00	34.00	.00

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..TS
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- LIMITING TANGENT NO. 1 AT Y = 1440.00
****

:E TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
1440.0	1720.0	2290.0	-280.0	1.778
1440.0	1720.0	2270.0	-280.0	1.782
1440.0	1740.0	2290.0	-300.0	1.779
1440.0	1720.0	2310.0	-280.0	1.789
1440.0	1700.0	2290.0	-260.0	1.779
1440.0	1720.0	2280.0	-280.0	1.779
1440.0	1730.0	2270.0	-290.0	1.778
1440.0	1720.0	2300.0	-280.0	1.781
1440.0	1710.0	2290.0	-270.0	1.779
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

PLATE B-

: 1440.0 1710.0 2280.0 -270.0 1.779

*INIMUM= 1.778 FOR THE CIRCLE OF CENTER (2290.0,-280.0)

:********************************
ERATION ON SEISMIC COEFFICIENT
:********************************

ER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
:	1440.0	1890.0	2290.0	-450.0	1.026
:	1440.0	1880.0	2260.0	-440.0	1.031
3	1440.0	1900.0	2280.0	-460.0	1.027
4	1440.0	1880.0	2300.0	-440.0	1.027
5	1440.0	1860.0	2280.0	-420.0	1.027
6	1440.0	1880.0	2270.0	-440.0	1.028
7	1440.0	1870.0	2280.0	-430.0	1.027
8	1440.0	1890.0	2270.0	-450.0	1.029
9	1440.0	1890.0	2290.0	-450.0	1.026
:	1440.0	1870.0	2290.0	-430.0	1.026
:	1440.0	1870.0	2270.0	-430.0	1.028
:	1440.0	1900.0	2290.0	-460.0	1.026
:	1440.0	1890.0	2300.0	-450.0	1.027
:	1440.0	1900.0	2280.0	-460.0	1.027
:	1440.0	1910.0	2290.0	-470.0	1.026
:	1440.0	1900.0	2300.0	-460.0	1.026
:	1440.0	1910.0	2280.0	-470.0	1.027
:	1440.0	1920.0	2290.0	-480.0	1.026

*INIMUM= 1.026 FOR THE CIRCLE OF CENTER (2290.0,-480.0) AND SEISMIC COEFFICIENT = .22918

:ICAL SEISMIC COEFFICIENT = .22918

PLATE F

****
CANYON LANDFILL B'-B'' WITH 50 FOOT SURCHARGE
****

****
LYSIS BY BISHOP'S SIMPLIFIED METHOD
****

ETRY

SECTIONS	900.00	945.00	1045.00	1095.00	1270.00	1325.00	[illegible]	1520.00	1545.00	1710.00	1775.00	1860.00
CRACKS	1000.00	1000.00	1050.00	1050.00	1070.54	1085.00	1082.00	1160.00	1160.00	1240.00	1245.00	1297.00
IN CRACK	1000.00	1000.00	1050.00	1050.00	1070.54	1085.00	1082.00	1160.00	1160.00	1240.00	1245.00	1257.00
BOUNDARY 1	1000.00	1000.00	1050.00	1050.00	1070.54	1085.00	1082.00	1160.00	1160.00	1240.00	1245.00	1287.00
BOUNDARY 2	1050.00	1050.00	1050.00	1050.00	1070.54	1085.00	1082.00	1160.00	1160.00	1240.00	1245.00	1287.00
BOUNDARY 3	1320.00	1333.49	1342.79	1347.44	1360.00	1369.17	1369.71	1385.00	1385.66	1390.00	1403.00	1420.00
BOUNDARY 4	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00	1600.00

SECTIONS	1877.00	2000.00	2045.00	2130.00	2280.00	[illegible]	2600.00
CRACKS	1283.00	1340.00	1338.00	1415.00	1440.00	1450.00	1450.00
IN CRACK	1283.00	1340.00	1338.00	1415.00	1440.00	1450.00	1450.00
BOUNDARY 1	1283.00	1340.00	1338.00	1415.00	1440.00	1450.00	1450.00
BOUNDARY 2	1283.00	[illegible]	[illegible]	[illegible]	1440.00	[illegible]	1450.00
BOUNDARY 3	1420.81	[illegible]	1425.81	[illegible]	1440.00	[illegible]	[illegible]
BOUNDARY 4	[illegible]	[illegible]	[illegible]	[illegible]	1600.00	[illegible]	[illegible]

PROPERTIES

LAYER	DENSITY	COHESION	FRICTION ANGLE	DELTA PHI
1	[illegible]	50.00	20.0	[illegible]
2	45.00	400.00	[illegible]	[illegible]
3	115.00	[illegible]	[illegible]	[illegible]

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****

****
LIMITING TANGENT NO. 1 AT Y = 1440.00
****

TANGENT	RADIUS	X, CENTER	Y, CENTER	F.S.
1440.0	1720.0	[illegible]	-280.0	[illegible]
1440.0	[illegible]	[illegible]	[illegible]	[illegible]
1440.0	1740.0	2270.0	-300.0	[illegible]
1440.0	1720.0	[illegible]	-280.0	[illegible]
1440.0	1710.0	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

PLATE I

1440.0	1720.0	2290.0	-270.0	1.779
1440.0	1730.0	2280.0	-290.0	1.779
1440.0	1770.0	2300.0	-290.0	1.751
1440.0	1710.0	2300.0	-270.0	1.782
1440.0	1700.0	2280.0	-270.0	1.779

MINIMUM= 1.778 FOR THE CIRCLE OF CENTER (2290.0,-290.0)

****
ATION IN SEISMIC COEFFICIENT
****

IR TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
1440.0	1890.0	2290.0	-450.0	1.026
1440.0	1530.0	2250.0	-440.0	1.031
1440.0	1900.0	2280.0	-460.0	1.027
1440.0	1880.0	2300.0	-440.0	1.027
1440.0	1860.0	2290.0	-420.0	1.027
1440.0	1880.0	2270.0	-440.0	1.028
1440.0	1870.0	2280.0	-430.0	1.027
1440.0	1890.0	2270.0	-450.0	1.029
1440.0	1890.0	2290.0	-450.0	1.026
1440.0	1870.0	2290.0	-430.0	1.026
1440.0	1870.0	2270.0	-430.0	1.028
1440.0	1900.0	2290.0	-460.0	1.026
1440.0	1890.0	2300.0	-450.0	1.027
1440.0	1900.0	2280.0	-460.0	1.027
1440.0	1910.0	2290.0	-470.0	1.026
1440.0	1900.0	2300.0	-460.0	1.026
1440.0	1910.0	2280.0	-470.0	1.027
1440.0	1920.0	2290.0	-480.0	1.026

MINIMUM= 1.026 FOR THE CIRCLE OF CENTER (2290.0,-450.0) AND SEISMIC COEFFICIENT = .22918

IAL SEISMIC COEFFICIENT = .22918

PLATE B-

::
:: CANYON LANDFILL B-A
::

::
..SIS BY BISHOP'S SIMPLIFIED METHOD
::

..TRY

..SITIONS	1000.00	1200.00	1500.00	1800.00	2100.00	2260.00	2500.00
.. CRACKS	1110.00	1106.00	1100.00	1222.37	1344.74	1410.00	1410.00
. IN CRACK	1110.00	1106.00	1100.00	1222.37	1344.74	1410.00	1410.00
.OUNDARY 1	1110.00	1106.00	1100.00	1222.37	1344.74	1410.00	1410.00
.OUNDARY 2	1172.00	1218.00	1350.00	1382.00	1412.00	1410.00	1410.00
.OUNDARY 3	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00

.ROPERTIES

LAYER	DENSITY	COHESION	FRICTION ANGLE	DELTA PHI
1	55.00	600.00	25.00	.00
2	115.00	200.00	34.00	.00

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.- LIMITING TANGENT NO. 1 AT Y = 1400.00
::

.R TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
1400.0	980.0	2150.0	420.0	1.731
1400.0	980.0	2130.0	420.0	1.733
1400.0	1000.0	2150.0	400.0	1.731
1400.0	980.0	2170.0	420.0	1.739
1400.0	960.0	2150.0	440.0	1.732
1400.0	980.0	2140.0	420.0	1.731
1400.0	990.0	2150.0	410.0	1.731
1400.0	980.0	2160.0	420.0	1.734
1400.0	970.0	2150.0	430.0	1.731
1400.0	980.0	2130.0	420.0	1.733
1400.0	990.0	2140.0	410.0	1.731
1400.0	970.0	2140.0	430.0	1.730
1400.0	970.0	2130.0	430.0	1.732
1400.0	970.0	2150.0	430.0	1.731
1400.0	960.0	2140.0	440.0	1.730
1400.0	960.0	2130.0	440.0	1.731

PLATE B-[illegible]

1400.0	970.0	2150.0	430.0	1.731
1400.0	950.0	2150.0	450.0	1.733
1400.0	950.0	2130.0	450.0	1.730

MINIMUM= 1.730 FOR THE CIRCLE OF CENTER (2140.0, 440.0)

****
RATION ON SEISMIC COEFFICIENT
****

ER TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
1400.0	1040.0	2140.0	360.0	1.024
1400.0	1030.0	2110.0	370.0	1.026
1400.0	1050.0	2130.0	350.0	1.024
1400.0	1030.0	2150.0	370.0	1.025
1400.0	1010.0	2130.0	390.0	1.024
1400.0	1030.0	2120.0	370.0	1.024
1400.0	1020.0	2130.0	380.0	1.024
1400.0	1040.0	2120.0	360.0	1.025
1400.0	1040.0	2140.0	360.0	1.024
1400.0	1020.0	2140.0	380.0	1.024
1400.0	1020.0	2120.0	380.0	1.024
1400.0	1050.0	2140.0	350.0	1.023

MINIMUM= 1.023 FOR THE CIRCLE OF CENTER (2140.0, 350.0) AND SEISMIC COEFFICIENT = .23325

ICAL SEISMIC COEFFICIENT = .23325

PLATE B

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*****************************************************************
II CANYON LANDFILL 3-A WITH 50 FOOT SURCHARGE
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*************************************
LYSIS BY BISHOP'S SIMPLIFIED METHOD
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ETRY

SECTIONS	1000.00	1200.00	1350.00	1450.00	1500.00	1800.00	2100.00	2260.00	2500.00
T. CRACKS	1050.00	1050.00	1050.00	1100.00	1100.00	1222.37	1344.74	1410.00	1410.00
+ IN CRACK	1050.00	1050.00	1050.00	1100.00	1100.00	1222.37	1344.74	1410.00	1410.00
BOUNDARY 1	1050.00	1050.00	1050.00	1100.00	1100.00	1222.37	1344.74	1410.00	1410.00
BOUNDARY 2	1110.00	1105.56	1102.22	1100.00	1100.00	1222.37	1344.74	1410.00	1410.00
BOUNDARY 3	1172.00	1218.00	1264.00	1328.00	1350.00	1382.00	1412.00	1410.00	1410.00
BOUNDARY 4	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00

PROPERTIES

LAYER	DENSITY	COHESION	FRICTION ANGLE	DELTA PHI
1	120.00	100.00	25.00	.00
2	85.00	600.00	25.00	.00
3	115.00	200.00	34.00	.00

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********************************************
T- LIMITING TANGENT NO. 1 AT Y = 1400.00
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IF	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
	1400.0	1260.0	2120.0	140.0	1.573
	1400.0	1260.0	2100.0	140.0	1.575
	1400.0	1280.0	2120.0	120.0	1.573
	1400.0	1260.0	2140.0	140.0	1.575
	1400.0	1240.0	2120.0	160.0	1.573
	1400.0	1250.0	2110.0	140.0	1.573
	1400.0	1270.0	2120.0	130.0	1.573
	1400.0	1260.0	2120.0	140.0	1.573
	1400.0	1250.0	2120.0	150.0	1.573
	1400.0	1270.0	2110.0	130.0	1.574
	1400.0	1270.0	2130.0	130.0	1.573
	1400.0	1250.0	2130.0	150.0	1.574
	1400.0	1250.0	2110.0	130.0	1.573

MINIMUM= 1.573 FOR THE CIRCLE OF CENTER (2120.0, 140.0)

PLATE

****
IFATION ON SEISMIC COEFFICIENT NO. 2
****

ER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
	1400.0	1330.0	2130.0	70.0	1.065
	1400.0	1320.0	2100.0	80.0	1.067
	1400.0	1340.0	2120.0	60.0	1.066
	1400.0	1320.0	2140.0	80.0	1.067
	1400.0	1300.0	2120.0	100.0	1.066
	1400.0	1320.0	2110.0	80.0	1.066
	1400.0	1310.0	2120.0	90.0	1.066
	1400.0	1330.0	2110.0	70.0	1.066
	1400.0	1330.0	2130.0	70.0	1.065
	1400.0	1310.0	2130.0	90.0	1.066
	1400.0	1310.0	2110.0	90.0	1.066
	1400.0	1340.0	2130.0	60.0	1.065
	1400.0	1330.0	2140.0	70.0	1.066
	1400.0	1340.0	2120.0	60.0	1.066
	1400.0	1350.0	2130.0	50.0	1.065
	1400.0	1340.0	2140.0	60.0	1.066
	1400.0	1350.0	2120.0	50.0	1.066
	1400.0	1360.0	2130.0	40.0	1.065
	1400.0	1350.0	2140.0	50.0	1.065
	1400.0	1360.0	2120.0	40.0	1.066
	1400.0	1370.0	2130.0	30.0	1.065
	1400.0	1360.0	2140.0	40.0	1.065
	1400.0	1370.0	2120.0	30.0	1.066
	1400.0	1370.0	2140.0	30.0	1.065
	1400.0	1350.0	2140.0	50.0	1.065
	1400.0	1350.0	2120.0	50.0	1.066
	1400.0	1380.0	2140.0	20.0	1.065
	1400.0	1370.0	2150.0	30.0	1.065
	1400.0	1380.0	2130.0	20.0	1.065
	1400.0	1390.0	2140.0	10.0	1.065
	1400.0	1380.0	2150.0	20.0	1.065
	1400.0	1390.0	2130.0	10.0	1.065
	1400.0	1400.0	2140.0	.0	1.065
	1400.0	1390.0	2150.0	10.0	1.065
	1400.0	1400.0	2130.0	.0	1.065
	1400.0	1400.0	2150.0	.0	1.065
	1400.0	1380.0	2150.0	20.0	1.065
	1400.0	1380.0	2130.0	20.0	1.065
	1400.0	1410.0	2150.0	-10.0	1.065
	1400.0	1400.0	2160.0	.0	1.065
	1400.0	1410.0	2140.0	-10.0	1.065
	1400.0	1420.0	2150.0	-20.0	1.065

MINIMUM= 1.065 FOR THE CIRCLE OF CENTER (2150.0, -20.0) AND SEISMIC COEFFICIENT = .16450

ICAL SEISMIC COEFFICIENT = .16450

PLATE

****

E STABILITY WITH CLAY LINER (5% BENTONITE ADDED)

****

POINTS COORDINATES

X	Y
50.00	100.00
115.00	100.00
195.00	140.00
250.00	140.00

OF SLICES = 6

DATA

X	Y	GAMMA	U	CEE	PHI	DPHI
100.00	100.00					
		115.00	.00	290.00	33.00	.00
115.00	107.50					
		115.00	.00	290.00	33.00	.00
130.00	115.00					
		115.00	.00	290.00	33.00	.00
150.00	125.00					
		115.00	.00	290.00	33.00	.00
165.00	132.50					
		115.00	.00	290.00	33.00	.00
180.00	140.00					
		115.00	.00	290.00	33.00	.00
195.00	140.00					

*****

LTE

*****

ITERATION	F	THETA DEGREES	EXCESS FORCE	EXCESS MOMENT
1	3.000	25.0	7882.5	-425460.3
2	2.767	23.4	-1452.7	52590.[illegible]
3	2.602	22.8	9.2	-551.0
4	2.602	23.1	.0	.0

SECTION NUMBER	X COORDINATE	INTERSLICE FORCES FORCE	THETA	POA	EFFECTIVE STRESSES ON SLIP SURFACE NORMAL	SHEAR	
0	100.00	0.0	0.0	0.0	.0	.0	NO TENSION CRACK
1	115.00	-413.3	23.1	.05	343.5	197.1	
2	130.00	607.8	23.1	-.11	653.7	284.5	
3	150.00	1955.5	23.1	.13	653.7	284.5	
4	165.00	1977.[illegible]	23.1	.21	653.7	284.5	
5	180.00	1994.[illegible]	23.1	-.23	653.7	284.5	
6	195.00	[illegible]	23.1	.36	575.5	244.7	

COMPUTED FACTOR OF SAFETY = 2.602

PLATE B

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:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
:: CANYON LANDFILL   50 FOOT SURCHARGE LOCAL STABILITY
:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::


::::::::::::::::::::::::::::::::::::::::
..SIS BY BISHOP'S SIMPLIFIED METHOD
::::::::::::::::::::::::::::::::::::::::

METRY

SECTIONS      100.00   300.00   400.00   450.00   700.00

T. CRACKS     500.00   500.00   550.00   550.00   640.00
. IN CRACK    500.00   500.00   550.00   550.00   640.00
BOUNDARY 1    500.00   500.00   550.00   550.00   640.00
BOUNDARY 2    550.00   550.00   550.00   550.00   640.00
BOUNDARY 3    700.00   700.00   700.00   700.00   700.00

PROPERTIES

 LAYER   DENSITY     COHESION  FRICTION ANGLE  DELTA PHI
   1      120.00      100.00        25.00          .00
   2       55.00      600.00        25.00          .00


::::::
..TS
::::::


::::::::::::::::::::::::::::::::::::::::::::::::
TH LIMITING TANGENT NO.  1  AT Y =   530.00
::::::::::::::::::::::::::::::::::::::::::::::::


R  TANGENT  RADIUS   (X) CENTER  (Y) CENTER      F.S.

    530.0     90.0      360.0       440.0       1.392
    530.0     90.0      340.0       440.0       1.703
    530.0    110.0      360.0       420.0       1.460
    530.0     90.0      350.0       440.0       5.976
    530.0     70.0      360.0       460.0       1.447
    530.0     90.0      350.0       440.0       1.498
    530.0    100.0      360.0       430.0       1.419
    530.0     90.0      370.0       440.0       1.566
    530.0     80.0      360.0       450.0       1.395
    530.0    100.0      350.0       430.0       1.554
    530.0    100.0      370.0       430.0       1.466
    530.0     80.0      370.0       450.0       1.711
    530.0     80.0      350.0       450.0       1.449

MINIMUM= 1.392 FOR THE CIRCLE OF CENTER ( 360.0, 440.0)

::::::::::::::::::::::::::::::::::::::::::::::::
TH LIMITING TANGENT NO.  2  AT Y =   550.00
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PLATE B-5

OF TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
550.0	110.0	360.0	440.0	1.567
550.0	100.0	330.0	450.0	2.226
550.0	120.0	350.0	430.0	1.783
550.0	100.0	370.0	450.0	1.402
550.0	90.0	350.0	470.0	1.670
550.0	120.0	370.0	430.0	1.455
550.0	100.0	390.0	450.0	1.294
550.0	80.0	370.0	470.0	1.396
550.0	120.0	390.0	430.0	1.273
550.0	100.0	410.0	450.0	1.472
550.0	80.0	390.0	470.0	1.343
550.0	120.0	380.0	430.0	1.344
550.0	130.0	390.0	420.0	1.286
550.0	120.0	400.0	430.0	1.276
550.0	110.0	390.0	440.0	1.275
550.0	130.0	380.0	420.0	1.370
550.0	130.0	400.0	420.0	1.257
550.0	110.0	400.0	440.0	1.292
550.0	110.0	380.0	440.0	1.323
550.0	140.0	400.0	410.0	1.255

MINIMUM= 1.255 FOR THE CIRCLE OF CENTER (400.0, 410.0)

****

* LIMITING TANGENT NO. 3 AT Y = 570.00

****

OF TANGENT	RADIUS	(X) CENTER	(Y) CENTER	F.S.
570.0	160.0	400.0	410.0	1.899
570.0	150.0	370.0	420.0	1.934
570.0	170.0	390.0	400.0	1.903
570.0	150.0	410.0	420.0	1.941
570.0	130.0	390.0	440.0	1.873
570.0	130.0	380.0	440.0	1.866
570.0	140.0	390.0	430.0	1.864
570.0	130.0	400.0	440.0	1.916
570.0	120.0	390.0	450.0	1.883
570.0	140.0	380.0	430.0	1.907
570.0	140.0	400.0	430.0	1.909
570.0	120.0	400.0	450.0	1.952
570.0	120.0	380.0	450.0	1.868
570.0	120.0	370.0	450.0	1.896
570.0	110.0	350.0	460.0	1.859

MINIMUM= 1.859 FOR THE CIRCLE OF CENTER (350.0, 460.0)

PLATE B-

APPENDIX F

HYDROLOGY STUDY DATA

100- YR FINAL CLOSURE
HYDROLOGY

SLOPE 'A'

12/92

HEC-1 INPUT

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID  *********************************************
  2           ID  * 100-YR HYDROLOGY FINAL CLOSURE SLOPE A       *
  3           ID  * LOPEZ CANYON SANITARY LANDFILL               *
  4           ID  * JOB NO. 9258-126     24 HOUR STORM           *
  5           ID  * FILE : LOPCLSA2.HC1  BY : A.C.R.             *
  6           ID  *********************************************
  7           IT       5 10NOV91     100     170
  8           IO       0
              *
              *

  9           KK     1AA  INITIAL AREA
 10           KO       0
 11           KM    (BEGIN. OF STREAM)
 12           BA   .0144
 13           PI   .0172   .0172   .0215   .0215   .0215   .0215   .0215   .0215   .0215   .0215
 14           PI   .0215   .0215   .0215   .0215   .0215   .0258   .0258   .0258   .0258   .0258
 15           PI   .0258   .0258   .0258   .0258   .0258   .0301   .0301   .0301   .0301   .0301
 16           PI   .0301   .0258   .0258   .0301   .0301   .0344   .0344   .0344   .0344   .0344
 17           PI   .0344   .0344   .0344   .0344   .0344   .0386   .0386   .0386   .0386   .0386
 18           PI   .0386   .0386   .0386   .0429   .0429   .0472   .0472   .0472   .0472   .0429
 19           PI   .0429   .0472   .0472   .0565   .0565   .0622   .0622   .0678   .0678   .0735
 20           PI   .0735   .0735   .0735   .0678   .0678   .0735   .0735   .0735   .0735   .0791
 21           PI   .0791   .0678   .0678   .0735   .0735   .0735   .0735   .0735   .0735   .0735
 22           PI   .0735   .0735   .0735   .0735   .0735   .0847   .0847   .0847   .0847   .0847
 23           PI   .0847   .0847   .0847   .0961   .0961   .0961   .0961   .1186   .1186   .1695
 24           PI   .1695   .3164   .3164   .1017   .1017   .0791   .0791   .0791   .0791   .0735
 25           PI   .0735   .0678   .0678   .0508   .0395   .0439   .0439   .0395   .0395   .0352
 26           PI   .0132   .0176   .0176   .0088   .0088   .0088   .0088   .0132   .0132   .0088
 27           LS              97                      97
 28           UK     450     .03      .1      50
 29           UK     450     .03      .1      50
 30           RK     800     .03     .03            TRAP       1      10      NO
              *
              *

 31           KK     2AA
 32           KM   DOWN DRAIN
 33           BA   .0178
 34           UK     200     .03      .1      50
 35           UK     200     .03      .1      50
 36           RK     500     .35    .024            CIRC       3              YES
              *
              *

 37           KK     3AA
 38           KM   DOWN DRAIN
 39           BA   .0114
 40           UK     500     .03      .1      60
 41           UK     300     .03      .1      40
```

```
 42           RK    650    .32   .024          CIRC      3             YES
              *
              *
                                    HEC-1 INPUT

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 43           KK    4AA INITIAL AREA
 44           KM   (BEGIN. OF STREAM)
 45           BA   .0138
 46           UK    450    .03     .1     50
 47           UK    450    .03     .1     50
 48           RK   1200    .36    .03          TRAP      1      10     NO
              *
              *

 49           KK    5AA
 50           KM  DOWN DRAIN W/ CONCRETE CHANNEL B=3,H=3,Z=1
 51           BA   .0034
 52           UK    180    .03     .1     50
 53           UK    180    .03     .1     50
 54           RK    400    .05   .024          CIRC      3             YES
              *
              *

 55           KK    6AA CONFLUENCE OF STREAMS
 56           KM
 57           HC     2
              *
              *
 58           ZZ
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXI STA
HYDROGRAPH AT	1AA	30.	9.42	9.	5.	5.	.01	
HYDROGRAPH AT	2AA	69.	9.42	20.	11.	11.	.03	
HYDROGRAPH AT	3AA	93.	9.42	27.	15.	15.	.04	
HYDROGRAPH AT	4AA	29.	9.42	9.	5.	5.	.01	
HYDROGRAPH AT								

	5AA	37.	9.42	11.	6.	6.	.02
2 COMBINED AT							
	6AA	130.	9.42	38.	20.	20.	.06

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

						INTERPOLATED TO COMPUTATION INTERVAL			
ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUM
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
1AA	MANE	.72	30.11	566.00	7.36	5.00	29.74	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5660E+01 OUTFLOW= .5651E+01 BASIN STORAGE= .5583E-02

2AA	MANE	.19	69.37	563.96	7.36	5.00	68.88	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5650E+01 EXCESS= .6996E+01 OUTFLOW= .1264E+02 BASIN STORAGE= .1960E-02

3AA	MANE	.13	93.19	565.14	7.36	5.00	92.99	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1264E+02 EXCESS= .4480E+01 OUTFLOW= .1711E+02 BASIN STORAGE= .3849E-02

4AA	MANE	.41	29.14	565.69	7.36	5.00	29.00	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5424E+01 OUTFLOW= .5415E+01 BASIN STORAGE= .5178E-02

5AA	MANE	.15	36.86	565.34	7.35	5.00	36.57	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5412E+01 EXCESS= .1336E+01 OUTFLOW= .6746E+01 BASIN STORAGE= .4153E-03

*** NORMAL END OF HEC-1 ***
NORMAL END OF HEC-1

100-YR FINAL CLOSURE
HYDROLOGY

SLOPE 'B'

12/92

HEC-1 INPUT

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID  ***********************************************
  2           ID  * 100-YR HYDROLOGY FINAL CLOSURE SLOPE B      *
  3           ID  * LOPEZ CANYON SANITARY LANDFILL              *
  4           ID  * JOB NO. 9258-126     24 HOUR STORM          *
  5           ID  * FILE : LOPCLSB2.HC1  BY : A.C.R.            *
  6           ID  ***********************************************
  7           IT       5 10NOV91     100     170
  8           IO       0
              *
              *

  9           KK     1BB  INITIAL AREA
 10           KO       0
 11           KM    (BEGIN. OF STREAM)
 12           BA   .0189
 13           PI   .0172   .0172   .0215   .0215   .0215   .0215   .0215   .0215   .0215   .0215
 14           PI   .0215   .0215   .0215   .0215   .0215   .0258   .0258   .0258   .0258   .0258
 15           PI   .0258   .0258   .0258   .0258   .0258   .0301   .0301   .0301   .0301   .0301
 16           PI   .0301   .0258   .0258   .0301   .0301   .0344   .0344   .0344   .0344   .0344
 17           PI   .0344   .0344   .0344   .0344   .0344   .0386   .0386   .0386   .0386   .0386
 18           PI   .0386   .0386   .0386   .0429   .0429   .0472   .0472   .0472   .0472   .0429
 19           PI   .0429   .0472   .0472   .0565   .0565   .0622   .0622   .0678   .0678   .0735
 20           PI   .0735   .0735   .0735   .0678   .0678   .0735   .0735   .0735   .0735   .0791
 21           PI   .0791   .0678   .0678   .0735   .0735   .0735   .0735   .0735   .0735   .0735
 22           PI   .0735   .0735   .0735   .0735   .0735   .0847   .0847   .0847   .0847   .0847
 23           PI   .0847   .0847   .0847   .0961   .0961   .0961   .0961   .1186   .1186   .1695
 24           PI   .1695   .3164   .3164   .1017   .1017   .0791   .0791   .0791   .0791   .0735
 25           PI   .0735   .0678   .0678   .0508   .0395   .0439   .0439   .0395   .0395   .0352
 26           PI   .0132   .0176   .0176   .0088   .0088   .0088   .0088   .0132   .0132   .0088
 27           LS              97                      97
 28           UK     450     .03      .1      50
 29           UK     450     .03      .1      50
 30           RK    1200     .03     .03            TRAP       1      10      NO
              *
              *

 31           KK     2BB
 32           KM   DOWN DRAIN
 33           BA   .0194
 34           UK     350     .03      .1      60
 35           UK     300     .03      .1      40
 36           RK     350     .35    .024            CIRC       3             YES
              *
              *

 37           KK     3BB
 38           KM   DOWN DRAIN
 39           BA   .0122
 40           UK     500     .03      .1      60
 41           UK     300     .03      .1      40
 42           RK     650     .38    .024            CIRC       3             YES
```

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                                   *
                                   *
                                                         HEC-1 INPUT

 LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  43            KK     4BB INITIAL AREA
  44            KM    (BEGIN. OF STREAM)
  45            BA   .0141
  46            UK     450     .03      .1      50
  47            UK     450     .03      .1      50
  48            RK    1200     .03     .03              TRAP       1      10      NO
                *
                *

  49            KK     5BB
  50            KM  DOWN DRAIN W/ CONCRETE CHANNEL B=3,H=3,Z=1
  51            BA   .0136
  52            UK     300     .03      .1      50
  53            UK     300     .03      .1      50
  54            RK    1000     .35    .024              CIRC       3              YES
                *
                *

  55            KK     6BB CONFLUENCE OF STREAMS
  56            KM
  57            HC       2
                *
                *
  58            ZZ
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXI STA
HYDROGRAPH AT	1BB	38.	9.42	12.	6.	6.	.02	
HYDROGRAPH AT	2BB	81.	9.42	24.	13.	13.	.04	
HYDROGRAPH AT	3BB	107.	9.42	32.	17.	17.	.05	
HYDROGRAPH AT	4BB	28.	9.42	9.	5.	5.	.01	
HYDROGRAPH AT	5BB	59.	9.42	17.	9.	9.	.03	

2 COMBINED AT

6BB	165.	9.42	49.	26.	26.	.08

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUM
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
1BB	MANE	.98	39.09	566.11	7.36	5.00	38.34	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7428E+01 OUTFLOW= .7417E+01 BASIN STORAGE= .7576E-02

2BB	MANE	.21	81.33	565.17	7.36	5.00	81.22	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7415E+01 EXCESS= .7625E+01 OUTFLOW= .1503E+02 BASIN STORAGE= .4492E-02

3BB	MANE	.09	107.26	565.14	7.35	5.00	106.72	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1502E+02 EXCESS= .4795E+01 OUTFLOW= .1980E+02 BASIN STORAGE= .4186E-02

4BB	MANE	1.02	29.12	566.66	7.36	5.00	28.43	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5542E+01 OUTFLOW= .5533E+01 BASIN STORAGE= .5700E-02

5BB	MANE	.26	58.89	565.58	7.36	5.00	58.68	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5532E+01 EXCESS= .5345E+01 OUTFLOW= .1087E+02 BASIN STORAGE= .3030E-02

*** NORMAL END OF HEC-1 ***
NORMAL END OF HEC-1

100-YR FINAL CLOSURE
HYDROLOGY

AREA 'C'

12/92

```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1         ID  ***************************************************
  2         ID  * 100-YR HYDROLOGY FINAL CLOSURE  AREA C          *
  3         ID  * LOPEZ CANYON SANITARY LANDFILL                  *
  4         ID  * JOB NO. 9258-126                                *
  5         ID  * FILE : LOPCCLS2.HC1   BY : A.C.R.               *
  6         ID  ***************************************************
  7         IT       5 10NOV91     100     170
  8         IO       5
            *
            *

  9         KK      1A  INITIAL AREA
 10         KO       1
 11         KM    (BEGIN STREAM A)
 12         BA   .0213
 13         PI   .0172   .0172   .0215   .0215   .0215   .0215   .0215   .0215   .0215   .0215
 14         PI   .0215   .0215   .0215   .0215   .0215   .0258   .0258   .0258   .0258   .0258
 15         PI   .0258   .0258   .0258   .0258   .0258   .0301   .0301   .0301   .0301   .0301
 16         PI   .0301   .0258   .0258   .0301   .0301   .0344   .0344   .0344   .0344   .0344
 17         PI   .0344   .0344   .0344   .0344   .0344   .0386   .0386   .0386   .0386   .0386
 18         PI   .0386   .0386   .0386   .0429   .0429   .0472   .0472   .0472   .0472   .0429
 19         PI   .0429   .0472   .0472   .0565   .0565   .0622   .0622   .0678   .0678   .0735
 20         PI   .0735   .0735   .0735   .0678   .0678   .0735   .0735   .0735   .0735   .0791
 21         PI   .0791   .0678   .0678   .0735   .0735   .0735   .0735   .0735   .0735   .0735
 22         PI   .0735   .0735   .0735   .0735   .0735   .0847   .0847   .0847   .0847   .0847
 23         PI   .0847   .0847   .0847   .0961   .0961   .0961   .0961   .1186   .1186   .1695
 24         PI   .1695   .3164   .3164   .1017   .1017   .0791   .0791   .0791   .0791   .0735
 25         PI   .0735   .0678   .0678   .0508   .0395   .0439   .0439   .0395   .0395   .0352
 26         PI   .0132   .0176   .0176   .0088   .0088   .0088   .0088   .0132   .0132   .0088
 27         LS              97                      97
 28         UK     600    .033      .1      43
 29         UK     650    .036      .1      57
 30         RK     850    .024     .03             TRAP       1      10      NO
            *
            *

 31         KK      2A
 32         KM  (ROUTE AREAS A1 & A2)
 33         BA   .0203
 34         UK     200     .07      .1      60
 35         UK     150     .15      .1      40
 36         RK    1000    .075    .015             TRAP       4       1     YES
            *
            *

 37         KK      3A
 38         KM  (ROUTE AREAS 1A, 2A, & 3A)
 39         BA   .0072
 40         UK     350     .04      .1      60
 41         UK     250     .04      .1      40
 42         RK     700     .05    .015             TRAP       4       1     YES
            *
```

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                 *
                                              HEC-1 INPUT

LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  43             KK      4B INITIAL AREA
  44             KM    (BEGIN STREAM B)
  45             BA   .0148
  46             UK     550    .045      .1      50
  47             UK     500    .028      .1      50
  48             RK     800     .03     .03             TRAP       1      10      NO
                 *
                 *

  49             KK      5B
  50             KM    (ROUTE AREAS 4B & 5B)
  51             BA   .0105
  52             UK     700     .03      .1      50
  53             UK     700     .03      .1      50
  54             RK     700     .38    .024             CIRC       3              YES
                 *
                 *

  55             KK     6AB CONFLUENCE OF STREAMS A & B
  56             KM
  57             HC       2
                 *
                 *

  58             KK      7A
  59             KM  (ROUTE STREAMS A & B)
  60             BA   .0039
  61             UK     250     .03      .1      50
  62             UK     250     .03      .1      50
  63             RK     650     .07    .015             TRAP       4       1     YES
                 *
                 *

  64             KK      8A
  65             KM  (ROUTE STREAMS A & B)
  66             BA   .0041
  67             UK     250     .03      .1      50
  68             UK     250     .03      .1      50
  69             RK     650     .07    .015             TRAP       4       1     YES
                 *
                 *

  70             KK      9C INITIAL AREA
  71             KM    (BEGIN STREAM C)
  72             BA   .0125
  73             UK     350     .03      .1      50
  74             UK     350     .03      .1      50
  75             RK     450     .35    .024             CIRC       3              NO
                 *
```

```
          *
                              HEC-1 INPUT

LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 76       KK   10AC CONFLUENCE OF STREAMS A & C
 77       KM
 78       HC      2
          *
          *

 79       KK    11A
 80       KM  (ROUTE STREAMS A, B, & C)
 81       BA   .0128
 82       UK    200     .40      .1      50
 83       UK    200     .40      .1      50
 84       RK    750    .070    .015              TRAP       4       1     YES
          *
          *

 85       KK    12D INITIAL AREA
 86       KM  (BEGIN STREAM D)
 87       BA   .0172
 88       UK    250     .03      .1      50
 89       UK    250     .03      .1      50
 90       RK    450     .35    .024              CIRC       3              NO
          *
          *

 91       KK    13D
 92       KM  (ROUTE AREAS 12D & 13D)
 93       BA    .018
 94       UK    450     .03      .1      50
 95       UK    350     .03      .1      50
 96       RK    600     .35    .024              CIRC       3             YES
          *
          *

 97       KK   14AD CONFLUENCE OF STREAMS A & D
 98       KM
 99       HC      2
          *
          *

100       KK    15A
101       KM  (ROUTE STREAMS A, B, C & D)
102       BA   .0066
103       UK    150     .07      .1      50
104       UK    150     .07      .1      50
105       RK    250     .05     .03              TRAP       1       5     YES
          *
          *

106       KK    16E INITIAL AREA
```

```
107          KM  (BEGIN STREAM E)
108          BA   .0192
109          UK    400     .03      .1      50
110          UK    350     .03      .1      50
111          RK   1000     .03     .03              TRAP       1      10      NO
             *
             *
                                        HEC-1 INPUT

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


112          KK     17E
113          KM  (ROUTE AREAS 16E & 17E)
114          BA    .008
115          UK    400     .07      .1      50
116          UK    350     .07      .1      50
117          RK    500     .05    .015              TRAP       1      10     YES
             *
             *

118          KK     18E
119          KM  (ROUTE AREAS 16E, 17E & 18E)
120          BA   .0131
121          UK    300     .03      .1      50
122          UK    300     .03      .1      50
123          RK    500     .05    .025              TRAP       1      10     YES
             *
             *

124          KK     19E
125          KM  (ROUTE AREAS 16E & 17E)
126          BA    .008
127          UK    300    .333      .1      50
128          UK    300     .45      .1      50
129          RK    900     .35    .015              TRAP       3       2     YES
             *
             *

130          KK    20AE CONFLUENCE OF STREAMS A & E
131          KM
132          HC       2
             *
             *

133          KK     21A
134          KM  (ROUTE STREAMS A, B, C, D & E)
135          BA    .023
136          UK    400      .2      .1      50
137          UK    400      .2      .1      50
138          RK    800     .05    .014              CIRC       5              YES
             *
             *

139          KK     22A
```

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140          KM  (END OF STUDY TO WHITE HORSE DEBRIS/DETENTION BASIN)
141          BA   .0052
142          UK    125     .2     .1     50
143          UK    125     .2     .1     50
144          RK    200    .05   .014          CIRC      6           YES
             *
             *
145          ZZ
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXI STA
HYDROGRAPH AT	1A	41.	9.42	13.	7.	7.	.02	
HYDROGRAPH AT	2A	89.	9.42	26.	14.	14.	.04	
HYDROGRAPH AT	3A	105.	9.42	31.	16.	16.	.05	
HYDROGRAPH AT	4B	30.	9.42	9.	5.	5.	.01	
HYDROGRAPH AT	5B	49.	9.42	16.	9.	9.	.03	
2 COMBINED AT	6AB	154.	9.42	47.	25.	25.	.07	
HYDROGRAPH AT	7A	161.	9.42	49.	26.	26.	.08	
HYDROGRAPH AT	8A	169.	9.42	52.	28.	28.	.08	
HYDROGRAPH AT	9C	27.	9.42	8.	4.	4.	.01	
2 COMBINED AT	10AC	196.	9.42	59.	32.	32.	.09	
HYDROGRAPH AT	11A	225.	9.42	68.	36.	36.	.11	
HYDROGRAPH AT	12D	39.	9.42	11.	6.	6.	.02	
HYDROGRAPH AT	13D	78.	9.42	22.	12.	12.	.04	

2 COMBINED AT							
	14AD	303.	9.42	90.	48.	48.	.14
HYDROGRAPH AT							
	15A	316.	9.42	94.	50.	50.	.15
HYDROGRAPH AT							
	16E	41.	9.42	12.	6.	6.	.02
HYDROGRAPH AT							
	17E	58.	9.42	17.	9.	9.	.03
HYDROGRAPH AT							
	18E	87.	9.42	25.	14.	14.	.04
HYDROGRAPH AT							
	19E	105.	9.42	30.	16.	16.	.05
2 COMBINED AT							
	20AE	421.	9.42	124.	67.	67.	.20
HYDROGRAPH AT							
	21A	474.	9.42	139.	74.	74.	.22
HYDROGRAPH AT							
	22A	484.	9.42	142.	76.	76.	.23

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

						INTERPOLATED TO COMPUTATION INTERVAL			
ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUM
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
1A	MANE	.75	41.97	566.27	7.35	5.00	41.10	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .8371E+01 OUTFLOW= .8354E+01 BASIN STORAGE= .1270E-01

2A	MANE	.25	89.22	565.11	7.36	5.00	89.19	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8352E+01 EXCESS= .7978E+01 OUTFLOW= .1632E+02 BASIN STORAGE= .1524E-02

3A	MANE	.25	104.98	565.13	7.36	5.00	104.84	565.00	7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1633E+02 EXCESS= .2830E+01 OUTFLOW= .1916E+02 BASIN STORAGE= .1830E-02

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4B  MANE        .92    30.43   566.60    7.36    5.00    30.05   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5817E+01 OUTFLOW= .5807E+01 BASIN STORAGE= .6770E-02

5B  MANE        .16    49.10   565.24    7.36    5.00    48.84   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5809E+01 EXCESS= .4127E+01 OUTFLOW= .9925E+01 BASIN STORAGE= .6651E-02

7A  MANE        .24   161.60   565.11    7.36    5.00   161.27   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2908E+02 EXCESS= .1533E+01 OUTFLOW= .3061E+02 BASIN STORAGE= .1147E-02

8A  MANE        .21   169.84   565.17    7.36    5.00   169.22   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3061E+02 EXCESS= .1611E+01 OUTFLOW= .3222E+02 BASIN STORAGE= .1197E-02

9C  MANE        .20    26.59   564.72    7.36    5.00    26.59   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4913E+01 OUTFLOW= .4907E+01 BASIN STORAGE= .3003E-02

11A  MANE       .13   225.10   565.26    7.36    5.00   224.90   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3714E+02 EXCESS= .5031E+01 OUTFLOW= .4216E+02 BASIN STORAGE= .9018E-03

12D  MANE       .21    39.23   563.81    7.36    5.00    39.23   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6760E+01 OUTFLOW= .6755E+01 BASIN STORAGE= .2785E-02

13D  MANE       .21    77.74   565.04    7.36    5.00    77.70   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6751E+01 EXCESS= .7074E+01 OUTFLOW= .1382E+02 BASIN STORAGE= .5428E-02

15A  MANE       .12   316.65   565.17    7.36    5.00   315.94   565.00     7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5599E+02 EXCESS= .2594E+01 OUTFLOW= .5858E+02 BASIN STORAGE= .7826E-03

16E  MANE       .78    41.51   566.04    7.36    5.00    40.81   565.00     7.3
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CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7546E+01 OUTFLOW= .7537E+01 BASIN STORAGE= .5771E-02

              17E  MANE          .31     58.74    565.49       7.36       5.00     58.39    565.00         7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7536E+01 EXCESS= .3144E+01 OUTFLOW= .1068E+02 BASIN STORAGE= .1532E-02

              18E  MANE          .39     87.34    565.50       7.36       5.00     86.76    565.00         7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1068E+02 EXCESS= .5149E+01 OUTFLOW= .1582E+02 BASIN STORAGE= .3009E-02

              19E  MANE          .21    105.12    565.08       7.36       5.00    105.08    565.00         7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1582E+02 EXCESS= .3144E+01 OUTFLOW= .1896E+02 BASIN STORAGE= .4347E-03

              21A  MANE          .17    473.95    565.03       7.36       5.00    473.76    565.00         7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7755E+02 EXCESS= .9040E+01 OUTFLOW= .8658E+02 BASIN STORAGE= .2262E-02

              22A  MANE          .26    484.56    564.94       7.36       5.00    483.87    565.00         7.3

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8660E+02 EXCESS= .2044E+01 OUTFLOW= .8863E+02 BASIN STORAGE= .1587E-03


*** NORMAL END OF HEC-1 ***
NORMAL END OF HEC-1
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APPENDIX G

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT PERMIT TO CONSTRUCT AND FLARE STATION ANNUAL SOURCE TESTING DATA

PERMIT TO CONSTRUCT

Granted as of August 28, 1991

Legal Owner or Operator: ID 049805

CITY OF LOS ANGELES, BUREAU OF SANITATION
419 S. SPRING, 8TH FLOOR, ROOM 800
LOS ANGELES, CALIFORNIA 90012
ATTN: JOHN BEHJAN

Equipment Location: 11950 LOPEZ CANYON ROAD, LAKEVIEW TERRACE, CA 91342

The equipment described below and as shown on the approved plans and specifications are subject to the special condition, or conditions listed.

Equipment Description

ALTERATION TO THE EXISTING LANDFILL GAS FLARING SYSTEM, ISSUED A PERMIT TO CONSTRUCT UNDER A/N 229460, CONSISTING OF:

1. LANDFILL GAS FILTER/KNOCKOUT VESSEL (V-1), PEGO SYSTEMS, 5'-0" DIA. X 14'-0" H., WITH A 48" DIA. X 6" THICK DEMISTER, 2 MICRON REMOVAL AT 99.9%, A LIQUID LEVEL CONTROL SYSTEM, AND A CONDENSATE PUMP, MARCH TE 5.5S-MD, DRIVEN BY A 1/3 H.P. MOTOR.

2. BLOWER NO. 1 (B-1), HAUCK MFG. CO., MODEL NO. TBGB-081-291E, 3,800 SCFM AT 35" W.C. VACUUM AND 10" W.C. DISCHARGE, DRIVEN BY A 75 H.P. MOTOR.

3. BLOWER NO. 2 (B-2), STANDBY, HAUCK MFG. CO., MODEL NO. TBGB-081-291E, 3,800 SCFM AT 35" W.C. VACUUM AND 10" W.C. DISCHARGE, DRIVEN BY A 75 H.P. MOTOR.

4. FOUR (4) FLAME ARRESTORS (FA-1 THROUGH 4), GROTH, 10" HORIZONTAL TYPE, MODEL NO. 7638-10-11-FOZ, ONE FOR EACH FLARE.

5. FLARE NO. 1 (I-1), 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

6. FLARE NO. 2 (I-2), 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

7. FLARE NO. 3 (I-3), 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM

SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

8. FLARE NO. 4 (I-4), 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

BY THE ADDITION OF THE FOLLOWING, ISSUED A PERMIT TO CONSTRUCT UNDER APPLICATION NO. 242642:

1. FLAME ARRESTOR (FA-5), ENARDO, 10" HORIZONTAL TYPE, SERIES 7.

2. FLARE NO. 5 (I-5), 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

AND BY THE ADDITION OF THE FOLLOWING:

1. LANDFILL GAS FILTER/KNOCKOUT VESSEL (V-1A), PEGO SYSTEMS, 5'-0" DIA. X 14'-0" H., WITH A 48" DIA. X 6" THICK DEMISTER, 2 MICRON REMOVAL AT 99.9%, A LIQUID LEVEL CONTROL SYSTEM, AND A CONDENSATE PUMP, MARCH TE 5.5S-MD, DRIVEN BY A 1/3 H.P. MOTOR.

2. BLOWER NO. 3 (B-3), HAUCK MFG. CO., MODEL NO. TBGB-091-311J, 5,000 SCFM AT 36" W.C. VACUUM AND 16" W.C. DISCHARGE, DRIVEN BY A 75 H.P. MOTOR.

3. BLOWER NO. 4 (B-4), STANDBY, HAUCK MFG. CO., MODEL NO. TBGB-091-311J, 5,000 SCFM AT 36" W.C. VACUUM AND 16" W.C. DISCHARGE, DRIVEN BY A 75 H.P. MOTOR.

4. FOUR (4) FLAME ARRESTORS (FA-6 THROUGH 9), ENARDO, 10" HORIZONTAL TYPE, SERIES 7, ONE FOR EACH FLARE.

5. FLARE NO. 6 (I-6), 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

6. FLARE NO. 7 (I-7), 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

7. FLARE NO. 8 (I-8), STANDBY, 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

8. FLARE NO. 9 (I-9), STANDBY, 8'-4" O.D. X 24'-4" H., SPUD-TYPE HEX BURNER, PROPANE GAS PILOT, ELECTRIC IGNITOR, UV FLAME SENSOR, AUTOMATIC SHUT-DOWN AND ALARM SYSTEM, AUTOMATIC COMBUSTION AIR REGULATING SYSTEM AND TEMPERATURE CONTROLLER.

Conditions

1. CONSTRUCTION AND OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.

3. EACH FLARE SHALL BE EQUIPPED WITH A TEMPERATURE INDICATOR AND RECORDER WHICH MEASURES AND RECORDS THE GAS TEMPERATURE IN THE FLARE STACK. THE TEMPERATURE INDICATOR AND RECORDER SHALL OPERATE CONTINUOUSLY.

4. A TEMPERATURE OF NOT LESS THAN 1,500 DEGREES FAHRENHEIT AS MEASURED BY THE TEMPERATURE INDICATOR/RECORDER SHALL BE MAINTAINED IN EACH FLARE STACK WHENEVER THE FLARE IS IN OPERATION.

5. A FLOW INDICATING AND RECORDING DEVICE SHALL BE INSTALLED IN THE LANDFILL GAS SUPPLY LINE TO THE FLARE STATION TO MEASURE AND RECORD THE TOTAL QUANTITY OF LANDFILL GAS BEING BURNED THROUGH THE FLARES. THIS FLOW INDICATING AND RECORDING DEVICE SHALL OPERATE CONTINUOUSLY.

6. A FLOW INDICATING AND RECORDING DEVICE SHALL BE INSTALLED IN THE LANDFILL GAS SUPPLY LINE TO EACH OF FLARE NO. 5, NO. 6, NO. 7, NO. 8, AND NO. 9, RESPECTIVELY, TO MEASURE AND RECORD THE TOTAL QUANTITY OF LANDFILL GAS BEING BURNED THROUGH EACH FLARE. EACH FLOW INDICATING AND RECORDING DEVICE SHALL OPERATE CONTINUOUSLY WHENEVER THE FLARE IT SERVES IS IN OPERATION.

7. THE TOTAL VOLUME OF LANDFILL GAS BURNED IN EACH FLARE SHALL NOT EXCEED 1,250 STANDARD CUBIC FEET PER MINUTE.

8. THE TOTAL VOLUME OF LANDFILL GAS BURNED THROUGH THE COMBINATION OF ALL OPERATING FLARES SHALL NOT EXCEED 8,750 STANDARD CUBIC FEET PER MINUTE.

9. THE FOLLOWING FLARING SYSTEM FAILURE ALARMS, WHICH SHALL INCLUDE AN AUTOMATIC TELEPHONE NOTIFICATION SYSTEM AND AUTOMATIC BLOWER AND/OR FLARE INLET VALVE SHUT-OFF SYSTEM APPROVED BY THE DISTRICT, SHALL BE INSTALLED AND MAINTAINED IN GOOD OPERATING CONDITION:

   A. FLARE FLAME OUT.
   B. LOW FLAME STACK TEMPERATURE.
   C. HIGH FLARE STACK TEMPERATURE.

10. THE SAFETY SYSTEMS SPECIFIED IN CONDITION NUMBER 9 SHALL BE TESTED AND THE RESULTS RECORDED WITHIN SEVEN (7) DAYS OF THE FLARE COMMENCING OPERATION AND ONCE EVERY THREE MONTHS THEREAFTER TO CONFIRM PROPER OPERATION.

11. ALL RECORDING DEVICES SHALL BE SYNCHRONIZED WITH RESPECT TO THE TIME OF DAY.

12. A SAMPLE PORT APPROVED BY THE DISTRICT SHALL BE INSTALLED AND MAINTAINED IN EACH LANDFILL GAS HEADER TO THE FLARE TO ALLOW THE COLLECTION OF A LANDFILL GAS SAMPLE AND FOR FLOW RATE TESTING.

13. FOUR (4) SAMPLING PORTS APPROVED BY THE DISTRICT SHALL BE INSTALLED AND MAINTAINED ON EACH FLARE STACK. THESE SAMPLING PORTS SHALL BE LOCATED AT LEAST TWO (2) FEET ABOVE THE FLAME ZONE AND AT LEAST FOUR (4) FEET BELOW THE TOP OF THE FLARE SHROUD. EACH PORT SHALL BE INSTALLED AT 90 DEGREES APART AND SHALL CONSIST OF FOUR-INCH COUPLING WITH A CAP. ADEQUATE AND SAFE ACCESS TO ALL SOURCE TEST PORTS SHALL BE PROVIDED BY THE CITY WITHIN TWENTY-FOUR (24) HOURS OF A REQUEST BY THE DISTRICT TO CONDUCT A TEST.

14. THE SKIN TEMPERATURE OF EACH FLARE SHROUD WITHIN FOUR (4) FEET OF ALL THE SOURCE TEST PORTS SHALL NOT EXCEED 250 DEGREES FAHRENHEIT. IF A HEAT SHIELD IS REQUIRED TO MEET THIS REQUIREMENT, ITS DESIGN SHALL BE APPROVED BY THE DISTRICT PRIOR TO CONSTRUCTION. THE HEAT SHIELD, IF REQUIRED TO MEET THE TEMPERATURE REQUIREMENT, SHALL BE IN PLACE WHENEVER A SOURCE TEST IN CONDUCTED BY THE DISTRICT.

15. ANY BREAKDOWN OR MALFUNCTION OF THE FLARING SYSTEM RESULTING IN THE EMISSION OF RAW LANDFILL GAS SHALL BE REPORTED TO THE SCAQMD DIRECTOR OF ENFORCEMENT WITHIN ONE (1) HOUR AFTER OCCURRENCE. IMMEDIATE REMEDIAL MEASURES SHALL BE UNDERTAKEN TO CORRECT THE PROBLEM AND PREVENT FURTHER EMISSIONS INTO THE ATMOSPHERE.

16. ALL RECORDS SHALL BE KEPT FOR A PERIOD OF AT LEAST TWO (2) YEARS IN A FORM APPROVED BY THE DIRECTOR OF ENFORCEMENT AND SHALL BE MADE AVAILABLE TO THE EXECUTIVE OFFICER UPON REQUEST.

17. THE EMISSIONS FROM THE OPERATION OF EACH FLARE SHALL NOT EXCEED THE FOLLOWING, AVERAGED OVER A ONE HOUR TIME:

POLLUTANT	LBS/MILLION BTU OF LANDFILL GAS
REACTIVE HYDROCARBONS	0.02
OXIDES OF NITROGEN	0.04
OXIDES OF SULFUR	0.007
CARBON MONOXIDE	0.01

POLLUTANT	LBS/MILLION CU. FT. OF LANDFILL GAS
TOTAL PARTICULATES	17.8

18. THE EMISSIONS FROM THE OPERATION OF EACH FLARE SHALL NOT EXCEED THE FOLLOWING:

POLLUTANT	LBS/HR
REACTIVE HYDROCARBONS	0.67
OXIDES OF NITROGEN	1.34
OXIDES OF SULFUR	0.23
CARBON MONOXIDE	0.33
TOTAL PARTICULATES	1.33

19. THE TOTAL EMISSIONS FROM THE OPERATION OF THIS FLARE STATION SHALL NOT EXCEED THE FOLLOWING:

POLLUTANT	LBS/DAY
REACTIVE HYDROCARBONS	113
OXIDES OF NITROGEN	225
OXIDES OF SULFUR	39
CARBON MONOXIDE	56
TOTAL PARTICULATE	224

20. EACH FLARE SHALL BE EQUIPPED WITH A SUFFICIENT NUMBER OF VIEW PORTS TO ALLOW VISUAL INSPECTION OF THE FLARE HEIGHT AT THE ELEVATION OF THE TEMPERATURE SENSOR LOCATIONS WITHIN EACH FLARE AT ALL TIMES. PERMANENT AND SAFE ACCESS SHALL BE PROVIDED FOR ALL VIEW PORTS.

ORIGINAL

21. THE CITY OF LOS ANGELES SHALL CONDUCT SOURCE TESTS ANNUALLY IN ACCORDANCE WITH THE APPROVED SCHEDULE AND TEST PROTOCOL IN EFFECT AT THE TIME THE TESTS ARE CONDUCTED. A COMPLETE SOURCE TEST REPORT SHALL BE SUBMITTED TO THE DISTRICT WITHIN 60 DAYS AFTER EACH TEST. THE CITY SHALL SUBMIT A FLARE TEST SCHEDULE TO THE DISTRICT FOR APPROVAL BY SEPTEMBER 1, 1991. THIS TEST SCHEDULE SHALL SHOW DATES OF TESTING OF EACH FLARE FOR THE FOLLOWING:

A. METHANE (INLET AND EXHAUST).
B. TOTAL NON-METHANE ORGANICS (INLET AND EXHAUST)
C. OXIDES OF NITROGEN (EXHAUST ONLY)
D. CARBON MONOXIDE (EXHAUST ONLY)
E. TOTAL PARTICULATES (EXHAUST ONLY)
F. HYDROGEN SULFIDE (INLET ONLY)
G. TOTAL SULFUR COMPOUNDS (INLET ONLY)
H. CARBON DIOXIDE (INLET AND EXHAUST)
I. OXYGEN (INLET AND EXHAUST)
J. NITROGEN (INLET AND EXHAUST)
K. MOISTURE CONTENT (INLET AND EXHAUST)
L. TEMPERATURE (INLET AND EXHAUST)
M. FLOWRATE (INLET AND EXHAUST)
N. BTU CONTENT (INLET ONLY).
O. TOXIC AIR CONTAMINANTS (INLET AND EXHAUST), INCLUDING BUT NOT LIMITED TO BENZENE, CHLOROBENZENE, DICHLOROBENZENE, 1,2-DICHLOROETHANE, 1,1-DICHLOROETHENE, DICHLOROMETHANE, TETRACHLOROETHYLENE, TETRACHLOROMETHANE, TOLUENE, 1,1,1-TRICHLOROETHANE, TRICHLOROETHYLENE, TRICHLOROMETHANE, VINYL CHLORIDE, XYLENE)
P. HYDROGEN CHLORIDE (EXHAUST ONLY)

22. THE SCAQMD ENGINEERING AND ENFORCEMENT DIVISIONS SHALL BE NOTIFIED IN WRITING WITHIN TWO (2) WORKING DAYS WHENEVER ANY EQUIPMENT IN THE FLARE STATION IS SHUTDOWN FOR A PERIOD IN EXCESS OF ONE (1) HOUR AND RESULTED IN REDUCED LANDFILL GAS DISPOSAL CAPABILITY. A WRITTEN APPROVAL FROM THE DISTRICT IS REQUIRED PRIOR TO ANY SCHEDULED SHUTDOWNS WHICH MAY REDUCE THE GAS DISPOSAL CAPACITY IN EXCESS OF EIGHT (8) HOURS. THE NOTIFICATION AND APPROVAL REQUEST SHALL INCLUDE THE REASONS AND DURATION OF THE SHUTDOWNS AND SHALL IDENTIFY ANY MITIGATION MEASURES (TO BE) IMPLEMENTED.

23. BY OCTOBER 1, 1991, THE CITY OF LOS ANGELES SHALL COMPLETE INSTALLATION OF FLARE NO. I-5 AND ITS APPURTENANCES, AND SHALL OPERATE THE FLARE STATION AT A TOTAL CAPACITY OF NO LESS THAN 4,000 SCFM. A WRITTEN NOTICE OF COMPLIANCE WITH THIS CONDITION SHALL BE SUBMITTED TO THE DISTRICT ENGINEERING AND ENFORCEMENT DIVISIONS, RESPECTIVELY, WITHIN FIVE (5) DAYS AFTER THE COMPLIANCE IS ACHIEVED.

24. THE CONSTRUCTION OF THE EQUIPMENT COVERED UNDER THIS PERMIT SHALL BE COMPLETED WITHIN THIRTEEN (13) MONTHS FROM THE DATE OF THIS PERMIT, UNLESS OTHERWISE APPROVED IN WRITING BY THE DISTRICT.

Approval or denial of this application for permit to operate the above equipment will be made after an inspection to determine if the equipment has been constructed in accordance with the approved plans and specifications and if the equipment can be operated in compliance with all Rules of the South Coast Air Quality Management District.

Please notify J. CHEN at 818/572-6193 when construction of equipment is complete.

This Permit to Construct is based on the plans, specifications, and data submitted as it pertains to the release of air contaminants and control measures or reduce air contaminants. No approval or opinion concerning safety and other factors in design, construction or operation of the equipment is expressed or implied.

This Permit to Construct shall serve as a temporary Permit to Operate provided the Executive Officer is given prior notice of such intent to operate.

This Permit to Construct will become invalid if the Permit to Operate is denied or if this application is cancelled. THIS PERMIT TO CONSTRUCT SHALL EXPIRE ONE YEAR FROM THE DATE OF ISSUANCE unless an extension is granted by the Executive Officer.

By Dorris M Bailey
DORRIS M. BAILEY
Principal Office Assistant

DMB/mb

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (714) 396-2000

January 11, 1993

City of Los Angeles
Bureau of Sanitation
200 N. Main Street, Suite 1400, CHE
Los Angeles, CA 90012

Attention: Mr. Delwin Biagi, Director

Dear Mr. Biagi:

The District has received your January 8, 1993 letter requesting an extension to your Permit to Construct (A/N R-255005) for landfill gas collection system at the Lopez Canyon Landfill.

Our staff has reviewed this request and has granted your extension. **Your Permit to Construct will now expire January 12, 1994 unless an extension is granted in writing by the District.**

If you have any questions, please call Ms. Linda Lee-Dejbakhsh at (909) 396-2614.

Very truly yours,

J M Tramma

Joseph M. Tramma
AQAC Supervisor

LLD/collext

cc: Richard Tambara

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive, Diamond Bar, CA 91765

PERMIT TO CONSTRUCT/OPERATE

D66964
A/N 274653
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This initial permit must be renewed ANNUALLY unless the equipment is moved, or changes ownership. If the billing for annual renewal fee (Rule 301.f) is not received by the expiration date, contact the District.

Legal Owner or Operator: LA CITY, BUREAU OF SANITATION
200 N MAIN ST
LOS ANGELES, CA 90012-4110
ATTN: ROSALIA ROJO

ID 049805

Equipment Location: 11950 LOPEZ CANYON RD, LAKEVIEW TERRACE, CA 91342-6036

Equipment Description:

LANDFILL GAS CONDENSATE COLLECTION AND TREATING SYSTEM CONSISTING OF:

1. NINE (9) CONDENSATE SUMPS, EACH 500 GALLON CAPACITY, LOCATED IN SERIES ALONG THE LOW POINTS OF THE GAS COLLECTION SYSTEM, EACH WITH AN AIR-DRIVEN DIAPHRAGM PUMP.
2. TWO (2) CONDENSATE STORAGE/TREATMENT TANKS, EACH 9000 GALLON CAPACITY.
3. ONE (1) SODIUM HYDROXIDE TANK, 1500 GALLON CAPACITY.
4. TWO (2) AIR DRIVEN DIAPHRAGM PUMPS.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
3. THIS EQUIPMENT SHALL BE OPERATED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
4. THE SCAQMD SHALL BE NOTIFIED IN WRITING WHEN WORK ON THIS SYSTEM COMMENCES AND WHEN IT IS COMPLETED. SUCH NOTIFICATION SHALL OCCUR AT LEAST TWO DAYS PRIOR TO THE COMMENCEMENT AND WITHIN FIVE DAYS AFTER THE COMPLETION OF THE WORK RESPECTIVELY.

ORIGINAL

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive, Diamond Bar, CA 91765

Permit No.
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PERMIT TO CONSTRUCT/OPERATE

CONTINUATION OF PERMIT TO CONSTRUCT/OPERATE

5. CONSTRUCTION SPOILS AND ALL WORKING AREAS ACTIVELY BEING USED FOR TRUCK AND CONSTRUCTION EQUIPMENT TRAFFICKING SHALL BE MAINTAINED IN A MOIST CONDITION TO MINIMIZE DUST AND EMISSIONS.

6. AS-BUILT DRAWINGS SHOWING THE TRENCH LOCATIONS AND LINE SIZES SHALL BE PROVIDED TO THE DISTRICT WITHIN 30 DAYS AFTER CONSTRUCTION IS COMPLETED.

7. ALL CONDENSATE COLLECTED AND TREATED SHALL BE PROPERLY DISPOSED OF.

8. THE CONDENSATE STORAGE/TREATMENT TANKS SHALL BE VENTED TO THE COLLECTION AND/OR FLARE SYSTEMS.

9. ALL CONNECTIONS, VALVES AND OPENINGS SHALL BE PROPERLY SEALED OR CLOSED SO AS TO PREVENT RAW LANDFILL GAS AND/OR CONDENSATE VAPORS FROM ENTERING INTO THE ATMOSPHERE.

10. ALL RECORDS SHALL BE KEPT FOR A PERIOD OF AT LEAST TWO (2) YEARS IN A FORM APPROVED BY THE DIRECTOR OF ENFORCEMENT AND SHALL BE MADE AVAILABLE TO THE EXECUTIVE OFFICER UPON REQUEST.

NOTICE

IN ACCORDANCE WITH RULE 206, THIS PERMIT TO OPERATE OR COPY SHALL BE POSTED ON OR WITHIN 8 METERS OF THE EQUIPMENT.

THIS PERMIT DOES NOT AUTHORIZE THE EMISSION OF AIR CONTAMINANTS IN EXCESS OF THOSE ALLOWED BY DIVISION 26 OF THE HEALTH AND SAFETY CODE OF THE STATE OF CALIFORNIA OR THE RULES OF THE AIR QUALITY MANAGEMENT DISTRICT. THIS PERMIT CANNOT BE CONSIDERED AS PERMISSION TO VIOLATE EXISTING LAWS, ORDINANCES, REGULATIONS OR STATUTES OF OTHER GOVERNMENT AGENCIES.

EXECUTIVE OFFICER

Dorris M. Bailey

By Dorris M. Bailey/lld
12/15/1992

ORIGINAL

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (714) 396-2000

January 11, 1993

City of Los Angeles
Bureau of Sanitation
200 N. Main Street, Suite 1400, CHE
Los Angeles, CA 90012

Attention: Mr. Delwin Biagi, Director

Dear Mr. Biagi:

The District has received your January 8, 1993 letter requesting an extension to your Permit to Construct (A/N R-255005) for landfill gas collection system at the Lopez Canyon Landfill.

Our staff has reviewed this request and has granted your extension. **Your Permit to Construct will now expire January 12, 1994 unless an extension is granted in writing by the District.**

If you have any questions, please call Ms. Linda Lee-Dejbakhsh at (909) 396-2614.

Very truly yours,

Joseph M. Tramma
AQAC Supervisor

LLD/collext

cc: Richard Tambara

PERMIT TO CONSTRUCT

Granted as of 12/12

Legal Owner or Operator: ID 049805

LA CITY, BUREAU OF SANITATION
419 S SPRING STREET SUITE 800
LOS ANGELES CA 90013
ATTN: MR. JOHN BEHJAN/ROSALIA ROJO

Equipment Location: 11950 LOPEZ CANYON ROAD, LAKEVIEW TERRACE, CA 91342

The equipment described below and as shown on the approved plans and specifications are subject to the special condition, or conditions listed.

Equipment Description:

ALTERATION TO THE EXISTING LANDFILL GAS COLLECTION SYSTEM IN DISPOSAL AREAS "A", "B", AND "AB+" ISSUED PERMITS TO CONSTRUCT UNDER APPLICATION NOS. 150397, 226792, 225669, CONSISTING OF:

(IN DISPOSAL AREAS "A" AND "B")

1. TWO(2) HORIZONTAL GAS EXTRACTION WELLS, GRID SYSTEMS AT AVERAGE ELEVATIONS OF 1720 FEET AND 1740 FEET RESPECTIVELY, ALTERNATING 6" AND 8" PVC PIPING CONSTRUCTION (A/N 150397).

2. FORTY-THREE(43) VERTICAL GAS EXTRACTION WELLS, 4" WELL CASING, SLOTTED PVC PIPING CONSTRUCTION, 25 TO 40 FEET DEPTH IN THE REFUSE (A/N 150397).

3. SIX(6) CONDENSATE HOLDING TANKS, EACH 500 GALLON CAPACITY, VENTED TO GAS COLLECTION HEADER LINE, EACH WITH AN AUTOMATIC LEVEL CONTROL SYSTEM AND AN AIR DRIVEN DIAPHRAGM PUMP, 28 GPM MAXIMUM CAPACITY (A/N 150397).

4. ONE HUNDRED THIRTY SIX(136) VERTICAL GAS EXTRACTION WELLS, 2", 4", OR 6" WELL CASING, EACH APPROXIMATELY 50 FEET DEEP (A/N 226792).

5. SEVENTEEN(17) VERTICAL DEEP WELLS, EACH APPROXIMATELY 150 FEET DEEP (A/N 226792).

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive, Diamond Bar, CA 91765

PERMIT TO CONSTRUCT

6. GAS TRANSMISSION HEADER AND LATERAL PIPING SYSTEM SERVING THE VERTICAL AND HORIZONTAL WELLS TO DIRECT THE LANDFILL GAS TO THE FLARE STATION (A/N 226792).

(IN DISPOSAL AREA "AB+")

7. HORIZONTAL GAS COLLECTION WELL, AT ELEVATION 1650 FEET, 6" CORRUGATED AND PERFORATED PE PIPE CONSTRUCTION, OR 6"/8" ALTERNATING DIAMETER PVC OR POLYMER COATED CMP CONSTRUCTION, 100 FEET CENTERED, COVERING APPROXIMATELY 11.5 ACRES OF LANDFILL AREA (A/N 225668).

8. HORIZONTAL GAS COLLECTION WELL, AT ELEVATION 1700 FEET, 6" CORRUGATED AND PERFORATED PE PIPE CONSTRUCTION, OR 6"/8" ALTERNATING DIAMETER PVC OR POLYMER COATED CMP CONSTRUCTION, 100 FEET CENTERED, COVERING APPROXIMATELY 15.25 ACRES OF LANDFILL AREA (A/N 225668).

9. FORTY-THREE(43) VERTICAL GAS EXTRACTION WELLS, SHALLOW WELL DESIGN, EACH 4" HDPE WELL CASING, APPROXIMATELY 50 FEET DEEP, LOCATED AT THE INITIAL FILL AREA (A/N R-237767).

10. FOURTEEN(14) VERTICAL GAS EXTRACTION WELLS, DEEP WELL DESIGN, EACH 4" HDPE WELL CASING, APPROXIMATELY 150 FEET DEEP, LOCATED AT THE INITIAL FILL AREA (A/N R-237767).

11. TWO(2) CONDENSATE HOLDING TANKS, EACH 500 GALLON CAPACITY, VENTED TO GAS COLLECTION HEADER LINE, EACH WITH AN AUTOMATI(LEVEL CONTROL SYSTEM AND AN AIR DRIVEN DIAPHRAGM PUMP (A/N R-237767).

12. GAS TRANSMISSION HEADER AND LATERAL PIPING SYSTEM SERVING THE VERTICAL AND HORIZONTAL WELLS TO DIRECT THE LANDFILL GA: TO THE FLARE STATION (A/N R-237767).

BY THE ADDITION OF THE FOLLOWING, ISSUED A PERMIT TO CONSTRUCT UNDER A/N 226792:

1. FIFTY FOUR(54) ADDITIONAL VERTICAL GAS EXTRACTION WELLS AS REQUIRED, SUBJECT TO DISTRICT APPROVAL PRIOR TO INSTALLATION.

2. THIRTY-TWO(32) PERIMETER GAS MIGRATION CONTROL WELLS AS REQUIRED, SUBJECT TO DISTRICT APPROVAL PRIOR TO INSTALLATION.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive, Diamond Bar, CA 91765

Application
255005

PERMIT TO CONSTRUCT

3. GAS TRANSMISSION HEADER AND LATERAL PIPING SYSTEM SERVING THE VERTICAL AND HORIZONTAL WELLS TO DIRECT THE LANDFILL GAS TO THE FLARE STATION.

AND BY THE ADDITION OF THE FOLLOWING UNDER THIS APPLICATION (A/N 255005):

1. HORIZONTAL GAS COLLECTION WELL, FOR THE TOP DECK OF DISPOSAL AREA "AB+", AT ELEVATION 1740 FEET, 6" CORRUGATED AND PERFORATED PE PIPE CONSTRUCTION, OR 6"/8" ALTERNATING DIAMETER PVC OR POLYMER COATED CMP CONSTRUCTION, 100 FEET CENTERED, COVERING APPROXIMATELY 11.5 ACRES OF LANDFILL AREA.

2. TEN(10) LAYERS OF HORIZONTAL GAS COLLECTION WELLS, FOR DISPOSAL AREA "C" AT ELEVATIONS INDICATED BELOW, 6" CORRUGATED AND PERFORATED PE PIPE CONSTRUCTION, OR 6"/8" ALTERNATING DIAMETER PVC OR POLYMER COATED CMP CONSTRUCTION, 100 FEET CENTERED EXCEPT THE FIRST (LOWEST) LAYER WHICH WILL BE 50 FEET CENTERED.

ELEVATION FEET	SURFACE AREA ACRES	LENGTH OF PIPES FEET
1405	40	1500
1425	40	7500
1465	45	8600
1505	45	9900
1545	45	9800
1585	45	10400
1625	40	9000
1665	40	8900
1705	35	7900
1745	30	6800

3. ONE HUNDRED FIFTY (150) VERTICAL GAS EXTRACTION WELLS AS REQUIRED, SUBJECT TO DISTRICT APPROVAL PRIOR TO INSTALLATION.

4. GAS TRANSMISSION HEADER AND LATERAL PIPING SYSTEM SERVING THE WELLS TO DIRECT THE LANDFILL GAS TO THE FLARE STATION.

Conditions:

1. CONSTRUCTION AND OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THIS APPLICATION UNDER WHICH THIS PERMIT TO CONSTRUCT IS ISSUED UNLESS OTHERWISE NOTED BELOW.

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.

3. THIS EQUIPMENT SHALL BE OPERATED AND MAINTAINED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.

4. WELL DRILLING, DRIVING AND/OR TRENCHING FOR THE INSTALLATION OF WELLS AND THEIR ASSOCIATED PIPING SHALL NOT BE CONDUCTED BETWEEN THE HOURS OF 6 P.M. AND 7 A.M. OR ON WEEKENDS OR LEGAL HOLIDAYS, UNLESS OTHERWISE APPROVED BY THE SCAQMD.

5. WELL DRILLING, DRIVING AND/OR TRENCHING SHALL NOT BE CONDUCTED ON DAYS WHEN THE SCAQMD FORECASTS SECOND OR THIRD STAGE EPISODES FOR AREA NO.7. EPISODE FORECASTS FOR THE FOLLOWING DAY CAN BE OBTAINED BY CALLING (800) 242-4022 OR (800) 242-4666.

6. WELL DRILLING, DRIVING AND/OR TRENCHING SHALL NOT BE CONDUCTED ON DAYS WHEN THE SCAQMD REQUIRES COMPANIES IN AREA NO.7 TO IMPLEMENT THEIR SECOND OR THIRD STAGE EPISODE PLANS AREA NUMBERS REQUIRED TO IMPLEMENT THEIR EPISODE PLANS CAN BE DETERMINED FOR THE NEXT DAY BY CALLING (800) 242-4022 OR (800) 242-4666.

7. WELL DRILLING, DRIVING AND/OR TRENCHING SHALL NOT BE CONDUCTED WHEN THE WIND SPEED IS GREATER THAN 15 M.P.H. AVERAGE (OVER 15 MINUTES) OR THE WIND SPEED INSTANTANEOUSLY

10. EACH WELL HOLE SHALL BE COMPLETELY COVERED TO PREVENT ANY EMISSION OF LANDFILL GAS TO THE ATMOSPHERE WHENEVER WORK ON THE WELL IS NOT ACTIVELY IN PROGRESS.

11. THE CONSTRUCTION OF ANY PIPING OR WELL TRENCH WHICH EXPOSES LANDFILL TRASH TO THE ATMOSPHERE SHALL BE STAGED SUCH THAT NO MORE THAN ONE HUNDRED (100) LINEAR FEET OF TRENCH IS EXPOSED AT ANY TIME PRIOR TO BACKFILLING.

12. TRENCHES WHICH EXPOSE LANDFILL TRASH TO THE ATMOSPHERE SHALL BE COMPLETELY COVERED TO PREVENT ANY EMISSION OF LANDFILL GAS TO THE ATMOSPHERE WHENEVER WORK ON THE TRENCH IS NOT ACTIVELY IN PROGRESS.

13. DURING CONSTRUCTION, IF A CONSIDERABLE NUMBER OF COMPLAINTS ARE RECEIVED, ALL WORK SHALL CEASE AND APPROVED MITIGATION MEASURES SHALL BE IMPLEMENTED IMMEDIATELY. OTHER MITIGATION MEASURES WHICH ARE DEEMED APPROPRIATE BY SCAQMD PERSONNEL TO ABATE A NUISANCE CONDITION SHALL BE IMPLEMENTED UPON REQUEST.

14. IF A DISTINCT ODOR LEVEL (LEVEL III OR GREATER) RESULTING FROM THE CONSTRUCTION IS DETECTED AT OR BEYOND THE PROPERTY LINE, ALL WORK SHALL CEASE UNTIL THE ODOR SOURCES ARE DETERMINED AND ELIMINATED. ODOR LEVELS SHALL BE DETERMINED BY SCAQMD PERSONNEL OR ON-SITE COORDINATOR IN THE ABSENCE OF SCAQMD PERSONNEL.

15. CONSTRUCTION SPOILS ARE LANDFILL TRASH, MATERIAL THAT IS MIXED WITH LANDFILL TRASH, MATERIAL THAT HAS BEEN IN CONTACT WITH LANDFILL TRASH, OR ODOROUS MATERIAL THAT IS REMOVED FROM WELL HOLES OR TRENCHES.

16. ALL CONSTRUCTION SPOILS SHALL BE TRANSPORTED TO THE WORKING FACE OF THE LANDFILL WITHIN ONE HOUR OF GENERATION OR AS DEEMED NECESSARY BY THE DISTRICT PERSONNEL.

17. DURING TRANSPORT OF CONSTRUCTION SPOILS, NO MATERIAL SHALL EXTEND ABOVE THE SIDES OR REAR OF THE VEHICLE HAULING THE MATERIAL.

18. ANY OVER SPILL DURING TRANSPORT OF CONSTRUCTION SPOILS SHAL BE REMOVED FROM THE LANDFILL SURFACE WITHIN ONE HOUR AND DISPOSED OF AT THE WORKING FACE.

19. THE EXTERIOR OF THE VEHICLE HAULING THE CONSTRUCTION SPOILS TO THE WORKING FACE SHALL BE CLEANED OFF PRIOR TO LEAVING THE WORKING SITE FOR THE WORKING FACE.

20. MITIGATION MEASURES, OTHER THAN THOSE INDICATED IN THESE CONDITIONS, WHICH ARE DEEMED APPROPRIATE BY SCAQMD PERSONNEI AS NECESSARY TO PROTECT THE COMFORT, REPOSE, HEALTH OR SAFETY OF THE PUBLIC SHALL BE IMPLEMENTED UPON REQUEST.

21. EACH VERTICAL WELL SHALL BE CONNECTED TO AN OPERATING LANDFILL GAS HEADER AS SOON AS POSSIBLE BUT NOT LATER THAN SEVEN(7) DAYS AFTER THE WELL IS INSTALLED.

22. EACH HORIZONTAL GAS COLLECTION WELL SHALL BE CONNECTED TO AN OPERATING LANDFILL GAS HEADER OR BLIND FLANGES SHALL BE INSTALLED AT THE ENDS OF THE WELL HEADS AS SOON AS THE WELL IS INSTALLED.

23. DURING WELL DRILLING, AN APPROVED EMISSION CONTROL BOX SHALI BE USED TO COLLECT GASES FROM THE WELL DUE TO DRILLING OPERATION. THE COLLECTED GASES SHALL EITHER BE DIRECTED TO THE OPERATIONAL GAS COLLECTION SYSTEM, OR VENTED TO A CARBON ADSORBER WHICH HAS SUFFICIENT CAPACITY TO REMOVE ODORS WHEN THERE IS NO OPERATIONAL GAS COLLECTION SYSTEM AVAILABLE NEARBY.

24. EACH VERTICAL AND HORIZONTAL WELL HEAD SHALL BE EQUIPPED WITH A SHUT-OFF VALVE AND A SAMPLING PORT. THE SAMPLING PORT SHALL BE PLUGGED AND/OR SEALED EXCEPT WHEN THE PORT IS IN USE.

25. UNTIL CONNECTED TO THE OPERATING LANDFILL GAS COLLECTION SYSTEM, EACH COMPLETED WELL SHALL BE CAPPED AND ITS GAS CONTROL VALVE CLOSED TO AVOID VENTING LANDFILL GAS TO THE ATMOSPHERE.

26. EACH WELL SHALL BE SECURELY SEALED TO PREVENT ANY EMISSIONS OF LANDFILL GAS FROM AROUND THE WELL CASING.

27. ALL GASES COLLECTED BY THIS SYSTEM SHALL BE VENTED TO A COMBUSTION OR PROCESSING FACILITY WHICH IS IN FULL USE, CAN ADEQUATELY PROCESS THE VOLUME OF GAS COLLECTED, AND HAS BEEN ISSUED A VALID PERMIT TO CONSTRUCT OR OPERATE BY THE DISTRICT.

28. ALL CONNECTIONS IN THE CONDENSATE SYSTEM SHALL BE SEALED SO AS TO PREVENT VAPORS FROM ENTERING INTO THE ATMOSPHERE.

29. THE OPERATION OF THIS EQUIPMENT SHALL NOT RESULT IN THE EMISSIONS OF ANY RAW LANDFILL GAS OR CONDENSATE INTO THE ATMOSPHERE.

30. ALL RECORDS SHALL BE KEPT FOR AT LEAST TWO YEARS IN A FORM APPROVED BY THE SCAQMD DIRECTOR OF ENFORCEMENT AND MADE AVAILABLE TO THE DISTRICT UPON REQUEST.

31. THE CITY OF LOS ANGELES SHALL NOTIFY THE DISTRICT IN WRITING AT LEAST ONE(1) WEEK IN ADVANCE AND OBTAIN APPROVAL FROM THE DISTRICT WHEN AN ADDITIONAL WELL OR SET OF WELLS (THE PROPOSED EQUIPMENT LISTED UNDER A/N 226792) AND THEIR ASSOCIATED PIPING WILL BE INSTALLED. THE PROPOSED WELL LOCATIONS AND CONNECTING PIPING SHALL BE DESCRIBED AND IDENTIFIED ON DRAWINGS WHICH SHOW THE ENTIRE GAS COLLECTION SYSTEM. ESTIMATED GAS COLLECTION VOLUME, WELL DEPTHS/DESIGN, REFUSE DEPTH, PIPE LENGTHS, DIAMETERS AND LAYOUTS SHALL BE SUPPLIED TO THE SCAQMD IN THIS ADVANCE NOTIFICATION.

32. AT LEAST 180 DAYS PRIOR TO THE INSTALLATION OF THE VERTICAL WELLS AND THEIR ASSOCIATED PIPING SYSTEM FOR DISPOSAL AREA "C", THE CITY OF LOS ANGELES SHALL SUBMIT COMPLETE DESIGN INFORMATION TO THE DISTRICT. INSTALLATION OF THE WELLS AND PIPING SYSTEM SHALL NOT BEGIN UNTIL AN APPROVAL IN WRITING FROM THE DISTRICT IS RECEIVED. THE DESIGN INFORMATION SHALL INCLUDE THE PROPOSED WELL LOCATIONS AND CONSTRUCTION DETAILS AS WELL AS THE LAYOUT AND DIMENSIONS OF THE PIPING SYSTEM AND PRESSURE DROP CALCULATIONS TO DEMONSTRATE THAT THE SYSTEM IS ADEQUATELY DESIGNED FOR THE EXPECTED PERFORMANCE. IT SHALL ALSO INCLUDE A WELL SCHEDULE TO INCLUDE WELL IDENTIFICATION, CASING DIAMETER/MATERIAL, WELL DEPTH, REFUSE DEPTH, WELL HEAD VACUUM, EXPECTED GAS FLOW, AND DRILL METHOD.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive, Diamond Bar, CA 91765

Applicatio
255005

PERMIT TO CONSTRUCT

33. WITHIN THIRTY(30) DAYS AFTER CONSTRUCTION OF A GROUP OF WELLS AND THEIR ASSOCIATED PIPING IS COMPLETE, THE CITY OF LOS ANGELES SHALL SUBMIT AS BUILT DRAWINGS/DATA IN DUPLICATI TO THE DISTRICT ENGINEERING DIVISION.

Approval or denial of this application for permit to operate the above equipment will be made after a inspection to determine if the equipment has been constructed in accordance with the approved plans an specifications and if the equipment can be operated in compliance with all Rules of the South Coast Air Qualit Management District.

Please notify Jay Chen at 714/396-2664 when construction of equipment is complete.

This Permit to Construct is based on the plans, specifications, and data submitted as it pertains to the release o air contaminants and control measures or reduce air contaminants. No approval or opinion concerning safet and other factors in design, construction or operation of the equipment is expressed or implied.

This Permit to Construct shall serve as a temporary Permit to Operate provided the Executive Officer is giver prior notice of such intent to operate.

This Permit to Construct will become invalid if the Permit to Operate is denied or if this application is cancelled. THIS PERMIT TO CONSTRUCT SHALL EXPIRE ONE YEAR FROM THE DATE OF ISSUANCE unless an extension is granted by the Executive Officer.

Dorris M. Bailey

By
DORRIS M. BAILEY
Principal Office Assistant

DMB/nd

TABLE 1.2

LOPEZ CANYON FLARE #2
STACK EMISSIONS

Parameter	Allowed Emissions[1]		Actual Emissions	
	lb/mmBTU	lb/hr	lb/mmBTU	lb/hr
Reactive Hydrocarbons	0.02	0.67	0.004	0.11
Oxides of Nitrogen	0.04	1.34	0.04	1.14
Oxides of Sulfur[2]	0.007	0.23	0.006	0.16
Carbon Monoxide	0.01	1.33	0.003	0.08
	lb/mmCFLFG[3]	lb/hr	lb/mmCFLFG[3]	lb/hr
Total Particulates	17.8	1.33	7.8	0.50

NOTES: (1) Reference Permit to Construct 242642
(2) Assume all sulfur measured at inlet is converted to sulfur dioxide during combustion
(3) mmCFLFG = million cubic feet landfill gas

SECTION 2.0

TEST RESULTS

2.1 SUMMARY

The results of the tests listed in Table 1.1 are presented in this section as follows:

Table 2.1
"Lopez Canyon Flare #2 Operating Conditions"

Table 2.2
"Lopez Canyon Flare #2 Stack Test Results for Nitrogen Oxides, Oxygen, Carbon Dioxide, and Carbon Monoxide"

Table 2.3
"Lopez Canyon Flare #2 Test Results for Particulate Matter and Hydrogen Chloride"

Table 2.4
"Lopez Canyon Flare #2 Test Results for Particulate Matter in Combustion Air Inlet"

Table 2.5
"Lopez Canyon Flare #2 Test Results for Methane and Non-Methane Hydrocarbons"

Table 2.6
"Lopez Canyon Flare #2 Test Results for Toxic Air Contaminants"

Table 2.7
"Lopez Canyon Flare #2 Test Results for Hydrogen Sulfide, Methyl Mercaptan, Dimethyl Disulfide, Dimethyl Sulfide, Carbonyl Sulfide, Ethyl Mercaptan, Carbon Disulfide"

TABLE 2.1

LOPEZ CANYON FLARE #2 OPERATING CONDITIONS

Date:	JULY 30, 1991
Total Landfill Gas Inlet Flow (wscfm)	3740 (a)
(wscfm)	3371 (b)
Flare #4 Inlet Gas Flow (dscfm)	1074 (c)
Landfill Gas Inlet Temperature (^{o}F):	112 (b)
Landfill Gas Static Pressure (in. H_2O):	11.5 (b)
Flare Operating Set Point Temperature (^{o}F):	1570 (d)

(a) Measured by the plant's instrument at landfill gas blower discharge header

(b) Measured by Sierra Environmental Engineering, Inc.

(c) Per flare flow assumed to be one third of total flow

(d) From Lopez Canyon Flare Control Panel

TABLE 2.2

LOPEZ CANYON FLARE #2 STACK TEST RESULTS FOR NITROGEN OXIDES, OXYGEN, CARBON DIOXIDE, AND CARBON MONOXIDE

Test Type: Continuous Emissions Monitoring

Test Site:	Stack
Date:	7/30/91
Flare #:	#2
Stack Effluent Gas Temp. (^{o}F):	1527 (a)
Stack Area, (sq. ft.):	44.17
Stack Velocity, (ft/min.):	1299 (a)
Flue gas flows:	
(wacfm)	57364 (a)
(dscfm) *	12843 (a)
Stack Moisture (%):	9.06 (a)
Gaseous Data Summary:	
O_2 (% dry)	12.5
NO_x concentration, as found (ppm)	12.2
NO_x concentration, at 3% O_2 (ppm)	25.9
NO_x emission rate (lb/hr)	1.14
CO concentration, as found (ppm)	1.38
CO emission rate (lb/hr)	0.08
CO_2 (% Dry)	7.6

* Standard conditions are 14.7 psi and 60 ^{o}F

(a) Based on results from Particulate/Hydrogen Chloride tests conducted concurrent with this test

TABLE 2.3

LOPEZ CANYON FLARE #2 TEST RESULTS FOR PARTICULATE MATTER AND HYDROGEN CHLORIDE

Test Type:	SCAQMD METHOD 5/CARB 421-Combined Particulate and Hydrogen Chloride	
Test Site:	Stack	Stack
Date:	7/30/91	7/30/91
Time Start:	09:06	13:34
Time Stop:	12:30	16:15
Test Duration (min):	120	120
Stack Effluent Gas Temp. (^{o}F):	1527	1576
Duct Area (sq. ft.):	44.17	44.17
Stack Gas Flow		
(wacfm):	57308	61558
(dscfm):	12833	13460
Stack Gas Moisture		
H_2O (%):	9.06	9.00
Sample Volume		
DSCF:	71.435	74.636
Particulate Concentration (gr/dscf)		
Probe, Nozzle and PM-10 filter:	0.0034	0.0013
Impingers and Final Filter:	0.0018	0.0025
Organic Extract:	0.0004	ND
Total:	0.0052	0.0038
Total Less Organics:	0.0048	0.0038
Particulate Emission Rate (lb/hr)		
Probe, Nozzle and PM-10 filter:	0.37	0.15
Impingers and Final Filter:	0.15	0.28
Organic Extract:	0.04	ND
Total:	0.56	0.43
Toal Less Organics:	0.52	0.43
Hydrogen Chloride		
Analysis (total mg/sample):	13.79	29.00
Concentration (mg/dscf):	0.19	0.39
Emission Rate (lb/hr):	0.33	0.69

TABLE 2.4

LOPEZ CANYON FLARE #2 TEST RESULTS FOR PARTICULATE MATTER IN COMBUSTION AIR INLET

Test Type:	SCAQMD METHOD 5.1 Particulate	
Test Site:	Combustion Air Inlet	Combustion Air Inlet
Date:	7/30/91	7/30/91
Time Start:	9:00	13:34
Time Stop:	11:45	15:40
Test Duration (min):	120	120
Stack Effluent Gas Temp. (^{o}F):	81.7	88.7
Duct Area (sq. ft.):	10.0	10.0
Stack Gas Flow		
(wacfm):	10,468	10,954
(dscfm):	9,325	9,454
Stack Gas Moisture		
H_2O (%):	1.27	2.71
Sample Volume		
DSCF:	99.979	93.620
Particulate Concentration (gr/dscf)		
Probe, Nozzle and PM-10 filter:	$2.69x10^{-4}$	$8.92x10^{-4}$
Impingers and Final Filter:	$5.74x10^{-4}$	$4.88x10^{-4}$
Organic Extract:	ND	$2.88x10^{-4}$
Total:	$8.42x10^{-4}$	$1.7x10^{-3}$
Total Less Organics:	$8.42x10^{-4}$	$1.4x10^{-3}$
Particulate Emission Rate (lb/hr)		
Probe, Nozzle and PM-10 filter:	0.02	0.07
Impingers and Final Filter:	0.05	0.04
Organic Extract:	ND	0.02
Total:	0.07	0.13
Total Less Organics:	0.07	0.11

TABLE 2.5

LOPEZ CANYON FLARE #2 TEST RESULTS FOR METHANE AND NON-METHANE HYDROCARBONS

Test Type:	SCAQMD 25.2	SCAQMD 25.2
Test Site:	Inlet	Stack
Date:	7/30/91	7/30/91
Gas Temp.(^{o}F):	114 (b)	1527 (a)
Cross-sectional Area (sq. ft.):	2.164 (b)	44.17
Velocity (ft. min.):	1778 (b)	1,297 (a)
Gas Flows		
(wacfm):	1283 (b)	57,308 (a)
(dscfm):	1074 (b)	12,833 (a)
Gas Moisture (%)	4.46 (b)	9.06 (a)
Analysis (c)		
CO_2 (%):	38.8	7.08
O_2 (%):	1.88	14.1
CH_4 (ppm):	425,000	<1
NMHC (ppm CH_4):	5,215	3.28
BTU Content (BTU/ft^3)	416 (d)	---
Mass Flow Methane Only (lb/hr as CH_4):	1156	<0.033
Mass Flow Total NMHC (lb/hr as CH_4):	14.18	0.106
Destruction Efficiency		
Methane	99.99+%	
Total NMHC	99.25%	

*See attached notes

(a) Based on results from Method 5/421 Test conducted concurrent with Method 25.2 tests
(b) Based on results from Velocity/Moisture Tests conducted on the same test day
(c) Based on the average of duplicate concurrent samples.
(d) Calculated based on Method 25 results

TABLE 2.6

LOPEZ CANYON FLARE #2 TEST RESULTS FOR TOXIC AIR CONTAMINANTS

EQUIPMENT TESTED: FLARE #2 STACK & INLET SAMPLING DATE: 7/30/91

A COMPOUND	B CHEMICAL FORMULA	C MOL. WT. LBS/MOLE	D BLANK CONC. PPM	E INLET CONC. PPM	F OUTLET CONC. PPM	G INLET MASS RATE LB/HR	H OUTLET MASS RATE LB/HR	I FLARE EFF %
VINYL CHLORIDE	C2H3Cl2	62.5	ND @ 0.0002	0.728	ND @ 0.0002	0.007726	<0.000025	> 99.67
DICHLOROMETHANE	CH2Cl2	84.9	ND @ 0.0100	10.700	0.1550	0.154254	0.026700	82.69
1,1-DICHLOROETHANE	C2H4Cl2	99.0	ND @ 0.0005	2.250	ND @ 0.0005	0.037823	<0.000100	> 99.73
1,1-DICHLOROETHENE	C2H2Cl2	97.0	ND @ 0.0002	0.168	ND @ 0.0002	0.002767	<0.000039	> 98.58
TRICHLOROMETHANE	CHCl3	119.4	ND @ 0.0005	0.009	ND @ 0.0005	0.000175	<0.000109	> 37.55
1,1,1-TRICHLOROETHANE	C2H3Cl3	133.4	0.0014	0.710	0.0002	0.016083	0.000054	99.66
TETRACHLOROMETHANE	CCl4	153.8	ND @ 0.0002	ND @0.0002	ND @ 0.0002	<0.000005	<0.000062	N/A
BENZENE	C6H6	78.1	0.0024	1.260	0.0041	0.016710	0.000650	96.11
1,2-DICHLOROETHANE	C2H4Cl2	99.0	ND @ 0.0005	0.071	ND @ 0.0005	0.001190	<0.000100	> 91.56
TRICHLOROETHYLENE	C2HCl3	131.4	0.0020	1.690	ND @ 0.0005	0.037707	<0.000133	> 99.65
TOLUENE		92.1	0.0600	22.600	0.0993	0.353437	0.018556	94.75
TETRACHLOROETHENE	C2Cl4	165.9	0.0002	1.790	0.0001	0.050425	0.000037	99.93
CHLOROBENZENE	C6H5Cl	112.6	ND @ 0.0006	ND @ 0.010	ND @ 0.0006	<0.000191	<0.000137	> 28.31
m+p-XYLENES	C8H10	106.2	0.0076	6.300	0.0152	0.113608	0.003275	97.12
o-XYLENES	C8H10	106.2	0.0016	2.060	0.0026	0.037148	0.000560	98.49
o+m+p-DICHLOROBENZENES	C6H4Cl2	147.0	ND @ 0.0011	0.202	ND @ 0.0011	0.005042	<0.000328	> 93.49
WEIGHTED HYDROCARBON BURN-UP EFFICIENCY						< 0.8343	< 0.0509	> 93.90
WEIGHTED HYDROCARBON BURN-UP EFFICIENCY LESS DICHLOROMETHANE (see Note P)						< 0.6800	< 0.0242	> 96.45

(1) INLET GAS FLOW RATE = 1074 DSCFM (2) OUTLET GAS FLOW RATE = 12833 DSCFM

NOTES:
- (A) CHEMICAL COMPOUNDS AS REPORTED.
- (B) CHEMICAL FORMULAS FOR THE LISTED COMPOUNDS.
- (C) MOL. WT.= MOLECULAR WEIGHTS OF THE LISTED COMPOUNDS.
- (D) COMPOUND CONCENTRATION OF FIELD BLANK.
- (E) COMPOUND CONCENTRATION AT THE FLARE INLET.
- (F) COMPOUND CONCENTRATION AT THE FLARE OUTLET.
- (G) POUNDS PER HOUR INFLOW TO FLARE = 60*C*(E-D)*(1)/(1000000*379.5).
- (H) POUNDS PER HOUR EXHAUST FROM FLARE = 60*C*(F-D)*(2)/(1000000*379.5).
- (I) FLARE EFFICIENCY ON MASS BASIS = 100*((G-H)/(G)).
- (J) PPM - PARTS PER MILLION BY VOLUME
- (K) CFM - CUBIC FEET PER MINUTE AIR FLOW
- (L) DSCFM - DRY STANDARD CUBIC FEET PER MINUTE (@ 60 DEGREES F, & 1 ATMOSPHERE PRESSURE)
- (M) < DENOTES LESS THAN. IN COLUMNS D, E & F < INDICATE BELOW DETECTION LIMIT VALUES.
- (N) > DENOTES GREATER THAN.
- (O) ND @ INDICATES BELOW STATED DETECTION LEVEL
- (P) SIERRA SUSPECTS THE DICHLOROMETHANE VALUES FROM THE STACK ARE INCORRECT DUE TO SAMPLE SYSTEM CONTAMINATION

TABLE 2.7

LOPEZ CANYON FLARE #2 TEST RESULTS FOR HYDROGEN SULFIDE METHYL MERCAPTAN, DIMETHYL DISULFIDE, DIMETHYL SULFIDE

Test Type:	Sulfur Compounds
Test Site:	Inlet
Date:	7/30/91
Inlet Gas Flow (dscfm):	1074 (a)
Sulfur Compounds	
Hydrogen Sulfide (ppm):	7.37
Mass Flow (lb/hr):	0.043
Dimethyl Disulfide (ppm):	4.42
Mass Flow (lb/hr):	0.068
Methyl Mercaptan (ppm):	1.31
Mass Flow (lb/hr):	0.012
Dimethyl Sulfide (ppm):	0.10
Mass Flow (lb/hr):	0.0011
Carbonyl Sulfide (ppm):	1.07
Mass Flow (lb/hr):	0.011
Ethyl Mercaptan (ppm)	<0.2
Mass Flow (lb/hr)	<0.002
Carbon Disulfide (ppm)	0.16
Mass Flow (lb/hr)	0.002

(a) Based on results from Velocity/Moisture Tests conducted on the test day. Flow was measured at the blower discharge header and divided into thirds for the three flares in operation.

(b) ND means not detected at the detection limit specified.

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (714) 396-2000

May 19, 1992
A/N 189533

City of Los Angeles
Bureau of Sanitayion
200 North Main Street
Room 1410 CHE
Los Angeles, Ca. 90012

Attention: Mr. Delwin A. Biagi
Director

Gentlemen:

<u>Rule 1150 Excavation Permit</u>
(This Permit supersedes the Permit issued August 18, 1989)

Reference is made to your Application No. 189533 for a Rule 1150 Excavation Permit and your extension request dated May 8, 1992, for the removal of refuse for the construction of 12 additional drainage lines to be installed at Disposal Areas A, B, AB+ and C of Lopez Canyon Landfill.

Please be advised that this Excavation Permit extension is granted under Rule 1150 of the Rules and Regulations of the South Coast Air Quality Management District and is subject to the following conditions (Condition Nos. 2, 3 and 4 are revised):

1. THIS EXCAVATION SHALL BE CONDUCTED IN COMPLIANCE WITH ALL PLANS AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.

2. THIS EXCAVATION PERMIT IS VALID UNTIL **JUNE 1, 1994.** AN EXTENSION MAY BE GRANTED UPON WRITTEN REQUEST. SUCH A REQUEST WILL INCLUDE THE REASONS THE EXTENSION IS REQUIRED, THE LENGTH OF THE EXTENSION, AND THE STATUS OF THE EXCAVATION TO DATE.

3. THE SCAQMD SHALL BE NOTIFIED IN WRITING AT LEAST TWO DAYS PRIOR TO THE COMMENCEMENT OF THE EXCAVATION OF A GROUP OF DRAINAGE LINES AND WITHIN FIVE DAYS AFTER COMPLETION.

4. THIS EXCAVATION PERMIT EXTENSION IS VALID ONLY FOR THE REMOVAL OF A TOTAL OF APPROXIMATELY 2,400 CUBIC YARDS OF EXCAVATED MATERIAL FOR THE CONSTRUCTION OF THE FOLLOWING:

   TWO DRAINAGE LINES, ONE EACH IN DISPOSAL AREAS A AND B
   TWO DRAINAGE LINES IN DISPOSAL AREA AB+
   EIGHT DRAINAGE LINES IN DISPOSAL AREA C

5. EXCAVATION SHALL NOT BE CONDUCTED BETWEEN THE HOURS OF 6 P.M. AND 7 A.M. OR ON SATURDAYS, SUNDAYS AND LEGAL HOLIDAYS.

6. EXCAVATION SHALL NOT BE CONDUCTED ON DAYS WHEN THE SCAQMD FORECASTS SECOND OR THIRD STAGE EPISODES FOR AREA NUMBER 7. EPISODE FORECASTS FOR THE FOLLOWING DAY CAN BE OBTAINED BY CALLING (800) 445-3826 OR (800) 242-4666.

7. EXCAVATION SHALL NOT BE CONDUCTED ON DAYS WHEN THE SCAQMD REQUIRES COMPANIES IN AREA NUMBER 7 TO IMPLEMENT THEIR SECOND OR THIRD STAGE EPISODE PLANS. AREA NUMBERS REQUIRED TO IMPLEMENT THEIR EPISODE PLANS CAN BE DETERMINED FOR THE NEXT DAY BY CALLING (800) 445-3826 OR (800) 242-4666.

8. EXCAVATION SHALL NOT BE CONDUCTED WHEN THE WIND SPEED IS GREATER THAN 15 M.P.H. AVERAGE (OVER 15 MINUTES) OR THE WIND SPEED INSTANTANEOUSLY EXCEEDS 25 M.P.H.

9. DURING EXCAVATION, ALL WORKING AREAS, EXCAVATED MATERIAL AND UNPAVED ROADWAYS SHALL BE WATERED DOWN UNTIL THE SURFACE IS MOIST AND THEN MAINTAINED IN A MOIST CONDITION TO MINIMIZE DUST.

10. WHEN LOADING IS COMPLETED AND DURING TRANSPORT, NO MATERIAL SHALL EXTEND ABOVE THE SIDES OR REAR OF THE TRUCK OR TRAILER WHICH WILL HAUL THE EXCAVATED MATERIAL TO THE WORKING FACE.

11. ALL EXCAVATED MATERIAL WHICH IS CONTAMINATED SHALL BE IMMEDIATELY HAULED TO THE ACTIVE FILL AREA OF THE LANDFILL.

12. ALL EXPOSED ORGANIC REFUSE SHALL BE COVERED WITH EITHER A MINIMUM OF 6 INCHES OF CLEAN SOIL, PLASTIC SHEETING OR APPROVED FOAM WHENEVER WORK IS NOT ACTIVELY IN PROGRESS. FOAM BY ITSELF SHALL NOT BE USED AS A NIGHT COVER IF IT IS RAINING OR RAIN IS PREDICTED BY THE NATIONAL WEATHER SERVICE PRIOR TO THE NEXT SCHEDULED DAY OF EXCAVATION.

13. DURING EXCAVATION, WIND SPEED AND DIRECTION SHALL BE CONTINUOUSLY MONITORED AND RECORDED AT A SITE APPROVED BY THE DISTRICT.

14. DURING EXCAVATION, IF A CONSIDERABLE NUMBER OF COMPLAINTS ARE RECEIVED, ALL WORK SHALL CEASE AND THE APPROVED MITIGATION MEASURES SHALL BE IMPLEMENTED IMMEDIATELY. OTHER MITIGATION MEASURES WHICH ARE DEEMED APPROPRIATE BY SCAQMD PERSONNEL TO ABATE A NUISANCE CONDITION SHALL BE IMPLEMENTED UPON REQUEST.

15. DURING EXCAVATION, MONITORING FOR ORGANICS AS METHANE USING AN ORGANIC VAPOR ANALYZER (OVA) SHALL BE CONDUCTED CONTINUOUSLY AT THE PROPERTY LINE DIRECTLY DOWNWIND OF THE EXCAVATION AND AT THE WORKING FACE.

16. IF THE OVA SHOWS A READING OF 500 PPMV OR GREATER AT THE WORKING FACE, THE AREA GENERATING THE EMISSIONS SHALL IMMEDIATELY BE COMPLETELY COVERED WITH A MINIMUM OF 6 INCHES OF CLEAN DIRT OR AN APPROVED FOAM AND THE FOLLOWING ACTIONS IMPLEMENTED:

    A. EXCAVATION OF THE AFFECTED AREA SHALL NOT RECOMMENCE UNTIL THE ORGANIC READINGS ARE BELOW 500 PPMV.

    B. EXCAVATION OF THE AFFECTED AREA SHALL BE CONDUCTED IN SUCH A MANNER AS TO LIMIT THE WORKING FACE TO LESS THAN 2000 SQUARE FEET OR OTHER SMALLER AREA DEEMED APPROPRIATE BY SCAQMD PERSONNEL TO REDUCE NUISANCE POTENTIAL.

17. IF THE OVA SHOWS A READING OF 100 PPMV OR GREATER AT THE PROPERTY LINE, THE EXCAVATION SHALL CEASE AND THE APPROVED MITIGATION MEASURES IMPLEMENTED IMMEDIATELY. THE EXCAVATION SHALL NOT RESUME UNTIL THE READINGS ARE BELOW 100 PPMV.

18. ALL MONITORS SHALL BE CALIBRATED DAILY OR EACH DAY THEY WILL BE OPERATED USING A METHOD APPROVED BY THE DISTRICT.

19. IF A DISTINCT ODOR (LEVEL III OR GREATER) RESULTING FROM THE EXCAVATION IS DETECTED AT OR BEYOND THE PROPERTY LINE, THE EXCAVATION SHALL CEASE AND THE APPROVED MITIGATION MEASURES IMPLEMENTED IMMEDIATELY. ODOR LEVELS WILL BE DETERMINED BY SCAQMD PERSONNEL OR ON-SITE SAFETY COORDINATOR IN THE ABSENCE OF SCAQMD PERSONNEL.

20. MITIGATION MEASURES, OTHER THAN THOSE INDICATED IN THESE CONDITIONS, WHICH ARE DEEMED APPROPRIATE BY SCAQMD PERSONNEL AS NECESSARY TO PROTECT THE COMFORT, REPOSE, HEALTH AND SAFETY OF THE PUBLIC, SHALL BE IMPLEMENTED UPON REQUEST.

Other governmental agencies may require approval before any excavation begins. It shall be the responsibility of the applicant to obtain that approval. The South Coast Air Quality Management District shall not be responsible or liable for any losses because of measures required or taken pursuant to the requirements of this approved Excavation Management Plan.

If you have any questions concerning this Permit, please call Mr. Jay Chen at (714) 396-2664.

Very truly yours,

Joseph M. Tramma
Supervising A.Q. Engineer

JC:1a189533

cc: Rosalia Rojo, Bureau of Sanitation
Larry Israel

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE SAMPLING SUMMARY

DATE SAMPLED	GRID ID	METHANE (ppm/v)	SUBMITTED FOR ANALYSIS	REMARKS
27-Feb-92	98	7	N	
28-Feb-92	100	8	N	
28-Feb-92	101	55	Y	
28-Feb-92	102	12	N	
28-Feb-92	40	4	N	
28-Feb-92	58	3.5	N	
28-Feb-92	66	6	N	
28-Feb-92	74	7	N	
28-Feb-92	80	10	N	
28-Feb-92	99	50	Y	

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: 19-Feb-92 **Inspector:** EP **Instrument Serial No.: A20876**

Grid ID	Sample ID	Bag No.	Sampling Time	Flow Rate (cc/min)	Sample Volume (Liters)	THC (ppm/v)	Sample sent to Lab ? (Y or N)
85	IS-02-85	351	1423	333	10	16	N
86	IS-02-86	304	1422	430	8	16	N
93	IS-02-93	302	1350	333	8	15	N
94	IS-02-94	319	1355	430	8	14	N
95	IS-02-92	323	1306	430	8	14	N
96	IS-02-96	320	1305	333	10	20	N

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: 20-Feb-92 **Inspector: JR** **Instrument Serial No.: A20408**

Grid ID	Sample ID	Bag No.	Sampling Time	Flow Rate (cc/min)	Sample Volume (Liters)	THC (ppm/v)	Sample sent to Lab ? (Y or N)
41	IS-02-41	360	1350	333	8	2.5	N
45	IS-02-45	304	1350	333	8	3	N
48	IS-02-48	300	0818	333	8	5.5	N
49	IS-02-49	303	1315	333	8	2.5	N
50	IS-02-50	311	1315	333	8	2.5	N
54	IS-02-54	306	0750	333	8	1.8	N
55	IS-02-55	328	0725	333	8	2	N
56	IS-02-56	323	1120	333	8	2	N
57	IS-02-57	350	1120	333	8	2	N
63	IS-02-55	308	0717	333	8	2.5	N
64	IS-02-64	361	1050	333	8	2.5	N
65	IS-02-65	306	1045	333	8	2.2	N
72	IS-02-72	311	0745	333	8	2.5	N
73	IS-02-73	361	0815	333	8	4	N

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: 21-Feb-92 **Inspector:** EP **Instrument Serial No.: A20847**

Grid ID	Sample ID	Bag No.	Sampling Time	Flow Rate (cc/min)	Sample Volume (Liters)	THC (ppm/v)	Sample sent to Lab ? (Y or N)
30	IS-02-30	300	0759	333	10	1.5	N
31	IS-02-31	314	0756	333	8	2	N
32	IS-02-32	320	0830	333	8	1.5	N
33	IS-02-33	301	0830	333	10	1.5	N
83	IS-02-83	328	0856	333	10	1.5	N
84	IS-02-84	319	0858	333	8	1.5	N
89	IS-02-89	308	0926	333	8	2.5	N
90	IS-02-90	305	0929	333	10	6	N
91	IS-02-91	350	0957	333	8	2.5	N
92	IS-02-92	302	0956	333	10	3	N

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: 24-Feb-92 **Inspector:** EF **Instrument Serial No.: A20876**

Grid ID	Sample ID	Bag No.	Sampling Time	Flow Rate (cc/min)	Sample Volume (Liters)	THC (ppm/v)	Sample sent to Lab ? (Y or N)
19	IS-02-19	328	0832	333	8	1.5	N
20	IS-02-20	320	0900	333	10	2	N
21	IS-02-21	351	0823	333	10	3.5	N
23	IS-02-23	305	0855	333	10	1.5	N

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: 25-Feb-92 **Inspector:** JR **Instrument Serial No.:** A21237

Grid ID	Sample ID	Bag No.	Sampling Time	Flow Rate (cc/min)	Sample Volume (Liters)	THC (ppm/v)	Sample sent to Lab ? (Y or N)
10	IS-10-2	311	0720	333	8	2	N
14	IS-14-2	361	0725	333	10	1.8	N

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: 26-Feb-92 **Inspector:** EF **Instrument Serial No.: A21337**

Grid ID	Sample ID	Bag No.	Sampling Time	Flow Rate (cc/min)	Sample Volume (Liters)	THC (ppm/v)	Sample sent to Lab ? (Y or N)
13	IS-02-13	303	0710	333	10	1.6	N
17	IS-02-17	304	0714	333	8	1.7	Y
18	IS-02-18	300	0745	333	10	1.6	N
27	IS-02-27	319	0750	333	10	1.6	Y
34	IS-02-34	306	0821	333	10	2	N
35	IS-02-35	360	0825	333	10	1.7	Y

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: 27-Feb-92 **Inspector:** EF **Instrument Serial No.: A21237**

Grid ID	Sample ID	Bag No.	Sampling Time	Flow Rate (cc/min)	Sample Volume (Liters)	THC (ppm/v)	Sample sent to Lab ? (Y or N)
11	IS-11-2	502	0910	333	10	1.5	N
12	IS-12-2	TEMP 1	0822	333	6	1.3	N
15	IS-15-2	306	0905	333	8	1.3	N
16	IS-16-2	301	0907	333	8	1.3	N
22	IS-22-2	TEMP 2	0810	333	8	1.3	N
24	IS-24-2	TEMP 3	0905	333	10	1.3	N
25	IS-25-2	301	1405	333	10	3	N
26	IS-26-2	TEMP 4	0845	333	10	1.3	N
28	IS-28-2	TEMP 5	0834	333	10	1.4	N
29	IS-29-2	206	1355	333	8	2	N
36	IS-36-2	204	1105	333	8	2	N
37	IS-37-2	300	1015	333	10	2.5	N
38	IS-38-2	502	1356	333	7	2	N
39	IS-39-2	202	1105	333	8	2.5	N
42	IS-42-2	311	1343	333	6	3.5	N
43	IS-43-2	306	1348	333	6	2.8	N
5	IS-05-2	303	0748	333	9	1.3	N
53	IS-53-2	TEMP 6	0800	333	10	4.2	N

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

6	IS-06-2	361	0740	333	6	1.3	N
61	IS-61-2	TEMP 7	0715	333	8	16	N
62	IS-62-2	TEMP 8	0742	333	8	1.6	N
7	IS-07-2	TEMP 9	0828	333	10	1.2	N
71	IS-72-2	TEMP 10	0728	333	8	1.8	N
8	IS-08-2	311	0815	333	10	1.2	N
87	IS-87-2	205	1357	333	8	11	N
88	IS-88-2	TEMP 11	1329	333	10	11	N
9	IS-09-2	TEMP 12	0746	333	8	1.6	N
97	IS-97-2	360	1330	333	8	3	N
98	IS-98-2	311	1118	333	9	7	N

Notes:

1. Greater than 50 ppm/v THC requires sample to be analyzed and the Chief Monitoring Technician must be notified.

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
QUALITY CONTROL DATA SHEET

Date: 28-Feb-92 **Inspector:** HA **Instrument Serial No.:** A21024

Grid ID	Sample ID	Bag No.	Sampling Time	Flow Rate (cc/min)	Sample Volume (Liters)	THC (ppm/v)	Sample sent to Lab ? (Y or N)
100	IS-100-2	303	0910	333	10	8	N
101	IS-101-2	503	0827	333	10	55	Y
102	IS-102-2	311	0758	333	7	12	N
40	IS-40-2	TEMP 1	1133	333	10	4	N
58	IS-58-2	301	1046	333	7	3.5	N
66	IS-66-2	350	0955	333	8	6	N
74	IS-74-2	TEMP 2	1000	333	6	7	N
80	IS-80-2	300	0907	333	10	10	N
99	IS-99-2	361	0743	333	10	50	Y

—

LOPEZ CANYON LANDFILL

#3971

CHAIN OF CUSTODY RECORD

Field Log Book

ACTIVITY: INTEGRATED SAMPLING

Reference No. IS-02-(

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks
✓ IS-17-1	304	8l	2-26-92	0711	INT						9200855
✓ IS-35-1	360	10l	2-26-92	0825	(						9200856
✓ IS-27-1	319	10l	2-26-92	0750	↓						9200857

Total No. of Samples Shipped:	Total No. of Containers Shipped:	Special Instructions:
3	14	

SAMPLED BY: (SIGN) [signature] / [signature] / ______ /

RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)
Greg Newborn	2	3	4
DATE/TIME 2/26, 1200	DATE/TIME (/)	DATE/TIME (/)	DATE/TIME (/)

COURIER (NAME)	SHIPPING NUMBER	SHIPPED BY (SIGN)	DATE/TIME
GREG NEWBORN			(/

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME
PERFORMANCE ANALYTICAL	[signature]	(2/26 1258)

Revised: August 24, 1991

Form: LC-(

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
IS-17-1 (304)	9200855	400	2.1	1.2
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
IS-17-1 (304)	9200855	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: IS-17-1 (304) (02/26/92) (07:11)

PAI Sample ID: 9200855

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	ND	10	ND	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	2.3 TR	10	0.71 TR	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	15	10	3.9	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	22	10	5.1	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	9.8 TR	10	1.6 TR	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
IS-27-1 (319)	9200857	370	1.9	1.5
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
IS-27-1 (319)	9200857	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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Environmental Testing and Consulting

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: IS-27-1 (319) (02/26/92) (07:50)

PAI Sample ID: 9200857

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	ND	10	ND	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	1.9 TR	10	0.58 TR	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	11	10	2.8	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	19	10	4.3	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	9.0 TR	10	1.5 TR	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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RESULTS OF METHANE &

TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Concentration in ppm, v/v Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
IS-35-1 (360)	9200856	400	1.9	1.3
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
IS-35-1 (304)	9200856	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: IS-35-1 (360) (02/26/92) (08:25)

PAI Sample ID: 9200856

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Chris Parnell	Date Received:	02/26/92
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	02/27/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	ND	10	ND	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	2.6 TR	10	0.81 TR	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	15	10	4.0	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	17	10	4.0	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	8.2 TR	10	1.4 TR	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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LOPEZ CANYON LANDFILL #3982

CHAIN OF CUSTODY RECORD

Field Log Book

ACTIVITY: INTEGRATED

Reference No. ISE-1 ISE-2

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks
99-2	361	10L	2-28-92								9200913
101-2	503	10L	2-28-92								9200914

Total No. of Samples Shipped:	Total No. of Containers Shipped:	Special Instructions:
2	2	

SAMPLED BY: (SIGN) Horatio Abili / / /

RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)
1 Horatio Abili	[signature]	3	4
DATE/TIME (/)	DATE/TIME 2/28 11:40	DATE/TIME (/)	DATE/TIME (/)

COURIER (NAME)	SHIPPING NUMBER	SHIPPED BY (SIGN)	DATE/TIME
[signature]			(/)

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME
	[signature]	(2/28/92 / 1435)

Revised: August 24, 1991

Form: LC-002

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PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE, CARBON DIOXIDE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3982

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Sharon Smithbauer
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/28/92
Date Analyzed: 03/02/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Methane	Concentration in ppm, v/v Carbon Dioxide	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
99-2 (361)	9200913	47	450	2.6
N/A (03/02/92)	METHOD BLANK	ND < 0.50	ND < 10	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Sharon Smithbauer
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/28/92
Date Analyzed: 02/28/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
99-2 (361)	9200913	ND < 100	770000	230000
N/A (02/28/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: 99-2 (361) (02/28/92)

PAI Sample ID: 9200913

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/28/92
Date Analyzed: 03/02/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	13	10	3.8	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	14	10	2.7	1.8
71-43-2	BENZENE	5.2 TR	10	1.6 TR	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	3.8 TR	10	0.71 TR	1.9
108-88-3	TOLUENE	22	10	6.0	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	22	10	5.2	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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RESULTS OF METHANE, CARBON DIOXIDE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3982

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Sharon Smithbauer
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/28/92
Date Analyzed: 03/02/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Methane	Carbon Dioxide	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
101-2 (503)	9200914	44	480	2.6
101-2 (503)	LAB DUPLICATE	44	480	2.4
N/A (03/02/92)	METHOD BLANK	ND < 0.50	ND < 10	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Sharon Smithbauer
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/28/92
Date Analyzed: 02/28/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
101-2 (503)	9200914	ND < 100	770000	230000
101-2 (503)	LAB DUPLICATE	ND < 100	770000	230000
N/A (02/28/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

Performance Analytical Inc.
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PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: 101-2 (503) (02/28/92)

PAI Sample ID: 9200914

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Chris Parnell	Date Received:	02/28/92
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	03/02/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	30	10	8.6	2.9
75-34-3	1,1-DICHLOROETHANE	6.8 TR	10	1.7 TR	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	12	10	2.2	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	17	10	4.6	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	20	10	4.5	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	4.0 TR	10	0.67 TR	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: N/A

PAI Sample ID: PAI Method Blank

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Chris Parnell	Date Received:	N/A
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	03/02/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	ND	10	ND	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	ND	10	ND	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	ND	10	ND	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

INSTANTANEOUS LANDFILL SURFACE EMISSION MONITORING RESULTS

LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
SURVEY SUMMARY

DATE	START TIME	FINISH TIME	GRID ID	GRID AVERAGE CH_4 (PPM/V)
19-Feb-92	08:15:00	08:54:00	05	2.5
19-Feb-92	08:13:00	08:43:00	06	1.6
19-Feb-92	08:55:00	09:15:00	07	3.5
19-Feb-92	08:50:00	09:15:00	08	1.3
19-Feb-92	08:15:00	08:40:00	09	9
19-Feb-92	11:46:00	12:15:00	10	4.2
19-Feb-92	09:15:00	09:47:00	11	4
19-Feb-92	09:23:00	09:53:00	12	7
19-Feb-92	08:45:00	09:20:00	13	8
19-Feb-92	11:50:00	12:18:00	14	6
19-Feb-92	11:09:00	11:40:00	15	2
19-Feb-92	11:05:00	11:32:00	16	6
19-Feb-92	09:40:00	10:12:00	17	1.3
19-Feb-92	11:58:00	12:30:00	18	2.1
19-Feb-92	14:00:00	14:33:00	19	1.9
19-Feb-92	13:45:00	14:15:00	20	8
19-Feb-92	13:45:00	14:10:00	21	6
19-Feb-92	14:16:00	14:50:00	22	2.8
19-Feb-92	14:55:00	15:30:00	23	2.6
19-Feb-92	14:45:00	15:10:00	24	5
19-Feb-92	14:13:00	14:42:00	25	7
20-Feb-92	07:35:00	08:00:00	26	2.3
20-Feb-92	07:30:00	07:53:00	27	12
20-Feb-92	07:55:00	08:22:00	28	12
20-Feb-92	08:05:00	08:30:00	29	1.5

LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
SURVEY SUMMARY

20-Feb-92	07:29:00	07:53:00	30	1.3
20-Feb-92	07:25:00	07:53:00	31	3
20-Feb-92	08:00:00	08:25:00	32	3.6
20-Feb-92	07:59:00	08:22:00	33	0
20-Feb-92	13:00:00	13:25:00	50	4
20-Feb-92	13:11:00	13:30:00	55	2
20-Feb-92	12:15:00	12:39:00	56	5
20-Feb-92	11:45:00	12:10:00	57	4
20-Feb-92	12:45:00	13:10:00	64	2
20-Feb-92	09:27:00	09:48:00	65	1
20-Feb-92	11:00:00	11:25:00	72	2
20-Feb-92	10:45:00	11:02:00	73	6
20-Feb-92	08:26:00	08:37:00	83	1.4
20-Feb-92	08:35:00	09:00:00	84	1.5
20-Feb-92	08:30:00	08:55:00	85	2
20-Feb-92	08:37:00	09:02:00	86	6
20-Feb-92	09:13:00	09:36:00	87	9.5
20-Feb-92	09:03:00	09:33:00	88	14
20-Feb-92	09:05:00	09:30:00	89	4.8
20-Feb-92	09:10:00	09:33:00	90	17.3
20-Feb-92	10:39:00	10:59:00	91	5.3
20-Feb-92	10:06:00	10:34:00	93	2.4
20-Feb-92	10:25:00	10:55:00	94	2.3
20-Feb-92	09:55:00	10:16:00	95	5
20-Feb-92	10:19:00	10:49:00	96	4.4
21-Feb-92	09:50:00	10:20:00	92	2.6
21-Feb-92	09:45:00	10:20:00	97	8
24-Feb-92	07:57:00	08:22:00	41	17
24-Feb-92	08:25:00	08:50:00	45	36

LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
SURVEY SUMMARY

24-Feb-92	07:30:00	07:55:00	49	15.3
24-Feb-92	08:05:00	08:40:00	62	7
24-Feb-92	07:30:00	08:05:00	63	6
25-Feb-92	06:40:00	07:05:00	34	14.7
25-Feb-92	08:00:00	08:27:00	35	27
25-Feb-92	08:05:00	08:40:00	36	7
25-Feb-92	09:00:00	09:30:00	37	7
25-Feb-92	07:07:00	07:32:00	38	6
25-Feb-92	06:50:00	07:25:00	42	19
25-Feb-92	07:25:00	08:00:00	43	7
25-Feb-92	08:20:00	08:45:00	48	2.8
25-Feb-92	08:52:00	09:18:00	53	1.1
25-Feb-92	08:28:00	08:47:00	54	1.2
25-Feb-92	08:50:00	09:27:00	71	2.8
27-Feb-92	10:41:00	11:21:00	100	1.3
27-Feb-92	11:00:00	11:27:00	101	3.3
27-Feb-92	13:31:00	13:57:00	102	2.7
27-Feb-92	08:15:00	08:45:00	39	2.3
27-Feb-92	07:12:00	07:33:00	40	7.4
27-Feb-92	08:10:00	08:47:00	61	36.3
27-Feb-92	14:45:00	15:15:00	66	30.1
27-Feb-92	14:31:00	14:57:00	74	33
27-Feb-92	13:15:00	13:45:00	80	6.4
27-Feb-92	10:05:00	10:45:00	99	47.2
28-Feb-92	08:30:00	09:00:00	58	23.6
28-Feb-92	07:49:00	08:09:00	98	19.6

LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
WIND SPEED DATA SUMMARY
FEBRUARY 1992

Sampling Date	AVERAGE-MPH												INSTANTANEOUS-MPH											
	Morning Hours - AM							Afternoon Hours - PM					Morning Hours - AM							Afternoon Hours - PM				
	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5
2/19/92				4	4	2	5	6	6	7	7					5	7	4	9	11	12	13	13	
2/20/92			4	2	3	4	4	4	4						7	3	4	7	6	7	8			
2/21/92					4	4											8	8						
2/24/92			4	7											8	12								
2/25/92		4	12	6	12									8	17	11	22							
2/27/92			3	3		5	9		6	4	4				4	4		8	17		10	6	8	
2/28/92			3	3											4	4								

NOTE:

1. Wind data taken from wind monitoring station located closest to grid. Surface gas sampling was not done during time periods when wind speed is not shown.

2. Instantaneous monitoring shall be terminated when the average wind speed exceeds fifteen (15) miles per hour or when the instantaneous wind speed exceeds twenty-five (25) miles per hour.

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
WIND SPEED DATA SUMMARY
FEBRUARY 1992

Sampling Date	AVERAGE-MPH												INSTANTANEOUS-MPH											
	Morning Hours - AM							Afternoon Hours - PM					Morning Hours - AM							Afternoon Hours - PM				
	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5
2/19/92								5	5											10	10			
2/20/92		3	3	1		3	3	4	4					5	6	2		5	5	7	7			
2/21/92			5	4	4										9	7	7							
2/24/92			4	4											7	6								
2/25/92		4	4											7	7									
2/26/92		7	6	8										12	10	17								
2/27/92		3	4	5	5	5	9	8	9	7				5	7	9	8	9	18	17	17	12		
2/28/92		2	2	3	1	5	5							3	3	4	2	9	9					

NOTE:

1. Wind data taken from wind monitoring station located closest to grid. Surface gas sampling was not done during time periods when wind speed is not shown.

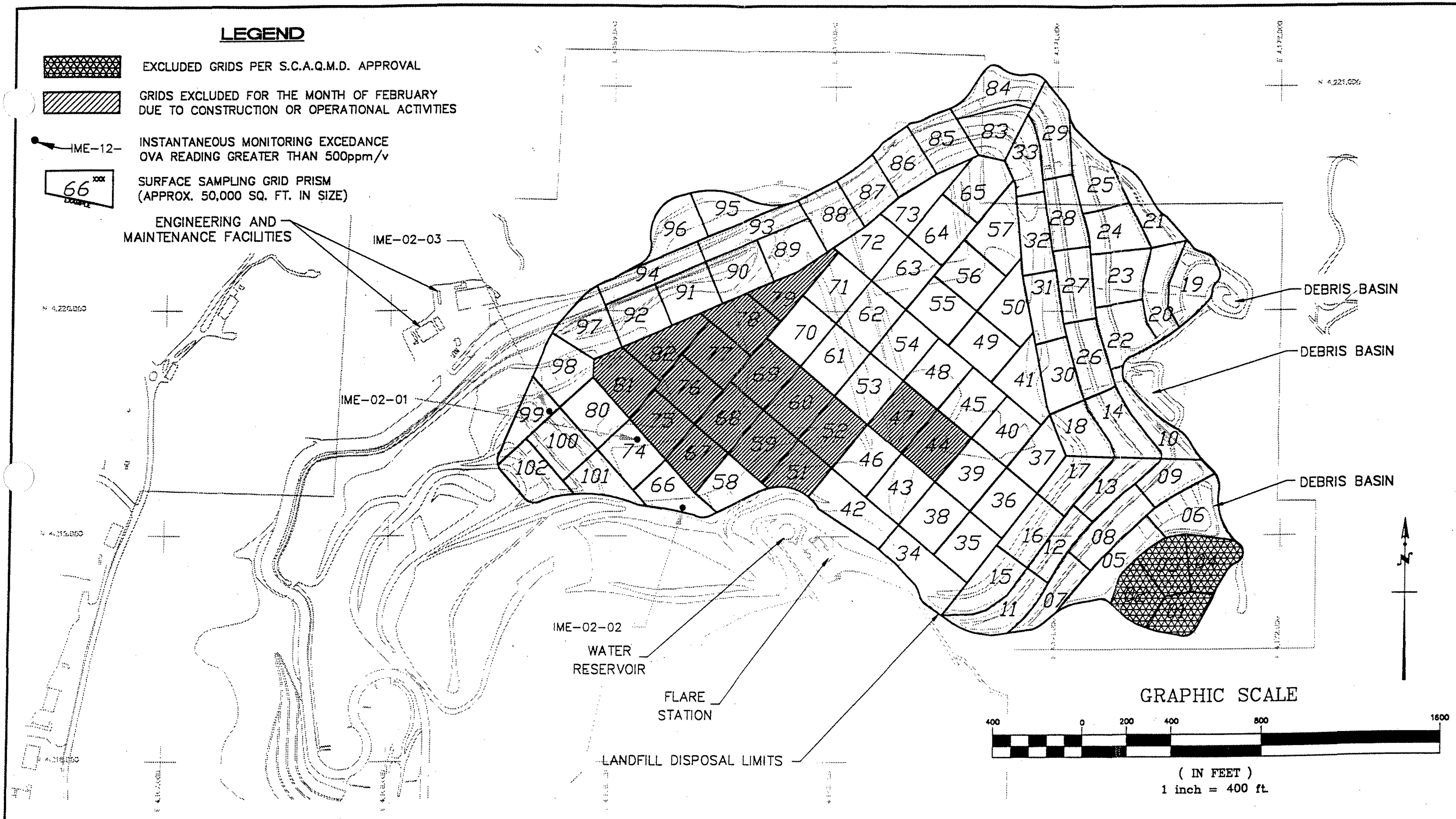
2. Integrated sampling shall be terminated when the average wind speed exceeds ten (10) miles per hour or when the instantaneous wind speed exceeds twenty (20) miles per hour.

3. Average reading is the average wind speed recorded for the sampling period. Instantaneous reading is the maximum wind speed recorded for the sampling period.

Form: LC - 042

LOPEZ CANYON LANDFILL
INSTANTANEOUS SURFACE EMISSIONS MONITORING
EXCEEDANCE SUMMARY

INITIAL INSPECTION REPORT						REPAIR		INITIAL RECHECK			10 DAY RECHECK		
RECORD NUMBER	DATE	TIME	GRID ID	INSPECTOR ID	CH_4 ppm/v	DATE	TIME	DATE	TIME	CH_4 ppm/v	DATE	TIME	CH_4 ppm/v
IME-02-02	27-Feb-92	14:45:00	66	MM	3000	28-Feb-92	08:00	28-Feb-92	09:05	4			
IME-02-01	27-Feb-92	14:31:00	74	EP	1000	28-Feb-92	01:30	28-Feb-92	13:40	8			
IME-02-03	27-Feb-92	10:05:00	99	MM	2200	28-Feb-92	10:00	28-Feb-92	13:30	100			



BAS (714)860-7777

BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE, WALNUT, CA. 91765

LOPEZ CANYON LANDFILL
INSTANTANEOUS MONITORING - FEBRUARY, 1992

JOB NO. 9201-127
DATE 2 / 1992
DRAWN BY: DAL
CHECKED BY: TEN

G:\DWG\LOPEZ\MONITOR\LPZ92B.DWG

APPENDIX H

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT LANDFILL GAS CONTROL

MONTHLY REPORT
FEBRUARY 1992

FOR

LOPEZ CANYON SANITARY LANDFILL

SUBMITTED TO

SCAQMD DIRECTORS

OF

ENGINEERING AND ENFORCEMENT

AND THE COMMUNITY MITIGATION

TASK FORCE

BY

BUREAU OF SANITATION
DEPARTMENT OF PUBLIC WORKS
CITY OF LOS ANGELES

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Page

I. EXECUTIVE SUMMARY

A. Monitoring

For the month of February, 1992, the Bureau was able to monitor eighty (80) of the established 102 grids following the instantaneous and integrated protocols. Eighteen (18) grids were temporarily excluded during February due to construction and trash disposal activities. A letter outlining the construction exclusion notification to SCAQMD and the Bureau is included in Tab XV.

Under the Integrated Landfill Surface Emission Sampling Program, two of the samples exceeded the maximum compliance level of 50 ppm/v of total organic compounds, measured as methane. The average methane reading of all integrated samples taken was 5.83 ppm/v CH_4. Further discussion of this program is set forth in Section II, A. and under Tab I.

In the month of February, 1992, under the Instantaneous Monitoring program the maximum compliance level of 500 ppm/v, measured as methane from any point on the landfill, was exceeded three (3) times. All three exceedances were found in the AB+ disposal area. As a mitigation measure, the Bureau has already scheduled eight (8) vertical wells to be placed in the AB+ area. Well installation will begin mid-April, 1992. The recorded exceedances averaged 2,067 ppm/v. Additional program information, including a summary of the exceedances along with locations, can be found in Section II, B and under Tab II.

The Ambient Air Sampling results for February indicate minimal emissions levels emanating from the landfill. The contaminant levels of the nine (9) samples taken were below the Los Angeles basin background level for all of the ten (10) compounds currently tested for at the SCAQMD Burbank Station. The methane levels as well were within background levels, as has been typical for the site.

B. Maintenance Actions

The landfill surface areas where exceedances occurred under the Instantaneous and Integrated Surface Emission Monitoring Program, as noted under Section I, A above, were repaired per the procedure stipulated in the Bureau's Revised Draft plan, submitted to the SCAQMD on August 30, 1991. All three of the instantaneous exceedances were successfully repaired according to the initial recheck. Both of the integrated exceedances were also repaired with the first attempt.

The ten-day recheck for January's grid #99 instantaneous exceedance was conducted on February 19, 1992. Results from the recheck, 70 ppm CH_4, verified that the area remained in compliance.

The instantaneous exceedance in grid #58 was eliminated on February 28,1992 with the completion of the horizontal interface well. The maximum OVA reading was 20 ppm CH_4. The ten day recheck for this exceedance is also scheduled for next month.

The 10-day recheck for all three exceedance found in February will carry over into the month of March. The details of the exceedances are explained in Section II,B.

The gas collection system and Flare Station are physically checked six (6) days a week to ensure the system is operating properly. The maintenance crew is particularly attentive to finding and repairing condensate blockages and header line breaks.

C. Changes in Operating Procedures

No changes in operating procedures were made in the month of February 1992.

The Bryan A. Stirrat and Associate (BAS) staff and subcontractor E & A Environmental Services (E&A) continue to support the Bureau in the SCAQMD Compliance activities.

D. New Facilities

The Bureau is planning an additional office facility/trailer for the occupancy of thirty employees at the landfill. Such a facility could also meet the current need for a classroom to conduct training classes for landfill employees, i.e., reorganizing existing space allocations.

E. New Equipment/Instruments

The Bureau is currently in the process of testing another Carbon Monoxide detection meter. This meter will help in the early detection of subsurface combustion.

In order to ensure that the weekly well reading schedule is safely maintained, the Bureau is currently in the process of obtaining two (2) four-wheel utility vehicles.

These vehicles will eliminate much of the physical exertion landfill technicians must undergo to complete the well monitoring regime while ensuring accurate and reliable data collection.

II. REVIEW AND ANALYSES OF COLLECTED DATA

A. Integrated Landfill Surface Emission Sampling

During February, 1992, Integrated Landfill Surface Emission Sampling was performed on eighty (80) of the grids. Two (2) of the grids had readings that exceeded the compliance level of 50 ppm/v of total organic compounds, measured as methane. The average methane reading of all samples taken was 5.83 ppm/v CH_4. The field "Sampling Summary" sheets are found under Tab I.

As required by Section 5.9 of Rule 1150.1, samples from grids, Grid #17, Grid #27, and Grid #35 were submitted to the laboratory for analyses. The field OVA readings were 1.7, 1.6, and 1.7 ppm/v respectively and the laboratory results were 2.1 ppm/v methane for Grid #17, 1.9 ppm/v for Grid #27, and 1.9 ppm/v for Grid #35. A copy of the laboratory results of the sampling, along with "Quality Control Data Sheets" and "Chain of Custody Record" can be found under Tab I.

In addition, samples from the two exceedances, Grids #99 and #101, were sent to the laboratory. The field readings were 50 ppm/v for grid #99 and 55 ppm/v for grid #101. The laboratory results indicated a level of 47 ppm/v for Grid #99 and 44 ppm/v for Grid #101. After repair, the grids were rechecked and showed field OVA readings of 25 ppm/v and 35 ppm/v respectively. Information on the exceedances can be found Under Tab I.

The integrated exceedance in grid #99 was indicative of the Instantaneous exceedance found earlier the same day. In the future the Bureau will attempt to eliminate this type of redundancy in order to obtain full benefit from each monitoring protocol.

A review of the February data shows that sixty-seven (67) of the eighty (80) sampled grids had a total organic compounds level of less than 10 ppm/v, measured as methane. A complete map of the grids with the associates methane levels is shown under Tab XX.

On July 15, 1991, the SCAQMD approved the grid layout submitted by the Bureau on June 27, 1991. Areas not accessible for monitoring as approved by the SCAQMD, included certain slope areas considered to be unsafe for the technician to traverse. An 11" x 17" map showing the location of the grids, can be found under Tab I.

A "Wind Data Summary" sheet showing the average wind speed during each sampling event, an "Exceedance Summary" sheet showing the grids that exceeded the compliance level and a "Field Report" monitoring the repair inspection are included under Tab I.

B. Instantaneous Landfill Surface Emission Monitoring

Instantaneous Landfill Surface Emission Monitoring of the disposal area was performed on eighty (80) of the grids during the month of February, 1992. The monitoring was accomplished pursuant to SCAQMD Rule 1150.1, Section 9.0 and the Bureau's Revised Draft Plan.

As shown in the summary table under Tab II, and as discussed in Section I, A above, the maximum established level of 500 ppm/v of methane at sampled points was exceeded three (3) times for the month of February. The location of each exceedance can be found on the Grid Map (Tab II). The recorded exceedances averaged 2,067 ppm/v. The cover in the exceedance areas was reworked and repaired.

Reinspection all three (3) of the February emission areas immediately after repairs resulted in readings below the 500 ppm/v maximum established level, averaging 37.3 ppm/v. The 10 day recheck for the three (3) exceedance areas will carry over into the month of March and will be documented in the next monthly report.

The instantaneous exceedance in Grid #58 has been eliminated. This exceedance originated in December 1992 and consisted of a crack which formed along the interface of the trash with the virgin slopes, with emission exceedances found along several areas of the crack (See the January 1992 Monthly Report). The Bureau was able to mitigate this exceedance through the installation of a horizontal interface well as described in the February 5, 1992 letter to the SCAQMD. The ten-day recheck for this area is scheduled for March 13, 1992.

A temporary program designed to locate possible emission producing fissures before they develop is in progress at the landfill. The fissure inspection map for the month of February is included under Tab XVII.

The monitoring procedures described in the Revised Draft Plan were implemented for the month of February. Each surface grid is traversed by the monitoring technician on a preset walking pattern and noting the OVA reading for each node on a 20 pace interval. The average of the OVA readings for each grid is recorded on the "Survey Summary" sheet. Although not required by the SCAQMD's regulations the grid average methane reading allows the landfill engineers to evaluate the gas collection system and make adjustments prior to the emissions level reaching 500 ppm. For the seventy-two (77) grids that did not have an exceedance, the average OVA methane concentration was 6.76 ppm/v. The three (3) grids that had the exceedances obviously had higher averages due to the high OVA reading that triggered the exceedance. Tab II includes a grid map of these average OVA readings.

A "Wind Data Summary" sheet showing the average wind speed during each monitoring event, an "Exceedance Summary" sheet showing the areas that exceeded the compliance level, "Survey Summary" sheets showing the average methane concentration for each grid and "Field Reports" stating field monitoring and repair inspection activities are included under Tab II.

C. Gas Perimeter Probes Monitoring

The gas perimeter probe monitoring was accomplished on February 6 and February 25, 1992 in accordance with the protocols described in the Revised Draft Plan. The Revised Draft Plan states each perimeter probe must be read at least once per month. Thirty-nine (39) of the perimeter probes had been monitored during the month of February. Probes #2 and #38 were not monitored due to damage.

The results of this monitoring, along with the "Quality Control Data Sheets", "Chain of Custody Records" and "Gas Perimeter Probes, Location Map", are found under Tab IV.

All perimeter probes were well under the compliance level of 5% methane; in fact, the Gas Tech readings were all 0% methane and the highest OVA reading for Total Organics was 62 ppm/v.

A sample from migration probes #27 and #34 were sent to Performance Analytical Inc. for analysis. The results were 3.7 ppm/v and 3.6 ppm/v for Total Non-Methane Organics (as methane), and 8.8 ppm/v and 2.4 ppm/v for methane respectively. A copy of the results can be found under Tab IV.

D. Gas Collection Indicator Probes Monitoring

On April 1, 1991, the SCAQMD responded to the Bureau's proposal to install nine (9) Gas Collection Indicator Probes (GCIP). In their response, the SCAQMD approved the locations and designated the depth of these multi-depth probes. In further verbal communication with SCAQMD, Perimeter Probe No. 33 was converted to the tenth GCIP, GCIP #9. The Bureau utilized the protocol described in the Revised Draft Plan for the February monitoring.

The monitoring results are being used as an additional tool in accessing the operation of the gas collection system. The "Probe Location Map" can be found under Tab V.

The GCIPs are designed and located only to give gas migration concentration immediately adjacent to the landfill. There are a total of thirty-four (34) multi-level probes installed at ten (10) separate locations. GCIP #9 has only one probe at level A, GCIPs #5, 6 and 7 each have three probes at levels A, B and C and the rest of the GCIP's each have four probes at levels A, B, C, and D.

Each probe was monitored three (3) times in the month of February. Pressure results from GCIP monitoring appear to be fluctuating.

An investigation is ongoing comparing barometric pressure with the pressure in the probe. This investigation will inform landfill personnel what affect atmospheric pressure has on the GCIPs and thus, helping to explain the fluctuations in pressure readings. The Bureau is in the process of forming a computer data base to better utilize the probes as a monitoring tool.

The "Monitoring Summary" tables, found under Tab V, gives the probe pressure and methane concentration for each probe from the monitoring events performed in February.

E. Ambient Air Sampling

The ambient air samples were collected and analyzed according to the protocols described in the Revised Draft Plan and pursuant to SCAQMD Rule 1150.1. Nine (9) 12-hour samples are normally taken from six (6) sampling location. One sampling station pulls a 12-hour bag sample for daytime drainage, two other stations pull a 12-hour bag sample for nighttimedrainage and the last three stations pull both a 12-hour daytime and nighttime bag sample. The sampling was accomplished on February 25 and 26, 1992.

"Ambient Air Samplers & Weather Stations, Location Map", "Wind Data Summary" showing average wind speed during the monitoring event, "Quality Control Data Sheets", "Chain of Custody Records" and Laboratory Results can be found under Tab VI.

All nine (9) samples were successfully obtained for the month of February. The average total hydrocarbons detected in the field samples was 2.25 ppm/v. This is slightly below the average to date of 2.79 ppm/v, see "Total Hydrocarbon Summary" under Tab VI.

As reported in the **January** 1992 Monthly Report, the ambient sample AA-3-1 showed readings above the basin average for Toluene, and higher then the usual average results for Total Xylene (no basin averages were available at the time of this report). This station in close proximity with Kagel Canyon Road, which is an additional possible source for these two toxins. The results from the February sampling from this ambient station show that the contaminant levels have returned to below basin averages.

Under the new protocols, bag samples are labeled as daytime or nighttime samples taken over a twelve (12) hour period, typically from about 10:00 to 10:00. Therefore, a difference in nighttime and daytime conditions can be observed for the three (3) stations that do both.

F. Gas Collection System [at Flare Station Blower] Monitoring

One sample of landfill gas was collected on February 10, 1992 from the positive pressure side of the gas collection system blower, located at the Flare Station, and submitted to the laboratory for analysis, pursuant to SCAQMD Rule 1150.1.

The "Quality Control Data Sheet", "Chain of Custody" and laboratory report can be found under Tab VII.

The "Flare Daily Log" found under Tab VII, give daily field monitoring data for Flare Station gas flow rates, gas field vacuum and gas oxygen and methane concentrations.

The laboratory analysis of the gas sample had gas concentrations by volume of: 39.32% Carbon Dioxide, 14.5% Nitrogen, 44.35% Methane, 1.83% Oxygen.

G. Gas Collection Wells Monitoring

The gas collection wells monitoring was performed according to the protocols described in the Revised Draft Plan. As of February 29, 1992, all gas wells had been monitored.

Currently, the gas collection system consists of: 42 "Deep" wells, 211 "Shallow" wells, 22 "Angle" wells, and 35 "Horizontal" well connections.

The monitoring results of the gas collection wells for the month of February, 1992, can be found under Tab VIII. Each monitoring event for each well is indicated in these results. These monitoring results were generated by the Lopez Canyon Landfill management information system (LCMIS) recently established. The computer calculated many new pertinent values to aid in the evaluation of the gas collection system. New columns include CH_4 Flow Rate (cfm), CH_4 Flow Rate to Vacuum Ratio, and Compost Ratio "R" Value. The CH_4 Flow Rate is the actual flow of methane produced by that well, the Flow Rate to Vacuum Ratio is a factor which enables the adjustor to compare the reading to historical data, and the "R" Value helps the adjustor to monitor potential landfill situations.

A "Disposal Areas - Location Map" of the landfill, showing the Disposal Areas in which gas wells have been installed, can be found under Tab VIII.

All gas wells have been monitored twice for the month of February.

A large scale map, titled "Well Location Map", can be found on the plastic sleeve under Tab XX.

Samples of the current well designation numbering key:

- 1BVW1 - Bench 1, Disposal Area "B", Vertical Well (Shallow) #1.
- 2AAW01 - Bench 2, Disposal Area "A", Angle Well #1.
- 7BDW3 - Bench 7, Disposal Area "B", Vertical Well (deep) #3.
- 1ABHW5 - Layer #1, Disposal Area "AB+", Horizontal Well #5.
- 6BHW4 - Bench 6, Disposal Area "B", Horizontal Well #4.
- ASVW1 - Disposal Area "A", South Perimeter Vertical Well (shallow) #1.
- ANVW1 - Disposal Area "A", North Perimeter Vertical Well (shallow) #1.
- IT3-V4 - Initial Disposal Area, IT3 Header, Vertical Well (shallow) #4.
- IT3-D4 - Initial Disposal Area, IT3 Header, Vertical Well (deep) #4.
- 3ABVW2 - Bench 3, Disposal Area "AB+", Vertical Well (shallow) #2.
- 4ABDW3 - Bench 4, Disposal Area "AB+", Vertical Well (deep) #3.

Well adjustments are made by the monitoring crew when monitoring results fall outside of the normal operating criteria.

If a gas well has positive pressure and/or high methane concentration with very low oxygen content, the throttling valve is opened to a predetermined vacuum or flow rate. If a gas well has high temperature and/or high oxygen concentration and low methane concentration, the throttling valve is closed to a predetermined lower settling. The above general parameters have been implemented to reduce high temperatures, high oxygen content, and positive vacuum at individual wellheads. The resulting well adjustment vacuums are given in the final vacuum column of the "Average Gas Well readings" table.

The operating criteria for individual wells is dependent on such variables as well depth, amount of refuse influenced, refuse composition and age, etc. The wells will be analyzed, both individually and as a group, over a continuing time period to incrementally improve the effectiveness of the gas collection system and thereby reduce the gaseous emissions from the landfill.

A gas well adjustment manual is currently in the review stages at the Bureau. This document will enable the landfill technicians to do many of the minor adjustments in the field. This procedure will reduce the response time for adjustments creating a more efficient gas collection system.

H. Flare Source Testing

The source test for the Flare Station was completed July 29 through 31, 1991 by Sierra Environmental. Results of the test were transmitted to the SCAQMD on September 27, 1991.

I. Monitoring Delays

The annotative calendar for February 1992, which appears on Page 10, provides information for monitoring delays caused by rain and wind.

A "Weather Report Form" is maintained on a daily basis and provides a summary of wind and rainfall for each day of operations. These forms are on file at the landfill and are available to District personnel upon request.

Lopez Canyon Landfill
Monitoring and Construction Delays
February 1992

MONITORING						
M	**T**	**W**	**TH**	**F**	**SA**	**SU**
					1	2
3 W	4	5 W	6 R	7 R	8 N	9 N
10 R	11 R	12 R	13 R	14 R	15 N	16 N
17 H	18	19	20	21	22 N	23 N
24 W	25 W	26 W	27	28	29 N	

KEY: W - wind delay in monitoring
R - rain delay in monitoring
N - no monitoring
E - equipment calibration delay
H - holiday

III. REVISED DRAFT PLAN FOR LANDFILL INSPECTION, REPAIR AND MAINTENANCE PROCEDURES

A. Status

On August 30, 1991, the Bureau submitted the Revised Draft Plan to the District. The Bureau has implemented the protocols described in the Plan during February. Comments were received by the SCAQMD on the Draft Plan in a January 30, 1992 letter to the Bureau (Tab XVI). These comments are currently being reviewed.

The Bureau has developed a computerized database for the storage, analyses and reporting of monitoring activities defined within the Revised Draft Plan. This database, referred to as the Lopez Canyon Landfill Management Information System (LCLMIS) will be used to generate the monitoring forms and reproduce required reports, as specified in each section of Revised Draft Plan. Actual input of monitoring data began in October, 1991.

In February, the LCLMIS output was used to create many of the monitoring shown in this report summaries.

IV. AVAILABILITY AND MAINTENANCE OF EQUIPMENT

A. Equipment/Instruments Available and On Order

The status as of February 29, 1991 of the instruments and related equipment at the landfill is as follows:

- Organic Vapor Analyzers, manufactured by the Foxboro Company:

Model	Operational	Under Repair	On Order
OVA 108	11	0	0
OVA 128	3	0	0

- Portable Gas Indicators, manufactured by GASTECH, Inc.:

Model	Operational	Under Repair	On Order
NP-204 (Natural Gas)	6	1	0
XP-204 (Oxygen)	5	0	0
GX-82	5	1	0

- Digital Thermometers, manufactured by Cole Parmer:

Model	Operational	Under Repair	On Order
8525-42	4	1	12 (3 defective)

- Magnahelic Gauges, manufactured by Dwyer:

Model	Operational	Under Repair	On Order
0-1"	4	0	0
0-10"	3	1	0
0-100"	3	0	0

- Kurz Velocity Meters, Manufactured by Kurz Co:

Model	Operational	Under Repair	On Order
1440	4	0	0

- Integrated Surface Samplers, (five operational) recently assembled by the Bureau with newly specified equipment per recommendations found in the "Guidelines for Implementation of Rule 1150.1" published by the SCAQMD October 1985, Revised May 1987 and October 1989. During October, the diaphragms on one sampler was replaced.

- Ambient Air Samplers, (nine operational) six assembled by the Bureau per recommendations found in the "Guidelines for Implementation of Rule 1150.1" published by the SCAQMD, October 1985, and five were purchased.

- Wind sensors, (three operational) Climatronics F460 Utility Wind System, measures both wind speed and wind direction.

B. Repair and Maintenance Summary

As noted above, several instruments were under or in need of repair during the month of February, 1992. Records/data on instrument calibrations and repairs are maintained at the landfill and are available to District personnel upon request.

Routine maintenance and calibration was performed on all of the OVA's. The OVA's are recalibrated whenever a calibration check exceeds the 20% +/- factor. Nine (9) OVA's were sent in for repair and returned during February.

On a daily basis, the working Gastech NP-204's and XP-204 are checked, calibrated and maintained.

C. Operational Problems

Landfill technicians continue to fill-out a "Notification Sheet" whenever an operational problem occurs, i.e., an instrument malfunction. These sheets are kept on file at the landfill, and are available to District personnel upon request.

V. CONSTRUCTION PROGRAM

A. Gas Collection Wells

1. Proposed Wells

The current trash lifts in Disposal Area AB+ will be at design elevation in mid-January. The schedule is dependent on the amount of incoming refuse. After the lifts are completed, the installation of the second layer of horizontal wells will continue.

2. New Wells Installed

Two (2) horizontal wells were installed in the month of February

A horizontal well was installed in Grid #58 along the interface to mitigate instantaneous exceedances.

Testing is in progress on the ten (10) test wells installed in December 1991.

B. Gas Collection Headers

No header expansion for the month of February.

C. Flare Station Expansion

On February 1, 1991, the Bureau submitted to the SCAQMD an application for Permit to Construct five additional flares and to increase the landfill gas flow rate to a proposed 8,750 SCFM. This permit was issued to the Bureau by the SCAQMD on August 28, 1991.

Phase II of the expansion will increase the permitted flow rate to 8,750 scfm with the addition of four (4) more flares, two (2) more blowers and a Pego filter. The engineering design for the expansion is complete.
Plans and specifications have been advertised for bid. A prebid meeting was held November 26, 1991. The bids were received and are in review.

VI. COVER MAINTENANCE

A. Hydromulching and Hydroseeding

The Bureau hydroseeded all the exterior slopes of the landfill's disposal areas during October. This hydroseeding is intended to stabilize the soil as well as improve the aesthetics of the site.

B. Surface Areas Maintained

Landscaping maintenance continued during February 1992.

C. Irrigation System

Construction continued on the irrigation system for Disposal Areas A & B during the month of February 1992.

VII. FLARE STATION

A. Operational Data

The Flare Station was operated within/at the following limits during February, 1992:

- Methane Content Range: 40 to 47% @ 4,400 scfm
- Flow Rate Range: 4400 scfm
- Number of Flares: 4 flares operating

Additional details on Flare Station operating data may be found in the Flare Daily Log, under Tab VII.

B. Times Off Line

Date	Off Time	On Time	Reason
2/03/92	15:15	15:35	Maintenance
2/04/92	12:00	12:10	Maintenance
2/04/92	17:00	17:10	High winds
2/06/92	17:00	17:15	Power failure
2/09/92	22:50	23:39	High winds
2/10/92	9:00	9:15	Rain & winds
2/10/92	12:00	12:15	Rain & winds
2/10/92	13:15	13:25	Power failure
2/10/92	16:00	16:15	Power failure
2/10/92	19:30	19:40	Rain & winds
2/10/92	23:05	23:20	Rain & winds
2/12/92	10:20	10:35	Power failure

Total time Flare Station was shut down = 3.31 Hours

C. Operation Modifications

Based on Source Testing results, the set temperature for the flares was lowered from 1600 to 1570 degrees Fahrenheit.

VIII. HOT LINE REPORT

During the month of February, 1992, two (2) telephone call were received on the Hot Line.

A. Odors

No calls were received during the month of February relative to odors.

B. Noise

No calls were received during the month of February relative to noise.

C. Debris

No calls were received during the month of February relative to debris.

D. Visual

No calls were received during the month of February relative to dust or other visual complaints.

E. Other

Two phone calls were received during the month of February relative to the rainfall capacity of the debris basins. The callers were assured that the debris basins were functioning per design.

IX. SUBMITTALS

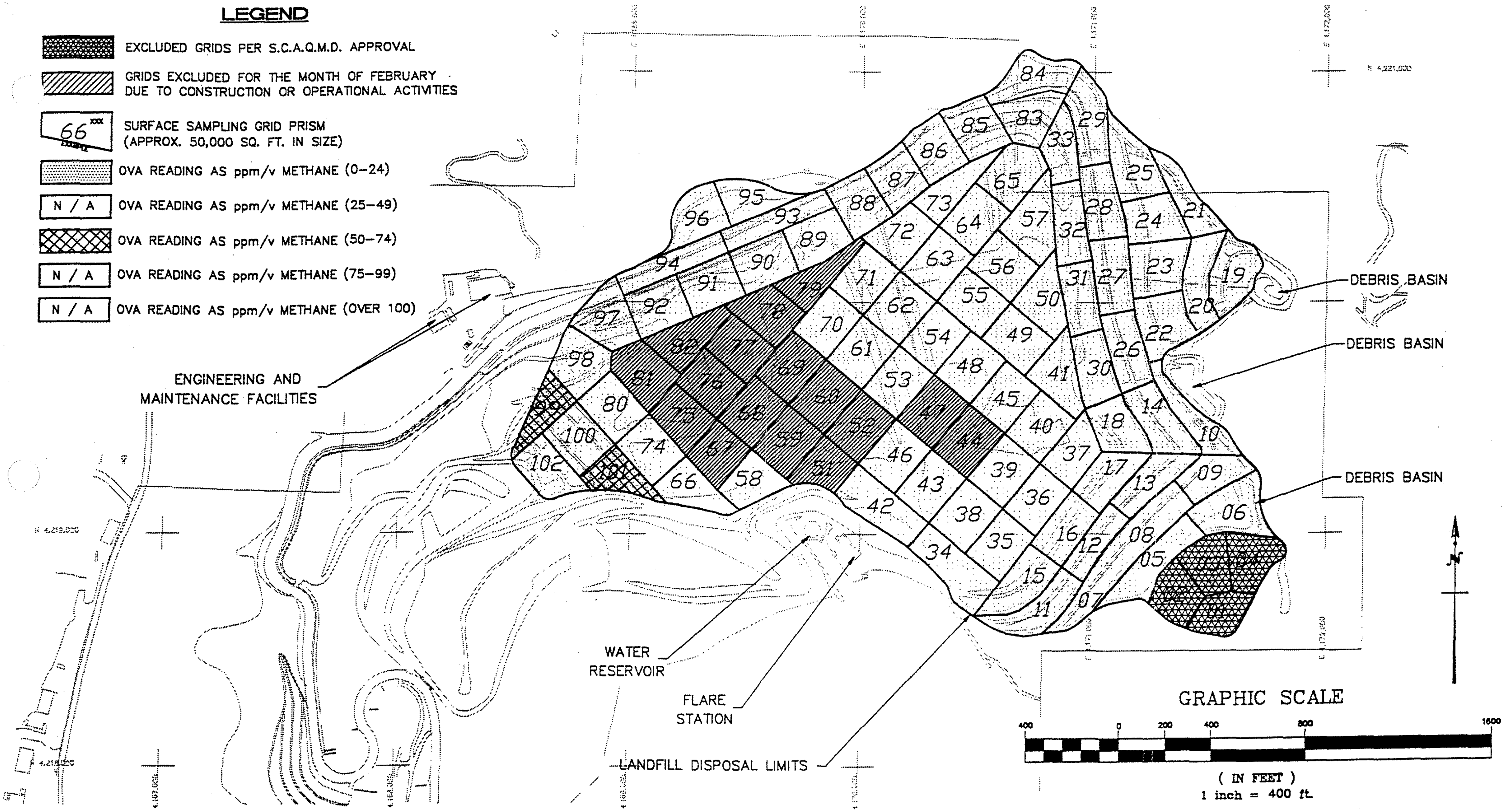
Field data sheets for designated monitoring programs continue to be submitted in this report under Tabs I, II, III, IV, V, VI, VII and VIII and are identified in the Table of Contents by a prefix notation "•". Various other submittals are also included under Tabs identified in the Table of Contents and, where appropriate, in the foregoing text of this report. Prints of a map showing all current integrated surface monitoring grids can be found in a plastic sleeve under Tab XX. Correspondence that occurred relative to the landfill can be found under Tabs XV and XVI.

INTEGRATED LANDFILL SURFACE EMISSION SAMPLING RESULTS

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE EMISSIONS SAMPLING
EXCEEDANCES REPAIR SUMMARY

INITIAL INSPECTION REPORT						REPAIR		RECHECK		
RECORD NUMBER	DATE	TIME	GRID ID	INSPECTOR ID	CH_4 ppm/v	DATE	TIME	DATE	TIME	CH_4 ppm/v
ISE-02-2	28-Feb-92	0808	101	HA	55	28-Feb-92	15:00	28-Feb-92	17:50	25
ISE-02-1	28-Feb-92	0722	99	HA	50	28-Feb-92	14:30	28-Feb-92	17:50	35

Revision: September 5, 1991 Form: LC - 017



BAS (714)860-7777 BRYAN A. STIRRAT & ASSOCIATES CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE, WALNUT, CA. 91765	LOPEZ CANYON LANDFILL INTEGRATED SAMPLING - FEBRUARY, 1992	JOB NO. 9201-127 DATE 2 / 1992 DRAWN BY: DAL CHECKED BY: TEN

G:\DWG\LOPEZ\MONITOR\LPZ92B.DWG

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE SAMPLING SUMMARY

DATE SAMPLED	GRID ID	METHANE (ppm/v)	SUBMITTED FOR ANALYSIS	REMARKS
21-Feb-92	83	1.5	N	
21-Feb-92	84	1.5	N	
21-Feb-92	89	2.5	N	
21-Feb-92	90	6	N	
21-Feb-92	91	2.5	N	
21-Feb-92	92	3	N	
24-Feb-92	19	1.5	N	
24-Feb-92	20	2	N	
24-Feb-92	21	3.5	N	
24-Feb-92	23	1.5	N	
25-Feb-92	10	2	N	
25-Feb-92	14	1.8	N	
26-Feb-92	13	1.6	N	
26-Feb-92	17	1.7	Y	
26-Feb-92	18	1.6	N	
26-Feb-92	27	1.6	Y	
26-Feb-92	34	2	N	
26-Feb-92	35	1.7	Y	
27-Feb-92	11	1.5	N	
27-Feb-92	12	1.3	N	
27-Feb-92	15	1.3	N	
27-Feb-92	16	1.3	N	
27-Feb-92	22	1.3	N	

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE SAMPLING SUMMARY

DATE SAMPLED	GRID ID	METHANE (ppm/v)	SUBMITTED FOR ANALYSIS	REMARKS
27-Feb-92	24	1.3	N	
27-Feb-92	25	3	N	
27-Feb-92	26	1.3	N	
27-Feb-92	28	1.4	N	
27-Feb-92	29	2	N	
27-Feb-92	36	2	N	
27-Feb-92	37	2.5	N	
27-Feb-92	38	2	N	
27-Feb-92	39	2.5	N	
27-Feb-92	42	3.5	N	
27-Feb-92	43	2.8	N	
27-Feb-92	5	1.3	N	
27-Feb-92	53	4.2	N	
27-Feb-92	6	1.3	N	
27-Feb-92	61	16	N	
27-Feb-92	62	1.6	N	
27-Feb-92	7	1.2	N	
27-Feb-92	71	1.8	N	
27-Feb-92	8	1.2	N	
27-Feb-92	87	11	N	
27-Feb-92	88	11	N	
27-Feb-92	9	1.6	N	
27-Feb-92	97	3	N	

LOPEZ CANYON LANDFILL
INTEGRATED SURFACE SAMPLING SUMMARY

DATE SAMPLED	GRID ID	METHANE (ppm/v)	SUBMITTED FOR ANALYSIS	REMARKS
19-Feb-92	85	16	N	
19-Feb-92	86	16	N	
19-Feb-92	93	15	N	
19-Feb-92	94	14	N	
19-Feb-92	95	14	N	
19-Feb-92	96	20	N	
20-Feb-92	41	2.5	N	
20-Feb-92	45	3	N	
20-Feb-92	48	5.5	N	
20-Feb-92	49	2.5	N	
20-Feb-92	50	2.5	N	
20-Feb-92	54	1.8	N	
20-Feb-92	55	2	N	
20-Feb-92	56	2	N	
20-Feb-92	57	2	N	
20-Feb-92	63	2.5	N	
20-Feb-92	64	2.5	N	
20-Feb-92	65	2.2	N	
20-Feb-92	72	2.5	N	
20-Feb-92	73	4	N	
21-Feb-92	30	1.5	N	
21-Feb-92	31	2	N	
21-Feb-92	32	1.5	N	
21-Feb-92	33	1.5	N	

MAINTENANCE AND REPAIR OF LANDFILL COVER

#100

INSTANTANEOUS MONITORING FIELD REPORT
FOR READINGS GREATER THAN 500 ppm/v

DATE OF ORIGINAL REPORT: 2-27-92

RECORD NUMBER: 02-01

INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT				INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RECHECK				10 DAY RECHECK [2]			
DATE	TIME	GRID ID	DESCRIPTION	INSPECTOR	VALUE[3] (ppm/v)	SOIL	WATER	OTHER	CREW	DATE	TIME	DATE	TIME	GRID ID	VALUE (ppm/v)	DATE	TIME	GRID ID	VALUE (ppm/v)
2-27-92	1435	74	Pit basin by The Red Bldg	EP	1000	✓	✓	Rework Area	RB	2-28	130	2-28	1340	74	8				

1. Walking in the crack is assumed to be part of all repairs except those in concrete, gunite or asphalt surface; or when a well field adjustment is required.
2. The ten day re-check procedure is to monitor within ten days if the recheck is below 500 ppm.
3. This is the original measured value that initiate the repair effort. It is entered only once by the monitoring inspector. Repairs extending beyond 24 hours do not start with the recheck value. Instantaneous readings measured as methane.

INSTANTANEOUS MONITORING FIELD REPORT
FOR READINGS GREATER THAN 500 ppm/v

DATE OF ORIGINAL REPORT:

RECORD NUMBER: JML [illegible] [illegible]

#99

INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT				INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RECHECK				10 DAY RECHECK [2]			
DATE	TIME	GRID ID	DESCRIPTION	INSPECTOR	VALUE[3] (ppm/v)	SOIL	WATER	OTHER	CREW	DATE	TIME	DATE	TIME	GRID ID	VALUE (ppm/v)	DATE	TIME	GRID ID	VALUE (ppm/v)
2/20/02	[illegible]	99		[illegible]	[illegible]	✓	✓	Rework	BB	2-28	10⁰⁰	2-28	13:30	99	100				

1. Walking in the crack is assumed to be part of all repairs except those in concrete, gunite or asphalt surface; or when a well field adjustment is required.
2. The ten day re-check procedure is to monitor within ten days if the recheck is below 500 ppm.
3. This is the original measured value that initiate the repair effort. It is entered only once by the monitoring inspector. Repairs extending beyond 24 hours do not start with the recheck value. Instantaneous readings measured as methane.

Revised: September 5, 1991

Form: LC-003

#98

INSTANTANEOUS MONITORING FIELD REPORT
FOR READINGS GREATER THAN 500 ppm/v

DATE OF ORIGINAL REPORT: 2-27-92

RECORD NUMBER: 02-02

INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT				INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RECHECK				10 DAY RECHECK [2]			
DATE	TIME	GRID ID	DESCRIPTION	INSPECTOR	VALUE[3] (ppm/v)	SOIL	WATER	OTHER	CREW	DATE	TIME	DATE	TIME	GRID ID	VALUE (ppm/v)	DATE	TIME	GRID ID	VALUE (ppm/v)
2-27-92	1500	66	by Interface Red Flag!	MM	3000	✓	✓	Rework Area	RB.	2-28	8:00 AM	2-28	9:05	66	4				

1. Walking in the crack is assumed to be part of all repairs except those in concrete, gunite or asphalt surface; or when a well field adjustment is required.

2. The ten day re-check procedure is to monitor within ten days if the recheck is below 500 ppm.

3. This is the original measured value that initiate the repair effort. It is entered only once by the monitoring inspector. Repairs extending beyond 24 hours do not start with the recheck value. Instantaneous readings measured as methane.

Copies

INTEGRATED SURFACE EMISSIONS SAMPLING FIELD REPORT
FOR READINGS GREATER THAN 50 ppm/v
DATE OF ORIGINAL REPORT: 2/28/92
RECORD NUMBER: 188-2-1

1SE02-01

INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RECHECK			
DATE	TIME	GRID ID	DESCRIPTION	INSPECTOR	VALUE[2] (ppm/v)	SOIL	WATER	OTHER	CREW	DATE	TIME	DATE	TIME	GRID ID	VALUE (ppm/v)
2/28/92	1243	99	ABt	Horatio A.	50ppm	/	/	Rework area	BB/	2/28/92	14:30	2/28/92	1750	99	35

1. Walking in a crack is assumed to be part of all repairs except those in concrete, gunite or asphalt surface; or when a well field adjustment is required.

2. Original measured methane concentration that initiates the repair effort. It is entered only once by the monitoring inspector. Integrated readings measured as methane.

INTEGRATED SURFACE EMISSIONS SAMPLING FIELD REPORT
FOR READINGS GREATER THAN 50 ppm/v
DATE OF ORIGINAL REPORT: 2/28/92
RECORD NUMBER: ISE-2-2

ISE 02-02

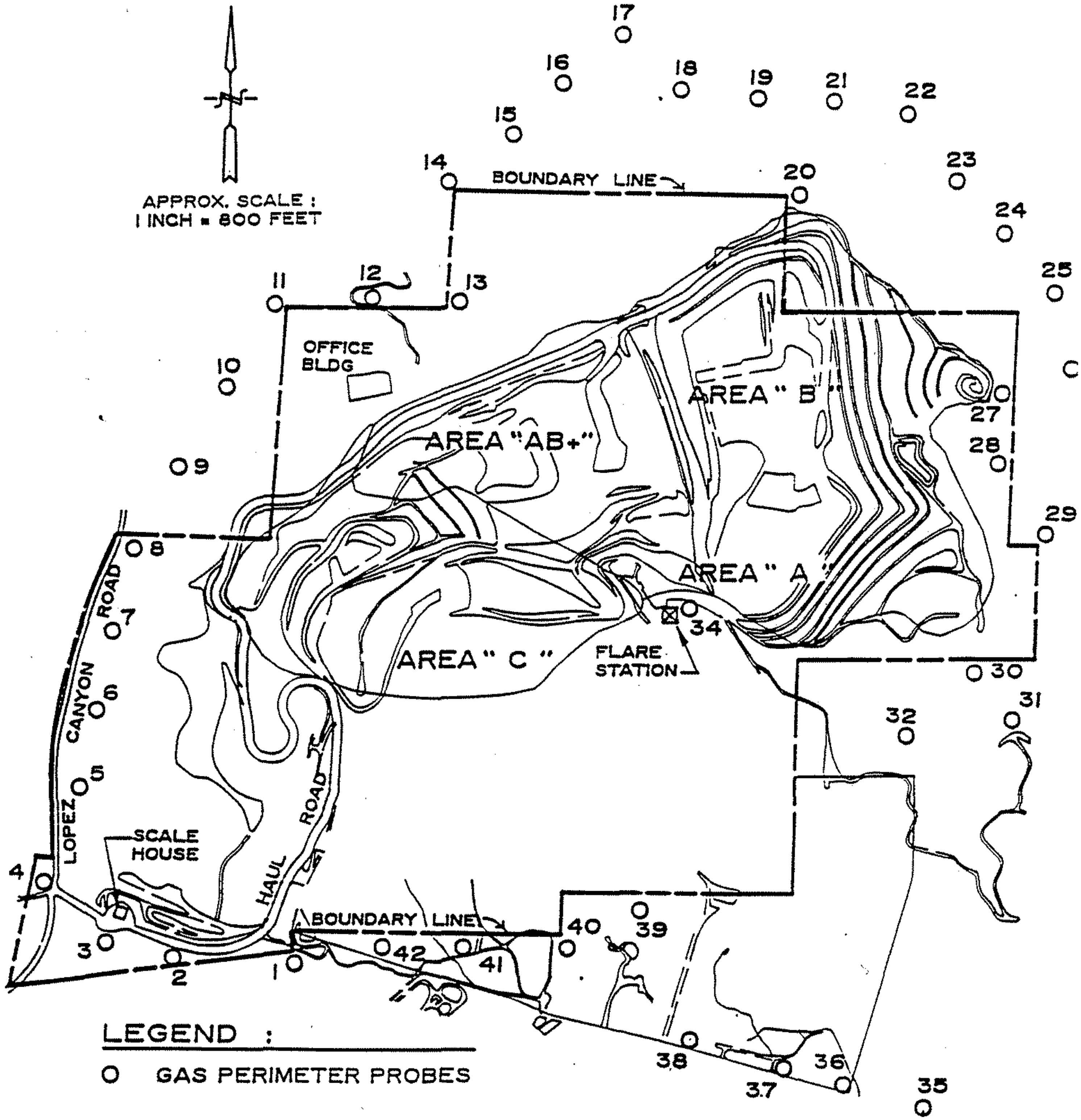
INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RECHECK			
DATE	TIME	GRID ID	DESCRIPTION	INSPECTOR	VALUE[2] (ppm/v)	SOIL	WATER	OTHER	CREW	DATE	TIME	DATE	TIME	GRID ID	VALUE (ppm/v)
2/28/92	1244	101	ABt	HORATIO·A·	55 ppm	✓	✓	[illegible] AREA	B13/	2/28/92	1500	2/28/92	1750	101	25

1. Walking in a crack is assumed to be part of all repairs except those in concrete, gunite or asphalt surface; or when a well field adjustment is required.

2. Original measured methane concentration that initiates the repair effort. It is entered only once by the monitoring inspector. Integrated readings measured as methane.

GAS PERIMETER PROBE
MONITORING RESULTS

LOPEZ CANYON LANDFILL
GAS PERIMETER PROBES
LOCATION MAP



LEGEND :

O GAS PERIMETER PROBES

REVISED 8\30\91

LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE MONITORING SUMMARY

DATE	PROBE ID	METHANE (ppm)	METHANE (percent)	SAMPLE SENT TO LAB?
06-Feb-92	04	3		N
06-Feb-92	05	11		N
06-Feb-92	06	18		N
06-Feb-92	07	5		N
06-Feb-92	08	11		N
06-Feb-92	09	8		N
06-Feb-92	10	6		N
06-Feb-92	14	6		N
06-Feb-92	15	5		N
06-Feb-92	16	62		N
06-Feb-92	17	8		N
06-Feb-92	18	6		N
06-Feb-92	19	10		N
06-Feb-92	20	9		N
06-Feb-92	21	11		N
06-Feb-92	22	6		N
06-Feb-92	23	8		N
06-Feb-92	24	5		N
06-Feb-92	25	8		N
06-Feb-92	26	6		N
06-Feb-92	35	5		N
06-Feb-92	36	4		N
06-Feb-92	37	2		N

LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE MONITORING SUMMARY

DATE	PROBE ID	METHANE (ppm)	METHANE (percent)	SAMPLE SENT TO LAB?
06-Feb-92	39	2		N
25-Feb-92	01	7		N
25-Feb-92	02			DAMAGED
25-Feb-92	03	2		N
25-Feb-92	11	3		N
25-Feb-92	12	2.5		N
25-Feb-92	13	2.5		N
25-Feb-92	27	9		Y
25-Feb-92	28	1.5		N
25-Feb-92	29	1.5		N
25-Feb-92	30	3		N
25-Feb-92	31	1		N
25-Feb-92	32	2.5		N
25-Feb-92	34	8		Y
25-Feb-92	38			DAMAGED
25-Feb-92	40	1.5		N
25-Feb-92	41	2		N
25-Feb-92	42	2		N

LOPEZ CANYON LANDFILL
GAS PERIMETER PROBE SAMPLING
QUALITY CONTROL DATA SHEET

Date: 26-Feb-92 Inspector: GV

Probe ID	Sample ID	Bag No.	Flow Rate (cc/min)	Start Time	Stop Time	Sample Volume (Liters)	Methane (ppm)	Methane (%)
27	GP-27-2	201	.50	0822	0842	10.0	6	
34	GP-34-1	203	.33	0910	0930	10.0	4	

LOPEZ CANYON LANDFILL

#3971

CHAIN OF CUSTODY RECORD

Field Log Book
Reference No. GP-02.

ACTIVITY: GAS PERIMETER PROBE

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks
✓ GP-27-1	201	10L	2-26-92	0842	GPP						9200853
✓ GP-34-1	203	7L	2-26-92	0930	GPP						9200854

Total No. of Samples Shipped: 2

Total No. of Containers Shipped: 14

Special Instructions:

SAMPLED BY: (SIGN) Barry Villalobos / [signature] / /

RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)
Greg Newborn	2	3	4
DATE/TIME 2/26) 1250	DATE/TIME (/)	DATE/TIME (/)	DATE/TIME (/)

COURIER (NAME)	SHIPPING NUMBER	SHIPPED BY (SIGN)	DATE/TIME
GREG NEWBORN			(/

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME
PERFORMANCE ANALYTICAL	J. Carter	2/26 / 1250

Revised: August 24, 1991

Form: LC-

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &

TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
GP-34-1 (203)	9200854	2.4	3.6
GP-34-1 (203)	LAB DUPLICATE	2.3	4.1
N/A (02/27/92)	METHOD BLANK	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
GP-34-1 (203)	9200854	27000	ND < 100	770000	200000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: GP-34-1 (203) (02/26/92) (09:30)

PAI Sample ID: 9200854

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	27	10	7.7	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	21	10	3.9	1.8
71-43-2	BENZENE	6.6 TR	10	2.1 TR	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	6.2 TR	10	1.2 TR	1.9
108-88-3	TOLUENE	190	10	52	2.7
12-18-4	TETRACHLOROETHENE	10	10	1.6	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	200	10	45	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	66	10	11	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &

TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
GP-27-1 (201)	9200853	8.8	3.7
N/A (02/27/92)	METHOD BLANK	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
GP-27-1 (201)	9200853	130000	ND < 100	760000	110000
GP-27-1 (201)	LAB DUPLICATE	140000	ND < 100	760000	110000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: GP-27-1 (201) (02/26/92) (08:42)

PAI Sample ID: 9200853

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92
Volume Analyzed: 1.00 Liter

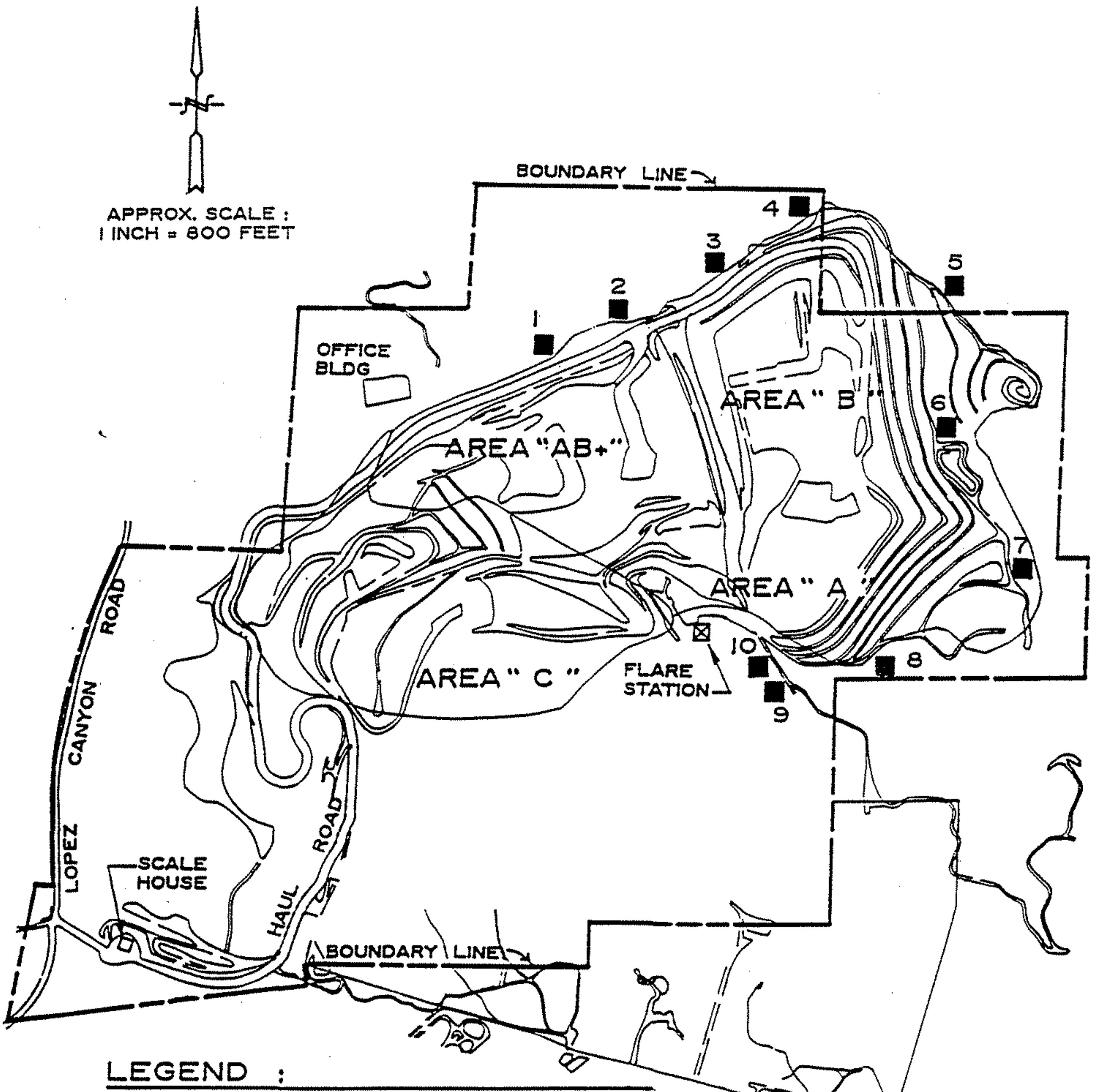
CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	36	10	11	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	24	10	4.5	1.9
108-88-3	TOLUENE	480	10	130	2.7
12-18-4	TETRACHLOROETHENE	24	10	3.6	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	380	10	88	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	180	10	30	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

GAS COLLECTION INDICATOR PROBE MONITORING

LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBES
LOCATION MAP



LEGEND :

■ GAS COLLECTION INDICATOR PROBES

REVISED 8\30\91

LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE MONITORING

Date:	Inspectors:	Instrument(ppm)-S/No.:	Instrument(%)-S/No.:
2-18-92	GN	A21338	0157N
		Instrument(ppm)-M/No.: OVA-108	Instrument(%)-M/No.: NP-204

Temperature @ Start: 54°F
Temperature @ End: 68°F

Weather: CLEAR

Legend: T = Trace, W = Water, D = Destroyed, -1 = no reading taken

GCIP #	Depth (ft)	Time	Barometric Pressure	Pressure (in. of H_2O)	TOC (ppm)	Methane (%)	Background (PPM)	Remarks
1A	7'-11'	0808	30.13	0.0	0.0	—	1.9	—
1B	17'-41'	0812		0.0	10.0	—	1.9	—
1C	47'-61'	0814		0.0	200.0	—	1.9	—
1D	67'-81'	0816		0.0	—	1.2	1.9	—
2A	7'-11'	0821	30.13	0.0	0.0	—	2.5	—
2B	17'-26'	0824		0.05	0.0	—	2.5	—
2C	32'-51'	0827		0.10	12.0	—	2.5	—
2D	57'-101'	0830		0.15	—	17.0	2.5	—
3A	7'-11'	0835	30.13	0.0	—	58.0	4.5	—
3B	17'-26'	0839		0.0	—	58.0	4.5	—
3C	32'-51'	0842		+.10	—	58.0	4.5	—
3D	57'-101'	0843		+.80	—	58.0	4.5	—
4A	7'-11'	0846	30.13	0.0	1500	—	2.5	—
4B	17'-36'	0848		0.0	—	56.0	2.5	—
4C	42'-71'	0852		0.0	—	56.0	2.5	—
4D	77'-101'	0855		0.0	—	56.0	2.5	—

LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE MONITORING

GCIP #	Depth (ft)	Time	Barometric Pressure	Pressure (in. of H_2O)	Total Organics (PPM)	Methane (%)	Background (PPM)	Remarks
5A	7'-11'	0922	30.13	-0.3	—	48.0	2.0	
5B	17'-26'		30.13	-0.3	—	51.0	2.0	
5C	32'-51'		30.13	-0.2	—	52.0	2.0	
6A	7'-11'	0933	30.13	-0.2	80.0	—	2.0	Flamed OVA out
6B	17'-26'		30.13	-0.2	—	14.0	2.0	
6C	32'-51'		30.13	-0.1	—	35.0	2.0	
7A	7'-11'	0940	30.13	-0.2	—	1.0	3.0	
7B	17'-26'		30.13	-0.1	7.0	—	3.0	
7C	32'-51'		30.13	-0.1	12.0	—	3.0	
8A	7'-11'	0949	30.13	-0.2	—	45.0	4.0	
8B	17'-36'		30.13	-0.2	—	46.0	4.0	
8C	42'-71'		30.13	0	—	53.0	4.0	
8D	77'-		30.13	0	—	54.0	4.0	
9A	3'-7'	0955	30.13	-0.1	—	26.0	2.0	
10A	7'-11'	0959	30.13	-0.1	—	20.0	2.5	
10B	17'-36'		30.13	-0.2	40.0	—	2.5	
10C	42'-71'		30.13	0	—	45.0	2.5	
10D	77'-		30.13	0	—	49.0	2.5	

LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE MONITORING

Date: 2/3/92	Inspectors: G. V. H. A.	Instrument(ppm)-S/No.: AZ1021 Instrument(ppm)-M/No.: OVA-108	Instrument(%)-S/No.: 0548N Instrument(%)-M/No.: NP204

Temperature @ Start: 62 Temperature @ End:	Weather: SANTA ANA CONDITIONS.	Legend:	T = Trace W = Water	D = Destroyed -1 = no reading taken

GCIP #	Depth (ft)	Time	Barometric Pressure	Pressure (in. of H_20)	TOC (ppm)	Methane (%)	Background (PPM)	Remarks
1A	7'-11'	0838		-0.02	10.0		18 ppm	
1B	17'-41'	0839		-0.04	14.0		18 ppm	
1C	47'-61'	0840		-0.08	200.0		18 ppm	
1D	67'-81'	0842		-0.10	35.0		18 ppm	
2A	7'-11'	0854		-.10	4.0		20 ppm	
2B	17'-26'	0855		+.10	6.0		20 ppm	
2C	32'-51'	0856		-.02	14.0		20 ppm	
2D	57'-101'	0857		-.23		15	20 ppm	
3A	7'-11'	0902		+.20		55	35 ppm	
3B	17'-26'	0903		+.15		53	35 ppm	
3C	32'-51'	0904		+.70		54	35 ppm	
3D	57'-101'	0905		+2.40		54	35 ppm	
4A	7'-11'	0912		-.02		2	18 ppm	
4B	17'-36'	0913		+.10		51	18 ppm	
4C	42'-71'	0914		+.40		51	18 ppm	
4D	77'-101'	0915		+.80		51	18 ppm	

LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE MONITORING

GCIP #	Depth (ft)	Time	Barometric Pressure	Pressure (in. of H_2O)	Total Organics (PPM)	Methane (%)	Background (PPM)	Remarks
5A	7'-11'	0900	30.13	0.0	—	45.0	1.5	—
5B	17'-26'	0903		0.0	—	55.0	1.5	—
5C	32'-51'	0907		0.0	—	55.0	1.5	—
6A	7'-11'	1107	30.13	0.0	1000	—	3.0	—
6B	17'-26'	1115		0.0	—	15.0	3.0	—
6C	32'-51'	1124		0.0	—	38.0	3.0	—
7A	7'-11'	1126	30.13	0.0	1000.	—	4.0	—
7B	17'-26'	1132		0.0	180.0	—	4.0	—
7C	32'-51'	1138		0.0	—	18.0	4.0	—
8A	7'-11'	1142	30.13	0.0	—	46.0	6.0	—
8B	17'-36'	1144		0.0	—	46.0	6.0	—
8C	42'-71'	1147		0.0	—	55.0	6.0	—
8D	77'-	1149		0.0	—	49.0	6.0	—
9A	3'-7'	1152	30.13	0.0	—	44.0	5.0	—
10A	7'-11'	1154	30.13	0.05	—	18.0	4.0	—
10B	17'-36'	1157		0.05	—	12.0	4.0	—
10C	42'-71'	1202		0.0	—	45.0	4.0	—
10D	77'-	1205		0.0	—	48.0	4.0	—

LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE MONITORING

Date: 2-26-92	Inspectors: (EnP) TR	Instrument(ppm)-S/No.: 20876 Instrument(ppm)-M/No.: OVA 108	Instrument(%)-S/No.: 0157N Instrument(%)-M/No.: NP204

Temperature @ Start: 73° Temperature @ End: 77°	Weather: HOT, WINDY + CLEAR	Legend:	T = Trace W = Water	D = Destroyed -1 = no reading taken

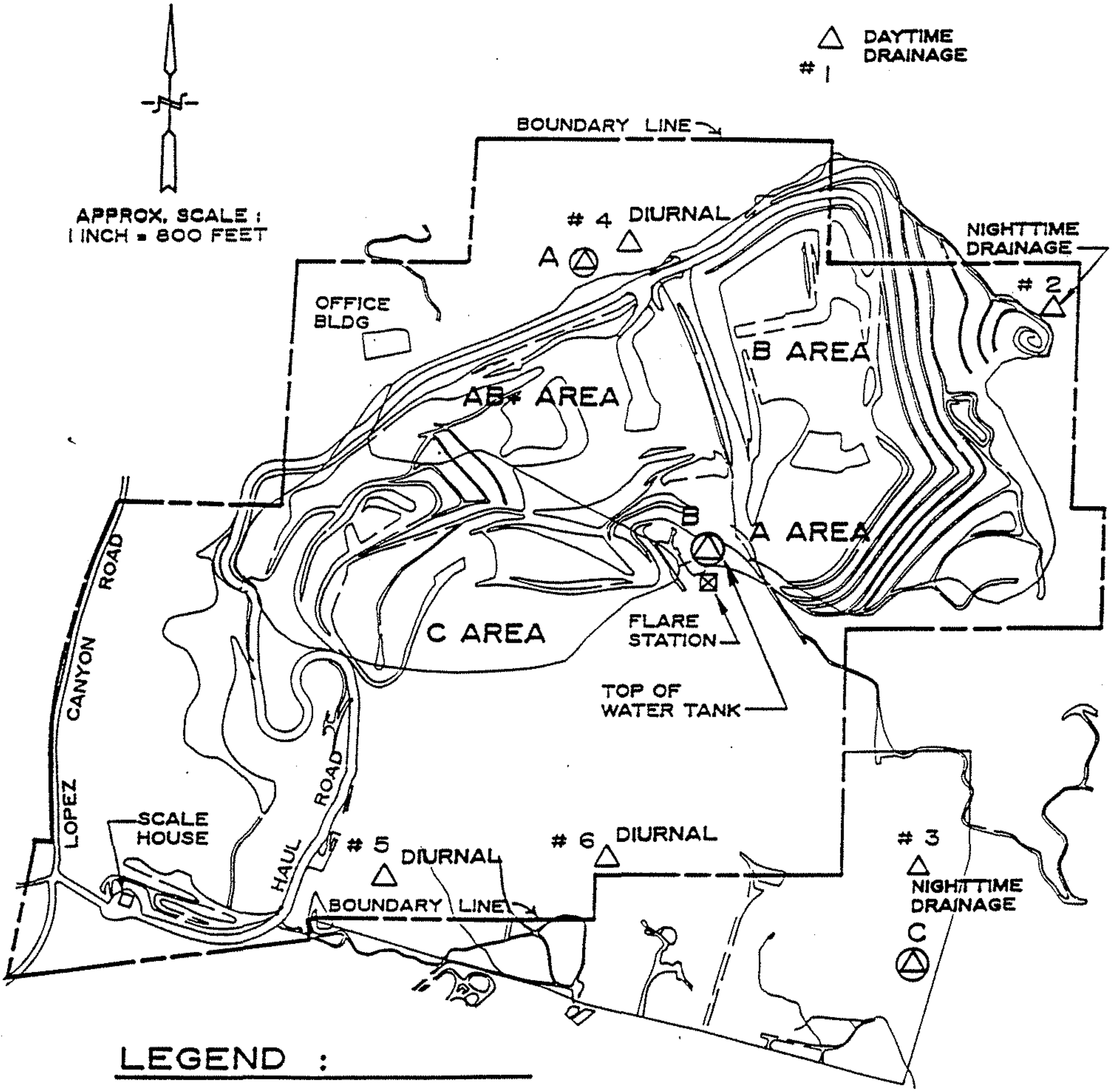
GCIP #	Depth (ft)	Time	Barometric Pressure	Pressure (in. of H_2O)	TOC (ppm)	Methane (%)	Background (PPM)	Remarks
1A	7'-11'	0851	30.13	-0.1	2.5	-	2.0	
1B	17'-41'		30.13	-0.1	7.0	-	2.0	
1C	47'-61'		30.13	-0.1	5.0	-	2.0	
1D	67'-81'		30.13	-0.2	4.5	-	2.0	
2A	7'-11'	0859	30.13	-0.2	6.0	-	2.5	
2B	17'-26'		30.13	-0.3	4.0	-	2.5	
2C	32'-51'		30.13	-0.4	6.0	-	2.5	
2D	57'-101'		30.13	-0.5	6.0	-	2.5	
3A	7'-11'	0905	30.13	-0.1	-	59.0	60.0	
3B	17'-26'		30.13	-0.1	-	56.0	60.0	
3C	32'-51'		30.13	+0.5	-	58.0	60.0	
3D	57'-101'		30.13	+1.9	-	58.0	60.0	
4A	7'-11'	0913	30.13	-0.2	60.0	-	2.0	
4B	17'-36'		30.13	-0.1	-	42.0	2.0	
4C	42'-71'		30.13	-0.3	-	50.0	2.0	
4D	77'-101'		30.13	+0.2	-	49.0	2.0	

LOPEZ CANYON LANDFILL
GAS COLLECTION INDICATOR PROBE MONITORING

GCIP #	Depth (ft)	Time	Barometric Pressure	Pressure (in. of H_2O)	Total Organics (PPM)	Methane (%)	Background (PPM)	Remarks
5A	7'-11'	0920		-.05		42	18ppm	
5B	17'-26'	0921		0		52	18ppm	
5C	32'-51'	0922		+.20		54	18ppm	
6A	7'-11'	0930		+.03	Unit Peak out at 4000		16ppm	
6B	17'-26'	0931		+.06		20	16ppm	
6C	32'-51'	0932		+.10		35	16ppm	
7A	7'-11'	0940		+.10		16	12ppm	
7B	17'-26'	0941		0		6	12ppm	
7C	32'-51'	0942		+.60		24	12ppm	
8A	7'-11'	0950		+.12		45	14ppm	
8B	17'-36'	0951		+.15		47	14ppm	
8C	42'-71'	0952		+.23		50	14ppm	
8D	77'-	0953		+.35	200		14ppm	
9A	3'-7'	1000		+.05		46	12.5ppm	
10A	7'-11'	1010		+.75	20		12ppm	
10B	17'-36'	1011		+.55	30		12ppm	
10C	42'-71'	1012		+.05		44	12ppm	
10D	77'-	1013		+.03		46	12ppm	

AMBIENT AIR SAMPLING RESULTS

LOPEZ CANYON LANDFILL
AMBIENT AIR SAMPLERS & WEATHER STATIONS LOCATION MAP



LEGEND :

△ AMBIENT AIR SAMPLERS

◬ WEATHER STATIONS

REVISED 8\30\91

LOPEZ CANYON LANDFILL
AMBIENT AIR SAMPLING
TOTAL HYDROCARBON SUMMARY
GAS CONCENTRATION - PPM/V

MONTH	AVERAGE CONCENTRATION
January - 92	2.78
February - 92	2.25

Average to Date 2.79 ppm/v

NOTE: Above total Hydrocarbon concentrations are the average of the laboratory results from Ambient Air Sampling stations for each month.

September 1990 to August 1991, five (5) samples were taken each month and starting September 1991, nine (9) samples are taken each month.

LOPEZ CANYON LANDFILL
AMBIENT AIR SAMPLING
QUALITY CONTROL DATA SHEET

Date: 18-Oct-91 Inspector: EP

Station ID	Sample ID	Bag No.	Start Time	End Time	Flow Rate (cc/min)	Volume (Liters)	Start Date	End Date
1	AA-1-2	302	10:00:00	22:00:00	10	10	25-Feb-92	25-Feb-92
1	AA-1-2	410	10:00:00	22:00:00	10	10	19-Feb-92	19-Feb-92
2	AA-2-2	305	22:00:00	10:00:00	10	10	25-Feb-92	26-Feb-92
2	AA-2-2	411	22:00:00	10:00:00	10	10	19-Feb-92	20-Feb-92
3	AA-3-2	308	22:00:00	10:00:00	10	10	25-Feb-92	26-Feb-92
3	AA-3-2	412	22:00:00	10:00:00	10	10	19-Feb-92	20-Feb-92
4A	AA-4A-2	314	10:00:00	22:00:00	10	10	25-Feb-92	25-Feb-92
4A	AA-4A-2	413	10:00:00	22:00:00	10	10	19-Feb-92	19-Feb-92
4B	AA-4B-2	320	22:00:00	10:00:00	10	10	25-Feb-92	26-Feb-92

Notes:

1. Ambient air samples shall be collected over a 12-hour period for daytime beginning between the hours of 10:00 AM and 11:00 AM and ending between 10:00 PM and 11:00 PM and for nighttime beginning between the hours of 10:00 PM and 11:00 PM and ending between 10:00 AM and 11:00 PM.

2. All Diurnal samples will be labeled "A" for daytime samples and "B" for nightime samples.

3. Wind monitoring stations with continuous recorder(s) shall be operating throughout the entire sampling period.

4. Ambient air samples collected for the diurnal 24-hour period shall begin between the hours of 10:00 AM and 11:00 AM and end between 10:00 AM and 11:00 AM the following day.

LOPEZ CANYON LANDFILL
WIND DATA SUMMARY
AMBIENT AIR SAMPLING
MONTH: YEAR:
STATION ID: A

DATE: 2/25/92 (date) 1000 (time) to 2/26/92 (date) 1000 (time)

Sampling Time	Wind Direction	Wind Speed
10:00 - 11:00 AM	*	11
11:00 - 12:00 AM	*	10
12:00 - 1:00 PM	*	10
1:00 - 2:00 PM	*	9
2:00 - 3:00 PM	*	12
3:00 - 4:00 PM	*	9
4:00 - 5:00 PM	*	12
5:00 - 6:00 PM	*	10
6:00 - 7:00 PM	*	7
7:00 - 8:00 PM	4	6
8:00 - 9:00 PM	4	6
9:00 - 10:00 PM	*	7
10:00 - 11:00 PM	*	7
11:00 - 12:00 PM	*	6
12:00 - 1:00 AM	*	4
1:00 - 2:00 AM	*	4
2:00 - 3:00 AM	*	4
3:00 - 4:00 AM	*	4
4:00 - 5:00 AM	*	4
5:00 - 6:00 AM	3	6
6:00 - 7:00 AM	11	4
7:00 - 8:00 AM	*	3
8:00 - 9:00 AM	*	5
9:00 - 10:00 AM	*	8

WIND SPEED: Hourly average wind speed in miles per hour.

WIND DIRECTION: Hourly average wind direction on a 16 point scale, e.g., 16 is north, 1 is north north east, 3 is east north east, etc.

***:** Rapid wind direction changes (non-directional).

LOPEZ CANYON LANDFILL
WIND DATA SUMMARY
AMBIENT AIR SAMPLING
MONTH: YEAR:
STATION ID: B

DATE: 2/25/92 (date) 1000 (time) to 2/26/92 (date) 1000 (time)

Sampling Time	Wind Direction	Wind Speed
10:00 - 11:00 AM	2	22
11:00 - 12:00 AM	2	25
12:00 - 1:00 PM	2	18
1:00 - 2:00 PM	2	18
2:00 - 3:00 PM	2	18
3:00 - 4:00 PM	2	20
4:00 - 5:00 PM	2	17
5:00 - 6:00 PM	2	15
6:00 - 7:00 PM	2	15
7:00 - 8:00 PM	*	5
8:00 - 9:00 PM	10	11
9:00 - 10:00 PM	*	11
10:00 - 11:00 PM	*	8
11:00 - 12:00 PM	*	8
12:00 - 1:00 AM	*	3
1:00 - 2:00 AM	*	4
2:00 - 3:00 AM	*	4
3:00 - 4:00 AM	*	4
4:00 - 5:00 AM	1	5
5:00 - 6:00 AM	3	8
6:00 - 7:00 AM	9	8
7:00 - 8:00 AM	2	7
8:00 - 9:00 AM	5	12
9:00 - 10:00 AM	4	15

WIND SPEED: Hourly average wind speed in miles per hour.

WIND DIRECTION: Hourly average wind direction on a 16 point scale, e.g., 16 is north, 1 is north north east, 3 is east north east, etc.

*** :** Rapid wind direction changes (non-directional).

LOPEZ CANYON LANDFILL
WIND DATA SUMMARY
AMBIENT AIR SAMPLING
MONTH: YEAR:
STATION ID: C

DATE: 2/25/92 2200 to 2/26/92 1000
date time date time

Sampling Time	Wind Direction	Wind Speed
10:00 - 11:00 AM		
11:00 - 12:00 AM		
12:00 - 1:00 PM		
1:00 - 2:00 PM		
2:00 - 3:00 PM		
3:00 - 4:00 PM		
4:00 - 5:00 PM		
5:00 - 6:00 PM		
6:00 - 7:00 PM		
7:00 - 8:00 PM		
8:00 - 9:00 PM		
9:00 - 10:00 PM	1	6
10:00 - 11:00 PM	*	5
11:00 - 12:00 PM	*	8
12:00 - 1:00 AM	*	12
1:00 - 2:00 AM	*	8
2:00 - 3:00 AM	3	7
3:00 - 4:00 AM	3	7
4:00 - 5:00 AM	3	7
5:00 - 6:00 AM	*	7
6:00 - 7:00 AM	*	6
7:00 - 8:00 AM	*	12
8:00 - 9:00 AM	*	10
9:00 - 10:00 AM	*	7

WIND SPEED: Hourly average wind speed in miles per hour.

WIND DIRECTION: Hourly average wind direction on a 16 point scale, e.g., 16 is north, 1 is north north east, 3 is east north east, etc.

*** :** Rapid wind direction changes (non-directional).

Revision: October 7, 1991 **Form: LC - 014**

LOPEZ CANYON LANDFILL
AMBIENT AIR SAMPLING
QUALITY CONTROL DATA SHEET

2-25-92
Date: 2-26-92 Inspector: G. Newbren

Station ID	Sample ID	Bag No.	Start Time	End Time	Flow Rate (cc/min)	Volume (Liters)	Start Date	End Date
1A	AA-1A-2	302	1000	2200	10	10	2-25-92	2-25-92
2B	AA-2B-2	305	2200	1000	10	10	2-25-92	2-26-92
3B	AA-3B-2	308	2200	1000	10	10	2-25-92	2-26-92
4A	AA-4A-2	314	1000	2200	10	10	2-25-92	2-25-92
4B	AA-4B-2	320	2200	1000	10	10	2-25-92	2-26-92
5A	AA-5A-2	323	1000	2200	10	10	2-25-92	2-25-92
5B	AA-6B-2	328	2200	1000	10	10	2-25-92	2-26-92
6A	AA-6A-2	357	1000	2200	10	10	2-25-92	2-25-92
6B	AA-6B-2	430	2200	1000	10	10	2-25-92	2-26-92

Comments:

Notes:

1. Ambient air samples collected for the daytime 12-hour period shall begin between the hours of 10:00 AM and 11:00 AM and ending between 10:00 PM and 11:00 PM and the nighttime 12-hour period shall begin between the hours of 10:00 PM and 11:00 PM and ending between 10:00 AM and 11:00 PM.

2. All Diurnal samples will be labeled "A" for daytime samples and "B" for nightime samples.

3. Wind monitoring stations with continuous recorder(s) shall be operating throughout the entire sampling period.

4. Ambient air samples collected for the diurnal 24-hour period shall begin between the hours of 10:00 AM and 11:00 AM and end between 10:00 AM and 11:00 AM the following day.

LOPEZ CANYON LANDFILL

CHAIN OF COSTODY RECORD

ACTIVITY: AMBIENT AIR

Field Log Book
Reference No. AA-02

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks
AA-1A-2	302	10	2-25-92	2200	AMB						
AA-2B-2	305	10	2-26-92	1000							
AA-3B-2	308	10	2-26-92	1000							
AA-4A-2	314	10	2-25-92	2200							
AA-4B-2	320	10	2-26-92	1000							
AA-5A-2	323	10	2-25-92	2200							
AA-5B-2	328	10	2-26-92	1000							
AA-6A-2	351	10	2-25-92	2200							
AA-6B-2	430	10	2-26-92	1000							

Total No. of Samples Shipped: 9	Total No. of Containers Shipped: 14	Special Instructions:

SAMPLED BY:
(SIGN) Chief Monitoring Technician / Greg Newborn / ______ /

RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)
1. Greg Newborn	2.	3.	4.
DATE/TIME (2/26) 1250	DATE/TIME (/)	DATE/TIME (/)	DATE/TIME (/)

COURIER (NAME)	SHIPPING NUMBER	SHIPPED BY (SIGN)	DATE/TIME
Greg Newborn			(/)
LABORATORY		**RECEIVED FOR LAB BY (SIGN)**	**DATE/TIME**
PERFORMANCE ANALYTICAL		[signature]	(2/26 / 1250)

Revised: August 24, 1991

Form: LC

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-1A-2 (302)	9200858	390	1.8	1.3
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-1A-2 (302)	9200858	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-1A-2 (302) (02/25/92) (22:00)

PAI Sample ID: 9200858

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Chris Parnell	Date Received:	02/26/92
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	02/26/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	4.3 TR	10	1.2 TR	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	12	10	3.2	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	12	10	2.8	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &

TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Concentration in ppm, v/v Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-2B-2 (305)	9200859	400	1.9	1.5
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-2B-2 (305)	9200859	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-2B-2 (305) (02/26/92) (10:00)

PAI Sample ID: 9200859

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	ND	10	ND	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	4.6 TR	10	1.2 TR	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	3.5 TR	10	0.80 TR	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected   TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
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RESULTS OF METHANE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Concentration in ppm, v/v Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-3B-2 (308)	9200860	390	1.8	1.5
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-3B-2 (308)	9200860	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-3B-2 (308) (02/26/92) (10:00)

PAI Sample ID: 9200860

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Chris Parnell	Date Received:	02/26/92
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	02/26/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	ND	10	ND	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	7.0 TR	10	1.9 TR	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	5.1 TR	10	1.2 TR	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
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RESULTS OF METHANE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-4A-2 (314)	9200861	380	2.0	1.5
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-4A-2 (314)	9200861	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-4A-2 (314) (02/25/92) (22:00)

PAI Sample ID: 9200861

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	ND	10	ND	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	4.5 TR	10	0.84 TR	1.9
108-88-3	TOLUENE	13	10	3.5	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	13	10	3.0	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected   TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
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PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-4B-2 (320)	9200862	390	2.5	1.6
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-4B-2 (320)	9200862	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-4B-2 (320) (02/26/92) (10:00)

PAI Sample ID: 9200862

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	ND	10	ND	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	ND	10	ND	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	3.7 TR	10	0.99 TR	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	3.3 TR	10	0.76 TR	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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RESULTS OF METHANE &

TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-5A-2 (323)	9200863	390	2.3	1.6
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-5A-2 (323)	9200863	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-5A-2 (323) (02/25/92) (22:00)

PAI Sample ID: 9200863

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	4.3 TR	10	1.2 TR	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	11	10	2.0	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	17	10	4.6	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	22	10	5.1	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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RESULTS OF METHANE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-5B-2 (328)	9200864	400	4.3	1.6
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-5B-2 (328)	9200864	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-5B-2 (328) (02/26/92) (10:00)

PAI Sample ID: 9200864

Test Code: GC/MS Mod. EPA TO-14
Analyst: Chris Parnell
Instrument ID: Finnigan 4500C/Tekmar 5010
Verified by: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92
Volume Analyzed: 1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	4.2 TR	10	1.2 TR	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	8.0 TR	10	1.5 TR	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	9.0 TR	10	2.4 TR	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	7.7 TR	10	1.8 TR	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &
TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-6A-2 (351)	9200865	380	1.8	1.5
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-6A-2 (351)	9200865	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

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RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-6A-2 (351) (02/25/92) (22:00)

PAI Sample ID: 9200865

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Chris Parnell	Date Received:	02/26/92
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	02/27/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	4.2 TR	10	1.2 TR	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	6.1 TR	10	1.1 TR	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	17	10	4.5	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	19	10	4.5	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF METHANE &

TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

PAI Project ID: 3971

Test Code: (FID/TCA)/SCAQMD Method 25.2
Instrument ID: HP 5890A/FID #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/27/92

Client Sample ID	PAI Sample ID	Concentration in ppm, v/v Carbon Dioxide	Methane	Concentration in ppmc, v/v Total Non-Methane Organics (as Methane)
AA-6B-2 (430)	9200866	400	1.9	1.5
AA-6B-2 (430)	LAB DUPLICATE	390	1.8	1.6
N/A (02/27/92)	METHOD BLANK	ND < 10	ND < 0.50	ND < 1.0

ND = Not Detected - Less Than Indicated Detection Limit

RESULTS OF FIXED GASES ANALYSIS

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: Kathleen Aguilera
Verified By: Michael Tuday

Matrix: Tedlar Bag
Date Received: 02/26/92
Date Analyzed: 02/26/92

Client Sample ID	PAI Sample ID	Carbon Monoxide (ppm)	Nitrogen (ppm)	Oxygen (ppm)
AA-6B-2 (430)	9200866	ND < 100	770000	230000
N/A (02/26/92)	METHOD BLANK	ND < 100	ND < 1000	ND < 300

ND = Not Detected - Less Than Indicated Detection Limit

Performance Analytical Inc.
Environmental Testing and Consulting

PERFORMANCE ANALYTICAL INC.

RESULTS OF ANALYSIS

Client: City of Los Angeles - Lopez Canyon Landfill

Client Sample ID: AA-6B-2 (430) (02/26/92) (10:00)

PAI Sample ID: 9200866

Test Code:	GC/MS Mod. EPA TO-14	Matrix:	Tedlar Bag
Analyst:	Chris Parnell	Date Received:	02/26/92
Instrument ID:	Finnigan 4500C/Tekmar 5010	Date Analyzed:	02/27/92
Verified by:	Michael Tuday	Volume Analyzed:	1.00 Liter

CAS #	COMPOUND	RESULT (UG/M^3)	DETECTION LIMIT (UG/M^3)	RESULT (PPB)	DETECTION LIMIT (PPB)
75-01-4	VINYL CHLORIDE	ND	10	ND	3.9
75-35-4	1,1-DICHLOROETHENE	ND	10	ND	2.5
75-09-2	METHYLENE CHLORIDE	8.5 TR	10	2.5 TR	2.9
75-34-3	1,1-DICHLOROETHANE	ND	10	ND	2.5
67-66-3	CHLOROFORM	ND	10	ND	2.1
107-06-2	1,2-DICHLOROETHANE	ND	10	ND	2.5
71-55-6	1,1,1-TRICHLOROETHANE	15	10	2.8	1.8
71-43-2	BENZENE	ND	10	ND	3.1
56-23-5	CARBON TETRACHLORIDE	ND	10	ND	1.6
79-01-6	TRICHLOROETHENE	ND	10	ND	1.9
108-88-3	TOLUENE	13	10	3.4	2.7
12-18-4	TETRACHLOROETHENE	ND	10	ND	1.5
108-90-7	CHLOROBENZENE	ND	10	ND	2.2
1330-20-7	TOTAL XYLENES	16	10	3.7	2.3
541-34-5	1,3-DICHLOROBENZENE	ND	10	ND	1.7
106-73-1	1,4-DICHLOROBENZENE	ND	10	ND	1.7
95-50-1	1,2-DICHLOROBENZENE	ND	10	ND	1.7
100-44-7	BENZYL CHLORIDE	ND	10	ND	1.9

ND = Not Detected TR = Trace Level - Below Indicated Detection Limit

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GAS COLLECTION SYSTEM (AT BLOWER) MONITORING RESULTS

LOPEZ CANYON LANDFILL
GAS COLLECTION SYSTEM MONITORING
(AT FLARE STATION BLOWER)
GAS COMPONENT SUMMARY
GAS CONCENTRATION - %

Gas Components	1992											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
CO_2	39	39.32										
CH_4	44	44.35										
N_2	16	14.5										
O_2	2.3	1.83										

Note: The above gas concentrations are the results of the laboratory analysis of the bag samples taken monthly.

FLARE DAILY LOG

DATE	FLOW RATE SCFM	OP %	FIELD VACUM	BLOWER NUMBER	BACK PRESSURE	OXYGEN %	METHANE %	REMARKS
02/03/92	4400	56	25	2	32	2	41	
02/04/92	4400	44	21	2	30	2	44	
02/05/92	4400	44	21	2	31	2	44	
02/06/92	4400	43	20	2	31	2	44	
02/07/92	4400	52	20	2	32	2	44	
02/14/92	4400	55	22	2	34	2	40	
02/17/92	4400	58	23	2	32	2	40	
02/18/92	4400	57	23	2	34	2	40	
02/19/92	4400	67	24	2	35	2	44	
02/20/92	4400	56	23	2	35	2	45	
02/21/92	4400	61	24	2	35	2	47	
02/25/92	4400	55	22	2	36	2	40	
02/26/92	4400	60	25	2	36	2	40	
02/28/92	4400	56	26	2	37	2	42	

NOTE: The above readings are field measurements using permanently mounted monitoring devices at the Flare Station or portable monitoring equipment

LOPEZ CANYON LANDFILL

CHAIN OF CUSTODY RECORD

Field Log Book LG-

ACTIVITY: LANDFILL GAS

Reference No. 02

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks
LG-B2-1	500	10l	2-10-92	0913	LG						FIXED GASES / VOCs

Total No. of Samples Shipped: 1

Total No. of Containers Shipped: 1

Special Instructions:

SAMPLED BY:
(SIGN) Chief Monitoring Technician / Greg Newborn / E Figueroa /

RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)
1 GNewborn	2	3	4
DATE/TIME 2/10 / 1030	DATE/TIME (/)	DATE/TIME (/)	DATE/TIME (/)

COURIER (NAME)	SHIPPING NUMBER	SHIPPED BY (SIGN)	DATE/TIME
G NEWBORN			(/)

LABORATORY	RECEIVED FOR LAB BY (SIGN)	DATE/TIME
HYPERION LAB	E Cruzeta	(2/10/92, 10:30

Revised: August 24, 1991

Form: LC-0C

LOPEZ CANYON LANDFILL

CHAIN OF CUSTODY RECORD

Field Log Book LG

ACTIVITY: LANDFILL GAS

Reference No. 0

Sample ID	Bag Number	Sample Volume (Liters)	Date	Time	Sample Type	Analyses					Remarks
LG-B2-1	500	10l	2-10-92	0913	LG						

Total No. of Samples Shipped: 1	Total No. of Containers Shipped: 1	Special Instructions:

SAMPLED BY:
(SIGN) Chief Monitoring Technician / Greg Newborn / E. Figueroa /

RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)	RELINQUISHED BY (SIGN)
1	2	3	4
DATE/TIME (/)	DATE/TIME (/)	DATE/TIME (/)	DATE/TIME (/)

COURIER (NAME)	SHIPPING NUMBER	SHIPPED BY (SIGN)	DATE/TIME
G NEWBORN			(/
LABORATORY: HYPERION LAB		RECEIVED FOR LAB BY (SIGN)	DATE/TIME (/

Revised: August 24, 1991

Form: LC-

LOPEZ CANYON LANDFILL
GAS COLLECTION SYSTEM SAMPLING
QUALITY CONTROL DATA SHEET

Date: 2/10/92 Inspector: GN/EF

Sample Port ID	Sample ID	Bag No.	Methane (%)	Oxygen (%)	Sample Volume (Liters)	Sample Time (min)
B-2	LG-B2-1	500	45	2	10 l	5

AIR EMISSION PROGRAM, ENVIRONMENTAL MONITORING DIVISION

Site		LOPEZ CANYON			
Sample_type		LANDFILL			
Sample_id		LG-B2-1			
Sample_date		10-Feb-92			
Time_stop		09:13			
Date_received		10-Feb-92			
Time_received		10:30			
Date_analyzed		11-Feb-92			
Time_analyzed		11:00			
Instrument A		GC-2-S			
	MDL (ppbv)				
Vinyl Chloride	25	879.5			
Vinylidene Chloride	30	33.65			
Benzene	20	869.6			
Toluene	25	21390			
Chlorobenzene	20	66.43			
Xylene	30	11040			
Dichlorobenzene	80	115.1*			
Benzyl Chloride	40	ND			
Methylene Chloride	40	3813			
1,1-Dichloroethane	30	818.2			
Chloroform	20	ND			
Methyl Chloroform	20	179.6			
Carbon Tetrachloride	20	ND			
1,2-Dichloroethane	25	29.96			
Trichloroethylene	25	872.5			
Tetrachloroethylene	20	827.5			

MDL = Method Detection Limit, ND = Not Detected, GC-1 = Fixed Gas Analysis, GC-2 = VOC Analysis, S = Small Loop (2 cc), L = Large Loop, *p-DCB quantitated from m-DCB std. (per SCAQMD guidelines)

Date_analyz'd		10-Feb-92			
Time_anlyz'd		11:48			
Instrument B		GC-1			
	MDL (%v)				
Carbon Dioxide	0.1	39.32%v			
Oxygen	0.1	1.83%v			
Nitrogen	0.1	14.50%v			
THC	1.0 ppmv	>0.1%v			
Methane	3.0 ppmv	44.35%v			
Group\Proj#\WorkOr#					

Analyst(s) Initials ECE Checker Initials CDC 2/25/92

GAS COLLECTION WELLS MONITORING RESULTS

LOPEZ CANYON LANDFILL
GAS COLLECTION WELL MONITORING SUMMARY

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	Well Static Pressure ("W.C.) A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	Kurz Veloc. (ft/min) A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
03-Feb-92	1BVW01	73	-2.8		6	6	105		0.00	0.00	0.00	0.00
03-Feb-92	1BVW02	81	-1.4		40	0	650		14.17	5.67	-37.42	0.00
03-Feb-92	1BVW03	73	-1		35	0	350		7.63	2.67	-14.69	0.00
03-Feb-92	1BVW04	72	-0.3		0	17	43		0.94	0.00	0.00	0.00
03-Feb-92	2BVW01	72	-5.5		25	5	55		1.20	0.30	-1.92	0.20
03-Feb-92	2BVW02	97	-4.1		22	6	2050		44.70	9.83	-59.99	0.27
03-Feb-92	2BVW03	76	-5.7		41	1	175		3.82	1.56	-8.92	0.02
03-Feb-92	2BVW04	93	-2.7		40	0	650		14.17	5.67	-33.45	0.00
03-Feb-92	2BVW05	72	0.25		39	0	15		0.33	0.13	-0.70	0.00
03-Feb-92	3BVW01	75	-3.9		36	0	860		18.75	6.75	-48.61	0.00
03-Feb-92	3BVW02	77	-4.5		40	0	1910		41.65	16.66	-108.29	0.00
03-Feb-92	3BVW03	78	-2.8		43	0	355		7.74	3.33	-20.64	0.00
03-Feb-92	3BVW04	98	-1.3		43	0	935		20.39	8.77	-56.99	0.00
03-Feb-92	3BVW05	96	-7.5		42	0	450		9.81	4.12	-27.61	0.00
03-Feb-92	3BVW06	84	-0.3		40	0	265		5.78	2.31	-14.56	0.00
03-Feb-92	3BVW07	75	-0.2		15	17	16		0.35	0.05	-0.32	1.13
03-Feb-92	3BVW08	72	-5.7		35	3	174		3.79	1.33	-7.97	0.09
03-Feb-92	BVW01	71	0.05	-1	8	17	110		2.40	0.19	-1.07	2.13
03-Feb-92	BVW02	74	-4.4		40	0	755		16.46	6.59	-39.51	0.00
03-Feb-92	BVW03	97	-3.8		37	1	3170		69.12	25.58	-150.90	0.03

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
03-Feb-92	BVW04	95	-4.6		35	1	1910		41.65	14.58	-87.46	0.03
04-Feb-92	1AVW01	77	0		0	18.3	5		0.11	0.00	0.00	0.00
04-Feb-92	1AVW02	83	-2.1		39	0	450		9.81	3.83	-34.44	0.00
04-Feb-92	1AVW03	76	-7.5		16	13.4	0		0.00	0.00	0.00	0.84
04-Feb-92	1AVW04	91	-0.6		44	0	210		4.58	2.01	-15.51	0.00
04-Feb-92	2AAW01	82	-0.5		37	1.9	5		0.11	0.04	-0.33	0.05
04-Feb-92	2AAW02	75	-0.1		9	3.9	6		0.13	0.01	0.00	0.43
04-Feb-92	2AAW03	91	-1		14	8.2	190		4.14	0.58	-4.76	0.59
04-Feb-92	2AAW04	102	-0.2		42	1	90		1.96	0.82	-6.59	0.02
04-Feb-92	2AAW05	95	-0.5		19	3	117		2.55	0.48	-3.97	0.16
04-Feb-92	2AAW06	73	-0.1		26	0.5	1		0.02	0.01	-0.05	0.02
04-Feb-92	2AAW07	66	-0.4		0	19.1	0		0.00	0.00	0.00	0.00
04-Feb-92	2AAW08	90	-0.4		51	0	200		4.36	2.22	-18.24	0.00
04-Feb-92	2AAW09	115	-2.1		40	1	590		12.87	5.15	-11.32	0.03
04-Feb-92	2AAW10	110	-2		20	7.5	590		0.00	0.00	0.00	0.00
04-Feb-92	2AAW11	110	-2.1		22	2	590		0.00	0.00	0.00	0.00
04-Feb-92	2AAW12	101	-2		24	1	590		0.00	0.00	0.00	0.00
04-Feb-92	2AAW13	95	-1.1		18	6.5	590		0.00	0.00	0.00	0.00
04-Feb-92	2AAW14	102	-4.7		33	1			0.00	0.00	0.00	0.00
04-Feb-92	2AAW15	69	-0.5		18	4	28		0.00	0.00	0.00	0.00
04-Feb-92	2AAW16	68	-0.2		35	0	80		0.00	0.00	0.00	0.00
04-Feb-92	2AAW17	76	-0.3		15	4	105		0.00	0.00	0.00	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
04-Feb-92	2AAW18	76	-0.2		25	1	95		0.00	0.00	0.00	0.00
04-Feb-92	2AAW19	89	0.1	-0.5	5	17	200		4.36	0.22	-1.70	3.40
04-Feb-92	2AAW20	86	-0.5		25	5.1	400		8.72	2.18	-15.26	0.20
04-Feb-92	2AAW21	88	-0.4		23	3	400		8.72	2.01	-14.24	0.13
04-Feb-92	2AAW22	78	-0.1		4	15	400		8.72	0.35	-2.41	3.75
04-Feb-92	2ABHW01	71	-1		45	0	1020		50.04	22.52	-144.13	0.00
04-Feb-92	2ABHW02	70	-1.7		43	0	1260		61.82	26.58	-172.78	0.00
04-Feb-92	2ABHW03	68	-1.6		40	0	1335		65.50	26.20	-167.68	0.00
04-Feb-92	2ADW01	113	-7.5		50	0	8500		185.35	92.67	-759.92	0.00
04-Feb-92	2ADW02	128	-3.4		52	0	370		8.07	4.20	-33.98	0.00
04-Feb-92	2AVW01	81	-5.1		4	11.9	130		2.83	0.11	-0.93	2.98
04-Feb-92	2AVW02	77	-0.5		45	0	35		0.76	0.34	-2.82	0.00
04-Feb-92	2AVW03	75	-0.8		0	17.1	65		1.42	0.00	0.00	0.00
04-Feb-92	2AVW04	109	-2.9		45	0	0.2		0.00	0.00	-0.02	0.00
04-Feb-92	2AVW05	75	-4.7		17	16	80		1.74	0.30	-2.34	0.94
04-Feb-92	2AVW06	77	-0.7		0	18	170		3.71	0.00	0.00	0.00
04-Feb-92	2AVW07	75	-0.1		1.1	18.1	0		0.00	0.00	0.00	16.45
04-Feb-92	2AVW07.5	119	-3.3		50	0	0.1		0.00	0.00	-0.01	0.00
04-Feb-92	2AVW08	80	-0.5		37	0	85		1.85	0.69	-5.35	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.")		CH4 (%)	O2 (%)	Kurz Veloc. (ft/min)		Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
			I	A			I	A				
04-Feb-92	2AVW09	74	-0.4		0	19	190		4.14	0.00	0.00	0.00
04-Feb-92	2AVW10	77	-4.3		24	4.2	20		0.44	0.10	-0.82	0.18
04-Feb-92	3ADW01	107	-4.4		49	0	1620		35.33	17.31	-162.71	0.00
04-Feb-92	3ADW02	117	-4.7		49	0	0.1		0.00	0.00	-0.01	0.00
04-Feb-92	3AVW01	92	-4.6		46	0	0.2		0.00	0.00	-0.02	0.00
04-Feb-92	3AVW02	100	-2.2		44	0	0.1		0.00	0.00	-0.01	0.00
04-Feb-92	3AVW03	108	-0.9		48	1.3	0.1		0.00	0.00	-0.01	0.03
04-Feb-92	3AVW04	112	-2.1		45	0	0.1		0.00	0.00	-0.01	0.00
04-Feb-92	3AVW05	98	-2.7		36	4	320		6.98	2.51	-20.85	0.11
04-Feb-92	3AVW06	76	-0.1		34	2.9			0.00	0.00	0.00	0.85
04-Feb-92	3AVW07	93	-7.6		37	0	265		5.78	2.14	-16.46	0.00
04-Feb-92	3AVW07.5	103	-4.6		34	0	610		13.30	4.52	-42.06	0.00
04-Feb-92	3AVW08	109	-7		38	0	630		13.74	5.22	-40.20	0.00
04-Feb-92	3AVW09	124	-7.3		35	0	1450		31.62	11.07	-85.21	0.00
04-Feb-92	3AVW10	94	-2.9		34	2.9	0.1		0.00	0.00	-0.01	0.09
04-Feb-92	3AVW10.5	121	-0.9		44	2.9	735		16.03	7.05	0.00	0.07
04-Feb-92	3AVW11	74	-0.3		1.8	12.6	53		1.16	0.02	-0.16	7.00
04-Feb-92	4BBW01	90	-6.1		59	0	1040		0.00	0.00	0.00	0.00
04-Feb-92	4BDW02	116	-5.1		44	0	817		0.00	0.00	0.00	0.00
04-Feb-92	4BDW03	102	-5		44	0	275		0.00	0.00	0.00	0.00
04-Feb-92	4BVW01	67	-0.3		0	21	0		0.00	0.00	0.00	0.00
04-Feb-92	4BVW02	75	-1.6		36	0	325		0.00	0.00	0.00	0.00
04-Feb-92	4BVW03	68	-1.3		0	21	12		0.00	0.00	0.00	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
04-Feb-92	4BVW04	98	-4.6		45	0	985		0.00	0.00	0.00	0.00
04-Feb-92	4BVW05	93	-5.5		40	0	490		0.00	0.00	0.00	0.00
04-Feb-92	4BVW06	81	-2.7		34	0	105		0.00	0.00	0.00	0.00
04-Feb-92	4BVW07	66	-0.2		0	20	4		0.09	0.00	0.00	0.00
04-Feb-92	4BVW08	69	-2.4		16	13	120		2.62	0.42	-2.97	0.81
04-Feb-92	4BVW08.5	103	-4.1		43	0	12000		261.67	112.52	-855.13	0.00
04-Feb-92	4BVW09	69	-0.4		0	21	106		2.31	0.00	0.00	0.00
04-Feb-92	5BDW01	108	-7.2		50	0	700		15.26	7.63	-57.24	0.00
04-Feb-92	5BVW01	94	-6.8		45	0	1610		35.11	15.80	-131.12	0.00
04-Feb-92	5BVW02	100	-4.9		43	0	1230		26.82	11.53	-99.18	0.00
04-Feb-92	5BVW03	105	-2.6		40	0	630		13.74	5.50	-45.06	0.00
04-Feb-92	5BVW04	116	-3.3		40	0	650		14.17	5.67	-52.16	0.00
04-Feb-92	5BVW05	126	-2		39	0	680		14.83	5.78	-55.52	0.00
04-Feb-92	5BVW06	105	-2.5		30	3	680		14.83	4.45	-36.48	0.10
04-Feb-92	5BVW07	78	-0.7		18	12	250		5.45	0.98	-7.46	0.67
04-Feb-92	5BVW08	107	-2.6		32	4	670		14.61	4.68	-35.06	0.13
04-Feb-92	5BVW09	107	-2		40	1	1945		42.41	16.96	-142.50	0.03
04-Feb-92	5BVW10	95	-1.4		45	2	650		14.17	6.38	-45.28	0.04
04-Feb-92	6BDW01	75	-7.5		45	2	80		1.74	0.79	-5.89	0.04
04-Feb-92	6BHW01	68	-5.3		50	0	12000		1,046.67	523.33	-4,814.67	0.00
04-Feb-92	6BHW02	64	-3.6		46	0	280		24.42	11.23	-87.63	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
04-Feb-92	6BHW03	67	-5.4		50	0	1850		161.36	80.68	-693.85	0.00
04-Feb-92	6BHW04	67	-4.3		45	0	6950		606.19	272.79	-1,936.79	0.00
04-Feb-92	6BHW05	69	-2.4		0	21	25		2.18	0.00	0.00	0.00
04-Feb-92	6BHW06	68	-2.1		0	21	18		1.57	0.00	0.00	0.00
04-Feb-92	6BVW02	77	-2.7		39	1.5	100		2.18	0.85	-6.63	0.04
04-Feb-92	6BVW03	69	-0.2		0	21	110		2.40	0.00	0.00	0.00
04-Feb-92	6BVW04	95	-4		17	5	610		13.30	2.26	-17.86	0.29
04-Feb-92	6BVW07	71	0.15	-0.5	50	0	210		4.58	2.29	-14.20	0.00
04-Feb-92	6BVW08	81	-0.06		43	0	170		3.71	1.59	-9.72	0.00
04-Feb-92	6BVW09	84	-0.05		35	0	120		2.62	0.92	-5.59	0.00
04-Feb-92	6BVW10	70	-0.25		10	20	72		1.57	0.16	-0.94	2.00
04-Feb-92	6BVW11		-1		41	0	800		17.44	7.15	0.00	0.00
04-Feb-92	6BVW12	68	-0.15		0	17	57		1.24	0.00	0.00	0.00
04-Feb-92	6BVW12.5	70	-1.7		40	0	220		4.80	1.92	-11.51	0.00
04-Feb-92	6BVW13	75	-0.2		0	21	30		0.65	0.00	0.00	0.00
04-Feb-92	6BVW13.2	69	-0.5		36	15	65		1.42	0.51	-3.01	0.42
04-Feb-92	6BVW13.5	95	-1.7		39	0	610		13.30	5.19	-31.13	0.00
04-Feb-92	6BVW14	73	-1.6		35	0	210		4.58	1.60	-9.62	0.00
04-Feb-92	6BVW14.5	77	-2		44	0	540		11.78	5.18	-30.57	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
04-Feb-92	6BVW15	70	-2.5		0	21	80		1.74	0.00	0.00	0.00
04-Feb-92	6BVW15.5	79	-2		49	0	910		19.84	9.72	-56.39	0.00
04-Feb-92	6BVW16	74	-0.35		46	2	175		3.82	1.76	-9.65	0.04
04-Feb-92	6BVW16.5	80	-0.8		47	0			0.00	0.00	0.00	0.00
04-Feb-92	6BVW17	75	-5.5		14	12	130		2.83	0.40	-2.18	0.86
04-Feb-92	7BDW01	102	-5.3		40	0	1530		75.07	30.03	-267.23	0.00
04-Feb-92	7BDW02	105	-6		40	0	230		11.28	4.51	-34.76	0.00
04-Feb-92	7BDW03	108	-4.2		40	0	3250		159.45	63.78	-497.49	0.00
04-Feb-92	7BHW01	71	-3.4		0	21	20		1.74	0.00	0.00	0.00
04-Feb-92	7BHW02	64	-2.6		20	3	220		19.19	3.84	-30.70	0.15
04-Feb-92	7BVW01	69	-0.9		0	21	2		0.04	0.00	0.00	0.00
04-Feb-92	7BVW02	82	-2		44	0	150		3.27	1.44	-10.65	0.00
04-Feb-92	7BVW03	83	-1.3		45	0	85		1.85	0.83	-6.09	0.00
04-Feb-92	7BVW04	115	-2.1		30	0	62		1.35	0.41	-3.00	0.00
04-Feb-92	7BVW05	73	-1		25	0	125		2.73	0.68	-4.43	0.00
04-Feb-92	7BVW06	71	-0.8		18	10	15		0.33	0.06	-0.38	0.56
04-Feb-92	7BVW07	90	-3.1		24	2	720		15.70	3.77	-27.13	0.08
04-Feb-92	8BHW01	71	-2.6		0	20	18		0.88	0.00	0.00	0.00
04-Feb-92	8BHW02	56	-2.6		0	21	4		0.20	0.00	0.00	0.00
04-Feb-92	8BHW03	65	-0.5		45	3	41		3.58	1.61	-9.49	0.07
04-Feb-92	8BVW01	70	-0.5		0	20	0		0.00	0.00	0.00	0.00
04-Feb-92	8BVW02	70	-1		0	21	43		0.94	0.00	0.00	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
04-Feb-92	8BVW04	74	-0.7		50	0	816		17.79	8.90	-60.50	0.00
04-Feb-92	8BVW05	75	-3.1		46	0	635		13.85	6.37	-43.31	0.00
04-Feb-92	8BVW06	80	-2.7		50	0	875		19.08	9.54	-62.01	0.00
04-Feb-92	8BVW07	77	-4.1		50	0	775		16.90	8.45	-56.61	0.00
04-Feb-92	8BVW08	79	-4.2		50	0	860		18.75	9.38	-58.13	0.00
04-Feb-92	8BVW09	80	-5.8		49	0	1400		30.53	14.96	-88.26	0.00
04-Feb-92	9BDW01	110	-5		55	0	460		10.03	5.52	-38.62	0.00
04-Feb-92	9BDW02	93	0.3	-1	55	0	125		6.13	3.37	-22.60	0.00
04-Feb-92	9BDW03	77	-1.1		48	0	85		4.17	2.00	-13.21	0.00
04-Feb-92	9BDW05	92	-6.5		55	0	210		10.30	5.67	-36.83	0.00
04-Feb-92	9BDW06	98	-5		50	0	300		14.72	7.36	-48.57	0.00
04-Feb-92	9BDW07	96	-2.1		50	0	900		19.63	9.81	-63.78	0.00
04-Feb-92	9BDW08	91	-1.8		50	0	1220		26.60	13.30	-89.12	0.00
04-Feb-92	9BVW00.5	73	-0.7		0	6	30		0.65	0.00	0.00	0.00
04-Feb-92	9BVW01	70	-0.9		0	20	3		0.07	0.00	0.00	0.00
04-Feb-92	9BVW02	71	-1		18	16	11		0.24	0.04	-0.28	0.89
04-Feb-92	9BVW03	94	-2.3		35	1	350		7.63	2.67	-18.43	0.03
04-Feb-92	9BVW04	98	-6.5		27	25	645		14.06	3.80	-24.68	0.93
04-Feb-92	9BVW05	109	-2		27	1	680		14.83	4.00	-26.42	0.04
04-Feb-92	9BVW06	93	-2.2		40	0	580		12.65	5.06	0.00	0.00
04-Feb-92	9BVW07	96	-1.9		44	0	445		9.70	4.27	-26.90	0.00
04-Feb-92	ANVW00.5	90	-0.9		15	9	25		0.55	0.08	-0.63	0.60
04-Feb-92	ANVW01	80	-0.3		3	1.5	4		0.09	0.00	-0.02	0.50

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
04-Feb-92	ANVW02	79	-0.3		40	4.9	155		3.38	1.35	-12.17	0.12
04-Feb-92	ANVW03	76	-0.9		36	1	85		1.85	0.67	-5.40	0.03
04-Feb-92	ASVW01	75	-0.7		15	12.4	30		0.65	0.10	-0.97	0.83
04-Feb-92	ASVW02	73	-8.4		48	1.9			0.00	0.00	0.00	0.04
04-Feb-92	ASVW03	75	-1.3		24	10.5	450		9.81	2.36	-22.14	0.44
05-Feb-92	2ABVW01	110	-1.5	-0.5	15	1	520		11.34	1.70	-3.23	0.07
05-Feb-92	2ABVW02	98	-1	-0.5	17	1	400		8.72	1.48	-2.82	0.06
05-Feb-92	2ABVW03	69	-1.3	-0.5	3	20	170		3.71	0.11	-0.21	6.67
05-Feb-92	2ABVW04	144	-1	-0.5	17	1	600		13.08	2.22	-4.45	0.06
05-Feb-92	2ABVW05	62	-0.1		25	5	64		1.40	0.35	-0.66	0.20
05-Feb-92	3ABVW01	88	-1.4	-1	27	0	490		10.68	2.88	-6.06	0.00
05-Feb-92	3ABVW02	88	-1.1		40	0	740		16.14	6.45	-13.55	0.00
05-Feb-92	3ABVW03	122	-1.3	-0.5	31	0	1110		24.20	7.50	-17.26	0.00
05-Feb-92	3ABVW04	63	-0.1		35	0	100		2.18	0.76	-1.45	0.00
05-Feb-92	3ABVW05	97	-1.7		36	0	940		20.50	7.38	-14.02	0.00
05-Feb-92	3ABVW06	98	-1.8		50	0	320		6.98	3.49	-6.98	0.00
05-Feb-92	4ABDW01	56	-1.2	-1	30	0			0.00	0.00	0.00	0.00
05-Feb-92	4ABDW02	64	-1.4		43	0	390		8.50	3.66	-5.12	0.00
05-Feb-92	4ABDW03	60	-1.1		44	0	380		8.29	3.65	-5.83	0.00
05-Feb-92	4ABDW04	58	-1.5		47	0	90		1.96	0.92	-1.48	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
05-Feb-92	4ABDW05	72	-1.9		50	0	930		20.28	10.14	-19.27	0.00
05-Feb-92	4AVW01	63	-0.8		4	19	45		0.98	0.04	-0.37	4.75
05-Feb-92	4AVW02	82	-1.8	-2.5	58	0	343		7.48	4.34	-42.51	0.00
05-Feb-92	4AVW03	71	-0.8	-1.3	55	0	40		0.87	0.48	-4.46	0.00
05-Feb-92	4AVW04	63	-0.3	-0.5	55	0	37		0.81	0.44	-4.08	0.00
05-Feb-92	4AVW06	78	-0.7		50	1	160		3.49	1.74	-15.70	0.02
05-Feb-92	4AVW07	89	-0.9		48	1	176		3.84	1.84	-16.40	0.02
05-Feb-92	4AVW08	97	-0.7		30	1	105		2.29	0.69	0.00	0.03
05-Feb-92	4AVW09	71	-0.5		29	2.5	29		0.63	0.18	-1.60	0.09
05-Feb-92	4AVW10	65	-1		45	0	29		0.63	0.28	-2.28	0.00
05-Feb-92	4AVW11	60	-0.9	-1	51	1	24		0.52	0.27	-2.14	0.02
05-Feb-92	4AVW12	77	-0.8		25	11	180		3.93	0.98	-7.85	0.44
05-Feb-92	5AVW01	96	-9	-5	27	4.5	510		11.12	3.00	-30.93	0.17
05-Feb-92	5AVW02	105	-2.6	-2	30	3	490		10.68	3.21	-32.37	0.10
05-Feb-92	5AVW03	104	-2.2		41	0	905		19.73	8.09	-88.19	0.00
05-Feb-92	5AVW04	103	-9		40	0	390		8.50	3.40	-30.27	0.00
05-Feb-92	5AVW05	105	-1.3		40	0	490		10.68	4.27	-38.04	0.00
05-Feb-92	5AVW06	105	-2.5		35	0	530		11.56	4.04	-36.40	0.00
05-Feb-92	5AVW07	92	-3.5		40	0	420		9.16	3.66	-32.60	0.00
05-Feb-92	5AVW08	69	-8	-6	28	6	185		4.03	1.13	-9.60	0.21
05-Feb-92	5AVW09	79	-3.5	-2.5	31	0	180		3.93	1.22	-10.10	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	Well Static Pressure ("W.C.) A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	Kurz Veloc. (ft/min) A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
05-Feb-92	5AVW10	72	-2		36	0	202		4.40	1.59	-14.27	0.00
05-Feb-92	5AVW11	84	-7.5		45	0	1430		31.18	14.03	-129.09	0.00
05-Feb-92	5AVW11.5	78	-1.7		50	0	350		7.63	3.82	-31.67	0.00
05-Feb-92	5AVW12	64	0.4	-1	55	0	135		2.94	1.62	-13.28	0.00
05-Feb-92	5AVW12.5	89	-3.7		46	1	420		9.16	4.21	-34.97	0.02
05-Feb-92	5AVW13	81	-4.7		50	0	730		15.92	7.96	-78.79	0.00
05-Feb-92	5AVW13.5	65	-0.6	-1	54	0	62		1.35	0.73	-5.69	0.00
05-Feb-92	5AVW14	75	-6.8		50	0	68		1.48	0.74	-6.30	0.00
05-Feb-92	6AHW01	68	-2.3		45	0	40		1.96	0.88	-9.10	0.00
05-Feb-92	6AHW02	62	-2.2		0	21	20		0.98	0.00	0.00	0.00
05-Feb-92	6AHW03	66	-2.6		41	0	750		36.80	15.09	-137.29	0.00
05-Feb-92	6AHW04	67	-2.6		0	21	50		2.45	0.00	0.00	0.00
05-Feb-92	6AVW01	69	-0.4		5	13	4		0.09	0.00	-0.05	2.60
05-Feb-92	6AVW02	144	-0.3		35	1	420		9.16	3.21	-34.94	0.03
05-Feb-92	6AVW03	87	-2.1		30	0	420		9.16	2.75	-29.40	0.00
05-Feb-92	6AVW04	114	-2.7		29	2	530		11.56	3.35	-37.87	0.07
05-Feb-92	6AVW05	83	-0.7		33	3.5	180		3.93	1.30	-12.69	0.11
05-Feb-92	6AVW06	95	-1.1		28	2.5	320		6.98	1.95	-17.78	0.09
05-Feb-92	6AVW07	85	-2.3		40	0	370		8.07	3.23	-30.34	0.00
05-Feb-92	6AVW08	68	-1.6		0	21	30		0.65	0.00	0.00	0.00
05-Feb-92	6AVW09	71	-1.2		0	20	70		1.53	0.00	0.00	0.00
05-Feb-92	6AVW10	66	-1.4		20	3	100		2.18	0.44	-3.71	0.15
05-Feb-92	6AVW11	79	-3.1		21	0	470		10.25	2.15	-18.51	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
05-Feb-92	6AVW12	68	-0.3		0	21	60		1.31	0.00	0.00	0.00
05-Feb-92	6AVW13	69	-0.3		5	18	10		0.22	0.01	-0.09	3.60
05-Feb-92	6AVW14	135	-1.6		16	6	330		7.20	1.15	-9.44	0.38
05-Feb-92	6AVW15	76	-0.8		15	13	290		6.32	0.95	-7.40	0.87
05-Feb-92	6AVW16	84	-0.9		45	0	250		5.45	2.45	-18.89	0.00
05-Feb-92	6AVW17	78	-1.7		35	3	350		7.63	2.67	-21.90	0.09
05-Feb-92	7ADHW05	99	-8.4		55	0	40		0.00	0.00	0.00	0.00
05-Feb-92	7ADW01	96	0.8	-1	50	0			0.00	0.00	0.00	0.00
05-Feb-92	7ADW02	86	-9		55	0	0.1		0.00	0.00	-0.02	0.00
05-Feb-92	7ADW03	82	-9.3		56	0	480		23.55	13.19	-122.65	0.00
05-Feb-92	7ADW04	104	-7.7		46	0	1010		49.55	22.79	-225.67	0.00
05-Feb-92	7ADW06	97	-2.1		46	0	370		18.15	8.35	-81.83	0.00
05-Feb-92	7ADW07	104	-2.2		50	0	530		26.00	13.00	-109.21	0.00
05-Feb-92	7ADW08	90	-1.6		50	0	370		18.15	9.08	-72.61	0.00
05-Feb-92	7AHW01	64	-9.2		45	0	3910		341.04	153.47	-1,580.72	0.00
05-Feb-92	7AHW02	65	-3.3		0	21	30		2.62	0.00	0.00	0.00
05-Feb-92	7AHW03	69	-6		35	1	2940		256.43	89.75	-906.49	0.03
05-Feb-92	7AHW04	60	-3.2		0	21	40		3.49	0.00	0.00	0.00
05-Feb-92	7AHW05	65	-7.8		0	21	30		2.62	0.00	0.00	0.00
05-Feb-92	IT1V01	56	-0.6		0	20			0.00	0.00	0.00	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
05-Feb-92	IT1V02	67	-1.9		23	8	52		1.13	0.26	-0.50	0.35
05-Feb-92	IT1V03	61	-1.9		39	0	68		1.48	0.58	-1.10	0.00
06-Feb-92	1ABHW01	51	-2	-1	26	7	700		34.34	8.93	-17.86	0.27
06-Feb-92	1ABHW02	58	-2		37	0.5	30		1.47	0.54	-1.09	0.01
06-Feb-92	1ABHW03	52	-0.6		51	0	30		1.47	0.75	-1.50	0.00
06-Feb-92	1ABHW04	79	-1.2		46	0	3840		188.40	86.66	-216.66	0.00
06-Feb-92	1ABHW05	60	-2		35	0	40		1.96	0.69	-1.37	0.00
06-Feb-92	1ABHW06	83	-2.2		35	0	2400		117.75	41.21	-90.67	0.00
06-Feb-92	1ABHW07	75	-1		39	0	720		35.33	13.78	-31.69	0.00
06-Feb-92	1ABHW08	51	-2.1	-1.5	35	5	60		2.94	1.03	-2.16	0.14
06-Feb-92	1ABHW09	67	-2.1		31	2	180		8.83	2.74	-6.02	0.06
06-Feb-92	1ABHW10	68	-2.2		30	0	70		3.43	1.03	-2.27	0.00
06-Feb-92	1ABHW11	69	-2.1		30	0	120		5.89	1.77	-3.71	0.00
06-Feb-92	2ABHW04	61	-2.1		26	0	2740		0.00	0.00	0.00	0.00
06-Feb-92	IT2D01	76	-1.8		51	0	720		15.70	8.01	-16.01	0.00
06-Feb-92	IT2D02	53	-2	-2.5	51	0	30		0.65	0.33	-0.67	0.00
06-Feb-92	IT2D03	71	-2		50	0	60		1.31	0.65	-1.31	0.00
06-Feb-92	IT2D04	70	-2.1		50	0	30		0.65	0.33	-0.72	0.00
06-Feb-92	IT2D05	90	-1		49	0	310		6.76	3.31	-6.96	0.00
06-Feb-92	IT2V01	61	-2.1	-0.5	10	17	790		17.23	1.72	-3.62	1.70
06-Feb-92	IT2V02	63	-0.9	-1.5	56	0	30		0.65	0.37	-0.73	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
06-Feb-92	IT2V03	79	-0.5		50	0	150		3.27	1.64	-3.27	0.00
06-Feb-92	IT2V04	102	-1		52	0	160		3.49	1.81	-3.63	0.00
06-Feb-92	IT2V05	58	-1.2		50	0	30		0.65	0.33	-0.65	0.00
06-Feb-92	IT2V06	115	-0.6		51	0	70		1.53	0.78	-1.71	0.00
06-Feb-92	IT2V07	74	-2.1		50	0	120		2.62	1.31	-2.88	0.00
06-Feb-92	IT2V08	70	-1.9		49	0	30		0.65	0.32	-0.71	0.00
06-Feb-92	IT2V09	78	-0.2		48	0	190		4.14	1.99	-4.18	0.00
06-Feb-92	IT2V10	107	-2.1		34	0	680		14.83	5.04	-10.59	0.00
06-Feb-92	IT2V11	112	-1.1		30	2	310		6.76	2.03	-4.66	0.07
06-Feb-92	IT2V12	56	-0.8		0	20	50		1.09	0.00	0.00	0.00
06-Feb-92	IT2V13	52	-0.7		20	1	20		0.44	0.09	-0.20	0.05
06-Feb-92	IT3D01	74	-1.3		45	0	120		2.62	1.18	-4.24	0.00
06-Feb-92	IT3V01	69	-2.2		30	0	110		2.40	0.72	-3.38	0.00
06-Feb-92	IT3V02	65	-3		40	0	30		0.65	0.26	-1.15	0.00
06-Feb-92	IT3V03	55	-0.2		19	10	0		0.00	0.00	0.00	0.53
06-Feb-92	IT3V04	54	0.6	-1.3	45	1	20		0.44	0.20	-0.80	0.02
06-Feb-92	IT3V05	55	0.5	-1.3	45	0	20		0.44	0.20	-0.79	0.00
06-Feb-92	IT3V06	52	-1.2	-0.9	35	3	20		0.44	0.15	-0.55	0.09
06-Feb-92	IT3V07	82	-1		40	0	90		1.96	0.79	-2.90	0.00
06-Feb-92	IT3V08	66	-2		45	0	3000		65.42	29.44	-105.98	0.00
06-Feb-92	IT3V09	88	0.2	-0.9	45	0	440		9.59	4.32	-15.54	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
06-Feb-92	IT3V10	76	-0.8		46	0	390		8.50	3.91	-14.47	0.00
06-Feb-92	IT4D01	67	-1		40	0	660		14.39	5.76	-16.12	0.00
06-Feb-92	IT4D02	64	-2.6		40	0	30		0.65	0.26	-0.71	0.00
06-Feb-92	IT4V01	53	-0.5		14	0	30		0.65	0.09	-0.26	0.00
06-Feb-92	IT4V02	61	-1		33	0	50		1.09	0.36	-1.01	0.00
06-Feb-92	IT4V03	71	-2.4		40	0	210		4.58	1.83	-4.95	0.00
06-Feb-92	IT4V04	61	-2.4		39	0	40		0.87	0.34	-0.92	0.00
06-Feb-92	IT5D01	89	-2.1	-1	10	6	470		10.25	1.02	-2.87	0.60
06-Feb-92	IT5V01	52	-0.1		20	0	10		0.22	0.04	-0.13	0.00
06-Feb-92	IT5V02	54	-0.3		30	0	90		1.96	0.59	-1.59	0.00
06-Feb-92	IT5V03	80	-1.3		40	0	270		5.89	2.36	-6.36	0.00
18-Feb-92	1BVW01	55	-4		5	6	40		0.87	0.04	-0.03	1.20
18-Feb-92	1BVW02	58	-2.6	-2	30	8	410		8.94	2.68	-21.99	0.27
18-Feb-92	1BVW03	73	-2.5	-2	27	5	260		5.67	1.53	-11.33	0.19
18-Feb-92	1BVW04	61	-0.02		0	10	20		0.44	0.00	0.00	0.00
18-Feb-92	2ABHW01	70	-2		40	0	2390		117.26	46.90	-309.57	0.00
18-Feb-92	2ABHW02	69	-6		40	0	800		39.25	15.70	-106.76	0.00
18-Feb-92	2ABHW03	68	-1		39	0	430		21.10	8.23	-54.30	0.00
18-Feb-92	2BVW01	60	-7.6		15	11	40		0.87	0.13	-1.05	0.73
18-Feb-92	2BVW02	98	-5.8	-4	30	3	250		5.45	1.64	-12.76	0.10
18-Feb-92	2BVW03	65	-1.5		50	0	30		0.65	0.33	-2.42	0.00
18-Feb-92	2BVW04	88	-4		40	0	125		2.73	1.09	-8.40	0.00

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.)		CH4 (%)	O2 (%)	Kurz Veloc. (ft/min)		Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
			I	A			I	A				
18-Feb-92	2BVW05	68	-2.3	-2	30	3	70		1.53	0.46	-3.30	0.10
18-Feb-92	3BVW01	72	-5.6		35	1	550		11.99	4.20	-37.78	0.03
18-Feb-92	3BVW02	74	-6		37	0	1520		33.14	12.26	-103.01	0.00
18-Feb-92	3BVW03	70	-4.4		47	0	240		5.233333	2.459667	-19.6773	0
18-Feb-92	3BVW04	89	-2.5		47	0	710		15.48194	7.276514	-61.1227	0
18-Feb-92	3BVW05	85	-1.9		47	0	430		9.376389	4.406903	-38.3401	0
18-Feb-92	3BVW06	73	-1.6		45	0	130		2.834722	1.275625	-10.205	0
18-Feb-92	3BVW07	62	-1.6	-1	5	15	30		0.654167	0.032708	-0.25513	3
18-Feb-92	3BVW08	67	-7.7		36	3	60		1.308333	0.471	-3.6738	0.083333
18-Feb-92	4BBW01	97	-8		48	0	980		21.36944	4.273889	-34.1911	0.45
18-Feb-92	4BDW02	112	-5.3		35	1	1060		23.11389	8.089861	-72.8088	0.028571
18-Feb-92	4BDW03	89	-5.5		45	1	640		13.95556	6.28	-47.1	0.022222
18-Feb-92	4BVW01	65	-0.9		0	21	20		0.436111	0	0	0
18-Feb-92	4BVW02	75	-2.4		40	0	40		0.872222	0.348889	-2.96556	0
18-Feb-92	4BVW03	66	-2.3	-0.5	0	20	30		0.654167	0	0	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
18-Feb-92	4BVW04	88	-5.3		46	2	560		12.21111	5.617111	-44.9369	0.043478
18-Feb-92	4BVW05	90	-6.3		45	0	540		11.775	5.29875	-45.5693	0
18-Feb-92	4BVW06	72	-3.3		40	0	150		3.270833	1.308333	-10.3358	0
18-Feb-92	4BVW07	67	-0.9		0	20	20		0.436111	0	0	0
18-Feb-92	4BVW08	67	-2.8	-2	19	11	120		2.616667	0.497167	-3.72875	0.578947
18-Feb-92	4BVW08.5	99	-4.5		40	2	12000		261.6667	104.6667	-680.333	0.05
18-Feb-92	4BVW09	66	-6.3	-5	27	30	30		0.654167	0.176625	-1.32469	1.111111
18-Feb-92	5BDW01	105	-7.7		45	0	980		21.36944	9.61625	-75.0068	0
18-Feb-92	5BVW01	90	-8.1		40	0	2680		58.43889	23.37556	-203.367	0
18-Feb-92	5BVW02	94	-5.8		40	2	1670		36.41528	14.56611	-129.638	0.05
18-Feb-92	5BVW03	102	-3.5		38	0	990		21.5875	8.20325	-70.548	0
18-Feb-92	5BVW04	113	-4.4		38	0	1270		27.69306	10.52336	-97.8673	0
18-Feb-92	5BVW05	118	-3	-1	14	2	1040		22.67778	3.174889	-31.1139	0.142857
18-Feb-92	5BVW06	102	-3.3	-2.5	26	4	990		21.5875	5.61275	-47.1471	0.153846

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
18-Feb-92	5BVW07	82	-1.8	-1	32	4	410		8.940278	2.860889	-22.601	0.125
18-Feb-92	5BVW08	108	-3.3		35	0	1020		22.24167	7.784583	-61.4982	0
18-Feb-92	5BVW09	101	-2.6		41	0	980		21.36944	8.761472	-75.3487	0
18-Feb-92	5BVW10	91	-2.1		37	1	1030		22.45972	8.310097	-61.4947	0.027027
18-Feb-92	6BDW01	69	-7.7		40	0	250		5.451389	2.180556	-16.5722	0
18-Feb-92	6BHW01	71	-5.7		45	0	12000		1046.667	471	-4474.5	0
18-Feb-92	6BHW02	66	-3.9		40	0	410		35.76111	14.30444	-114.436	0
18-Feb-92	6BHW03	68	-5.5		43	0	3600		314	135.02	-1188.18	0
18-Feb-92	6BHW04	66	-5.5		35	0	2145		187.0917	65.48208	-523.857	0
18-Feb-92	6BHW05	70	-3.8	-3.1	0	21	30		2.616667	0	0	0
18-Feb-92	6BHW06	67	-3.6	-2.8	0	21	25		2.180556	0	0	0
18-Feb-92	6BVW01	89	-4.7	-3.5	32	0	1170		25.5125	8.164	-71.8432	0
18-Feb-92	6BVW02	74	-3	-2.5	34	0	70		1.526389	0.518972	-4.15178	0
18-Feb-92	6BVW03	71	-1.7		39	0	60		1.308333	0.51025	-3.92893	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	Well Static Pressure ("W.C.) A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	Kurz Veloc. (ft/min) A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
18-Feb-92	6BVW04	97	-4.9	-3.5	18	0	930		20.27917	3.65025	-29.202	0
18-Feb-92	6BVW05	72	-2.5	-2	31	0	140		3.052778	0.946361	-7.09771	0
18-Feb-92	6BVW06	65	-1.4	-0.15	0	20	30		0.654167	0	0	0
18-Feb-92	6BVW07	82	-1.6	-1	30	0	410		8.940278	2.682083	-19.5792	0
18-Feb-92	6BVW08	74	-0.7		0	20	80		1.744444	0	0	0
18-Feb-92	6BVW09	72	-0.5		11	14	70		1.526389	0.167903	-1.17532	1.272727
18-Feb-92	6BVW10	67	-0.5		0	20	70		1.526389	0	0	0
18-Feb-92	6BVW11	70	-1		10	16	110		2.398611	0.239861	-1.67903	1.6
18-Feb-92	6BVW11.5	85	-1.8		30	0	750					0
18-Feb-92	6BVW12	69	-0.5		0	20	30		0.654167	0	0	0
18-Feb-92	6BVW12.5	70	-2.8		35	0	850		18.53472	6.487153	-47.3562	0
18-Feb-92	6BVW13	81	-1.3	-0.5	0	20	155		3.379861	0	0	0
18-Feb-92	6BVW13.2	67	-1		29	3	160		3.488889	1.011778	-7.18362	0.103448
18-Feb-92	6BVW13.5	97	-2.6	-2	34	0	850		18.53472	6.301806	-45.373	0
18-Feb-92	6BVW14	73	-2.2	-1.5	31	0	575		12.53819	3.88684	-27.9853	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
18-Feb-92	6BVW14.5	75	-3.5		39	0	1430		31.18194	12.16096	-87.5589	0
18-Feb-92	6BVW15	63	-1.8	-1	0	10	80		1.744444	0	0	0
18-Feb-92	6BVW15.5	75	-4		41	0	1330		29.00139	11.89057	-83.234	0
18-Feb-92	6BVW16	70	-1		41	25	130		2.834722	1.162236	-7.78698	0.609756
18-Feb-92	6BVW16.5	82	-1.4		43	0	750		16.35417	7.032292	-47.8196	0
18-Feb-92	6BVW17	72	-0.5		8	16	180		3.925	0.314	-2.1038	2
18-Feb-92	7BDW01	99	-9		39	0	5000		245.3125	95.67188	-535.763	0
18-Feb-92	7BDW02	102	-6.4		40	0	410		20.11563	8.04625	-64.37	0
18-Feb-92	7BDW03	105	-5		38	0	1650		80.95313	30.76219	-246.098	0
18-Feb-92	7BHW01	69	-3.2		0	21	30		2.616667	0	0	0
18-Feb-92	7BHW02	66	-3		22	0	510		44.48333	9.786333	-80.2479	0
18-Feb-92	7BVW01	66	-1.4	-0.1	0	21	35		0.763194	0	0	0
18-Feb-92	7BVW02	77	-2		43	0	250		5.451389	2.344097	-18.0495	0
18-Feb-92	7BVW03	77	-1.4		41	0	190		4.143056	1.698653	-12.9098	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
18-Feb-92	7BVW04	112	-2.4	-1.5	27	0	930		20.27917	5.475375	-42.7079	0
18-Feb-92	7BVW05	67	-1.3	-1.1	26	0	220		4.797222	1.247278	-8.73094	0
18-Feb-92	7BVW06	68	-0.5		7	20	50		1.090278	0.076319	-0.51897	2.857143
18-Feb-92	7BVW07	90	-3.5	-2.9	29	0	1880		40.99444	11.88839	-92.7294	0
18-Feb-92	8BHW01	66	-2.6		0	21	25		1.226563	0	0	0
18-Feb-92	8BHW02	63	-2.5	-2.2	0	21	26		1.275625	0	0	0
18-Feb-92	8BHW03	66	-0.4		0	21	140		12.21111	0	0	0
18-Feb-92	8BVW01	69	-0.5		0	21	22		0.479722	0	0	0
18-Feb-92	8BVW02	66	-1.1		0	21	165		3.597917	0	0	0
18-Feb-92	8BVW03	70	-1		45	0	460		10.03056	4.51375	-31.5963	0
18-Feb-92	8BVW04	71	-0.5		46	0	2080		45.35556	20.86356	-150.218	0
18-Feb-92	8BVW05	77	-2.2		39	0	2000		43.61111	17.00833	-149.673	0
18-Feb-92	8BVW06	84	-4		41	0	2350		51.24306	21.00965	-138.664	0
18-Feb-92	8BVW07	82	-4		44	0	2050		44.70139	19.66861	-137.68	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
18-Feb-92	8BVW08	83	-4		46	0	1750		38.15972	17.55347	-112.342	0
18-Feb-92	8BVW09	82	-6		45	0	3350		73.04861	32.87188	-197.231	0
18-Feb-92	9BDW01	108	-5.2		45	0	1125		24.53125	11.03906	-81.6891	0
18-Feb-92	9BDW02	100	-1.2		45	0	450		22.07813	9.935156	-69.5461	0
18-Feb-92	9BDW03	74	-1.2		43	0	135		6.623438	2.848078	-19.3669	0
18-Feb-92	9BDW04	97	-3.4		44	0	870		42.68438	18.78113	-154.005	0
18-Feb-92	9BDW05	92	-6.8		45	0	340		16.68125	7.506563	-51.0446	0
18-Feb-92	9BDW06	99	-5		45	0	5000		245.3125	110.3906	-827.93	0
18-Feb-92	9BDW07	99	-0.6		46	0	2200		47.97222	22.06722	-132.403	0
18-Feb-92	9BDW08	90	-0.6		45	0	1700		37.06944	16.68125	-116.769	0
18-Feb-92	9BVW00.5	62	-1	-0.6	5	8	100		2.180556	0.109028	-0.76319	1.6
18-Feb-92	9BVW01	63	-1.2	-1	0	19	26		0.566944	0	0	0
18-Feb-92	9BVW02	63	-1.4	-1	7	18	38		0.828611	0.058003	-0.39442	2.571429
18-Feb-92	9BVW03	93	-2.2		35	0	650		14.17361	4.960764	-35.7175	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
18-Feb-92	9BVW04	97	-6.8	-4	28	2	1200		26.16667	7.326667	-49.8213	0.071429
18-Feb-92	9BVW05	106	-2	-1.5	30	0	850		18.53472	5.560417	-37.8108	0
18-Feb-92	9BVW06	83	-0.6		42	0	150		3.270833	1.37375		0
18-Feb-92	9BVW07	91	-1.2		45	0	260		5.669444	2.55125	-15.8178	0
18-Feb-92	BVW01	59	-7	-5	32	8	310		6.759722	2.163111	-15.7907	0.25
18-Feb-92	BVW02	69	-6		48	0	840		18.31667	8.792	-70.336	0
18-Feb-92	BVW03	93	-5.5		40	1						0.025
18-Feb-92	BVW04	87	-6.4		40	1	2100		45.79167	18.31667	-146.533	0.025
19-Feb-92	2AAW01	79	-6.6		10	4	20		0.436111	0.043611	-0.37506	0.4
19-Feb-92	2AAW02	76	-0.4		2	9	20		0.436111	0.008722		4.5
19-Feb-92	2AAW03	91	-1.8		18	8	160		3.488889	0.628	-5.4008	0.444444
19-Feb-92	2AAW04	87	-0.1		36	1	40		0.872222	0.314	-2.7004	0.027778
19-Feb-92	2AAW05	89	-0.7		2	10	30		0.654167	0.013083	-0.11383	5
19-Feb-92	2AAW06	69	-0.1		0	21	20		0.436111	0	0	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
19-Feb-92	2AAW07	67			0	20	20		0.436111	0	0	0
19-Feb-92	2AAW08	89	-0.4		45	0	290		6.323611	2.845625	-24.4724	0
19-Feb-92	2AAW09	113	-3.5		44	0.5	870		18.97083	8.347167	-30.8845	0.011364
19-Feb-92	2ADW01	111	-8.1		47	0	12000		261.6667	122.9833	-1082.25	0
19-Feb-92	2ADW02	126	-4.2		54	0	760		16.57222	8.949	-76.9614	0
19-Feb-92	2AVW01	74	-8		7	5	70		1.526389	0.106847	-0.9082	0.714286
19-Feb-92	2AVW02	72	-0.4		42	0	150		3.270833	1.37375	-11.8143	0
19-Feb-92	2AVW03	73	-1.8		0	19	80		1.744444	0	0	0
19-Feb-92	2AVW04	119	-4.6		42	0						0
19-Feb-92	2AVW05	71	-7.9		2	16	40		0.872222	0.017444	-0.14828	8
19-Feb-92	2AVW06	69	-6.6		2	18	110		2.398611	0.047972	-0.40297	9
19-Feb-92	2AVW07	77	-0.2		0	20	20		0.436111	0		0
19-Feb-92	2AVW07.5	114	-3.4		59	1						0.016949
20-Feb-92	2AAW10	104	-3.6		28	2.5	870		18.97083	5.311833	-19.6538	0.089286

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
20-Feb-92	2AAW11	103	-3.6		18	1	870		18.97083	3.41475	-12.6346	0.055556
20-Feb-92	2AAW12	95	-3.4		25	2	870		18.97083	4.742708	-17.548	0.08
20-Feb-92	2AAW13	74	-2.7		4	18	870		18.97083	0.758833	-2.80768	4.5
20-Feb-92	2AAW14	96	-5.6		28	3						0.107143
20-Feb-92	2AAW15	66	-2.3		8.5	11						1.294118
20-Feb-92	2AAW16	68	-1.5		39	0	0		0	0	0	0
20-Feb-92	2AAW17	77	-0.5		22	1	160		3.488889	0.767556	-6.52422	0.045455
20-Feb-92	2AAW18	73	-0.3		35	0	130		2.834722	0.992153	-8.63173	0
20-Feb-92	2AAW19	74	-0.4		0	20	440		9.594444	0	0	0
20-Feb-92	2AAW20	94	-1.3		39	0	870		18.97083	7.398625	-59.9289	0
20-Feb-92	2AAW21	87	-0.6		22	0	870		18.97083	4.173583	-33.3887	0
20-Feb-92	2AAW22	72	-0.2		0	18	870		18.97083	0	0	0
20-Feb-92	2AVW08	73	-0.7		46	0	130		2.834722	1.303972	-10.9534	0
20-Feb-92	2AVW09	66	-0.7		0	20	190		4.143056	0	0	0
20-Feb-92	2AVW10	61	-4.5		25	5	11700		255.125	63.78125	-554.897	0.2

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
20-Feb-92	3ADW01	106	-5.5		48	1	15300		333.625	160.14	-1601.4	0.020833
20-Feb-92	3ADW02	116	-5.1		48	1						0.020833
20-Feb-92	3AVW01	90	-5		40	3						0.075
20-Feb-92	3AVW02	100	-3.1		44	0.5						0.011364
20-Feb-92	3AVW03	104	-1.7		46	1						0.021739
20-Feb-92	3AVW04	111	-2.9		40	1						0.025
20-Feb-92	3AVW05	94	-7.4		24	8	850		18.53472	4.448333	-39.1453	0.333333
20-Feb-92	3AVW06	96	-7.6		22	1	29		0.632361	0.139119	0	0.045455
20-Feb-92	3AVW07	87	-7.6		26	6	330		7.195833	1.870917	-16.0899	0.230769
20-Feb-92	3AVW07.5	113	-4.6		34	1.5	1420		30.96389	10.52772	-105.277	0.044118
20-Feb-92	3AVW08	108	-7.5		32	4	730		15.91806	5.093778	-43.2971	0.125
20-Feb-92	3AVW09	124	-3.5		32	2	2920		63.67222	20.37511	-175.226	0.0625
20-Feb-92	3AVW10	98	-3.8		36	2.5						0.069444
20-Feb-92	3AVW10.5	118	-1.6		41	1	820		17.88056	7.331028		0.02439

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
20-Feb-92	3AVW11	64	-1.6		5	13	30		0.654167	0.032708	-0.28129	2.6
21-Feb-92	4AVW01	64	-5.9		19	9	30		0.654167	0.124292	-1.18077	0.473684
21-Feb-92	4AVW02	81	-1.8		44	0.5	480		10.46667	4.605333	-46.0533	0.011364
21-Feb-92	4AVW03	72	-0.8		44	0	70		1.526389	0.671611	-6.31314	0
21-Feb-92	4AVW04	64	-0.2		44	0	30		0.654167	0.287833	-2.67685	0
21-Feb-92	4AVW06	76	-0.6		40	3	110		2.398611	0.959444	-8.73094	0.075
21-Feb-92	4AVW07	83	-0.8		38	1	70		1.526389	0.580028	-5.27825	0.026316
21-Feb-92	4AVW08	85	-0.7		25	1	170		3.706944	0.926736		0.04
21-Feb-92	4AVW09	60	-1		3	18	37		0.806806	0.024204	-0.23236	6
21-Feb-92	4AVW10	57	-0.5		39	0	13		0.283472	0.110554		0
21-Feb-92	4AVW11	61	-2.4		34	2.5	91		1.984306	0.674664	-6.00451	0.073529
21-Feb-92	4AVW12	77	-3.4		34	2	670		14.60972	4.967306	-44.209	0.058824
21-Feb-92	5AVW01	94	-1.6		24	4	820		17.88056	4.291333	-47.2047	0.166667
21-Feb-92	5AVW02	106	-3.1		36	1.5	3310		72.17639	25.9835	-270.228	0.041667

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.)		CH4 (%)	O2 (%)	Kurz Veloc. (ft/min)		Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
			I	A			I	A				
21-Feb-92	5AVW03	103	-2.6		44	1.5	1010		22.02361	9.690389	-108.532	0.034091
21-Feb-92	5AVW04	100	-1.2		44	0	370		8.068056	3.549944	-32.6595	0
21-Feb-92	5AVW05	105	-1.6		44	1	642		13.99917	6.159633	-56.6686	0.022727
21-Feb-92	5AVW06	92	-2.2		38	2	910		19.84306	7.540361	-72.3875	0.052632
21-Feb-92	5AVW07	95	-3.5		40	1	350		7.631944	3.052778	-28.0856	0.025
21-Feb-92	5AVW08	81	-1.1		44	0	167		3.641528	1.602272	-14.7409	0
21-Feb-92	5AVW09	79	-3.7		36	2	213		4.644583	1.67205	-14.8812	0.055556
21-Feb-92	5AVW10	75	-2.6		30	1.5	290		6.323611	1.897083	-18.212	0.05
21-Feb-92	5AVW11	85	-8.5		22	8	1782		38.8575	8.54865	-88.0511	0.363636
21-Feb-92	5AVW11.5	79	-3.2		36	3.5	390		8.504167	3.0615	-28.472	0.097222
21-Feb-92	5AVW12	82	-3.3		40	2	580		12.64722	5.058889	-57.1654	0.05
21-Feb-92	5AVW12.5	88	-5.3		32	4.5	673		14.67514	4.696044	-43.6732	0.140625
21-Feb-92	5AVW13	81	-5.7		32	4	690		15.04583	4.814667	-51.0355	0.125
21-Feb-92	5AVW13.5	68	-1.5		44	1.5	80		1.744444	0.767556	-6.67773	0.034091

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
21-Feb-92	5AVW14	73	-7.8		30	6	660		14.39167	4.3175	-40.1528	0.2
21-Feb-92	6AHW01	65	-2.8		41	2.5	5130		251.6906	103.1932	-1114.49	0.060976
21-Feb-92	6AHW02	66	-2.8		0	20	90		4.415625	0	0	0
21-Feb-92	6AHW03	68	-3.2		44	2	10.8		0.529875	0.233145	-2.28482	0.045455
21-Feb-92	6AHW04	74	-3.2		0	20	0		0	0	0	0
21-Feb-92	6AVW01	72	-0.8		0	19	14		0.305278	0	0	0
21-Feb-92	6AVW02	130	-1		18	5.5	400		8.722222	1.57	-6.751	0.305556
21-Feb-92	6AVW03	89	-2.8		26	1.5	400		8.722222	2.267778	-26.7598	0.057692
21-Feb-92	6AVW04	112	-3.2		28	3.5	490		10.68472	2.991722	-35.0032	0.125
21-Feb-92	6AVW05	84	-1.2		40	1	150		3.270833	1.308333	-13.4758	0.025
21-Feb-92	6AVW06	92	-1.7		38	2	380		8.286111	3.148722	-32.4318	0.052632
21-Feb-92	6AVW07	82	-3.1		44	2	250		5.451389	2.398611	-23.9861	0.045455
21-Feb-92	6AVW08	70	-2.2		0	21	60		1.308333	0	0	0
21-Feb-92	6AVW09	72	-1.7		16	9.5	60		1.308333	0.209333	-1.98867	0.59375

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.)		CH4 (%)	O2 (%)	Kurz Veloc. (ft/min)		Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
			I	A			I	A				
21-Feb-92	6AVW10	67	-1.9		39	1	60		1.308333	0.51025	-4.64328	0.025641
21-Feb-92	6AVW11	78	-3.6		18	2.5	350		7.631944	1.37375	-12.6385	0.138889
21-Feb-92	6AVW12	69	-0.7		0	20	32		0.697778	0	0	0
21-Feb-92	6AVW13	74	-0.8		10	15	0		0	0	0	1.5
21-Feb-92	6AVW14	135	-2.7		15	5	52		1.133889	0.170083	-1.51374	0.333333
21-Feb-92	6AVW15	86	-2.4		26	5	190		4.143056	1.077194	-9.04843	0.192308
21-Feb-92	6AVW16	87	-1.5		38	1	280		6.105556	2.320111	-19.2569	0.026316
21-Feb-92	6AVW17	81	-2.4		29	4	330		7.195833	2.086792	-18.1551	0.137931
24-Feb-92	1ABHW01	66	-2.7		36	0	3020		148.1688	53.34075	-144.02	0
24-Feb-92	1ABHW02	78	-2.6		42	0	120		5.8875	2.47275	-6.42915	0
24-Feb-92	1ABHW03	75	-2.6		35	0	710		34.83438	12.19203	-31.6993	0
24-Feb-92	1ABHW04	80	-1.9		40	0	3150		154.5469	61.81875	-191.638	0
24-Feb-92	1ABHW05	71	-2.7	-2	34	0	190		9.321875	3.169438	-8.55748	0
24-Feb-92	1ABHW06	83	-2.7	-2	32	0	274		13.44313	4.3018	-11.6149	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
24-Feb-92	1ABHW07	79	-1.6		35	0	1950		95.67188	33.48516	-97.107	0
24-Feb-92	1ABHW08	74	-2.7		40	0	40		1.9625	0.785	-2.1195	0
24-Feb-92	1ABHW09	75	-2.6	-2	28	0	280		13.7375	3.8465	-10.0009	0
24-Feb-92	1ABHW10	73	-2.6	-2	25	0	390		19.13438	4.783594	-12.4373	0
24-Feb-92	1ABHW11	75	-2.5	-2	25	0	380		18.64375	4.660938	-12.1184	0
24-Feb-92	1AVW01	72	-0.1		0	16	13		0.283472	0	0	0
24-Feb-92	1AVW02	78	-2.6		42	0	700		15.26389	6.410833	-58.9797	0
24-Feb-92	1AVW03	62	-8.5		8	16	11		0.239861	0.019189	-0.16886	2
24-Feb-92	1AVW04	76	-0.7		50	0	300		6.541667	3.270833	-28.7833	0
24-Feb-92	2BVW01	96	-0.7		20	0	350		7.631944	1.526389	-3.81597	0
24-Feb-92	2BVW02	96	-0.9		8	0	220		4.797222	0.383778	-0.95944	0
24-Feb-92	2BVW03	102	-2.2		36	0	340		7.413889	2.669	-6.6725	0
24-Feb-92	2BVW04	133	-1.4	-1	18	0	400		8.722222	1.57	-3.768	0
24-Feb-92	2BVW05	80	-2.5		38	0	330		7.195833	2.734417	-6.83604	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
24-Feb-92	3ABVW01	87	-2.2	-1.5	26	0	400		8.722222	2.267778	-6.34978	0
24-Feb-92	3ABVW02	97	-1.9		35	0	420		9.158333	3.205417	-8.33408	0
24-Feb-92	3ABVW03	112	-2	-1.5	23	0	680		14.82778	3.410389	-9.20805	0
24-Feb-92	3ABVW04	80	-1.2		35	0	240		5.233333	1.831667	-4.9455	0
24-Feb-92	3ABVW05	98	-2.4		38	0	1150		25.07639	9.529028	-28.5871	0
24-Feb-92	3ABVW06	97	-2.5		48	0	380		8.286111	3.977333	-11.1365	0
24-Feb-92	4ABDW01	77	-0.1		11	12						1.090909
24-Feb-92	4ABDW02	89	-1.7		43	0	370		8.068056	3.469264	-6.24468	0
24-Feb-92	4ABDW03	90	-1.7		45	0	360		7.85	3.5325	-7.065	0
24-Feb-92	4ABDW04	78	-2		47	1	60		1.308333	0.614917	-1.22983	0.021277
24-Feb-92	4ABDW05	99	-1.8		40	0	630		13.7375	5.495	-11.5395	0
24-Feb-92	6AHW01	75	-3.1		50	0	460		22.56875	11.28438	-120.743	0
24-Feb-92	6AHW02	75	-3		0	21	30		1.471875	0	0	0
24-Feb-92	6AHW03	73	-4		48	0	970		47.59063	22.8435	-221.582	0
24-Feb-92	6AHW04	74	-3.5		0	21	40		1.9625	0	0	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
24-Feb-92	6AVW01	76	-0.7		0	18	60		1.308333	0	0	0
24-Feb-92	6AVW02	127	-1.2	-0.6	15	6	320		6.977778	1.046667	-11.8273	0.4
24-Feb-92	6AVW03	88	-3	-2.5	27	0	800		17.44444	4.71	-52.752	0
24-Feb-92	6AVW04	117	-3.5	-3	30	1	600		13.08333	3.925	-45.1375	0.033333
24-Feb-92	6AVW05	85	-1.7		36	2	270		5.8875	2.1195	-21.8309	0.055556
24-Feb-92	6AVW06	90	-3.8	-3	34	2.5	340		7.413889	2.520722	-25.4593	0.073529
24-Feb-92	6AVW07	81	-4		45	0	300		6.541667	2.94375	-29.4375	0
24-Feb-92	6AVW08	77	-2.6	-1.5	3	19	27		0.58875	0.017663	-0.16956	6.333333
24-Feb-92	6AVW09	73	-2.2	-1.4	15	9	85		1.853472	0.278021	-2.6134	0.6
24-Feb-92	6AVW10	73	-2	-1.5	30	0	90		1.9625	0.58875	-5.23988	0
24-Feb-92	6AVW11	78	-3.8	-3	20	0	280		6.105556	1.221111	-11.1121	0
24-Feb-92	6AVW12	72	-0.5		0	21	40		0.872222	0	0	0
24-Feb-92	6AVW13	74	-1	-0.5	35	6	20		0.436111	0.152639	-1.31269	0.171429
24-Feb-92	6AVW14	132	-2.8	-2	15	4	450		9.8125	1.471875	-12.6581	0.266667

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.)		CH4 (%)	O2 (%)	Kurz Veloc. (ft/min)		Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
			I	A			I	A				
24-Feb-92	6AVW15	83	-2.4	-2	27	2	330		7.195833	1.942875	-16.1259	0.074074
24-Feb-92	6AVW16	82	-1.6		38	0	450		9.8125	3.72875	-30.9486	0
24-Feb-92	6AVW17	77	-2.5	-2	33	2	510		11.12083	3.669875	-31.9279	0.060606
24-Feb-92	7ADHW05	101	-9.1		50	0	470					0
24-Feb-92	7ADW01	87	-2.7	-3	52	0						0
24-Feb-92	7ADW02	84	-10.7		54	0						0
24-Feb-92	7ADW03	74	-10.1		54	0	1550		76.04688	41.06531	-414.76	0
24-Feb-92	7ADW04	105	-8.5		45	0	1300		63.78125	28.70156	-304.237	0
24-Feb-92	7ADW06	98	-2.3		42	0	240		11.775	4.9455	-50.9387	0
24-Feb-92	7ADW07	102	-3.2		47	0	570		27.96563	13.14384	-116.98	0
24-Feb-92	7ADW08	89	-2.4		48	0	430		21.09688	10.1265	-87.0879	0
24-Feb-92	7AHW01	69	-10.3		44	0	5370		468.3833	206.0887	-2349.41	0
24-Feb-92	7AHW02	72	-4.3	-2.7	0	21	11		0.959444	0	0	0
24-Feb-92	7AHW03	73	-7.2	-2.9	31	0.5	3800		331.4444	102.7478	-1089.13	0.016129
24-Feb-92	7AHW04	74	-8.8	-3.3	0	21	20		1.744444	0	0	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
24-Feb-92	7AHW05	73	-3.8	-3.2	0	21	30		2.616667	0	0	0
24-Feb-92	ANVW00.5	80	-1.6	-0.5	11	11	210		4.579167	0.503708	-4.38226	1
24-Feb-92	ANVW01	60	-0.6		4	6	20		0.436111	0.017444	-0.15351	1.5
24-Feb-92	ANVW02	68	-0.9		42	0	330		7.195833	3.02225	-27.8047	0
24-Feb-92	ANVW03	66	-2		26	1	31		0.675972	0.175753	-1.59935	0.038462
24-Feb-92	ASVW01	59	-5.2		21	2.5	22		0.479722	0.100742	-1.09808	0.119048
24-Feb-92	ASVW02	67	-9.7		40	3						0.075
24-Feb-92	ASVW03	77	-4.4	-5	55	0	530		11.55694	6.356319	-65.4701	0
24-Feb-92	IT1V01	78	-1.1	-0.5	0	21						0
24-Feb-92	IT1V02	78	-2.6	-1.5	18	10	650		14.17361	2.55125	-6.63325	0.555556
24-Feb-92	IT1V03	78	-2.6		40	0	70		1.526389	0.610556	-1.58744	0
24-Feb-92	IT2D01	74	-2.6	-0.7	0	21						0
24-Feb-92	IT2D02	84	-2.7		43	0	200		4.361111	1.875278	-5.06325	0
24-Feb-92	IT2D03	88	-2.6		45	0	60		1.308333	0.58875	-1.58963	0
24-Feb-92	IT2D04	82	-2.6		44	0	60		1.308333	0.575667	-1.5543	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
24-Feb-92	IT2D05	92	-1.3		42	0	590		12.86528	5.403417	-14.5892	0
24-Feb-92	IT2V01	81	-2.6		40	0	1000		21.80556	8.722222	-22.6778	0
24-Feb-92	IT2V02	79	-2.8		41	0	800		17.44444	7.152222	-20.0262	0
24-Feb-92	IT2V04	106	-2.6	-1.5	44	0	350		7.631944	3.358056	-8.73094	0
24-Feb-92	IT2V05	75	-1.8		43	0	40		0.872222	0.375056	-0.97514	0
24-Feb-92	IT2V06	116	-1.1	-1	47	0	470		10.24861	4.816847	-13.4872	0
24-Feb-92	IT2V07	84	-2.6		45	0	110		2.398611	1.079375	-2.91431	0
24-Feb-92	IT2V08	82	-2.5		45	0	90		1.9625	0.883125	-2.38444	0
24-Feb-92	IT2V09	84	-0.7		42	0	330		7.195833	3.02225	-8.16008	0
24-Feb-92	IT2V10	102	-2.5	-2	33	0	800		17.44444	5.756667	-15.543	0
24-Feb-92	IT2V11	110	-1.6	-1	30	1	180		3.925	1.1775	-3.297	0.033333
24-Feb-92	IT2V12	81	-2.6	-2	16	7	20		0.436111	0.069778	-0.18142	0.4375
24-Feb-92	IT2V13	74	-2.5		20	0	20		0.436111	0.087222	-0.21806	0
24-Feb-92	IT3D01	90	-1.8		40	0	50		1.090278	0.436111	-1.87528	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
24-Feb-92	IT3V01	76	-3	-1.5	39	0	960		20.93333	8.164	-42.4528	0
24-Feb-92	IT3V02	77	-3.7		38	0	480		10.46667	3.977333	-18.2957	0
24-Feb-92	IT3V03	75	-1.1	-0.7	20	0	20		0.436111	0.087222	-0.41867	0
24-Feb-92	IT3V04	72	-3.4	-1	3	18	30		0.654167	0.019625	-0.08831	6
24-Feb-92	IT3V05	76	-2.8		35	2	40		0.872222	0.305278	-1.37375	0.057143
24-Feb-92	IT3V06	72	-3.1		40	0	60		1.308333	0.523333	-2.30267	0
24-Feb-92	IT3V07	88	-1.6		38	0	200		4.361111	1.657222	-7.4575	0
24-Feb-92	IT3V08	75	-4.1		40	0	300		6.541667	2.616667	-10.7283	0
24-Feb-92	IT3V09	82	-1.3		41	0	220		4.797222	1.966861	-8.06413	0
24-Feb-92	IT3V10	98	-1.7		40	0	300		6.541667	2.616667	-10.99	0
24-Feb-92	IT4D01	79	-1.5		35	0	60		1.308333	0.457917	-2.06063	0
24-Feb-92	IT4D02	83	-4.5		52	0	250		5.451389	2.834722	-12.7563	0
24-Feb-92	IT4V01	76	-0.2		0	20	90		1.9625	0	0	0
24-Feb-92	IT4V02	76	-1.5		36	1	200		4.361111	1.57	-7.065	0.027778
24-Feb-92	IT4V03	83	-3.5		52	0	350		7.631944	3.968611	-17.8588	0

Date	Well ID	Gas Temp. (F)	Well Static Pressure ("W.C.) I	A	CH4 (%)	O2 (%)	Kurz Veloc. (ft/min) I	A	Gas Flow Rate (cfm)	CH4 Flow Rate (cfm)	Vacuum To CH4 Flow Rate Ratio	Compost Ratio ("R" Value)
24-Feb-92	IT4V04	78	-2	-2.5	52	0	260		5.669444	2.94811 1	-13.2665	0
24-Feb-92	IT5D01	100	-0.1		12	9	480		10.46667	1.256	-3.768	0.75
24-Feb-92	IT5V01	81	-0.1		0	21	50		1.090278	0	0	0
24-Feb-92	IT5V02	78	-0.5		29	0	190		4.143056	1.20148 6	-5.40669	0
24-Feb-92	IT5V03	86	-0.5	-1	52	0	740		16.13611	8.39077 8	-37.7585	0

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HARRY M. SIZEMORE
ROBERT M. ALPERN
MICHAEL M. MILLER
ASSISTANT DIRECTORS

SUITE 1400, CITY HALL EAST
200 NORTH MAIN STREET
LOS ANGELES, CA 90012
(213) 485-5112
FAX NO. (213) 626-5514

FEB 05 1992

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4182

Attention: Mohsen Nazemi, Senior Engineering Manager

ADDITIONAL PROCEDURES FOR REPAIR OF LANDFILL COVER- DISPOSAL AREA AB+

The Bureau completed the connection of the horizontal well termination points in disposal area AB+ as described in the Bureau's January 17, 1992 letter to your office. The completion date was January 31, 1992. A recheck of the interface area on February 4, 1992 showed a reduction in the intensity and number of exceedance points, but not a complete elimination.

As discussed during the telephone conversation between Jay Chen of the SCAQMD and Scott Hill of my staff on February 5, 1992, the Bureau proposes to install an additional horizontal well parallel to the interface in grid #58. The well will be installed at approximately 1700 feet, with the east termination point connected to the most recent horizontal, and the west termination point to the header on bench 4 in disposal area AB+. This well should eliminate the remaining emissions by intercepting the gas before it can reach the surface. The procedure for the installation will be identical to the horizontal well installation procedure currently used at the landfill, and will also follow the Permit to Construct No. 25505. The approximate location and length of the well is shown on the attached plan.

For your information, an updated Instantaneous Monitoring Field Report for grid #58 is also attached. This report shows all of the action taken to date by the Bureau to mitigate the exceedance.

It is critical that the Bureau receives immediate approval to commence installation of this well in order to keep ahead of current trash fill operations. Please contact Kelly Gharios of my staff at (818) 989-8586 if you should have any questions.

Delwin A. Biagi gmt

Delwin A. Biagi
Director

enclosures

cc: Edwin Pupka, Senior Enforcement Manager
Elliot Sernell, Senior Deputy District Prosecutor
Chris Westhoff, City Attorney
Mike Miller, Assistant Director
Mal Toy, Principal Sanitary Engineer
John Behjan, Sanitary Engineer
John de la Rosa, Manager
Kelly Gharios, Sanitary Engineer
Turner Johnson, Superintendent II
Scott Hill, Sanitary Engineering Assistant
Tom Nuckols, BAS

#91

INSTANTANEOUS MONITORING FIELD REPORT
FOR READINGS GREATER THAN 500 ppm/v

DATE OF ORIGINAL REPORT: 12-27-91

RECORD NUMBER: IME-12-10

INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT				INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RECHECK				10 DAY RECHECK [2]			
DATE	TIME	GRID ID	DESCRIPTION	INSPECTOR	VALUE[3] (ppm/v)	SOIL	WATER	OTHER	CREW	DATE	TIME	DATE	TIME	GRID ID	VALUE (ppm/v)	DATE	TIME	GRID ID	VALUE (ppm/v)
12-27	10:30	#58	Crack runs	21 points						12/28/91	1500	1/10/92	1425	58	10,000 PPM	1/10/92	1425	~~58~~	10,000 ppm
			along interface	E.P 1.	5000	✓	✓	8 LOADS OF DIRT [illegible]	RH DB	12/27/91	1500	1-2-92	1415	58	3,000				
			of virgin slope	E.P 2.	5000	✓	✓	DB CAT	" "	12/27/91	1500								
			in Grid #58	E.P 3.	5000	✓	✓	" "	" "	12/27/91	1500								
			Targeted area	E.P 4.	5000	✓	✓	" "	" "	12/27/91	1500								
			are flag with	E.P 5.	5000	✓	✓	ADJUSTED HORIZONTAL WELLS IN TARGETED AREA	G.V., E.P.	12/27/91	1400								
			Red Flags																
[illegible]		58	RAIN DELA	YS	SEE	BEL	OW												
						✓	✓	5 LOADS OF DIRT [illegible]	RH DB	1/13/92	1600	1-14-92	[illegible]	58	[illegible]				
						✓	✓	4 LOADS OF DIRT [illegible]	JL DB	1/14/92	1600	1-15-92	1515	58	3,000				
1-15-92		58	MEET &	CONFER	WI	TH	AQ	MD (LETTER	ON	FILE	DA	TED	1-	17-9	2).				

1. Walking in the crack is assumed to be part of all repairs except those in concrete, gunite or asphalt surface; or when a well field adjustment is required.

2. The ten day re-check procedure is to monitor within ten days if the recheck is below 500 ppm.

3. This is the original measured value that initiate the repair effort. It is entered only once by the monitoring inspector. Repairs extending beyond 24 hours do not start with the recheck value. Instantaneous readings measured as methane.

* 12-28-91 SAT RAIN DELAY NOT CALLED TO AQMD
(1.31 IN PER LA COUNTY F.C. NAGEL CYN STA
12-30-91 RAIN DELAY (TILL 1-4-92)
1-2-92 WIND DELAY
1-3-92 RAIN DELAY (TILL 1-7-92)
1-5-92 RAIN DELAY (TILL 1-9-92)
1-6-92 WIND DELAY
1-7-92 RAIN DELAY (TILL 1-11-92)
1-8-92 WIND DELAY

NOTE: Targeted points are of a continuous crack in Interface of slope

GRID 58

#91

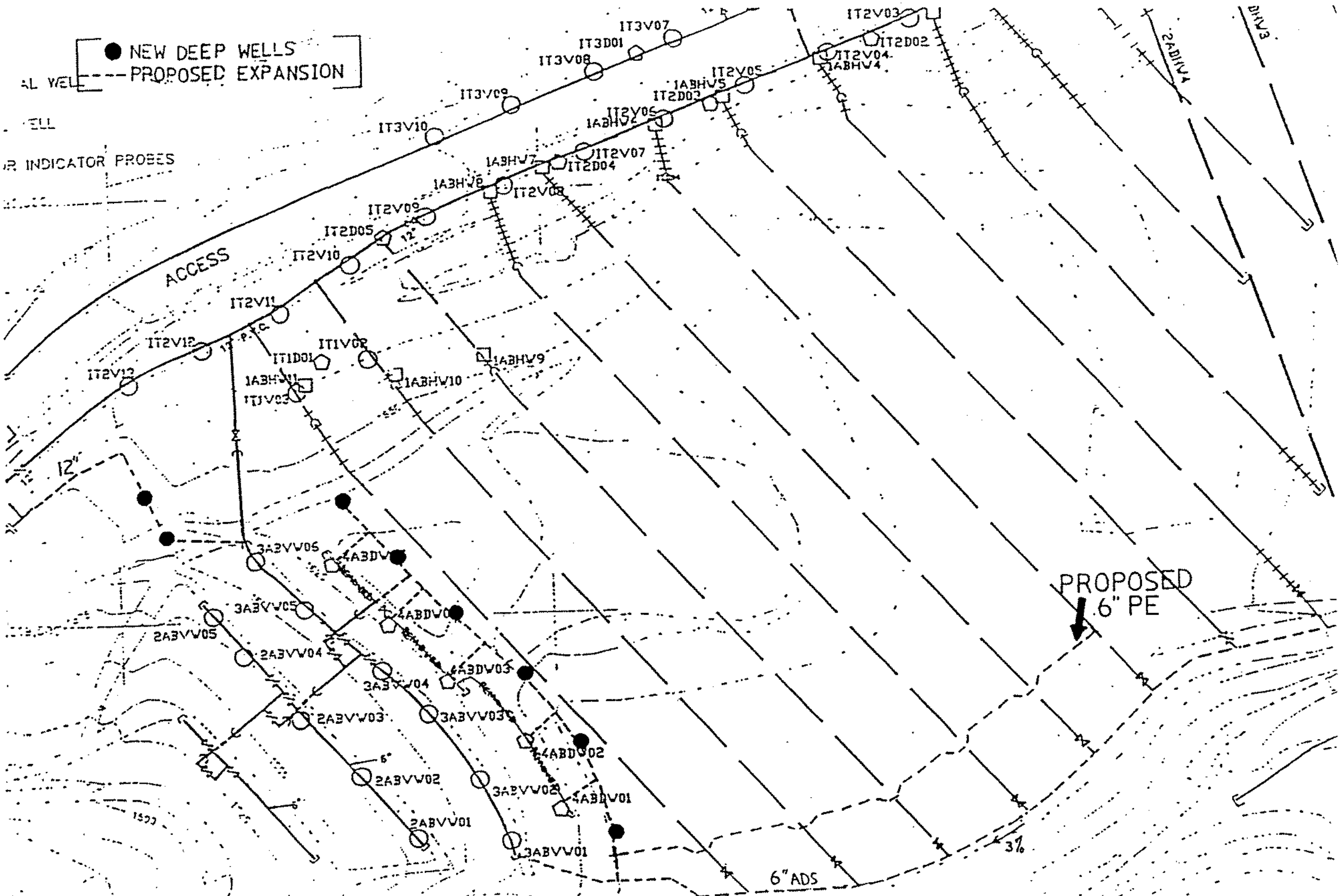
INSTANTANEOUS MONITORING FIELD REPORT
FOR READINGS GREATER THAN 500 ppm/v
DATE OF ORIGINAL REPORT: 12-27-91
RECORD NUMBER: 1111E 12-10

INSPECTION REPORT						REPAIR CREW REPORT						INSPECTION REPORT				INSPECTION REPORT			
						DESCRIPTION OF REPAIR [1]				COMPLETION		RECHECK				10 DAY RECHECK [2]			
DATE	TIME	GRID ID	DESCRIPTION	INSPECTOR	VALUE[3] (ppm/v)	SOIL	WATER	OTHER	CREW	DATE	TIME	DATE	TIME	GRID ID	VALUE (ppm/v)	DATE	TIME	GRID ID	VALUE (ppm/v)
		58				✓	✓	installed operating under the horizontal	RH SF	1-30-92	5:30 pm	1/2/92	8:15	58	3166				
								wells installed	crew				(C..)	1					
								in deck of											
								A & T. Added				2/1/92	11:30	58	7300				
								soil and water											
								& rewalked.					(E..)	M	2				
												2-4-92	1530	58	800 ppm				
												1F 3	5H	E	5,000				

1. Walking in the crack is assumed to be part of all repairs except those in concrete, gunite or asphalt surface; or when a well field adjustment is required.

2. The ten day re-check procedure is to monitor within ten days if the recheck is below 500 ppm.

3. This is the original measured value that initiate the repair effort. It is entered only once by the monitoring inspector. Repairs extending beyond 24 hours do not start with the recheck value. Instantaneous readings measured as methane.



NEW DEEP WELLS
PROPOSED EXPANSION
AL WELL
ELL
R INDICATOR PROBES
ACCESS
IT3V07
IT3D01
IT3V08
IT3V09
IT3V10
IT2V03
IT2D02
IT2V04
1ABHV4
IT2V05
1ABHV5
IT2D03
IT2V06
1ABHV6
IT2V07
IT2D04
1ABHV7
1ABHV8
IT2V08
IT2V09
IT2D05
IT2V10
IT2V11
IT2V12
IT2V13
IT1V02
IT1D01
1ABHV9
1ABHV10
1ABHV11
IT1V03
12"
3ABVV05
3ABVV04
3ABVV03
3ABVV02
3ABVV01
2ABVV05
2ABVV04
2ABVV03
2ABVV02
2ABVV01
4ABDV03
4ABDV02
4ABDV01
6"
PROPOSED
6" PE
3%
6"ADS
2ABHV4

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TOM BRADLEY
MAYOR

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DELWIN A. BIAGI
DIRECTOR
HARRY M. SIZEMORE
ROBERT M. ALPERN
JOHN T. CROSSE
SAM FURUTA
MICHAEL M. MILLER
ASSISTANT DIRECTORS

SUITE 1400, CITY HALL EAST
200 NORTH MAIN STREET
LOS ANGELES, CA 90012
(213) 485-5112
FAX No. (213) 626-5514

FEB 07 1992

South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, California 91765-4182

Attention: Mohsen Nazemi, Senior Engineering Manager

LOPEZ CANYON LANDFILL - REQUEST FOR MODIFICATION - PERMIT TO CONSTRUCT HORIZONTAL GAS WELLS - PERMIT NO. R-255005

The Bureau of Sanitation (Bureau) requests a revision to the Permit to Construct R-255005, granted January 13, 1992.

In the letter to SCAQMD dated August 9, 1991, the Bureau requested a permit to construct nine (9) layers of horizontal wells at Lopez Canyon Disposal Area C. The first layer was to be installed over the proposed leachate liner at elevation 1405 ft. However, upon further review, the Bureau decided to forgo the proposed first layer and start with the second layer at elevation 1425 ft., that is 20 ft above the leachate liner. This decision was made primarily because the structural integrity of the proposed piping system could not be guaranteed during the placement of refuse, moveover the deletion of the first layer would not have any negative impact to the effectiveness of the gas extraction system at Disposal Area "C".

If there are any questions, please contact Ms. Rosalia Rojo at (213) 893-8206.

Delwin A. Biagi 9MT
DELWIN A. BIAGI
Director

cc: Edwin Pupka, Senior Enforcement, SCAQMD
Elliot Sernell, Senior Deputy District Prosecutor
Chris Westhoff, City Attorney
John de la Rosa, Manager, Lopez Canyon Landfill
Kelly Gharios, Lopez Repository

a:rr19-pj

[redacted]

CITY OF LOS ANGELES
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TOM BRADLEY
MAYOR

DEPARTMENT OF
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DELWIN A. BIAGI
DIRECTOR
HARRY M. SIZEMORE
ROBERT M. ALPERN
JOHN T. CROSSE
SAM FURUTA
MICHAEL M. MILLER
ASSISTANT DIRECTORS

SUITE 1400, CITY HALL EAST
200 NORTH MAIN STREET
LOS ANGELES, CA 90012
(213) 485-5112
FAX NO. (213) 626-5514

FEB 12 1992

South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765-4182

Attention: Mohsen Nazemi, Senior Engineering Manager

LOPEZ CANYON LANDFILL GAS WELL AND PROBE AS-BUILT DRAWINGS

Enclosed please find a copy of the Lopez Canyon Landfill gas well probe final as-built drawings prepared as of January, 1992. Preliminary as built-drawings have already been submitted to your office thus satisfying Condition 33 of Permit to Construct Number R-237767.

If you have any questions, please contact John Behjan at (213) 893-8208.

Delwin A. Biagi mt

DELWIN A. BIAGI
Director

Enclosure

cc: Edwin Pupka, Senior Enforcement, SCAQMD
Elliot Sernell, Senior Deputy District Prosecutor
Chris Westhoff, City Attorney
John de la Rosa, Manager, Lopez Canyon Landfill
Kelly Gharios, Lopez Repository
Steve Derus, BAS

a:rr20-pj

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HARRY M. SIZEMORE
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MICHAEL M. MILLER
ASSISTANT DIRECTORS
SUITE 1400, CITY HALL EAST
200 NORTH MAIN STREET
LOS ANGELES, CA 90012
(213) 485-5112
FAX No. (213) 626-5514

FEB 12 1992

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4182

Attention: Mohsen Nazemi, Senior Engineering Manager

ADDITIONAL PROCEDURES FOR REPAIR OF LANDFILL COVER- DISPOSAL AREA AB+

In the interest of constantly improving the efficiency of gas collection system at the Lopez Canyon Landfill, the Bureau of Sanitation proposes to install four (4) vertical wells in addition to the eight (8) described in the January 17, 1992 letter to your office. These wells will be placed in two regions of the landfill which have been labeled by the Bureau as areas of concern.

The first area of concern is the initial trash region described in the August 9, 1991 letter to your office referencing the exceedances detected on July 31, 1991. In accordance with step three of the letter, the Bureau proposes to install two gas collection wells at a depth of 75 feet to mitigate the exceedances. The location of the proposed wells is shown on the enclosed plan. The depths and locations of the wells were determined from the results of the five borings, described in an October 11, 1991 letter to your office. The borings were completed on January 22, 1992. Data from these borings is included as an attachment.

The second area of concern is the southeast corner of monitoring grid #15. Emission exceedances have reoccurred in this area over the past several months. The Bureau proposes to install up to two (2) wells along the header on bench 7A at a minimum depth of 50 feet. A plan showing the approximate location of the first well is attached. A determination on the second well will be made once the first well is complete.

The Bureau will follow the Permit to Construct # 255005 when installing the above mentioned wells. The Bureau would like approval from your office by February 14, 1992 to prevent an interruption in the well installation operation describe in the January 17, 1992 letter. Please contact Scott Hill of my staff if you should have any comments or questions.

Delwin A. Biagi gmT

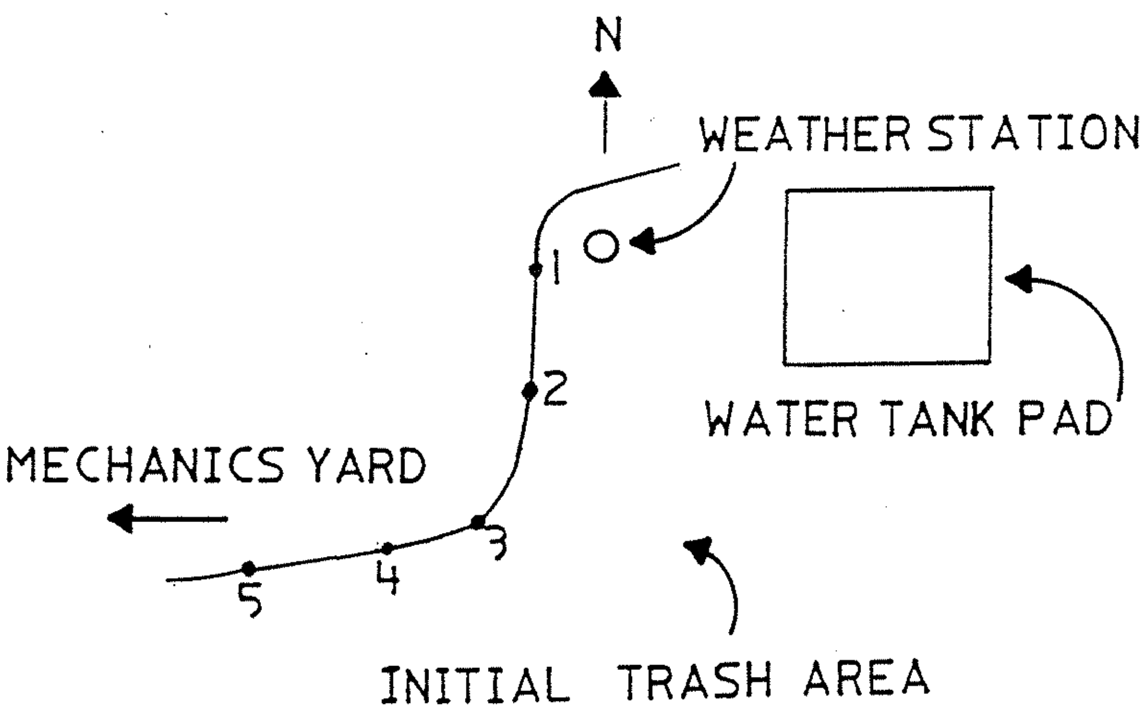
Delwin A. Biagi
Director

enclosures

cc: Edwin Pupka, Senior Enforcement Manager
Elliot Sernell, Senior Deputy District Prosecutor
Chris Westhoff, City Attorney
Mike Miller, Assistant Director
Mal Toy, Principal Sanitary Engineer
John Behjan, Sanitary Engineer
John de la Rosa, Manager
Kelly Gharios, Sanitary Engineer
Turner Johnson, Superintendent II
Scott Hill, Sanitary Engineering Assistant
Tom Nuckols, BAS

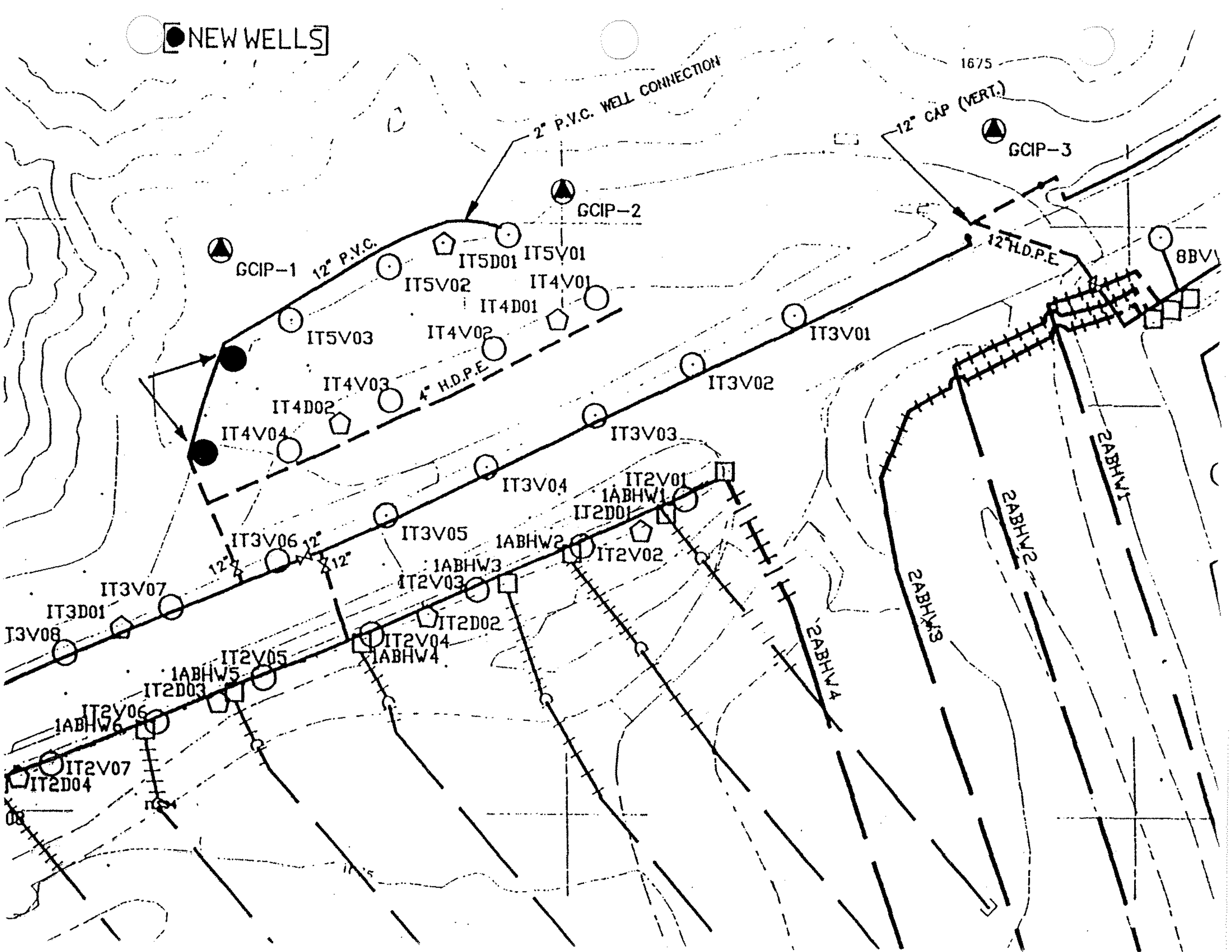
BORINGS TO ESTABLISH LIMITS OF TRASH IN INTIAL TRASH AREA, LOPEZ CANYON LANDFILL.

BORING	DEPTH OF TRASH	TOTAL DEPTH TO BEDROCK
TB1	42'- 78'	90'
TB2	27'- 127'	138'
TB3	21'- 135'	145'
TB4	19'- 78'	85'
TB5	40'- 67'	75'



INITIAL TRASH - TEST BORINGS

POINT	NORTH	EAST	ELEVATION
TB1	220349.074	169154.028	1703.882
TB2	220250.403	169150.996	1693.897
TB3	220184.411	169091.302	1689.572
TB4	220152.982	169000.521	1687.540
TB5	220130.234	168923.803	1679.441


NEW WELLS
2" P.V.C. WELL CONNECTION
12" CAP (VERT.)
1675
GCIP-1
GCIP-2
GCIP-3
12" P.V.C.
12" H.D.P.E.
4" H.D.P.E.
IT5V01
IT5V02
IT5V03
IT5D01
IT4V01
IT4V02
IT4V03
IT4V04
IT4D01
IT4D02
IT3V01
IT3V02
IT3V03
IT3V04
IT3V05
IT3V06
IT3V07
IT3V08
IT3D01
IT2V01
IT2V02
IT2V03
IT2V04
IT2V05
IT2V06
IT2V07
IT2D01
IT2D02
IT2D03
IT2D04
1ABHW1
1ABHW2
1ABHW3
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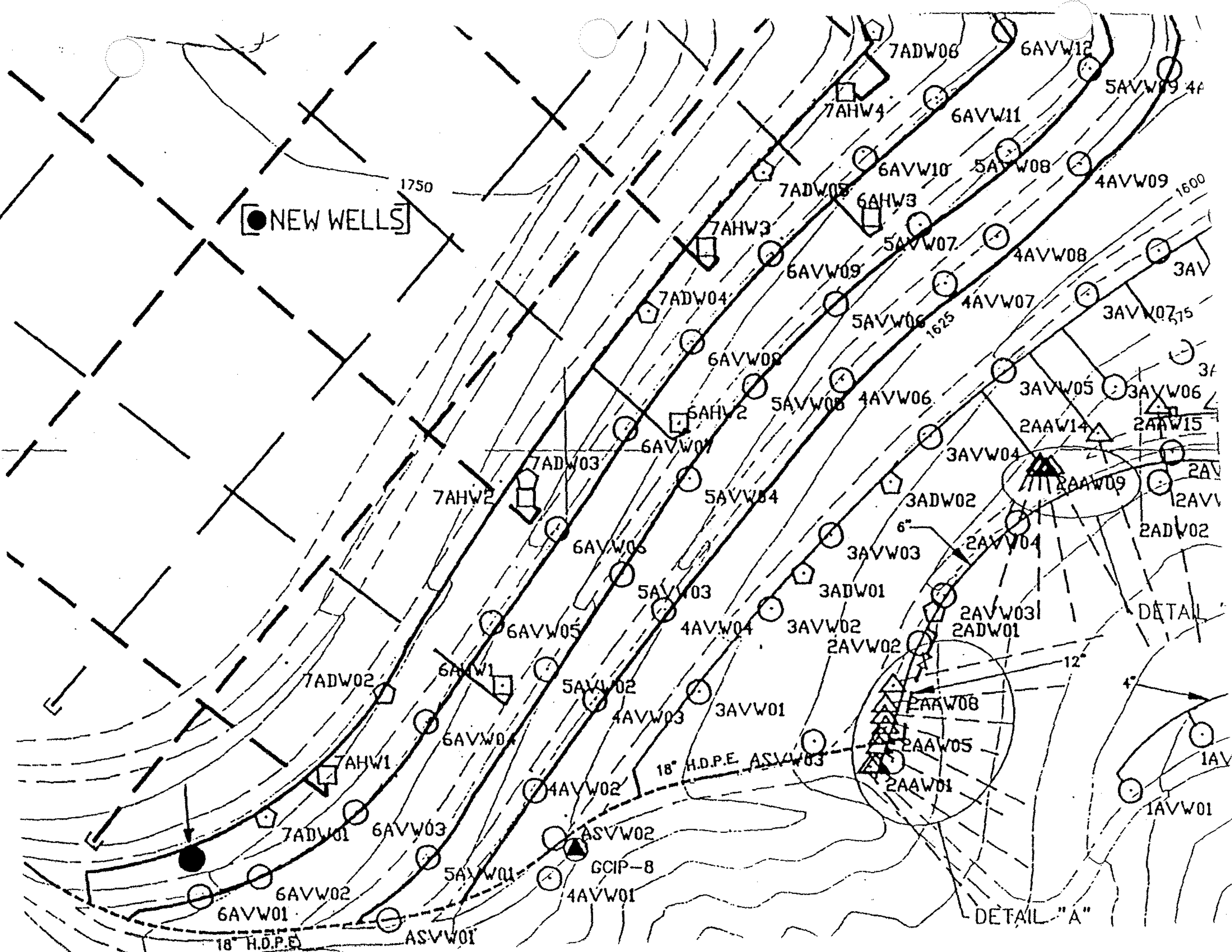
1ABHW5
1ABHW6
2ABHW1
2ABHW2
2ABHW3
2ABHW4
8BV
12"



NEW WELLS
1750
1600
1625
7ADW06
6AVW12
5AVW09
7AHW4
6AVW11
6AVW10
5AVW08
4AVW09
7ADW05
6AHW3
7AHW3
5AVW07
4AVW08
6AVW09
4AVW07
7ADW04
5AVW06
3AVW07
6AVW08
3AVW05
3AVW06
5AVW05
4AVW06
6AHW2
2AAW14
2AAW15
6AVW07
3AVW04
7ADW03
2AAW09
7AHW2
5AVW04
3ADW02
6"
2AVW04
2ADW02
6AVW06
3AVW03
5AVW03
3ADW01
2AVW03
2ADW01
6AVW05
4AVW04
3AVW02
DETAIL
2AVW02
12"
6AHW1
7ADW02
5AVW02
3AVW01
4"
2AAW08
4AVW03
6AVW04
2AAW05
7AHW1
18" H.D.P.E
ASVW03
2AAW01
4AVW02
1AVW01
7ADW01
6AVW03
ASVW02
GCIP-8
5AVW01
4AVW01
6AVW02
6AVW01
DETAIL "A"
18" H.D.P.E
ASVW01

[redacted]

CITY OF LOS ANGELES

CALIFORNIA

TOM BRADLEY
MAYOR

DEPARTMENT OF
PUBLIC WORKS

BUREAU OF SANITATIC

DELWIN A. BIAGI
DIRECTOR

HARRY M. SIZEMORE
ROBERT M. ALPERN
MICHAEL M. MILLER
ASSISTANT DIRECTORS

SUITE 1400, CITY HALL EAST
200 NORTH MAIN STREET
LOS ANGELES, CA 90012
(213) 485-5112
FAX No. (213) 626-5514

FEB 14 1992

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4182

Attention: SCAQMD Enforcement Manager, Air Toxics Control Branch, and Engineering Manager for Landfills

LOPEZ CANYON SANITARY LANDFILL - PROPOSED NOTIFICATION FOR TEMPORARY EXCLUDED GRIDS

Per our letter dated November 18, 1991 and our agreement, the Bureau, is notifying the SCAQMD Enforcement Manager in writing of grids that will be temporarily excluded this month from instantaneous monitoring and integrated sampling. To avoid any delays, the Bureau's notification will be telecopied to SCAQMD.

Grids #44, 46, 47, 51, 52, 59, 60, 67, 68, 69, 70, 75, 76, 77, 78, 79, 81 and 82 will be temporarily excluded this month. The reason for the temporary exclusion is due to construction and equipment landfill activities that result in heavy equipment traffic.

The Bureau also requests that the SCAQMD Enforcement Manager notifies the Director of the Bureau in writing of his decision in three (3) days of the Bureau's notification date. AQMD's concerns if any, as a result of the Bureau's temporary exclusions will be addressed by the Bureau within three (3) days of AQMD's decision. The Bureau's notification and SCAQMD's response will be included in the Bureau's monthly report to SCAQMD.

Delwin A Biagi (AdIR)
DELWIN A. BIAGI
Director

DAB/KG:mep

cc: Edwin Pupka, Senior Enforcement Manager
Elliot Sernell, Senior Deputy District Prosecutor
John de la Rosa, Manager I
Turner L. Johnson
Brian Yeh
Ivan Forbes

[EXGRIDS]

MESSAGE CONFIRMATION
TRANSMISSION

FEB-14-'92 FRI 17:17

TERM ID: LOPEZ COMPLIANCE SAN P-0000
TEL NO.: 818 969 8216

NO.	DATE	ST. TIME	TOTAL TIME	ABBR/SBD	ID	DEPT CODE	#PGS	
689	02-14	17:15	00°01'39		714 396 3342		OK- 2	NG- 0

MESSAGE CONFIRMATION
TRANSMISSION

FEB-14-'92 FRI 17:19

TERM ID: LOPEZ COMPLIANCE SAN P-0000
TEL NO.: 818 969 8216

NO.	DATE	ST. TIME	TOTAL TIME	ABBR/SBD	ID	DEPT CODE	#PGS	
690	02-14	17:17	00°01'34		-G3-		OK- 2	NG- 0

[redacted]

CITY OF LOS ANGELES
CALIFORNIA

TOM BRADLEY
MAYOR

DEPARTMENT OF
PUBLIC WORKS

BUREAU OF SANITATION

DELWIN A. BIAGI
DIRECTOR
HARRY M. SIZEMORE
ROBERT M. ALPERN
MICHAEL M. MILLER
ASSISTANT DIRECTORS

SUITE 1400, CITY HALL EAST
200 NORTH MAIN STREET
LOS ANGELES, CA 90012
(213) 485-5112
FAX No. (213) 626-5514

FEB 21 1992

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4182

Attention: Mohsen Nazemi, Senior Engineering Manager

SPECIAL PROCEDURES FOR REPAIR OF LANDFILL COVER - DISPOSAL AREA AB+

This is to confirm the February 19, 1992 telephone conversation between Brian Yeh of the SCAQMD and Scott Hill of my staff. As approved by AQMD, the Bureau of Sanitation started the repairs of the surface erosion in disposal area AB+ which resulted from the February 1992 storms.

The project will involve removing part of the header on benches 3 and 2 in disposal area AB+. The Bureau will only disconnect one (1) header at a time. The disconnection of bench 3 header will deactivate six (6) wells and the disconnection of bench 2 will deactivate two (2) wells. The Bureau will complete this project within one week from February 19, 1992.

If you have any questions, please call Scott Hill of my staff at (818) 904-3298.

DELWIN A. BIAGI
Director

DAB/KG:mep

cc: Edwin Pupka, Senior Enforcement Manager
Elliot Sernell, Senior Deputy District Prosecutor
Chris Westhoff, City Attorney
Kelly Gharios, Sanitary Engineer
Turner L. Johnson, Superintendent II
Scott Hill, Assistant Sanitary Engineer

[SCAQMD02]

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (714) 396-2000

February 19, 1992

City of Los Angeles
Bureau of Sanitation
200 N. Main St., Rm 1410, City Hall East
Los Angeles, CA 90012

Attention: Mr. Delwin A. Biagi, Director

Dear Mr. Biagi:

This is in response to your letter dated February 19, 1992, requesting District's approval for temporary disconnection of the gas collection headers and the associated wells on Benches 2 and 3 in Disposal Area AB+ of Lopez Canyon Landfill. As indicated in your letter, this header disconnection is required to complete repaires of the surface erosion resulted from the February storms.

Please be advised that your request has been approved subject to the following conditions:

1. The disconnection of the headers and wells shall be proceeded with one header (bench) at a time. The second header shall not be disconnected until the first header and its associated wells are placed back to service.

2. The repair of the surface shall be completed and all wells and headers reconnected to service by March 4, 1992, unless an extension is otherwise approved by the District.

If you have any questions, please call Mr. Jay Chen of my staff at (714) 396-2664.

Very truly yours,

Mohsen Nazemi

Mohsen Nazemi, P.E.
Senior Engineering Manager

JC:lopez1

cc: Scott Hill, Bureau of Sanitation - By FAX
Ed Pupka
Larry Israel

[redacted]

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (714) 396-2000

Kelly
JMT

February 7, 1992

RECEIVED
BUREAU OF SANITATION
SOLID WASTE MANAGEMENT DIVISION
FEB 25 1992

City of Los Angeles
Bureau of Sanitation
200 N. Main St., Rm 1410, City Hall East
Los Angeles, CA 90012

Attention: Mr. Delwin A. Biagi, Director

Dear Mr. Biagi:

This is in response to your letter dated February 5, 1992, requesting District's approval for the additional procedure for repair of landfill cover in Disposal Area AB+ of Lopez Canyon Landfill. As indicated in your letter, the special repair procedure previously approved by the District in January 1992, has reduced the intensity and number of exceedances on Grid #58. However, an additional horizontal well parallel to the refuse/virgin soil interface in Grid #58 is required to eliminate the remaining surface emissions.

Please be advised that the installation of the proposed additional horizontal well in Grid #58 has been approved. The construction and operation of the proposed wells shall be conducted in accordance with the conditions set forth in the Permit to Construct issued under Application No. R-255005.

If you have any questions, please call Mr. Jay Chen of my staff at (714) 396-2664.

Very truly yours,

Mohsen Nazemi, P.E.
Senior Engineering Manager

JC:lopez1

cc: Kelly Garios, Bureau of Sanitation
Ed Pupka

[redacted]

South Coast
AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (714) 396-2000

February 7, 1992

City of Los Angeles
Bureau of Sanitation
200 N. Main St., Rm 1410, City Hall East
Los Angeles, CA 90012

Attention: Mr. Delwin A. Biagi, Director

Dear Mr. Biagi:

This is in response to your letter dated February 5, 1992, requesting District's approval for the additional procedure for repair of landfill cover in Disposal Area AB+ of Lopez Canyon Landfill. As indicated in your letter, the special repair procedure previously approved by the District in January 1992, has reduced the intensity and number of exceedances on Grid #58. However, an additional horizontal well parallel to the refuse/virgin soil interface in Grid #58 is required to eliminate the remaining surface emissions.

Please be advised that the installation of the proposed additional horizontal well in Grid #58 has been approved. The construction and operation of the proposed wells shall be conducted in accordance with the conditions set forth in the Permit to Construct issued under Application No. R-255005.

If you have any questions, please call Mr. Jay Chen of my staff at (714) 396-2664.

Very truly yours,

Mohsen Nazemi, P.E.
Senior Engineering Manager

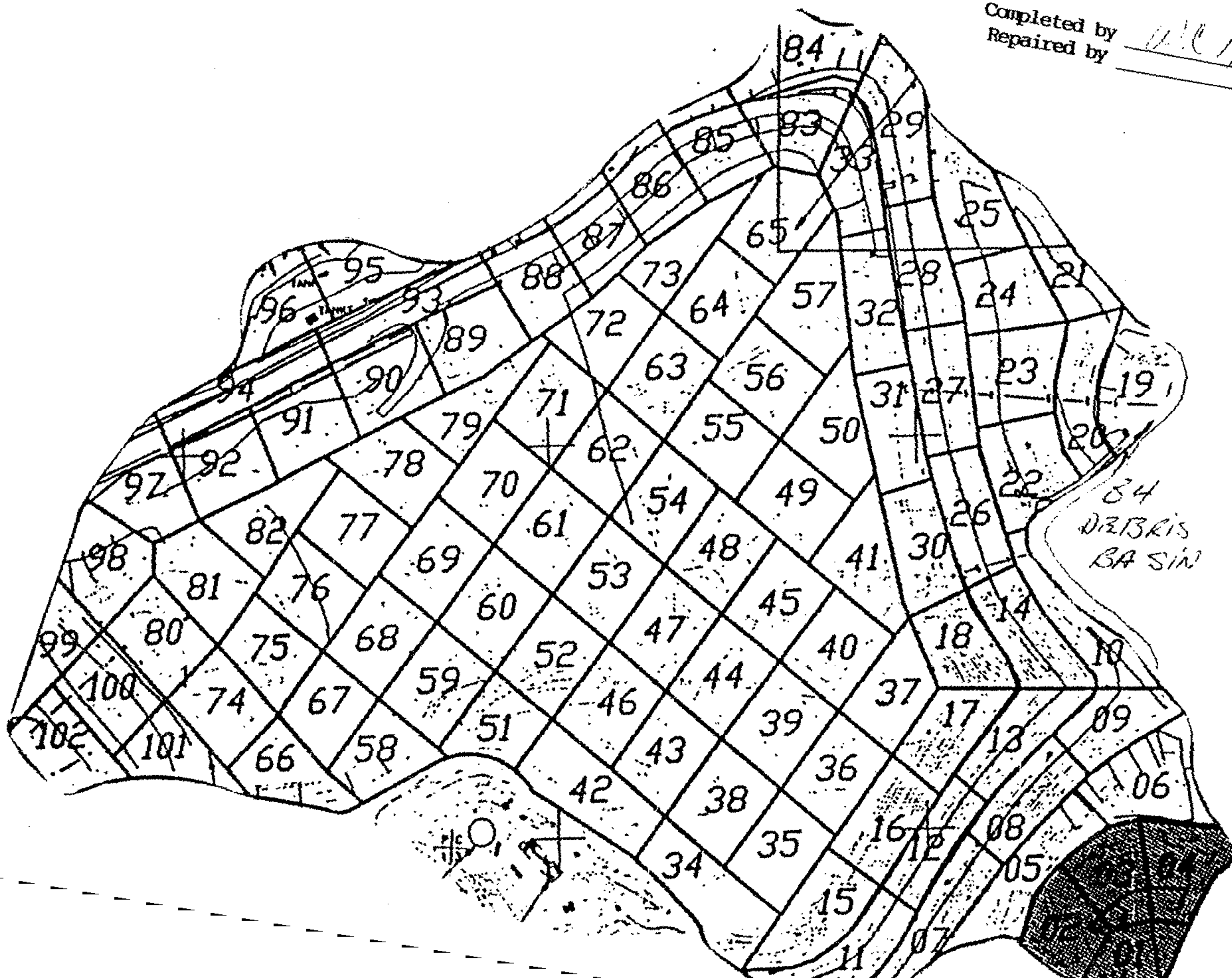
JC:lopez1

cc: Kelly Garios, Bureau of Sanitation
Ed Pupka

DATE 5-11-92

LOPEZ CANYON LANDFILL
PERIMETER INSPECTION
(crack and fissure)

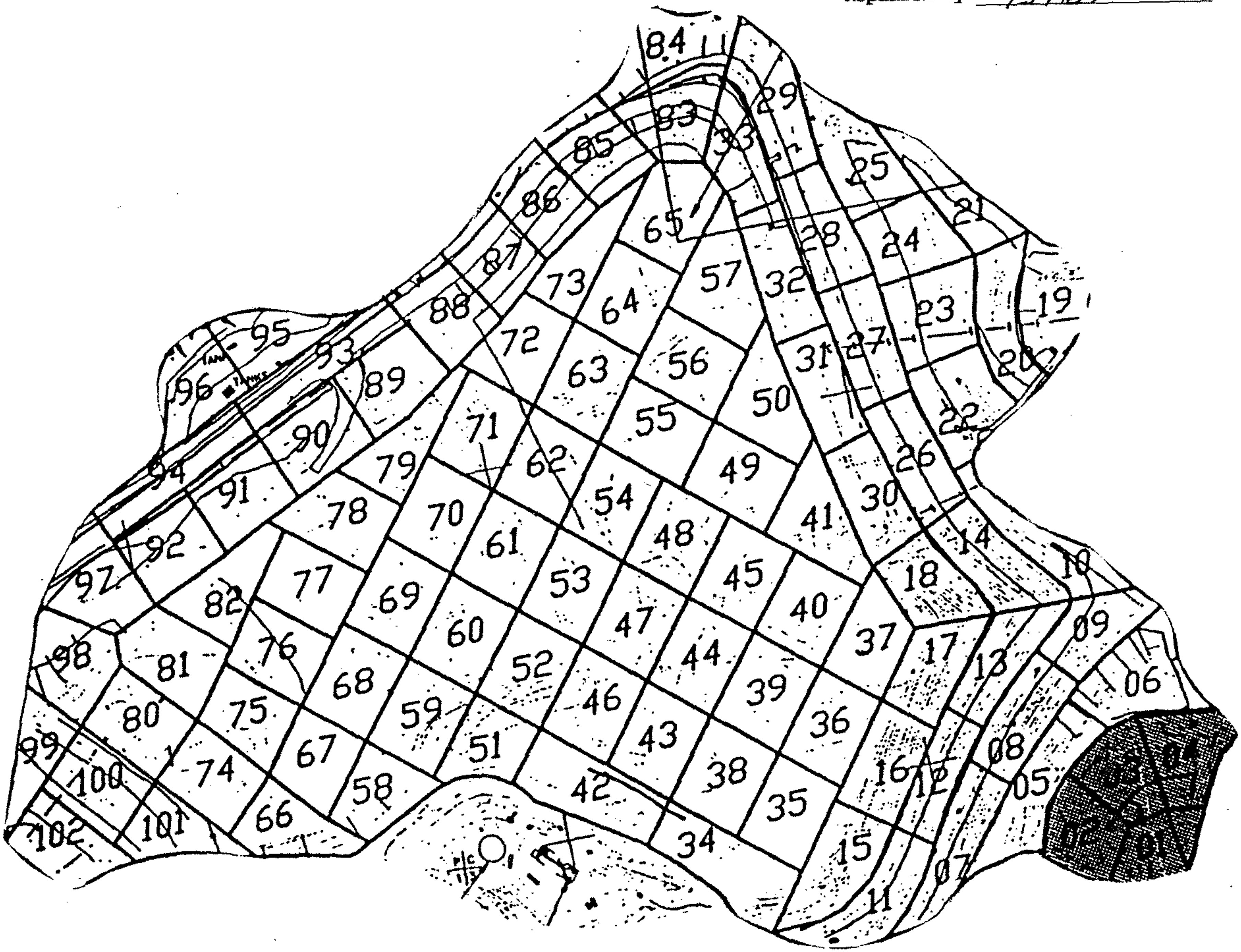
Completed by [illegible signature]
Repaired by



LOPEZ CANYON LANDFILL
PERIMETER INSPECTION
(crack and fissure)

DATE 3-12-92

Completed by B.B.
Repaired by B.B.



APPENDIX I

REGIONAL WATER QUALITY CONTROL BOARD DISCHARGE REQUIREMENTS AND MONITORING AND REPORTING PROGRAM

STATE OF CALIFORNIA PETE WILSON, Go

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
LOS ANGELES REGION
101 CENTRE PLAZA DRIVE
MONTEREY PARK, CA 91754-2156
(213) 266-7500

December 4, 1991

Mr. Delwin A. Biagi, Director
Bureau of Sanitation
City of Los Angeles
Suite 1400, City Hall East
200 North Spring Street
Los Angeles, CA 90012

WASTE DISCHARGE REQUIREMENTS & MONITORING AND REPORTING PROGRAM - LOPEZ CANYON LANDFILL (File No. 69-68) (CI 5636)

Reference is made to our letter of November 14, 1991, which transmitted a copy of tentative waste discharge requirements for the disposal of inert wastes at Lopez Canyon Landfill. The area of the landfill in the tentative requirements was corrected to read 399 acres.

Pursuant to Division 7 of the California Water Code, this California Regional Water Quality Control Board, at a public meeting held on December 2, 1991, reviewed the tentative Order, considered all factors in the case, and adopted Order No. 91-122 (copy attached) relative to this discharge.

Please reference all technical and monitoring reports to Compliance File No. 5636. We would appreciate it if you would not combine other reports, such as progress or technical reports, with your monitoring reports, but would submit each report as a separate document.

If you have any questions, please call Mr. Don Peterson at (213) 266-7578.

Rodney H. Nelson

RODNEY H. NELSON, Head
Landfills Unit

cc: See attached mailing list
Enclosures

WDRs Mailing List - Lopez Canyon Landfill

The Honorable Richard Katz
Member of the Assembly,
Thirty-Ninth District
9140 Van Nuys Boulevard, Suite 109
Panorama City, CA 91402

The Honorable Paula Boland
Member of the Assembly, District 38
10727 White Oak #124
Granada Hills, CA 91344

The Honorable Ernani Bernardi
Councilman, Seventh District
200 N. Spring Street, Room 240
Los Angeles, CA 90012

The Honorable Zev Yaroslavsky
Councilman, Fifth District
200 N. Spring Street, Room 320
Los Angeles, CA 90012

The Honorable Michael D. Antonovich
Supervisor, Fifth District
Room 869, Hall of Administration
500 W. Temple Street
Los Angeles, CA 90012

Mr. Garrett W. Zimmon, Captain
Commanding Officer
Planning and Research Division
Los Angeles Police Department
P.O. Box 30158
Los Angeles, CA 90030

Mr. Jim King
Department of Water and Power
City of Los Angeles
111 N. Hope Street
Los Angeles, CA 90012

Mr. Gary Stolarik
Department of Water and Power
City of Los Angeles
111 N. Hope Street
Los Angeles, CA 90012

Mr. Davis R. Parsons
Assistant Bureau Commander
Bureau of Fire Prevention
City Hall East, Room 920
City of Los Angeles
200 N. Main Street
Los Angeles, CA 90012

Mr. Allyn D. Rifkin
Department of Transportation
City of Los Angeles
200 N. Spring Street
Los Angeles, CA 90012

Mr. Robert S. Horii
City Engineer
City of Los Angeles
200 N. Spring Street
Los Angeles, CA 90012

Department of Water Resources
P. O. Box 29068
Glendale, CA 91209-9068

Ms. Elizabeth Babcock
Division of Clean Water Programs
State Water Resources Control Board
P.O Box 100
Sacramento, CA 95801-0100

Mr. Bill Orr
California Integrated Waste Management Board
1020 9th Street, Suite 300
Sacramento, CA 95814

Toxic Substances Control Department
1405 N. San Fernando Boulevard
Burbank, CA 91504

Toxic Substances Control Department
245 W. Broadway
Long Beach, CA 90802

Ms. Kathryn Gualtieri
State Historic Preservation Officer
Office of Historic Preservation
California Department of Parks and Recreation
P.O. Box 2390
Sacramento, CA 95811

Mr. David C. Nunenkamp, Chief
Office of Permit Assistance
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

Mr. Robert Fuji
Resource Conservation and Local Planning Divisions
California Integrated Waste Management Board
8800 California Center Drive
Sacramento, CA 95826

Ms. Christine A. Rose, District Ranger
Forest Service
United States Department of Agriculture
12371 N. Little Tujunga Canyon Road
San Fernando, CA 91342

Mr. Richard Hanson, Program Director
Environmental Management
Solid Waste Management Program
Department of Health Services
County of Los Angeles
2525 Corporate Place
Monterey Park, CA 91754

Mr. N.C. Datwyler, Deputy Director
Planning Division
Department of Public Works
County of Los Angeles
900 S. Fremont Avenue
Alhambra, CA 91803-1331

Mr. Donald S. Nellor
Planning/Engineering Section Head
Solid Waste Management Department
County Sanitation Districts of Los Angeles County
P.O. Box 4998
Whittier, CA 90607

Mr. John Ege
Department of Public Works
County of Los Angeles
Waste Management Division
UST Pilot Project
P.O. Box 1460
Alhambra, CA 91802-1460

Mr. Gary Yamamoto
Water Sanitation Section
Department of Health Services
1449 W. Temple Street, Room 202
Los Angeles, CA 90026

Mr. Mel Blevins
ULARA Watermaster
P.O. Box 111, Room 1455
Los Angeles, CA 90051

Mr. Bryan A. Stirrat, President
Bryan A. Stirrat & Associates
1360 Valley Vista Drive
Diamond Bar, CA 91765

Mr. P. A. Maljian, Senior Vice President
Law/Crandall, Inc.
200 Citadel Drive
Los Angeles, CA 90040-1554

Mr. Victor Gleason
Metropolitan Water District of Southern California
1111 Sunset Boulevard
Los Angeles, CA 90054

Mr. Rob Zapple
11315 Blue Sage Drive
Kagel Canyon, CA 91342

Mr. Jules S. Bagneris, President
Lakeview Terrace Homeowners Association
11375 Kamloops Street
Lakeview Terrace, CA 91342

Mr. Sel Anderson
L.A.C.T.C.
13606 Little Tujunga Canyon Road
San Fernando, CA 91342

Mr. Wayde Hunter
North Valley Coalition
12841 Jimeno Avenue
Granada Hills, CA 91344

Ms. Lynne Cooper
Lakeview Terrace Improvement Association
P.O. Box 224
Sunland, CA 91041

Ms. Tina Eick, Landuse Chairperson
Shadow Hills Property Owners Association Inc.
P.O. Box CE
Sunland, CA 91040

Mr. Luther Derian, P.E.
Solid Waste Management Division
City of Los Angeles
419 South Spring Street, Suite 800
Los Angeles, CA 90013

Program Supervisor
Environmental Analysis
South Coast Air Quality Management District
21865 East Copley Drive
Diamond Bar, CA 91765-4182

Director
Department of Planning
City of Los Angeles
200 N. Spring Street
Los Angeles, CA 90012

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 91-122

WASTE DISCHARGE REQUIREMENTS
for
CITY OF LOS ANGELES
(LOPEZ CANYON LANDFILL)
(File No. 69-68)

The California Regional Water Quality Control Board, Los Angeles Region finds:

1. The City of Los Angeles owns and operates the Lopez Canyon Landfill, a 399-acre, Class III waste disposal facility located at 11950 Lopez Canyon Road, Lakeview Terrace District, Los Angeles, California, within the City of Los Angeles and bordered by unincorporated Los Angeles County, under this Board's Resolution No. 70-05, adopted January 14, 1970.

2. The City of Los Angeles (hereinafter Discharger) has filed a Report of Waste Discharge (ROWD) and supplemental information for the disposal of wastes to land of nonhazardous and inert solid wastes with this Regional Board for expansion and continued operation of the Lopez Canyon Landfill in accordance with Section 13260, California Water Code (CWC), and Article 9 of Chapter 15, Division 3, Title 23, California Code of Regulations, "Discharges of Wastes to Land", (hereinafter Chapter 15).

3. The Lopez Canyon Landfill is located adjacent to the San Fernando Hydrologic Subunit of the Los Angeles - San Gabriel River Hydrologic Unit (Los Angeles River Basin). Surface runoff exiting the landfill eventually enters the surface waters and underlying water bearing strata of this Subunit. Evidence indicates the site area's sparsely occurring ground water does not reach, or does not contribute an appreciable quantity to this Subunit. The existing and/or future beneficial uses of the San Fernando Subunit are municipal, domestic, and agricultural supply, industrial service and process supply, groundwater recharge, water contact and non-contact recreations, and wildlife habitats.

4. Conditional Use Permit (CUP) City Plan Case No. 90-0271 CU was approved by the City Planning Commission on September 27, 1990 and prohibits the disposal of sewage sludge and/or any of its constituents.

5. A variety of land uses exist within one mile of the landfill. Lakeview Terrace residential community is immediately to the south, with some residences within 300 feet of the site. Kagel Canyon residential community is to the east, with some residences within 1,000 feet of the site. Blue Star Mobile Home Park is immediately to the west, with some residences within 300 feet of the site. Light manufacturing, commercial, and agricultural uses are west along Lopez Canyon Road. Sparsely developed foothill areas border the north and northeastern site boundaries. The Foothill Freeway is approximately one mile south and southwest.

6. The landfill is, and will be operated as, a modified "cut and cover" side hill landfill. Soil for use as cover is excavated within the site property, or provided by reclaiming clean dirt loads from the incoming waste stream. Cover is designed and constructed to minimize infiltration of precipitation. Refuse is spread and compacted in lifts to form cells which are approximately 20 to 25 feet in height. On the face of the landfill, soil is placed at a minimum thickness of 7 feet perpendicular to the front face (15 feet on the horizontal). In addition, a bench, approximately 15-feet wide, is constructed every 50 feet vertically to provide for improved slope stability, drainage, and access for maintenance. This design provides for proper grading and drainage of surface water to eliminate ponding of such water over the waste. The supplemental information includes the installation of a cutoff wall and system drains between existing fill Area AB+ and proposed fill Area(s) C. The wall has a minimum thickness of one foot, a permeability below 1×10^{-6} cm/sec, and is keyed in at least five feet into the bedrock. The discharger submitted a report, "Results of Hydraulic Conductivity Testing, Seepage Cutoff Barrier and Disposal Area AB+" in order to fully satisfy the Chapter 15 requirements for this alternative to the construction of a liner on "virgin" ground areas within the existing waste management area, AB+. This report demonstrates that the underlying bedrock in area AB+ provides adequate ground water quality protection from the disposal of nonhazardous solid wastes. Any leachate collected from this area will be conveyed to the mouth of Canyon C and disposed of as required. The final design and construction methods for proposed engineered systems will be reviewed and approved by the Executive Officer prior to installation and use.

7. The City of Los Angeles has installed a landfill gas recovery system (LGRS) at the landfill. This system will be expanded to include the new area. Landfill gas is collected under vacuum through a system of vertical extraction wells and horizontal trenches. The recovered landfill gas is burned at an onsite flare station and/or an onsite gas-to-energy facility.

8. The City of Los Angeles has proposed drainage improvements at the landfill to better protect nearby residential areas. For runoff from Areas A and B, the City has proposed additional debris basins, benchdrains, downdrains, and energy dissipators to remove the debris and reduce the flow rate. Storm water runoff from Areas A and B flows to a debris basin equipped with an outlet standpipe and an overflow structure, both of which direct the discharge into the Hansen Dam Flood Control Basin. Runoff from Areas AB+, and construction Area(s) C flows to debris basins and into the Whitehorse catch basin which directs the flow into the Lopez Canyon Flood Control Channel. The additional improvements the City has proposed for this area include raising the channel walls in the proximity of additional basins and installing drains in the basins to direct the runoff into the Lopez Canyon Flood Control Channel. From this channel, the runoff will flow to the Hansen Dam Flood Control Channel. All drains will be sized to handle runoff from the 100-year storm.

9. There is no known ground water table under the site since only ephemeral ground water has been encountered.

10. The site is not within a 100-year flood plain or in a designated flood prone area.

11. Active traces of the San Fernando Fault Zone which moved in 1971 are present in the nearby area. Active faults are defined as Holocene Epoch faults, meaning that they have shown surface movement in the last 11,000 years. The more significant segments are the Tujunga Fault, the Kagel Fault, and the Oak Hill Fault. The Tujunga Fault crosses the southwest corner of the property just north of the landfill entrance. The Kagel Fault crosses the southeast corner of the site. The known portion of the Oak Hill Fault is 150 feet northwest of the property. Recurrence intervals indicate this fault should be dormant for several hundred years. Recent excavation in the area of the proposed water tank revealed a few segments of faults up to 65 million years of age (Tertiary) in sediments with uncertain activity. Recent trenching in proposed

fill Area(s) C, revealed several segments of inactive faults (no active or potentially active faults were revealed). Potentially active faults are those which have been active within the past 11,000 to 3 million years and inactive faults are those which have not been active for over 3 million years. Only the above named active faults showed activity in the 1971 earthquake. No traces of active faults are known to cross the expansion areas.

12. A seismic analysis conducted for this facility indicates that a magnitude 6.75 earthquake is the maximum probable earthquake that is statistically likely to occur within 100 kilometers and within 100 years. The nearest fault capable of generating this magnitude earthquake is the San Gabriel Fault, which, at its nearest point, is four miles from the site. Peak horizontal acceleration from the maximum probable earthquake is approximately 0.5g. The maximum credible earthquake on the San Fernando Fault is estimated to be 6.5.

13. The landfill site is underlain by the Tertiary Modelo, Tertiary Towsley and Pico, and the Tertiary-Quaternary Saugus Formations. The Modelo Formation consists of two types of materials: a predominantly sandstone unit, and a predominantly shale unit. The sandstone unit contains some interbedded shale and siltstone, and the shale unit varies from silty shale to sandstone. The Towsley and Pico Formations are made-up of three units: a sandstone/conglomerate unit, a shale/siltstone unit, and a conglomerate unit. The Saugus Formation consists of loosely consolidated conglomerate and course sandstone. Where exposed, bedding is indistinct or absent. The relatively scarce alluvium is locally derived and is present only in drainage channels and canyon bottoms. The bedrock structure, where observed, trends west or slightly north of west, and dips to the north between 20 to 70 degrees.

14. The Bureau of Sanitation of the City of Los Angeles prepared a Subsequent Environmental Impact Report (SEIR), a Final SEIR, and an addendum to the Final SEIR. Since none of the issues significantly changes the information presented in the Final SEIR an addendum was prepared for this project. In addition, all other issues, including Water Quality, Earth/Landforms, Air Quality, Noise Level, Land Use, Transportation and Circulation, Human Health, Views/Aesthetics, and Light and Shadows are unaffected by the consideration of the environmental topics of the addendum. While revisions have been made to the shade and shadow and seismicity analyses presented in the Final SEIR, the revisions do not change the determination of no significant impacts in the Final SEIR. Therefore, the addendum presents technical changes to the information presented in the existing environmental documents. The SEIR for Lopez Canyon Landfill was certified by the City Council on January 30, 1991. The EIR determined that the disposal of waste within the Lopez Canyon Landfill could be done in such a manner as to have no adverse effect on water quality.

15. The Board adopted a revised Water Quality Control Plan for the Los Angeles River Basin on June 3, 1991. The Plan contains water quality objectives for surface and ground waters of the San Fernando Hydrologic Subunit of the Los Angeles River Basin. The requirements in this Order, as they are met, will be in conformance with the goals of the Water Quality Control Plan.

The Board has notified the discharger and interested agencies and persons of its intent to revise waste discharge requirements for this discharge pursuant to Section 13263 CWC, and has provided them with an opportunity to submit their written views and recommendations.

The Board, in a public meeting heard and considered all comments pertaining to the discharge and to the tentative requirements.

IT IS HEREBY ORDERED, that the City of Los Angeles, shall comply with the following at the Lopez Canyon Landfill:

A. Acceptable Materials

1. The Lopez Canyon Landfill is a Class III landfill.

2. Wastes disposed of at this site shall be limited to certain nonhazardous solid and inert wastes.

a. Nonhazardous solid waste means all putrescible and nonputrescible solid, semi-solid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-solid wastes and other discarded solid or semi-solid waste; provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state (i.e., designated waste) (Section 2523(a), Chapter 15).

b. Inert wastes are earth, rock, gravel and concrete; glass; bricks; broken asphalt; vehicle tires and rubber scrap.

B. Unacceptable Materials

1. No hazardous, designated, or special wastes such as liquids, oils, waxes, tars, soaps, solvents, or readily water-soluble solids such as salts, borax, lye, caustic or acids shall be disposed of at this site.

2. No semi-solid waste shall be disposed of at this site except as noted above. Semi-solid waste means waste containing less than 50 percent solids, as described in Section 2520(d)(3), Chapter 15.

3. No materials which are of a toxic nature, such as insecticides, poisons, or radioactive materials, shall be disposed of at this site.

4. No infectious materials or hospital or laboratory wastes, except those authorized for disposal to land by official agencies charged with control of plant, animal, and human disease, shall be disposed of at this site.

5. No pesticide containers shall be disposed of at this site unless they are rendered nonhazardous by triple rinsing.

6. No septic tank pumpage or chemical toilet wastes shall be disposed of at this site.

7. The discharge of wastes or waste byproducts (leachate or gas condensate, for example) to natural surface drainage courses or to ground water is prohibited.

C. Water Quality Protection Standards

1. In accordance with Section 2550.2 of Chapter 15, the following water quality protection standards are established for this facility:

Parameter	Units	Maximum Value	
		Alluvium	Bedrock
Total dissolved solids	mg/l	1400	400
Sulfate	mg/l	680	100
Chloride	mg/l	110	50
Boron	mg/l	.23	1

2. If any waste constituents are not considered to occur naturally, the absolute background concentrations for these constituents shall be zero. The ambient background value for a constituent may be established to be greater than zero if this constituent is present upgradient.

3. If a concentration of a waste constituent is statistically significantly above background concentrations, one of the following will apply:

(a) If this concentration is above background concentrations, but below the maximum water quality protection standard, the site will be reported to be leaking that waste constituent.

(b) If this concentration is above the maximum water quality protection standard, the site will be reported to be leaking a prohibited level of that waste constituent.

(c) If this concentration is above an attenuated waste concentration derived from the corresponding level listed in Article 11, Chapter 30, Title 22, of the California Code of Regulations, the site will be reported to be leaking hazardous waste.

4. Water quality protection standards may be modified by the Board based on more recent or complete monitoring data, changes in background water quality, or for any other valid reason.

5. The compliance point(s) where the water quality protection standards shall apply shall be the downgradient edges of the waste management units.

6. The compliance period for which the water quality protection standards are applicable shall be the entire active life of the site and during the closure and post-closure maintenance periods.

7. The discharger shall use the statistical procedures contained in Chapter 15, Section 2550(e)(7) to determine if there is a statistically significant spatial increase for any indicator parameter or waste constituent. Upon approval of the Executive Officer, alternative statistical procedures may be used.

8. In the event a statistically significant spatial increase is observed for any indicator parameter or waste constituent, the discharger shall establish an evaluation program in accordance with Section 2550.9 of Chapter 15.

9. In the event the evaluation monitoring program reveals a statistically significant spatial increase for any indicator parameter or waste constituent, the discharger shall establish a corrective action monitoring program in accordance with Section 2550.10 of Chapter 15.

D. Requirements for Disposal Site Operation

1. All State, County and City sanitary health codes, rules, regulations and ordinances pertinent to the disposal of wastes on land shall be complied with in the operation and maintenance of this site.

2. There shall be no damage or nuisance to the community by odors or unsightliness, which result from the disposal of wastes at this site, as defined in Section 13050(m) of the CWC.

3. A detailed description of the periodic waste load checking program shall be submitted for Executive Officer approval within 90 days of adoption of this Order. Any proposed changes in this program shall be submitted for Executive Officer approval. The approved program shall be continued (or implemented) to prevent the disposal of hazardous wastes, designated wastes, or other unacceptable materials.

4. Neither the disposal nor handling of wastes at this site shall create pollution as defined in Section 13050(l) of the CWC.

5. The discharger shall comply with notification procedures contained in Section 13271 of the CWC in regards to the discharge of hazardous substances. The discharger shall remove and relocate to a legal point of disposal, in accordance with County Health guidelines, any safely recoverable wastes which are discharged at this site in violation of these requirements. The Board shall be informed monthly, in writing, whenever relocation of wastes is necessary. The source, final disposition, and location of the wastes, as well as methods undertaken to prevent future occurrences of such disposals shall also be reported. Those wastes which cannot be safely recovered shall be reported to the Board in writing within seven days of the discharge. If no removal of wastes occurred during the reporting period the report shall so state.

6. Wastes deposited at this site shall be contained, and shall not be permitted to migrate off the site.

7. All wastes shall be adequately covered at the end of each operating day in accordance with Subsection 2544 of Chapter 15. Interim cover is daily cover and intermediate cover as defined by the California Integrated Waste Management Board. Interim cover over wastes discharged to this landfill shall be designed and constructed to minimize percolation of precipitation through wastes and contact with material deposited. To this end, ponding of liquids over deposited wastes is prohibited. Other measures shall be taken as needed, to prevent a condition of nuisance from fly breeding, rodent harborage, and other vectors.

8. The migration of gases from the disposal site shall be controlled as necessary to prevent water pollution, nuisance, or health hazards.

9. Gas condensate gathered from the gas monitoring and collection system at this disposal site shall not be returned to the site. Any proposed modifications or expansions to this system shall be designed to allow the collection, testing, and treatment or disposal by approved methods of all gas condensate produced at the disposal site.

10. A Leachate Collection and Removal System (LCRS) will be installed at this site. The discharger shall intercept, remove, and dispose any liquid detected in the LCRS to a legal point of disposal.

11. In any area within the disposal site where seepage water is observed, provisions shall be made and/or facilities shall be provided to insure that seep water will not come in contact with decomposable refuse in this waste management unit. The location of all springs and seeps found during, prior to, or after placement of waste material that could affect this waste management unit shall be reported to the Board.

12. Drainage controls, structures, and facilities shall be designed to divert any precipitation or tributary runoff and prevent ponding and percolation of water at the site in compliance with Section 2546 of Chapter 15. Temporary structures shall be installed as needed to comply with this requirement.

13. The waste management area shall be graded and maintained to promote proper runoff of precipitation and to prevent ponding of water. Erosion or washout of refuse or cover materials shall be prevented.

14. No polluted surface waters shall leave this site except as permitted by a National Pollutant Discharge Elimination System (NPDES) permit issued in accordance with the Federal Clean Water Act and the CWC.

15. Any abandoned water wells or bore holes under the control of the discharger must be located and properly modified or sealed to prevent mixing of any waters between adjacent water bearing zones. A notice of intent to decommission a water well must be filed with the appropriate regulatory agencies prior to decommissioning. Procedures used to decommission these wells, or to modify wells still in use, must conform to the specifications of the local health department or other applicable agencies.

16. As a safeguard against structural deficiencies including faults, after the final excavation of any area has been completed and before construction of any containment feature or ground water barrier such areas shall be inspected and approved by Regional Board staff. A geologic map showing structural features and lithologies of the excavated area shall be prepared by a qualified geologist. Any significant geologic features encountered during ongoing excavation activities should also be noted. Such map shall be included with the final "as-built" report for the excavated area.

17. The Regional Board shall be notified of any incident resulting from site operations that may endanger health or the environment by telephone within 24 hours and in writing within seven days. The written notification shall fully describe the incident, including time of occurrence and duration of the incident, a description of the type of, time of, and duration of corrective measures, when correction will be complete (if the endangerment is continual), and the steps taken or planned to prevent recurrence.

E. Provisions for Water Quality Monitoring

1. The discharger shall furnish, under penalty of perjury, technical or monitoring program reports in accordance with Section 13267 of the CWC. Failure or refusal to furnish these reports, or falsifying any information provided therein, renders the discharger guilty of a misdemeanor and subject to the penalties stated in Section 13268 of the CWC. Monitoring reports shall be submitted in accordance with the specifications contained in the Monitoring and Reporting Program prepared by the Executive Officer. This Monitoring and Reporting Program is subject to periodic revisions as warranted.

2. The effectiveness of all monitoring wells, monitoring devices, and leachate and gas collection systems shall be maintained for the active life of this site, and during the closure and post-closure maintenance periods. If any of these wells and/or monitoring devices is damaged, destroyed or abandoned for any reason, the discharger shall provide a substitute to meet the monitoring requirements of this Order.

3. The discharger shall ensure that all the monitoring wells and/or lysimeters are in proper operating order at all times. The discharger shall have a Monitoring Well Preventative Maintenance Program approved by the Executive Officer. Elements of the Program are to include a minimum of periodic visual inspections of the well integrity, pump removal and inspection, etc., plus appropriate inspection frequencies. If a well or lysimeter is found to be inoperative, the Regional Board and other interested agencies shall be so informed in writing within seven days after such discovery, and this notification shall contain a time schedule for returning the well or lysimeter to operating order. The initial Monitoring Well Preventative Maintenance Program will be due to the Board within 60 days after the adoption of this Order. Changes to the Program should be submitted for Executive Officer approval at least 30 days prior to implementing the change(s).

4. Additional monitoring is required in Canyon C as the downgradient well cannot be completed until construction in this area is completed. For this well and all other monitoring wells or lysimeters installed in the future, the discharger shall submit a technical report for approval by the Executive Officer, prior to installation. The technical report shall be submitted at least 90 days prior to the anticipated date of installation of the wells or lysimeters. The report shall include:

a. Maps and cross sections showing the locations of the monitoring facilities; and,

b. Drawings and data showing the following design details of the monitoring facilities. These data shall include:

(i) casing and bore hole diameters;
(ii) casing materials (PVC, stainless steel, etc.);
(iii) depth of each hole;
(iv) size and position of perforations;
(v) method of joining the sections of the casing;
(vi) nature of filter material;
(vii) depth and composition of seals; and,
(viii) method and length of time of well development.

If a well or lysimeter is proposed to replace an inoperative well or lysimeter identified in the Well Preventative Maintenance Program, the discharger shall not delay replacement while waiting for Executive Officer approval. However, the technical report should be submitted with the required time schedule.

5. The discharger shall provide for the proper handling and disposal of water purged from the wells during sampling. Water pumped from a well shall not be returned to that well (or any other), unless appropriate waste discharge requirements have been prescribed, nor shall it be used for dust control or irrigation without waste discharge requirements.

6. Within 60 days of adoption of this Order, the discharger shall submit for review and Executive Officer approval, a workplan to develop and evaluate background water quality in the vicinity of the landfill. The workplan shall contain design specifications, proposed locations, and supporting rationale for monitoring wells and lysimeters, in accordance with Item E-4, above. The proposed monitoring wells will be used to obtain ground water samples representative of quality equivalent to conditions anticipated to be naturally occurring at the upgradient boundaries of the landfill.

F. Provisions for Containment Structures

1. The site shall have containment structures which are capable of preventing degradation of the waters of the State. Construction standards for containment structures shall comply with Article 4 of Chapter 15. Any exceptions to these standards must fully meet the standards in Section 2510(b-c). Any deviation from these design specifications is subject to the Executive Officer's review and approval prior to any construction.

2. The discharger shall submit detailed preliminary plans, specifications, and descriptions for all future containment structures and monitoring systems (for which they have not already done so) for Executive Officer approval within 60 days after the adoption of this Order. The preliminary plans shall contain detailed quality assurance/quality control for the proposed construction. No disposal shall occur in a new area until the corresponding construction is completed and certified. The discharger shall also submit detailed as-built plans, specifications and descriptions for all future containment structures and monitoring systems within 30 days after completion of construction. If the preliminary and as-built plans and specifications are virtually identical, only change sheets need be submitted in lieu of complete as-built plans. The discharger shall also submit a program, to be implemented upon request by the Executive Officer, which will provide for testing of any leachate collection system to demonstrate its operating efficiency during the operating life of the facility, and during the closure and post-closure maintenance periods.

3. A legal description of the property boundaries of the disposal site shall be provided and permanent survey monuments shall be installed and maintained. The discharger shall also provide a scaled drawing of the site showing the current elevations of the disposal areas, permanent monuments, structures, and other significant features, and their locations relative to the site boundaries within 60 days of adoption of this Order.

4. Bench marks shall be established and maintained at the site in sufficient number to enable reference to key elevations and to permit control of critical grading and compaction operations.

G. Provisions for Reporting Scheduled Activities

1. The discharger shall furnish, within a reasonable time, any information the Regional Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The City of Los Angeles shall also furnish to the Regional Board, upon request, copies of records required to be kept by this Order.

2. The Regional Board shall be notified in writing within seven days if fluid is detected in a previously dry LCRS or if a progressive increase in the liquid volume is detected in an LCRS.

3. The discharger shall notify the Regional Board of changes in information submitted in the ROWD and supplementary information, including any material change in the types, quantities, or concentrations of wastes discharged; or site operations and features. The discharger shall notify the Regional Board at least 120 days before any material change is made.

4. The discharger shall notify the Regional Board in writing of any proposed change of ownership or responsibility for construction, operation, closure or post-closure maintenance of this facility. This notification shall be given prior to the effective date of the change and shall include a statement by the new discharger that construction, operation, closure, and post-closure maintenance will be in compliance with any existing waste discharge requirements, approved closure plans, and any revisions thereof.

5. The discharger shall comply with the closure notification requirements contained in Section 2590(c)(5) of Chapter 15. As noted in that Section, closure must be in accordance with an approved closure plan.

6. The discharger shall submit final closure and post-closure maintenance plans to the Board at least 240 days prior to closure (unless this requirement is less stringent than laws or regulations adopted regarding Closure and Post Closure Plans adopted for other regulatory agencies.).

7. The discharger shall submit a plan to be approved by the Executive Officer, within 60 days after adoption of this Order, demonstrating compliance with Section 2580(f) of Chapter 15, which requires that the discharger provide for funding to insure that closure and post-closure maintenance activities are properly performed (unless this requirement is less stringent than laws or regulations adopted regarding closure and post-closure plans adopted for other regulatory agencies).

8. The discharger shall notify the Regional Board in writing at least 180 days prior to the beginning of final closure activities. The notice shall include a statement that all closure activities will conform to the most recently approved closure plan and that the plan provides for site closure in compliance with applicable federal and state regulations. In the event closure and post-closure maintenance plans have not been submitted for this disposal site, they shall accompany this notice.

9. The discharger shall notify the Regional Board within 30 days after the completion of final closure activities that closure has been completed. The discharger shall certify under penalty of perjury that all closure activities were performed in accordance with the most recently approved closure plan and in accordance with applicable regulations. The discharger shall certify that all closed waste management units shall be maintained in accordance with approved post-closure maintenance plan(s).

H. General Provisions

1. The discharger shall comply with all applicable provisions, requirements, and procedures contained in the most recent revision of the California Code of Regulations, Title 23, Chapter 3, Chapter 15, "Discharges of Waste to Land," and any amendments thereto.

2. Regional Board staff shall be allowed entry to the landfill, and to any location where records are kept regarding the landfill, at any reasonable time. Staff shall be permitted to inspect any area of the landfill and any monitoring equipment used to demonstrate compliance with this Order. Staff shall be permitted to copy any records, photograph any area, obtain samples, and/or monitor operations to assure compliance with this Order, or as authorized by applicable laws or regulations.

3. The discharger shall maintain a copy of this Order at the site so as to be available at all times to site operating personnel.

4. This Board considers the property owner(s) to have a continuing responsibility for correcting any problems which may arise in the future as a result of this waste discharge and from gases and leachate that may be caused by infiltration or precipitation of drainage waters into the waste disposal areas or by infiltration of water applied to this property during subsequent use of the land for other purposes.

5. These requirements do not exempt the discharger of this waste disposal site from compliance with any other current or future law which may be applicable. These requirements are not a permit; they do not legalize this waste disposal site, and they leave unaffected any further restraints on the disposal of wastes at this site which may be contained in other statutes.

6. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from their liabilities under federal, state, or local laws.

7. The filing of a request by the discharger for a modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any condition, provision, or requirement of this Order.

8. This Order does not convey any property rights of any sort, or any exclusive privilege.

9. The discharger must comply with all of the terms, requirements, and conditions of this Order. Any violation of this Order constitutes a violation of the CWC, and is grounds for enforcement action, Order termination, Order revocation and reissuance, denial of an application for reissuance, or a combination thereof.

10. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

a. Violation of any term or condition contained in this Order;

b. Obtaining this Order by misrepresentation, or failure to disclose all relevant facts;

c. A change in any condition that required either a temporary or permanent reduction or elimination of the authorized waste discharge.

11. Resolution No. 70-05, adopted by this Board on January 14, 1970, is hereby rescinded.

I, Robert P. Ghirelli, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Los Angeles Region on December 2, 1991.

Robert P. Ghirelli

ROBERT P. GHIRELLI, D.Env.
Executive Officer

STATE OF CALIFORNIA

PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
LOS ANGELES REGION

101 CENTRE PLAZA DRIVE
MONTEREY PARK, CA 91754-2156
(213) 266-7500

October 26, 1992

Mr. Delwin A. Biagi, Director
Bureau of Sanitation
City of Los Angeles
Suite 1400, City Hall East
200 North Spring Street
Los Angeles, CA 90012

MONITORING AND REPORTING PROGRAM - LOPEZ CANYON LANDFILL (File No. 69-68) (CI 5636)

Reference is made to our letter of December 4, 1991, which transmitted a copy of the Monitoring and Reporting Program requirements for the Lopez Canyon Landfill. This Monitoring and Reporting Program has been modified by revising paragraph B.2 and adding paragraph B.3 to Section III - Ground Water Monitoring. Also, please note that well MW88-3 has been decommissioned and will be replaced by well MW92-3, which will serve as an upgradient well to MW-5.

Attached is the revised Monitoring and Reporting Program which reflects this update of your requirements. This program becomes effective November 1, 1992.

Please reference all technical and monitoring reports to Compliance File No. 5636. We would appreciate it if you would not combine other reports, such as progress or technical reports, with your monitoring reports, but would submit each report as a separate document.

If you have any questions, please call Mr. Don Peterson at (213) 266-7578.

Rodney H. Nelson

RODNEY H. NELSON, Head
Landfills Unit

cc: See attached mailing list
Enclosure

Mailing List - Lopez Canyon Landfill

The Honorable Richard Katz
Member of the Assembly,
Thirty-Ninth District
9140 Van Nuys Boulevard, Suite 109
Panorama City, CA 91402

The Honorable Paula Boland
Member of the Assembly, District 38
10727 White Oak #124
Granada Hills, CA 91344

The Honorable Ernani Bernardi
Councilman, Seventh District
200 N. Spring Street, Room 240
Los Angeles, CA 90012

The Honorable Zev Yaroslavsky
Councilman, Fifth District
200 N. Spring Street, Room 320
Los Angeles, CA 90012

The Honorable Michael D. Antonovich
Supervisor, Fifth District
Room 869, Hall of Administration
500 W. Temple Street
Los Angeles, CA 90012

Mr. Garrett W. Zimmon, Captain
Commanding Officer
Planning and Research Division
Los Angeles Police Department
P.O. Box 30158
Los Angeles, CA 90030

Mr. Jim King
Department of Water and Power
City of Los Angeles
111 N. Hope Street
Los Angeles, CA 90012

Mr. Gary Stolarik
Department of Water and Power
City of Los Angeles
111 N. Hope Street
Los Angeles, CA 90012

Mr. Davis R. Parsons
Assistant Bureau Commander
Bureau of Fire Prevention
City Hall East, Room 920
City of Los Angeles
200 N. Main Street
Los Angeles, CA 90012

Mr. Allyn D. Rifkin
Department of Transportation
City of Los Angeles
200 N. Spring Street
Los Angeles, CA 90012

Mr. Robert S. Horii
City Engineer
City of Los Angeles
200 N. Spring Street
Los Angeles, CA 90012

Department of Water Resources
P. O. Box 29068
Glendale, CA 91209-9068

Ms. Elizabeth Babcock
Division of Clean Water Programs
State Water Resources Control Board
P.O Box 100
Sacramento, CA 95801-0100

Mr. Bill Orr
California Integrated Waste Management Board
1020 9th Street, Suite 300
Sacramento, CA 95814

Toxic Substances Control Department
1405 N. San Fernando Boulevard
Burbank, CA 91504

Toxic Substances Control Department
245 W. Broadway
Long Beach, CA 90802

Ms. Kathryn Gualtieri
State Historic Preservation Officer
Office of Historic Preservation
California Department of Parks and Recreation
P.O. Box 2390
Sacramento, CA 95811

Mr. David C. Nunenkamp, Chief
Office of Permit Assistance
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

Mr. Robert Fuji
Resource Conservation and Local Planning Divisions
California Integrated Waste Management Board
8800 California Center Drive
Sacramento, CA 95826

Ms. Christine A. Rose, District Ranger
Forest Service
United States Department of Agriculture
12371 N. Little Tujunga Canyon Road
San Fernando, CA 91342

Mr. Richard Hanson, Program Director
Environmental Management
Solid Waste Management Program
Department of Health Services
County of Los Angeles
2525 Corporate Place
Monterey Park, CA 91754

Mr. N.C. Datwyler, Deputy Director
Planning Division
Department of Public Works
County of Los Angeles
900 S. Fremont Avenue
Alhambra, CA 91803-1331

Mr. Donald S. Nellor
Planning/Engineering Section Head
Solid Waste Management Department
County Sanitation Districts of Los Angeles County
P.O. Box 4998
Whittier, CA 90607

Mr. John Ege
Department of Public Works
County of Los Angeles
Waste Management Division
UST Pilot Project
P.O. Box 1460
Alhambra, CA 91802-1460

Mr. Gary Yamamoto
Water Sanitation Section
Department of Health Services
1449 W. Temple Street, Room 202
Los Angeles, CA 90026

Mr. Mel Blevins
ULARA Watermaster
P.O. Box 111, Room 1455
Los Angeles, CA 90051

Mr. Bryan A. Stirrat, President
Bryan A. Stirrat & Associates
1360 Valley Vista Drive
Diamond Bar, CA 91765

Mr. P. A. Maljian, Senior Vice President
Law/Crandall, Inc.
200 Citadel Drive
Los Angeles, CA 90040-1554

Mr. Victor Gleason
Metropolitan Water District of Southern California
1111 Sunset Boulevard
Los Angeles, CA 90054

Mr. Rob Zapple
11315 Blue Sage Drive
Kagel Canyon, CA 91342

Mr. Jules S. Bagneris, President
Lakeview Terrace Homeowners Association
11375 Kamloops Street
Lakeview Terrace, CA 91342

Mr. Sel Anderson
L.A.C.T.C.
13606 Little Tujunga Canyon Road
San Fernando, CA 91342

Mr. Wayde Hunter
North Valley Coalition
12841 Jimeno Avenue
Granada Hills, CA 91344

Ms. Lynne Cooper
Lakeview Terrace Improvement Association
P.O. Box 224
Sunland, CA 91041

Ms. Tina Eick, Landuse Chairperson
Shadow Hills Property Owners Association Inc.
P.O. Box CE
Sunland, CA 91040

Mr. Luther Derian, P.E.
Solid Waste Management Division
City of Los Angeles
419 South Spring Street, Suite 800
Los Angeles, CA 90013

Program Supervisor
Environmental Analysis
South Coast Air Quality Management District
21865 East Copley Drive
Diamond Bar, CA 91765-4182

Director
Department of Planning
City of Los Angeles
200 n. Spring Street
Los Angeles, CA 90012

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

MONITORING AND REPORTING PROGRAM NO. 5636
FOR
CITY OF LOS ANGELES
(Lopez Canyon Landfill)

(File No. 69-68)

I. REPORTING

A. The discharger shall implement this Monitoring and Reporting Program beginning November 1, 1992. Quarterly monitoring shall be performed during the months of February, May, August and November. Monitoring reports shall be submitted to the Board by the fifteenth (15th) day of the second month following each quarterly sampling event. The first water quality monitoring report under this program is due January 15, 1993. Waste disposal monitoring reports shall be submitted to the Board monthly, by the first day of the second following month. The first waste disposal monitoring report under this program is due January 1, 1993. Subsequent to receipt of any reports required by Water Quality Monitoring item D-4 of Order No. 91-122, this Monitoring and Reporting Program shall be revised accordingly.

B. The discharger shall submit all monitoring data in hard copy form and also monitoring data on computer diskette (5-1/4 inch, 360 kilobyte, or 3-1/2 inch, 1.44 megabyte). The monitoring data submitted on diskette should be in ASCII format, and presented in a cumulative, updated form with each submittal. Monitoring data submitted in hard copy form should be in discrete, noncumulative form.

C. Each monitoring report must affirm that all analyses were conducted at a laboratory certified for such analyses in accordance with Section 13176 of the California Water Code and in accordance with current EPA guideline procedures contained in 40 CFR Part 136, or as specified in this Monitoring Program.

D. For any analyses performed for which no procedures are specified in the EPA guidelines or in this Monitoring Program, the constituent or parameter analyzed and the method or procedure used must be specified in the report.

E. The discharger may submit additional data to the Board not required by this Program in order to simplify reporting to other regulatory agencies.

F. Quarterly monitoring shall be performed during the months of March, June, September, and December. Annual monitoring shall be performed during the month of December. See Section IIIA(4) for additional requirements for quarterly monitoring. In the event monitoring is not performed as above because of unforeseen circumstances, substitute monitoring shall be performed as soon as possible after these times, and the reason for the delay shall also be given.

G. Where the units for a parameter are listed as ug/l (ppb), suitable analytical techniques shall be used to achieve this precision. All method detection limits shall be below the current Maximum Contaminant Levels listed in Title 22 of the California Code of Regulations or Action Levels Recommended by the Department of Health Services, Sanitary Engineering Branch, or (for organics) the minimum limit of detection specified in EPA Methods or Appendix A, 40 CFR 136 if the Maximum Contaminant Level or Action Level is not achievable.

H. Analytical data reported as "less than" shall be reported as less than a numeric value or below the limit of detection for that particular analytical method (also give the limit of detection).

I. All analytical samples obtained for this Program shall be grab samples.

J. If the discharger performs analyses for any parameter more frequently than required by this Program using approved analytical methods, the results of those analyses shall be included in the monitoring report.

K. After approval of the required waste load checking program, results of that checking program shall be reported in each monitoring report. In the event that hazardous wastes or other unacceptable materials are detected, the type, source, and disposition of those wastes shall also be reported.

L. The City of Los Angeles shall retain records of all monitoring information, including all calibration and maintenance records regarding monitoring instrumentation, and copies of all data submitted to regulatory agencies for a period of at least five years. This period may be extended by request of the Regional Board at any time and shall be extended during the course of any unresolved litigation regarding all or any part of the entire site.

M. Records of monitoring information shall include:

a. The date, exact place, procedure and time of sampling or measurement;
b. The individual(s) who performed the sampling or measurement;
c. The date(s) analyses were performed on the samples;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of the analyses or measurements.

II. WASTE DISPOSAL REPORTING

A. The first report to the Board shall include a map of the site and shall indicate the area(s) where disposal is taking place or will begin. This map shall be updated monthly and summarized and submitted with the annual report due March 1. If a new area is started, it shall be updated with the corresponding monthly report.

B. A waste disposal report containing the following information shall be filed with this Board each month:

1. A tabular list of the estimated average monthly quantities (in cubic yards and tons) and types of materials deposited each month. If no wastes were deposited during the month, the report shall so state.

2. An estimate of the remaining capacity (in cubic yards and tons) and the remaining life of the site in years and months.

3. A certification that all wastes were deposited in compliance with the Board's requirements, and that no wastes were deposited outside of the boundaries of the waste management area(s) as specified in the Board's requirements.

4. A description of the location and an estimate of the seepage rate or flow of all known seeps and springs at the site.

5. The estimated amount of water used at the waste management area for landscape irrigation, compaction, dust control etc., during the month.

C. In the event that dewatered sewage or water treatment sludge, is permitted at the site, such disposal shall be subject to monitoring and reporting requirements which shall be developed prior to the disposal of this waste.

D. The discharger shall report all unacceptable (to this site) wastes inadvertently received at this site and their disposition.

The following details shall be included:

1. The source (if known), including the hauler, of the unacceptable wastes and date received and/or discovered.

2. Identification (if known) and the amount of waste.

3. The name and address of the hauler (who removes the waste from this site), if different from the source.

4. The ultimate point of disposal for the waste.

5. The City of Los Angeles' actions to prevent recurrence of the attempted depositing of unacceptable wastes by this source or individual (if applicable).

If no unacceptable wastes were received (or discovered) during the month, the report shall so state.

III. GROUND WATER MONITORING

A. Provisions and General Requirements

1. For the purposes of this Program, the terms "Monitoring Well" and "Lysimeter" are synonymous.

2. The ground water monitoring program must be carried out during the active life of this site, during the closure and post-closure care periods, and during periods when no wastes are deposited at the site.

3. Analytical results for ground water monitoring shall be submitted with the corresponding monthly waste disposal report. If a well was not sampled (or measured) during the reporting period, the reason for the omission shall be given. If no fluid was detected in a monitoring well, a statement to that effect shall be submitted.

4. Monthly observations and measurements of the static water levels shall be made on all monitoring wells, and records of such observations and measurements shall be submitted with the monthly reports. All monitoring wells shall be sounded each December to determine total depth. Wells affected by pumping shall be measured prior to pumping insofar as is possible. In the event that ground water is encountered in a normally dry well, samples shall be collected at that time for analysis.

5. Duplicate samples shall be taken for all metals analyses. Unfiltered samples shall be tested for total metals, and filtered samples (using filters with openings not less than 0.45 microns) shall be tested for dissolved metals. Both samples are preserved with nitric acid, the filtered sample preserved immediately after it has been filtered.

6. No filtering of samples taken for organics analyses shall be permitted. Samples for organic analyses shall be taken with a sampling method which minimizes volatilization and degradation of potential constituents.

7. The velocity and direction of ground water flow under the waste management unit shall be determined quarterly for the

first year and every third quarter thereafter. ("Third" means nine months later, not the third quarter of the year).

B. Monitoring Well Locations

1. Representative ground water samples shall be obtained, if water is present, on a quarterly basis, and the analytical results reported, from at least the following monitoring wells:

   MW88-1, MW88-2, MW88-4, MW88-5, LYS88-1, LYS88-2, (MW88-3 has been decommissioned)

2. The Los Angeles County Public Works - Waterworks District #21 is located directly east of the landfill. The District has three water wells (6019, 4920B, 4920C) within one mile of Lopez Canyon Landfill and they provide water to approximately 225 homes in Kagel Canyon. These wells shall be analyzed on an annual basis for the parameters listed in paragraphs C.2 and C.3.

3. The precise locations, depths, well screen lengths, and other design criteria for new monitoring wells shall be submitted to the Executive Officer for approval. Wells MW92-1, MW92-2 and MW92-3 shall be installed on or before December 31, 1992. Wells MW92-1 and MW92-2 shall serve as downgradient wells for Disposal Area C and MW92-3 is to be located in B Canyon and is designed to be an upgradient well To MW88-5.

C. Sampling and Analyses

1. The following are the indicator parameters for this facility: Electrical conductivity, chloride, sulfate, pH, total organic halogen, BOD, and COD.

2. Routine quarterly sampling and analyses shall consist of the following parameters:

Parameters	Units
pH[1]	pH units
Electrical conductivity	µmhos/cm
BOD_5 20°C	mg/l
COD	mg/l
Total dissolved solids	mg/l
Boron	mg/l
Alkalinity[1]	mg/l
Ammonia (as N)	mg/l
Bicarbonate (HCO_3)	mg/l
Calcium	mg/l
Chloride	mg/l
Iron (total and dissolved)	mg/l
Total Hardness (as $CaCO_3$)	mg/l
CO_2[1]	mg/l
Sulfate	mg/l
Sodium	mg/l
Potassium	mg/l
Nitrate (as N)	mg/l
Total organic carbon	mg/l
Total organic halogens	µg/l
Benzene	µg/l
Carbon tetrachloride	µg/l
Methylene Chloride	µg/l
1,1-Dichloroethane	µg/l
1,2-Dichloroethane	µg/l
1,1-Dichloroethene	µg/l
1,2-Dichloroethene	µg/l
Trichloroethylene	µg/l
Perchloroethylene	µg/l
Vinyl chloride	µg/l

[1] Although field determination is the preferred procedure for pH in the presence of dissolved carbon dioxide, pH may be determined in the laboratory if the total elapsed time between sampling and testing is less than 6 hours and the sample is properly sealed during transit. Each report shall certify that these conditions were met if laboratory determination of these parameters was done in lieu of field determination.

3. The following shall be sampled quarterly for the first year that this program is in effect and yearly thereafter (during

the month of December), provided further quarterly sampling is not warranted by the presence of appreciable contamination:

a. Volatiles, semi-volatiles, pesticides and PCBs using EPA Methods 624, 625, and 8080. If Method 624 cannot satisfy Item I-H of this program, then EPA Methods 601 and 602 shall be substituted for Method 624. All peaks greater than 10% of the internal standard should be identified and quantified for gas chromatography analyses. After the first year of monitoring, Method 8080 will be discontinued unless warranted by the presence of appreciable contamination.

b. The following metals: antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, and zinc. Total cyanide and sulfides shall also be determined.

c. Acrolein and acrylonitrile (using EPA Method 603 or 8030), if EPA Method 601 or 624 does not quantitatively determine their presence. After the first year of monitoring, quantification of acrolein and acrylonitrile may be discontinued unless warranted by the presence of appreciable contamination.

IV. SURFACE WATER MONITORING

A. Provisions and General Requirements

1. The surface water monitoring program must be carried out during the active life of this waste management area, during the closure and post closure care periods, and during periods when no wastes are deposited at the site, unless, at some future time, the City of Los Angeles installs drainage controls which prevent all of the runoff from the waste management units from entering the surface and ground waters of the State. If such drainage controls are installed, the surface water program will be discontinued.

2. Analytical results for surface water monitoring shall be submitted with the corresponding monthly waste disposal report. If a surface water monitoring location was not sampled during a reporting period, the reason for not

obtaining a sample shall be given (no rain, already obtained one for fall, etc.).

3. All metals analyses shall be unfiltered for total metals concentrations. If you choose to also have dissolved metals concentrations determined, you may do so, provided the determination is made on filtered samples (using filters with openings not less than 0.45 microns). Both samples are preserved with nitric acid, the filtered sample preserved immediately after it has been filtered.

B. Sample Locations

1. Representative surface water samples shall be obtained semiannually, once during the rainy months (Fall) and once during the second half of the rainy months (Spring), from at least the following locations.

   Canyon A basin outlet, Canyon B basin outlet, Canyon C basin outlet, Sub-drain C pipe outlet.

C. Sampling and Analyses

1. The following are the indicator parameters for this facility: Electrical conductivity, chloride, sulfate, pH, total organic halogens, BOD, and COD.

2. Routine (semiannually) sampling and analyses shall consist of the following parameters:

Parameters	Units
pH[1]	pH units
Electrical conductivity	µmhos/cm
BOD_5 20°C	mg/l
COD	mg/l
Oil & Grease	mg/l
Total dissolved solids	mg/l
Boron	mg/l
Alkalinity[1]	mg/l
Ammonia (as N)	mg/l
Bicarbonate (HCO_3)	mg/l
Calcium	mg/l
Chloride	mg/l
Iron	mg/l

Total hardness (as $CaCO_3$)	mg/l
CO_2 [1]	mg/l
Sulfate	mg/l
Sodium	mg/l
Potassium	mg/l
Nitrate (as N)	mg/l
Total organic carbon	mg/l
Total organic halogens	µg/l
Acetone	µg/l
Benzene	µg/l
Carbon tetrachloride	µg/l
Methylene Chloride	µg/l
1,1-Dichloroethane	µg/l
1,2-Dichloroethane	µg/l
1,1-Dichloroethene	µg/l
1,2-Dichloroethene	µg/l
Trichloroethylene	µg/l
Perchloroethylene	µg/l
Vinyl chloride	µg/l

[1] Although field determination is the preferred procedure for pH in the presence of dissolved carbon dioxide, pH may be determined in the laboratory if the total elapsed time between sampling and testing is less than 6 hours and the sample is properly sealed during transit. Each report shall certify that these conditions were met if laboratory determination of these parameters was done in lieu of field determination.

3. The following shall be sampled semiannually for the first year that this program is in effect and yearly thereafter (during the first storm of the rainy season), provided further semiannually sampling is not warranted by the presence of appreciable contamination:

   a. Volatiles and semi-volatiles using EPA Methods 624 and 625. If Method 624 cannot satisfy Item I-H of this program, then EPA Methods 601 and 602 shall be substituted for Method 624. All peaks greater than 10% of the internal standard should be identified and quantified for gas chromatography analyses.

   b. The following metals: antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, and zinc. Total cyanide and sulfides shall also be determined.

4. Surface water monitoring will be continued as long as it is determined necessary by the Board.

V. GENERAL PROVISIONS

1. All sampling, sample preservation, and analyses shall be performed in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants", promulgated by the United States Environmental Protection Agency.

2. The discharger shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to ensure accuracy of measurements, or shall ensure that both activities will be conducted.

3. A grab sample is defined as an individual sample collected in fewer than 15 minutes.

4. For every item where the requirements are not met, the discharger shall submit a statement of the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time and submit a timetable for correction.

5. By March 1 of each year, the discharger shall submit an annual report to the Board. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the discharger shall discuss the compliance record and the corrective actions taken or planned which may be needed to bring the discharge into full compliance with the waste discharge requirements.

6. The discharger shall maintain all sampling and analytical, results, including strip charts; date, exact place, and time of sampling; date analyses were performed; analyst's name, analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge when requested by the Board.

7. In reporting the monitoring data, the discharger shall arrange the data in tabular form so that the data, the constituents, and the concentrations are readily discernible. The data shall be summarized to demonstrate compliance with waste discharge requirements and, where applicable, shall include results of receiving water observations.

8. Monitoring reports shall be signed by:

   a. In the case of corporations, by a principal executive officer at least of the level of vice-president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates;

   b. In the case of a partnership, by a general partner;

   c. In the case of a sole proprietorship, by the proprietor;

   d. In the case of a municipal, state or other public facility, by either a principal executive officer, ranking elected official, or any other authorized employee.

9. Each report shall contain the following completed declaration:

   "I declare under penalty of perjury that the foregoing is true and correct.

   Executed on the ______ day of _____________ at _____________."

   __________________(Signature)

   __________________(Title)

10. If no waste was deposited during the reporting period, the report shall so state.

11. The discharger shall mail each monitoring report to:

TECHNICAL SUPPORT UNIT
CALIFORNIA REGIONAL WATER QUALITY
CONTROL BOARD - LOS ANGELES REGION
101 Centre Plaza Drive
Monterey Park, CA 91754-2156

12. These records and reports are public documents and shall be made available for inspection during business hours at the office of the California Regional Water Quality Board, Los Angeles Region. Records or reports which might disclose trade secrets, etc., may be excluded from this provision as provided in Section 13267(b) of the California Water Code, if requested.

Ordered By: Robert P. Ghirelli
ROBERT P. GHIRELLI, D.Env.
Executive Officer

Date: 10/26/92

APPENDIX J

WATER BALANCE STUDY

LAW ENVIRONMENTAL

WATER BALANCE

LOPEZ CANYON LANDFILL

LAKEVIEW TERRACE DISTRICT

LOS ANGELES, CALIFORNIA

Prepared for

City of Los Angeles
Solid Waste Management Division

March 27, 1992

Law Environmental Project No. 58-6425.07

LAW ENVIRONMENTAL, INC.

3320 N. SAN FERNANDO BLVD.
BURBANK, CALIFORNIA 91504
TEL. (818) 848-0214
FAX (818) 848-1674

March 27, 1992

City of Los Angeles
Solid Waste Management Division
419 South Spring Street, Suite 800
Los Angeles, California 90013

Law Environmental Project No. 58-6425.07

Attention: Mr. Luther Derian, P.E.

WATER BALANCE
Lopez Canyon Landfill
Lakeview Terrace District
Los Angeles, California

As required by the California Integrated Solid Waste Management Board letter dated January 7, 1992, we have prepared this water balance study for the cover of canyons A and B at the Lopez Canyon Landfill (their Item No. 5). The balance uses site-specific soils data and climatological data from nearby localities.

Law Environmental, Inc., prepared this report for the City of Los Angeles's specific needs. The registered geologists who prepared this report have a minimum of 10 years experience. Our findings and recommendations were prepared according to generally accepted professional principles and practices used by similar consulting firms in this or similar areas. Any use, interpretation, or emphasis other than that contained here, is done at the reader's own risk.

We appreciate working with you on this project. If you have any questions or require further assistance, please call Alice Campbell at (818) 848-0214.

Sincerely,

LAW ENVIRONMENTAL, INC.

William J. O'Braitis

William J. O'Braitis
Staff Geologist

Alice Campbell

Alice Campbell, C.E.G. 1157
Principal Hydrogeologist

AC/ks/642507WB.RPT
Attachments

WATER BALANCE

To help predict the effects of future land use on moisture conditions in the fill, detailed water balances were calculated for irrigated and non-irrigated conditions on the cover. The cover thickness used was five feet, to include both the barrier soil and the vegetative layer. The soil data we used for calculations were from the test pad developed for liner design. This was chosen because the same or similar materials will be used for the cover. The soil data are as follows:

Location:	Pad 2-1
Soil Type (ASTM):	CL
Plasticity Index:	8.5
Permeability (lab):	2.02×10^{-6} cm/sec
Dry Density:	108.3
Wet Density:	132.9
Field Moisture (Specific Yield):	12.6
Porosity:	24.6 percent

Four water balance cases were considered; these included natural rainfall (no irrigation), adding irrigation, irrigating a cover loosened by cracking, and loosening the cover without irrigation but with rainfall. Changes with time were modeled by increasing the "root hole factor" from 0.01 to 0.20. For our analysis, we used the water year 1982-83, which was well above the average.

The results of the simulation showed that the cover, as newly installed, essentially prevents percolation. As the cover settles and ages, some infiltration will occur. However, for the irrigated and vegetated cover, plant transpiration increases as water penetration increases during aging, and total water penetration, even with 45 inches of water applied, is just over two inches per year. Assuming that the trash can absorb 15 percent water without saturating, and that the trash is 180 feet thick, then it can hold 324 inches of water, this would result in a time to saturation of 160+ years, assuming the same precipitation each year.

This analysis assumes the cover remains generally intact. In reality, most of the water that passes through the cover will enter via cracks or by ponding. Saturating the cover is highly improbable in the Southern California climate. Thus, maintenance and crack repair are far more important than irrigation in preventing saturation of the landfill.

A detailed water balance for the season 1982-1983 is attached in Appendix A. This year was chosen because it was the wettest year since 1940-1941, and would illustrate cover performance under greater than 100-year rainfall conditions. The calculations are for a unit area on the landfill surface, in inches of water. The totals can be multiplied by the area of the site (about 72 acres) for the total volume of each category.

Monthly totals are presented in Table 1, Water Balance: 1982-1983. Monthly summaries of daily totals for the water balance are in Appendix A, along with an explanation of the equations used to compute daily balances.

TABLE 1

LOPEZ CANYON WATER BALANCE: 1982-83

MONTH	IRRIG	P82-83	AVL. MOI	INFIL	TRANSP	EVAP	PERC	RUNOFF
OCT	2.710	0.180	-0.271	2.890	0.707	1.911	0.000	0.000
NOV	1.490	4.850	0.555	3.230	0.870	2.915	0.000	3.110
DEC	0.700	1.347	1.790	1.877	1.240	2.426	0.000	0.170
JAN	0.350	8.512	-1.665	4.680	0.899	2.116	0.000	4.182
FEB	0.000	5.890	-1.625	3.482	0.625	1.232	0.000	2.408
MAR	0.000	15.789	-3.032	4.891	1.158	0.694	0.007	10.898
APR	0.000	3.880	1.658	2.207	2.205	1.645	0.014	1.673
MAY	0.700	0.320	3.220	1.020	2.383	1.857	0.000	0.000
JUN	1.400	0.068	0.362	1.468	1.358	0.472	0.000	0.000
JUL	1.400	0.034	2.040	1.434	0.965	2.510	0.000	0.000
AUG	2.100	2.777	-1.189	3.481	0.866	1.427	0.000	1.396
SEP	2.100	1.710	-0.995	3.180	0.730	1.455	0.000	0.630
TOTAL:	**12.950**	**45.357**	**0.848**	**33.841**	**14.007**	**20.661**	**0.020**	**24.467**
CHECK:	**WAT IN =>**		**59.155**	**=**	**59.155**	**<= WAT OUT**		

The State regulations would allow 1 x 10^{-6} cm/sec, or about one foot per year, of seepage through the cover. The cover, as designed, is estimated to allow no seepage even under the unusually wet design conditions. This is because the low infiltration rate would allow little infiltration, even during large storms. What little water infiltrates, generally evaporates after a storm.

Based on the results of the water balance calculation, irrigation to establish vegetation will not results in unacceptable percolation through the cover, even under the wettest conditions. The cover, as designed, will allow much less than 10^{-6} cm/sec of drainage even in a wet year. In a dry year, the effective permeability of the cover is about 10^{-8} cm/sec, or less.

APPENDIX A

WATER BALANCE CALCULATIONS

APPENDIX A
WATER BALANCE CALCULATIONS

Calculation of Deep Percolation Through Cover

The approach used in our calculations was to simulate the behavior of the clay during and after rainfall events. The factors that affect percolation are precipitation, moisture-in-storage, infiltration, evaporation, runoff, and transpiration. Each of these factors was calculated using equations describing each step in the processes linking precipitation with percolation. The processes and equations used are as follows:

- Rainfall (ppt)

  Daily rainfall records were obtained from Los Angeles County Flood Control District (LACFCD). The station used was for Hansen Dam. This station was chosen because it is nearest the site. We used 1982-83, which totaled 39.51 inches, as a worst-case for infiltration.

- Irrigation

  Irrigation was based on 0.25 inches every other day.

- Evaporation

  Evaporation records were obtained from LACFCD. The closest station is at Los Angeles Dam, 9 miles northwest. Evaporation is limited by either the energy available or by the soils ability to transmit water. In addition, the rate of soil evaporation declines exponentially as the dry upper part of the soil inhibits evaporation from lower parts of the soil. Therefore, evaporation was calculated using maximum rates after a rain and an exponential decline until the next rainfall event.

- Soil Properties

The soil was described by its thickness, porosity, maximum infiltration rate, field capacity, maximum evaporation rate, permeability, plant cover, and available water content. The infiltration rate was made to change with moisture content of the soil using the method of Holtan (USDA, 1969).

- Plant Cover

Plant cover has two effects: it retards evaporation and it produces evapotranspiration. Plant roots promote infiltration, but this is offset by the higher transpiration rates of dense vegetation. The method used follows that used in the EPA HELP Method (1983). Transpiration is limited by soil and available moisture.

- Infiltration

Infiltration rates vary from highest in dry soil to a low equal to the saturated unit hydraulic conductivity (K_s or Ksat), and is a function of the moisture content and also of thickness. It is also affected by compaction, plant root holes, worm borings, and animal burrows. We have assumed that, as the landfill cover ages, it loses some of its initial compaction.

- Runoff

Runoff is ordinarily calculated using maximum storm conditions and assuming wet conditions, because maximum runoff rates are used for many hydraulic design problems. However, this tends to overestimate runoff for smaller events. For low intensity events, runoff is not a constant, but depends on how much water infiltrates. Early in the rainy season or in a storm, most of the water is absorbed by the soil. Therefore, runoff for this model was calculated based on the residual after infiltration.

- Deep Percolation

Percolation rates vary from zero at field capacity to Ksat at saturation. Intermediate rates are calculated using the percentage of saturated pore space.

- Soil Moisture

Soil moisture may vary from practically zero to a maximum depending on thickness and pore space. Directly or indirectly, soil moisture determines the rates of all other processes. The model mediates all movements of water based on daily precipitation.

- Structure

All units are in inches or rates of inches per day. The model starts with an assumed initial moisture content. For convenience, the model begins in October, when soil moisture is a minimum. Initial moisture was chosen from available moisture contents measured in cover materials during July 1985. Soil parameters used were based on permeabilities measured for site soils.

The calculations are made for each day in six steps:

1. Initialize saturated porosity, moisture content at field capacity, moisture content at wilting point, and maximum infiltration rate.

2. From initial moisture content and daily precipitation (if any), calculate infiltration using maximum rate based on moisture content or pore space availability, whichever is less.

3. Calculate deep percolation at a rate based on percent saturation and Ksat for moisture contents greater than field capacity, or on available water content above field capacity, whichever is less.

4. Calculate transpiration based on whether or not it has rained, whether or not the soil is wetter than the wilting point, and whether there is water available for transpiration.

5. Calculate evaporation based on a) whether it is raining, b) the soil's maximum rate or the maximum evaporation rate measured for that day, whichever is less, with adjustment for plant cover, and c) whether there is sufficient moisture for evaporation.

6. Total all losses and gains to the soil and use new moisture content for next day's calculations. Table A-1 shows the results of a one year simulation using the recommended cover design. The water year 1982-83 represents a very high rainfall year. The monthly summary shows that in 1982-83, no deep percolation would occur. Tables A-2, A-3 and A-6 shows the result of a one-year simulation with irrigation. Tables A-4, A-5 and A-7 shows the result of a one-year simulation with no irrigation. The summary shows that 1.2 inches of water percolate.

TABLE A-1

WATER BALANCE SUMMARY

CASE	THICKNESS	IRRIGATION	PRECIPITATION	COMPACTION	RESULTS inches/year	RESULTS cm/sec
WATER YEAR 1982-83						
1	60	12.9	45.36	0.01 (dense)	.020	2.5×10^{-10}
2	60	12.9	45.36	0.10 (loose)	.937	1.2×10^{-8}
3	60	0	45.36	0.01 (dense)	.004	4.8×10^{-11}
4	60	0	45.36	0.10 (loose)	.52	6.4×10^{-9}
WATER YEAR 1990-91						
5	60	12.9	13.38	0.01 (dense)	0	--
6	60	0	13.38	0.01 (dense)	0	--

The main differences between the new and aged cover were in transpiration. The additional infiltration which occurs as plant roots are established is predominantly lost to transpiration, and only a small amount is left percolate.

TABLE A-2
LOPEZ CANYON WATER BALANCE
CALCULATIONS FOR CASE 1: IRRIGATION + DENSE COVER

MONTH	IRRIG	P82-83	AVL. MOI	INFIL	TRANSP	EVAP	PERC	RUNOFF
OCT	2.710	0.180	-0.271	2.890	0.707	1.911	0.000	0.000
NOV	1.490	4.850	0.555	3.230	0.870	2.915	0.000	3.110
DEC	0.700	1.347	1.790	1.877	1.240	2.426	0.000	0.170
JAN	0.350	8.512	-1.665	4.680	0.899	2.116	0.000	4.182
FEB	0.000	5.890	-1.625	3.482	0.625	1.232	0.000	2.408
MAR	0.000	15.789	-3.032	4.891	1.158	0.694	0.007	10.898
APR	0.000	3.880	1.658	2.207	2.205	1.645	0.014	1.673
MAY	0.700	0.320	3.220	1.020	2.383	1.857	0.000	0.000
JUN	1.400	0.068	0.362	1.468	1.358	0.472	0.000	0.000
JUL	1.400	0.034	2.040	1.434	0.965	2.510	0.000	0.000
AUG	2.100	2.777	-1.189	3.481	0.866	1.427	0.000	1.396
SEP	2.100	1.710	-0.995	3.180	0.730	1.455	0.000	0.630
TOTAL:	12.950	45.357	0.848	33.841	14.007	20.661	0.020	24.467
CHECK:		WAT IN=>	59.155	=	59.155	<=WAT OUT		

EVAP IN/DAY	GROWTH	IRRIG	*70%	
0.17	0.300	4.000	0.090	OCT
0.15	0.400	2.000	0.047	NOV
0.13	0.680	1.000	0.023	DEC
0.09	0.800	0.500	0.011	JAN
0.07	0.820	0.000	0.000	FEB
0.11	1.000	0.000	0.000	MAR
0.19	0.930	0.000	0.000	APR
0.20	0.780	1.000	0.023	MAY
0.17	0.530	2.000	0.047	JUN
0.18	0.440	2.000	0.045	JUL
0.17	0.370	3.000	0.068	AUG
0.16	0.330	3.000	0.070	SEP

SOIL :	CL	PAD 2-1	
Ksat (in/day)	0.04	1E-06	cm/sec
PORE %	0.394		
EVPexp	3.900	1E-06	
FIELD CAP	0.202	0.036	
WILT PT	0.100		
COVER (in)	60	MMAX	23.654
LAI	1.5	IMax (in/day)	0.874
HOLE %	0.010	MFC	12.115
EVAP (in/day)	0.210	MWP	6.000
INIT MC	9.058		
REV:	MAR 11 92		

TABLE A-3
LOPEZ CANYON WATER BALANCE
CALCULATIONS FOR CASE 2: IRRIGATION + LOOSE COVER

MONTH	IRRIG	P82-83	AVL. MOI	INFIL	TRANSP	EVAP	PERC	RUNOFF
OCT	2.710	0.180	-0.271	2.890	0.707	1.911	0.000	0.000
NOV	1.490	4.850	-2.555	6.340	0.870	2.915	0.000	0.000
DEC	0.700	1.347	1.620	2.047	1.240	2.426	0.000	0.000
JAN	0.350	8.512	-5.646	8.862	0.899	2.116	0.201	0.000
FEB	0.000	5.890	-3.212	5.743	0.625	1.232	0.674	0.147
MAR	0.000	15.789	-3.306	5.173	1.158	0.694	0.016	10.615
APR	0.000	3.880	1.078	2.780	2.205	1.645	0.008	1.100
MAY	0.700	0.320	3.224	1.020	2.383	1.857	0.004	0.000
JUN	1.400	0.068	0.366	1.468	1.358	0.472	0.004	0.000
JUL	1.400	0.034	2.318	1.434	1.238	2.510	0.004	0.000
AUG	2.100	2.777	-2.564	4.877	0.871	1.427	0.015	0.000
SEP	2.100	1.710	-1.614	3.810	0.730	1.455	0.011	0.000
TOTAL:	12.950	45.357	-10.561	46.445	14.286	20.661	0.937	11.862
CHECK:		WAT IN=>	47.746	=	47.746	<=WAT OUT		

EVAP IN/DAY	GROWTH	IRRIG	*70%	
0.17	0.300	4.000	0.090	OCT
0.15	0.400	2.000	0.047	NOV
0.13	0.680	1.000	0.023	DEC
0.09	0.800	0.500	0.011	JAN
0.07	0.820	0.000	0.000	FEB
0.11	1.000	0.000	0.000	MAR
0.19	0.930	0.000	0.000	APR
0.20	0.780	1.000	0.023	MAY
0.17	0.530	2.000	0.047	JUN
0.18	0.440	2.000	0.045	JUL
0.17	0.370	3.000	0.068	AUG
0.16	0.330	3.000	0.070	SEP

SOIL :	CL	PAD 2-1	
Ksat (in/day)	0.04	1E-06 cm/sec	
PORE %	0.394		
EVPexp	3.900	1E-06	
FIELD CAP	0.202	0.036	
WILT PT	0.100		
COVER (in)	60	MMAX	23.654
LAI	1.5	IMax (in/day)	8.420
HOLE %	0.100	MFC	12.115
EVAP (in/day)	0.210	MWP	6.000
INIT MC	9.058		
REV:	MAR 11 92		

TABLE A-4
LOPEZ CANYON WATER BALANCE
CALCULATIONS FOR CASE 3: NO IRRIGATION + DENSE COVER

MONTH	IRRIG	P82-83	AVL. MOI	INFIL	TRANSP	EVAP	PERC	RUNOFF
OCT	0.000	0.180	2.439	0.180	0.707	1.911	0.000	0.000
NOV	0.000	4.850	0.782	2.444	0.310	2.915	0.000	2.406
DEC	0.000	1.347	1.093	1.334	0.000	2.426	0.000	0.013
JAN	0.000	8.512	–2.494	4.836	0.225	2.116	0.000	3.677
FEB	0.000	5.890	–1.893	3.751	0.625	1.232	0.000	2.139
MAR	0.000	15.789	–3.371	5.227	1.158	0.694	0.004	10.561
APR	0.000	3.880	1.528	2.322	2.205	1.645	0.000	1.558
MAY	0.000	0.320	3.920	0.320	2.383	1.857	0.000	0.000
JUN	0.000	0.068	1.420	0.068	1.016	0.472	0.000	0.000
JUL	0.000	0.034	2.475	0.034	0.000	2.510	0.000	0.000
AUG	0.000	2.777	–0.397	1.824	0.000	1.427	0.000	0.953
SEP	0.000	1.710	–0.029	1.484	0.000	1.455	0.000	0.226
TOTAL:	0.000	45.357	5.471	23.824	8.630	20.661	0.004	21.533
CHECK:		WAT IN=>	50.828	=	50.828	<=WAT OUT		

EVAP IN/DAY	GROWTH	IRRIG	*70%	
0.17	0.300	0.000	0.000	OCT
0.15	0.400	0.000	0.000	NOV
0.13	0.680	0.000	0.000	DEC
0.09	0.800	0.000	0.000	JAN
0.07	0.820	0.000	0.000	FEB
0.11	1.000	0.000	0.000	MAR
0.19	0.930	0.000	0.000	APR
0.20	0.780	0.000	0.000	MAY
0.17	0.530	0.000	0.000	JUN
0.18	0.440	0.000	0.000	JUL
0.17	0.370	0.000	0.000	AUG
0.16	0.330	0.000	0.000	SEP

SOIL :	CL	PAD 2-1	
Ksat (in/day)	0.04	1E-06 cm/sec	
PORE %	0.394		
EVPexp	3.900	1E-06	
FIELD CAP	0.202	0.036	
WILT PT	0.100		
COVER (in)	60	MMAX	23.654
LAI	1.5	IMax (in/day)	0.874
HOLE %	0.010	MFC	12.115
EVAP (in/day)	0.210	MWP	6.000
INIT MC	9.058		
REV:	MAR 11 92		

TABLE A-5
LOPEZ CANYON WATER BALANCE
CALCULATIONS FOR CASE 4: NO IRRIGATION + LOOSE COVER

MONTH	IRRIG	P82-83	AVL. MOI	INFIL	TRANSP	EVAP	PERC	RUNOFF
OCT	0.000	0.180	2.439	0.180	0.707	1.911	0.000	0.000
NOV	0.000	4.850	-1.364	4.850	0.571	2.915	0.000	0.000
DEC	0.000	1.347	2.097	1.347	1.017	2.426	0.000	0.000
JAN	0.000	8.512	-5.670	8.512	0.726	2.116	0.000	0.000
FEB	0.000	5.890	-3.562	5.890	0.625	1.232	0.470	0.000
MAR	0.000	15.789	-6.664	8.542	1.158	0.694	0.026	7.246
APR	0.000	3.880	0.736	3.124	2.205	1.645	0.009	0.756
MAY	0.000	0.320	3.922	0.320	2.383	1.857	0.002	0.000
JUN	0.000	0.068	1.762	0.068	1.358	0.472	0.000	0.000
JUL	0.000	0.034	3.717	0.034	1.238	2.510	0.004	0.000
AUG	0.000	2.777	-0.471	2.777	0.871	1.427	0.008	0.000
SEP	0.000	1.710	0.476	1.710	0.730	1.455	0.001	0.000
TOTAL:	0.000	45.357	-2.583	37.354	13.590	20.661	0.520	8.002
CHECK:		WAT IN=>	42.774	=	42.774	<=WAT OUT		

EVAP IN/DAY	GROWTH	IRRIG	*70%	
0.17	0.300	0.000	0.000	OCT
0.15	0.400	0.000	0.000	NOV
0.13	0.680	0.000	0.000	DEC
0.09	0.800	0.000	0.000	JAN
0.07	0.820	0.000	0.000	FEB
0.11	1.000	0.000	0.000	MAR
0.19	0.930	0.000	0.000	APR
0.20	0.780	0.000	0.000	MAY
0.17	0.530	0.000	0.000	JUN
0.18	0.440	0.000	0.000	JUL
0.17	0.370	0.000	0.000	AUG
0.16	0.330	0.000	0.000	SEP

SOIL :	CL	PAD 2-1	
Ksat (in/day)	0.04	1E-06 cm/sec	
PORE %	0.394		
EVPexp	3.900	1E-06	
FIELD CAP	0.202	0.036	
WILT PT	0.100		
COVER (in)	60	MMAX	23.654
LAI	1.5	IMax (in/day)	8.420
HOLE %	0.100	MFC	12.115
EVAP (in/day)	0.210	MWP	6.000
INIT MC	9.058		
REV:	MAR 11 92		

TABLE A-6
LOPEZ CANYON WATER BALANCE
CALCULATIONS FOR CASE 5: IRRIGATION + DENSE COVER

MONTH	IRRIG	P90-91	AVL. MOI	INFIL	TRANSP	EVAP	PERC	RUNOFF
OCT	2.710	0.000	-0.313	2.710	0.745	1.652	0.000	0.000
NOV	1.490	0.630	0.112	2.011	0.901	1.222	0.000	0.109
DEC	0.700	0.030	2.408	0.730	1.305	1.834	0.000	0.000
JAN	0.350	2.030	0.739	1.818	1.003	1.554	0.000	0.562
FEB	0.000	3.030	-0.934	1.169	0.099	0.136	0.000	1.861
MAR	0.000	7.540	-0.949	3.614	1.401	1.265	0.000	3.926
APR	0.000	0.040	2.666	0.040	1.612	1.094	0.000	0.000
MAY	0.700	0.000	-0.260	0.700	0.000	0.440	0.000	0.000
JUN	1.400	0.000	-0.464	1.400	0.916	0.020	0.000	0.000
JUL	1.400	0.070	0.527	1.470	0.355	1.642	0.000	0.000
AUG	2.100	0.010	-0.244	2.110	0.074	1.792	0.000	0.000
SEP	2.100	0.000	-1.209	2.100	0.642	0.249	0.000	0.000
TOTAL:	12.950	13.380	2.079	19.872	9.051	12.900	0.000	6.458
CHECK:		WAT IN=>	28.409	=	28.409	<=WAT OUT		

EVAP IN/DAY	GROWTH	IRRIG	*70%	
0.17	0.300	4.000	0.090	OCT
0.15	0.400	2.000	0.047	NOV
0.13	0.680	1.000	0.023	DEC
0.09	0.800	0.500	0.011	JAN
0.07	0.820	0.000	0.000	FEB
0.11	1.000	0.000	0.000	MAR
0.19	0.930	0.000	0.000	APR
0.20	0.780	1.000	0.023	MAY
0.17	0.530	2.000	0.047	JUN
0.18	0.440	2.000	0.045	JUL
0.17	0.370	3.000	0.068	AUG
0.16	0.330	3.000	0.070	SEP

SOIL :	CL	PAD 2-1	
Ksat (in/day)	0.04	1E-06	cm/sec
PORE %	0.394		
EVPexp	3.900	1E-06	
FIELD CAP	0.202	0.036	
WILT PT	0.100		
COVER (in)	60	MMAX	23.654
LAI	1.5	IMax (in/day)	0.874
HOLE %	0.010	MFC	12.115
EVAP (in/day)	0.210	MWP	6.000
INIT MC	9.058		
REV:	MAR 11 92		

TABLE A-7
LOPEZ CANYON WATER BALANCE
CALCULATIONS FOR CASE 6: NO IRRIGATION + DENSE COVER

MONTH	IRRIG	P90-91	AVL. MOI	INFIL	TRANSP	EVAP	PERC	RUNOFF
OCT	0.000	0.000	2.397	0.000	0.745	1.652	0.000	0.000
NOV	0.000	0.630	1.270	0.630	0.678	1.222	0.000	0.000
DEC	0.000	0.030	1.804	0.030	0.000	1.834	0.000	0.000
JAN	0.000	2.030	-0.068	1.622	0.000	1.554	0.000	0.408
FEB	0.000	3.030	-1.242	1.378	0.000	0.136	0.000	1.652
MAR	0.000	7.540	-2.152	3.901	0.485	1.265	0.000	3.639
APR	0.000	0.040	1.832	0.040	0.778	1.094	0.000	0.000
MAY	0.000	0.000	0.440	0.000	0.000	0.440	0.000	0.000
JUN	0.000	0.000	0.020	0.000	0.000	0.020	0.000	0.000
JUL	0.000	0.070	1.572	0.070	0.000	1.642	0.000	0.000
AUG	0.000	0.010	1.782	0.010	0.000	1.792	0.000	0.000
SEP	0.000	0.000	0.249	0.000	0.000	0.249	0.000	0.000
TOTAL:	0.000	13.380	7.905	7.681	2.686	12.900	0.000	5.699
CHECK:		WAT IN=>	21.285	=	21.284	<=WAT OUT		

EVAP IN/DAY	GROWTH	IRRIG	*70%	
0.17	0.300	0.000	0.000	OCT
0.15	0.400	0.000	0.000	NOV
0.13	0.680	0.000	0.000	DEC
0.09	0.800	0.000	0.000	JAN
0.07	0.820	0.000	0.000	FEB
0.11	1.000	0.000	0.000	MAR
0.19	0.930	0.000	0.000	APR
0.20	0.780	0.000	0.000	MAY
0.17	0.530	0.000	0.000	JUN
0.18	0.440	0.000	0.000	JUL
0.17	0.370	0.000	0.000	AUG
0.16	0.330	0.000	0.000	SEP

SOIL :	CL	PAD 2-1	
Ksat (in/day)	0.04	1E-06 cm/sec	
PORE %	0.394		
EVPexp	3.900	1E-06	
FIELD CAP	0.202	0.036	
WILT PT	0.100		
COVER (in)	60	MMAX	23.654
LAI	1.5	IMax (in/day)	0.874
HOLE %	0.010	MFC	12.115
EVAP (in/day)	0.210	MWP	6.000
INIT MC	9.058		
REV:	MAR 11 92		

SAMPLE WATER BALANCE CALCULATION FOR 2/14/1980*

Input Data

Soil Variables

Ksat,	0.003 in/day
Porosity	0.264
Soil Limited Evaporation Rate	0.197 in/day
Field Capacity (F.C.)	0.17
Wilting Point	0.15

Problem Variables

Cover thickness	24 inches
Leaf Area Index (LAI)	3.0 ft^2/ft^2
Pore-space continuity	0.10
Initial Moisture in Storage (IMC)	2.5 in.

Initial Setpoint Calculations

Feb. daily evaporation (weather-limited)	3.14"/28d = .0112 in/day
Days since last rain	5
Available Storage (thickness * porosity)	6.336 in.
Moisture at Field Cap	4.08 in.
Moisture at Wilt Point	3.60 in.
Maximum Infiltration Rate**	1.329 in/day

** = holes × (avl. storage ^ 1.4) + Ksat

(0.10 × (6.336) ^ 1.4) + .003 = 1.329

---

*This example does not use the same input data as the model for the site.

Day 1 (2/14/80)
ppt = 0.10

1. Calculate infiltration (I)
Logic: If no rain --> 0
calculate today's <u>rate</u>
calculate today's avail. storage (<u>room</u>)
if rate > room, room (if rain > room, else rain)
if room > rate, rate (if rain > rate, else rain)

a) today's room = avl. storage - imc = 6.336 - 2.50 = 3.836 in.
today's rate = holes × (room ^ $^{1.4}$) + Ksat = 0.1 × (3.836 ^ $^{1.4}$) + .003

so: room > rate but = .6598 in/day
ppt < room so I = 0.10

2. Calculate runoff
R = Ppt - Inf = 0.00

3. Calculate evaporation

Logic: If no water in storage --> 0 or remainder if moisture is below limiting rate
find limiting rate, soil or weather
set initial rate based on available moisture and limiting rate
assume exponential decline in evap. after rain stops

$AMC_2 = AMC_1 e^{-kt}$ k = -0.1, t = days since rain

for weather, assume plant cover reduces evap.

rate = EFEB/28 × exp $^{(-0.4 \times LAI)}$

(atm) = .111 × exp $^{(-0.4 \times 3)}$ = .03343 in/day
(soil limited rate = MXE = 0.197 in/day)

MXE > atm evap. so use atm (energy-limited)

evap. $= 0.03343 \times e^{-0.1 \times t}$
$= 0.03343 \times e^{-0.1 \times 5}$
$= 0.0203$ in.

Note: if AMC < etoday, do not bother with evap.

4. Transpiration (T)

check whether today is rainy (>.01") or not.
(if it is raining, cut transpiration in half)

if AMC < MWP, --> 0 G - growth factor

if AMC - MWP, < rate, AMC - MWP

otherwise, [rainy --> EFEB × GFEB × LAI/6
dry --> EFEB × GFEB × LAI/3

So $T = 0.488 \times 0.111 \times 3/6 = 0.027$

5. Deep Percolation (D.P.)

1. Assume unit vertical gradient
   Q = KiA 100% at saturation

2. Assume Q = 0 at field capacity

3. Assume linear relation recharge
   between F.C. and saturation

Get field capacity (MFC) = 4.08

Get infiltration - add to yesterday's moisture-in-storage

$$AMC = AMC_{yest} + I = 2.5 + 0.10 = 2.60''$$

Compute today's percolation rate

Ksat × (IMC + Inf)/MMAX
= .003 × (2.5 + .01)/6.336
= 0.04771 in/day

Check against available moisture

if Ktoday < (AMC + INF - F.C.), then
.04771 > (2.5 + .10 - 4.08) so D.P. = 0

Note: (if AMC + INF - F.C. < K_{today}, take excess water
if AMC > FC if AMC + INF - F.C. > K_{today}, take K_{today})

Rebalance Moisture for day's events

$$AMC_{today} = IMC + INFILT - EVAP - TRANSP - PERC - R.O.$$
$$= 2.5 + 0.10 - 0.0203 - 0.027 - 0 - 0$$

New AMC = 2.553 Continue through cycle

APPENDIX B

PRECIPITATION DATA

SEASONAL PRECIPITATION BY DAY 1982 - 1983

STATION NO. 436C

Hansen Dam

LATITUDE 34 ° 16' 08"
LONGITUDE 118 ° 23' 59"
ELEVATION 1110'
OBSERVATION TIME 5 ~~AM~~/PM

LENGTH OF RECORD

REMARKS/CERTIFICATION:

SUBAREA CODE D1
FOREIGN NO.
QUAD INDEX NO. 49-03

DAY	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.
1						5.61		.32				
2					.72	2.92						
3					.18	.35						
4												
5					.18		.11					
6					.03							
7					.32							
8					.89							
9		.90										
10		.96										
11												
12							.05					
13					.17	.12						
14						.15						
15											.05	
16											.04	
17						.54					1.48	
18					.06*	.24	.78				.26	
19		.69		1.02		.05	.17				.87	
20							1.34				.02	.10
21						.81	.31					.06
22			.56	.26		.25						
23			.66	1.63		.08						
24				.67	.27	.64						
25												
26	.12				.71							
27				1.82	1.62							
28					.74	.07	.05					
29			.07	1.44			.59					.99
30	.06	2.30					.48					.56
31												
TOTAL	.18	4.85	1.29	6.84	5.89**	11.83	3.88	0.32	Ø	0	2.72	1.71

LACFCD

SEASON TOTAL 39.51 INCHES

2379 FCD 7'77

SEASONAL PRECIPITATION BY DAY 1990 - 1991

STATION NO. 436C

Hansen Dam

LATITUDE 34° 16' 08"
LONGITUDE 118° 23' 59"
ELEVATION 1110'
OBSERVATION TIME 5 [redacted]/PM

LENGTH OF RECORD

REMARKS/CERTIFICATION:

SUBAREA CODE D1
FOREIGN NO.
QUAD INDEX NO. 49-03

DAY	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.
1						1.62						
2												
3				0.46								
4				1.09								
5				0.13		0.20						
6												
7												
8										0.07		
9				0.35								
10												
11						0.05					0.01	
12			0.03									
13						0.20						
14						0.02						
15												
16												
17												
18												
19						1.60						
20		0.50				0.80						
21							0.04					
22												
23												
24												
25						1.25						
26		0.13				0.42						
27					0.82	1.38						
28					2.21							
29												
30					X							
31		X			X		X		X			X
TOTAL	Ø.Ø	0.63	0.03	2.03	3.03	7.54	0.04	0.0	0.0	0.07	0.01	0.0

LACFCD

SEASON TOTAL 13.38 INCHES

APPENDIX K

INITIAL COST ESTIMATE WORKSHEET

2-10-95
Sent to CIWMB 2-17-95

SWIS # 19-AA-0820

INITIAL COST ESTIMATE WORKSHEET
(rev. 10/89)

SITE DESCRIPTION

The following questions will provide general information regarding the site description, the type of waste accepted at the site and basic geological information. This information will aid in assessing factors that may affect the initial cost estimates.

Prepared By: GeoSyntec Consultants

General Site Information:

Name of Solid Waste Landfill: Lopez Canyon Sanitary Landfill

Solid Waste Facilities Permit Number: 19-AA-0820

Facility Operator: CITY OF LOS ANGELES BUREAU OF SANITATION

Site Owner: CITY OF LOS ANGELES BUREAU OF SANITATION

Site Location (California coordinates, township & range or longitude/latitude, preferred)

Section 6

Assessors Parcel Number ____________________

Site Address: 11950 Lopez Canyon Road, Lakeview Terrace, CA 91342

1. What is the existing State Water Resources Control Board classification of the solid waste landfill? (mark the appropriate response)

NEW If Waste Discharge Requirements (WDR) revised since 11-84		OLD	
______	Class I	______	Class I
		X	Class II-1

Note: The solid waste landfill is excluded from these requirements, if the facility is a hazardous waste facility or co-disposal facility of both hazardous and nonhazardous waste as a RCRA Subtitle C facility subject to specific closure plan requirements.

______ Class II ______ Class II-2

__X__ Class III ______ Class III

2. What is the anticipated closing date for the existing permitted landfill? Proposed expansions which have not been approved by the Board and LEA are not to be included in these calculations. Include calculations supporting the estimate date. (Attach additional sheets as necessary.)

month February , year 1996

Note: All facilities with an anticipated closure date of September 28, 1992, or earlier, will be required to submit their closure and postclosure maintenance plan no later than July 1, 1990.

Type of Fill

3. Type of Fill (check appropriate type)

______ Trench __X__ Canyon

__X__ Area ______ Other (describe)

______ Pit

Volume of Waste

4.	What is the estimated in-place volume of landfilled wastes at the site in cubic yards?	13,320,000
5.	What is the design capacity of the site in cubic yards?	26,562,000
6.	Minimum thickness of waste (ft)?	25'
7.	Average thickness of waste (ft)?	120'
8.	Maximum thickness of waste (ft)?	245'
9.	Average height above surrounding terrain (ft)?	N/A
10.	Typical inclination of side slopes, in slope ratio (horizontal:vertical)? (e.g., 5:1, 2:1)	2:1

Note: ______

11.	Quantity of waste typically received (tons/day)?	4,000
12.	Total permitted site acreage?	399
13.	Waste disposal area acreage?	161

Waste Description

14. Estimate of solid waste received (total of entries for residential, commercial, industrial, demolition and other should add up to 100%).

% Residential__85__ % Commercial_____

% Industrial_______ % Demolition_____

% Other (special waste streams, such as ash, auto shredder waste, infectious waste, sludge, asbestos)

Describe material under "other" and give its percentage.

Material	Percentage
Street Sweeping	15

Resid. + Indus. + Comm. + Demo. + Other = 100%

Site Geology and Groundwater Data

15. Briefly describe the underlying geology of the site. (Mark as many boxes that apply).

__X__ Shallow alluvium <50' ______ Deep alluvium >50'

__X__ Sedimentary ______ Igneous

______ Metamorphic

a. What is the name of the nearest major fault? San Fernando Zone

b. Distance from site (miles)? Onsite

c. On-site fault(s), if known? Yes

16. What are the groundwater characteristics?

a. What is the depth to groundwater (ft)? A seasonal water table was obtained from MW 88-5 drilled to a depth of 42 ft or 1429.7 ft MSL

This will be the range of water levels, <u>from well data</u>, in a groundwater well network. Note: Consider seasonal variations from rainy to dry periods, wet and dry years, well locations and variations in the subsurface geology.

Highest recorded level (depth in ft) ELEV. 42 ft, 1429.7 ft MSL

Well Number MW 88-5 Date Recorded 3/9/88

Lowest recorded level (depth in ft) ELEV. N/A

Well Number N/A Date Recorded N/A

Typical N/A

b. What direction does the groundwater flow?

The apparent ground water flow direction is north to south.

c. What is the groundwater gradient?

Data is insufficient to determine ground water gradient.

CLOSURE COSTS

Final Cover

17. Area of Landfill for Final Cover

a. Area of top deck to be capped (ft^2) A_d= 3,673,850

b. Area of side slopes to be capped (ft^2) A_s= 2,985,603
(map area)

Side Slopes Horizontal:Vertical	Conversion Factor (C)
5 : 1	1.02
4 : 1	1.03
3 : 1	1.05
2½: 1	1.08
2 : 1	1.12
1¾: 1	1.15

18. Final Cover Soil - Foundation Layer (Already in place)

a. Thickness

1) Top deck (minimum 3 feet of soil)

T_d = (≥ 3') 0

2) Side slope (minimum 3 feet normal to slope)
T_s = (≥ 3') 0

	b.	Volume = $[(T_d \times A_d) + (T_s \times A_s \times \text{Conv. factor})]/27$ (yd^3)	______
	c.	% Native soil	______
	d.	Native material acquisition cost (excavation, hauling,etc.) ($\$/yd^3$)	______
	e.	Native soil cost ($) (Line 18b x Line 18c x Line 18d)	______
	f.	% Imported soil	______
	g.	Imported material acquisition cost (purchase, delivery, etc.) ($\$/yd^3$)	______
	h.	Imported soil cost ($) (Line 18b x Line 18f x Line 18g)	______
	i.	Placement, grading and compaction (to achieve relative compaction of .90) unit cost ($\$/yd^3$)	______
	j.	Placement, grading and compaction cost ($) (Line 18b x Line 18i)	______
	k.	Subtotal final cover soil ($) (Line 18e + Line 18h + Line 18j)	$0
19.	Clay Layer		
	a.	Area to be capped (ft^2) of A, B and AB+Decks	2,691,572
	b.	Thickness (ft) (minimum 1 foot)	1.00
	c.	Volume (yd^3) (Line 19a x Line 19b)/27	~~$~~99,688
	d.	<u>% On-site Clay</u>	100
	e.	On-site material acquisition cost (excavation, hauling, etc.) ($\$/yd^3$)	$0
	f.	On-site clay cost ($) (Line 19c x Line 19d x Line 19e)	$0
	g.	<u>% Imported Clay</u>	100
	h.	Imported material acquisition cost (purchase, delivery, etc.) ($\$/yd^3$)	$6.50
	i.	Imported clay cost ($) (Line 19c x Line 19g x Line 19h)	$647,972

j.	Placement/spreading, grading, compaction (to achieve permeability no greater than 1 x 10-6 cm/sec) unit costs ($\$/yd^3$)	$8.35
k.	Placement, grading and compaction cost ($) (Line 19c x Line 19j)	$832,395
l.	Subtotal clay costs ($) (Line 19f + Line 19i + Line 19k)	$1,480,367

20. Synthetic Membrane

Note: This item must be estimated in addition to the clay barrier layer unless/until an alternative final cover design has been approved in the closure plan.

a.	Type of membrane (e.g., HDPE, CPE, PVC)	VLDPE
	Thickness (minimum 30 mils)	40
b.	Quantity (ft^2)	1,051,158
c.	Purchase, delivery and installation unit cost ($\$/ft^2$)	$0.45
d.	Synthetic layer testing (percent of total synthetic membrane unit cost) (%/100)	0.15
e.	Synthetic layer costs ($) (Line 20b x Line 20c x (1 +20d)	$543,974

21. What other types of materials/layers are included in the design (e.g., asphalt-tar, gravel for gas venting)?

16 oz.geotextile cushion layer, 1 ft. thick drainage layer, 8 oz. geotextile filter layer, 1 ft. thick erosion layer

a. Geotextile filter (8 oz. nonwoven)

1)	Quantity (ft^2)	2,691,572
2)	Purchase, delivery and installation unit cost ($\$/ft^2$)	$0.17
a.	Synthetic layer testing (% of total synthetic membrane unit cost) (%/100)	0.15
3)	Geotextile layer costs ($)	$526,202

b. Drainage layer (1-ft thick sand layer, min. $k=10^{-2}$ cm/sec) ______

1) Quantity (yd^3)

2) Purchase, delivery and installation unit cost (\$/yd^3) ______

3) Drainage layer costs $0

c. Erosion layer (2-ft thick native soil layer) (A,B, AB+, and C)

1)	Volume of soil on deck areas (A, B, AB+ and C) (yd^3)	272,137
2)	Purchase, delivery and installation on decks unit cost (\$/yd^3)	$4.00
3)	Volume of soil on slope areas (A, B, AB+, and C) (yd^3)	247,695
4)	Purchase, delivery and installation on slopes unit cost (\$/yd^3)	$4.50
5)	Total cost of erosion layer (Line 21^{c1} x Line 21^{c2} + Line 21^{c3} x Line 21^{c4})	$2,203,176

d. Total other types of layers (\$) (Line 21a.3 + Line 21b.3 + Line 21c.5) $2,729,378

NOTE: Thickness of individual layers may be modified depending on the integrated cover design.

22. Construction Quality Assurance

The following cost estimates apply to the quality assurance activities necessary to ensure that the final cover is installed properly, as specified in the design parameters, and fulfill the conditions mandated by regulations.

a. Monitoring costs incurred while evaluating the final cover system components:

1)	Laboratory test fees (e.g., soil permeability, soil density and moisture content) (\$)	$136,990
2)	Field test expenditures (e.g., test pad field permeability tests, relative compaction tests) (\$)	$75,000
b.	Inspections (e.g., initial inspection of native and imported soil or clay, visual check of completed cover) (\$)	$244,000
c.	Reporting costs (e.g., daily reporting procedures, corrective measure report, as-built reports) (\$)	$63,040
d.	Engineering design costs (\$)	$134,500

e.	Quality assurance costs ($) (Line 22a1 + Line 22a2 + Line 22b + Line 22c + Line 22d)	$653,530

23. Final Cover Subtotal ($) (Line 18k + Line 19l + Line 20e + Line 21d+ Line 22e) — $5,407,249

Revegetation

24. Soil Preparation

a.	Area to be vegetated, including closed areas that need replanting (acres) (Line 17a + Line 17b)/43560	161.1
b.	Preparation unit cost ($/acre)	$325
c.	Soil preparation subtotal ($) (Line 24a x Line 24b)	$52,358

25. Planting

a.	Type of vegetation	Annual and perennial native grasses and flowers
b.	Planting unit cost (e.g., seeding, sprigging, plugs) (include cost of seeds, sprigs, plugs) ($/acre)	$2,000
c.	Planting cost ($) (Line 24a x Line 25b)	$322,200

26. Fertilizing

a.	Type of fertilizer	Root stimulant
b.	Fertilizer unit cost ($/acre)	$300
c.	Fertilizing cost ($) (Line 24a x Line 26b)	$48,330

27. Mulching

a.	Mulch unit cost ($/acre)	$600.00
b.	Mulching cost ($) (Line 24a x Line 27a)	$96,660

28. Irrigation installation cost ($) (temporary) — $1,302,275

29. Revegetation Subtotal ($) (Line 24c + Line 25c + Line 26c + Line 27b + Line 28) — $1,821,823

Landfill Gas Monitoring and Control

30. Does the landfill have a gas monitoring network?

YES X NO______

If NO,

a. What will be the spacing between monitoring wells (≤ 1000 ft)? __________

b. What criteria was used to select this spacing?

____

____

c. Total number of gas monitoring wells? __________

Note: Depth of probes should equal at least 1 x depth of refuse within 1000'.

d. Number of probes per wellbore? __________

Suggested minimum;

1. Surface (5-10 ft)
2. Intermediate (half the depth of boring)
3. Deep (to depth of boring)

e. Cost of Design ($) 0.00

f. Cost of drilling, materials ($) 0.00

g. Cost of installation ($) 0.00

h. Subtotal for monitoring network ($)
(Line 30e + Line 30f + Line 30g) 0.00

If YES,

i. How many gas monitoring wells are in place? 52

j. What is the lateral spacing between gas monitoring wells? <1,000 ft

k. What is the number of probes per wellbore? one to four

l. Additional monitoring wells required at closure? None

m. Number of probes per boring? N/A

n. Cost to expand existing monitoring network (design, drilling, and installation)? $0.00

31. Is there a gas control system operating at the landfill?

YES X NO

If YES,

a. What type(s) (e.g., recovery, perimeter extraction, air injection, etc.) is/are in place? Extraction

b. What type of system will be installed during closure? None

c. Cost of design ($) 0.00

d. Cost of materials ($) 0.00

e. Cost of installation ($) 0.00

f. Subtotal for control system ($) (Line 31c + Line 31d + Line 31e) 0.00

32. Landfill Gas Subtotal ($) (Line 30h + Line 30n + Line 31f) 0.00

__Groundwater Monitoring Installations__

33. Does the landfill have a ground-water monitoring network?

YES X NO

If YES,

a. Number of upgradient (minimum 1) wells 4

b. Number of downgradient (minimum 3) wells (number of background wells) 0

If less than minimum or NO,

c. Number of wells to be installed (minimum 1 upgradient and minimum 3 downgradient). 0

d. Drilling total footage (ft) 0

e. Cost of design ($) 0

f. Developing, installing, materials ($)

34. Groundwater monitoring subtotal ($)
(Line 33e + Line 33f) $0

Drainage

35. Is there a surface water runon and runoff control system existing at the site:

YES X NO

If NO,

a. What will be the estimated cost of installation and construction of the drainage conveyance system to accommodate anticipated runoff (e.g., diversion ditches, downdrains, energy dissipators) and protection from runon (e.g., dikes, levees, protective berms)? ($) $747,283

b. Cost of grading and drainage design ($) $82,587

c. Drainage subtotal ($)
(Line 35a + Line 35b) $829,870

Security

36. Is there a security system established at the landfill (e.g., fencing, access gates, locks on the gates, informational signs)?

YES X NO

a. What is presently in place at the site? (mark appropriate boxes)

X	Fencing	X	Locks
X	Gates		Other (describe)
X	Signs		

b. What will be the estimated cost of installing a security fence, access gates with locks, and/or informational signs (e.g., either around site perimeter or around enclosures) to protect equipment and the public and is compatible with postclosure use? $33,000

c. What will be the estimated cost of dismantling and removing security equipment not necessary after closure and incompatible with postclosure use? $00

d. Security system costs ($)
(Line 36b + line 36c) $33,000

SUPPLEMENTAL DATA

37. Itemize cost on additional worksheets for closure procedures, specific to this solid waste disposal site, and attach at the end of this worksheet. Make sure each page is appropriately labeled with site name and SWIS number.

Other Closure Costs
(Lines: 55l + 80o + 81d + 84i + 85n + 86c + 87c) $4,868,254

Administrative Costs - Construction Management
(Line 88) $1,655,629

POSTCLOSURE MONITORING AND MAINTENANCE COSTS

Revegetation

38. Fertilizing (first 2 years)

a. Area to be fertilized (acres) 161

b. Type of fertilizer 7-1-7 starter and 8-5-1 slow release

c. Fertilizer unit cost ($/acre/yr) $1,000

d. Fertilizing cost (first 2 years)
(Line 38a x Line 38c) $322,000

e. Fertilizing costs for the four year period $644,000

39. Irrigation (first 4 years)

a. Type of irrigation system Overhead spray

b. Quantity (gallon/day) 165,422

c. Unit cost ($/gallon) $0.0011

d. How many irrigation days per week? 7

e. Annual irrigation costs ($/yr)
{(Line 39b x Line 39c) x Line 39d} x 52 wk/yr $66,235

f. Annual maintenance costs ($/yr) $73,992

g. Irrigation costs ($/yr) (Line 39e + line 39f) — $140,227

h. Irrigation costs for a four-year period — $560,908

40. Revegetation Subtotal (first 4 years) (Line 38e + Line 39h) — $1,204,908

Leachate Management

41. Does the solid waste disposal site have a liner?

    YES X (Disposal Area C) NO X (Disposal Areas A,B, and AB+)

42. Does the landfill have a leachate collection/removal system? (e.g., leachate barrier and recovery system, dendritic system)

    YES X NO If YES,

    a. What type of system? A leachate seepage cut-off barrier wall at the downstream end of disposal area AB+ with a gravel collector placed upstream of the barrier wall. The leachate collection and removal system for Disposal Area C consists of a drainage blanket on the liner with an integrated drainage system on the bottom canyon.

    b. Annual cost of operation and maintenance of system ($/yr). — $29,000

43. List types of leachate (including leachate-affected water and landfill gas condensate) treatment used and that will continue to be used during closure and postclosure maintenance (e.g., discharge to sewer, on-site or off-site management).

    a. Type of treatment (on-site).

       Landfill Gas Condensate pH Adjustment
       (Note: Leachate production is not anticipated and has not been detected to-date.)

    b. Volume/unit frequency (e.g., gals/day, gals/month) — 210 gal/day

    c. Unit cost of treatment ($/gal.) — $0.38/gal

    d. Annual costs of on-site treatment. ($/yr) — $29,127

44. Type of treatment (off-site) — N/A

    a. Volume/unit frequency (e.g., gals/day, gals/month) — N/A

    b. Unit cost of treatment - including hauling ($) — N/A

    c. Annual costs of off-site treatment. ($/yr) — $0

d. Other (explain)

45. Leachate sampling and testing

a.	Number of samples/round	1
b.	Sampling costs/round ($)	$40
c.	Frequency of sampling per year	52
d.	Annual sampling costs ($/yr) (Line 45b x Line 45c)	$2,080
e.	Testing costs/sample ($)	$58
f.	Annual testing costs ($/yr) (Line 45a x Line 45c x Line 45e)	$3,016
g.	Annual sampling/testing cost subtotal ($) (Line 45d + Line 45f)	$5,096

46. Leachate management costs ($/yr) (Line 42b + Line 43d + Line 44c + Line 45g) — $63,223

Monitoring

47. Gas Monitoring Systems

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.) — OVA Meters; Gas Chromatography; Flame Ionization Detector

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Note: See supplemental cost worksheets for additional gas monitoring costs.

c.	On-site annual monitoring costs for principal gases? ($/yr)	$0.00
d.	Annual sampling costs for trace gases ($/yr)	$0.00
e.	Annual testing costs for trace gases ($/yr)	$0.00
f.	Assumed replacement frequency, of probes, in years.	52
g.	Installation unit cost for probes ($)	$2,500

h. Annual replacement costs ($)
(Line 30i x Line 47g)/Line 47f — $2,500

i. Annual maintenance costs ($/yr) — $3,000

j. Gas monitoring subtotal ($/yr) (Line 47c + Line 47d + Line 47e + Line 47h + Line 47i) — $5,500

48. Is the vadose (unsaturated) zone monitored at this landfill?

YES ______________ NO ____X____

If YES,

a. What type of monitoring procedures and equipment are utilized? (e.g., vacuum/pressure lysimeter)

b. How many monitoring devices are utilized? ______

c. Annual sampling costs ($/yr) ______

d. Annual testing costs ($/yr) ______

e. Assumed replacement frequency, of devices, in years ______

f. Installation unit cost of devices ($) ______

g. Annual replacement cost ($/yr)
(Line 48b x Line 48f)/Line 48e ______

h. Annual maintenance costs ($/yr) ______

i. Vadose zone monitoring subtotal ($/yr)
(Line 48c + Line 48d + Line 48g + Line 48h) — $0.00

49. Ground-Water Monitoring

a. Number of wells — 12

b. Frequency of monitoring, per year — 4

c. Analytical methods (e.g., EPA 601 and 602 or 624, and 625)

EPA 624 and 625, and 8080, Metals (unfiltered), pH, electrical conductivity, BOD, COD, TDS, Total Hardness

d. Number of samples/round — 1

e. Testing costs/sample ($) — $1,700

f.	Annual groundwater sampling & testing costs ($/yr) [(Line 49d x Line 49e) x Line 49a] x Line 49b	$81,600
g.	Annual monitoring costs ($/yr)	$5,267
h.	Assumed replacement frequency, of wells, in years	20 years
i.	Installation unit cost of wells ($)	$8,333
j.	Annual replacement cost ($/yr) (Line 49a x Line 49i)/Line 49h	$5,000
k.	Annual maintenance costs ($/yr)	$2,400
l.	Ground-water monitoring subtotal ($/yr) (Line 49f + Line 49g + Line 49j + Line 49k)	$94,267

50. Monitoring Cost Subtotal ($/yr) (Line 48i + Line 49l) — $94,267

See supplemental worksheets for additional monitoring costs.

Drainage

51. How often do you anticipate the need to perform maintenance activities (e.g., clear material from runoff surface water conveyances, erosion repair, minor grading, repair of articulated drains; also problems with runon maintenance and repairs of levees, dikes, protective berms)?

Once during the summer months and after each heavy rainfall.

a. Annual maintenance costs ($/yr) — $37,000

Security

52. What are the estimated annual maintenance costs to repair/replace fencing, gates, locks, signs, and/or other security equipment at the landfill site? ($/yr) — $7,000

Inspection

53. What will be the routine maintenance inspection frequency of the landfill during postclosure (minimum semi-annually)?

Varies (see Post-Closure Plan)

a. Inspection unit cost ($) — $0.00

b. Annual inspection costs during the postclosure care period? ($/yr) — $300,000

Components that should be inspected include, but are not limited to:

- Final cover - erosion damage
- Final grading - ponding caused by settlement
- Drainage control systems - continuity of articulated drains, sediment choked conduits
- Gas collection/control systems
- Leachate collection and treatment systems effectiveness, and continuity
- Security - fences, gates and signs
- Vector and fire control
- Monitoring equipment
- Litter control

SUPPLEMENTAL DATA

54. Itemize annual costs on additional worksheets for monitoring and postclosure maintenance procedures, specific to this solid waste disposal site, and attach at the end of this worksheet. Make sure each page is appropriate labeled with site name and SWIS number.

Other-Annual Postclosure Maintenance Costs (Lines 66c, 67c, 68c, 69f, 70e, 71b, 72g, 73d, 74b 75d, 76b, 78d, and 79b)	$390,150
Administrative Costs	

SUMMARY OF COST ESTIMATES

Facility Name Lopez Canyon SWIS #19-AA-0820

Closure

Final Cover (Line 23)	$5,407,249
Revegetation (Line 29)	$1,821,823
Landfill Gas Monitoring and Control (Line 32)	$0
Groundwater Monitoring Installations (Line 34)	$0
Drainage Installation (Line 35c)	$829,870
Security Installation (Line 36d)	$33,000
Other (Line 37)	$6,523,883
I. Subtotal Closure	$14,615,825
II. Subtotal I x 20% Contingency Costs	$2,923,165
Total Closure Cost	$17,538,990

Monitoring and Postclosure Maintenance

Leachate Management (Line 46)	$63,223
Water Monitoring (Line 48i + 49l)	$94,267
Drainage (Line 51a)	$37,000
Security (Line 52)	$7,000
Inspection (Line 53b)	$300,000
Landfill Gas Management (Line 47j, 56e, 57d, 58b,59c, 60e, 61e, 62e, 63e, 64d, 65c)	$277,500
Other (Line 54)	$390,150
Final Cover Maintenance (82f, 83b)	$18,658
III. Subtotal	$1,187,798
IV. Subtotal III x 30 years	$35,633,940

V. Revegetation (Line 40)	**$1,204,908**

TOTAL COSTS **Total Postclosure Maintenance Cost** $54,377,838
(Item I, Item II, Item IV, Item V)
(Total Closure and Postclosure Maintenance Cost)

N/A: NOT APPLICABLE TOWARDS CLOSURE
SUPPLEMENTAL WORKSHEETS

55. Clay Layer (C Deck)

a.	Area to be capped (ft^2) of C Deck	982,278
b.	Thickness (ft) (minimum 1 foot)	1.00
c.	Volume (yd^3) (Line 55a x Line 55b)/27	36,381
d.	% On-site Clay	0
e.	On-site material acquisition cost (excavation, hauling, etc.) ($\$/yr^3$)	0
f.	On-site clay cost ($) (Line 55c x Line 55d x Line 55e)	$0
g.	% Imported clay	100
h.	Imported material acquisition cost (purchase, delivery, etc.) ($\$/yd^3$)	6.50
i.	Imported clay cost ($) (Line 55c x Line 55g x Line 55h)	$236,477
j.	Placement/spreading, grading, compaction (to achieve permeability no greater than 1 x 10^{-6} cm/sec) unit costs ($\$/yd^3$)	8.37
k.	Placement, grading and compaction cost ($) (Line 55c x Line 55j)	$304,509
l.	Subtotal clay costs ($) (Line 55f + Line 55i+ + Line 55k)	$540,986

GAS RECOVERY SYSTEM MONITORING

56. a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

    Kuetz velocity meter, thermometer, magnehelic, differential pressure gauge, Gas-tech NP-204

    b. Frequency of monitoring (e.g., daily, weekly, monthly) — Quarterly

    c. On-site monitoring costs? ($/yr) — $16,000

    d. Annual analysis costs ($/yr) — $3,000

    e. Gas Recovery System monitoring subtotal ($/yr)
    Line 56c + Line 56d) — $19,000

57. Gas Migration Control System - Gas Collection Indicator Probe (GCIP) Monitoring

    a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

    OVA, Gas Tech NP-204, Magnehelic, Differential Pressure Gauge, Barometer

    b. Frequency of monitoring (e.g., daily, weekly, monthly) — Quarterly

    c. On-site monitoring costs? ($/yr) — $7,000

    d. Gas Migration System - (GCIP) Monitoring Subtotal ($/yr) — $7,000

58. Visual Inspection of Landfill Surface

    a. Frequency of monitoring (e.g., daily, weekly, monthly) — Weekly

    b. On-site monitoring costs? ($/yr) — $20,000

59. Instantaneous Surface Emissions Monitoring

    a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.) — Organic Vapor Analyzer

    b. Frequency of monitoring (e.g., daily, weekly, monthly)

    c. On-site monitoring costs? ($/yr) — $28,000

60. Integrated Surface Emissions Monitoring

    a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.) — Organic Vapor Analyzer, Integrated Surface Sampler

e. Flare Station Sampling subtotal ($/yr) $3,000

64. Flare Source Testing

a. Frequency of testing (e.g., daily, weekly, monthly) Annually

b. On-site monitoring costs ($/yr) 0.00

c. Annual analysis costs ($/yr) $52,000

d. Flare Source Testing subtotal ($/yr) $52,000

65. Gas Recovery System Monitoring - Sumps and Condensate Drain Lines

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

OVA meters, Gas Chromatography, Gas Sampling Equipment

b. Frequency of monitoring (e.g., daily, weekly, monthly) Weekly

c. On-site monitoring costs? ($/yr) $7,000

66. Reseeding and Mulching

a. Labor $13,150

b. Materials $13,000

c. Reseeding and Mulching Total ($/yr.) $26,150

67. Monitoring Supervisor

a. Duties

Supervise and coordinate post-closure monitoring activities and provide QA/QC.

b. On-site costs ($/yr) $90,000

c. Supervisor subtotal ($/yr) $90,000

68. Health and Safety Officer

a. Duties

Supervise, coordinate, and administrate health and safety activities relative to post-closure monitoring and maintenance.

b. On-site costs ($/yr) $38,000

c. Health and Safety subtotal ($/yr) $38,000

69. Monitoring Equipment Maintenance and Repair

a. Monitoring Devices

Organic Vapor Analyzer, Kurz Velocity Meters, Thermometers, Magnehelic, Differential Pressure Gauges, Gas Tech NP-204, Wind Monitoring Stations, Integrated Ambient Air Sampling units, Vacuum Pumps, Integrated Surface Sampler, Barometer

b. Frequency of maintenance Monthly

c. Frequency of Repair As Required

d. On-site maintenance and repair costs ($/yr) $40,000

e. Replacement parts costs ($/yr) $15,000

f. Equipment Maintenance and Repair subtotal ($/yr) $55,000

70. Monitoring Equipment Replacement Amortization

a. Monitoring Devices

Organic Vapor Analyzer, Kurz Velocity Meters, Thermometers, Magnehelic, Differential Pressure Gauges, Gas Tech NP-204, Wind Monitoring Stations, Integrated Ambient Air Sampling units sample train, Integrated Surface Sampler, Organic Vapor Monitor

b. Average equipment life or replacement cycle. Every 5 years

c. Equipment Cost List

OVA - 8 @	$8,500/ea.		$68,000
Kurz - 5 @	$1,200/ea.		$6,000
Magnehelic - 5 @	$300/ea.		$1,500
NP-204 - 2 @	$1,500/ea.		$3,000
Wind Station - 3 @	$2,700/ea.		$8,100
Ambient Air Sampling Unit - 5 @	$2,200/ea.		$11,000
Sample Train - 4 @	$2,500/ea.		$10,000
Surface Sampler - 5 @	$750/ea.		$3,750
OVM - 2 @	$1,800/ea.		$3,600
		TOTAL	$114,950

d. Amortization Costs ($/yr) $23,000

e. Amortization Subtotal ($/yr) $23,000

b. Frequency of monitoring (e.g., daily, weekly, monthly)

c. On-site monitoring costs? ($/yr) $74,500

d. Annual analysis costs ($/yr) $10,000

e. Integrated Surface Emissions monitoring subtotal ($/yr) $84,500

61. Sampling Gas in Branch Line, Probes, and Headers

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.) Kurtz Velocity Meter, Magnehelic Differential Pressure Gauge, Gas Tech NP-204

b. Frequency of monitoring (e.g., daily, weekly, monthly) Quarterly

c. On-site monitoring costs? ($/yr) $1,000

d. Annual analysis costs ($/yr) $5,500

e. Sampling gas in branch lines, probes and headers subtotal ($/yr) $6,500

62. Ambient Air Sampling at Perimeter of the Site

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.) Integrated Ambient Air Sampling Unit, Line Monitoring Station, Organic Vapor Analyzer

b. Frequency of monitoring (e.g., daily, weekly, monthly) Quarterly

c. On-site monitoring costs? ($/yr) $10,000

d. Annual analysis costs ($/yr) $35,000

e. Integrated Surface Emissions monitoring subtotal ($/yr) $45,000

63. Gas Recovery System - Flare Station Sampling

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.) Tedlar Bag, Organic Vapor Analyzer

b. Frequency of testing (e.g., daily, weekly, monthly) Quarterly

c. On-site monitoring costs? ($/yr) $500

d. Annual analysis costs? ($/yr) $2,500

71. Monitoring Materials

a. Material Items

Tedlar bags, Tygon Tubing, Calibration Gases, Safety Equipment, Misc. Tools, cleaning and maintenance supplies

b. On-site Material Costs ($/yr) — $25,000

72. Monitoring Vehicles

a. Type of Vehicles

4-Wheel drive vehicles

b. Number of Vehicles — 6

c. Unit cost of vehicles — $18,000

d. Average vehicle life or replacement cycle — 5 years

e. Estimated trade-in value — $2,000

f. Amortization costs ($/yr) — $16,000

g. Monitoring Vehicle Cost ($/yr) — $19,000

73. Weather Station Management

a. Number of Stations — 3

b. Frequency of monitoring — Weekly

c. On-site monitoring costs ($/yr) — $72,000

d. Weather Station Management Subtotal ($/yr) — $72,000

74. Subdrain Collection System Maintenance

a. Frequency of monitoring (e.g., daily, weekly, monthly) — As Required

b. On-site monitoring costs? ($/yr) — $5,000

75. Subdrain Collection System Sampling

a. Frequency of monitoring, per year — Quarterly

b. On-site monitoring costs? ($/yr) — $3,000

	c. Annual analysis costs ($/yr)	$2,000
	d. Subdrain Collection System Monitoring subtotal ($/yr)	$5,000
76.	Outfall System Inspection	
	a. Frequency of monitoring, per year	Quarterly
	b. On-site monitoring costs? ($/yr)	$10,000
77.	Final Closure/Post-Closure Plan Preparation	$0.00
78.	Surface Water Monitoring	
	a. Frequency of monitoring, per year	Two times annually during discharges
	b. On-site monitoring costs	$3,000
	c. Annual analytical costs	$12,000
	d. Annual surface water sampling & testing costs ($/yr) Line 78b + 78c	$15,000
79.	Gas Recovery System Monitoring - Sumps and Condensate Drainlines	
	a. Frequency of monitoring	Weekly
	b. On-site monitoring costs? ($/yr)	$7,000
80.	Clay Layer (Slope)	
	a. Total Area to be Capped (ft^2) (Line 17b x Conv. Factor)	3,343,875
	b. Area of A and B slopes to be capped (ft^2)	2,103,704
	c. Thickness (ft) on slopes of Disposal Areas A and B	1.00
	d. Area of AB+ and C slopes to be capped (ft^2)	1,240,171
	e. Thickness (ft) on slopes of Disposal Areas AB+ and C	1.00
	f. Volume of slope areas (A, B, AB+ and C) (yd^3) (Line b x Line c + Line d x Line e) /27	123,847
	g. Percent on-site clay	0

h.	On-site material acquisition cost (excavation, hauling, etc.) ($/yd^3)	$0
i.	On-site clay cost ($) (Line 80f x Line 80g x Line 80h)	$0
j.	Percent imported clay	100%
k.	Imported mat. acquisition cost (purchase, delivery, etc.) ($/yd^3)	$6.50
l.	Imported clay cost ($) (Line 80f x Line 80j x Line 80k)	$805,006
m.	Placement/spreading, grading, compaction (to achieve permeability no greater than $1x10^{-6}$ cm/sec) unit costs ($/yd^3)	$15.91
n.	Placement, grading and compaction cost ($) (Line 80f x Line 80m)	$1,970,406
o.	Subtotal clay cost ($) (Line 80i + Line 80l + Line 80n)	$2,775,412

81. Geotextile Cushion (12 oz./yd^3 nonwoven)

a.	Quantity (ft^2)	1,051,158
b.	Purchase, delivery and installation unit cost ($/ft^2)	$0.20
c.	Cushion fabric testing (percent of total cushion fabric unit cost (%/100)	0.15
d.	Geotextile layer cost ($) (Line 81a x Line 81b x [1 + 81c])	$241,766

FINAL COVER MAINTENANCE

82. Repair and Replacement of VLDPE Geomembrane and of Geotextile Cushion

a.	Assumed repair/replacement frequency	Annually
b.	Assumed area of repair/replacement (ft^2)	5,000
c.	Purchase, delivery and installation unit cost ($/ft^2)	$1.10
d.	Cost of repair/replacement ($)	$5,500

	e. Annual cost of providing construction quality assurance (CQA) during the repairs (25% of the construction cost) ($)	$1,375
	f. Total annual cost of repairs ($)	$6,875
83.	Final Cover Earthen Repair	
	a. Assumed area to be repaired (ft^2)	17,500
	b. Total annual cost of earthen cover repair (including CQA during the repair) ($)	$11,783
84.	Rebuilding of Haul Road and Channel	
	a. Total length of the Haul Road to rebuild (ft)	2,000
	b. Haul Road rebuild unit cost ($/ft)	$90
	c. Total Haul Road rebuild cost ($) (Line 84a x Line 84b)	$180,000
	d. Total length of channel to rebuild	1,660
	e. Channel rebuild unit cost ($/ft)	$45
	f. Total channel rebuild cost ($) (Line 84d x Line 84e)	$74,700
	g. Total rebuild cost ($) (Line 84c + Line 84f)	$254,700
	h. Design cost ($) (20%/100 Line 84g)	$50,940
	i. Total Haul Road and Channel Cost (Line 84g + Line 84h)	$305,640
85.	Gas System Modifications	
	a. Decommission Existing Shallow Vertical Wells	
	1. Wells at 12.5' (#23)	288 ft.
	2. Wells at 37.5' (#81)	3,038 ft.
	3. Wells at 62.5 (#106)	6,625 ft.
	b. Subtotal Decommissioning Wells @ $5/ft.	$50,000
	c. Abandonment Materials and Labor	
	1. Sand - 1,000 bags @ $8/bag	$8,000
	2. Bentonite Chips - 350 bags @ $9/bag	$3,150

3.	Labor (2 per Crew) - 130 hours @ $20/hr.	$2,600
4.	Backhoe - 130 hours @ $90/hr.	$11,700
5.	Foreman - 130 hours @ $35/hr.	$4,550
6.	Water Truck - 130 hours @ $60/hr.	$7,800

d. Subtotal Abandonment Materials and Labor — $37,800

e. New Shallow Well Construction - 10,333 LF @ $36/ft. — $372,000

f. Well disconnection materials and labor (Disposal Area C) - 186 @ $20 ea. — $3,720

g. Well Connection Materials

1.	2" Slide Gate Valve	450 @ $12 ea.	$5,400
2.	6" PVC Tee	450 @ $25 ea.	$11,250
3.	6" Cap PVC	450 @ $10 ea.	$4,500
4.	6"x2" PVC Red	450 @ $20 ea.	$9,000
5.	2" PVC El	450 @ $5 ea.	$2,250
6.	1" Make Adapter-PVC	450 @ $3 ea.	$1,350
7.	1" PVC Cap	450 @ $2 ea.	$900
8.	2" Flex Cplg.	450 @ $75 ea.	$33,750
9.	2" PVC pipe	450 @ $5 ea.	$2,250

h. Connection Assembly-Labor — 450 @ $17.50 ea. — $7,875

i. Connection Installation — 450 @ $26,40 ea. — $11,880

j. Subtotal Well Connection Materials — $90,405

k. Relocate and Replace Header System - 36,780 LF @ $8/ft. — $294,240

l. Relocate condensate sumps - 8 @ $4,000/ea. — $32,000

m. Gas Well Protection - 233 @ $425/ea. — $99,025

n. Total Gas System Modifications
(Line 85b + Line 85d + Line 85e + Line 85f + Line 85j
+ Line 85k + Line 85l + Line 85m) — $979,190

86. Groundwater Monitoring Well Abandonment and Replacement at Closure

a. Abandonment of Wells MW 88-5 and MW 88-4 — $5,240

b. Replacement of Wells MW 88-5 and MW 88-4 — $10,300

c. Groundwater Well Replacement Total — $15,540

87. Lysimeter Abandonment and Replacement at Closure

	a. Abandonment of Lysimeters 88-1 and 88-2	$1,320
	b. Replacement of Lysimeters	$8,400
	c. Lysimeter Replacement Total	$9,720
88.	Construction Management - QA/QC (Note: does not include final cover QA/QC)	$1,655,629

SWIS # 19-AA-0820

Revised 2-10-95 refer to modified estimate

COST ESTIMATE WORKSHEET

Site Description

The following questions will provide general information regarding the site description, the type of waste accepted at the site and basic geological information. This information will aid in assessing factors that may affect the initial cost estimates.

Prepared By: Bryan A. Stirrat & Associates

General Site Information

Name of Solid Waste Landfill: Lopez Canyon Landfill

Solid Waste Facilities Permit Number: 19-AA-0820

Facility Operator: City of Los Angeles Bureau of Sanitation

Site Owner: City of Los Angeles Bureau of Sanitation

Site Location (California coordinates, township & range or longitude/latitude, preferred)

Section 6- Township 2 North, Range 14 West, Section 31 - Township 3 North, Range 14 West, and Section 1 - Township 2 North, Range 15 West of the San Bernardino Meridian, Los Angeles County, California.

Assessors Parcel Number ____________________

Site Address: 11950 Lopez Canyon Road, Lakeview Terrace, CA 91342

1. What is the existing State Water Resources Control Board classification of the solid waste landfill? (mark the appropriate response)

NEW If Waste Discharge Requirements (WDR) revised since 11-84		OLD	
______	Class I	______	Class I
		X	Class II-1

Note: The solid waste landfill is excluded from these requirements, if the facility is a hazardous waste facility or co-disposal facility of both hazardous and nonhazardous waste as a RCRA Subtitle C facility subject to specified closure plan requirements.

______	Class II	______	Class II-2
X	Class III	______	Class III

2. What is the anticipated closing date for the existing permitted landfill? Proposed expansions which have not been approved by the Board and LEA are not to be included in these calculations. Include calculations supporting the estimated date. (Attach additional sheets as necessary.)

month February ,year 1996

Note: All facilities with an anticipated closure date of September 28, 1992, or earlier, will be required to submit their closure and postclosure maintenance plan no later than July 1, 1990.

Type of Fill

3. Type of Fill (check appropriate type)

______	Trench	X	Canyon
X	Area	______	Other (describe)
______	Pit	______	

Volume of Waste

4. What is the estimated in-place volume of landfilled wastes at the site in cubic yards? 13,320,000

5. What is the design capacity of the site in cubic yards? 24,500,000

6. Minimum thickness of waste (ft)? 25'

7. Average thickness of waste (ft)? 120'

8. Maximum thickness of waste (ft)? 245'

9. Average height above surrounding terrain (ft)? NA

10. Typical inclination of side slopes, in slope ratio (horizontal:vertical)? (e.g., 5:1, 2:1)

2.0 :1

11. Quantity of waste typically received (tons/day)? 4,000

12. Total permitted site acreage? 399

13. Waste disposal area acreage? 166

Waste Description

14. Estimate of solid waste received (total of entries for residential, commercial, industrial, demolition and other should add up to 100%).

% Residential	85.00	% Commerical	0.00
% Industrial	0.00	% Demolition	0.00

% Other (special waste streams, such as ash, auto shredder waste, infectious waste, sludge, asbestos) 15.00

Describe material under "other" and give its percentage.

Material	Percentage
Street Sweepings	15.00

Resid. + Indus. + Comm. + Demo. + Other = 100 % 100

Site Geology and Groundwater Data

15. Briefly describe the underlying geology of the site. (Mark as many boxes that apply.)

X Shallow alluvium <50' ____________ Deep alluvium >50'

X Sedimentary ____________ Igneous

____________ Metamorphic

a. What is the name of the nearest major fault?

San Fernando Zone

b. Distance from site (miles)? Onsite

c. On-site fault(s), if known? Yes

16. What are the groundwater characteristics?

Ephemeral, dependent on seasonal precipitation.

a. What is the depth to groundwater (ft)? A seasonal water table was obtained from MW88-5 drilled to a depth of 42 feet or 1429.7 feet MSL.

This will be the range of water levels, from well data, in a groundwater well network. Note: Consider seasonal variations from rainy to dry periods, wet and dry years, well locations and variations in the subsurface geology.

Highest recorded level (depth in ft) 42 feet, 1429.7 feet MSL

Well Number MW88-5 Date Recorded 3/9/88

Lowest recorded level (depth in ft) N/A ELEV. N/A

Well Number N/A Date Recorded N/A

Typical N/A

b. What direction does the groundwater flow? The apparent groundwater flow direction is north to south.

c. What is the groundwater gradient? Data is insufficient to determine groundwater gradient.

CLOSURE COSTS

Final Cover

17. Area of Landfill for Final Cover

a. Area of top deck to be capped (ft^2) Ad = 3,702,600

b. Area of side slopes to be capped (ft^2) As = 3,528,360
(map area)

18. Final Cover Soil - Vegetative Layer

Note: Costs included herein are for the vegetative layer, the foundation will be placed prior to closure.

a. Thickness

1) Top deck (minimum 3 feet of soil) - vegetative layer

Td = (> or = 3') 2

NOTE : 2 FT OF FOUNDATION ARE PROVIDED BY LANDFILL OPERATION.

2) Side slope (minimum 3 feet normal to slope)

Ts = (> or = 3') 0

NOTE : 2 FT OF FOUNDATION ARE PROVIDED BY LANDFILL OPERATION. A MONOLITHIC CLAY LAYER WILL BE PLACED - SEE SLOPE CLAY LAYER COSTS LINE 55.

b. Volume = [(Td x Ad) + (Ts x As x Conv. factor)]/27 = (yd^3)

274,267

c. % Native soil (decimal) 1.00

d. Native material acquisition cost (excavation, hauling,

etc.) ($/yd^3) $1.90

e. Native soil cost ($) $521,107
(Line 18b x Line 18c x Line 18d)

f. % Imported soil (decimal) 0.00

g. Imported material acquisition cost (purchase, delivery,

etc.) ($/yd^3) $0.00

h. Imported soil cost ($) $0.00
(Line 18b x Line 18f x Line 18g)

i. Placement, grading and compaction (to achieve relative compaction of .90) unit cost ($/yd^3) — $1.35

j. Placement, grading and compaction cost ($) (Line 18b x Line 18i) — $370,260

k. Subtotal final cover soil ($) (Line 18e + Line 18h + Line 18j) — $891,367

19. Clay Layer (deck)

a. Area to be capped (ft^2) (Line 17a) — 3,702,600

b. Thickness (ft) (minimum 1 foot) — 1.25

c. Volume (yd^3) (Line 19a x Line 19b)/27 — 171,417

d. % On-site Clay (decimal) — 1

e. On-site material acquisition cost (excavation, hauling, etc.) ($/yd^3) — $1.90

f. On-site clay cost ($) (Line 19c x Line 19d x Line 19e) — $325,692

g. % Imported clay (decimal) — 0.00

h. Imported material acquisition cost (purchase, delivery, etc.) ($/yd^3) — $0.00

i. Imported clay cost) ($) (Line 19c x Line 19g x Line 19h) — $0.00

j. Placement/spreading, grading, compaction (to achieve permeability no greater than 1 x 10-6 cm/sec) unit costs ($/yd^3) — $8.35

k. Placement, grading and compaction cost ($) (Line 19c x Line 19j) — $1,431,329

l. Subtotal deck clay costs ($) (Line 19f + Line 19i + Line 19k) — $1,757,021

20. Synthetic Membrane (if applicable)

Note: This item must be estimated in addition to the clay barrier layer unless/until an alternative final cover design has been approved in the closure plan.

a. Type of membrane (e.g., HDPE, CPE, PVC) NA

Thickness (minimum 30 mils) 0

b. Quantity (ft^2) 0

c. Purchase, delivery and installation unit cost ($/ft^2)

$0.00

d. Synthetic layer testing (percent of total synthetic membrane unit cost)(%/100)

0.00

e. Synthetic layer costs ($) $0
(Line 20b x Line 20c x (1 + 20d)

21. What other types of materials/layers are included in the design (e.g., asphalt-tar, gravel for gas venting)? Geotextile Filter Fabric

Note: Costs for placement of geotextile filter fabric are covered in item number 57 in the supplemental worksheets. This fabric will be placed between the clay layer and the vegetative layer on the deck area.

22. Construction Quality Assurance

The following cost estimates apply to the quality assurance activities necessary to ensure that the final cover is installed properly, as specified in the design parameters, and fulfill the conditions mandated by regulations.

a. Monitoring costs incurred while evaluating the final cover system components:

1) Laboratory test fees (e.g., soil permeability, soil density and moisture content) ($)	$136,990
2) Field test expenditures (e.g., test pad field permeability tests, relative compaction tests) ($)	$75,000
b. Inspections (e.g., initial inspection of native and imported soil or clay, visual check of completed cover)($)	$244,000
c. Reporting costs (e.g., daily reporting procedures, corrective measure reports) ($)	$63,040
d. Engineering design costs	$134,500
e. Quality assurance costs ($) (Line 22a1 + Line 22a2 + Line 22b + Line 22c + Line 22d)	$653,530
23. Final Cover Subtotal ($) (Line 18k + Line 19l + Line 20e + Line 22e)	$3,301,918

Revegetation

24. Soil Preparation

a. Area to be vegetated, including closed areas that need replanting (acres) (Line 17a + Line 17b)/43560	166
b. Preparation unit cost ($/acre)	$325
c. Soil preparation subtotal ($) (Line 24a x Line 24b)	$53,950

25. Planting

a. Type of vegetation — Annual and perennial grasses; annual and perennial flowers.

b. Planting unit cost (e.g., seeding, sprigging, plugs) (include cost of seeds, sprigs, plugs)($/acre) — $2,000

c. Planting cost($) (Line 24a x Line 25b) — $332,000

26. Fertilizing

a. Type of fertilizer — Root Stimulant

b. Fertilizer unit cost ($/acre) — $300

c. Fertilizing cost ($) (Line 24a x Line 26b) — $49,800

27. Mulching

a. Mulch unit cost ($/acre) — $600

b. Mulching cost ($) (Line 24a x Line 27a) — $99,600

28. Irrigation installation cost ($) — $1,847,000

29. Revegetation Subtotal ($) (Line 24c + Line 25c + Line 26c + Line 27b + Line 28) — $2,382,350

Landfill Gas Monitoring and Control

30. Does the landfill have a gas monitoring network?

YES X NO ____________

If NO,

a. What will be the spacing between monitoring wells (< or = 1000 ft)? ____________

b. What criteria was used to select this spacing?

____

____

c. Total number of gas monitoring wells? ________________

Note: Depth of probes should equal at least 1 x depth of refuse within 1,000'.

d. Number of probes per wellbore? ________________

Suggested minimum;

1) Surface (5-10 ft)

2) Intermediate (half the depth of boring)

3) Deep (to depth of boring)

e. Cost of design ($) $0.00

f. Cost of drilling, materials ($) $0.00

g. Cost of installation ($) $0.00

h. Subtotal for monitoring network ($) $0.00
(Line 30e + Line 30f + Line 30g)

If YES,

i. How many gas monitoring wells are in place? 52

j. What is the lateral spacing between gas monitoring wells? <1000'

k. What is the number of probes per wellbore? One to four

l. Additional monitoring wells required at closure? none

m. Number of probes per boring? N/A

n. Cost to expand existing monitoring network (design, drilling, and installation)? $0

31. Is there a gas control system operating at the landfill?

YES X NO ______

If YES,

a. What type(s) (e.g., recovery, perimeter extraction, air injection, etc.) is/are in place?

Extraction

If NO,

b. What type of system will be installed during closure?

Note: See gas system modification cost estimate in item number 56.

c. Cost of design ($)	$0.00
d. Cost of materials ($)	$0.00
e. Cost of installation ($)	$0.00
f. Subtotal for control system ($) (Line 31c + Line 31d + Line 31e)	$0.00

32. Landfill Gas Subtotal ($) (Line 30h + Line 30n + Line 31f) $0

Groundwater Monitoring Installations

33. Does the landfill have a groundwater monitoring network?

YES X NO ______

If YES,

a. Number of upgradient (minimum 1) wells 4

Note: Water has been found in only one well, gradient is not known. This is the total number of wells on site.

b. Number of downgradient (minimum 3) wells 0

If less than minimum or NO,

c. Number of wells to be installed (minimum 1 upgradient and minimum 3 downgradient) 0

Note: Three wells and two lysimeters will be abandoned and relocated during closure. Costs for these are included in item numbers 58 and 59 of the supplemental worksheets.

d. Drilling total footage (ft) 0

e. Cost of design ($) $0.00

f. Developing, installing, materials ($) $0.00

34. Groundwater monitoring subtotal ($) $0.00
(Line 33e + Line 33f)

Drainage

35. Is there a surface water runon and runoff control system existing at the site?

YES X(Interim System) NO ________

If NO,

a. What will be the estimated cost of installation and construction of the drainage conveyance system to accommodate anticipated runoff (e.g., diversion ditches, downdrains, energy dissipators) and protection from runon (e.g., dikes, levees, protective berms)? ($)

$2,177,180

b. Cost of grading and drainage design ($) $217,718

c. Drainage subtotal ($) $2,394,898
(Line 35a + Line 35b)

Security

36. Is there a security system established at the landfill (e.g., fencing, access gates, locks on the gates, informational signs)?

YES X NO ________

a. What is presently in place at the site? (mark appropriate boxes)

X	Fencing	X	Locks
X	Gates	________	Other (describe)
X	Signs	________________	

b. What will be the estimated cost of installing a security fence, access gates with locks, and/or informational signs (e.g., either around site perimeter or around enclosures) to protect equipment and the public and is compatible with postclosure use?

$33,000

c. What will be the estimated cost of dismantling and removing security equipment not necessary after closure and incompatible with postclosure use?

$0

d. Security system costs ($) (Line 36b + Line 36c) — $33,000

SUPPLEMENTAL DATA

37. Itemize costs on additional worksheets for closure procedures, specific to this solid waste disposal site, and attach at the end of this worksheet. Make sure each page is appropriately labeled with site name and SWIS number.

Other - Closure costs (Line 55m + Line 56n + Line 57c + Line 58c + Line 59c + Line 60 + Line 84) — $10,095,800

POSTCLOSURE MONITORING AND MAINTENANCE COSTS

Revegetation

38. Fertilizing (For a four-year period)

a. Area to be fertilized (acres) — 166

b. Type of fertilizer — 7-1-7 starter and 8-5-1 slow release

c. Fertilizer unit cost ($/acre/yr) — $1,000

d. Fertilizing cost ($/yr) (Line 38a x Line 38c) — $166,000

e. Fertilizing costs for the four-year period. — $664,000

39. Irrigation (For a six-year period)

a. Type of irrigation system — Overhead Spray

b. Quantity (gallon/week) — 2,388,200

c. Unit cost ($/gallon) — $0.0011

d. How many irrigation weeks per year? — 26

e. Annual irrigation costs ($/yr) {(Line 39b x Line 39c) x Line 39d} — $68,303

f. Annual maintenance costs ($/yr) — $76,280

g. Irrigation costs ($/yr) (Line 39e + Line 39f) — $144,583

h. Irrigation costs for a six-year period — $867,495

40. Revegetation subtotal ($/yr) (Line 38e + Line 39h) — $1,531,495

Leachate Management

41. Does the solid waste disposal site have a liner?

YES X (Disposal Area C) NO X (Disposal Areas A,B, and AB+)

42. Does the landfill have a leachate collection/removal system? (e.g., leachate barrier and recovery system, dendritic system)

YES X NO ________________

If YES,

a. What type of system? A leachate seepage cut-off barrier wall at the downstream end of Disposal Area AB+ with a gravel collector placed upstream of the barrier wall. The leachate collection and removal system for Disposal Area C consists of a drainage blanket on the liner with an integrated drainage system on the bottom canyon.

b. Annual cost of operation and maintenance of system. ($) — $29,000

43. List types of leachate (including leachate-affected water and landfill gas condensate) treatment used and that will continue to be used during closure and postclosure maintenance (e.g., discharge to sewer, on-site or off-site management). Condensate

a. Type of treatment (on-site) - Landfill Gas Condensate pH adjustment.
Note: Leachate production is not anticipated and has not been detected to date.

b. Volume/unit frequency (e.g., gals/day, gals/month)

210 gal/day

c. Unit cost of treatment ($) 0.38/gal

d. Annual costs of on-site treatment. ($/yr) $29,127

44. Type of treatment (off-site) N/A

a. Volume/unit frequency (e.g., gals/day, gals/month) N/A

b. Unit cost of treatment ($) N/A

c. Annual costs of off-site treatment. ($/yr) $0

d. Other (explain)

---

45. Leachate sampling and testing

a. Number of samples/round 1

b. Sampling costs/round ($) $40

c. Frequency of sampling per year 52

d. Annual sampling costs ($/yr) $2,080
(Line 45b x Line 45c)

e. Testing costs/sample ($) $58

f. Annual testing costs ($/yr) $3,016
(Line 45a x Line 45c x Line 45e)

g. Annual sampling/testing cost subtotal ($) $5,096
(Line 45d + Line 45f)

46. Leachate management costs ($/yr) $63,223
(Line 42b + Line 43d + Line 44c + Line 45g)

Monitoring

47. Gas Monitoring Systems

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

OVA METERS, GAS CHROMATOGRAPHY, FLAME IONIZATION DETECTOR

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Note: See supplemental cost worksheets for additional gas monitoring costs.

c. On-site annual monitoring costs for principal gases? ($/yr)

$0.00

d. Annual sampling costs for trace gases ($/yr)

$0.00

e. Annual testing costs for trace gases ($/yr)

$0.00

f. Assumed replacement frequency, of probes, in years.

1

g. Installation unit cost for probes ($) $2,500

h. Annual replacement costs ($) $2,500
(Line 30i x Line 47g)/Line 47f

i. Annual maintenance costs ($/yr) $3,000

j. Gas monitoring subtotal ($/yr) $5,500
(Line 47c + Line 47d + Line 47e + Line 47h + Line 47i)

48. Is the vadose (unsaturated) zone monitored at this landfill?

YES X NO ________

If YES,

a. What type of monitoring procedures and equipment are utilized? (e.g., vacuum/pressure lysimeter)

Pressure vacuum lysimeters

b. How many monitoring devices are utilized?	2
c. Annual sampling costs ($/yr)	$3,000
d. Annual testing costs ($/yr)	$6,300
e. Assumed replacement frequency, of devices, in years.	________
f. Installation unit cost of devices. ($)	________
g. Annual replacement cost ($/yr) (Line 48b x Line 48f)/Line 48e	$0.00
h. Annual maintenance costs ($/yr)	$700
i. Vadose zone monitoring subtotal ($/yr) (Line 48c + Line 48d + Line 48g + Line 48h)	$10,000

49. Groundwater Monitoring

a. Number of wells	7
b. Frequency of monitoring, per year	1

c. Analytical methods (e.g., EPA 601 and 602 or 624, and 625)

EPA 624 and 625, and 8080, Metals (unfiltered), pH, Electrical Conductivity, BOD, COD, TDS, Total Hardness

d. Number of samples/round	1
e. Testing costs/sample ($)	$1,500

f. Annual groundwater sampling & testing costs ($/yr)
[(Line 49d x Line 49e) x Line 49a] x Line 49b

$10,500

g. Annual monitoring costs ($/yr) $650

h. Assumed replacement frequency, of wells, in years.

1/5 years

i. Installation unit cost of wells ($) $18,750

j. Annual replacement cost ($/yr) $3,750

k. Annual maintenance costs ($/yr) $1,800

l. Groundwater monitoring subtotal ($/yr) $16,700
(Line 49f + Line 49g + Line 49j + Line 49k)

50. Monitoring Cost Subtotal ($/yr) $32,200
(Line 47j + Line 48i + Line 49l)
See supplemental worksheets for additional monitoring costs.

Drainage

51. How often do you anticipate the need to perform maintenance activities (e.g., clear material from runoff surface water conveyances, erosion repair, minor grading, repair of articulated drains; also problems with runon maintenance and repairs of levees, dikes, protective berms)?

Once during the summer months and after each heavy rainfall.

a. Annual maintenance costs ($/yr) $37,000

Security

52. What are the estimated annual maintenance costs to repair/replace fencing, gates, locks, signs, and/or other security equipment at the landfill site? ($/yr)

$7,000

Inspection

53. What will be the routine maintenance inspection frequency of the landfill during postclosure (minimum semi-annually)?

VARIES (SEE POST-CLOSURE PLAN)

a. Inspection unit cost ($) $0.00

b. Annual inspection costs during the postclosure care period? ($/yr) $300,000

Components that should be inspected include, but are not limited to:

- Final cover - erosion damage
- Final grading - ponding caused by settlement
- Drainage control systems - continuity of articulated drains, sediment choked conduits
- Gas collection/control systems
- Leachate collection and treatment systems effectiveness, and continuity
- Security - fences, gates and signs
- Vector and fire control
- Monitoring equipment
- Litter control

SUPPLEMENTAL DATA

54. Itemize annual costs on additional worksheets for monitoring and postclosure maintenance procedures, specific to this solid waste disposal site, and attach at the end of this worksheet. Make sure each page is appropriately labeled with site name and SWIS number.

Other- Annual Postclosure Maintenance Costs (Line 61e + Line 62e + Line63d + Line 64c + Line 65e + Line 66b + Line 67e + Line 68e + Line 69e + Line 70e + Line 71d + Line 72c +Line 73c + Line 74c + Line 75c + Line 76f + Line 77e + Line 78b + Line 79g + Line 80d + Line 81b + Line 82d + Line 83b) $662,150

SUMMARY OF INITIAL COST ESTIMATES

Facility Name	Lopez Canyon	SWIS #	19-AA-0820

Closure

Final Cover (Line 23)	$	3,301,918
Revegetation (Line 29)	$	2,382,350
Landfill Gas Monitoring and Control (Line 32)	$	0
Groundwater Monitoring Installations (Line 34)	$	0
Drainage Installation (Line 35c)	$	2,394,898
Security Installation (Line 36d)	$	33,000
Other (Line 37)	$	10,095,800
I. Subtotal	$	18,207,965
II. Contingency Costs (Subtotal I x 20%)	$	3,641,593
III. Total Closure Costs (Line I + Line II)	$	21,849,558

Monitoring and Postclosure Maintenance

Leachate Management (Line 46)	$	63,223
Monitoring (Line 50)	$	32,200
Drainage (Line 51a)	$	37,000
Security (Line 52)	$	7,000
Inspection (Line 53b)	$	300,000
Other (Line 54)	$	662,150
IV. Subtotal	$	1,101,573
V. Subtotal III x 30 years	$	33,047,190
VI. Revegetation (Line 40)	$	1,531,495
TOTAL COSTS (Item III + Item V + Item VI)	$	56,428,244

ADD SUPPLEMENTAL WORKSHEETS AT THIS POINT

N/A: NOT APPLICABLE TOWARDS CLOSURE

SUPPLEMENTAL WORKSHEETS

55. Clay Layer (slope)

a. Area to be capped (ft^2) (Line 17b x conv. factor)	3,944,826
b. Thickness (ft) (minimum 1 foot)	3
c. Volume (yd^3) (Line 55a x Line 55b)/27	438,314
d. % On-site Clay (decimal)	1
e. On-site material acquisition cost (excavation, hauling, etc.) ($/yd^3)	$3.15
f. On-site clay cost ($) (Line 55c x Line 55d x Line 55e)	$1,380,689
g. % Imported clay (decimal)	0.00
h. Imported material acquisition cost (purchase, delivery, etc.) ($/yd^3)	$0.00
i. Imported clay cost) ($) (Line 55c x Line 55g x Line 55h)	$0.00
j. Placement/spreading, grading, compaction (to achieve permeability no greater than 1 x 10-6 cm/sec) unit costs ($/yd^3)	$9.30
k. Placement, grading and compaction cost ($) (Line 55c x Line 55j)	$4,076,321
l. Grade Benches - 800,000 sq.ft. @ $1.25/sq.ft.	$1,000,000
m. Subtotal slope clay costs ($) (Line 55f + Line 55i + Line 55k + Line 55l)	$6,457,010

56. Gas System Modifications

a. Decommission Existing Shallow Vertical Wells		
1. Wells at 12.5' (#23)		288 ft.
2. Wells at 37.5' (#81)		3038 ft.
3. Wells at 62.5 (#106)		6625 ft.
b. Subtotal Decommisioning Wells @ $5/ft.		$50,000
c. Abandonment Materials and Labor		
1. Sand - 1,000 bags @ $8/bag		$8,000
2. Bentonite Chips - 350 bags @ $9/bag		$3,150
3. Labor (2 per Crew) - 130 hours @ $20/hr.		$2,600
4. Backhoe - 130 hours @ $90/hr.		$11,700
5. Foreman - 130 hours @ $35/hr.		$4,550
6. Water Truck - 130 hours @ $60/hr.		$7,800
d. Subtotal Abandonment Materials and Labor		$37,800
e. New Shallow Well Construction - 10,333 LF @ $36/ft.		$372,000
f. Well disconnection materials and labor(Disposal Area C) - 186 @ $20ea.		$3,720
g. Well Connection Materials		
1. 2" Slide Gate Valve	450@ $12ea.	$5,400
2. 6" PVC Tee	450@ $25ea.	$11,250
3. 6" Cap PVC	450@ $10ea.	$4,500
4. 6"x 2" PVC Red	450@ $20ea.	$9,000
5. 2" PVC El	450@ $5ea.	$2,250
6. 1" Make Adapter - PVC	450@ $3ea.	$1,350
7. 1" PVC Cap	450@ $2ea.	$900
8. 2" Flex Cplg.	450@ $75ea.	$33,750
9. 2" PVC pipe	450@ $5ea.	$2,250
h. Connection Assembly - Labor	450@ $17.50ea.	$7,875
i. Connection Installation	450@ $26.40ea.	$11,880
j. Subtotal Well Connection Materials		$90,405
k. Relocate and Replace Header System - 36,780 LF @ $8/ft.		$294,240
l. Relocate condensate Sumps - 8 @ $4000/ea.		$32,000
m. Gas Well Protection - 233 @ $425/ea.		$99,025
n. Total Gas System Modifications (Line 56b + Line 56d + Line 56e + Line 56f + Line 56j + Line 56k + Line 56l + Line 56m)		$979,190

57. Geotextile Fabric Placement

a. Quantity (ft^2)	3,441,000
b. Purchase, delivery and installation unit cost ($/ft^2)	$0.27
c. Total Geotextile Fabric Cost	$929,070

58. Groundwater Monitoring Well Abandonment and Replacement at Closure

a. Abandonment of Wells MW 88-5 and MW 88-4	$5,240
b. Replacement of Wells MW 88-5 and MW 88-4	$10,300
c. Groundwater Well Replacement Total	$15,540

59. Lysimeter Abandonment and Replacement at Closure

a. Abandonment of Lysimeters 88-1 and 88-2 $1,320

b. Replacement of Lysimeters $8,400

c. Lysimeter Replacement Total $9,720

60. Construction Management - QA/QC $1,655,270
Note: Does not inlcude final cover QA/QC

61. Gas Recovery System - Well Monitoring

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

Kurz velocity meter, thermometer, maghehelic, differential pressure gauge, Gas Tech NP-204

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Quarterly

c. On-site monitoring costs? ($/yr)

$16,000

d. Annual analysis costs ($/yr)

$3,000

e. Gas Recovery System - Well Monitoring Subtotal ($/yr) $19,000

62. Gas Migration Control System - Perimeter Probe Monitoring

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

OVA, Gas Tech NP-204, Magnehelic, Differential Pressure Gauge, Barometer

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Quarterly

c. On-site monitoring costs? ($/yr)

$2,000

d. Annual analysis costs ($/yr)

$5,000

e. Gas Migration System - Perimeter Probe Monitoring Subtotal ($/yr) $7,000

63. Gas Migration Control System - Gas Collection Indicator Probe (GCIP) Monitoring

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

OVA, Gas Tech NP-204, Magnehelic, Differential Pressure Gauge, Barometer

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Quarterly

c. On-site monitoring costs? ($/yr)

$7,000

d. Gas Migration System - (GCIP) Monitoring Subtotal ($/yr) $7,000

64. Instantaneous Surface Emissions Monitoring

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

Organic Vapor Analyzer

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Quarterly

c. On-site monitoring costs? ($/yr) $28,000

65. Integrated Surface Emissions Monitoring

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

Integrated Surface Sampler, Organic Vapor Analyzer

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Quarterly

c. On-site monitoring costs? ($/yr)

$74,500

d. Annual analysis costs ($/yr)

$10,000

e. Integrated Surface Emissions monitoring subtotal ($/yr) $84,500

66. Visual Inspection of Landfill Surface

a. Frequency of monitoring (e.g., daily, weekly, monthly)

Weekly

b On-site monitoring costs? ($/yr) $20,000

67. Gas Recovery System - Gas Header Monitoring

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

Kurz Velocity Meter, Thermometer, Magnehelic Differential Pressure Gauge, Gas Tech NP-204

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Quarterly

c. On-site monitoring costs? ($/yr)

$1,000

d. Annual analysis costs ($/yr)

$5,500

e. Sampling gas in branch lines, probes and headers subtotal ($/yr) $6,500

68. Ambient Air Sampling at Perimeter of the Site

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

Integrated Ambient Air Sampling Unit, Wind Monitoring Station, Organic Vapor Analyzer

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Quarterly

c. On-site monitoring costs? ($/yr)

$10,000

d. Annual analysis costs ($/yr)

$35,000

e. Ambient Air Sampling subtotal ($/yr) $45,000

69. Gas Recovery System - Flare Source Testing

   a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)
      Outside testing service

   b. Frequency of testing (e.g., daily, weekly, monthly)

      Annually

   c. On-site monitoring costs? ($/yr)

      $0

   d. Annual analysis costs ($/yr)

      $52,000

   e. Flare Source Testing subtotal ($/yr) $52,000

70. Gas Recovery System - Flare Station Sampling

   a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)
      Tedlar Bag, Organic Vapor Analyzer

   b. Frequency of testing (e.g., daily, weekly, monthly)

      Quarterly

   c. On-site monitoring costs? ($/yr)

      $500

   d. Annual analysis costs ($/yr)

      $2,500

   e. Flare Station Sampling subtotal ($/yr) $3,000

71. Surface Water Monitoring

   a. Frequency of monitoring, per year

      Two times annually during discharges

   b. On-site monitoring costs? ($/yr)

      $3,000

c. Annual analysis costs ($/yr)

$12,000

d. Surface Water Monitoring subtotal ($/yr) $15,000

72. Gas Recovery System Monitoring - Sumps and Condensate Drain Lines

a. Monitoring devices of principal gases (e.g., Gastech, OVA, etc.)

OVA METERS, GAS CHROMATOGRAPHY, GAS SAMPLING EQUIPMENT

b. Frequency of monitoring (e.g., daily, weekly, monthly)

Weekly

c. On-site monitoring costs? ($/yr) $7,000

73. Reseeding and Mulching

a. Labor $13,150

b. Materials $13,000

c. Reseeding and Mulching Total ($/yr.) $26,150

74. Monitoring Supervisor

a. Duties

Supervise and coordinate post-closure monitoring activities and provide QA/QC.

b. On-site costs ($/yr) $90,000

c. Supervisor subtotal ($/yr) $90,000

75. Health and Safety Officer

a. Duties

Supervise,coordinate, and administrate health and safety activities relative to post-closure monitoring and maintenance.

b. On-site costs ($/yr) $38,000

c. Health and Safety subtotal ($/yr) $38,000

76. Monitoring Equipment Maintenance and Repair

a. Monitoring Devices
Organic Vapor Analyzer, Kurz Velocity Meters, Thermometers, Magnehelic, Differential Pressure Gauges, Gas Tech NP-204, Wind Monitoring Stations, Integrated Ambient Air Sampling units, Vacuum Pumps, Integrated Surface Sampler, Barometer

b. Frequency of maintenance	Monthly
c. Frequency of Repair	As Required
d. On-site maintenance and repair costs ($/yr)	$40,000
e. Replacement parts costs ($/yr)	$15,000
f. Equipment Maintenance and Repair subtotal ($/yr)	$55,000

77. Monitoring Equipment Replacement Amoritization

a. Monitoring Devices
Organic Vapor Analyzer, Kurz Velocity Meters, Thermometers, Magnehelic, Differential Pressure Gauges, Gas Tech NP-204, Wind Monitoring Stations, Integrated Ambient Air Sampling units sample train, Integrated Surface Sampler, Organic Vapor Monitor.

b. Average equipment life or replacement cycle. Every 5 years

c. Equipment Cost List

OVA - 8 @	$8,500 /ea.	$68,000
Kurz - 5 @	$1,200 /ea.	$6,000
Magnehelic - 5 @	$300 /ea.	$1,500
NP-204 - 2 @	$1,500 /ea.	$3,000
Wind Station - 3 @	$2,700 /ea.	$8,100
Ambient Air Sampling Unit - 5 @	$2,200 /ea.	$11,000
Sample Train - 4 @	$2,500 /ea.	$10,000
Surface Sampler - 5 @	$750 /ea.	$3,750
OVM - 2 @	$1,800 /ea.	$3,600
	Total	$114,950

d. Amoritization Costs ($/yr)	$23,000
e. Amoritization Subtotal ($/yr)	$23,000

78. Monitoring Materials

a. Material Items

Tedlar bags, Tygon Tubing, Calibration Gases, Safety Equipment, Misc. Tools, cleaning and maintenance supplies.

b. On-site Material Costs ($/yr) $25,000

79. Monitoring Vehicles

a. Type of Vehicles

4-Wheel drive vehicles

b. Number of Vehicles 6

c. Unit cost of vehicles $18,000

d. Average vehicle life or replacement cycle. 5 years

e. Estimated trade-in value. $2,000

f. Amoritization costs ($/yr.) $16,000

g. Monitoring Vehicle Cost ($/yr) $19,000

80. Weather Station Management

a. Number of Stations 3

b. Frequency of monitoring Weekly

c. On-site monitoring costs ($/yr) $72,000

d. Weather Station Management Subtotal ($/yr) $72,000

81. Subdrain Collection System Maintenance

a. Frequency of monitoring (e.g., daily, weekly, monthly)

As Required

b. On-site monitoring costs? ($/yr.) $5,000

82. Subdrain Collection System Sampling

a. Frquency of monitoring, per year

Quarterly

b. On-site monitoring costs? ($/yr)

$3,000

c. Annual analysis costs ($/yr)

$2,000

d. Subdrain Collection System Monitoring subtotal ($/yr) $5,000

83. Outfall System Inspection

a. Frequency of monitoring, per year

Quarterly

b. On-site monitoring costs? ($/yr) $10,000

84. Final Closure/Post-Closure Plan Preparation $50,000